

# TEST REPORT

of the accredited test laboratory

TÜV Nr.:INE-AT/FG-21/115

**Applicant:** SES-imagotag GmbH  
Kalsdorfer Strasse 12  
A – 8072 Fernitz-Mellach

**Tested Product:** Networking transceiver

**Product Name:** VUSION 5.9

**Model:** EDG3-0590-A

**FCC-ID:** 2ACQM-EDG3-0590-A

**IC-ID:** 12154A-EDG30590A

**Manufacturer:** SES-imagotag GmbH  
Kalsdorfer Strasse 12  
A – 8072 Fernitz-Mellach

**Output power / field strength:** 1,95 mV/m average @ 3m distance      **power supply:** 3V DC internal battery

**Frequency range:** 2404,053 - 2479,285 MHz      **Channel separation:** 0,35 MHz

**Standard:** FCC: 47 CFR Part 15 (eCFR 24.03.2021)  
RSS-210 Issue 10, December 2019

Testing Laboratory,  
Inspection Body,  
Certification Body,  
Calibration Laboratory,  
Verifizierungsstelle**Notified Body 0408**  
IC 2932K-1**Non-executive**  
**Board of Directors:**  
KR DI Johann  
Marihart**Management:**  
DI Dr. Stefan Haas  
Mag. Christoph  
Wenninger**Registered Office:**  
Deutschstrasse 10  
1230 Vienna/Austria**Branch Offices:**  
www.tuv.at/standorte**Company Register**  
**Court / - Number:**  
Vienna / FN 288476 f**Bank Details:**  
IBAN  
AT131200052949001066  
BIC BKAUATWWVAT ATU63240488  
DVR 3002476TÜV AUSTRIA SERVICES GMBH  
Test laboratory for EMC

Ing. Andreas Malek

**examined by / Testing**  
**Laboratory**  
**TÜV AUSTRIA SERVICES**  
**GMBH**



26.03.2021

Ing. Michael Emminger

**approved by / Testing**  
**Laboratory**  
**TÜV AUSTRIA SERVICES**  
**GMBH**

A publication of this test report is only permitted literally.

Copying or reproduction of partial sections needs a written permission of TÜV AUSTRIA  
SERVICES GMBH.

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

## Contents

|          | Designation                                             | PAGE  |
|----------|---------------------------------------------------------|-------|
| 1.       | Applicant                                               | 3     |
| 2.       | Description of EUT                                      | 4     |
| 3.       | Standards / Final result                                | 5     |
| 4.       | Test results                                            |       |
|          | List of measurements according to 47 CFR 15 and RSS-210 |       |
| 4.1      | Test object data                                        | 6     |
| 4.2      | Number of channels and channel spacing                  | 7     |
| 4.3      | Duty Cycle for averaging                                | 8     |
| 4.4      | Field strength at 2400 – 2483,5 MHz                     | 9-11  |
| 4.5      | Emissions outside 2400 – 2483,5 MHz (15.209)            | 12-14 |
| Appendix | Designation                                             | PAGES |
| 1        | Test equipment used                                     | 4     |
| 2        | Photodocumentation                                      | 10    |

## 1. Applicant

**Company:** SES-imagotag GmbH

**Department:** Product & Project Manager

**Address:** A – 8072 Fernitz-Mellach; Kalsdorfer Strasse 12

**Contact person:** Mr. Philipp Jauck

**EUT received on:** 24.03.2021

**Tests were performed on:** 24.03. and 26.03.2021

## 2. Description of EUT

|                                                   |                                                                                                                                                      |
|---------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>EUT:</b>                                       | Networking transceiver                                                                                                                               |
| <b>Product Name:</b>                              | VUSION 5.9                                                                                                                                           |
| <b>Model:</b>                                     | EDG3-0590-A                                                                                                                                          |
| <b>Serial Number:</b>                             | Prototype                                                                                                                                            |
| <b>Manufacturer:</b>                              | SES-imagotag GmbH<br>A – 8072 Fernitz-Mellach; Kalsdorfer Strasse 12                                                                                 |
| <b>Description:</b>                               | SES-imagotag GmbH provided the following configuration for the measurements:<br><br>Prototype with special test-firmware for continuous transmission |
| <b>Operating mode:</b>                            | The measurements were carried out at the following running states:<br><br>test-firmware running, transmitting continuously                           |
| <b>Technical data EUT:</b>                        | Rated voltage: 3VDC<br>Rated current: <1A<br>Rated frequency: DC<br><br>Mains voltage during the tests: 3VDC internal battery                        |
| <b>Climatic conditions in the emc laboratory:</b> | Relative humidity: 23%<br>Temperature: 23°C                                                                                                          |

### 3. Standards / Final result

| Name                                                                                                    | Title                                                   | Deviation | Result |
|---------------------------------------------------------------------------------------------------------|---------------------------------------------------------|-----------|--------|
| Title 47 CFR Part 15<br>eCFR 24.03.2021                                                                 | RADIO FREQUENCY DEVICES                                 | none      | OK     |
| RSS-210 Issue 10,<br>December 2019                                                                      | Licence-Exempt Radio Apparatus:<br>Category I Equipment | none      | OK     |
| <p>Result: Opinions and interpretation of testing laboratory<br/>OK: EUT passed<br/>NOK: EUT failed</p> |                                                         |           |        |

## 4.1 TEST OBJECT DATA

### General EUT Description

This transceiver module 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 1,95 mV/m average @ 3m distance. There is no power control or regulation.

2.1033 (7) Maximum output power rating: 1,95 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

Tests were performed on: March 24<sup>th</sup> and March 26<sup>th</sup> 2021.

## 4.2 Number of channels and channel spacing

§ 2.1033

Channel plan:

| ESL-CH | RF-CH | $f_{G2}$ [GHz]<br>(26.000000 MHz)<br>(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                                       |

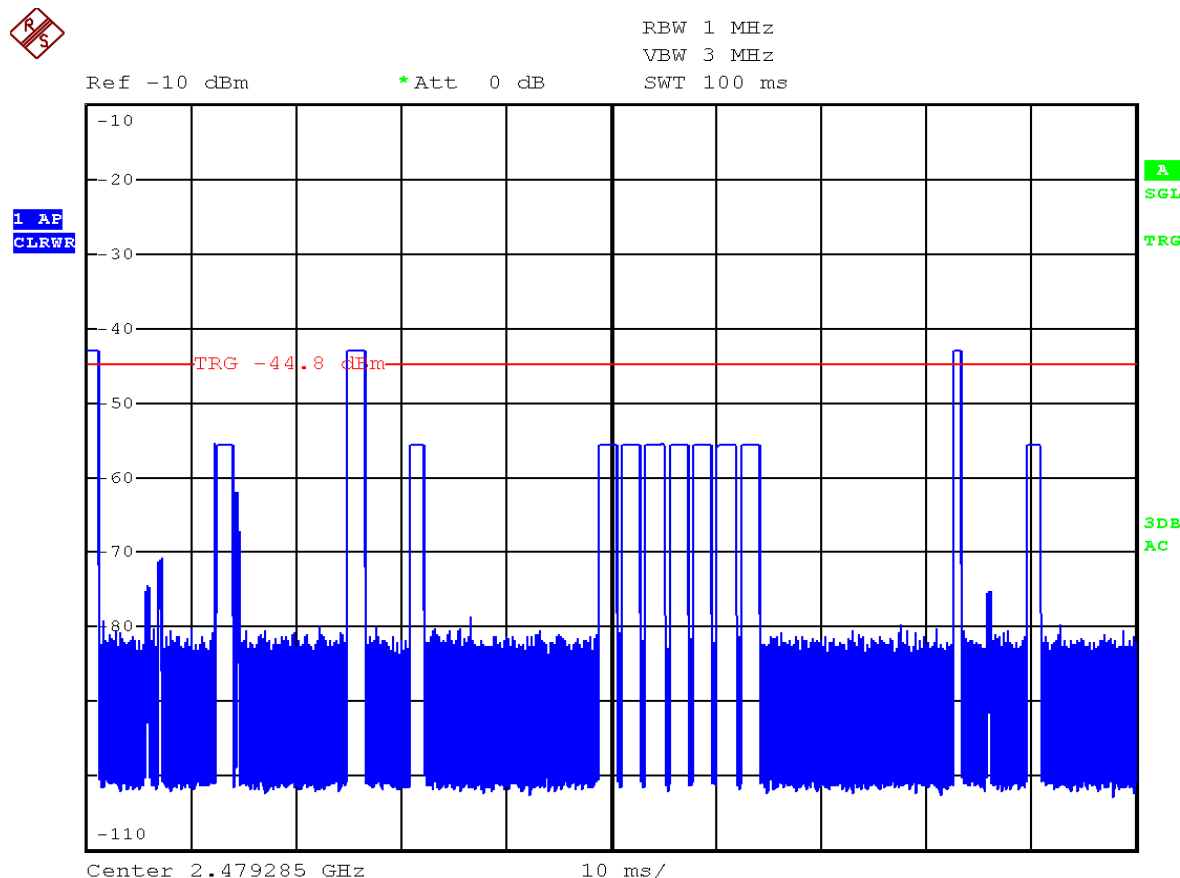
Tests were performed on ESL channels 0, 4 and 10.

Test Equipment used: N/A

#### 4.3 Duty Cycle measurements for averaging

§ 15.249 (e)

Mode: data transmission (worst case in 100ms)



Date: 24.MAR.2021 12:16:50

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 burst in a 100ms time frame has a length of 1,46ms, the second one is 1,97ms in length and the third one is 1,19ms, giving a duty cycle of 4,62% or an average factor of -26,7 dB.

#### 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: NT-203/1

#### 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 measured was 92,5 dBµV/m = 42,17 mV/m at 3m distance.

With the averaging factor calculated on page 8 of this test report of -26,7 dB the maximum average value is then 65,8 dBµV/m = 1,95 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

**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 92,3 dBµV/m = 41,21 mV/m at 3m distance.

With the averaging factor calculated on page 8 of this test report of -26,7 dB the maximum average value is then 65,6 dBµV/m = 1,91 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

**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 92,1 dBµV/m = 40,27 mV/m at 3m distance.

With the averaging factor calculated on page 8 of this test report of -26,7 dB the maximum average value is then 65,4 dBµV/m = 1,86 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                                           |

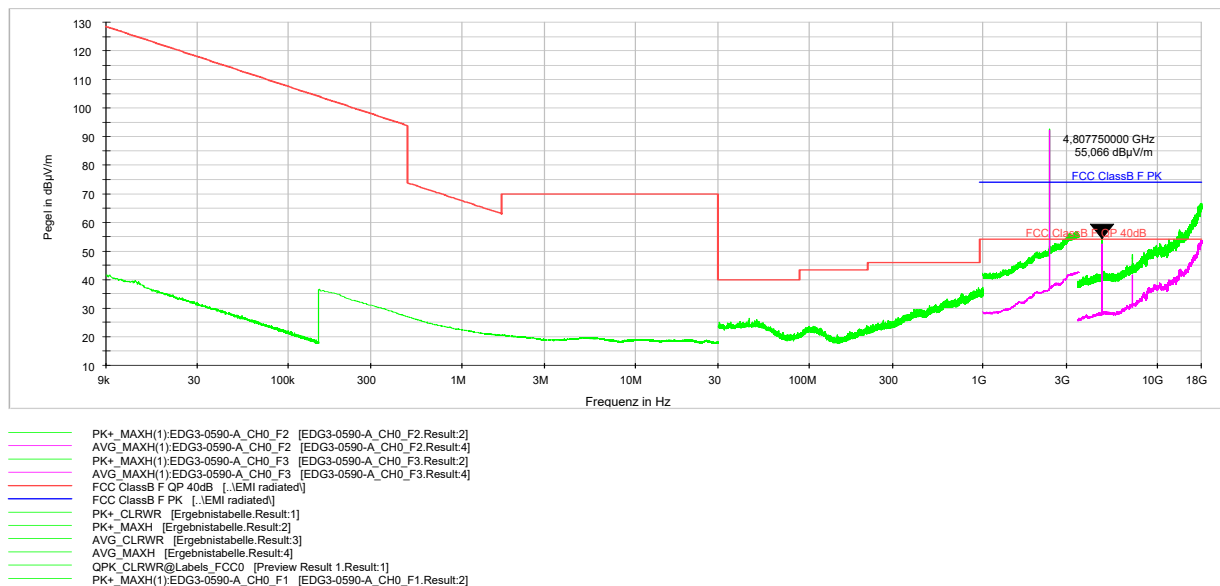
(c) Field strength limits are specified at a distance of 3 meters.

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

#### 4.5 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



Worst case Emission: 55,1 dBµV/m Peak at 4807,75 MHz giving 28,4 dBµV/m average with the factor described on page 8.

#### 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:

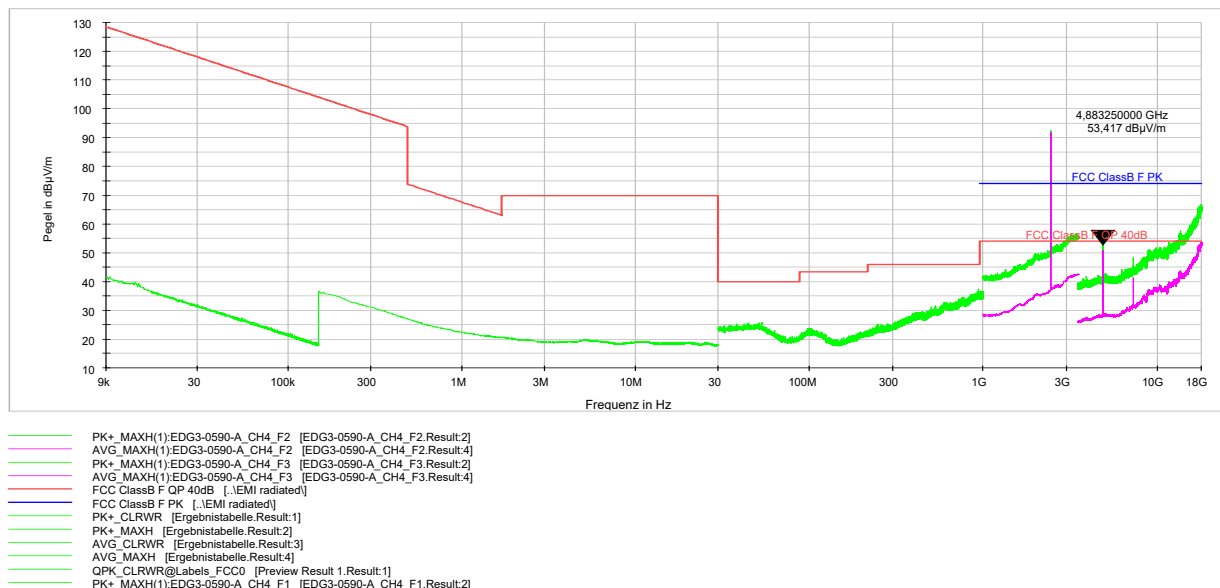
EMV-100; EMV-101; EMV-102; EMV-103; EMV-105; EMV-110; EMV-111; EMV-112; EMV-200/1; NT-416

Remark: Although the measurements were made up to the 10<sup>th</sup> 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.

## 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



Worst case Emission: 53,4 dBµV/m Peak at 4883,25 MHz giving 26,7 dBµV/m average with the factor described on page 8.

### 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:

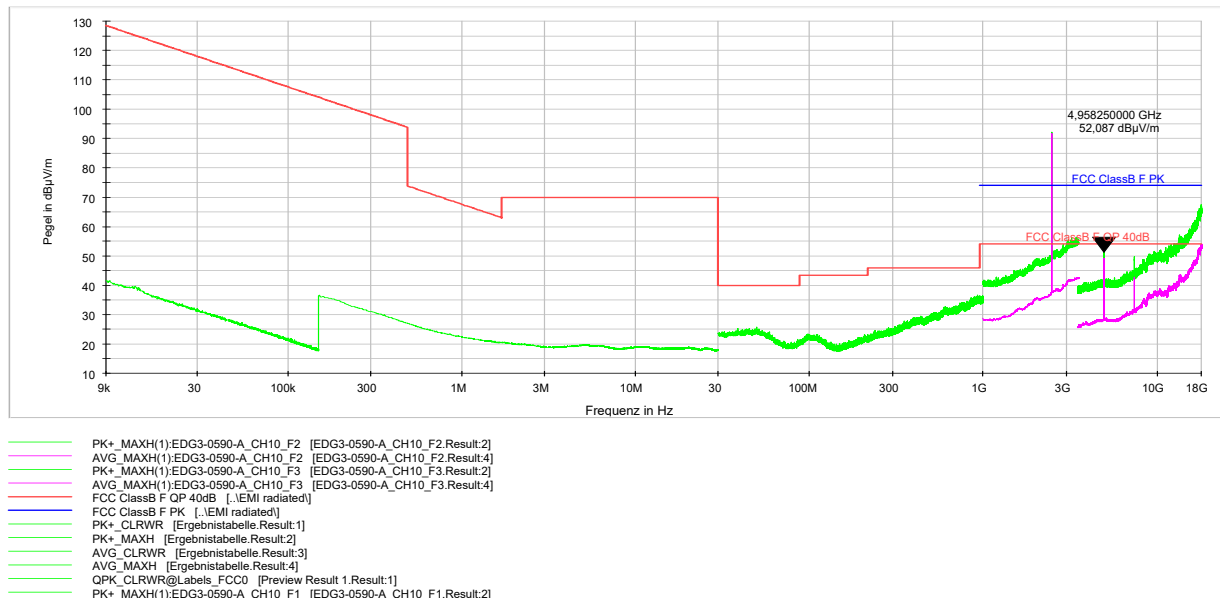
EMV-100; EMV-101; EMV-102; EMV-103; EMV-105; EMV-110; EMV-111; EMV-112; EMV-200/1; NT-416

Remark: Although the measurements were made up to the 10<sup>th</sup> 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.

## 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



Worst case Emission: 52,1 dBµV/m Peak at 4958,25 MHz giving 25,4 dBµV/m average with the factor described on page 8.

### 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-200/1; NT-416

Remark: Although the measurements were made up to the 10<sup>th</sup> 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.

# Appendix 1

## Test equipment used

**Division:**  
Industry & Energy

Department: FG

Test report number:  
INE-AT/FG-21/115

Page: 1 of 4

Date: 26.03.2021

|                                                                           |          |                                                                                 |                    |
|---------------------------------------------------------------------------|----------|---------------------------------------------------------------------------------|--------------------|
| <input type="checkbox"/> Anechoic Chamber with 3m measurement distance    | NT-100   | <input type="checkbox"/> Power quality analyzer<br>Fluke 1760 (complete set)    | NT-160 -<br>NT-173 |
| <input type="checkbox"/> Stripline according to ISO 11452-5               | NT-108   | <input type="checkbox"/> Spectrumalyzer – FSP7<br>9 kHz – 7 GHz                 | NT-200             |
| <input type="checkbox"/> MA4000 - Antenna mast<br>1 - 4 m height          | NT-110/1 | <input type="checkbox"/> ESCI - Test receiver<br>9 kHz - 7 GHz                  | NT-203/1           |
| <input type="checkbox"/> DS - Turntable<br>0 - 400 ° Azimuth              | NT-111/1 | <input type="checkbox"/> ESR – Test receiver<br>20 Hz – 26,5 GHz                | NT-207/1           |
| <input type="checkbox"/> CO3000 Controller<br>Mast+Turntable              | NT-112/1 | <input type="checkbox"/> Digital Radio Tester<br>CMW500                         | NT-208/1           |
| <input type="checkbox"/> HUF-Z3 - Log. Per. Antenna<br>200 - 1000 MHz     | NT-121   | <input type="checkbox"/> Noise-gen., ITU-R 559-2<br>20 Hz – 20 kHz              | NT-209             |
| <input type="checkbox"/> FMZB1513 - Loop Antenna<br>9 kHz - 30 MHz        | NT-122/1 | <input type="checkbox"/> CMTA - Radiocommunication<br>analyzer ; 0,1 - 1000 MHz | NT-210             |
| <input type="checkbox"/> HFH-Z6 - Rod Antenna<br>9 kHz - 30 MHz           | NT-123   | <input type="checkbox"/> 3271 - Spectrum analyzer<br>100 Hz - 26,5 GHz          | NT-211             |
| <input type="checkbox"/> 3121C - Dipole Antenna<br>28 - 1000 MHz          | NT-124   | <input type="checkbox"/> Digital Radio Tester<br>Aeroflex 3920                  | NT-212/1           |
| <input type="checkbox"/> 3115 - Horn Antenna<br>1 - 18 GHz (immunity)     | NT-125   | <input type="checkbox"/> Mixer M28HW<br>26,5 GHz - 40 GHz                       | NT-214             |
| <input type="checkbox"/> 3116 - Horn Antenna<br>18 - 40 GHz               | NT-126   | <input type="checkbox"/> RubiSource T&M<br>Timing reference                     | NT-216             |
| <input type="checkbox"/> SAS-200/543 - Bicon. Antenna<br>20 MHz - 300 MHz | NT-127   | <input type="checkbox"/> Radiocommunicationanalyzer<br>SWR 1180 MD              | NT-217             |
| <input type="checkbox"/> AT-1080 - Log. Per. Antenna<br>80 - 1000 MHz     | NT-128   | <input type="checkbox"/> Mixer M19HWD<br>40 GHz – 60 GHz                        | NT-218             |
| <input type="checkbox"/> HK-116 - bicon. Antenna<br>20 MHz - 300 MHz      | NT-129   | <input type="checkbox"/> Mixer M12HWD<br>60 GHz – 90 GHz                        | NT-219             |
| <input type="checkbox"/> HK-116 - bicon. Antenna<br>20 MHz - 300 MHz      | NT-130   | <input type="checkbox"/> DSO9104<br>Digital scope                               | NT-220/1           |
| <input type="checkbox"/> 3146 - Log. Per. Antenna<br>200 – 1000 MHz       | NT-131   | <input type="checkbox"/> TPS 2014<br>Digital scope                              | NT-222             |
| <input type="checkbox"/> VULB 9163 Trilog Antenna<br>30 – 3000 MHz        | NT-131/1 | <input type="checkbox"/> Artificial Ear<br>according to IEC 60318               | NT-224             |
| <input type="checkbox"/> Loop Antenna<br>H-Field                          | NT-132   | <input type="checkbox"/> 1 kHz Sound calibrator                                 | NT-225             |
| <input type="checkbox"/> Horn Antenna<br>500 MHz - 2900 MHz               | NT-133   | <input type="checkbox"/> B10 - Harmonics and<br>flicker analyzer                | NT-232             |
| <input type="checkbox"/> Horn Antenna<br>500 MHz - 6000 MHz               | NT-133/1 | <input type="checkbox"/> SRM-3006<br>Spectrumalyzer                             | NT-233/1a          |
| <input type="checkbox"/> Log. per. Antenna<br>800 MHz - 2500 MHz          | NT-134   | <input type="checkbox"/> E-field probe SRM<br>75 MHz – 3 GHz                    | NT-234             |
| <input type="checkbox"/> Log. per. Antenna<br>800 MHz - 2500 MHz          | NT-135   | <input type="checkbox"/> Field Meter NBM-500<br>incl. E- and H-Field probes     | NT-240a-e          |
| <input type="checkbox"/> BiConiLog Antenna<br>26 MHz – 2000 MHz           | NT-137   | <input type="checkbox"/> Hall-Teslameter<br>ETM-1                               | NT-241             |
| <input type="checkbox"/> Conical Dipol Antenna<br>PCD8250                 | NT-138   | <input type="checkbox"/> EFA-3<br>H-field- / E-field probe                      | NT-243             |
| <input type="checkbox"/> HF 906 - Horn Antenna<br>1 - 18 GHz (emission)   | NT-139   | <input type="checkbox"/> EHP-50F<br>H-field- / E-field probe                    | NT-243/1           |
| <input type="checkbox"/> HZ-1<br>Antenna tripod                           | NT-150   | <input type="checkbox"/> Field Meter EMR-200<br>100 kHz – 3 GHz                 | NT-244             |
| <input type="checkbox"/> BN 1500<br>Antenna tripod                        | NT-151   | <input type="checkbox"/> E-field probe<br>100 kHz – 3 GHz                       | NT-245             |
| <input type="checkbox"/> Ant. tripod for EN61000-4-3<br>Model TP1000A     | NT-156   | <input type="checkbox"/> H-field probe<br>300 kHz – 30 MHz                      | NT-246             |

## Appendix 1 (continued)

### Test equipment used

|                          |                                                       |             |                          |                                                    |          |
|--------------------------|-------------------------------------------------------|-------------|--------------------------|----------------------------------------------------|----------|
| <input type="checkbox"/> | E-field probe<br>3 MHz – 18 GHz                       | NT-247      | <input type="checkbox"/> | 500W1000M7 - RF-Amplifier<br>80 - 1000 MHz / 500 W | NT-332   |
| <input type="checkbox"/> | H-field probe<br>27 MHz – 1 GHz                       | NT-248      | <input type="checkbox"/> | AS0102-65R - RF-Amplifier<br>1 GHz - 2 GHz         | NT-333   |
| <input type="checkbox"/> | ELT-400<br>1 Hz – 400 kHz                             | NT-249      | <input type="checkbox"/> | APA01 – RF-Amplifier<br>0,5 GHz – 2,5 GHz          | NT-334   |
| <input type="checkbox"/> | MDS 21 - Absorbing clamp<br>30 - 1000 MHz             | NT-250      | <input type="checkbox"/> | Preamplifier<br>1 GHz - 4 GHz                      | NT-335   |
| <input type="checkbox"/> | FCC-203I<br>EM Injection clamp                        | NT-251      | <input type="checkbox"/> | Preamplifier for GPS<br>MKU 152 A                  | NT-336   |
| <input type="checkbox"/> | FCC-203I-DCN<br>Ferrite decoupling network            | NT-252      | <input type="checkbox"/> | Preamplifier<br>1 GHz – 18 GHz                     | NT-337/1 |
| <input type="checkbox"/> | PR50<br>Current Probe                                 | NT-253      | <input type="checkbox"/> | DC Block 10 MHz – 18 GHz<br>Model 8048             | NT-338   |
| <input type="checkbox"/> | i310s<br>Current Probe                                | NT-254/1    | <input type="checkbox"/> | 2-97201<br>Electronic load                         | NT-341   |
| <input type="checkbox"/> | Fluke 87 V<br>True RMS Multimeter                     | NT-260      | <input type="checkbox"/> | TSX3510P - Power supply<br>0-30 V / 0 - 10 A       | NT-344   |
| <input type="checkbox"/> | Model 2000<br>Digital Multimeter                      | NT-261      | <input type="checkbox"/> | TSX3510P - Power supply<br>0-30 V / 0 - 10 A       | NT-345   |
| <input type="checkbox"/> | Fluke 87 V<br>Digital Multimeter                      | NT-262/1    | <input type="checkbox"/> | VDS 200<br>Mobil-impuls-generator                  | NT-350   |
| <input type="checkbox"/> | ESH2-Z5-U1 Artificial mains<br>network 4x25A          | NT-300      | <input type="checkbox"/> | LD 200<br>Mobil-impuls-generator                   | NT-351   |
| <input type="checkbox"/> | ESH3-Z5-U1 Artificial mains<br>network 2x10A          | NT-301      | <input type="checkbox"/> | MPG 200<br>Mobil-Impuls-Generators                 | NT-352   |
| <input type="checkbox"/> | ESH3-Z6-U1 Artificial mains<br>network 1x100A         | NT-302      | <input type="checkbox"/> | EFT 200<br>Mobil-impuls-generator                  | NT-353   |
| <input type="checkbox"/> | ESH3-Z6-U1 Artificial mains<br>network 1x100A         | NT-302a     | <input type="checkbox"/> | AN 200 S1<br>Artificial Network                    | NT-354   |
| <input type="checkbox"/> | PHE 4500/B<br>Power amplifier                         | NT-304      | <input type="checkbox"/> | FP-EFT 32M<br>3 ph. Coupling filter (Burst)        | NT-400/1 |
| <input type="checkbox"/> | EZ10<br>T-Artificial Network                          | NT-305      | <input type="checkbox"/> | PHE 4500 - Mains impedance<br>network              | NT-401   |
| <input type="checkbox"/> | SMG - Signal generator<br>0,1 - 1000 MHz              | NT-310      | <input type="checkbox"/> | IP 6.2 Coupling filter for<br>data lines (Surge)   | NT-403   |
| <input type="checkbox"/> | SMA100A - Signal generator<br>9 kHz - 6 GHz           | NT-310/1    | <input type="checkbox"/> | TK 9421 High Power Volt. Probe<br>150 kHz - 30 MHz | NT-409   |
| <input type="checkbox"/> | RefRad<br>Reference generator                         | NT-312      | <input type="checkbox"/> | ESH2-Z3 - Probe<br>9 kHz - 30 MHz                  | NT-410   |
| <input type="checkbox"/> | SMP 02 Signal generator<br>10 MHz - 20 GHz            | NT-313      | <input type="checkbox"/> | IP 4 - Capacitive clamp<br>(Burst)                 | NT-411   |
| <input type="checkbox"/> | 40 MHz Arbitrary Generator<br>TGA1241                 | NT-315      | <input type="checkbox"/> | Highpass-Filter<br>100 MHz – 3 GHz                 | NT-412   |
| <input type="checkbox"/> | Artificial mains network<br>NSLK 8127-PLC             | NT-316      | <input type="checkbox"/> | Highpass-Filter<br>600 MHz – 4 GHz                 | NT-413   |
| <input type="checkbox"/> | PSURGE 4.1<br>Surge generator                         | NT-324      | <input type="checkbox"/> | Highpass-Filter<br>1250 MHz – 4 GHz                | NT-414   |
| <input type="checkbox"/> | IMU4000<br>Immunity test system                       | NT-325/1    | <input type="checkbox"/> | Highpass-Filter<br>1800 MHz – 16 GHz               | NT-415   |
| <input type="checkbox"/> | VCS 500-M6<br>Surge-Generator                         | NT-326      |                          |                                                    |          |
| <input type="checkbox"/> | Oscillatory Wave Simulator incl.<br>Coupling networks | NT-328a+b+c |                          |                                                    |          |
| <input type="checkbox"/> | BTA-250 - RF-Amplifier<br>9 kHz - 220 MHz / 250 W     | NT-330      |                          |                                                    |          |
| <input type="checkbox"/> | T82-50 RF-Amplifier<br>2 GHz – 8 GHz                  | NT-331      |                          |                                                    |          |

**Division:**  
Industry & Energy

Department: FG

Test report number:  
INE-AT/FG-21/115

Page: 2 of 4

Date: 26.03.2021

## Appendix 1 (continued)

### Test equipment used

|                          |                                                |          |                          |                                                       |                    |                                         |
|--------------------------|------------------------------------------------|----------|--------------------------|-------------------------------------------------------|--------------------|-----------------------------------------|
| <input type="checkbox"/> | Highpass-Filter<br>3500 MHz – 18 GHz           | NT-416   | <input type="checkbox"/> | FCC-801-AF10<br>Coupling decoupling network           | NT-461             | <b>Division:</b><br>Industry & Energy   |
| <input type="checkbox"/> | RF-Attenuator 10 dB<br>DC – 18 GHz / 50 W      | NT-417/1 | <input type="checkbox"/> | FCC-801-S25<br>Coupling decoupling network            | NT-462             | Department: FG                          |
| <input type="checkbox"/> | RF-Attenuator 6 dB<br>DC – 18 GHz / 50 W       | NT-418   | <input type="checkbox"/> | FCC-801-T4<br>Coupling decoupling network             | NT-463             | Test report number:<br>INE-AT/FG-21/115 |
| <input type="checkbox"/> | RF-Attenuator 3 dB<br>DC – 18 GHz / 50 W       | NT-419   | <input type="checkbox"/> | FCC-801-C1<br>Coupling decoupling network             | NT-464             | Page: 3 of 4                            |
| <input type="checkbox"/> | RF-Attenuator 20 dB<br>DC - 1000 MHz / 25 W    | NT-421   | <input type="checkbox"/> | SW 9605 - Current probe<br>150 kHz – 30 MHz           | NT-465/1           | Date: 26.03.2021                        |
| <input type="checkbox"/> | RF-Attenuator 30 dB<br>DC - 1000 MHz / 1 W     | NT-423   | <input type="checkbox"/> | 95242-1 – Current probe<br>1 MHz – 400 MHz            | NT-468             |                                         |
| <input type="checkbox"/> | RF-Attenuator<br>30 dB                         | NT-424   | <input type="checkbox"/> | 94106-1L-1 – Current probe<br>100 kHz – 450 MHz       | NT-471             |                                         |
| <input type="checkbox"/> | RF-Attenuator 6 dB<br>DC - 1000 MHz / 1 W      | NT-425   | <input type="checkbox"/> | GA 1240 Power amplifier<br>according to EN 61000-4-16 | NT-480             |                                         |
| <input type="checkbox"/> | RF-Attenuator 6 dB<br>DC - 1000 MHz / 1 W      | NT-426   | <input type="checkbox"/> | Coupling networks<br>according to EN 61000-4-16       | NT-481 -<br>NT-483 |                                         |
| <input type="checkbox"/> | RF-Attenuator<br>6 dB                          | NT-428   | <input type="checkbox"/> | Van der Hoofden Test Head                             | NT-484             |                                         |
| <input type="checkbox"/> | RF-Attenuator<br>0 dB - 81 dB                  | NT-429   | <input type="checkbox"/> | EMC Video/Audiosystem                                 | NT-511/1           |                                         |
| <input type="checkbox"/> | WRU 27 - Band blocking<br>27 MHz               | NT-430   | <input type="checkbox"/> | ES-K1 Version 1.71 SP2<br>Test software               | NT-520             |                                         |
| <input type="checkbox"/> | WHJ450C9 AA - High pass<br>450 MHz             | NT-431   | <input type="checkbox"/> | EMC32 Version 10.60.20<br>Test software               | NT-520/1           |                                         |
| <input type="checkbox"/> | WHJ250C9 AA - High pass<br>250 MHz             | NT-432   | <input type="checkbox"/> | SRM-TS Version 1.3<br>software for SRM-3000           | NT-522             |                                         |
| <input type="checkbox"/> | RF-Load<br>150 W                               | NT-433   | <input type="checkbox"/> | SRM-TS Version 1.3.1<br>software for SRM-3006         | NT-522/1           |                                         |
| <input type="checkbox"/> | Impedance transducer<br>1:4 ; 1:9 ; 1:16       | NT-435   | <input type="checkbox"/> | Spitzenberger und Spies<br>Test software V4.1         | NT-525             |                                         |
| <input type="checkbox"/> | RF-Attenuator DC – 18 GHz<br>6 dB              | NT-436   | <input type="checkbox"/> | Noise power test apparatus<br>according to EN 55014   | NT-530             |                                         |
| <input type="checkbox"/> | RF-Attenuator DC – 18 GHz<br>6 dB              | NT-437   | <input type="checkbox"/> | Vertical coupling plane<br>(ESD)                      | NT-531             |                                         |
| <input type="checkbox"/> | RF-Attenuator DC – 18 GHz<br>10 dB             | NT-438   | <input type="checkbox"/> | Test cable #4<br>for EN 61000-4-6                     | NT-553             |                                         |
| <input type="checkbox"/> | RF-Attenuator DC – 18 GHz<br>20 dB             | NT-439   | <input type="checkbox"/> | Test cable #3<br>for conducted emission               | NT-554             |                                         |
| <input type="checkbox"/> | I+P 7780 Directional coupler<br>100 - 2000 MHz | NT-440   | <input type="checkbox"/> | Test cable #5+#6<br>ESD-cable (2x470k)                | NT-555 +<br>NT-556 |                                         |
| <input type="checkbox"/> | ESH3-Z2 - Pulse limiter<br>9 kHz - 30 MHz      | NT-441   | <input type="checkbox"/> | Test cable #8<br>Sucoflex 104EA                       | NT-559             |                                         |
| <input type="checkbox"/> | Power Divider<br>6 dB/1 W/50 Ohm               | NT-443   | <input type="checkbox"/> | Test cable #9<br>(for outdoor measurements)           | NT-580             |                                         |
| <input type="checkbox"/> | Directional coupler<br>0,1 MHz – 70 MHz        | NT-444   | <input type="checkbox"/> | Test cable #10<br>(for outdoor measurements)          | NT-581             |                                         |
| <input type="checkbox"/> | Directional coupler<br>0,1 MHz – 70 MHz        | NT-445   | <input type="checkbox"/> | Test cable #13<br>Sucoflex 104PE                      | NT-584             |                                         |
| <input type="checkbox"/> | Tube imitations<br>according to EN 55015       | NT-450   | <input type="checkbox"/> | Test cable #21<br>for SRM-3000                        | NT-592             |                                         |
| <input type="checkbox"/> | FCC-801-M3-16A<br>Coupling decoupling network  | NT-458   | <input type="checkbox"/> | Shield chamber                                        | NT-600             |                                         |
| <input type="checkbox"/> | FCC-801-M2-50A<br>Coupling decoupling network  | NT-459   | <input type="checkbox"/> | Climatic chamber                                      | M-1200             |                                         |
| <input type="checkbox"/> | FCC-801-M5-25<br>Coupling decoupling network   | NT-460   |                          |                                                       |                    |                                         |

## Appendix 1 (continued)

### Test equipment used

|                          |                                                     |                     |                          |                                                   |                 |
|--------------------------|-----------------------------------------------------|---------------------|--------------------------|---------------------------------------------------|-----------------|
| <input type="checkbox"/> | Anechoic Chamber<br>3 m / 5 m measuring distance    | EMV-100             | <input type="checkbox"/> | Log.per Antenna 0,7 – 9 GHz<br>STLP9149           | EMV-305         |
| <input type="checkbox"/> | Turntabel<br>6 m diameter                           | EMV-101             | <input type="checkbox"/> | HF- Amplifier 9 kHz-250 MHz<br>BBA150 (low noise) | EMV-306         |
| <input type="checkbox"/> | Antenna mast + controller                           | EMV-102+<br>EMV-103 | <input type="checkbox"/> | ISO11451-2 TLS<br>10 kHz – 30 MHz                 | EMV-307         |
| <input type="checkbox"/> | EMC Video/Audiosystem                               | EMV-104             | <input type="checkbox"/> | Load Dump Generator<br>LD 200N                    | EMV-350         |
| <input type="checkbox"/> | EMC Software<br>EMC32 Version 10.60.20              | EMV-105             | <input type="checkbox"/> | Ultra Compact Symulator<br>UCS 200N100            | EMV-351         |
| <input type="checkbox"/> | Hornantenna 1 – 18 GHz<br>HF 907                    | EMV-110             | <input type="checkbox"/> | Automotive Power fail module<br>PFM 200N100.1     | EMV-352         |
| <input type="checkbox"/> | Antennapre.amp. 1 – 18 GHz<br>ERZ-LNA0200-1800-30-2 | EMV-111             | <input type="checkbox"/> | Voltage Drop Symulator<br>VDS 200Q100             | EMV-353         |
| <input type="checkbox"/> | Trilog Antenna 30-3000 MHz<br>VULB9163              | EMV-112             | <input type="checkbox"/> | Arb. Generator<br>AutoWave                        | EMV-354         |
| <input type="checkbox"/> | Monopol 9 kHz – 30 MHz<br>VAMP 9243                 | EMV-113             | <input type="checkbox"/> | Ultra Compact Symulator<br>UCS 500N7              | EMV-355         |
| <input type="checkbox"/> | Antennapre.amp 18 – 40 GHz<br>BBV 9721              | EMV-114             | <input type="checkbox"/> | Coupling decoupling network<br>CNI 503B7 / 32 A   | EMV-356         |
| <input type="checkbox"/> | Hornantenna 200 – 2000 MHz<br>AH-220                | EMV-115             | <input type="checkbox"/> | Coupling decoupling network<br>CNI 503B7 / 63 A   | EMV-357         |
| <input type="checkbox"/> | DC Artificial Network<br>PVDC 8300                  | EMV-150             | <input type="checkbox"/> | Telecom Surge Generator<br>TSurge 7               | EMV-358         |
| <input type="checkbox"/> | AC Artificial Network<br>NNLK 8121 RC               | EMV-151             | <input type="checkbox"/> | Coupling decoupling network<br>CNI 508N2          | EMV-359         |
| <input type="checkbox"/> | EMI Receiver<br>ESW44                               | EMV-200/1           | <input type="checkbox"/> | Coupling decoupling network<br>CNV 504N2.2        | EMV-360         |
| <input type="checkbox"/> | Signalgenerator 9 kHz – 40 GHz<br>N5173B            | EMV-201             | <input type="checkbox"/> | Immunity generator<br>NSG4060/NSG4060-1           | EMV-361         |
| <input type="checkbox"/> | GPS Frequency normal<br>B-88                        | EMV-202             | <input type="checkbox"/> | Coupling network<br>CDND M316-2                   | EMV-362         |
| <input type="checkbox"/> | DC Power supply<br>N5745A                           | EMV-203             | <input type="checkbox"/> | Coupling network<br>CT419-5                       | EMV-363         |
| <input type="checkbox"/> | Spektrum Analyzator<br>FSV40                        | EMV-205             | <input type="checkbox"/> | ESD Generator<br>NSG 437                          | EMV-364         |
| <input type="checkbox"/> | Thd Multimeter<br>Model 2015                        | EMV-206             | <input type="checkbox"/> | Pulse Limiter<br>VTSD 9561-F BNC                  | EMV-405         |
| <input type="checkbox"/> | Poweramplifier<br>PAS15000                          | EMV-<br>207/abc     | <input type="checkbox"/> | Transient emission<br>BSM200N40+BS200N100         | EMV-<br>450+451 |
| <input type="checkbox"/> | Inrush Current Source                               | EMV-<br>208/abc     | <input type="checkbox"/> | Cap. Coupling Clamp<br>HFK                        | EMV-455         |
| <input type="checkbox"/> | Arb.-generator<br>Sycore                            | EMV-209             | <input type="checkbox"/> | Mag. Field System<br>MS100N+MC26100+MC2630        | EMV-<br>456-458 |
| <input type="checkbox"/> | Harmonics/Flicker analyzer<br>ARS 16/3              | EMV-210             | <input type="checkbox"/> | Coupling network<br>CDN M2-100A                   | EMV-459         |
| <input type="checkbox"/> | HF- Amplifier 9 kHz-250 MHz<br>BBA150               | EMV-300             | <input type="checkbox"/> | Coupling network<br>CDN M3-32A                    | EMV-460         |
| <input type="checkbox"/> | HF- Amplifier 80 -1000 MHz<br>BBA150                | EMV-301             | <input type="checkbox"/> | Coupling network<br>CDN M5-100A                   | EMV-461         |
| <input type="checkbox"/> | HF- Amplifier 0,8 - 6 GHz<br>BBA150                 | EMV-302             | <input type="checkbox"/> | Current Clamp<br>CIP 9136A                        | EMV-462         |
| <input type="checkbox"/> | High Power Ant. 20-200 MHz<br>HPBA-2510             | EMV-303/1           | <input type="checkbox"/> | DC Artificial Network<br>HV-AN 150                | EMV-<br>464+465 |
| <input type="checkbox"/> | Log.per Antenna 80-2700 MHz<br>STLP 9128 E special  | EMV-304             | <input type="checkbox"/> | Coupling Clamp<br>EM 101                          | EMV-466         |
|                          |                                                     |                     | <input type="checkbox"/> | Decoupling Clamp<br>FTC 101                       | EMV-467         |
|                          |                                                     |                     | <input type="checkbox"/> | Power attenuator<br>10 dB / 250 Watt              | EMV-469/2       |

**Division:**  
Industry & Energy

**Department:** FG

**Test report number:**  
INE-AT/FG-21/115

**Page:** 4 of 4

**Date:** 26.03.2021

## Appendix 2 Photodocumentation

Description: Front view

**Division:**  
Industry & Energy

Department: FG

Test report reference:  
INE-AT/FG-21/115

Page: 1 of 10

Date: 26.03.2021



## Appendix 2 Photodocumentation

Description: Backside view

**Division:**  
Industry & Energy

Department: FG

Test report reference:  
INE-AT/FG-21/115

Page: 2 of 10

Date: 26.03.2021



## Appendix 2

### Photodocumentation

Description: Battery compartement opened

**Division:**  
Industry & Energy

Department: FG

Test report reference:  
INE-AT/FG-21/115

Page: 3 of 10

Date: 26.03.2021



## Appendix 2 Photodocumentation

Description: Case opened

**Division:**  
Industry & Energy

Department: FG

Test report reference:  
INE-AT/FG-21/115

Page: 4 of 10

Date: 26.03.2021



## Appendix 2 Photodocumentation

Description: Electronics detached

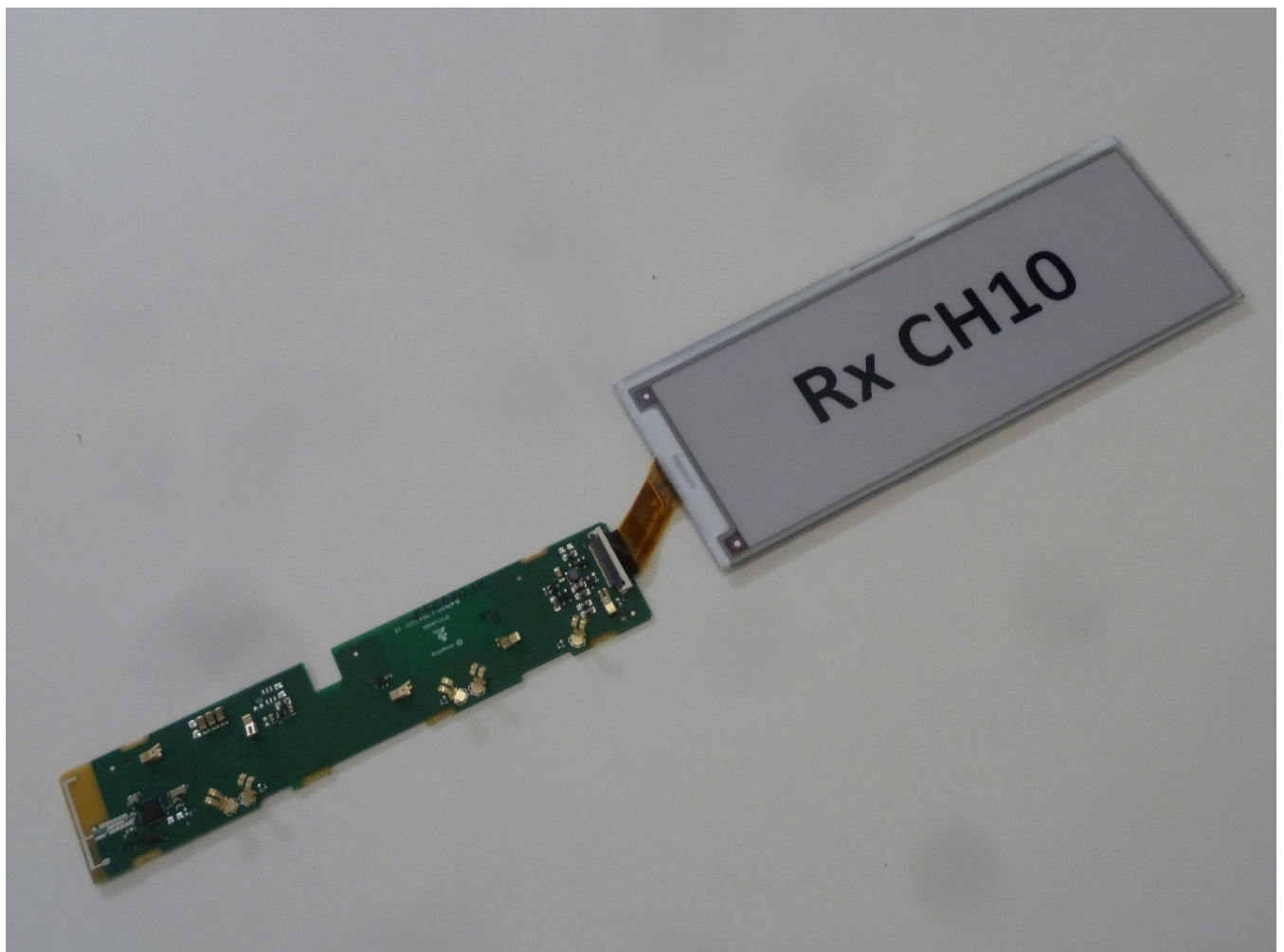
**Division:**  
Industry & Energy

Department: FG

Test report reference:  
INE-AT/FG-21/115

Page: 5 of 10

Date: 26.03.2021



## Appendix 2 Photodocumentation

Description: PCB view #1

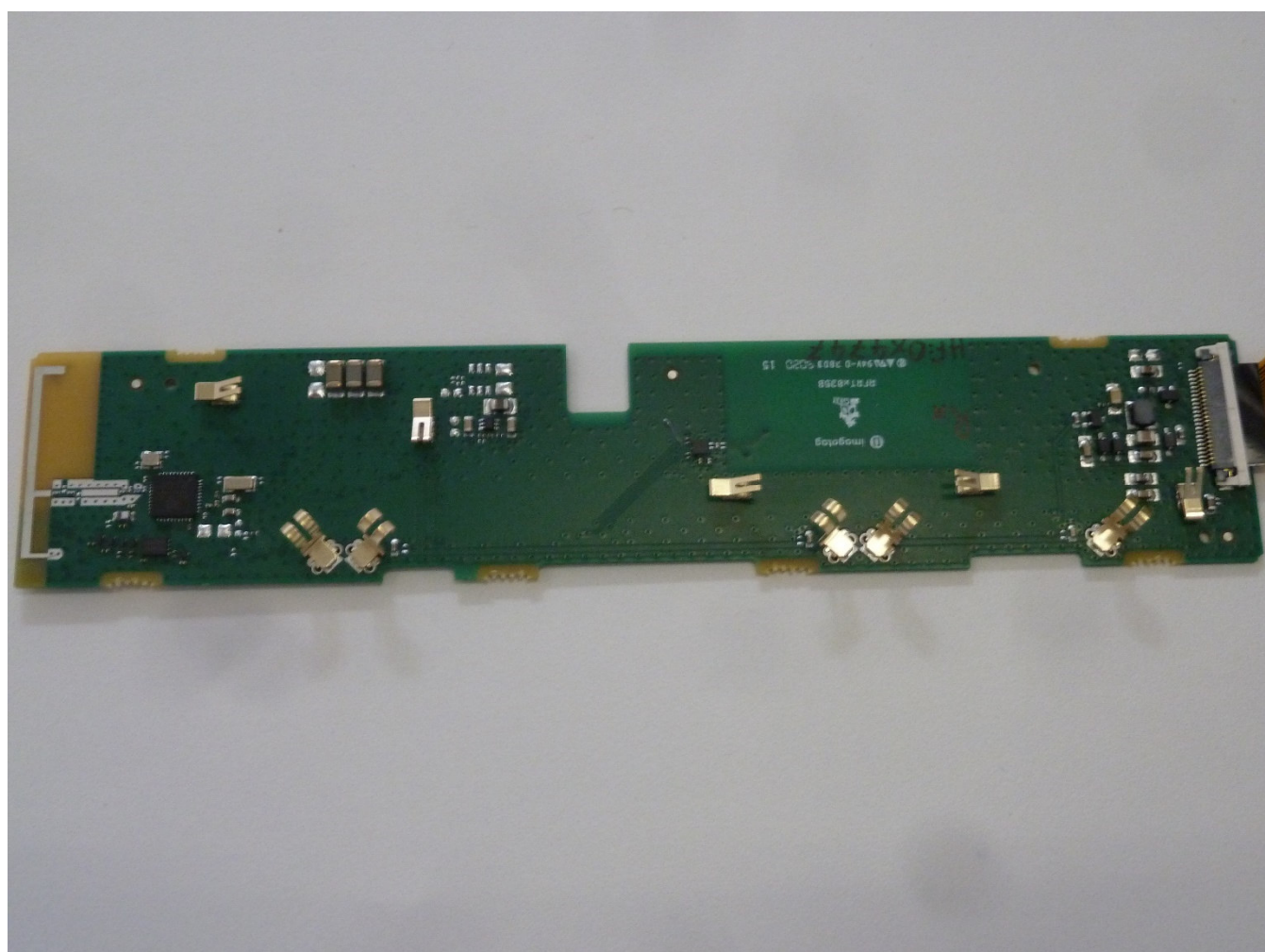
**Division:**  
Industry & Energy

Department: FG

Test report reference:  
INE-AT/FG-21/115

Page: 6 of 10

Date: 26.03.2021



## Appendix 2 Photodocumentation

Description: PCB view #2

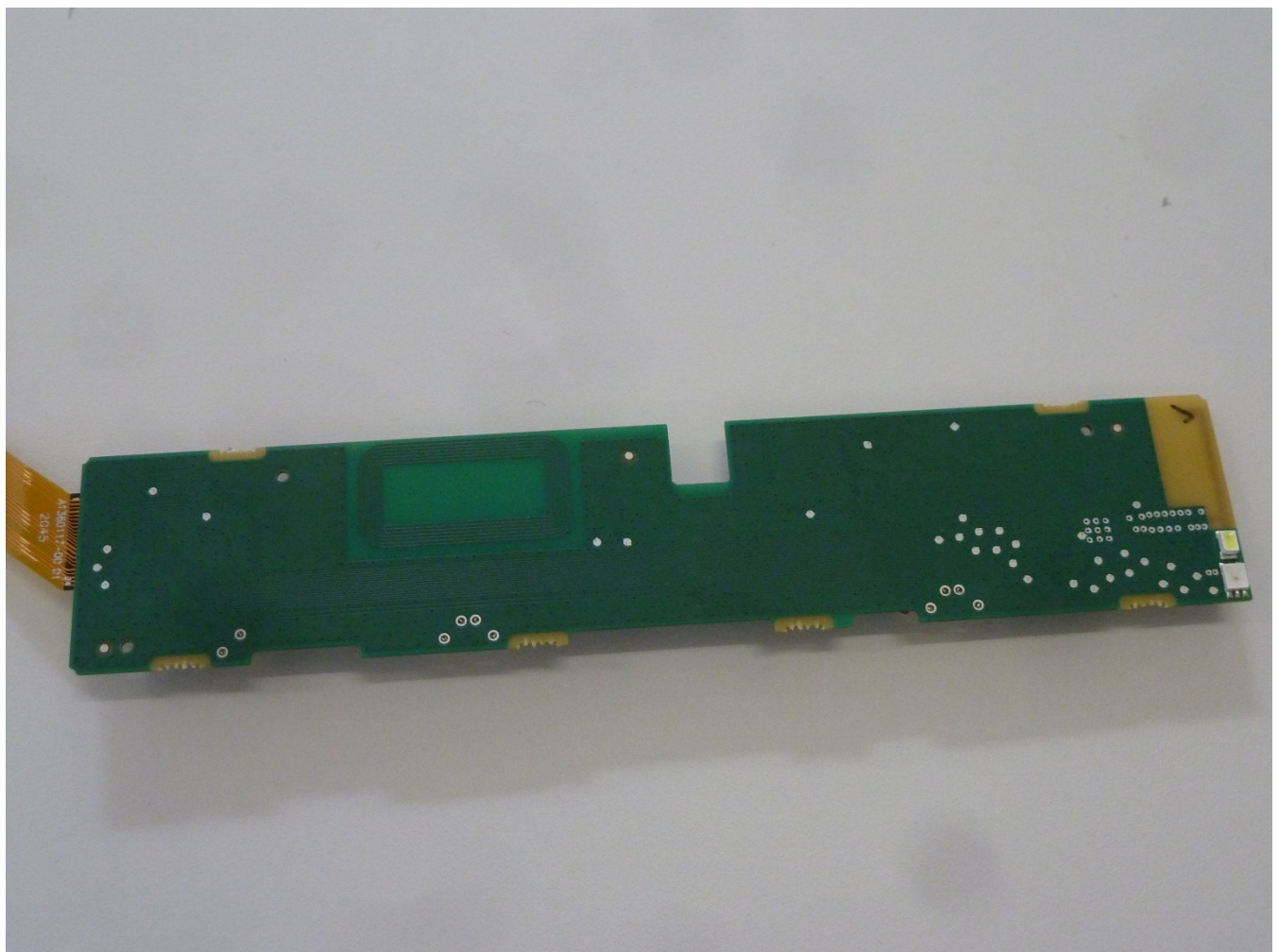
**Division:**  
Industry & Energy

Department: FG

Test report reference:  
INE-AT/FG-21/115

Page: 7 of 10

Date: 26.03.2021



## Appendix 2 Photodocumentation

Description: Test setup below 30 MHz

**Division:**  
Industry & Energy

Department: FG

Test report reference:  
INE-AT/FG-21/115

Page: 8 of 10

Date: 26.03.2021



## Appendix 2

### Photodocumentation

Description: Test setup 30 MHz - 1 GHz

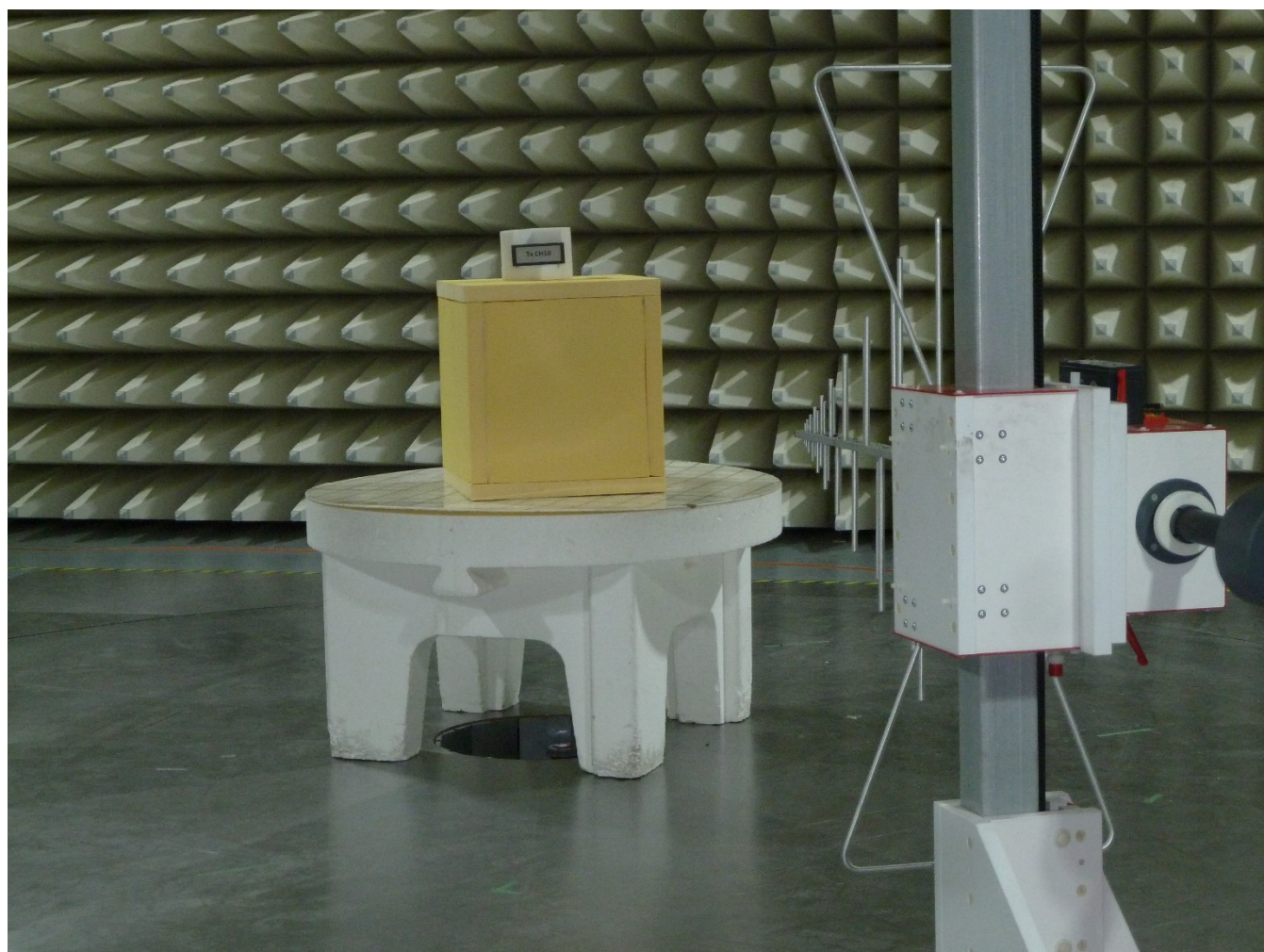
**Division:**  
Industry & Energy

Department: FG

Test report reference:  
INE-AT/FG-21/115

Page: 9 of 10

Date: 26.03.2021



## Appendix 2 Photodocumentation

Description: Test setup above 1 GHz

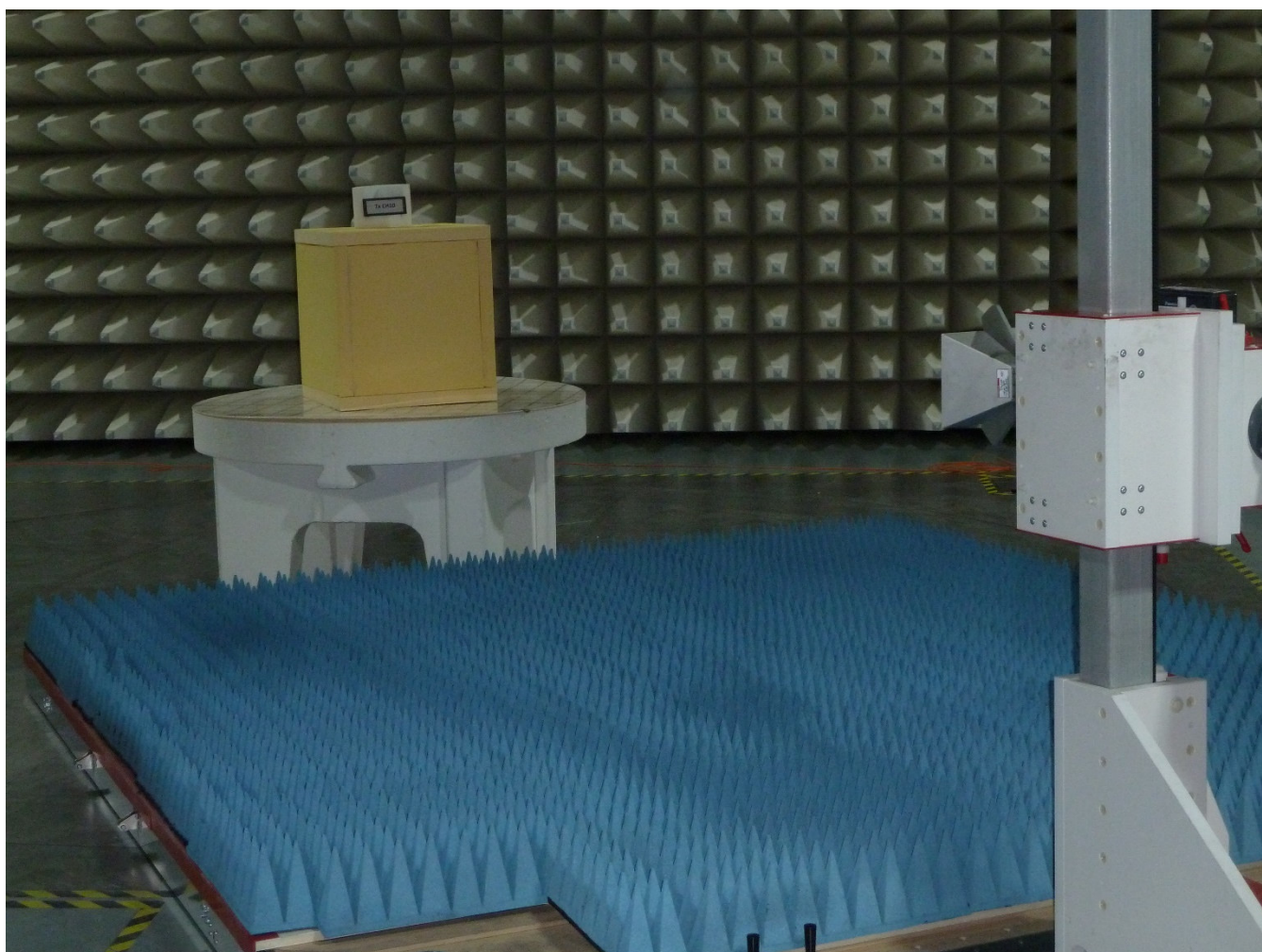
**Division:**  
Industry & Energy

Department: FG

Test report reference:  
INE-AT/FG-21/115

Page: 10 of 10

Date: 26.03.2021



--- END OF TEST REPORT ---