Report on the FCC and IC Testing of the Nuki Home Solutions GmbH

Model: Smart Lock Ultra Article type: 012.518

In accordance with FCC 47 CFR Part 15 C and ISED RSS-247 and ISED RSS-GEN

Product Service

Add value.
Inspire trust.

Prepared for: Nuki Home Solutions GmbH
Münzgrabenstr. 92/4
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Austria

FCC ID: 2BH6T012518
IC: 32893-012518

COMMERCIAL-IN-CONFIDENCE

Date: 2025-06-12
Document Number: TR-713334509-05 | Revision 2

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Project Management	Alexander Deese	2025-06-12	SIGN-ID 1051654
Authorised Signatory	Alex Fink	2025-06-12	SIGN-ID 1051668

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD Product Service document control rules.

Engineering Statement:

The measurements shown in this report were made in accordance with the procedures described on test pages. All reporded testing was carried out on a sample equipment to demonstrate limited compilance with FCC 47 CFR Part 15 C and ISED RSS-247 and RSS-GEN.

The sample tested was found to comply with the requirements defined in the applied rules.

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Testing	Alexander Deese	2025-06-12	SIGN-ID 1051654

Laboratory Accreditation	Laboratory recognition	Industry Canada test site registration
DAkkS Reg. No. D-PL-11321-11-03 DAkkS Reg. No. D-PL-11321-11-04	Registration No. BNetzA-CAB-16/21-15	3050A-2

Executive Statement:

A sample of this product was tested and found to be compliant with FCC 47 CFR Part 15 C:2023 and ISED RSS247 Issue 3: 2023 and RSS-GEN Issue 5 Amd. 1 : 2019, Amd. 2 : 2021

Trade Register Munich
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Product Service

Content

Product Service

1 Report Summary

1.1 Modification Report

Alternations and additions of this report will be issued to the holders of each copy in the form of a complete document.

Revision	*Description of changes*	*Date of Issue*
0	First Issue	2025-02-03
1	FCC ID and IC added	2025-03-11
2	Instrument settings added to chapters 2.1.7, 2.2.7, 2.3.7, 2.4.7 and 2.5.7. Specific test method section added to chapters 2.2.6, 2.3.6 and 2.4.6.	2025-04-24
3	Statement about worst case added, chapter 2.5.7.	2025-06-12

Table 1: Report of Modifications

1.2 Introduction

Applicant	Nuki Home Solutions GmbH
Manufacturer	Nuki Home Solutions GmbH
Model Number(s)	Smart Lock Ultra Article type: 012.518
Serial Number(s)	---
Hardware Version(s)	---
Software Version(s)	---
Number of Samples Tested	1
Test Specification(s) /	FCC 47 CFR Part 15 C : 2023
Issue / Date	ISED RSS-247, Issue 3 : 2023
	ISED RSS-GEN, Issue 5, Amd. 1 : 2019, Amd. 2 : 2021
Test Plan/Issue/Date	---
Order Number	102573
Date	2024-03-29
Date of Receipt of EUT	2024-08-26
Start of Test	2024-08-27
Finish of Test	2024-09-05
Name of Engineer(s)	Alexander Deese
Related Document(s)	ANSI C63.4: 2014
	ANSI C63.10: 2013
	FCC 47 CFR Part 2 J : 2023
	KDB 558074 D01 V05R02
	ISED RSS-102, Issue 6, 2023

Product Service

1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 15 C, ISED RSS-247 and ISED RSS-GEN is shown below.

Section	*Specification Clause*	*Test Description*	*Result*
---	15.203, 15.247(b)	Antenna requirement	N/T
2.1	15.247(a)(2)	Emission Bandwidth	Pass
2.2	15.247(b)(3)	Output Power	Pass
2.3	15.247(e)	Power Spectral Density	Pass
2.4	15.247(d)	Frequency Band Edge	Pass
2.5	15.247(d), 15.205, 15.209	Spurious Emissions	Pass
---	15.207	Conducted Emissions on Mains Terminals	N/T

Table 2: Results according to FCC 47 CFR Part 15 C

Section	*Specification Clause*	*Test Description*	*Result*
2.1	5.2 a	Emission Bandwidth	Pass
2.2	5.4 d	Output Power	Pass
2.3	5.2 b	Power Spectral Density	Pass
2.4	5.5	Frequency Band Edge	Pass
2.5	5.5	Spurious Emissions	Pass

Table 3: Results according to ISED RSS-247

Section	*Specification Clause*	*Test Description*	*Result*
2.1	6.7	Emission Bandwidth	Pass
2.5	8.9, 8.10	Spurious Emissions	Pass
2.6	8.11	Frequency Stability	Pass
---	8.8	Conducted Emissions on Mains Terminals	Pass

Table 4: Results according to RSS-Gen

Product Service

1.4 Product Information

1.4.1 Technical Description

Nuki Smart Lock
The Nuki Smart Lock motorizes most standard door locks and creates a digital access system when combined with a smartphone.

The Nuki Smart Lock is placed on the inside of the door using the included Nuki Universal Cylinder (Ultra variant) or on the existing cylinder with the key inserted (Pro Variant). The locking mechanism is turned by the motor of the Nuki Smart Lock. Even if a Nuki Smart Lock is installed, the lock can be turned manually.

The Nuki Smart Lock contains a wi-fi module, which allows connectivity to the Nuki Smart Lock via the Internet. The Nuki Smart Lock system can be set up in such a way as to allow access online and connection to other smart home products. See also below “Wi-Fi Module.”

The Nuki Smart Lock has a built-in Lithium Polymer (Ultra variant) or Lithium Ion (Pro variant) battery that can be charged using the charging cable (which is included with the set) and a suitable USB-C charger (which is not included with the set).

Frequency Band:	2400.0 MHz – 2483.5 MHz
Supply Voltage:	11.1 V (Ultra) 14.8 V (Pro)
Supply Frequency:	DC, battery powered
Antenna Gain:	2.62 dBi
Temperature Range:	10 °C – 40 °C

1.5 Test Configuration

The EUT was battery powered. Channel and power were configured via test software provided by the customer.

Product Service

1.6 Modes of Operation

Mode 1:
11, 2405 MHz,2 MHz, Power setting 0, PN9 continuously modulated output

Mode 2:
18, 2440 MHz,2 MHz, Power setting 0, PN9 continuously modulated output

Mode 3:
26, 2480 MHz,2 MHz, Power setting 0, PN9 continuously modulated output

1.7 Deviations from Standard

Product Service

1.8 EUT Modifications Record

The table below details modifications made to the EUT during the test program.
The modifications incorporated during each test are recorded on the appropriate test pages.

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
0	As supplied by the customer	Not Applicable	Not Applicable

Table 5

1.9 Test Location

TÜV SÜD Product Service conducted the following tests at our Straubing test laboratory:

Test Name	Name of Engineer(s)
Configuration according to 1.5 and 1.6	
Emission Bandwidth	Alexander Deese
Output Power	Alexander Deese
Power Spectral Density	Alexander Deese
Frequency Band Edge	Alexander Deese
Spurious Emissions	Alexander Deese
Temperature Stability	Alexander Deese

Office Address:
Äußere Frühlingstraße 45
94315 Straubing
Germany

Product Service

2 Test Details

2.1 Emission Bandwidth

2.1.1 Specification Reference

FCC 47 CFR Part 15 C, Clause 15.247(a)(2)
ISED RSS-247, Clause 5.2 a
ISED RSS-Gen, Clause 6.7

2.1.2 Equipment under Test and Modification State

Smart Lock Ultra Article type: 012.518; S/N ---; Modification state 0

2.1.3 Date of Test

2024-09-19

2.1.4 Environmental Conditions

Ambient Temperature	25 °C
Relative Humidity	46 %

2.1.5 Specification Limits

For systems using digital modulation techniques, operating in the 902 MHz – 928 MHz, 2400 MHz – 2483.5 MHz and/or 5725 MHz – 5850 MHz bands, the minimum 6 dB bandwidth shall be at least 500 kHz

ISED RSS-GEN:
The occupied (99 %) bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSS.

2.1.6 Test Method

The test was performed according to ANSI C63.10, clauses 6.9.3 and 11.8.1

Product Service

2.1.7 Test Results

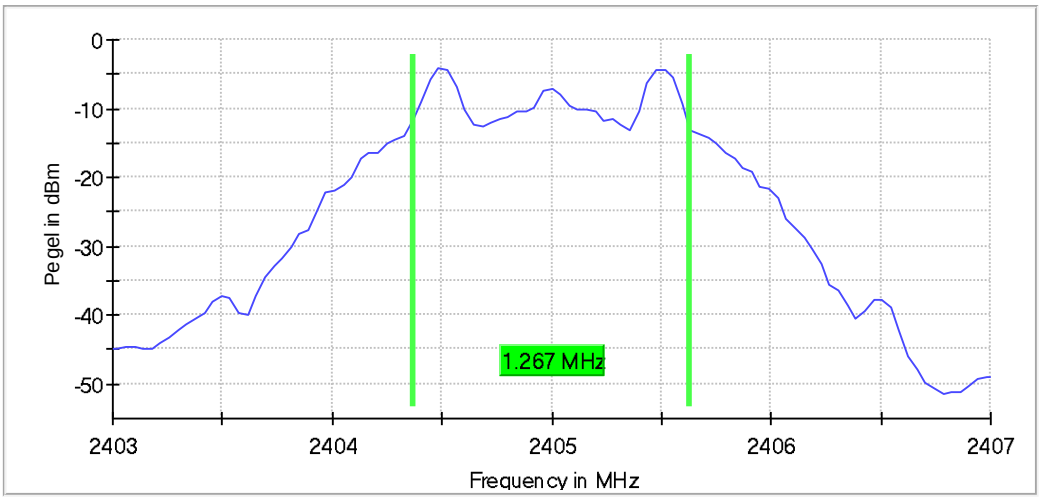
Frequency Channel	6 dB Bandwidth (MHz)	Limit (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
11	1.267326	0.500	2404.366337	2405.633663
18	1.306930	0.500	2439.326733	2440.633663
26	1.267326	0.500	2479.366337	2480.633663

Table 6: 6 dB bandwidth

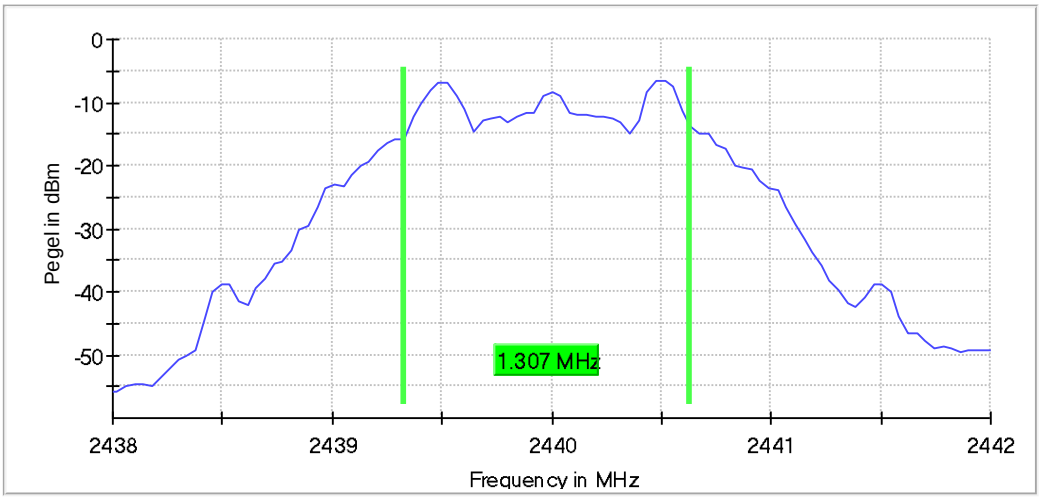
Instrument Settings	Instrument Value	Target Value
Span	4.000 MHz	4.000 MHz
RBW	100.000 kHz	~ 100.000 kHz
VBW	300.000 kHz	~ 300.000 kHz
SweepPoints	101	~ 80
Sweeptime	18.938 µs	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off

Product Service

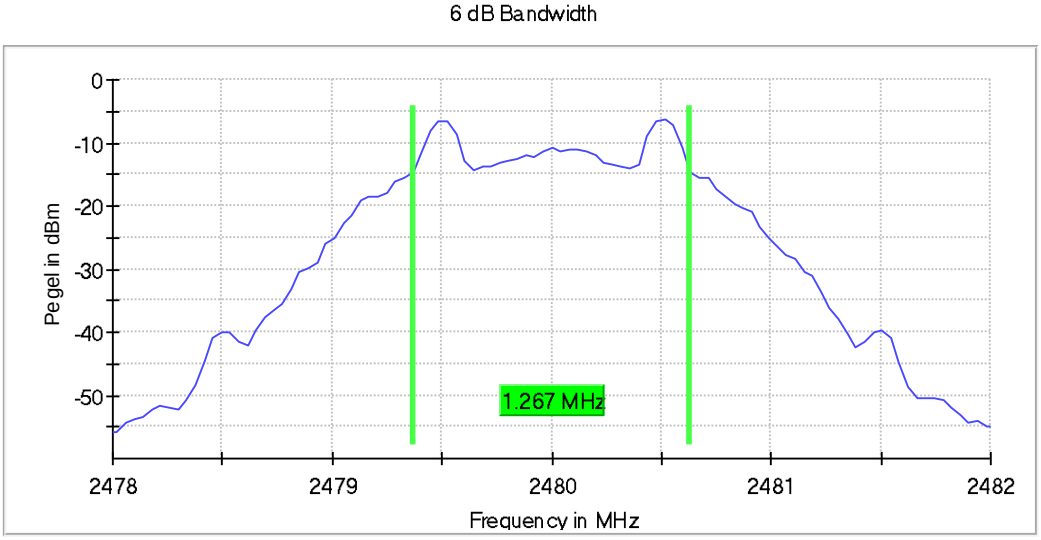
6 dB Bandwidth



6 dB Bandwidth



Product Service

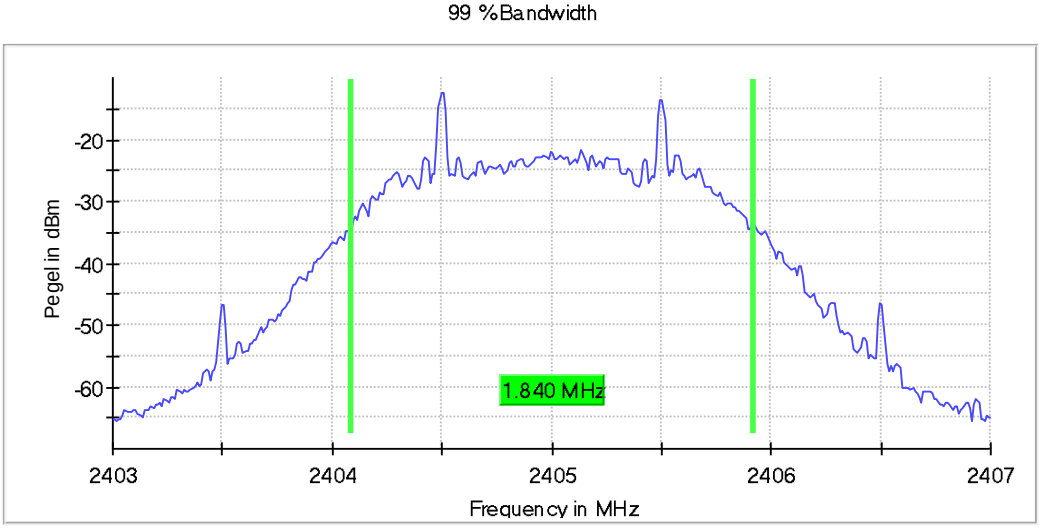


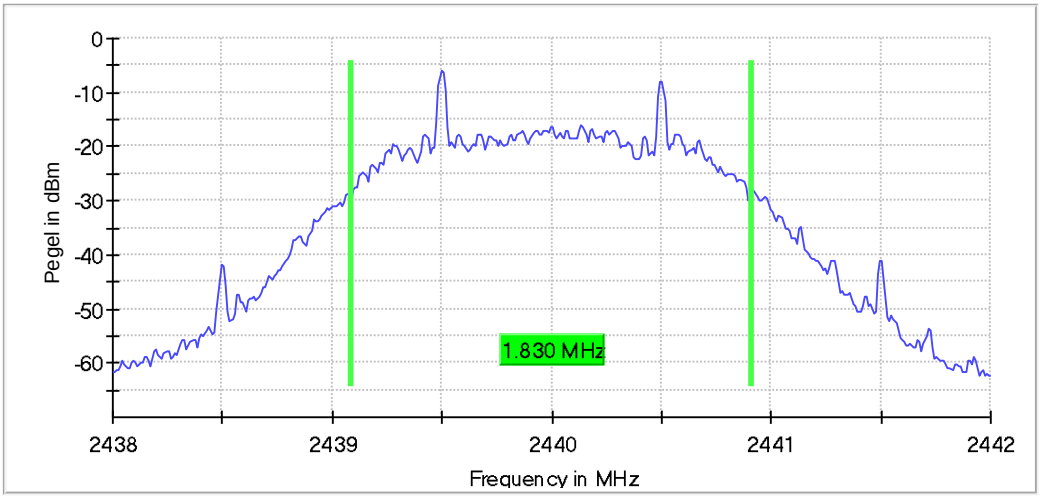
Frequency Channel	99% Bandwidth (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
11	1.840000	2404.085000	2405.925000
18	1.830000	2439.085000	2440.915000
26	1.840000	2479.085000	2480.925000

Table 7: 99% bandwidth

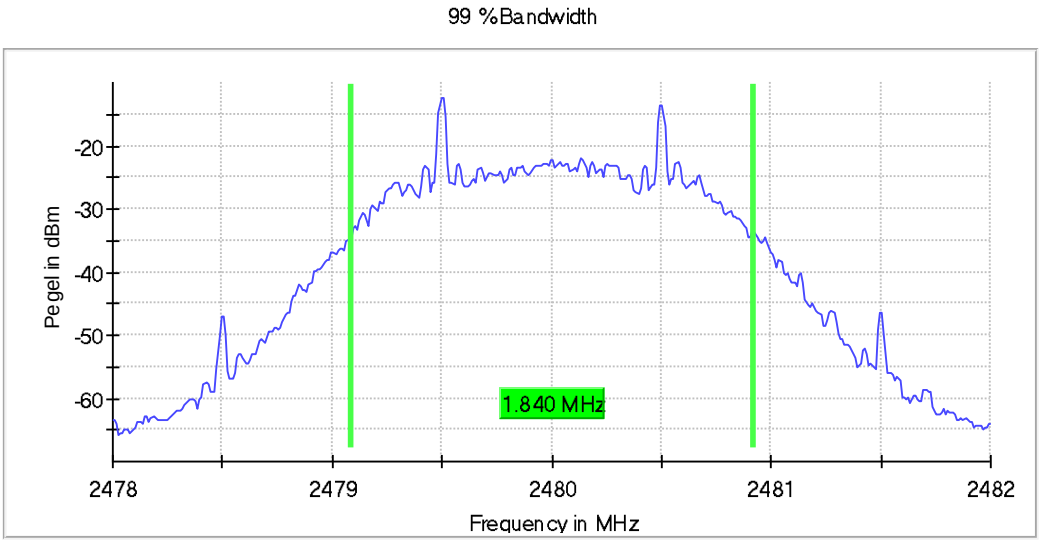
Setting	Instrument Value	Target Value
Span	4.000 MHz	4.000 MHz
RBW	20.000 kHz	>= 20.000 kHz
VBW	100.000 kHz	>= 60.000 kHz
SweepPoints	400	~ 400
Sweeptime	94.824 µs	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off

Product Service





Product Service



Product Service

2.1.8 Test Location and Test Equipment

The test was carried out in a non-shielded room:

Instrument	*Manufacturer*	*Type No*	*TE No*	*Calibration Period (months)*	*Calibration Due*
Climatic test chamber	ESPEC	PL-4 J	38958	18	2025-01-31
Switching device	Rohde & Schwarz	OSP120	20248	36	2026-07-31
Switching device	Rohde & Schwarz	OSP120	38807	36	2026-08-31
Signal and Spectrum Analysator	Rohde & Schwarz	FSV40	20219	24	2026-03-31
EMC measurement software	Rohde & Schwarz	EMC32 TS8997 – V10.60.00	44381	---	---

Table 8

Product Service

2.2 Output Power

2.2.1 Specification Reference

FCC 47 CFR Part 15 C, Clause 15.247(b)(3)
ISED RSS-247, Clause 5.4 d

2.2.2 Equipment under Test and Modification State

Smart Lock Ultra Article type: 012.518; S/N ---; Modification state 0

2.2.3 Date of Test

2024-09-19

2.2.4 Environmental Conditions

Ambient Temperature	25 °C
Relative Humidity	46 %

2.2.5 Specification Limits

The maximum conducted output power shall not exceed 1 W (30 dBm).
The e.i.r.p. shall not exceed 4 W (36 dBm).

2.2.6 Test Method

The test was performed according to ANSI C63.10, section 11.9, specifically 11.9.2

Product Service

2.2.7 Test Results

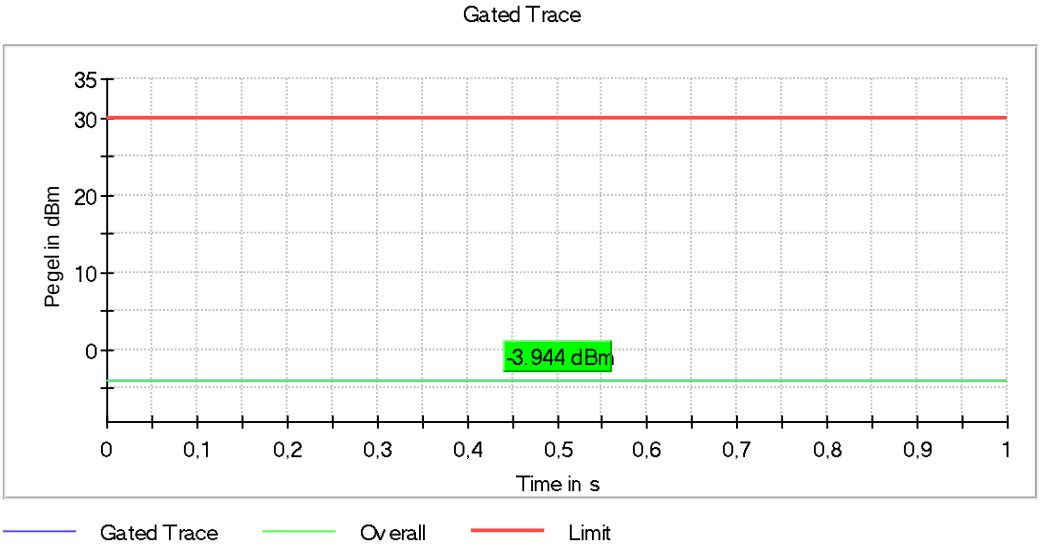
Frequency Channel	*Detector*	*Conducted Output Power (dBm)*	*Limit (dBm)*
11	RMS	-3.944	30.0
18	RMS	-7.531	30.0
26	RMS	-6.099	30.0

Table 9: Conducted Output Power

Frequency Channel	*Detector*	*EIRP (dBm)*	*Limit (dBm)*
11	RMS	-1.324	36.0
18	RMS	-4.911	36.0
26	RMS	-3,479	36.0

Table 10: EIRP

Instrument Settings	Instrument Value	Target Value
Measurement Time	1.000 s	1.000 s
Points	1000000	1000000
Time resolution	1.000 µs	1.000 µs



Product Service

2.2.8 Test Location and Test Equipment

The test was carried out in a non-shielded room:

Instrument	*Manufacturer*	*Type No*	*TE No*	*Calibration Period (months)*	*Calibration Due*
Climatic test chamber	ESPEC	PL-4 J	38958	18	2025-01-31
Switching device	Rohde & Schwarz	OSP120	20248	36	2026-07-31
Switching device	Rohde & Schwarz	OSP120	38807	36	2026-08-31
Signal and Spectrum Analysator	Rohde & Schwarz	FSV40	20219	24	2026-03-31
EMC measurement software	Rohde & Schwarz	EMC32 TS8997 – V10.60.00	44381	---	---

Table 11

Product Service

2.3 Power Spectral Density

2.3.1 Specification Reference

FCC 47 CFR Part 15 C, Clause 15.247(e)
ISED RSS-247, Clause 5.2 b

2.3.2 Equipment under Test and Modification State

Smart Lock Ultra Article type: 012.518; S/N ---; Modification state 0

2.3.3 Date of Test

2024-09-19

2.3.4 Environmental Conditions

Ambient Temperature	25 °C
Relative Humidity	46 %

2.3.5 Specification Limits

FCC 47 CFR, section 15.257(e)
ISED RSS-247, Clause 5.2.(b)
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.
The same method (detector) of determining the conducted output power shall be used to determine the power spectral density.

2.3.6 Test Method

The test was performed according to ANSI C63.10, section 11.10, specifically 11.10.3

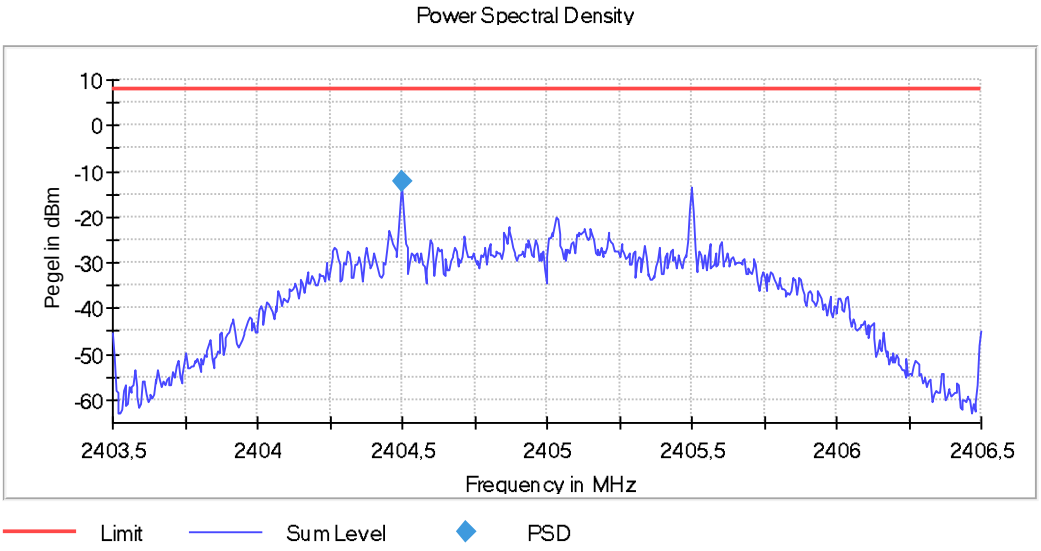
Product Service

2.3.7 Test Results

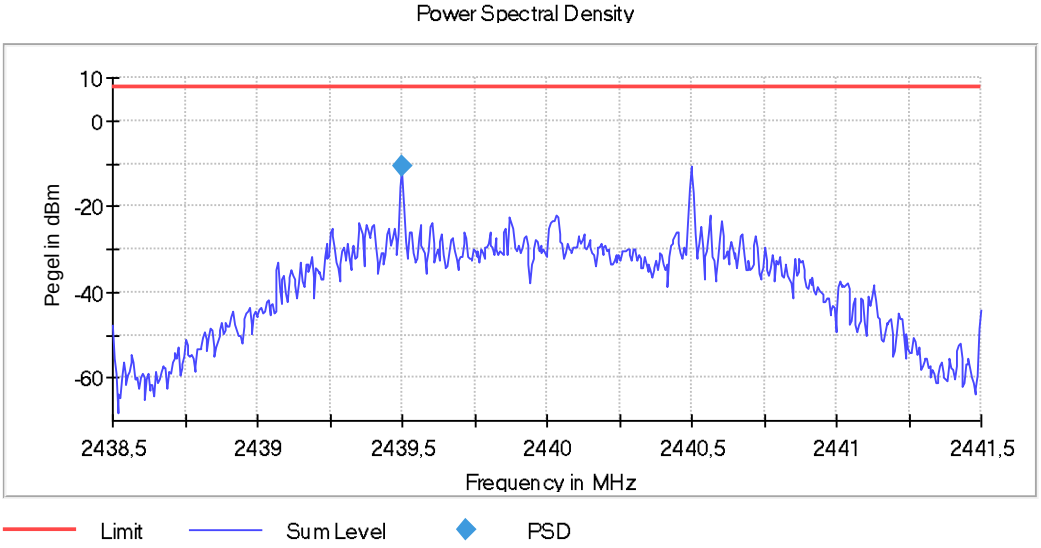
Frequency Channel	Detector	Spectral Power Density (dBm)	Limit (dBm)
11	RMS	-12.409	8.0
18	RMS	-10.779	8.0
26	RMS	-14.437	8.0

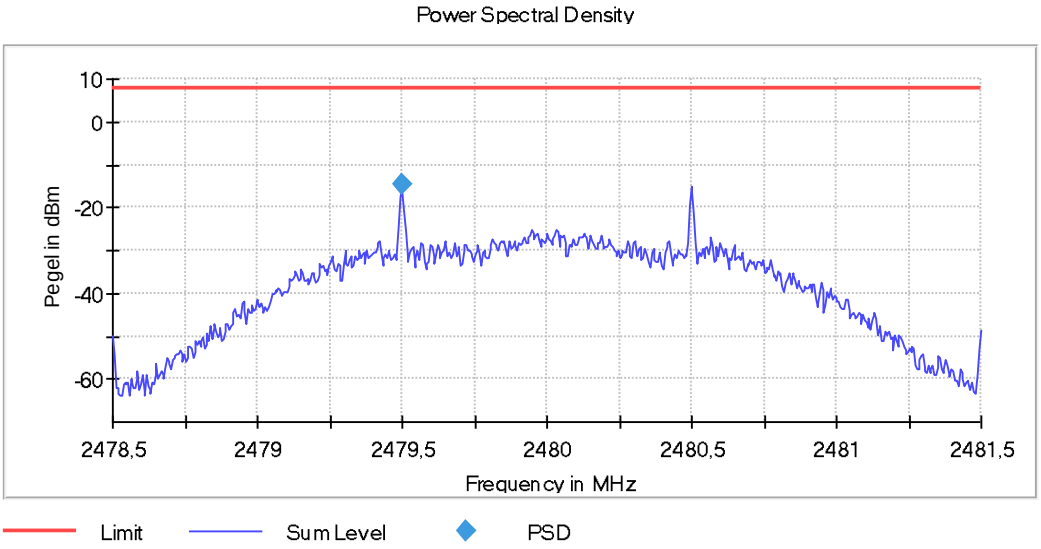
Table 12: Spectral Power Density

Setting	Instrument Value	Target Value
Span	3.000 MHz	3.000 MHz
RBW	10.000 kHz	<= 10.000 kHz
VBW	30.000 kHz	>= 30.000 kHz
SweepPoints	600	~ 600
Sweeptime	12.000 ms	12.000 ms
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	RMS	RMS
SweepCount	1	1
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	Sweep
Preamp	off	off



Product Service





Product Service

2.3.8 Test Location and Test Equipment

The test was carried out in a non-shielded room:

Instrument	*Manufacturer*	*Type No*	*TE No*	*Calibration Period (months)*	*Calibration Due*
Climatic test chamber	ESPEC	PL-4 J	38958	18	2025-01-31
Switching device	Rohde & Schwarz	OSP120	20248	36	2026-07-31
Switching device	Rohde & Schwarz	OSP120	38807	36	2026-08-31
Signal and Spectrum Analysator	Rohde & Schwarz	FSV40	20219	24	2026-03-31
EMC measurement software	Rohde & Schwarz	EMC32 TS8997 – V10.60.00	44381	---	---

Table 13

Product Service

2.4 Frequency Band Edge

2.4.1 Specification Reference

FCC 47 CFR Part 15 C, Clause 15.247(d)
ISED RSS-247, Clause 5.5

2.4.2 Equipment under Test and Modification State

Smart Lock Ultra Article type: 012.518; S/N ---; Modification state 0

2.4.3 Date of Test

2024-09-19

2.4.4 Environmental Conditions

Ambient Temperature	25 °C
Relative Humidity	46 %

2.4.5 Specification Limits

In any 100 kHz bandwidth outside the frequency band in which the device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of desired power, based on either conducted or radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted, the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits is not required.
In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.

2.4.6 Test Method

The test was performed according to ANSI C63.10, sections 11.13

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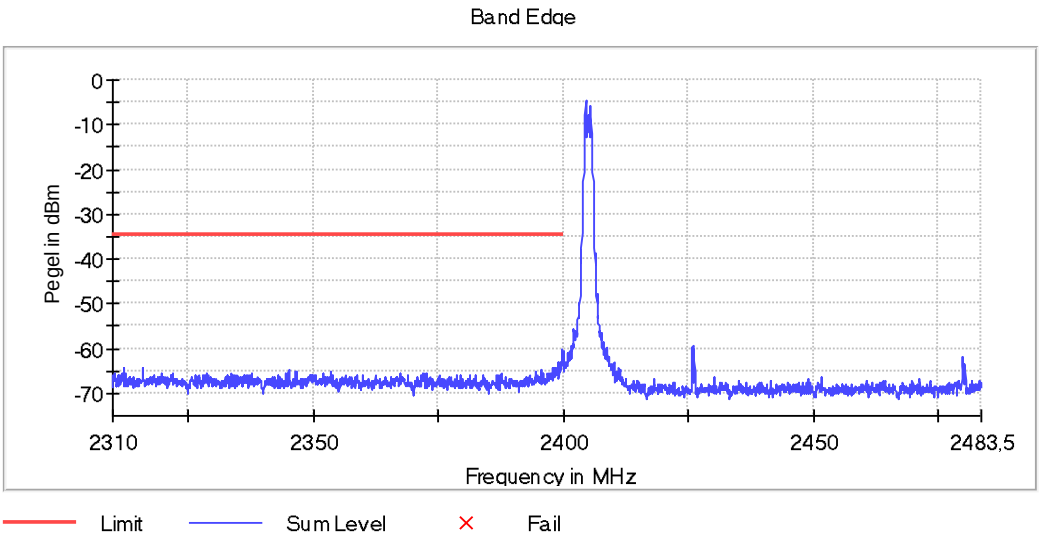
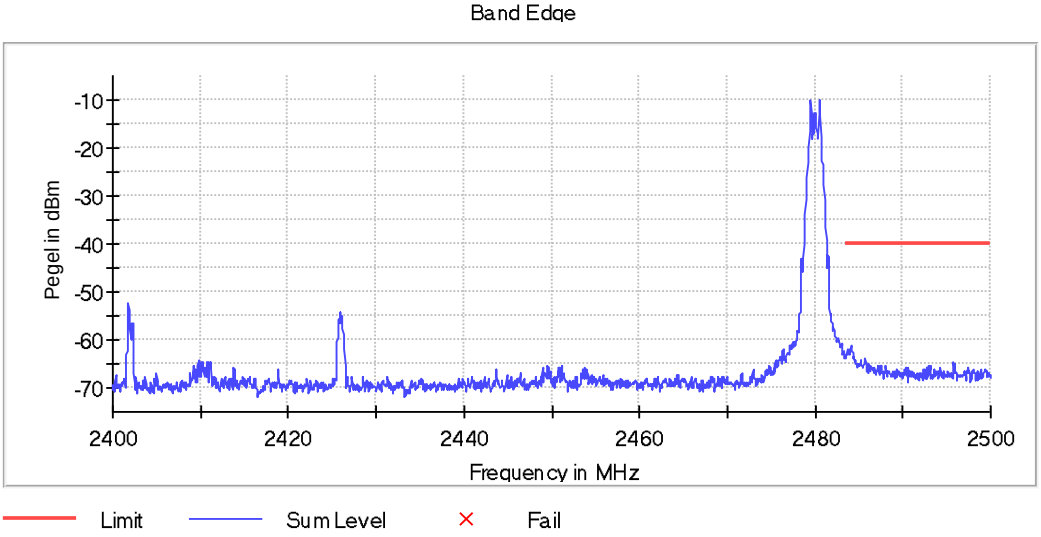
2.4.7 Test Results



Instrument Settings	Instrument Value	Target Value
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
Detector	MaxPeak	MaxPeak

Product Service



Instrument Settings	Instrument Value	Target Value
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
Detector	MaxPeak	MaxPeak

Product Service

2.4.8 Test Location and Test Equipment

The test was carried out in a non-shielded room:

Instrument	*Manufacturer*	*Type No*	*TE No*	*Calibration Period (months)*	*Calibration Due*
Climatic test chamber	ESPEC	PL-4 J	38958	18	2025-01-31
Switching device	Rohde & Schwarz	OSP120	20248	36	2026-07-31
Switching device	Rohde & Schwarz	OSP120	38807	36	2026-08-31
Signal and Spectrum Analysator	Rohde & Schwarz	FSV40	20219	24	2026-03-31
EMC measurement software	Rohde & Schwarz	EMC32 TS8997 – V10.60.00	44381	---	---

Table 14

Product Service

2.5 Spurious emissions

2.5.1 Specification Reference

FCC 47 CFR Part 15 C, Clause 15.205, 15.209, 15.247(d)
ISED RSS-247, Clause 5.5
ISED RSS-Gen, Clauses 8.9 and 8.10

2.5.2 Equipment under Test and Modification State

Smart Lock Ultra Article type: 012.518; S/N ---; Modification state 0

2.5.3 Date of Test

2024-09-19 to 2024-09-23

2.5.4 Environmental Conditions

Ambient Temperature	22 °C
Relative Humidity	52 %

2.5.5 Specification Limits

In any 100 kHz bandwidth outside the frequency band in which the device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of desired power, based on either conducted or radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted, the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits is not required.
In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.

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General radiated emission limits:					
Frequency Range	*Test distance*	*Field strength*		*Field strength*	
(MHz)	*(m)*	*(µA/m)*	*(dBµA/m)*	*(µV/m)*	*(dBµV/m)*
0.009 – 0.49	300	6.37 / *f*	20*lg(6.37 / *f*)	2400 / *f*	20*lg(2400 / *f*)
0.49 – 1.705	30	63.7 / *f*	20*lg(63.7 / *f*)	24000 / *f*	20*lg(24000 / *f*)
1.705 - 30	30	0.08	20*lg(0.08 / *f*)	30	20*lg(30 / *f*)
30 – 88	3	---	--	100	40
88 – 216	3	--	--	150	43.5
126 – 960	3	--	--	200	46
above 960	3	--	--	500	54
Note 1: *f* in kHz					

Table 15 General radiated emission limits

At frequencies at or above 30 MHz, measurements may be performed at distance other than what is specified provided: measurements are not made in the near field except where it can be shown that near field measurements are appropriate due to the characteristics of the device; and it can be demonstrated that the signal levels needed to be measured at the distance employed can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 m, unless it can be further demonstrated that measurements at a distance of 30 m or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements.

At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations; however, an attempts should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade).

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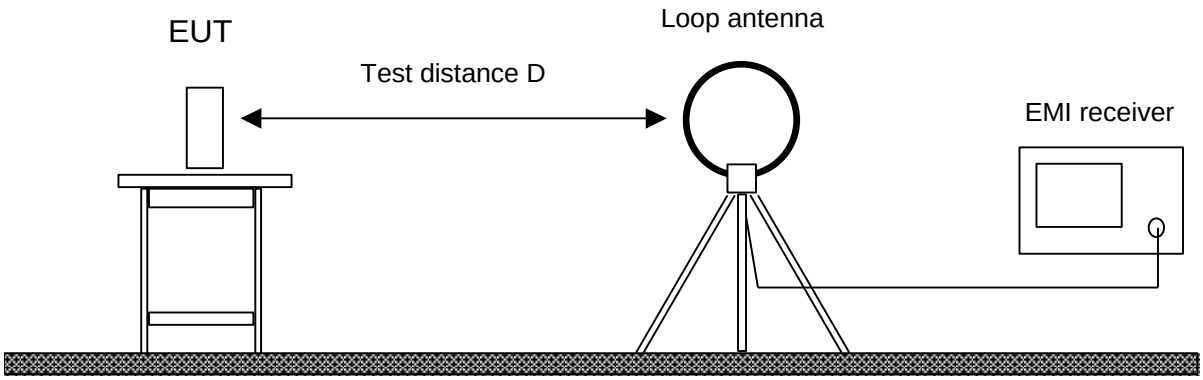
2.5.6 Test Method

The test was performed according to ANSI C63.10, sections 11.11 and 11.12

Prescans are performed in six positions of the EUT to get the full spectrum of emission caused by the EUT with the measuring antenna raised and lowered from 1 m to 4 m with vertical and horizontal polarisation to find the combination of table position, antenna height and antenna polarisation for the maximum emission levels.
Data reduction is applied to these results to select those levels having less margin than 10 dB or exceeding the limit using subranges and limited number of maximums.
Further maximisation for adjusting the maximum position is following.
Equipment and cables are placed and moved within the range of position likely to find their maximum emissions.

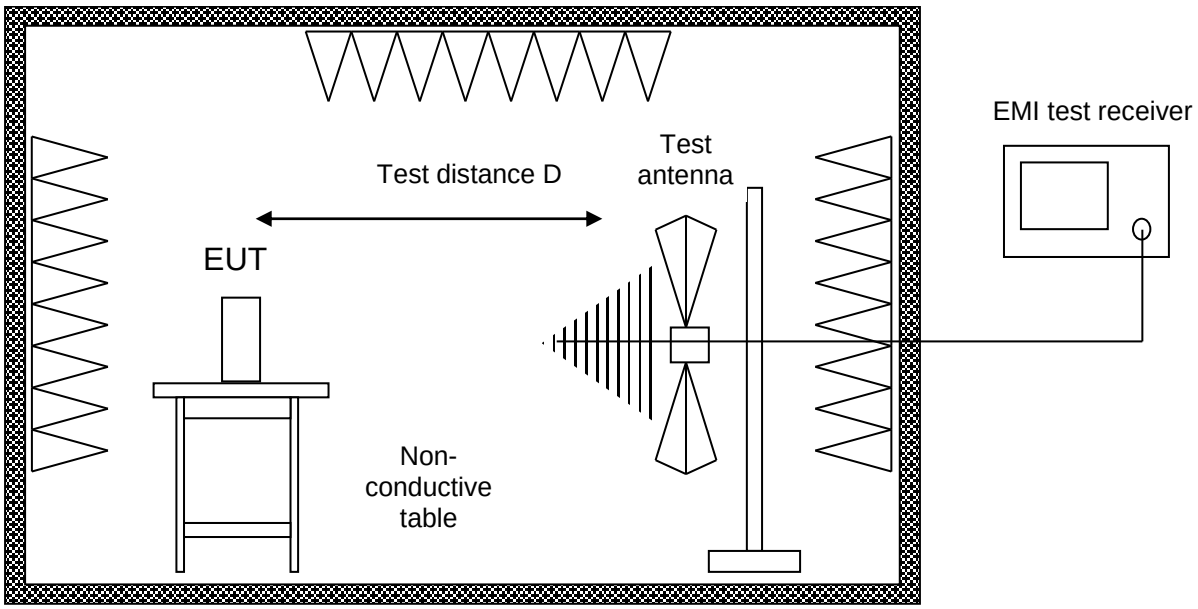
2.5.6.1 Frequency range 9 kHz – 30 MHz



The EUT was placed on a non-conductive table, 0.8 m above the ground.
Radiated emissions in the frequency 9 kHz – 30 MHz is measured within a semi-anechoic room with an active loop antenna with the measurement detector set to peak. In addition in the frequency range 9 kHz to 490 kHz also an average detector was used. The measurement bandwidth of the receiver was set to 300 Hz in the frequency range 9 kHz to 150 kHz and 10 kHz in the frequency range 150 kHz to 30 MHz. Prescans were performed in six positions of the EUT.
For final measurements the detector was set to CISPR quasi-peak and in addition to CISPR average in the frequency range 9 kHz to 490 kHz with a resolution bandwidth 200 Hz in the frequency range 9 kHz to 150 kHz and 9 kHz in the frequency range 150 kHz to 30 MHz. Final tests were performed immediately after a final frequency and zoom (for drifting disturbances) and maximum adjustment.

Product Service

2.5.6.2 Frequency range 30 MHz – 1 GHz

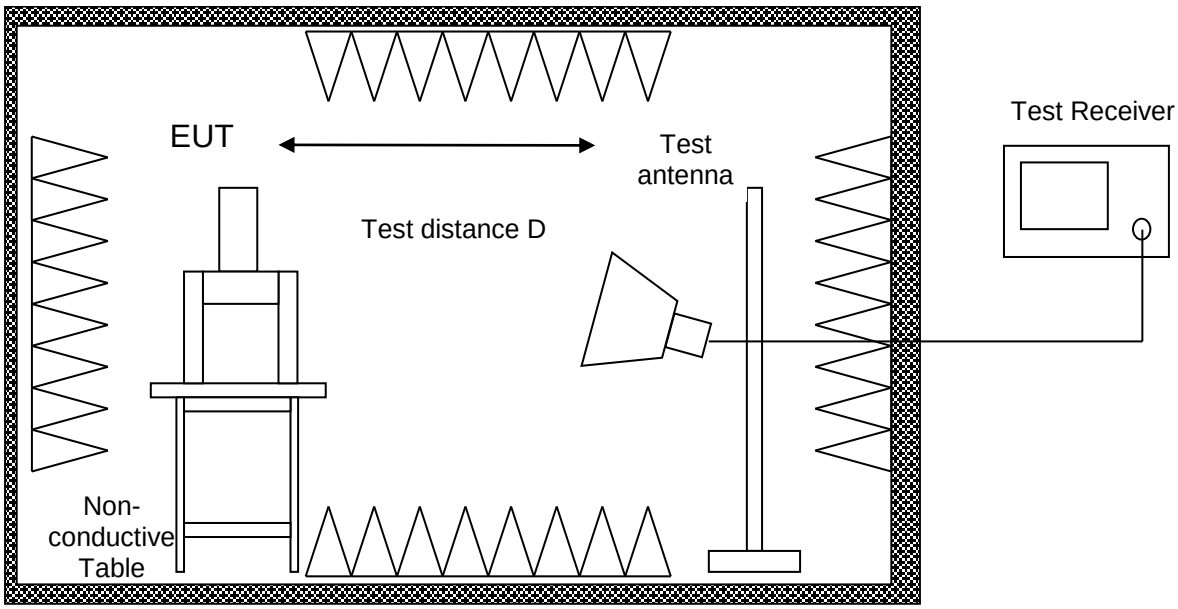


Alternate test site (semi anechoic room)

The EUT was placed on a non-conductive table, 0.8 m above the ground plane
Radiated emissions in the frequency range 30 MHz – 1 GHz is measured within a semi-anechoic room with groundplane complying with the NSA requirements of ANSI C63.4. for alternative test sites. A linear polarised logarithmic periodic antenna combined with a 4:1 broadband dipole (“Trilog broadband antenna”) is used.
For prescan tests the test receiver is set to peak-detector with a bandwidth of 120 kHz.
With the measurement bandwidth of the test receiver set to 120 kHz CISPR quasi-peak detector is selected for final measurements following immediately after a final frequency zoom (for drifting disturbances) and maximum adjustment.

Product Service

2.5.6.3 Frequency range above 1 GHz



Fully anechoic room

The EUT was placed on a non-conductive table, 1.5 m above the ground plane
Radiated emission tests above 1 GHz are performed in a fully anechoic room with the S_{VSWR} requirements of ANSI C63.4. Measurements are performed both in the horizontal and vertical planes of polarisation using a test receiver with the detector function set to peak and average and the resolution bandwidth set to 1 MHz. Testing above 1 GHz is performed with horn antennas with the EUT in boresight of the antenna.
For prescan tests the test receiver is set to peak- and average-detector with a bandwidth of 1 MHz. With the measurement bandwidth of the test receiver set to 1 MHz and peak- and CISPR average-detector is selected for final measurements following immediately after a final frequency zoom (for drifting disturbances) and maximum adjustment.

Product Service

2.5.7 Test Results

Frequency range	*Limit applied*	*Test distance*
9 kHz – 30 MHz	15.209; RSS-Gen	3 m
30 MHz – 1 GHz	15.209; RSS-Gen	3 m
1 GHz – 13 GHz	15.209; RSS-Gen	1 m
13 GHz – 18 GHz	15.209; RSS-Gen	1 m
18 GHz – 25 GHz	15.209; RSS-Gen	3 m

Table 16

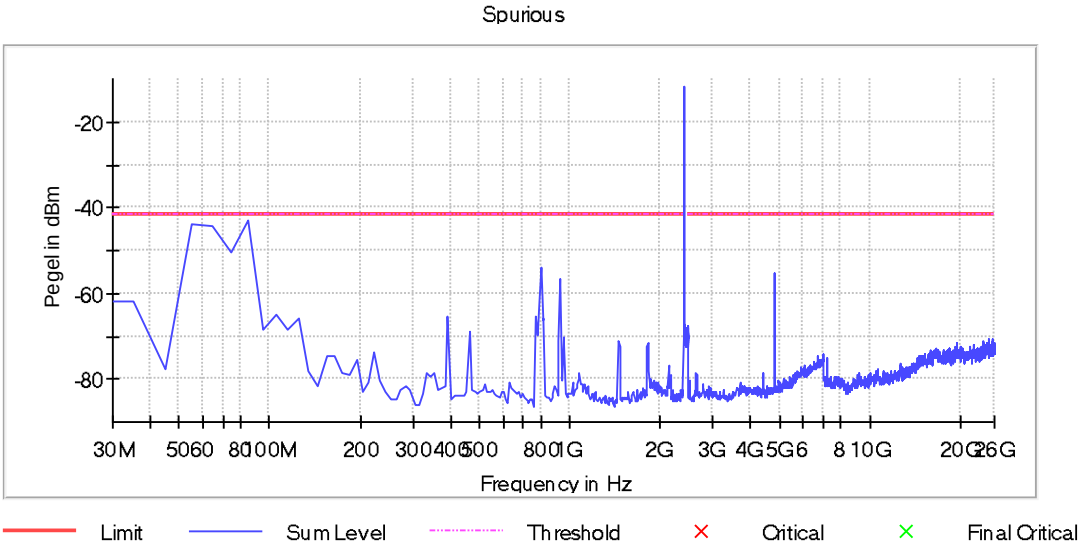
Sample calculation:

Final Value (dBµV/m) = Reading Value (dBµV) + (Cable attenuation (dB) + Antenna Transducer (dB(1/m)))

Additional correction of limit in the frequency range 9 – 490 kHz (300 m to 3 m): +80.0 dB
Additional correction of limit in the frequency range 490 kHz – 30 MHz (30 m to 3 m): +40.0 dB
Additional correction of limit in the frequency ranges above 1 GHz (3 m to 1 m): +9.54 dB

Product Service

Conducted Tx spurious emissions Mode 1:

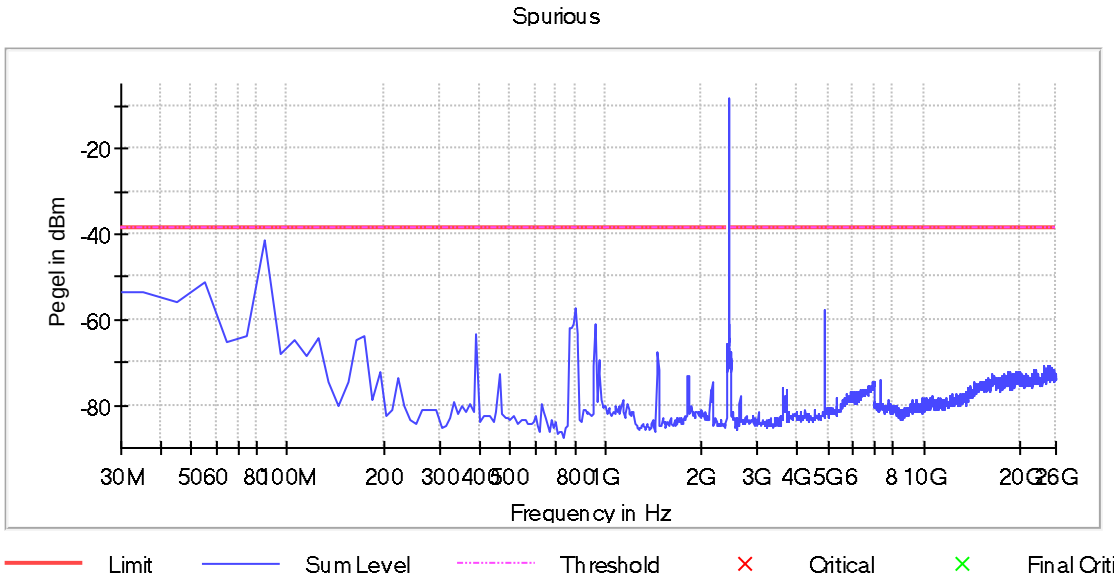


Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
84.768908	-43.0	1.3	-41.7
54.894958	-43.9	2.2	-41.7
64.852941	-44.2	2.5	-41.7
74.810924	-50.6	8.9	-41.7
801.743697	-54.1	12.3	-41.7
4807.166065	-55.5	13.7	-41.7
931.197479	-56.8	15.0	-41.7
791.785714	-61.3	19.5	-41.7
34.978992	-61.8	20.1	-41.7
30.000000	-61.8	20.1	-41.7
104.684874	-64.9	23.2	-41.7
771.869748	-65.2	23.5	-41.7
393.466387	-65.6	23.8	-41.7
821.659664	-65.6	23.9	-41.7
124.600840	-66.0	24.2	-41.7

Instrument Settings	Instrument Value	Target Value
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
Detector	MaxPeak	MaxPeak

Product Service

Conducted Tx spurious emissions Mode 2:

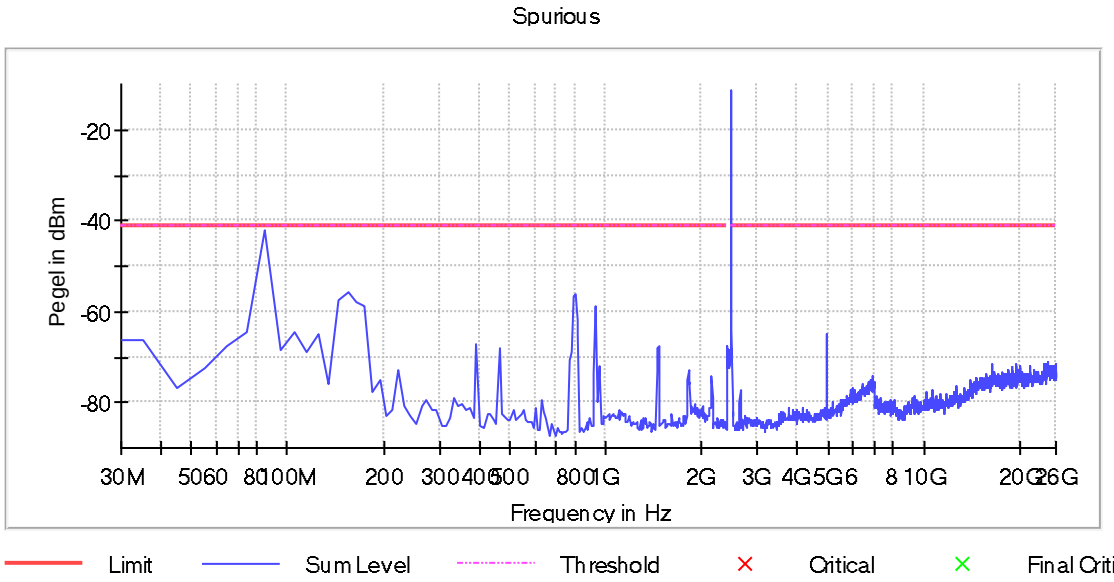


Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
84.768908	-41.4	3.0	-38.4
54.894958	-51.3	12.9	-38.4
34.978992	-53.6	15.2	-38.4
30.000000	-53.6	15.2	-38.4
44.936975	-55.7	17.3	-38.4
801.743697	-57.1	18.7	-38.4
4877.125903	-57.7	19.3	-38.4
791.785714	-61.0	22.6	-38.4
931.197479	-61.2	22.8	-38.4
771.869748	-61.9	23.5	-38.4
781.827731	-62.2	23.7	-38.4
811.701681	-63.5	25.0	-38.4
393.466387	-63.6	25.1	-38.4
74.810924	-64.0	25.6	-38.4
174.390756	-64.0	25.6	-38.4

Instrument Settings	Instrument Value	Target Value
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
Detector	MaxPeak	MaxPeak

Product Service

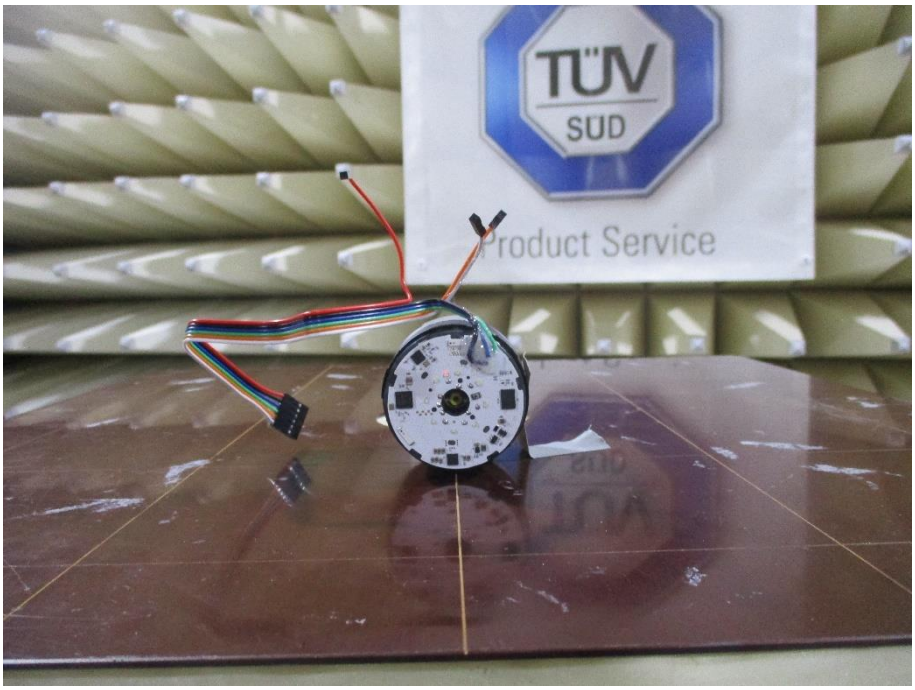
Conducted Tx spurious emissions Mode 3:



Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
84.768908	-41.9	0.7	-41.2
154.474790	-55.9	14.8	-41.2
801.743697	-56.2	15.0	-41.2
791.785714	-56.6	15.4	-41.2
144.516807	-57.5	16.3	-41.2
164.432773	-58.0	16.8	-41.2
174.390756	-58.8	17.7	-41.2
931.197479	-59.0	17.8	-41.2
811.701681	-61.9	20.8	-41.2
2488.497131	-63.9	22.8	-41.2
104.684874	-64.7	23.5	-41.2
74.810924	-64.7	23.5	-41.2
821.659664	-65.0	23.9	-41.2
124.600840	-65.0	23.9	-41.2
4957.080004	-65.1	23.9	-41.2

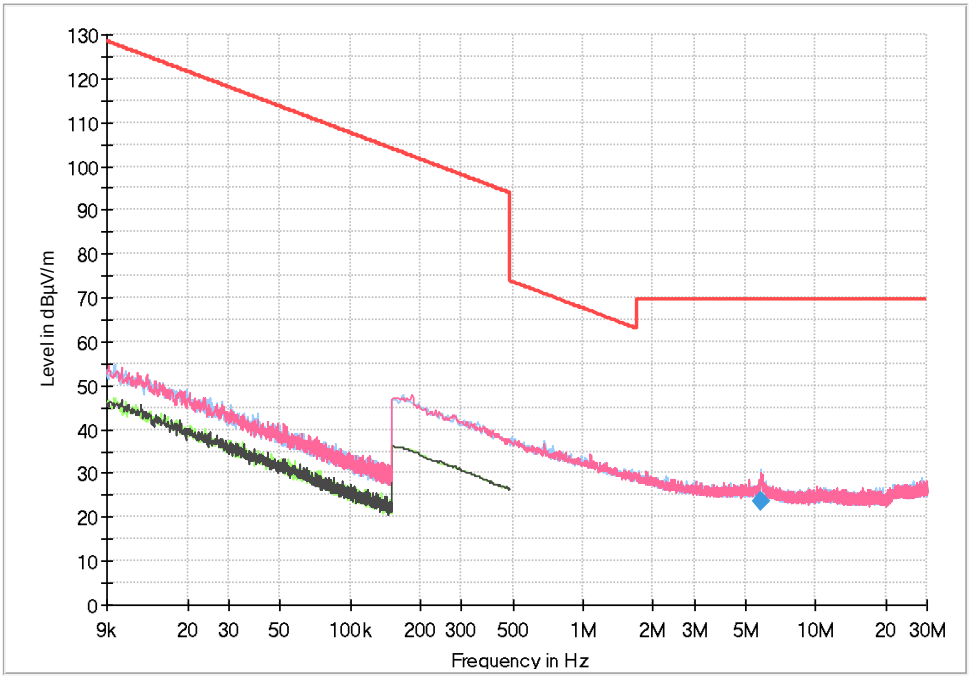
Instrument Settings	Instrument Value	Target Value
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
Detector	MaxPeak	MaxPeak

Premeasurements were performed for worst case evaluation. Final testing was performed in the chosen worst-case Mode, see section 2.2. Mode 1 was found to be the most critical configuration. Following radiated Tx spurious emissions were captured with Mode 1 active. The device was positioned along the following axis:



Product Service

Radiated Tx spurious emissions Mode 1:

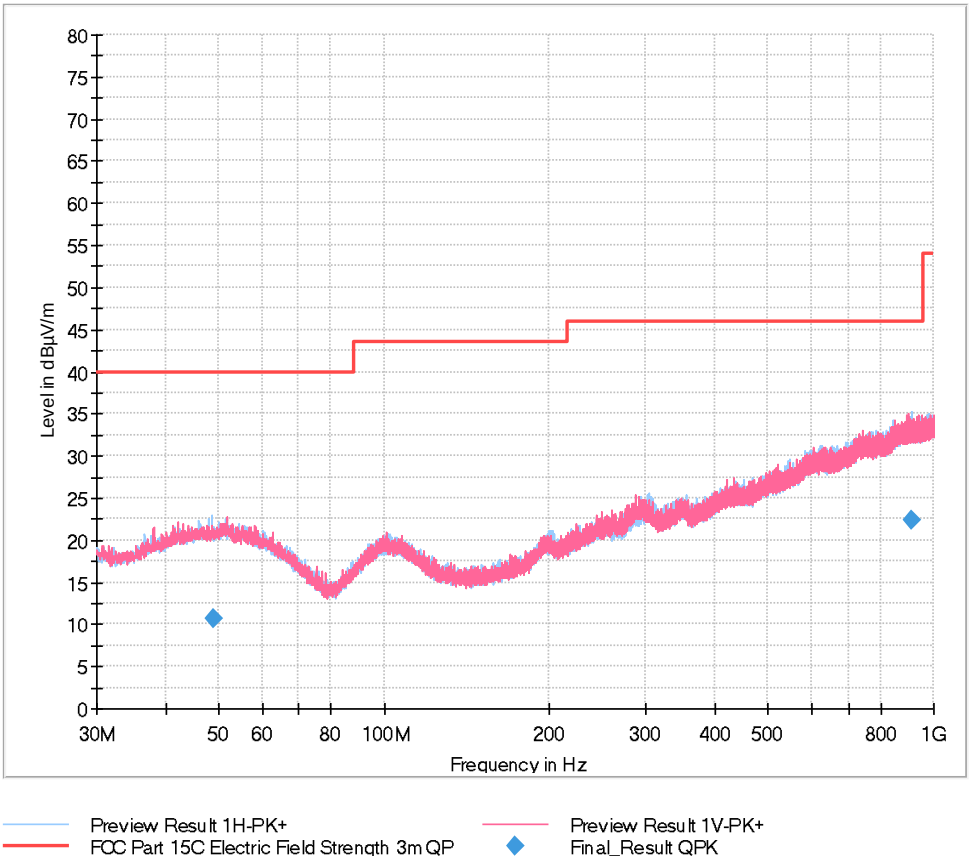


Preview Result 2H-AVG
Preview Result 1H-PK+
Preview Result 2V-AVG
Preview Result 1V-PK+
FCC Part 15C Electric Field Strength 3m QP+AV (9k-30M)
Final_Result QPK
Final_Result CAV

Final Results:

Frequency *MHz*	*Qua-siPeak* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Band-width* *kHz*	*Height* *cm*	*Pol*	*Azi-muth* *deg*	*Corr.* *dB/m*
5.811250	23.44	69.54	46.10	1000.0	9.000	100.0	H	139.0	19.4

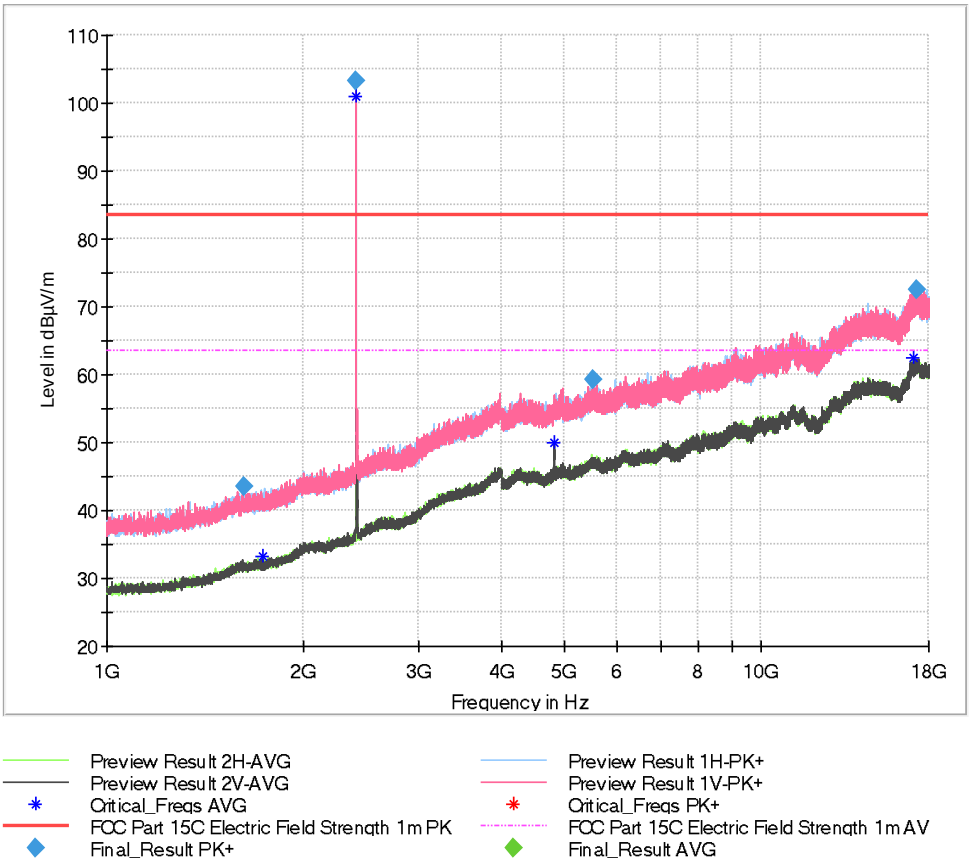
Product Service



Final Results:

Frequency *MHz*	*Qua-siPeak* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Band-width* *kHz*	*Height* *cm*	*Pol*	*Azi-muth* *deg*	*Corr.* *dB/m*
49.050000	10.71	40.00	29.29	1000.0	120.000	235.0	H	-114.0	21.9
914.310000	22.44	46.02	23.58	1000.0	120.000	350.0	H	-51.0	32.3

Product Service



Final Results:

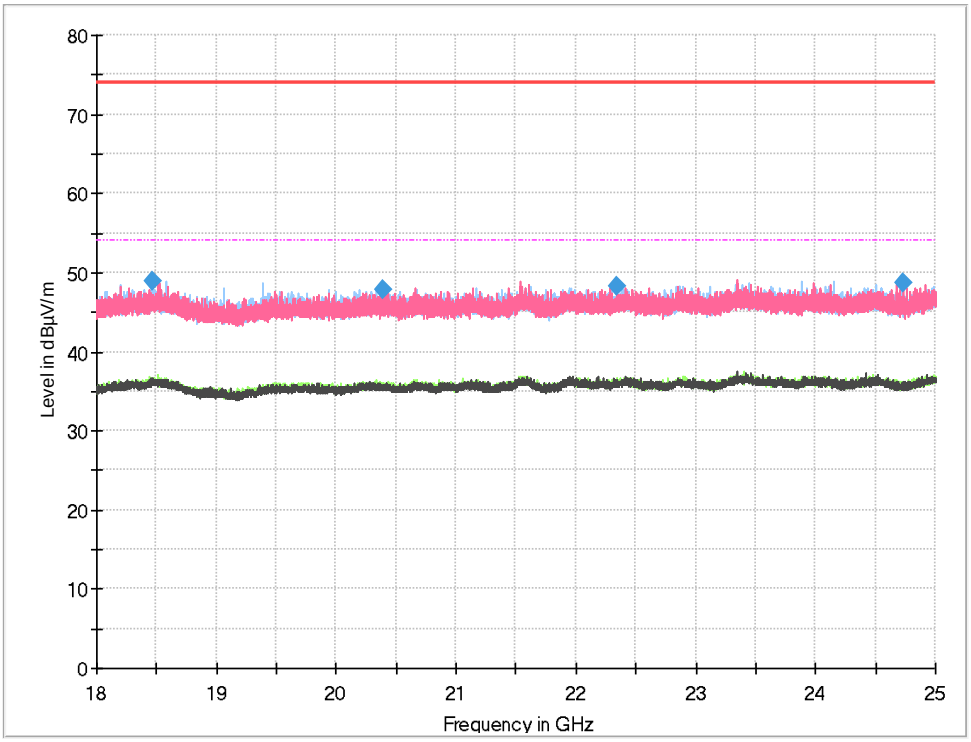
Frequency MHz	*MaxPeak at 1m dBµV/m*	*Limit dBµV/m*	*Mar-gin dB*	*Meas. Time ms*	*Bandwidth kHz*	*Height cm*	*Pol*	*Azi-muth deg*	*Corr. dB/m*
1625.000000	43.41	83.50	40.09	1000.0	1000.000	100.0	H	135.0	31.5
2405.500000	103.21	*	*	1000.0	1000.000	100.0	V	-15.0	34.7
5533.000000	59.21	83.50	24.29	1000.0	1000.000	300.0	H	-135.0	43.1
17278.500000	72.49	83.50	11.01	1000.0	1000.000	200.0	H	165.0	57.5

*: Intentional radiation not evaluated.

Restricted Bands:

Frequency MHz	*MaxPeak at 3m dBµV/m*	*Limit dBµV/m*	*Margin dB*	*Meas. Time ms*	*Bandwidth kHz*	*Height cm*	*Pol*	*Azi-muth deg*
1625.000000	33.87	74.00	40.13	1000.0	1000.000	100.0	H	135.0

Product Service



Final Results:

Frequency *MHz*	*MaxPeak* *dBµV/m*	*Limit* *dBµV/m*	*Mar-gin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azi-muth* *deg*	*Corr.* *dB/m*
18463.500000	49.01	73.98	24.97	1000.0	1000.000	300.0	H	165.0	11.8
20384.500000	47.84	73.98	26.14	1000.0	1000.000	300.0	H	-15.0	12.5
22336.500000	48.29	73.98	25.69	1000.0	1000.000	300.0	H	165.0	13.2
24735.500000	48.60	73.98	25.38	1000.0	1000.000	100.0	V	-165.0	14.4

Product Service

2.5.8 Test Location and Test Equipment

The test was carried out in a non-shielded room and semi anechoic room no. 3:

Instrument	*Manufacturer*	*Type No*	*TE No*	*Calibration Period (months)*	*Calibration Due*
Climatic test chamber	ESPEC	PL-4 J	38958	18	2025-01-31
Switching device	Rohde & Schwarz	OSP120	20248	36	2026-07-31
Switching device	Rohde & Schwarz	OSP120	38807	36	2026-08-31
Signal and Spectrum Analysator	Rohde & Schwarz	FSV40	20219	24	2026-03-31
Signal and Spectrum Analyser	Rohde & Schwarz	FSW43	53496	12	2025-04-30
TRILOG Broadband Antenna	Schwarzbeck	VULB 9163	19691	36	2027-04-30
Double ridged horn antenna	Rohde & Schwarz	HF907	40089	24	2024-10-31
Horn Antenna with preamplifier	Rohde & Schwarz	A-INFOMW LB-180400H-KF + TS-LNA 1840	43661	24	2025-01-17
Loop antenna	Schwarzbeck	FMZB 1519 B	44334	36	2026-06-30
EMI test receiver	Rohde & Schwarz	ESR7	61814	12	2025-06-30
Semi anechoic room	Frankonia	Cabin no. 3	56331	35	2025-07-07
EMC measurement software	Rohde & Schwarz	EMC32 TS8997 – V10.60.00	44381	---	---

Table 17

Product Service

2.6 Temperature Stability

2.6.1 Specification Reference

ISED RSS-Gen, Clause 6.11, 8.11

2.6.2 Equipment under Test and Modification State

Smart Lock Ultra Article type: 012.518; S/N ---; Modification state 0

2.6.3 Date of Test

2024-09-19

2.6.4 Environmental Conditions

Ambient Temperature	25 °C
Relative Humidity	46 %

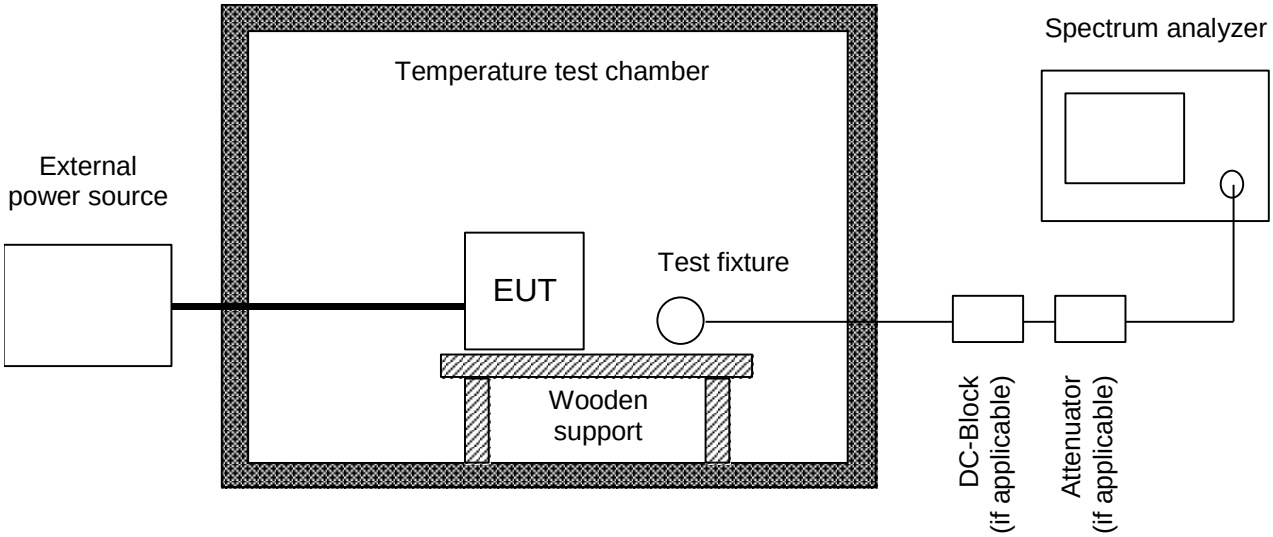
2.6.5 Specification Limits

If the stability of the license-exempt radio apparatus is not specified in the applicable RSS, the fundamental emissions of the radio apparatus should be kept within at least the central 80 % of its permitted operating frequency band in order to minimize the possiblilty of out-of-band operation. In additions, its occupied bandwidth shall be entirely outside the resitricted bands and the prohibited TV bands of 85 MHz – 72 MHz, 76 MHz – 88 MHz, 174 MHz – 216 MHz, and 470 MHz – 602 MHz, unless otherwise indicated.

Product Service

2.6.6 Test Method

The test was performed according to ANSI C63.10, section 6.8.



The frequency tolerance of the carrier signal is measured over a temperature variation of -20 °C to +50 °C at normal supply voltage, and for a variation in the primary supply voltage from 85 % to 115 % of the rates supply voltage at a temperature of 20 °C. Temperature and voltage range may vary if the manufacturer states another temperature or voltage range.
If the EUT provides an antenna connector the spectrum analyzer is connected to this port. If required, a resistive matching network equal to the impedance specified or employed for the antenna is used as well as a DC block and appropriate (50 Ω) attenuators. In case where the EUT does not provide an antenna connector or a test fixture is used.
For battery operated equipment, the test is performed using a new battery. Alternatively, an external supply voltage can be used and is at least set to:

- The maximum battery voltage as delivered by a new battery or 115 % of the battery nominal voltage;
- The battery nominal voltage
- 85 % of the battery nominal voltage
- The battery operating end point voltage which shall be specified by the equipment manufacturer.

The EUT is operating providing an unmodulated carrier for frequency error tests. The peak detector of the spectrum analyzer is selected and resolution as well as video bandwidth are set to values appropriate to shape of the spectrum of the EUT. The frequency counter mode of the spectrum analyzer is used to maximize the accuracy of the measured frequency tolerance.
If an unmodulated carrier is not available a significant and stable point of the spectrum is selected and the span is reduced to a value that delivers an accuracy which shall be better than 1 % of the maximum frequency tolerance allowed for the carrier signal. This method may be performed as long as the margin to the frequency tolerance is larger than the uncertainty of the measured frequency tolerance.

Product Service

2.6.7 Test Results

Temperature	*Channel*	*Supply Voltage*	*Band Edge Left (MHz)*	*Band Edge Right (MHz)*	*Center Frequency (MHz)*	*Frequency drift (‰)*
20 °C	11	14.8 V	2404.085000	2405.925000	2405.005000	0
20 °C	18	14.8 V	2439.085000	2440.915000	2440.000000	0
20 °C	26	14.8 V	2479.085000	2480.925000	2480.005000	0
10 °C	11	14.8 V	2405.085000	2405.935000	2405.510000	0.2099787734
10 °C	18	14.8 V	2439.085000	2440.935000	2440.010000	0.004098360656
10 °C	26	14.8 V	2479.085000	2480.935000	2480.010000	0.002016124968
40 °C	11	14.8 V	2404.045000	2405.895000	2404.970000	-0.01455298430
40 °C	18	14.8 V	2439.045000	2440.895000	2439.970000	-0.01229508197
40 °C	26	14.8 V	2479.055000	2480.895000	2479.975000	-0.01209674981

Table 18

2.6.8 Test Location and Test Equipment

The test was carried out in a non-shielded room:

Instrument	*Manufacturer*	*Type No*	*TE No*	*Calibration Period (months)*	*Calibration Due*
Climatic test chamber	ESPEC	PL-4 J	38958	18	2025-01-31
Switching device	Rohde & Schwarz	OSP120	20248	36	2026-07-31
Switching device	Rohde & Schwarz	OSP120	38807	36	2026-08-31
Signal and Spectrum Analysator	Rohde & Schwarz	FSV40	20219	24	2026-03-31
EMC measurement software	Rohde & Schwarz	EMC32 TS8997 – V10.60.00	44381	---	---

Table 19

Product Service

3 Measurement Uncertainty

For a 95% confidence level, the measurement uncertainties for defined systems are:

Radio Interference Emission Testing		
Test Name	*kp*	*Expanded Uncertainty*
Conducted Voltage Emission		
9 kHz to 150 kHz (50Ω/50µH AMN)	2	± 3.8 dB
150 kHz to 30 MHz (50Ω/50µH AMN)	2	± 3.4 dB
100 kHz to 200 MHz (50Ω/5µH AMN)	2	± 3.6 dB
Discontinuous Conducted Emission		
9 kHz to 150 kHz (50Ω/50µH AMN)	2	± 3.8 dB
150 kHz to 30 MHz (50Ω/50µH AMN)	2	± 3.4 dB
Conducted Current Emission		
9 kHz to 200 MHz	2	± 3.5 dB
Magnetic Fieldstrength		
9 kHz to 30 MHz (with loop antenna)	2	± 3.9 dB
9 kHz to 30 MHz (large-loop antenna 2 m)	2	± 3.5 dB
Radiated Emission		
30 MHz to 300 MHz	2	± 4.9 dB
300 MHz to 1 GHz	2	± 5.0 dB
1 GHz to 6 GHz	2	± 4.6 dB
Test distance 10 m		
30 MHz to 300 MHz	2	± 4.9 dB
300 MHz to 1 GHz	2	± 4.9 dB
The expanded uncertainty reported according to to CISPR16-4-2: 2011 + A1 + A2 + Cor1 is based on a standard uncertainty multiplied by a coverage factor of kp = 2, providing a level of confidence of p = 95.45%		

Table 20 Measurement uncertainty based on CISPR 16-4-2

Product Service

Radio Interference Emission Testing		
Test Name	*kp*	*Expanded Uncertainty*
Occupied Bandwdith	2	± 5 %
Conducted Power		
9 kHz ≤ f < 30 MHz	2	± 1.0 dB
30 MHz ≤ f < 1 GHz	2	± 1.5 dB
1 GHz ≤ f ≤ 40 GHz	2	± 2.5 dB
1 MS/s power sensor (TS8997)	2	± 1.5 dB
Occupied Bandwidth	2	± 5 %
Power Spectral Density	2	± 3.0 dB
Radiated Power		
25 MHz – 6 GHz	1.96	±4.4 dB
1 GHz – 18 GHz	1.96	±4.7 dB
18 GHz – 40 GHz	1.96	±4.9 dB
40 GHz – 325 GHz	1.96	±6.1 dB
Conducted Spurious Emissions	2	± 3.0 dB
Radiated Spurious Emissions	2	± 6.0 dB
Voltage		
DC	2	± 1.0 %
AC	2	± 2.0 %
Time (automatic)	2	± 5 %
Frequency	2	± 10^{-7}
The expanded uncertainty reported according to to ETSI TR 100 028:2001 is based on a standard uncertainty multiplied by a coverage factor of kp = 2, providing a level of confidence of p = 95.45%		

Table 21 Measurement uncertainty based on ETSI TR 100 028

The measurement uncertainty in the laboratory is less than or equal to the maximum measurement uncertainty according to CISPR16-4-2: 2011 + A1 + A2 + Cor1 (U_{CISPR}) and as specified in the test report below. This normative regulation means that the measured value is also the value to be assessed in relation to the limit value.

Product Service

Test Name	*Expanded Uncertainty*
Occupied Bandwidth	±5 %
Conducted Power	
9 kHz ≤ f < 30 MHz	±1.0 dB
30 MHz ≤ f < 1 GHz	±1.5 dB
1 GHz ≤ f ≤ 40 GHz	±2.5 dB
1 MS/s power sensor (2.4 / 5 GHz band)	±1.5 dB
Power Spectral Density	±3.0 dB
Radiated Power	
25 MHz – 26.5 GHz	±6.0 dB
26.5 GHz – 66 GHz	±8.0 dB
40 GHz – 325 GHz	±10.0 dB
Conducted Spurious Emissions	±3.0 dB
Radiated Field Strength 9 kHz – 40 GHz	±6.0 dB
Voltage	
DC	± 1.0 %
AC	± 2.0 %
Time (automatic)	± 5 %
Frequency	± 10^{-7}

Table 22 Decision Rule: Maximum allowed measurement uncertainty