# Test Report

of the accredited Testing Laboratory
0274 – TÜV AUSTRIA GMBH – Location Vienna - EMC Radio
ISED Laboratory Company Number: 2932K, CAB identifier: AT0001

**Order Confirmation Number: 2024-AT-TC-EE-ET-EX-0-000005**

About

the Radio - test listed below

| | |
|---|---|
| **Applicant:** | VusionGroup GmbH<br>Kalsdorfer Strasse 12<br>A – 8072 Fernitz-Mellach |
| **Test object:** | Electronic shelf labelling system<br>Product Marketing Name: V300 2.9<br>Model: EDG3-0290-B<br>FCC-ID: 2ACQM-EDG3-0290-B<br>IC-ID: 12154A-EDG30290B |
| **Serial number:** | Prototype |
| **Accredited regulation:** | FCC: 47 CFR Part 15 (eCFR 17.12.2024)<br>RSS-102 Issue 6, December 2023<br>RSS-210 Issue 11, June 2024<br>ANSI C63.10-2020 |

Andreas Malek

**Examined by / Testing Laboratory**
**TÜV AUSTRIA GMBH**

TÜV AUSTRIA GMBH

Michael Emminger

**Approved by / Testing Laboratory**
**TÜV AUSTRIA GMBH**

The results of this test report only refer to the provided equipment.

Issued on 28.03.2025 in Vienna / TIC





Deutschstraße 10
1230 Vienna / Austria
Tel.: +43 (0)504 54
Mail: info@tuv.at
Web: http://www.tuv.at

# Contents







Deutschstraße 10
1230 Vienna / Austria
Tel.: +43 (0)504 54
Mail: info@tuv.at
Web: http://www.tuv.at

# 1. Applicant

| | |
|---|---|
| **Company:** | VusionGroup GmbH |
| **Department:** | Product & Project Manager |
| **Address:** | A – 8072 Fernitz-Mellach; Kalsdorfer Strasse 12 |
| **Contact person:** | Mrs. Tamara Risek-Gmajnic |

| | |
|---|---|
| **EUT received on:** | 17.12.2024 |
| **Tests were performed on:** | 17.12. till 19.12.2024 |





Deutschstraße 10
1230 Vienna / Austria
Tel.: +43 (0)504 54
Mail: info@tuv.at
Web: http://www.tuv.at

# 2. Description of EUT

| | |
|---|---|
| **EUT:** | Electronic shelf labelling system |
| **Product Name:** | V300 2.9 |
| **Model:** | EDG3-0290-B |
| **Serial Number:** | Prototypes |
| **Manufacturer:** | VusionGroup GmbH<br>A – 8072 Fernitz-Mellach; Kalsdorfer Strasse 12 |
| **Description:** | VusionGroup GmbH provided the following configuration for the measurements:<br><br>Prototype with special test-firmware for continuous transmission |
| **Operating mode:** | The measurements were carried out at the following running states:<br><br>test-firmware running, transmitting continuously |
| **Technical data EUT:** | Rated voltage: 3VDC<br>Rated frequency: DC<br><br>Mains voltage during the tests: 3VDC internal battery<br><br>Field strength: 3,39 mV/m average @ 3m distance<br>Frequency range: 2404,053 - 2479,285 MHz<br>Channel separation: 0,35 MHz |
| **Climatic conditions in the emc laboratory:** | Relative humidity: 33%<br>Temperature: 23°C |





Deutschstraße 10
1230 Vienna / Austria
Tel.: +43 (0)504 54
Mail: info@tuv.at
Web: http://www.tuv.at

# 3. Standards / Final result

| Name | Title | Deviation | Result |
|---|---|---|---|
| Title 47 CFR Part 15 eCFR 23.09.2024 | RADIO FREQUENCY DEVICES | none | OK |
| RSS-210 Issue 10, December 2019 | Licence-Exempt Radio Apparatus: Category I Equipment | none | OK |
| RSS-210 Issue 11, June 2024 | Licence-Exempt Radio Apparatus: Category I Equipment | none | OK |
| RSS-102 Issue 6, December 2023 | Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands) | none | OK |
| ANSI C63.10-2020 | American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices | none | OK |

Result: Opinions and interpretation of testing laboratory
OK: EUT passed
NOK: EUT failed





Deutschstraße 10
1230 Vienna / Austria
Tel.: +43 (0)504 54
Mail: info@tuv.at
Web: http://www.tuv.at

# 4. Test results

## 4.1 TEST OBJECT DATA

General EUT Description

This transceiver is working in a network consisting of a controller station, so called Accesspoint, and various displays. The Accesspoint transmits information to the displays and receives acknowledgements.
This device is a display operating in the network system. The device is equipped with a passive NFC chip onboard which does not have its own rf generation. It works as tag and can also receive information from the NFC reader station.

2.1033 (c) Technical description

2.1033 (4) Type of emission: Minimum shift keying – declared channel bandwidth 250 kHz –
'virtual' channel spacing about 0,35 MHz. Only 11 channels from the channel plan are used, therefore the channel spacing in reality is much higher and varies from 2,45 MHz minimum up to 17,15 MHz.

2.1033 (5) Frequency range: 2404,053 – 2479,285 MHz (channel center frequencies of channel 0 up to ch. 10)

2.1033 (6) Power range and Controls: The maximum field strength measured is 3,39 mV/m average @ 3m distance. There is no power control or regulation.

2.1033 (7) Maximum output power rating: 3,39 mV/m average @ 3m distance.

2.1033 (8) DC Voltage and Current: 3 VDC (internal battery)
maximum current consumption: 28,0mA during continuous transmission

RSS-135 This standard does not apply to:
1.1.(a) a receiver that scans radio frequencies for the purpose of enabling its associated transmitter to avoid transmitting in an occupied frequency but which does not have the capability of decoding the message (e.g. converting it to audio voice) contained in the radio signal

Worst case Spurious Emissions: 50,85 dBµV/m Peak at 7325,8 MHz.

Tests were performed on: 17th to 19th December, 2024.

All test equipment was calibrated at the time of testing.





Deutschstraße 10
1230 Vienna / Austria
Tel.: +43 (0)504 54
Mail: info@tuv.at
Web: http://www.tuv.at

## 4.2 Number of channels and channel spacing § 2.1033

Channel plan:

| ESL-CH | RF-CH | $f_{G2}$ [GHz] (26.000000 MHz) (6049109) |
|---|---|---|
| CH0 | 12 | 2.404053 |
| CH1 | 29 | 2.410002 |
| CH2 | 63 | 2.421899 |
| CH3 | 71 | 2.424698 |
| CH4 | 120 | 2.441844 |
| CH5 | 141 | 2.449192 |
| CH6 | 177 | 2.461789 |
| CH7 | 199 | 2.469487 |
| CH8 | 213 | 2.474386 |
| CH9 | 220 | 2.476835 |
| CH10 | 227 | 2.479285 |

Tests were performed on ESL channels 0, 4 and 10.

Test Equipment used: N/A

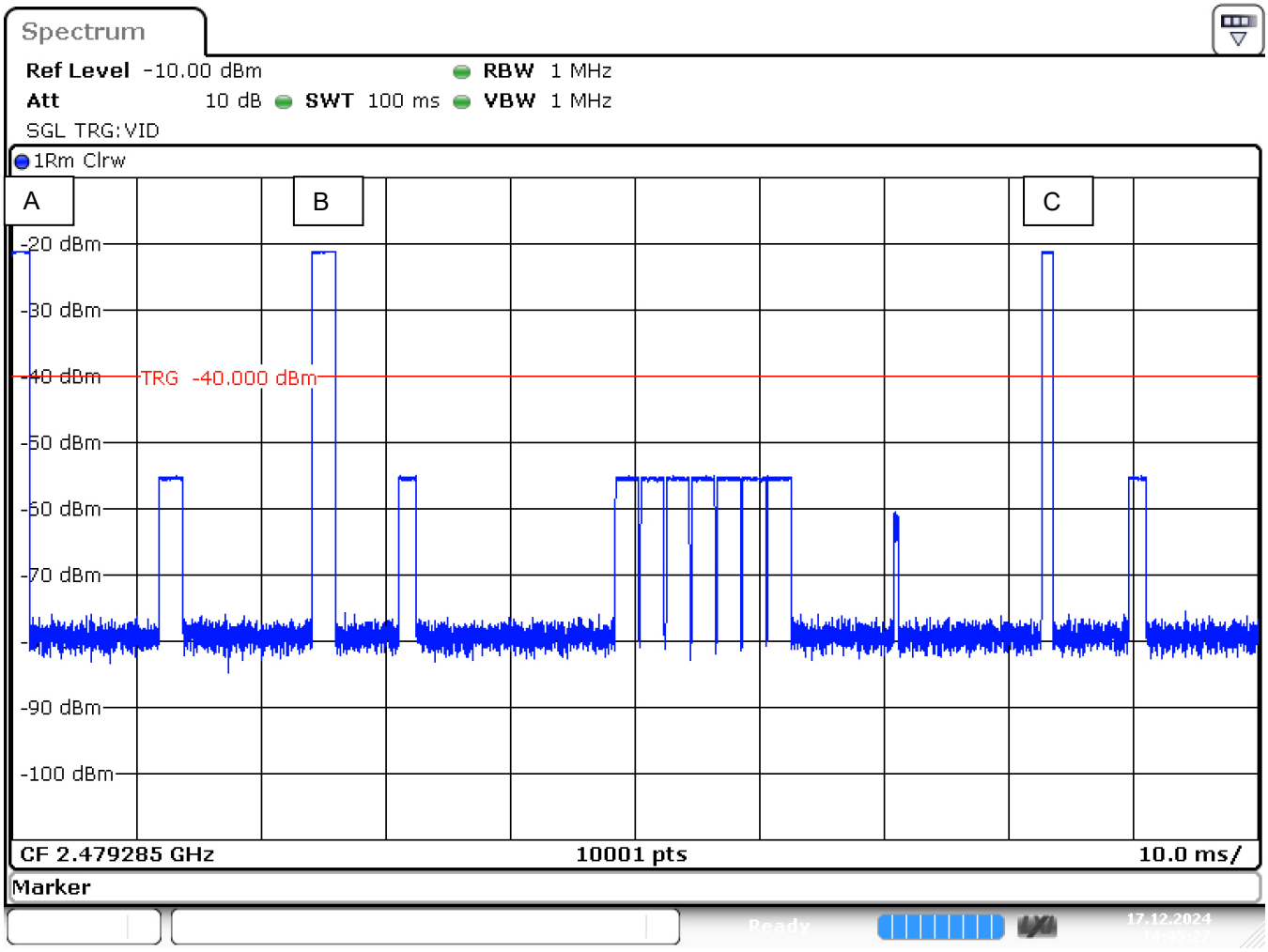




Deutschstraße 10
1230 Vienna / Austria
Tel.: +43 (0)504 54
Mail: info@tuv.at
Web: http://www.tuv.at

**4.3 Duty Cycle measurements for averaging** **§ 15.249 (e)**

**Mode: data transmission (worst case in 100ms)**




Date: 17.DEC.2024 14:45:28

**According to the timing protocol description provided by the manufacturer and attached as technical description to the application for certification, the transmission burst time was checked to not exceed the declared value. The declared value was taken for calculation, as that gives the worst case.**
**The first transmission A burst in a 100ms time frame has a length of 1,46ms, the second one B is 1,97ms in length and the third one C is 1,19ms, giving a duty cycle of 4,62% or an average factor of -26,7 dB.**
**The weaker emissions below -50 dBm are from the access point that was used to send the query.**

**LIMIT** **SUBCLAUSE 15.249(e)**

(e) As shown in §15.35(b), for frequencies above 1000 MHz, the field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For point-to-point operation under paragraph (b) of this section, the peak field strength shall not exceed 2500 millivolts/meter at 3 meters along the antenna azimuth.

Test Equipment used: EMV-205





Deutschstraße 10
1230 Vienna / Austria
Tel.: +43 (0)504 54
Mail: info@tuv.at
Web: http://www.tuv.at

**4.4 Field strength of emissions at 2400 – 2483,5 MHz** **§ 15.249 (a) (c)**

**Operating on CH 0 (2404,053MHz)**

**The maximum peak value as measured in was 95,9 dBµV/m = 62,37 mV/m at 3m distance, see section 4.5.**

**With the averaging factor calculated on page 8 of this test report of -26,7 dB the maximum average value is then 69,2 dBµV/m = 2,88 mV/m at 3m distance.**

**LIMIT** **SUBCLAUSE 15.249(a) (c)**

(a) Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

| Fundamental frequency | Field strength of fundamental (millivolts/meter) | Field strength of harmonics (microvolts/meter) |
|---|---|---|
| 902–928 MHz | 50 | 500 |
| 2400–2483.5 MHz | 50 | 500 |
| 5725–5875 MHz | 50 | 500 |
| 24.0–24.25 GHz | 250 | 2500 |

(c) Field strength limits are specified at a distance of 3 meters.

Test Equipment used: EMV-100; EMV-101; EMV-102; EMV-103; EMV-105; EMV-110; EMV-200/1





Deutschstraße 10
1230 Vienna / Austria
Tel.: +43 (0)504 54
Mail: info@tuv.at
Web: http://www.tuv.at

**Field strength of emissions at 2400 – 2483,5 MHz** **§ 15.249 (a) (c)**

**Operating on CH 4 (2441,844 MHz)**

**The maximum peak value measured was 97,3 dBµV/m = 73,28 mV/m at 3m distance, see section 4.5.**

**With the averaging factor calculated on page 8 of this test report of -26,7 dB the maximum average value is then 70,6 dBµV/m = 3,39 mV/m at 3m distance.**

**LIMIT** **SUBCLAUSE 15.249(a) (c)**

(a) Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

| Fundamental frequency | Field strength of fundamental (millivolts/meter) | Field strength of harmonics (microvolts/meter) |
|---|---|---|
| 902–928 MHz | 50 | 500 |
| 2400–2483.5 MHz | 50 | 500 |
| 5725–5875 MHz | 50 | 500 |
| 24.0–24.25 GHz | 250 | 2500 |

(c) Field strength limits are specified at a distance of 3 meters.

Test Equipment used: EMV-100; EMV-101; EMV-102; EMV-103; EMV-105; EMV-110; EMV-200/1





Deutschstraße 10
1230 Vienna / Austria
Tel.: +43 (0)504 54
Mail: info@tuv.at
Web: http://www.tuv.at

**Field strength of emissions at 2400 – 2483,5 MHz** **§ 15.249 (a) (c)**

**Operating on CH 10 (2479,285 MHz)**

**The maximum peak value measured was 97,3 dBµV/m = 73,28 mV/m at 3m distance, see section 4.5.**

**With the averaging factor calculated on page 8 of this test report of -26,7 dB the maximum average value is then 70,6 dBµV/m = 3,39 mV/m at 3m distance.**

**LIMIT** **SUBCLAUSE 15.249(a) (c)**

(a) Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

| Fundamental frequency | Field strength of fundamental (millivolts/meter) | Field strength of harmonics (microvolts/meter) |
|---|---|---|
| 902–928 MHz | 50 | 500 |
| 2400–2483.5 MHz | 50 | 500 |
| 5725–5875 MHz | 50 | 500 |
| 24.0–24.25 GHz | 250 | 2500 |

(c) Field strength limits are specified at a distance of 3 meters.

Test Equipment used: EMV-100; EMV-101; EMV-102; EMV-103; EMV-105; EMV-110; EMV-200/1





Deutschstraße 10
1230 Vienna / Austria
Tel.: +43 (0)504 54
Mail: info@tuv.at
Web: http://www.tuv.at

## 4.5 Emissions outside 2400 – 2483,5 MHz § 15.249 (d) (e)

### Measuring apparatus parameters 9 kHz to 150 kHz

| Parameter | Preview measurement | Final measurement | Parameter | Preview measurement | Final measurement |
|---|---|---|---|---|---|
| Start frequency | 9 kHz | 9 kHz | Detector | Max Peak | Quasi Peak |
| Stop frequency | 150 kHz | 150 kHz | Measuring time | 10 ms | 1 s |
| Stepsize | 50 Hz | 50 Hz | RF-attenuation | 0dB | 0dB |
| IF- Bandwidth | 200 Hz | 200 Hz | Preamplifier | 20 dB | 20 dB |

### Measuring apparatus parameters 150 kHz to 30 MHz

| Parameter | Preview measurement | Final measurement | Parameter | Preview measurement | Final measurement |
|---|---|---|---|---|---|
| Start frequency | 150 kHz | 150 kHz | Detector | Max Peak | Quasi Peak |
| Stop frequency | 30 MHz | 30 MHz | Measuring time | 10 ms | 1 s |
| Stepsize | 2.25 kHz | 2.25 kHz | RF-attenuation | 0dB | 0dB |
| IF- Bandwidth | 9 kHz | 9 kHz | Preamplifier | 20 dB | 20 dB |

### Measuring apparatus parameters 30 MHz to 1000 MHz

| Parameter | Preview measurement | Final measurement | Parameter | Preview measurement | Final measurement |
|---|---|---|---|---|---|
| Start frequency | 30 MHz | 30 MHz | Detector | Max Peak | Quasi Peak |
| Stop frequency | 1000 MHz | 1000 MHz | Measuring time | 10 ms | 1 s |
| Stepsize | 30 kHz | 30 kHz | RF-attenuation | 0dB | 0dB |
| IF- Bandwidth | 120 kHz | 120 kHz | Preamplifier | 20 dB | 20 dB |

### Measuring apparatus parameters 1 GHz to 25 GHz

| Parameter | Preview measurement | Final measurement | Parameter | Preview measurement | Final measurement |
|---|---|---|---|---|---|
| Start frequency | 1 GHz | 1 GHz | Detector | Max Peak / Average | Max Peak / Average |
| Stop frequency | 25 GHz | 25 GHz | Measuring time | 100 ms | 100 ms |
| Stepsize | 250 kHz | 250 kHz | RF-attenuation | 0dB | 0dB |
| IF- Bandwidth | 1 MHz | 1 MHz | Preamplifier | 20 dB | 20 dB |

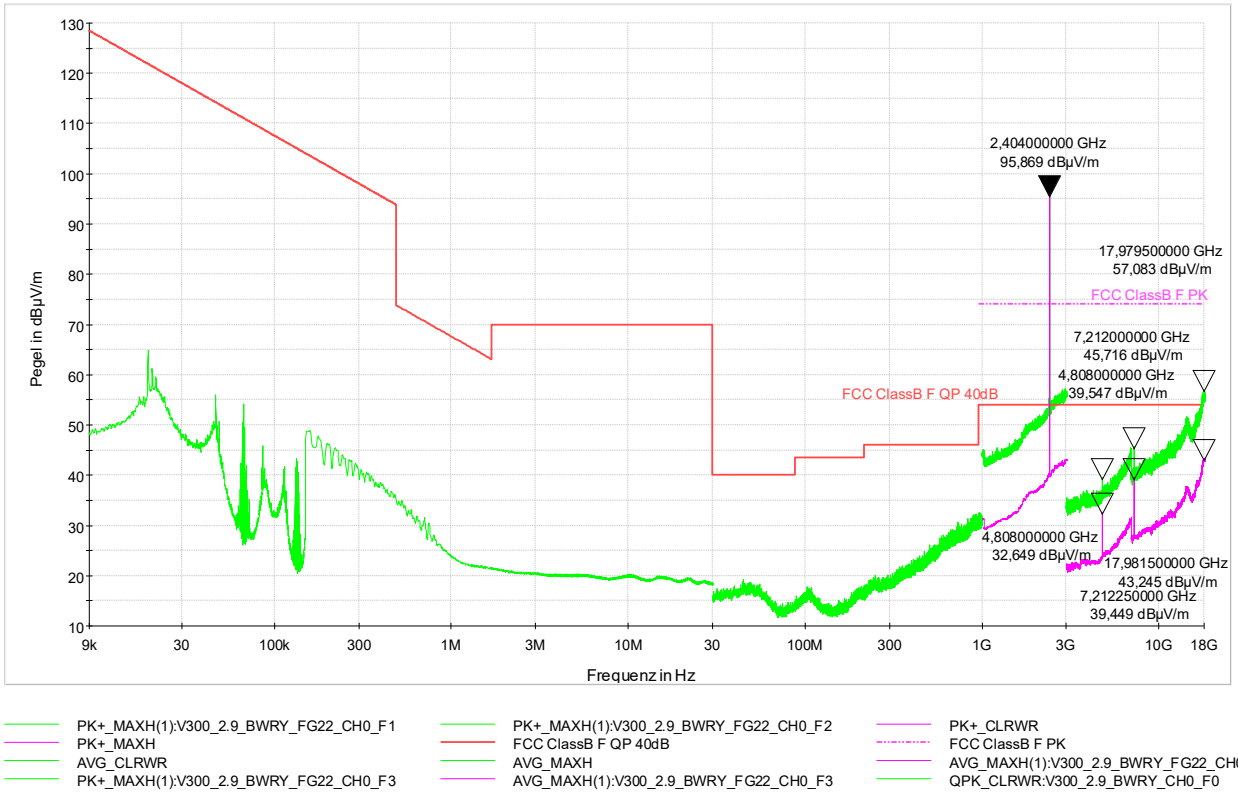




Deutschstraße 10
1230 Vienna / Austria
Tel.: +43 (0)504 54
Mail: info@tuv.at
Web: http://www.tuv.at

**Emissions outside 2400 – 2483,5 MHz** **§ 15.249 (d) (e)**
**Channel 0 (2404,053 MHz) – average values above 1 GHz are shown in magenta – green = peak**

The NFC part of the EUT was powered on during the test.




Worst case Emission: 45,72 dBµV/m Peak at 7212,0 MHz

| Frequency (MHz) | Value (dBµV/m) without duty-cycle | Value (dBµV/m) with duty cycle |
|---|---|---|
| 4808,0 | 32,65 (AVG) | 12,85 (AVG) |
| 4808,0 | 39,55 (PK) | 39,55 (PK) |
| 7212,0 | 45,72 (PK) | 45,72 (PK) |
| 7212,3 | 39,45 (AVG) | 19,02 (AVG) |

Duty cycle measurements and the reduction factor are described on page 8.
The other values are noise.

Remark: Although the measurements were made up to the 10th harmonic (25 GHz) the frequency range above 18 GHz is not automatized, so no graphs are available. Nevertheless no emissions above noise level were found in the frequency range above 18 GHz.

**LIMIT** **SUBCLAUSE 15.249(d) (e) (15.209)**

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

(e) As shown in §15.35(b), for frequencies above 1000 MHz, the field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For point-to-point operation under paragraph (b) of this section, the peak field strength shall not exceed 2500 millivolts/meter at 3 meters along the antenna azimuth.



Deutschstraße 10
1230 Vienna / Austria
Tel.: +43 (0)504 54
Mail: info@tuv.at
Web: http://www.tuv.at

| Frequency (MHz) | Field strength (microvolts/meter) | Measurement distance (meters) |
|---|---|---|
| 0.009–0.490 | 2400/F(kHz) | 300 |
| 0.490–1.705 | 24000/F(kHz) | 30 |
| 1.705–30.0 | 30 | 30 |
| 30–88 | 100** | 3 |
| 88–216 | 150** | 3 |
| 216–960 | 200** | 3 |
| Above 960 | 500 | 3 |

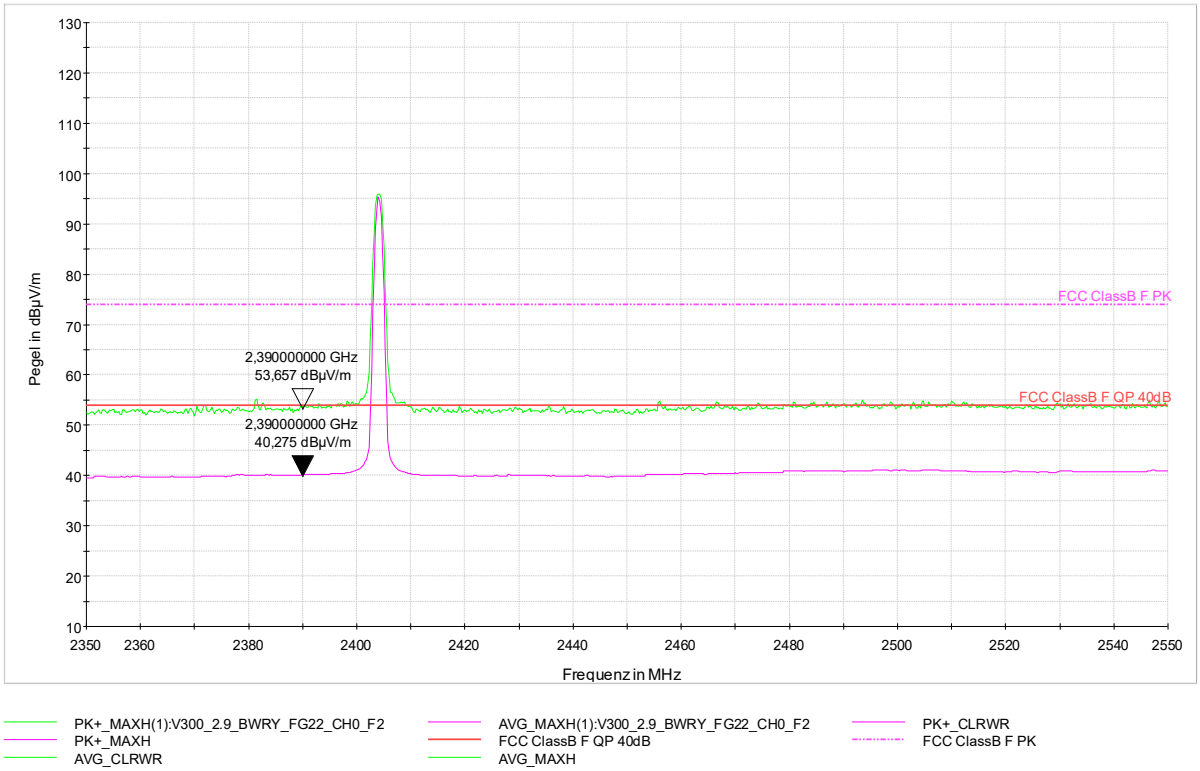
Test Equipment used:
EMV-100; EMV-101; EMV-102; EMV-103; EMV-105; EMV-110; EMV-111; EMV-112; EMV-114; EMV-200/1; NT-126; NT-416





Deutschstraße 10
1230 Vienna / Austria
Tel.: +43 (0)504 54
Mail: info@tuv.at
Web: http://www.tuv.at

**Emissions outside 2400 – 2483,5 MHz** **§ 15.249 (d) (e)**
**Channel 0 (2404,053 MHz) – band edge requirement – average values are in magenta – green = peak**




Nearest Band Edge: 2390 MHz

**LIMIT** **SUBCLAUSE 15.249(d) (e) (15.209)**

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

(e) As shown in §15.35(b), for frequencies above 1000 MHz, the field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For point-to-point operation under paragraph (b) of this section, the peak field strength shall not exceed 2500 millivolts/meter at 3 meters along the antenna azimuth.

| Frequency (MHz) | Field strength (microvolts/meter) | Measurement distance (meters) |
|---|---|---|
| 0.009–0.490 | 2400/F(kHz) | 300 |
| 0.490–1.705 | 24000/F(kHz) | 30 |
| 1.705–30.0 | 30 | 30 |
| 30–88 | 100** | 3 |
| 88–216 | 150** | 3 |
| 216–960 | 200** | 3 |
| Above 960 | 500 | 3 |

Test Equipment used:
EMV-100; EMV-101; EMV-102; EMV-103; EMV-105; EMV-110; EMV-111; EMV-112; EMV-114; EMV-200/1; NT-126; NT-416

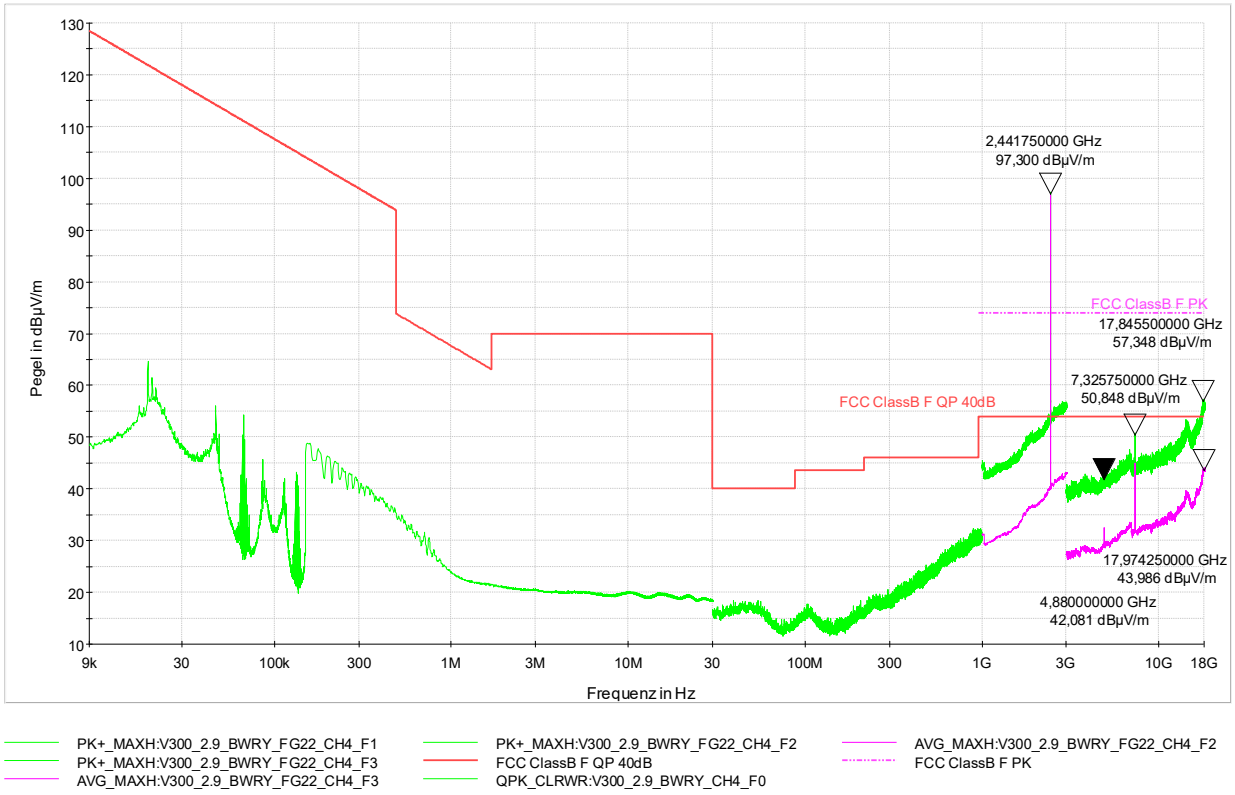




Deutschstraße 10
1230 Vienna / Austria
Tel.: +43 (0)504 54
Mail: info@tuv.at
Web: http://www.tuv.at

**Emissions outside 2400 – 2483,5 MHz** **§ 15.249 (d) (e)**
**Channel 4 (2441,844 MHz) – average values above 1 GHz are shown in magenta – green = peak**

The NFC part of the EUT was powered on during the test.




Worst case Emission: 50,85 dBµV/m Peak at 7325,8 MHz

| Frequency (MHz) | Value (dBµV/m) without duty-cycle | Value (dBµV/m) with duty cycle |
|---|---|---|
| 4880,0 | 42,08 (PK) | 42,08 (PK) |
| 4883,8 | 32,47 (AVG) | 15,38 (AVG) |
| 7325,8 | 50,85 (PK) | 50,85 (PK) |
| 7325,8 | 44,90 (AVG) | 24,15 (AVG) |

Duty cycle measurements and the reduction factor are described on page 8.
The other values are noise.

Remark: Although the measurements were made up to the 10th harmonic (25 GHz) the frequency range above 18 GHz is not automatized, so no graphs are available. Nevertheless no emissions above noise level were found in the frequency range above 18 GHz.

**LIMIT** **SUBCLAUSE 15.249(d) (e) (15.209)**

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

(e) As shown in §15.35(b), for frequencies above 1000 MHz, the field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For point-to-point operation under paragraph (b) of this section, the peak field strength shall not exceed 2500 millivolts/meter at 3 meters along the antenna azimuth.



Deutschstraße 10
1230 Vienna / Austria
Tel.: +43 (0)504 54
Mail: info@tuv.at
Web: http://www.tuv.at

| Frequency (MHz) | Field strength (microvolts/meter) | Measurement distance (meters) |
|---|---|---|
| 0.009–0.490 | 2400/F(kHz) | 300 |
| 0.490–1.705 | 24000/F(kHz) | 30 |
| 1.705–30.0 | 30 | 30 |
| 30–88 | 100** | 3 |
| 88–216 | 150** | 3 |
| 216–960 | 200** | 3 |
| Above 960 | 500 | 3 |

Test Equipment used:
EMV-100; EMV-101; EMV-102; EMV-103; EMV-105; EMV-110; EMV-111; EMV-112; EMV-114; EMV-200/1; NT-126; NT-416

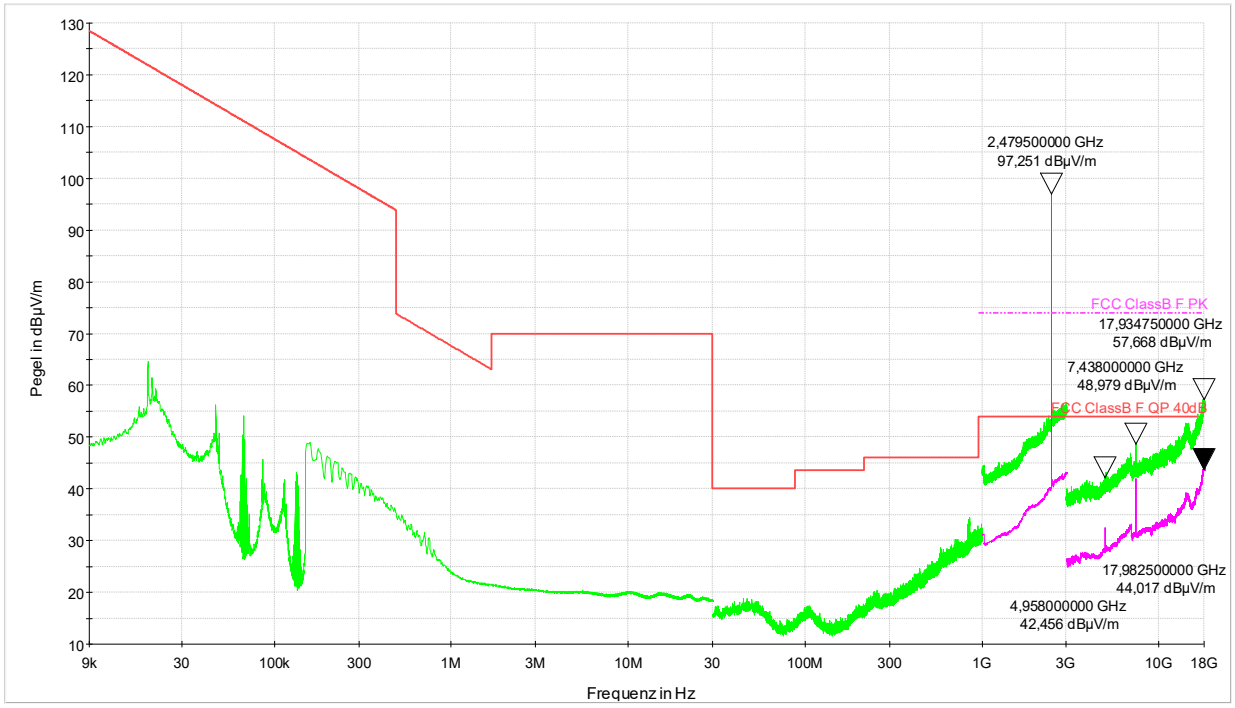




Deutschstraße 10
1230 Vienna / Austria
Tel.: +43 (0)504 54
Mail: info@tuv.at
Web: http://www.tuv.at

**Emissions outside 2400 – 2483,5 MHz** **§ 15.249 (d) (e)**
**Channel 10 (2479,285 MHz) – average values above 1 GHz are shown in magenta – green = peak**

The NFC part of the EUT was powered on during the test.




Worst case Emission: 48,98 dBµV/m Peak at 7438,0

| Frequency (MHz) | Value (dBµV/m) without duty-cycle | Value (dBµV/m) with duty cycle |
|---|---|---|
| 4958,0 | 42,46 (PK) | 42,46 (PK) |
| 4958,5 | 32,51 (AVG) | 15,76 (AVG) |
| 7438,0 | 48,98 (PK) | 48,98 (PK) |
| 7437,8 | 42,03 (AVG) | 22,28 (AVG) |

Duty cycle measurements and the reduction factor are described on page 8.
The other values are noise.

Remark: Although the measurements were made up to the 10th harmonic (25 GHz) the frequency range above 18 GHz is not automatized, so no graphs are available. Nevertheless no emissions above noise level were found in the frequency range above 18 GHz.

**LIMIT** **SUBCLAUSE 15.249(d) (e) (15.209)**

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

(e) As shown in §15.35(b), for frequencies above 1000 MHz, the field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For point-to-point operation under paragraph (b) of this section, the peak field strength shall not exceed 2500 millivolts/meter at 3 meters along the antenna azimuth.



Deutschstraße 10
1230 Vienna / Austria
Tel.: +43 (0)504 54
Mail: info@tuv.at
Web: http://www.tuv.at

| Frequency (MHz) | Field strength (microvolts/meter) | Measurement distance (meters) |
|---|---|---|
| 0.009–0.490 | 2400/F(kHz) | 300 |
| 0.490–1.705 | 24000/F(kHz) | 30 |
| 1.705–30.0 | 30 | 30 |
| 30–88 | 100** | 3 |
| 88–216 | 150** | 3 |
| 216–960 | 200** | 3 |
| Above 960 | 500 | 3 |

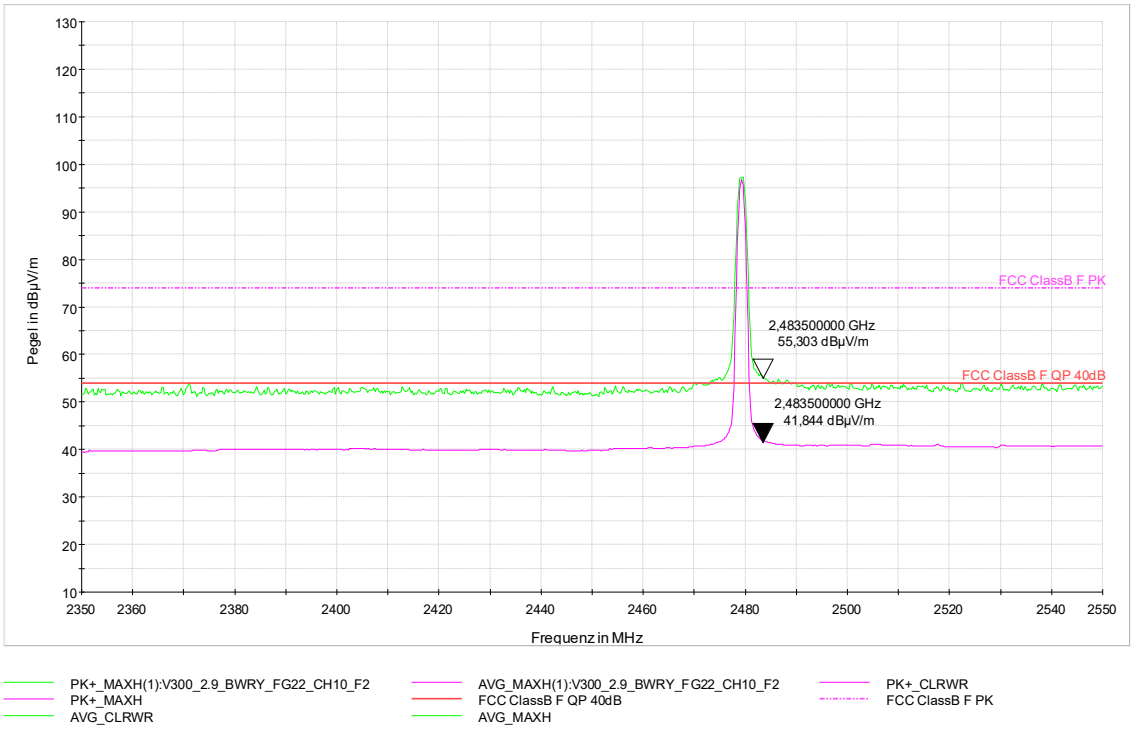
EMV-100; EMV-101; EMV-102; EMV-103; EMV-105; EMV-110; EMV-111; EMV-112; EMV-114; EMV-200/1; NT-126; NT-416





Deutschstraße 10
1230 Vienna / Austria
Tel.: +43 (0)504 54
Mail: info@tuv.at
Web: http://www.tuv.at

**Emissions outside 2400 – 2483,5 MHz** **§ 15.249 (d) (e)**
**Channel 10 (2479,285 MHz) – band edge requirement – average values are in magenta – green = peak**




Nearest Band Edge: 2483,5 MHz

**LIMIT** **SUBCLAUSE 15.249(d) (e) (15.209)**

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

(e) As shown in §15.35(b), for frequencies above 1000 MHz, the field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For point-to-point operation under paragraph (b) of this section, the peak field strength shall not exceed 2500 millivolts/meter at 3 meters along the antenna azimuth.

| Frequency (MHz) | Field strength (microvolts/meter) | Measurement distance (meters) |
|---|---|---|
| 0.009–0.490 | 2400/F(kHz) | 300 |
| 0.490–1.705 | 24000/F(kHz) | 30 |
| 1.705–30.0 | 30 | 30 |
| 30–88 | 100** | 3 |
| 88–216 | 150** | 3 |
| 216–960 | 200** | 3 |
| Above 960 | 500 | 3 |

Test Equipment used:
EMV-100; EMV-101; EMV-102; EMV-103; EMV-105; EMV-110; EMV-111; EMV-112; EMV-114; EMV-200/1; NT-126; NT-416





Deutschstraße 10
1230 Vienna / Austria
Tel.: +43 (0)504 54
Mail: info@tuv.at
Web: http://www.tuv.at

**4.6 RF Exposure** **§ 1.1307(b)(3)(i)(A)**

Title 47 §1.1307(b)(3)(i):

(3) Determination of exemption. (i) For single RF sources (i.e., any single fixed RF source, mobile device, or portable device, as defined in paragraph (b)(2) of this section): A single RF source is exempt if:

(A) The available maximum time-averaged power is no more than 1 mW, regardless of separation distance. This exemption may not be used in conjunction with other exemption criteria other than those in paragraph (b)(3)(ii)(A) of this section. Medical implant devices may only use this exemption and that in paragraph (b)(3)(ii)(A);

| max. Tx power [mW] (from conducted and ERP measurement) | Duty cycle [%] (see 4.3) | Production variance [1] | max. time-averaged power [mW] | §1.1307(b)(3)(i)(A) limit [mW] |
|---|---|---|---|---|
| 1.22 | 4.62 | 1,58 | 0.089 | 1 |

The maximum time-averaged power is less than 1 mW.

The device is an *exempt RF device* as per Title 47 §1.1307(b)(3)(i)(A).

| ERP measurement: | | Effective radiated power (mW) | | |
|---|---|---|---|---|
| Test condition | | CH 0 (2404,053MHz) | CH 4 (2441,844MHz) | CH 10 (2479,285MHz) |
| $T_{nom}$ 23 °C | $V_{nom}$ (3)V | 0.72 | 0.99 | 0.99 |

| EIRP measurement: | | Effective isotropically radiated power (mW) | | |
|---|---|---|---|---|
| Test condition | | CH 0 (2404,053MHz) | CH 4 (2441,844MHz) | CH 10 (2479,285MHz) |
| $T_{nom}$ 23 °C | $V_{nom}$ (3)V | 1.17 | 1.62 | 1.62 |

| Conducted measurement | | conducted power (mW) | | |
|---|---|---|---|---|
| Test condition | | CH 0 (2404,053MHz) | CH 4 (2441,844MHz) | CH 10 (2479,285MHz) |
| $T_{nom}$ 23 °C | $V_{nom}$ (3)V | 1.22 | 1.20 | 1.20 |

| Maximum Gain derived from EIRP and conducted measurement: | | Maximum Gain (dBi) | | |
|---|---|---|---|---|
| Test condition | | CH 0 (2404,053MHz) | CH 4 (2441,844MHz) | CH 10 (2479,285MHz) |
| $T_{nom}$ 23 °C | $V_{nom}$ (3)V | -0.18 | 1.3 | 1.3 |





Deutschstraße 10
1230 Vienna / Austria
Tel.: +43 (0)504 54
Mail: info@tuv.at
Web: http://www.tuv.at

**RF Exposure** **RSS-102, Issue 6**

6.3 SAR exemption limits

Devices operating at or below the applicable output power levels (adjusted for tune-up tolerance) specified in table 11, based on the separation distance, are exempt from SAR evaluation. The separation distance, defined as the distance between the user and/or bystander and the antenna and/or radiating element of the device or the outer surface of the device, shall be less than or equal to 20 cm for these exemption limits to apply.

**Table 11: Power limits for exemption from routine SAR evaluation based on the separation distance**

| Frequency (MHz) | Exemption Limits (mW) | | | | |
|---|---|---|---|---|---|
| | At separation distance of ≤5 mm (mW) | At separation distance of 10 mm (mW) | At separation distance of 15 mm (mW) | At separation distance of 20 mm (mW) | At separation distance of 25 mm (mW) |
| ≤300 | 45 | 116 | 139 | 163 | 189 |
| 450 | 32 | 71 | 87 | 104 | 124 |
| 835 | 21 | 32 | 41 | 54 | 72 |
| 1900 | 6 | 10 | 18 | 33 | 57 |
| 2450 | 3 | 7 | 16 | 32 | 56 |
| 3500 | 2 | 6 | 15 | 29 | 50 |
| 5800 | 1 | 5 | 13 | 23 | 32 |

| Frequency (MHz) | Exemption Limits (mW) | | | | |
|---|---|---|---|---|---|
| | At separation distance of 30 mm (mW) | At separation distance of 35 mm (mW) | At separation distance of 40 mm (mW) | At separation distance of 45 mm (mW) | At separation distance of ≥50 mm (mW) |
| ≤300 | 216 | 246 | 280 | 319 | 362 |
| 450 | 147 | 175 | 208 | 248 | 296 |
| 835 | 96 | 129 | 172 | 228 | 298 |
| 1900 | 92 | 138 | 194 | 257 | 323 |
| 2450 | 89 | 128 | 170 | 209 | 245 |
| 3500 | 72 | 94 | 114 | 134 | 158 |
| 5800 | 41 | 54 | 74 | 102 | 128 |

The exemption limits in table 11 Table 11 are based on measurements and simulations of half-wave dipole antennas at separation distances of 5 mm to 50 mm from a flat phantom, which provides a SAR value of approximately 0.4 W/kg for 1 g of tissue.
For limb-worn devices where the 10 gram of tissue applies, the exemption limits for routine evaluation in table 11 are multiplied by a factor of 2.5.
For controlled-use devices where the 8 W/kg for 1 gram of tissue applies, the exemption limits for routine evaluation in table 11 Table 11 are multiplied by a factor of 5.
When the operating frequency of the device is between two frequencies located in table 11, linear interpolation shall be applied for the applicable separation distance. If the separation distance of the device is between two distances located in table 11, linear interpolation may be applied for the applicable frequency. Alternatively, the limit corresponding to the smaller distance may be employed. For example, in case of a 7 mm separation distance, either use the exception value for a 5 mm separation distance or interpolate between the limits corresponding to 5 mm and 10 mm separation distances.
For implanted medical devices, the exemption limit for routine SAR evaluation is set at an output power of 1 mW, regardless of frequency.





Deutschstraße 10
1230 Vienna / Austria
Tel.: +43 (0)504 54
Mail: info@tuv.at
Web: http://www.tuv.at

**RSS-102 Exemption calculation**

| Frequency (MHz) | cond. P (mW) | max. EIRP (mW) | Duty Cycle (1) | Tune-up tolerance (1) | Avg. cond. P (mW) | Avg. EIRP (mW) | separation distance (mm) | Limit (mW) | |
|---|---|---|---|---|---|---|---|---|---|
| 2404.053 | 1.22 | 1.17 | 0.0462 | 1,58 | 0.089 | 0.085 | 5 | 8,13 | OK |
| 2441.844 | 1.20 | 1.62 | 0.0462 | 1,58 | 0.088 | 0.118 | 5 | 7,61 | OK |
| 2479.285 | 1.20 | 1.62 | 0.0462 | 1,58 | 0.088 | 0.118 | 5 | 7,43 | OK |

*) Calculations are done for a minimum separaton distance that's derived from the antenna distance to the device casing and limb worn exposure. It is conservative, as customers are not expected to touch electronic shelf labels for extended periods of time.

The time-averaged output power is below the exemption limit for routine evaluation.

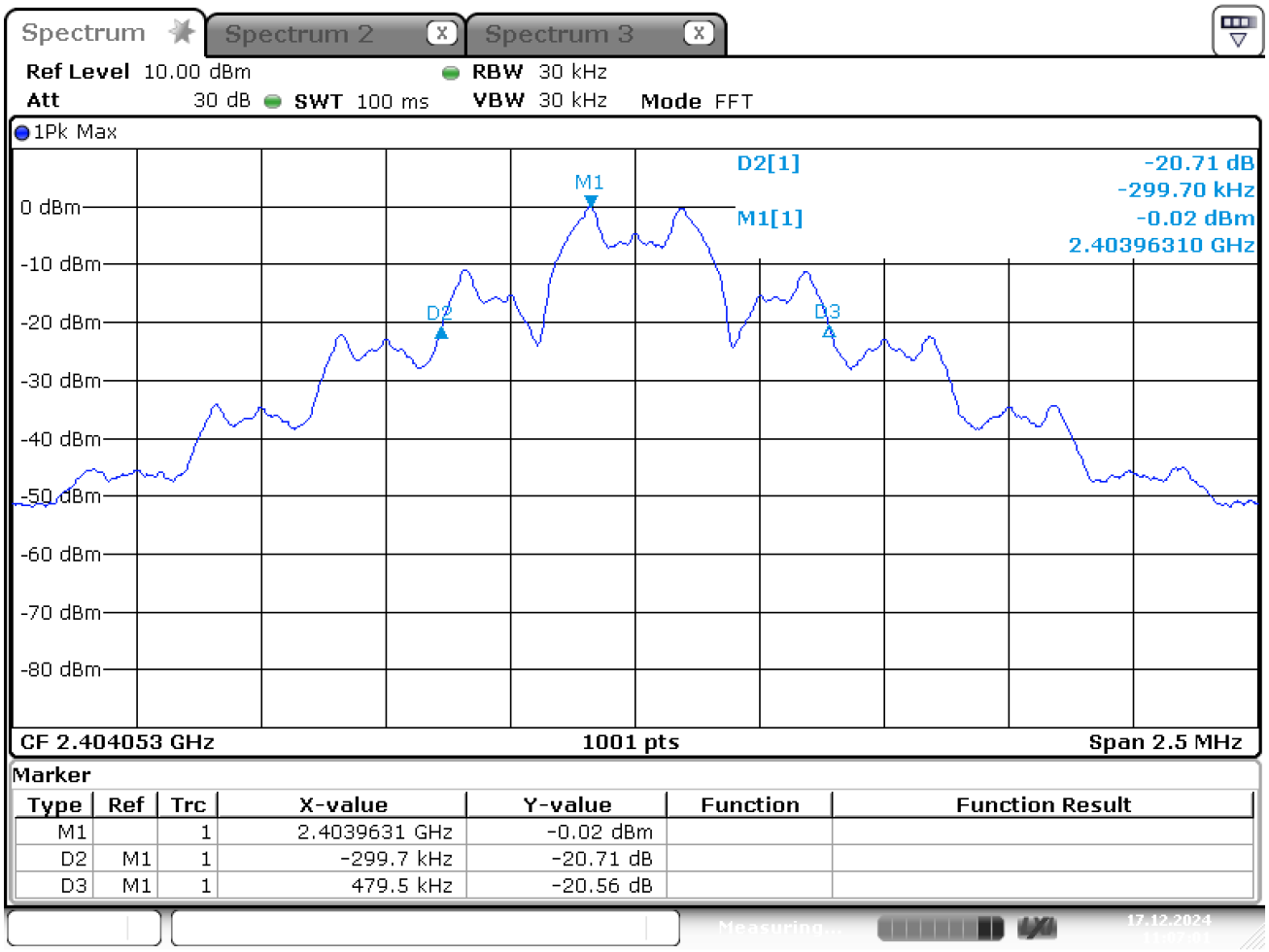




Deutschstraße 10
1230 Vienna / Austria
Tel.: +43 (0)504 54
Mail: info@tuv.at
Web: http://www.tuv.at

### 4.7 Additional provisions to the general radiated emission limitations § 15.215(c)

**Channel 0 (2404,053 MHz)**




Date: 17.DEC.2024 11:07:02

Frequency band (§ 15.249): 2400-2483.5 MHz
2403.9631 MHz – 0.2997 MHz = 2403.6634 MHz
The 20 dB bandwidth of the emission on the lowest channel is fully contained within the frequency band.

**LIMIT** **SUBCLAUSE 15.215(c)**

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. In the case of intentional radiators operating under the provisions of subpart E, the emission bandwidth may span across multiple contiguous frequency bands identified in that subpart. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

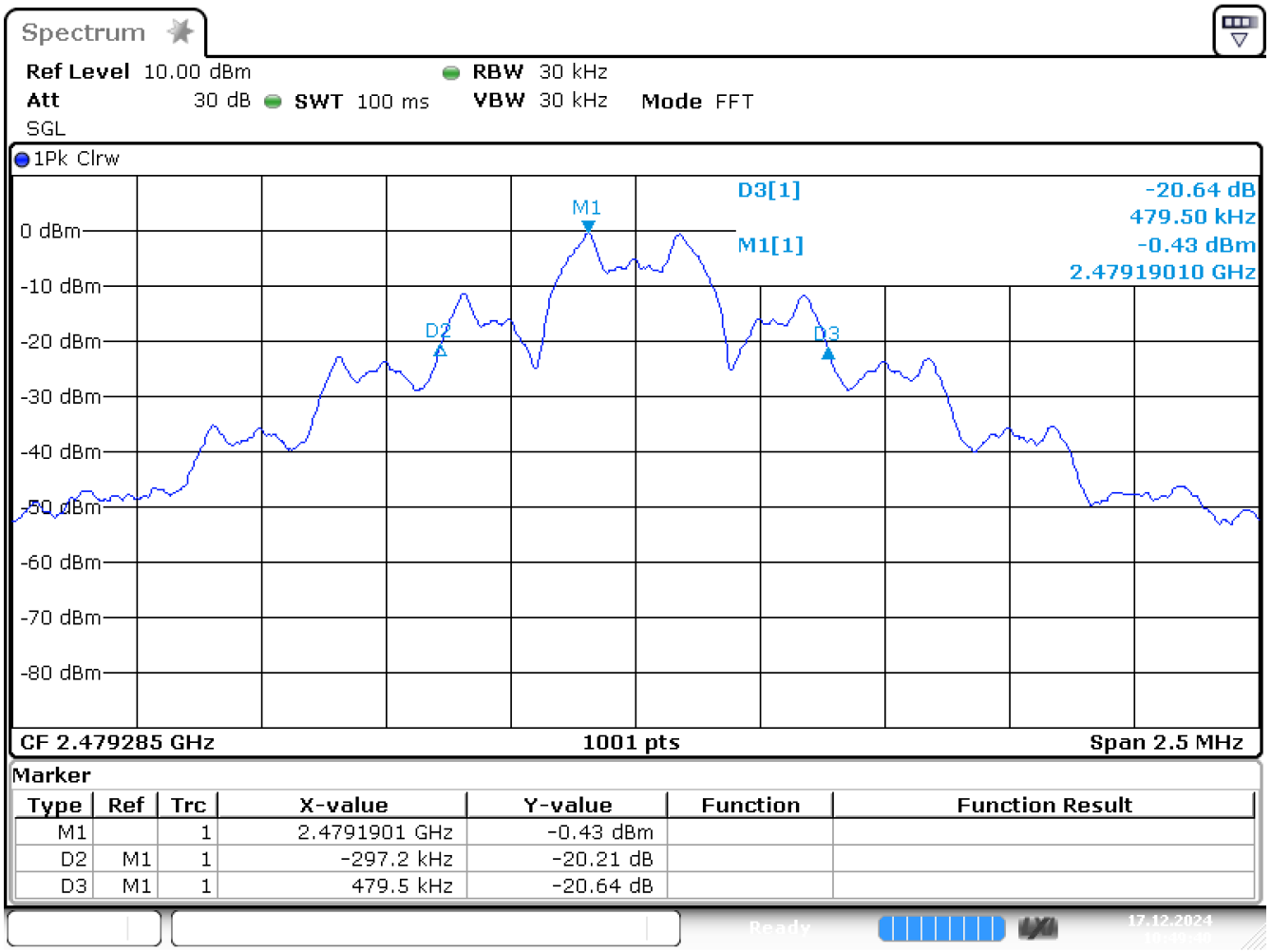
Test Equipment used: EMV-205





Deutschstraße 10
1230 Vienna / Austria
Tel.: +43 (0)504 54
Mail: info@tuv.at
Web: http://www.tuv.at

**Channel 10 (2479,285 MHz)**




Date: 17.DEC.2024 10:49:40

Frequency band (§ 15.249): 2400-2483.5 MHz
2479.1901 MHz + 0.4795 MHz = 2479.6696 MHz
The 20 dB bandwidth of the emission on the highest channel is fully contained within the frequency band.

**LIMIT** **SUBCLAUSE 15.215(c)**

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. In the case of intentional radiators operating under the provisions of subpart E, the emission bandwidth may span across multiple contiguous frequency bands identified in that subpart. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

Test Equipment used: EMV-205





Deutschstraße 10
1230 Vienna / Austria
Tel.: +43 (0)504 54
Mail: info@tuv.at
Web: http://www.tuv.at

# Appendix 1
# Test equipment used

| | | | | | |
|---|---|---|---|---|---|
| ☐ | Anechoic Chamber with 3m measurement distance | NT-100 | ☐ | Ant. tripod for EN61000-4-3 Model TP1000A | NT-156 |
| ☐ | Stripline according to ISO 11452-5 | NT-108 | ☐ | Power quality analyzer Fluke 1760 (complete set) | NT-160 - NT-173 |
| ☐ | MA4000 - Antenna mast 1 - 4 m height | NT-110/1 | | | |
| ☐ | DS - Turntable 0 - 400 ° Azimuth | NT-111/1 | ☐ | ESCI - Test receiver 9 kHz - 7 GHz | NT-203/1 |
| ☐ | CO3000 Controller Mast+Turntable | NT-112/1 | ☐ | ESR – Test receiver 20 Hz – 26,5 GHz | NT-207/1 |
| ☐ | HUF-Z3 - Log. Per. Antenna 200 - 1000 MHz | NT-121 | ☐ | Digital Radio Tester CMW500 | NT-208/1 |
| ☐ | FMZB1513 - Loop Antenna 9 kHz - 30 MHz | NT-122/1 | ☐ | Noise-gen., ITU-R 559-2 20 Hz – 20 kHz | NT-209 |
| ☐ | HFH-Z6 - Rod Antenna 9 kHz - 30 MHz | NT-123 | ☐ | CMTA - Radiocommunication analyzer ; 0,1 - 1000 MHz | NT-210 |
| ☐ | Dipole Antenna VHA9103 30 - 300 MHz | NT-124/1a | ☐ | 3271 - Spectrum analyzer 100 Hz - 26,5 GHz | NT-211 |
| ☐ | Dipole Antenna UHA9105 300 - 1000 MHz | NT-124/1b | ☐ | Digital Radio Tester Aeroflex 3920 | NT-212/1 |
| ☐ | 3115 - Horn Antenna 1 - 18 GHz (immunity) | NT-125 | ☐ | Mixer M28HW 26,5 GHz - 40 GHz | NT-214 |
| ☐ | 3116 - Horn Antenna 18 - 40 GHz | NT-126 | ☐ | RubiSource T&M Timing reference | NT-216 |
| ☐ | SAS-200/543 - Bicon. Antenna 20 MHz - 300 MHz | NT-127 | ☐ | Radiocommunicationanalyzer SWR 1180 MD | NT-217 |
| ☐ | AT-1080 - Log. Per. Antenna 80 - 1000 MHz | NT-128 | ☐ | Mixer FS-Z60 40 GHz – 60 GHz | NT-218/1 |
| ☐ | HK-116 - bicon. Antenna 20 MHz - 300 MHz | NT-129 | ☐ | Mixer FS-Z90 60 GHz – 90 GHz | NT-219/1 |
| ☐ | HK-116 - bicon. Antenna 20 MHz - 300 MHz | NT-130 | ☐ | GDS-2504 Digital scope | P-W/OS03 |
| ☐ | 3146 - Log. Per. Antenna 200 – 1000 MHz | NT-131 | ☐ | TPS 2014 Digital scope | NT-222 |
| ☐ | VULB 9163 Trilog Antenna 30 – 3000 MHz | NT-131/1 | ☐ | Artificial Ear according to IEC 60318 | NT-224 |
| ☐ | Loop Antenna H-Field | NT-132 | ☐ | 1 kHz Sound calibrator | NT-225 |
| ☐ | Horn Antenna 500 MHz - 2900 MHz | NT-133 | ☐ | SRM-3006 Spectrumanalyzer | NT-233/1a |
| ☐ | Horn Antenna 500 MHz - 6000 MHz | NT-133/1 | ☐ | E-field probe SRM 75 MHz – 3 GHz | NT-234 |
| ☐ | Log. per. Antenna 800 MHz - 2500 MHz | NT-134 | ☐ | Field Meter NBM-500 incl. E- and H-Field probes | NT-240a-e |
| ☐ | Log. per. Antenna 800 MHz - 2500 MHz | NT-135 | ☐ | Magnetometer HP-01 | NT-241/1 |
| ☐ | BiConiLog Antenna 26 MHz – 2000 MHz | NT-137 | ☐ | EFA-3 H-field- / E-field probe | NT-243 |
| ☐ | Conical Dipol Antenna PCD8250 | NT-138 | ☐ | EHP-50F H-field- / E-field probe | NT-243/1 |
| ☐ | HF 906 - Horn Antenna 1 - 18 GHz (emission) | NT-139 | ☐ | Field Meter EMR-200 100 kHz – 3 GHz | NT-244 |
| ☐ | HZ-1 Antenna tripod | NT-150 | ☐ | E-field probe 100 kHz – 3 GHz | NT-245 |
| ☐ | BN 1500 Antenna tripod | NT-151 | ☐ | H-field probe 300 kHz – 30 MHz | NT-246 |

**Competence Center:**
Electrical & Enviromental

Test report number:
2024-AT-TC-EE-ET-EX-0-000005-FG-066-E1



Date: 28.03.2025

# Appendix 1 (continued)
# Test equipment used

| | | |
|---|---|---|
| ☐ | E-field probe<br>3 MHz – 18 GHz | NT-247 |
| ☐ | H-field probe<br>27 MHz – 1 GHz | NT-248 |
| ☐ | ELT-400<br>1 Hz – 400 kHz | NT-249 |
| ☐ | MDS 21 - Absorbing clamp<br>30 - 1000 MHz | NT-250 |
| ☐ | CDN EMCL-35<br>EM Injection clamp | NT-251/1 |
| ☐ | FCC-203I-DCN<br>Ferrite decoupling network | NT-252 |
| ☐ | PR50<br>Current Probe | NT-253 |
| ☐ | i310s<br>Current Probe | NT-254/1 |
| ☐ | Fluke 87 V<br>True RMS Multimeter | NT-260 |
| ☐ | Model 2000<br>Digital Multimeter | NT-261 |
| ☐ | Fluke 87 V<br>Digital Multimeter | NT-262/1 |
| ☐ | ESH2-Z5-U1 Artificial mains network 4x25A | NT-300 |
| ☐ | ESH3-Z5-U1 Artificial mains network 2x10A | NT-301 |
| ☐ | ESH3-Z6-U1 Artificial mains network 1x100A | NT-302 |
| ☐ | ESH3-Z6-U1 Artificial mains network 1x100A | NT-302a |
| ☐ | EZ10<br>T-Artificial Network | NT-305 |
| ☐ | SMA100A - Signal generator<br>9 kHz - 6 GHz | NT-310/1 |
| ☐ | RefRad<br>Reference generator | NT-312 |
| ☐ | SMP 02 Signal generator<br>10 MHz - 20 GHz | NT-313 |
| ☐ | 40 MHz Arbitrary Generator<br>TGA1241 | NT-315 |
| ☐ | Artificial mains network<br>NSLK 8127-PLC | NT-316 |
| ☐ | PSURGE 4.1<br>Surge generator | NT-324 |
| ☐ | IMU4000<br>Immunity test system | NT-325/1a-e |
| ☐ | VCS 500-M6<br>Surge-Generator | NT-326 |
| ☐ | Oscillatory Wave Simulator incl. Coupling networks | NT-328a+b+c |
| ☐ | BTA-250 - RF-Amplifier<br>9 kHz - 220 MHz / 250 W | NT-330 |
| ☐ | Prana N-MT 500 - RF-Amplifier<br>80 - 1000 MHz / 500 W | NT-332/1 |
| ☐ | BBA150 RF-Amplifier<br>1 GHz - 6 GHz | NT-333/1 |
| ☐ | APA01 – RF-Amplifier<br>0,5 GHz – 2,5 GHz | NT-334 |
| ☐ | Preamplifier<br>1 GHz - 4 GHz | NT-335 |
| ☐ | Preamplifier for GPS<br>MKU 152 A | NT-336 |
| ☐ | Preamplifier<br>1 GHz – 18 GHz | NT-337/1 |
| ☐ | DC Block 10 MHz – 18 GHz<br>Model 8048 | NT-338 |
| ☐ | 2-97201<br>Electronic load | NT-341 |
| ☐ | TSX3510P - Power supply<br>0-30 V / 0 - 10 A | NT-344 |
| ☐ | TSX3510P - Power supply<br>0-30 V / 0 - 10 A | NT-345 |
| ☐ | VDS 200<br>Mobil-impuls-generator | NT-350 |
| ☐ | LD 200<br>Mobil-impuls-generator | NT-351 |
| ☐ | MPG 200<br>Mobil-Impuls-Generators | NT-352 |
| ☐ | EFT 200<br>Mobil-impuls-generator | NT-353 |
| ☐ | AN 200 S1<br>Artificial Network | NT-354 |
| ☐ | FP-EFT 32M<br>3 ph. Coupling filter (Burst) | NT-400/1 |
| ☐ | PHE 4500 - Mains impedance network | NT-401 |
| ☐ | IP 6.2 Coupling filter for data lines (Surge) | NT-403 |
| ☐ | TK 9421 High Power Volt. Probe<br>150 kHz - 30 MHz | NT-409 |
| ☐ | ESH2-Z3 - Probe<br>9 kHz - 30 MHz | NT-410 |
| ☐ | CN-EFT1000 - Capacitive clamp (Burst) | NT-411/1 |
| ☐ | Highpass-Filter<br>100 MHz – 3 GHz | NT-412 |
| ☐ | Highpass-Filter<br>600 MHz – 4 GHz | NT-413 |
| ☐ | Highpass-Filter<br>1250 MHz – 4 GHz | NT-414 |
| ☐ | Highpass-Filter<br>1800 MHz – 16 GHz | NT-415 |

**Competence Center:**
Electrical & Enviromental

Test report number:
2024-AT-TC-EE-ET-EX-0-000005-FG-066-E1



Date: 28.03.2025

# Appendix 1 (continued)
# Test equipment used

| | | |
|---|---|---|
| ☐ | RF-Attenuator 10 dB<br>DC – 18 GHz / 50 W | NT-417/1 |
| ☐ | RF-Attenuator 6 dB<br>DC – 18 GHz / 50 W | NT-418 |
| ☐ | RF-Attenuator 3 dB<br>DC – 18 GHz / 50 W | NT-419 |
| ☐ | RF-Attenuator 20 dB<br>DC - 1000 MHz / 25 W | NT-421 |
| ☐ | RF-Attenuator 30 dB<br>DC - 1000 MHz / 1 W | NT-423 |
| ☐ | RF-Attenuator<br>30 dB | NT-424 |
| ☐ | RF-Attenuator 6 dB<br>DC - 1000 MHz / 1 W | NT-425 |
| ☐ | RF-Attenuator 6 dB<br>DC - 1000 MHz / 1 W | NT-426 |
| ☐ | RF-Attenuator<br>6 dB | NT-428 |
| ☐ | RF-Attenuator<br>0 dB - 81 dB | NT-429 |
| ☐ | WRU 27 - Band blocking<br>27 MHz | NT-430 |
| ☐ | WHJ450C9 AA - High pass<br>450 MHz | NT-431 |
| ☐ | WHJ250C9 AA - High pass<br>250 MHz | NT-432 |
| ☐ | RF-Load<br>150 W | NT-433 |
| ☐ | Impedance transducer<br>1:4 ; 1:9 ; 1:16 | NT-435 |
| ☐ | RF-Attenuator DC – 18 GHz<br>6 dB | NT-436 |
| ☐ | RF-Attenuator DC – 18 GHz<br>6 dB | NT-437 |
| ☐ | RF-Attenuator DC – 18 GHz<br>10 dB | NT-438 |
| ☐ | RF-Attenuator DC – 18 GHz<br>20 dB | NT-439 |
| ☐ | ESH3-Z2 - Pulse limiter<br>9 kHz - 30 MHz | NT-441 |
| ☐ | Power Divider<br>6 dB/1 W/50 Ohm | NT-443 |
| ☐ | Directional coupler<br>0,1 MHz – 70 MHz | NT-444 |
| ☐ | Directional coupler<br>0,1 MHz – 70 MHz | NT-445 |
| ☐ | Tube imitations<br>according to EN 55015 | NT-450 |
| ☐ | FCC-801-M3-16A<br>Coupling decoupling network | NT-458 |
| ☐ | FCC-801-M2-50A<br>Coupling decoupling network | NT-459 |
| ☐ | FCC-801-M5-25<br>Coupling decoupling network | NT-460 |
| ☐ | FCC-801-T4<br>Coupling decoupling network | NT-463 |
| ☐ | FCC-801-C1<br>Coupling decoupling network | NT-464 |
| ☐ | SW 9605 - Current probe<br>150 kHz – 30 MHz | NT-465/1 |
| ☐ | 95242-1 – Current probe<br>1 MHz – 400 MHz | NT-468 |
| ☐ | 94106-1L-1 – Current probe<br>100 kHz – 450 MHz | NT-471 |
| ☐ | WHKX12-2700-3000-18000<br>3 GHz Highpass filter | NT-472 |
| ☐ | WHKX10-3870-4500-18000<br>4,5 GHz Highpass filter | NT-473 |
| ☐ | CDN S9 USB3.0<br>Coupling decoupling network | NT-474 |
| ☐ | CDN S2 XLR3-1<br>Coupling decoupling network | NT-475 |
| ☐ | CDN S8 RJ45<br>Coupling decoupling network | NT-476 |
| ☐ | GA 1240 Power amplifier<br>according to EN 61000-4-16 | NT-480 |
| ☐ | Coupling networks<br>according to EN 61000-4-16 | NT-481 -<br>NT-483 |
| ☐ | Van der Hoofden Test Head | NT-484 |
| ☐ | WRCJV12-5820-5850-5950-5980<br>5,9 GHz Band Reject Filter | NT-490 |
| ☐ | WHKX10-5670-6300-18000<br>6 GHz Highpass filter | NT-491 |
| ☐ | WHK12-935-1000-7000<br>1 GHz Highpass filter | NT-492 |
| ☐ | EMC Video/Audiosystem | NT-511/1 |
| ☐ | EMC32 Version 10.60.20<br>Test software | NT-520/1 |
| ☐ | SRM-TS Version 1.3<br>software for SRM-3000 | NT-522 |
| ☐ | SRM-TS Version 1.3.1<br>software for SRM-3006 | NT-522/1 |
| ☐ | Spitzenberger und Spies<br>Test software V4.1 | NT-525 |
| ☐ | Vertical coupling plane<br>(ESD) | NT-531 |
| ☐ | Test cable #4<br>for EN 61000-4-6 | NT-553 |
| ☐ | Test cable #3<br>for conducted emission | NT-554 |
| ☐ | Test cable #5+#6<br>ESD-cable (2x470k) | NT-555 +<br>NT-556 |
| ☐ | Test cable #8<br>Sucoflex 104EA | NT-559 |
| ☐ | Test cable #9<br>(for outdoor measurements) | NT-580 |
| ☐ | Test cable #10<br>(for outdoor measurements) | NT-581 |
| ☐ | Test cable #13<br>Sucoflex 104PE | NT-584 |
| ☐ | Test cable #21<br>for SRM-3000 | NT-592 |
| ☐ | Shield chamber | NT-600 |
| ☐ | Climatic chamber | M-1200 |

**Competence Center:**
Electrical & Enviromental

Test report number:
2024-AT-TC-EE-ET-EX-0-000005-FG-066-E1



Date: 28.03.2025

# Appendix 1 (continued)
# Test equipment used

| | | |
|---|---|---|
| ☐ | Anechoic Chamber<br>3 m / 5 m measuring distance | EMV-100 |
| ☐ | Turntabel<br>6 m diameter | EMV-101 |
| ☐ | Antenna mast + controller | EMV-102+<br>EMV-103 |
| ☐ | EMC Video/Audiosystem | EMV-104 |
| ☐ | EMC Software<br>EMC32 Version 10.6.2 | EMV-105 |
| ☐ | Hornantenna 1 – 18 GHz<br>HF 907 | EMV-110 |
| ☐ | Antennapre.amp. 1 – 18 GHz<br>BBV 9718 D | EMV-111/1 |
| ☐ | Trilog Antenna 30-3000 MHz<br>VULB9163 | EMV-112 |
| ☐ | Monopol 9 kHz – 30 MHz<br>VAMP 9243 | EMV-113 |
| ☐ | Antennapre.amp 18 – 40 GHz<br>BBV 9721 | EMV-114 |
| ☐ | Hornantenna 200 – 2000 MHz<br>AH-220 | EMV-115 |
| ☐ | DC Artificial Network<br>PVDC 8300 | EMV-150 |
| ☐ | AC Artificial Network<br>NNLK 8121 RC | EMV-151 |
| ☐ | AC Artificial Network<br>NNLK 140 | EMV-<br>153a-d |
| ☐ | EMI Receiver<br>ESW44 | EMV-200/1 |
| ☐ | Signalgenerator 9 kHz – 40 GHz<br>N5173B | EMV-201 |
| ☐ | GPS Frequency normal<br>LBE-1420 | EMV-202/1 |
| ☐ | DC Power supply<br>N5745A | EMV-203 |
| ☐ | Spektrum Analyzator<br>FSV40 | EMV-205 |
| ☐ | Thd Multimeter<br>Model 2015 | EMV-206 |
| ☐ | Poweramplifier<br>PAS15000 | EMV-<br>207/abc |
| ☐ | Inrush Current Source | EMV-<br>208/abc |
| ☐ | Arb.-generator<br>Sycore | EMV-209 |
| ☐ | Harmonics/Flicker analyzer<br>ARS 16/3 | EMV-210 |
| ☐ | Power Supply<br>Regatron AC | EMV-214 |
| ☐ | Power Supply<br>Regatron DC | EMV-215 |
| ☐ | Harmonics/Flicker analyser<br>Zimmer | EMV-216 |
| ☐ | Flicker Impedanz<br>Newtons4th 753 | EMV-218 |
| ☐ | Comemso | EMV-219 |
| ☐ | Diode power probe<br>R&S NRP40S | EMV-220 |
| ☐ | HF- Ampflifier 9 kHz-225 MHz<br>BBL200 | EMV-300/1 |
| ☐ | HF- Amplifier 80 -1000 MHz<br>BBA150 | EMV-301 |
| ☐ | HF- Amplifier 0,8 - 6 GHz<br>BBA150 | EMV-302 |
| ☐ | High Power Ant. 20-200 MHz<br>HPBA-2510 | EMV-303/1 |
| ☐ | High Power Ant. 20-200 MHz<br>S12018-21 | EMV-303/2 |
| ☐ | Log.per Antenna 80-2700 MHz<br>STLP 9128 E special | EMV-304 |
| ☐ | Log.per Antenna 0,7 – 9 GHz<br>STLP9149 | EMV-305 |
| ☐ | HF- Ampflifier 9 kHz-250 MHz<br>BBA150 (low noise) | EMV-306 |
| ☐ | ISO11451-2 TLS<br>10 kHz – 30 MHz | EMV-307 |
| ☐ | Load Dump Generator<br>LD 200N | EMV-350 |
| ☐ | Ultra Compact Symulator<br>UCS 200N100 | EMV-351 |
| ☐ | Automotive Power fail module<br>PFM 200N100.1 | EMV-352 |
| ☐ | Voltage Drop Symulator<br>VDS 200Q100 | EMV-353 |
| ☐ | Arb. Generator<br>AutoWave | EMV-354 |
| ☐ | Ultra Compact Symulator<br>UCS 500N7 | EMV-355 |
| ☐ | Coupling decoupling network<br>CNI 503B7 / 32 A | EMV-356 |
| ☐ | Coupling decoupling network<br>CNI 503B7 / 63 A | EMV-357 |
| ☐ | Telecom Surge Generator<br>TSurge 7 | EMV-358 |
| ☐ | Coupling decoupling network<br>CNI 508N2 | EMV-359 |
| ☐ | Coupling decoupling network<br>CNV 504N2.2 | EMV-360 |
| ☐ | Immunity generator<br>NSG4060/NSG4060-1 | EMV-361 |
| ☐ | Coupling network<br>CDND M316-2 | EMV-362 |
| ☐ | Coupling network<br>CT419-5 | EMV-363 |
| ☐ | ESD Generator<br>NSG 437 | EMV-364 |
| ☐ | Pulse Limiter<br>VTSD 9561-F BNC | EMV-405 |
| ☐ | Transient emission<br>BSM200N40+BS200N100 | EMV-<br>450+451 |
| ☐ | Cap. Coupling Clamp<br>HFK | EMV-455 |
| ☐ | Mag. Field System<br>MS100N+MC26100+MC2630 | EMV-<br>456-458 |

**Competence Center:**
Electrical & Enviromental

Test report number:
2024-AT-TC-EE-ET-EX-0-000005-FG-066-E1



Date: 28.03.2025

# Appendix 1 (continued)
# Test equipment used



| | | |
|---|---|---|
| ☐ | Coupling network<br>CDN M2-100A | EMV-459 |
| ☐ | Coupling network<br>CDN M3-32A | EMV-460 |
| ☐ | Coupling network<br>CDN M5-100A | EMV-461 |
| ☐ | Current Clamp<br>CIP 9136A | EMV-462 |
| ☐ | DC Artificial Network<br>HV-AN 150 | EMV-464+465 |
| ☐ | Coupling Clamp<br>EM 101 | EMV-466 |
| ☐ | Decoupling Clamp<br>FTC 101 | EMV-467 |
| ☐ | Power attenuator<br>10 dB / 250 Watt | EMV-469/2 |
| ☐ | HV AMN<br>NNHV 8123 800A | EMV-472 |
| ☐ | HV AMN<br>NNHV 8123 800A | EMV-473 |

# Appendix 2
# Photodocumentation

**Division:**
Industry & Energy

Description: Front view

Test report reference:
2024-AT-TC-EE-ET-EX-0-000005-FG-066-E1

Page: 1 of 10

Date: 28.03.2025

# Appendix 2
# Photodocumentation

Description: Rear view



# Appendix 2
# Photodocumentation

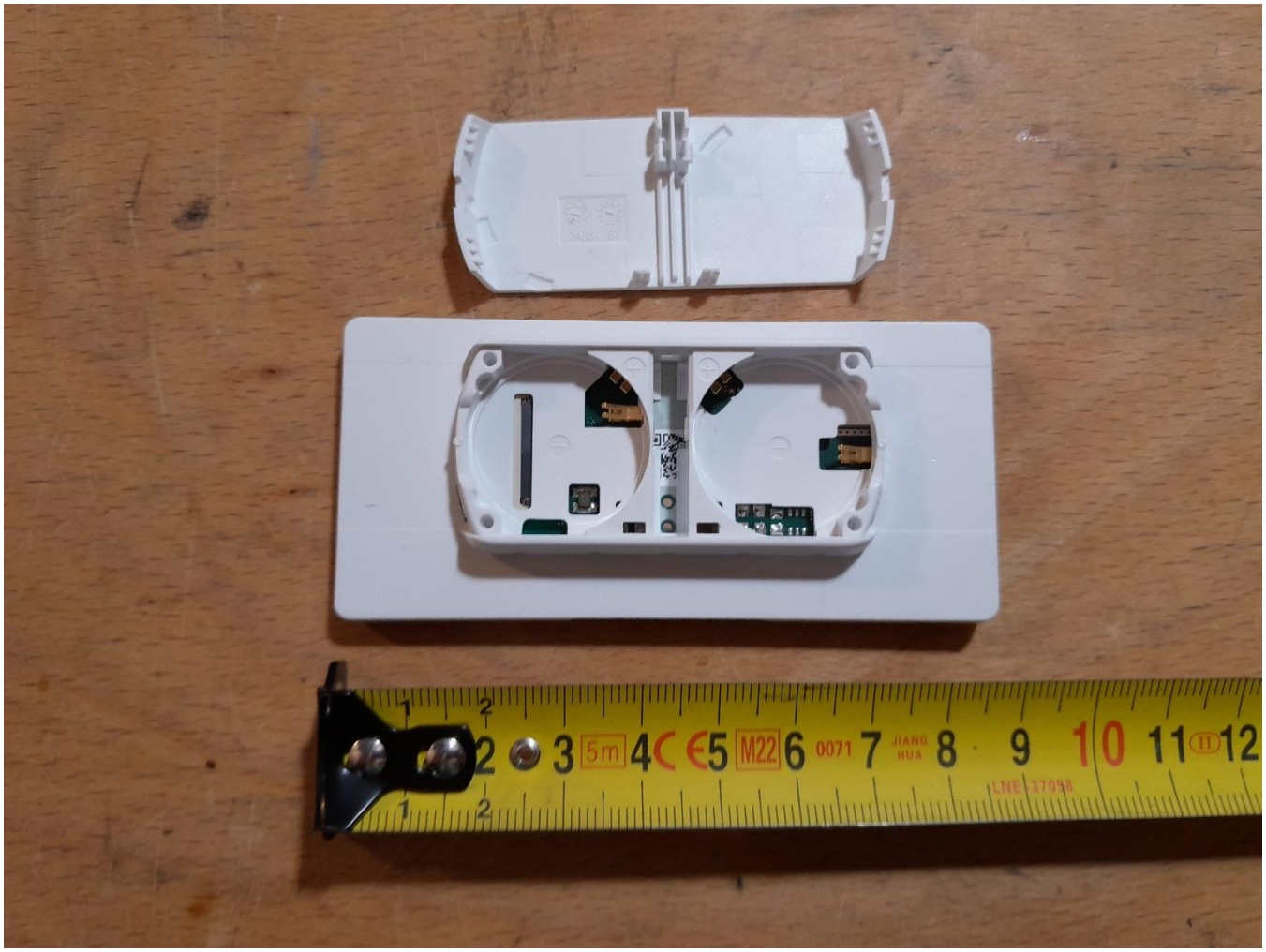
**Division:**
Industry & Energy

Description: Battery compartment opened

Test report reference:
2024-AT-TC-EE-ET-EX-0-000005-FG-066-E1



Date: 28.03.2025



# Appendix 2
# Photodocumentation

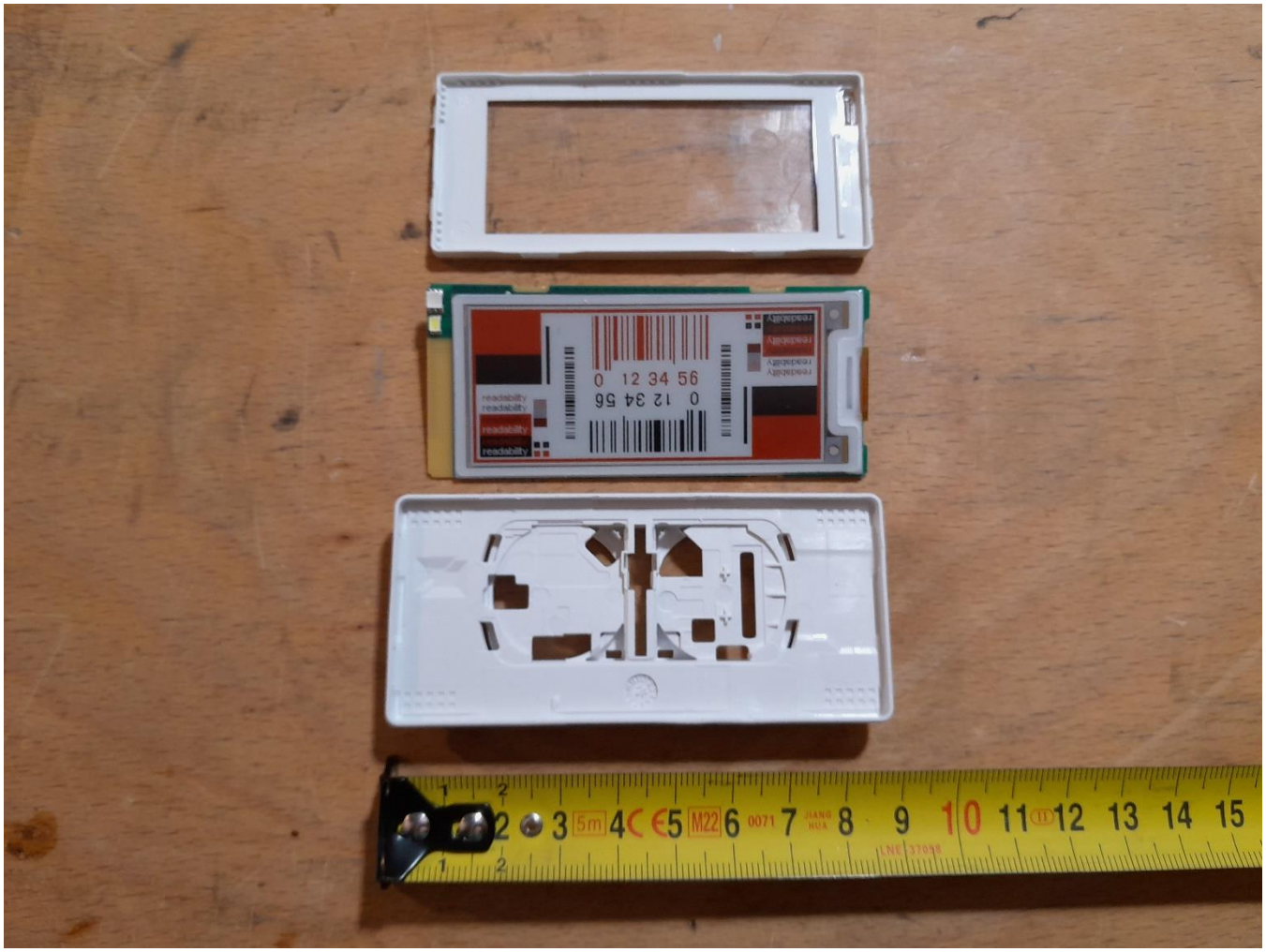
**Division:**
Industry & Energy

Description: Case opened

Test report reference:
2024-AT-TC-EE-ET-EX-0-000005-FG-066-E1



Date: 28.03.2025



# Appendix 2
# Photodocumentation

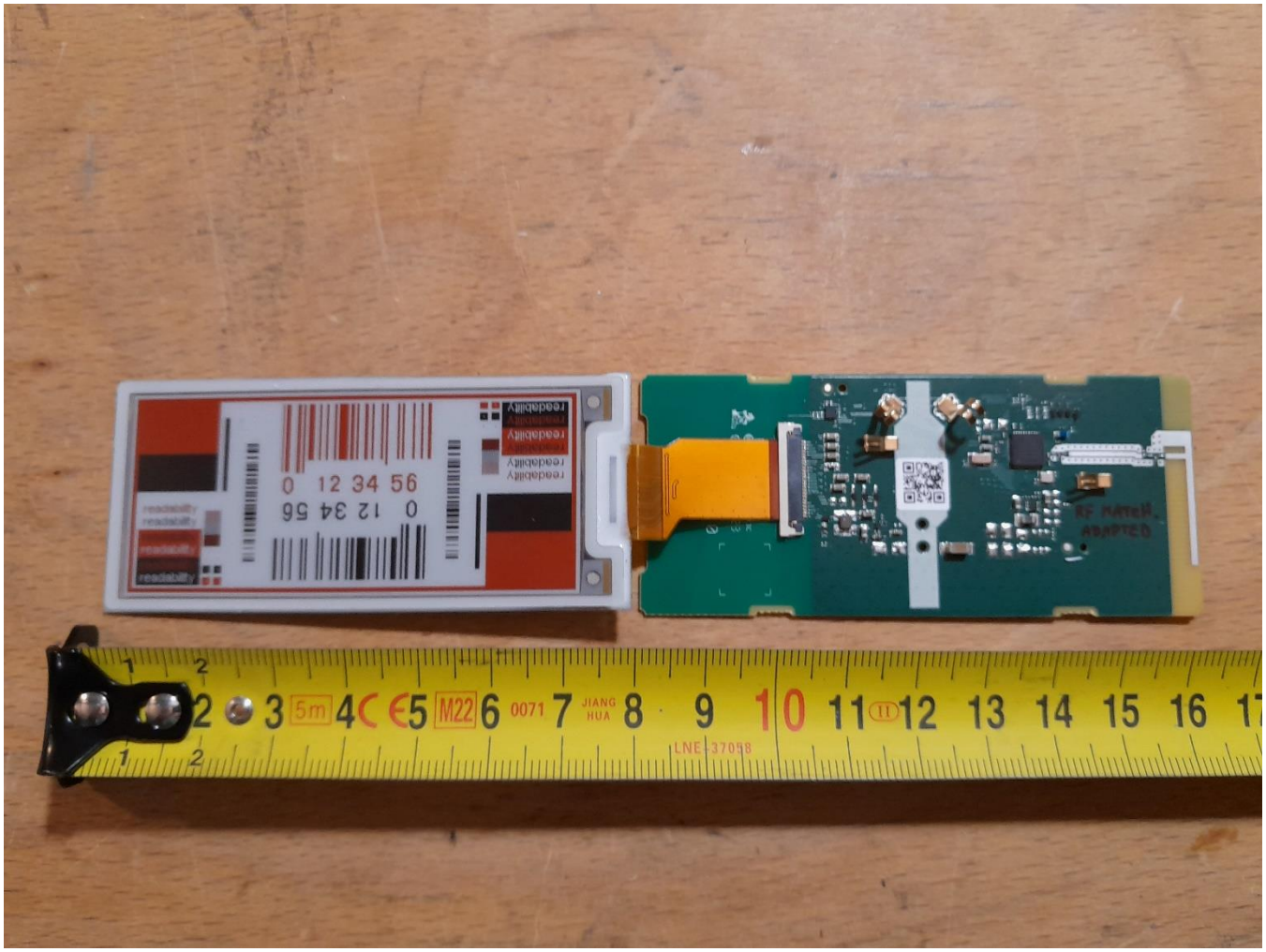
**Division:**
Industry & Energy

Description: Internal view #1

Test report reference:
2024-AT-TC-EE-ET-EX-0-000005-FG-066-E1

Page: 5 of 10

Date: 28.03.2025



# Appendix 2
# Photodocumentation

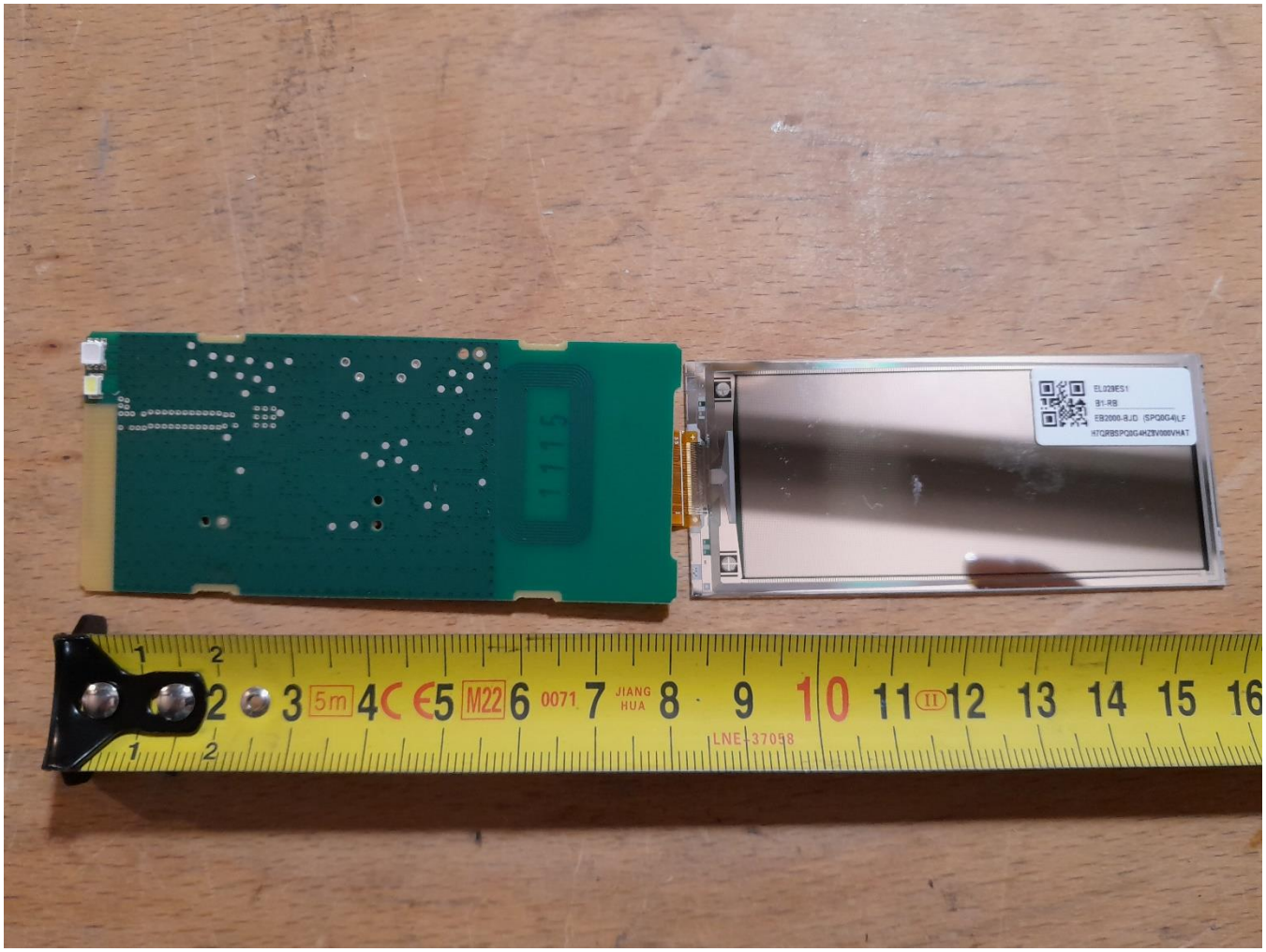
**Division:**
Industry & Energy

Description: Internal view #2

Test report reference:
2024-AT-TC-EE-ET-EX-0-000005-FG-066-E1



Date: 28.03.2025



# Appendix 2
# Photodocumentation

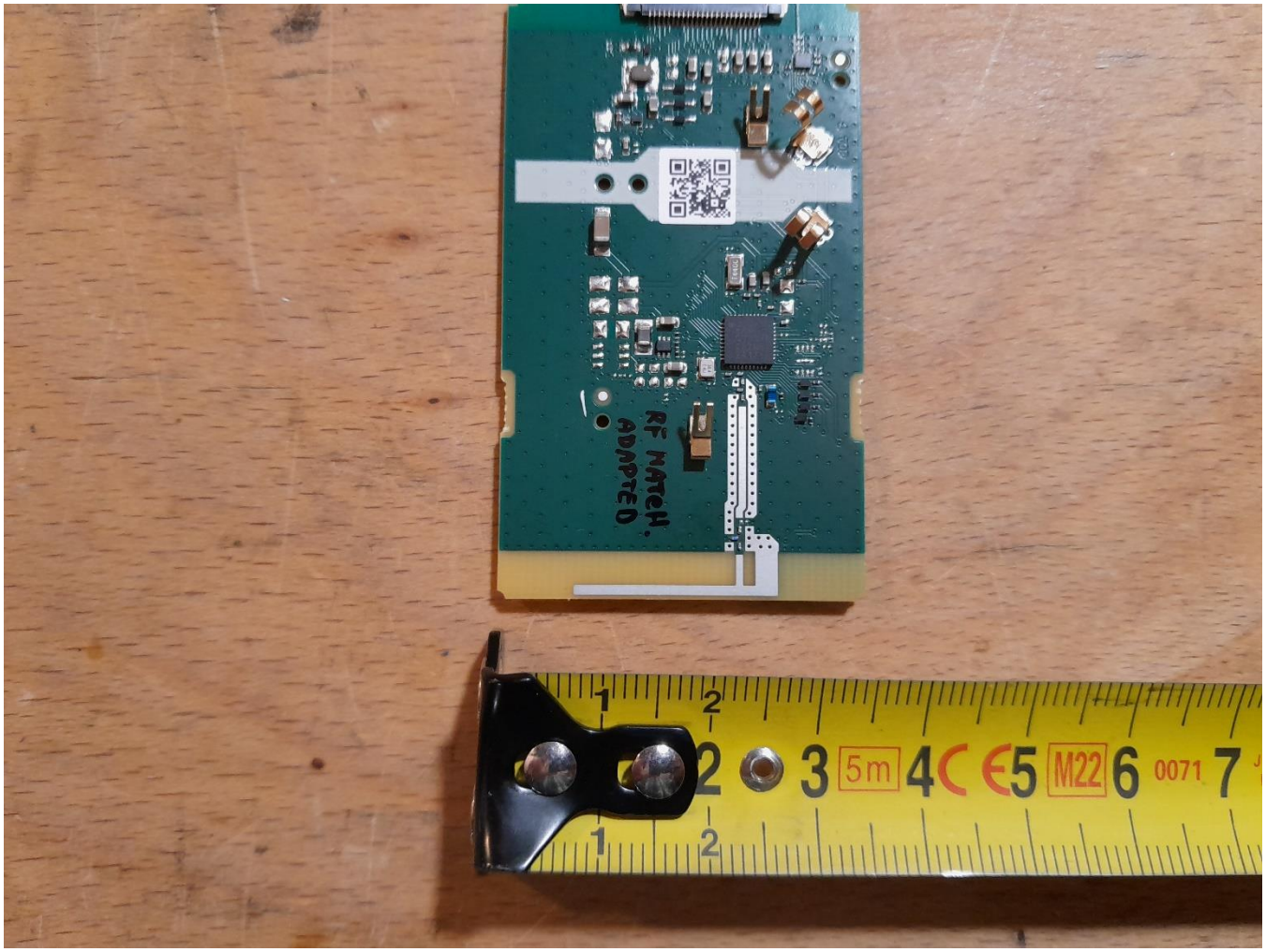
**Division:**
Industry & Energy

Description: Antenna detail

Test report reference:
2024-AT-TC-EE-ET-EX-0-000005-FG-066-E1

Page: 7 of 10

Date: 28.03.2025



# Appendix 2
# Photodocumentation

**Division:**
Industry & Energy

Description: Test setup emissions below 30 MHz

Test report reference:
2024-AT-TC-EE-ET-EX-0-000005-FG-066-E1



Date: 28.03.2025

# Appendix 2
# Photodocumentation

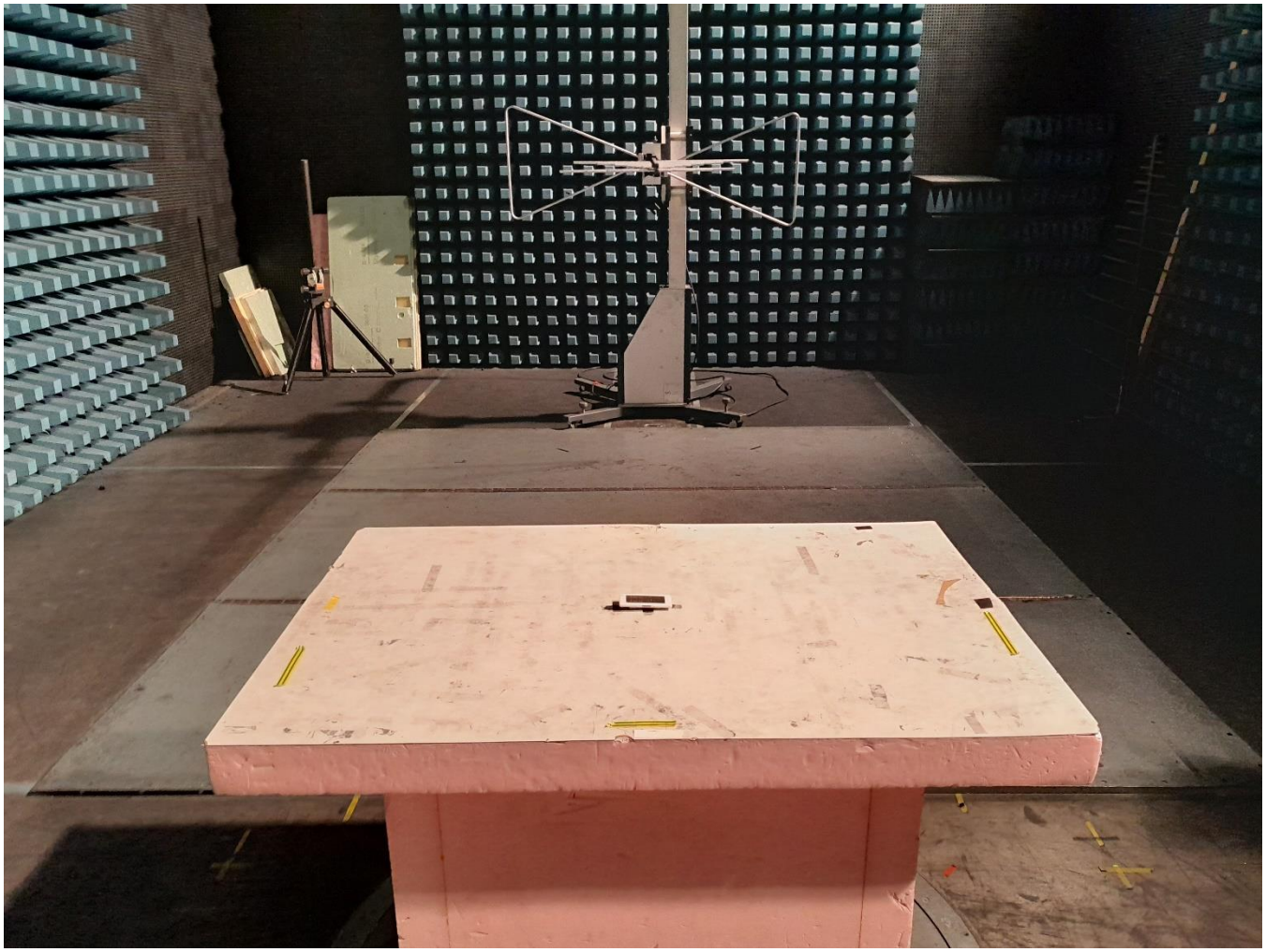
**Division:**
Industry & Energy

Description: Test setup emissions 30 MHz - 1 GHz

Test report reference:
2024-AT-TC-EE-ET-EX-0-000005-FG-066-E1



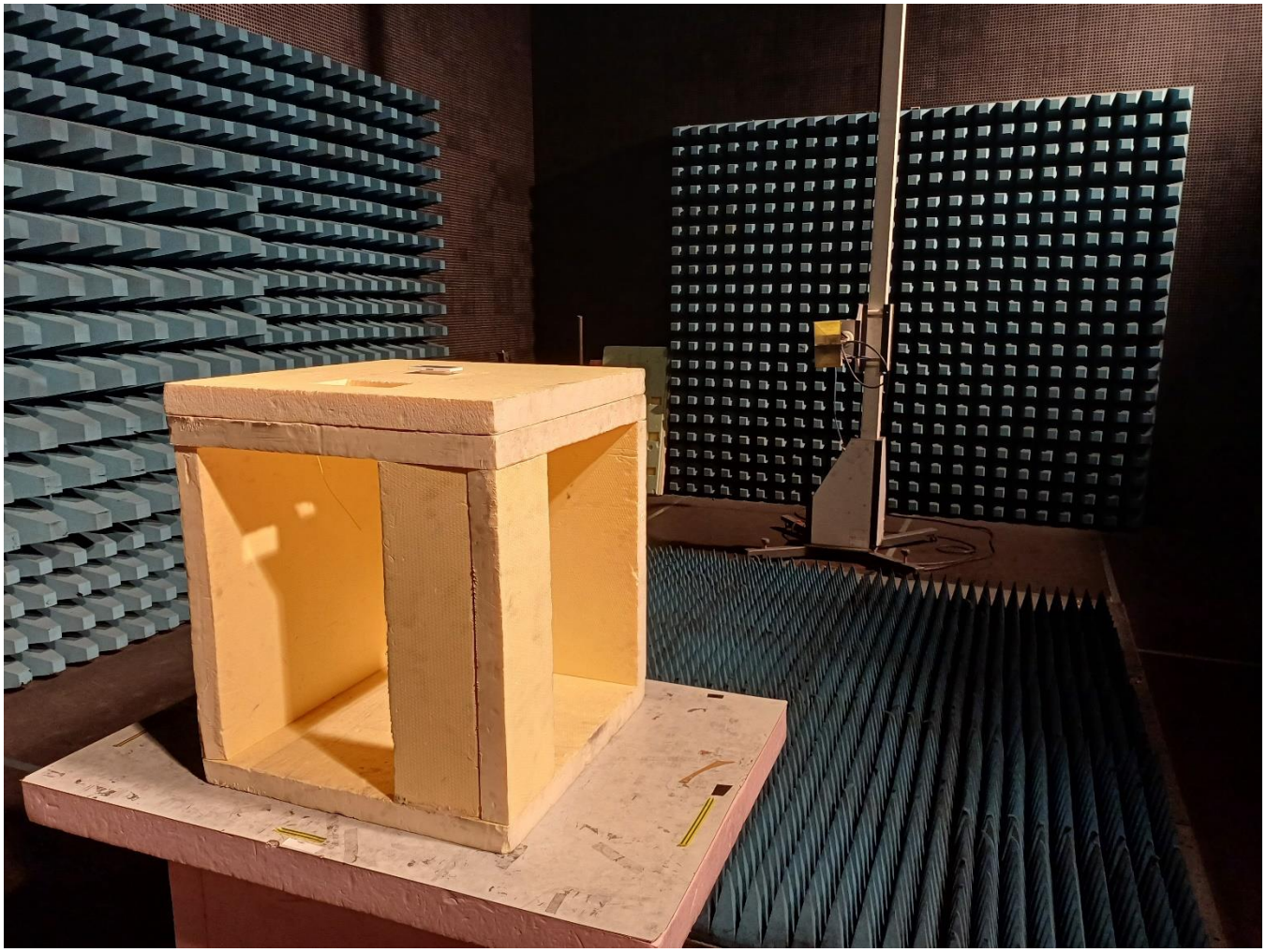
Date: 28.03.2025



# Appendix 2
# Photodocumentation



Description: Test setup emissions above 1 GHz



--- END OF TEST REPORT ---

| | | |
|---|---|---|
| Unterzeichner<br>*Signer* | Andreas Malek |  |
| Datum, Zeit<br>*Date, time* | 2025.04.01 22:24:33 MESZ | |
| Aussteller-Zertifikat<br>*Issuer's certificate* | TÜV AUSTRIA Group | |
| Seriennummer<br>*Serial number* | 136097799804368769714329353 | |
| Prüfinformation<br>*Check information* | Informationen zur Prüfung der elektronischen Signatur finden Sie unter: https://www.tuv.at/certifications | |
| Hinweis<br>*Note* | Dieses Dokument ist mit einer fortgeschrittenen elektronischen Signatur gemäß Art. 26 und deren Rechtswirkungen gemäß Art. 25 Abs. (1) der EU-VO Nr. 910/2014 vom 23.Juli 2014 (eIDAS-VO) versehen.<br>*This document is provided with an advanced electronic signature pursuant to Art. 26 and its legal effects pursuant to Art. 25 para. (1) of EU Regulation No. 910/2014 of 23 July 2014 (eIDAS Regulation).* | |

| | | |
|---|---|---|
| Unterzeichner<br>*Signer* | Michael Emminger |  |
| Datum, Zeit<br>*Date, time* | 2025.04.02 05:57:07 MESZ | |
| Aussteller-Zertifikat<br>*Issuer's certificate* | TÜV AUSTRIA Group | |
| Seriennummer<br>*Serial number* | 153415187167661149229102169 | |
| Prüfinformation<br>*Check information* | Informationen zur Prüfung der elektronischen Signatur finden Sie unter: https://www.tuv.at/certifications | |
| Hinweis<br>*Note* | Dieses Dokument ist mit einer fortgeschrittenen elektronischen Signatur gemäß Art. 26 und deren Rechtswirkungen gemäß Art. 25 Abs. (1) der EU-VO Nr. 910/2014 vom 23.Juli 2014 (eIDAS-VO) versehen.<br>*This document is provided with an advanced electronic signature pursuant to Art. 26 and its legal effects pursuant to Art. 25 para. (1) of EU Regulation No. 910/2014 of 23 July 2014 (eIDAS Regulation).* | |