

# TEST REPORT

of the accredited test laboratory

TÜV Nr.: **2022-IN-AT-TICL-E-EX-000246-FG-001-Rev1**TÜV AUSTRIA  
SERVICES GMBHOffice:  
Deutschstrasse 10  
1230 Vienna/Austria  
T: +43 5 0454-0  
F: +43 5 0454-6505  
E: ticwien@tuv.at  
W: www.tuv.atBusiness Area  
Industry & Energy Austria

Technik

TÜV®

**Applicant:** Harman Professional, Inc.  
8500 Balboa Blvd.  
Northridge, CA 91329, USA

**Tested Product:** Wireless microphone handheld transmitter

**Product Name:** HT 40 MINI PRO US25A

**FCC-ID:** **2AUHEHT4025A**

**IC:** 6132A-HT4025A

**Manufacturer:** VTech Communications Ltd.  
Xia Ling Bei Management Zone, Liaobu, Dongguan,  
Guangdong Province  
523411 China

**Output power / field strength:** 3,35 mW EIRP      **power supply:** 1,5V DC  
**Channel separation:** 350 kHz

**Frequency range:** 537,5 MHz

**Standard:** EN 300 422-1 V1.4.2; EN 300 422-1 V2.1.2;  
47 CFR Part 74 (eCFR July 25<sup>th</sup> 2022 Edition);  
47 CFR Part 15 (eCFR July 25<sup>th</sup> 2022 Edition);  
47 CFR Part 1 (eCFR July 25<sup>th</sup> 2022 Edition);  
RSS-210 Issue 10;  
**RSS-102 Issue 5**  
ANSI C63.26-2015; ANSI C63.10-2013:

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**

25.04.2023

Ing. Wilhelm Seier

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

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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 EN 300 422-1 V2.1.2	
	Transmitter parameters	
4.1	Frequency stability	6-8
4.2	Rated output power	9-10
4.3	Necessary bandwidth	11-12
4.4	Spurious emissions	13-15
4.5	Transmitter intermodulation distortion	16
	Receiver	
	Spurious emissions	---
	Receiver sensitivity	---
	Receiver adjacent channel selectivity	---
	Receiver blocking	---
4.6	SAR-based exemption	17-20
Appendix	Designation	PAGES
1	Test equipment used	5
2	Photodocumentation	8

## 1. Applicant

**Company:** Harman Professional, Inc.

**Department:** R&D

**Address:** 8500 Balboa Blvd.  
Northridge, CA 91329, USA

**Contact person:** Mr. Gabor Mikovics

**EUT received on:** 25.07.2022

**Tests were performed on:** 25.07. till 18.08.2022

## 2. Description of EUT

<b>EUT:</b>	Wireless microphone handheld transmitter
<b>Product name:</b>	HT 40 MINI PRO US25A
<b>Serial Number:</b>	Prototype
<b>Manufacturer:</b>	VTech Communications Ltd. Xia Ling Bei Management Zone, Liaobu, Dongguan, Guangdong Province 523411 China
<b>Description:</b>	Harman Professional, Inc. provided the following configuration for the measurements:  Prototype
<b>Operating mode:</b>	The measurements were carried out at the following running states:  Transmitting
<b>Technical data EUT:</b>	Rated voltage: 1,5VDC Rated current: 500mA Rated frequency: DC  Mains voltage during the tests: 1,5VDC via internal battery
<b>Climatic conditions in the emc laboratory:</b>	Relative humidity: 61% Temperature: 23°C

### 3. Standards / Final result

Name	Title	Deviation	Result
EN 300422-1 V2.1.2	Wireless Microphones; Audio PMSE up to 3 GHz; Part 1: Class A Receivers; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU	none	OK
EN 300422-1 V1.4.2	Electromagnetic compatibility and Radio spectrum Matters (ERM); Wireless microphones in the 25 MHz to 3 GHz frequency range; Part 1: Technical characteristics and methods of measurement	*)	OK
47 CFR Part 15 (eCFR July 25 <sup>th</sup> 2022 Edition)	RADIO FREQUENCY DEVICES	none	OK
47 CFR Part 74 (eCFR July 25 <sup>th</sup> 2022 Edition)	EXPERIMENTAL RADIO, AUXILIARY, SPECIAL BROADCAST AND OTHER PROGRAM DISTRIBUTIONAL SERVICES; Subpart H—Low Power Auxiliary Stations	none	OK
47 CFR Part 1 (eCFR July 25 <sup>th</sup> 2022 Edition)	GENERAL	none	OK
RSS-210 Issue 10	Licence-Exempt Radio Apparatus: Category I Equipment; Annex G—Low-Power Radio Apparatus Operating in the Television Bands	none	OK
ANSI C36.10-2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices	none	OK
ANSI C36.26-2015	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services	none	OK
RSS-102 Issue 5	Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)	none	OK
<p>Result: Opinions and interpretation of testing laboratory            OK: EUT passed            NOK: EUT failed</p>			

\*) Only Spurious Emissions and Necessary bandwidth were measured

#### 4. TEST RESULT

##### 4.1. Frequency stability

**ETSI EN 300 422-1 V2.1.2  
 SUBCLAUSE 8.1**

ETSI requirements

Rated output power: 3,35 mW

Operating condition		Frequency Error kHz		Frequency Error ppm	
		537,5 MHz		537,5 MHz	
T <sub>nom</sub> ( 23 )°C	V <sub>nom</sub> (1,5)V	-0,203		-0,378	
T <sub>min</sub> ( -10 )°C	V <sub>min</sub> (1,05)V	-2,113		-3,931	
	V <sub>nom</sub> (1,5)V	-2,200		-4,093	
T <sub>max</sub> ( 45 )°C	V <sub>min</sub> (1,05)V	-1,158		-2,154	
	V <sub>nom</sub> (1,5)V	-1,216		-2,262	
Measurement uncertainty		± 0,1 ppm			

#### LIMIT

#### ETSI EN 300 422-1 V2.1.2 SUBCLAUSE 8.1.3

The frequency error shall not exceed 20 parts per million for frequencies below 1 GHz, 15 parts per million between 1 GHz and 2 GHz and 10 ppm above 2 GHz.

Test Equipment used: EMV-205; M-1200

**Frequency stability**

**47 CFR § 74.861 (e) (3)**  
**47 CFR § 74.861 (e) (4)**  
**47 CFR § 15.236 (f) (3)**  
**RSS-210 G3**

FCC/ISED requirements

Rated output power: 3,35 mW

Operating condition	Frequency Error kHz			Frequency Error ppm		
	Operating voltage at 20°C ambient temperature		537,5 MHz			537,5 MHz
1,72 V		-0,376			-0,700	
1,05 V		-0,203			-0,378	
Measurement uncertainty				± 0,1 ppm		
Operating condition	Frequency Error kHz			Frequency Error ppm		
	ambient temperature at 1,5V operating voltage		537,5 MHz			537,5 MHz
-30°C		-8,828			-16,424	
-20°C		-4,718			-8,778	
-10°C		-2,200			-4,093	
0°C		-0,810			-1,507	
10°C		-0,232			-0,432	
20°C		-0,203			-0,378	
30°C		-0,405			-0,753	
40°C		-0,492			-0,915	
50°C		-0,492			-0,915	
Measurement uncertainty				± 0,1 ppm		

**LIMIT 47 CFR § 74.861 (e) (4) / Table G.1**

The frequency tolerance of the transmitter shall be 0,005 percent (50ppm).

**LIMIT 47 CFR § 74.861 (e) (3)**

Any form of modulation may be used. A maximum deviation of  $\pm 75$  kHz is permitted when frequency modulation is employed

**LIMIT 47 CFR § 15.236 (f) (3)**

The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.005\%$  of the operating frequency over a temperature variation of  $-20$  degrees to  $+50$  degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. Battery operated equipment shall be tested using a new battery.

**LIMIT RSS-210 G5**

The devices may employ any type of modulation. The type of modulation used shall be reported.

Equipment employing amplitude modulation (AM) or frequency modulation (FM) shall have a modulation index that does not exceed 100% or a frequency deviation that does not exceed  $\pm 75$  kHz, respectively.

Test Equipment used: EMV-205; M-1200



#### 4.2 Rated output power

ETSI EN 300 422-1 V2.1.2  
 SUBCLAUSE 8.2.3  
 47 CFR § 74.861 (e) (1) (ii)  
 47 CFR § 15.236 (d) (1)  
 RSS-210 G.1

#### Radiated Measurement

Rated output power: 3,35 mW

Test conditions		Transmitter power (mW) (erp)	
			537,5 MHz
T <sub>nom</sub> ( 23 )°C	V <sub>nom</sub> (1,5)V		2,04
Maximum deviation from rated output power under normal test conditions (%)			0
Measurement uncertainty		± 0,75 dB	

Test conditions		Transmitter power (mW) (eirp)	
			537,5 MHz
T <sub>nom</sub> ( 23 )°C	V <sub>nom</sub> (1,5)V		3,35
Measurement uncertainty		± 0,75 dB	

#### Conducted Measurement

Test conditions		Transmitter power (mW)	
			537,5 MHz
T <sub>nom</sub> ( 23 )°C	V <sub>nom</sub> (1,5)V		5,62
Maximum deviation from rated output power under normal test conditions (%)			0
Measurement uncertainty		± 0,75 dB	

**LIMIT ETSI EN 300 422-1 V2.1.2 SUBCLAUSE 8.2.3**

The measured value shall be within +20 % and -50 % of the manufacturers declared rated output power.

**LIMIT 47 CFR § 74.861 (e) (1) (ii)**

The he power may not exceed the following values: 250 mW conducted power

**LIMIT 47 CFR § 15.236 (d) (1)**

In the bands allocated and assigned for broadcast television and in the 600 MHz service band: 50 mW EIRP

**LIMIT RSS-210 G.1**

The transmit power shall be measured in average value as a conducted emission over any period of continuous transmission.

The frequency bands, transmit e.i.r.p., authorized bandwidth and frequency stability limits for devices are provided in table G1.

requecy bands (MHz)	Transmit e.i.r.p. (mW)	Authorized bandwidth (kHz)	Frequency stability (± ppm)
54-72 76-88 174-216	50	200	50
470-608	250	200	50
614-616 653-663	20	200	50

Test Equipment used: NT-100; NT-110/1; NT-111/1; NT-112/1; NT-131/1; NT-207/1

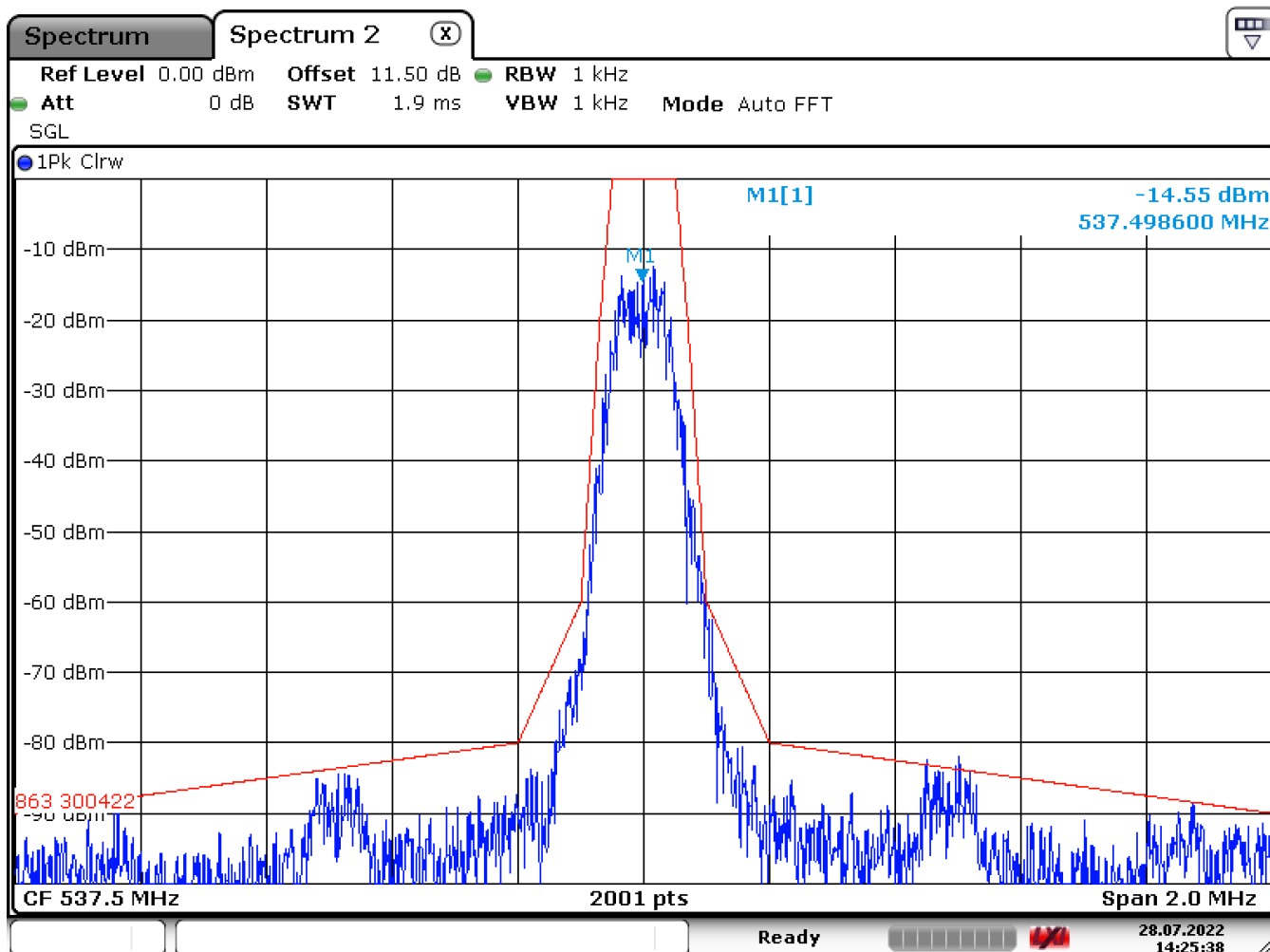
### 4.3 NECESSARY BANDWIDTH

ETSI EN 300 422-1 V2.1.2  
ETSI EN 300 422-1 V1.4.2  
SUBCLAUSE 8.3  
47 CFR § 15.236 (g)  
47 CFR § 15.236 (f) (2)  
47 CFR § 74.861 (e) (5)  
47 CFR § 74.861 (e) (7)  
RSS-210 G.2  
RSS-210 G.4

The operating Bandwidth was measured at an acoustic input level 12 dB higher than the limiting threshold, determined with 500 Hz signal.

Rated output power: 3,35 mW

Measurement with weighted noise source signal @ 537,5 MHz centered.



Date: 28.JUL.2022 14:25:38

**LIMIT**

**ETSI EN 300 422-1 V2.1.2 SUBCLAUSE 8.3.2.2  
 ETSI EN 300 422-1 V1.4.2 SUBCLAUSE 8.3.2.2**

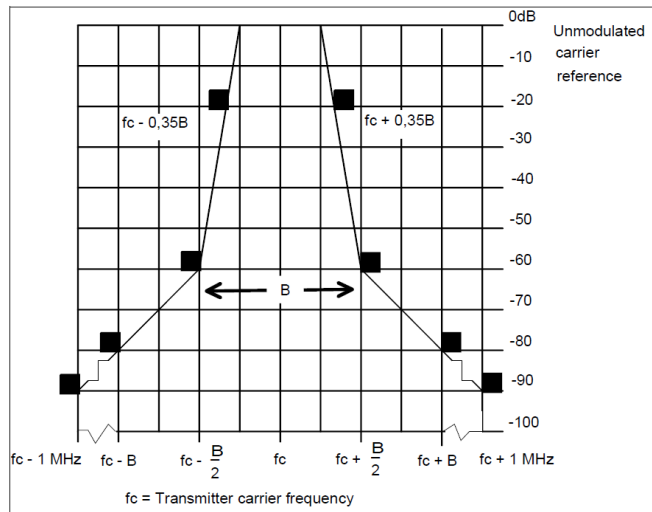


Figure 3 shows the spectrum mask for all analogue systems in the band. The -90 dBc point shall be  $\pm 1$  MHz from  $f_c$  measured with an average detector. To comply, a measured value shall fall below the mask limit as shown in figure 3.

**LIMIT 47 CFR § 15.236 (f) (2)**

One or more adjacent 25 kHz segments within the assignable frequencies may be combined to form a channel whose maximum bandwidth shall not exceed 200 kHz. The operating bandwidth shall not exceed 200 kHz.

**LIMIT 47 CFR § 15.236 (g)**

Emissions within the band from one megahertz below to one megahertz above the carrier frequency shall comply with the emission mask in § 8.3 of ETSI EN 300 422-1 V1.4.2

**LIMIT 47 CFR § 74.861 (e) (5)**

The operating bandwidth shall not exceed 200 kHz.

**LIMIT 47 CFR § 74.861 (e) (7)**

Analog emissions within the band from one megahertz below to one megahertz above the carrier frequency shall comply with the emission mask in section 8.3.1.2 of the European Telecommunications Institute Standard ETSI EN 300 422-1 v1.4.2

**LIMIT RSS-210 G.2**

The occupied bandwidth for wireless microphones shall not exceed the authorized bandwidth specified in G1: 200 kHz.

**LIMIT RSS-210 G.4**

The transmitter unwanted emissions shall meet and be measured according to the requirements in sections 8.3 and 8.4 of ETSI EN 300 422-1.

TEST EQUIPMENT USED: EMV-205

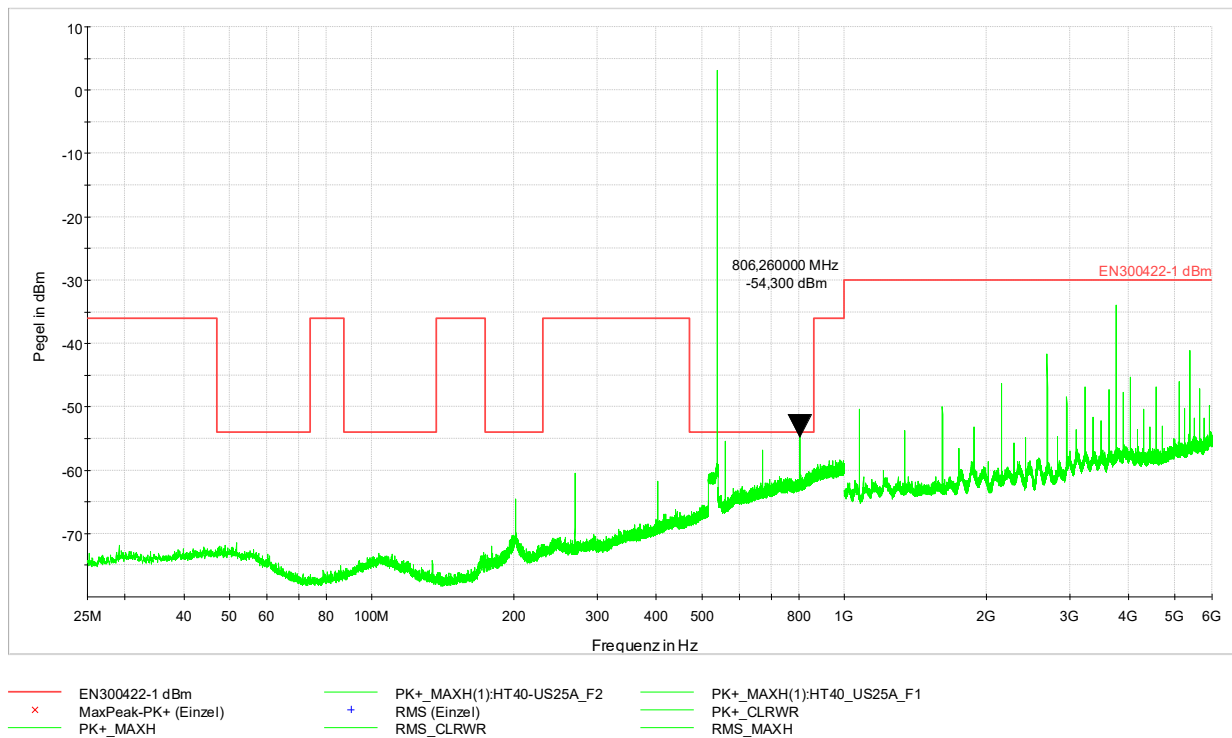
#### 4.4 TRANSMITTER SPURIOUS EMISSIONS radiated

ETSI EN 300 422-1 V2.1.2  
ETSI EN 300 422-1 V1.4.2  
47 CFR § 15.236 (g)  
47 CFR § 74.861 (e) (7)  
RSS-210 G.4

Operating mode: transmitter operating at 537,5 MHz

Rated output power: 3,35 mW

Modulation: unmodulated carrier





**TRANSMITTER SPURIOUS EMISSIONS radiated radiated**

**ETSI EN 300 422-1 V2.1.2  
SUBCLAUSE 8.4**

Operating mode: transmitter standby

Because the transmitter is operating after switching on, there is no standby mode available and no measurement was performed.

#### 4.5 Transmitter intermodulation distortion

ETSI EN 300 422-1 V2.1.2  
SUBCLAUSE 8.5

Radiated measurement

Unwanted Signal	TX-IMD (dBc)		
		537,5 MHz	
fw + 5 MHz		-52,6	
fw - 5 MHz		-50,4	
Measurement uncertainty	± 3dB		

#### LIMIT

#### ETSI EN 300 422-1 V2.1.2 SUBCLAUSE 8.5.3

The maximum resulting IMD product shall be at least 40 dB below the output power of the DUT.

Measuring equipment used:

NT-100; NT-111/1; NT-112/1; NT-113/1; NT-131/1; NT-210; NT-310/1; EMV-205



#### 4.6 RF Exposure

47 CRF § 1.1307  
 KDB 447498 D04 v01

Title 47 §1.1307(b)(3)(i)(B):

(B) Or the available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold P<sub>th</sub> (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). P<sub>th</sub> is given by:

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases}$$

Where

$$x = -\log_{10} \left( \frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$$

*d* = the separation distance (cm);

#### Revision 1:

Added max. antenna gain for URGENT CLARIFICATION - FCC Area of Concern-Antenna Gain Information from 26<sup>th</sup> August 2022 and Fall 2022 workshop guidance:

All part 15 applications will need to show how the antenna gain was derived either from a manufacturer data sheet or a measurement.

Conducted power [mW] (from 4.2)	Max. EIRP [mW] (from 4.2)	Max gain [dBi]
5,62	3,35	-2,25

**Revision 1:**

Added production tolerance to Single RF source, SAR based, RF exposure exemption calculation according to KDB 447498 D04 v01.

Conducted power [mW] (from 4.2)	Duty cycle [1]	Production variance [1] (declared by manufacturer)	Max. time-averaged available power [mW]
5,62	1	5,5 dBm cond.	9,17

ERP [mW] (from 4.2)	Duty cycle [1] (worst case assumption)	Production variance [1] (declared by manufacturer)	Max. time-averaged ERP [mW]
2,04	1	5,5 dBm cond.	3,33

**SAR-based exemption calculation**

Single RF source, calculated for  $d = 0.5$  cm (worst case, actual antenna might be further away)

Frequency [MHz]	Maximum of available power or ERP [mW]	Pth [mW]	P / Pth	P / Pth < 1
537,5	9,17	17,16	0,53	OK

## RF Exposure

## RSS-102, Issue 5

### 2.5.1 Exemption Limits for Routine Evaluation – SAR Evaluation

SAR evaluation is required if the separation distance between the user and/or bystander and the antenna and/or radiating element of the device is less than or equal to 20 cm, except when the device operates at or below the applicable output power level (adjusted for tune-up tolerance) for the specified separation distance defined in Table 1.

**Table 1: SAR evaluation – Exemption limits for routine evaluation based on frequency and separation distance**

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of ≤5 mm	At separation distance of 10 mm	At separation distance of 15 mm	At separation distance of 20 mm	At separation distance of 25 mm
≤300	71 mW	101 mW	132 mW	162 mW	193 mW
450	52 mW	70 mW	88 mW	106 mW	123 mW
835	17 mW	30 mW	42 mW	55 mW	67 mW
1900	7 mW	10 mW	18 mW	34 mW	60 mW
2450	4 mW	7 mW	15 mW	30 mW	52 mW
3500	2 mW	6 mW	16 mW	32 mW	55 mW
5800	1 mW	6 mW	15 mW	27 mW	41 mW

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of 30 mm	At separation distance of 35 mm	At separation distance of 40 mm	At separation distance of 45 mm	At separation distance of ≥50 mm
≤300	223 mW	254 mW	284 mW	315 mW	345 mW
450	141 mW	159 mW	177 mW	195 mW	213 mW
835	80 mW	92 mW	105 mW	117 mW	130 mW
1900	99 mW	153 mW	225 mW	316 mW	431 mW
2450	83 mW	123 mW	173 mW	235 mW	309 mW
3500	86 mW	124 mW	170 mW	225 mW	290 mW
5800	56 mW	71 mW	85 mW	97 mW	106 mW

Output power level shall be the higher of the maximum conducted or equivalent isotropically radiated power (e.i.r.p.) source-based, time-averaged output power. For controlled use devices where the 8 W/kg for 1 gram of tissue applies, the exemption limits for routine evaluation in Table 1 are multiplied by a factor of 5. For limb-worn devices where the 10 gram value applies, the exemption limits for routine evaluation in Table 1 are multiplied by a factor of 2.5. If the operating frequency of the device is between two frequencies located in Table 1, linear interpolation shall be applied for the applicable separation distance. For test separation distance less than 5 mm, the exemption limits for a separation distance of 5 mm can be applied to determine if a routine evaluation is required.

For medical implants devices, the exemption limit for routine evaluation is set at 1 mW. The output power of a medical implants device is defined as the higher of the conducted or e.i.r.p to determine whether the device is exempt from the SAR evaluation.

### RSS-102 2.5.1 Exemption calculation

Frequency (MHz)	cond. P (mW)	max. EIRP (mW)	Duty Cycle (1)	Avg. cond. P (mW)	Avg. EIRP (mW)	separation distance (mm)	Limit (mW)	
537,5	5,62	3,35	1	5,62	3,35	5	44,05	OK

\*) Duty cycle was not measured, factor 1 is a worst case assumption.

\*\*\*) Calculations are done for a minimum separation distance of 0.5 cm without considerations of limb worn exposure. The distance is derived from the device casing. The calculation is conservative. The exemption limit for limb-worn exposure would be 110,11 mW.

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

# Appendix 1

## Test equipment used

<input type="checkbox"/>	Anechoic Chamber with 3m measurement distance	NT-100	<input type="checkbox"/>	Ant. tripod for EN61000-4-3 Model TP1000A	NT-156
<input type="checkbox"/>	Stripline according to ISO 11452-5	NT-108	<input type="checkbox"/>	Power quality analyzer Fluke 1760 (complete set)	NT-160 - NT-173
<input type="checkbox"/>	MA4000 - Antenna mast 1 - 4 m height	NT-110/1	<input type="checkbox"/>	Spectrum analyzer – FSP7 9 kHz – 7 GHz	NT-200
<input type="checkbox"/>	DS - Turntable 0 - 400 ° Azimuth	NT-111/1	<input type="checkbox"/>	ESCI - Test receiver 9 kHz - 7 GHz	NT-203/1
<input type="checkbox"/>	CO3000 Controller Mast+Turntable	NT-112/1	<input type="checkbox"/>	ESR – Test receiver 20 Hz – 26,5 GHz	NT-207/1
<input type="checkbox"/>	HUF-Z3 - Log. Per. Antenna 200 - 1000 MHz	NT-121	<input type="checkbox"/>	Digital Radio Tester CMW500	NT-208/1
<input type="checkbox"/>	FMZB1513 - Loop Antenna 9 kHz - 30 MHz	NT-122/1	<input type="checkbox"/>	Noise-gen., ITU-R 559-2 20 Hz – 20 kHz	NT-209
<input type="checkbox"/>	HFH-Z6 - Rod Antenna 9 kHz - 30 MHz	NT-123	<input type="checkbox"/>	CMTA - Radiocommunication analyzer ; 0,1 - 1000 MHz	NT-210
<input type="checkbox"/>	Dipole Antenna VHA9103 30 - 300 MHz	NT-124/1a	<input type="checkbox"/>	3271 - Spectrum analyzer 100 Hz - 26,5 GHz	NT-211
<input type="checkbox"/>	Dipole Antenna UHA9105 300 - 1000 MHz	NT-124/1b	<input type="checkbox"/>	Digital Radio Tester Aeroflex 3920	NT-212/1
<input type="checkbox"/>	3115 - Horn Antenna 1 - 18 GHz (immunity)	NT-125	<input type="checkbox"/>	Mixer M28HW 26,5 GHz - 40 GHz	NT-214
<input type="checkbox"/>	3116 - Horn Antenna 18 - 40 GHz	NT-126	<input type="checkbox"/>	RubiSource T&M Timing reference	NT-216
<input type="checkbox"/>	SAS-200/543 - Bicon. Antenna 20 MHz - 300 MHz	NT-127	<input type="checkbox"/>	Radiocommunication analyzer SWR 1180 MD	NT-217
<input type="checkbox"/>	AT-1080 - Log. Per. Antenna 80 - 1000 MHz	NT-128	<input type="checkbox"/>	Mixer FS-Z60 40 GHz – 60 GHz	NT-218/1
<input type="checkbox"/>	HK-116 - bicon. Antenna 20 MHz - 300 MHz	NT-129	<input type="checkbox"/>	Mixer FS-Z90 60 GHz – 90 GHz	NT-219/1
<input type="checkbox"/>	HK-116 - bicon. Antenna 20 MHz - 300 MHz	NT-130	<input type="checkbox"/>	DSO9104 Digital scope	NT-220/1
<input type="checkbox"/>	3146 - Log. Per. Antenna 200 – 1000 MHz	NT-131	<input type="checkbox"/>	TPS 2014 Digital scope	NT-222
<input type="checkbox"/>	VULB 9163 Trilog Antenna 30 – 3000 MHz	NT-131/1	<input type="checkbox"/>	Artificial Ear according to IEC 60318	NT-224
<input type="checkbox"/>	Loop Antenna H-Field	NT-132	<input type="checkbox"/>	1 kHz Sound calibrator	NT-225
<input type="checkbox"/>	Horn Antenna 500 MHz - 2900 MHz	NT-133	<input type="checkbox"/>	SRM-3006 Spectrum analyzer	NT-233/1a
<input type="checkbox"/>	Horn Antenna 500 MHz - 6000 MHz	NT-133/1	<input type="checkbox"/>	E-field probe SRM 75 MHz – 3 GHz	NT-234
<input type="checkbox"/>	Log. per. Antenna 800 MHz - 2500 MHz	NT-134	<input type="checkbox"/>	Field Meter NBM-500 incl. E- and H-Field probes	NT-240a-e
<input type="checkbox"/>	Log. per. Antenna 800 MHz - 2500 MHz	NT-135	<input type="checkbox"/>	Magnetometer HP-01	NT-241/1
<input type="checkbox"/>	BiConiLog Antenna 26 MHz – 2000 MHz	NT-137	<input type="checkbox"/>	EFA-3 H-field- / E-field probe	NT-243
<input type="checkbox"/>	Conical Dipol Antenna PCD8250	NT-138	<input type="checkbox"/>	EHP-50F H-field- / E-field probe	NT-243/1
<input type="checkbox"/>	HF 906 - Horn Antenna 1 - 18 GHz (emission)	NT-139	<input type="checkbox"/>	Field Meter EMR-200 100 kHz – 3 GHz	NT-244
<input type="checkbox"/>	HZ-1 Antenna tripod	NT-150	<input type="checkbox"/>	E-field probe 100 kHz – 3 GHz	NT-245
<input type="checkbox"/>	BN 1500 Antenna tripod	NT-151	<input type="checkbox"/>	H-field probe 300 kHz – 30 MHz	NT-246

**Division:**  
Industry & Energy

Test report number:  
2022-IN-AT-TICL-E-EX-000246-FG-001-Rev1

Page: 1 of 5

Date: 25.04.2023

## Appendix 1 (continued) Test equipment used

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

**Division:**  
Industry & Energy

Test report number:  
2022-IN-AT-TICL-E-EX-  
000246-FG-001-Rev1

Page: 2 of 5

Date: 25.04.2023

## Appendix 1 (continued) Test equipment used

<input type="checkbox"/>	RF-Attenuator 10 dB DC – 18 GHz / 50 W	NT-417/1	<input type="checkbox"/>	FCC-801-T4 Coupling decoupling network	NT-463
<input type="checkbox"/>	RF-Attenuator 6 dB DC – 18 GHz / 50 W	NT-418	<input type="checkbox"/>	FCC-801-C1 Coupling decoupling network	NT-464
<input type="checkbox"/>	RF-Attenuator 3 dB DC – 18 GHz / 50 W	NT-419	<input type="checkbox"/>	SW 9605 - Current probe 150 kHz – 30 MHz	NT-465/1
<input type="checkbox"/>	RF-Attenuator 20 dB DC - 1000 MHz / 25 W	NT-421	<input type="checkbox"/>	95242-1 – Current probe 1 MHz – 400 MHz	NT-468
<input type="checkbox"/>	RF-Attenuator 30 dB DC - 1000 MHz / 1 W	NT-423	<input type="checkbox"/>	94106-1L-1 – Current probe 100 kHz – 450 MHz	NT-471
<input type="checkbox"/>	RF-Attenuator 30 dB	NT-424	<input type="checkbox"/>	WHKX12-2700-3000-18000 3 GHz Highpass filter	NT-472
<input type="checkbox"/>	RF-Attenuator 6 dB DC - 1000 MHz / 1 W	NT-425	<input type="checkbox"/>	WHKX10-3870-4500-18000 4,5 GHz Highpass filter	NT-473
<input type="checkbox"/>	RF-Attenuator 6 dB DC - 1000 MHz / 1 W	NT-426	<input type="checkbox"/>	GA 1240 Power amplifier according to EN 61000-4-16	NT-480
<input type="checkbox"/>	RF-Attenuator 6 dB	NT-428	<input type="checkbox"/>	Coupling networks according to EN 61000-4-16	NT-481 - NT-483
<input type="checkbox"/>	RF-Attenuator 0 dB - 81 dB	NT-429	<input type="checkbox"/>	Van der Hoofden Test Head	NT-484
<input type="checkbox"/>	WRU 27 - Band blocking 27 MHz	NT-430	<input type="checkbox"/>	WRCJV12-5820-5850-5950-5980 5,9 GHz Band Reject Filter	NT-490
<input type="checkbox"/>	WHJ450C9 AA - High pass 450 MHz	NT-431	<input type="checkbox"/>	WHKX10-5670-6300-18000 6 GHz Highpass filter	NT-491
<input type="checkbox"/>	WHJ250C9 AA - High pass 250 MHz	NT-432	<input type="checkbox"/>	WHK12-935-1000-7000 1 GHz Highpass filter	NT-492
<input type="checkbox"/>	RF-Load 150 W	NT-433	<input type="checkbox"/>	EMC Video/Audiosystem	NT-511/1
<input type="checkbox"/>	Impedance transducer 1:4 ; 1:9 ; 1:16	NT-435	<input type="checkbox"/>	ES-K1 Version 1.71 SP2 Test software	NT-520
<input type="checkbox"/>	RF-Attenuator DC – 18 GHz 6 dB	NT-436	<input type="checkbox"/>	EMC32 Version 10.60.20 Test software	NT-520/1
<input type="checkbox"/>	RF-Attenuator DC – 18 GHz 6 dB	NT-437	<input type="checkbox"/>	SRM-TS Version 1.3 software for SRM-3000	NT-522
<input type="checkbox"/>	RF-Attenuator DC – 18 GHz 10 dB	NT-438	<input type="checkbox"/>	SRM-TS Version 1.3.1 software for SRM-3006	NT-522/1
<input type="checkbox"/>	RF-Attenuator DC – 18 GHz 20 dB	NT-439	<input type="checkbox"/>	Spitzenberger und Spies Test software V4.1	NT-525
<input type="checkbox"/>	I+P 7780 Directional coupler 100 - 2000 MHz	NT-440	<input type="checkbox"/>	Vertical coupling plane (ESD)	NT-531
<input type="checkbox"/>	ESH3-Z2 - Pulse limiter 9 kHz - 30 MHz	NT-441	<input type="checkbox"/>	Test cable #4 for EN 61000-4-6	NT-553
<input type="checkbox"/>	Power Divider 6 dB/1 W/50 Ohm	NT-443	<input type="checkbox"/>	Test cable #3 for conducted emission	NT-554
<input type="checkbox"/>	Directional coupler 0,1 MHz – 70 MHz	NT-444	<input type="checkbox"/>	Test cable #5+#6 ESD-cable (2x470k)	NT-555 + NT-556
<input type="checkbox"/>	Directional coupler 0,1 MHz – 70 MHz	NT-445	<input type="checkbox"/>	Test cable #8 Sucoflex 104EA	NT-559
<input type="checkbox"/>	Tube imitations according to EN 55015	NT-450	<input type="checkbox"/>	Test cable #9 (for outdoor measurements)	NT-580
<input type="checkbox"/>	FCC-801-M3-16A Coupling decoupling network	NT-458	<input type="checkbox"/>	Test cable #10 (for outdoor measurements)	NT-581
<input type="checkbox"/>	FCC-801-M2-50A Coupling decoupling network	NT-459	<input type="checkbox"/>	Test cable #13 Sucoflex 104PE	NT-584
<input type="checkbox"/>	FCC-801-M5-25 Coupling decoupling network	NT-460	<input type="checkbox"/>	Test cable #21 for SRM-3000	NT-592
<input type="checkbox"/>	FCC-801-AF10 Coupling decoupling network	NT-461	<input type="checkbox"/>	Shield chamber	NT-600
<input type="checkbox"/>	FCC-801-S25 Coupling decoupling network	NT-462	<input type="checkbox"/>	Climatic chamber	M-1200

**Division:**  
Industry & Energy

Test report number:  
2022-IN-AT-TICL-E-EX-  
000246-FG-001-Rev1

Page: 3 of 5

Date: 25.04.2023

## Appendix 1 (continued)

### Test equipment used

<input type="checkbox"/>	Anechoic Chamber 3 m / 5 m measuring distance	EMV-100	<input type="checkbox"/>	HF- Amplifier 9 kHz-225 MHz BBL200	EMV-300/1
<input type="checkbox"/>	Turntabel 6 m diameter	EMV-101	<input type="checkbox"/>	HF- Amplifier 80 -1000 MHz BBA150	EMV-301
<input type="checkbox"/>	Antenna mast + controller	EMV-102+ EMV-103	<input type="checkbox"/>	HF- Amplifier 0,8 - 6 GHz BBA150	EMV-302
<input type="checkbox"/>	EMC Video/Audiosystem	EMV-104	<input type="checkbox"/>	High Power Ant. 20-200 MHz HPBA-2510	EMV-303/1
<input type="checkbox"/>	EMC Software EMC32 Version 10.60.20	EMV-105	<input type="checkbox"/>	High Power Ant. 20-200 MHz S12018-21	EMV-303/2
<input type="checkbox"/>	Hornantenna 1 – 18 GHz HF 907	EMV-110	<input type="checkbox"/>	Log.per Antenna 80-2700 MHz STLP 9128 E special	EMV-304
<input type="checkbox"/>	Antennapre.amp. 1 – 18 GHz BBV 9718 D	EMV-111/1	<input type="checkbox"/>	Log.per Antenna 0,7 – 9 GHz STLP9149	EMV-305
<input type="checkbox"/>	Trilog Antenna 30-3000 MHz VULB9163	EMV-112	<input type="checkbox"/>	HF- Amplifier 9 kHz-250 MHz BBA150 (low noise)	EMV-306
<input type="checkbox"/>	Monopol 9 kHz – 30 MHz VAMP 9243	EMV-113	<input type="checkbox"/>	ISO11451-2 TLS 10 kHz – 30 MHz	EMV-307
<input type="checkbox"/>	Antennapre.amp 18 – 40 GHz BBV 9721	EMV-114	<input type="checkbox"/>	Load Dump Generator LD 200N	EMV-350
<input type="checkbox"/>	Hornantenna 200 – 2000 MHz AH-220	EMV-115	<input type="checkbox"/>	Ultra Compact Symulator UCS 200N100	EMV-351
<input type="checkbox"/>	DC Artificial Network PVDC 8300	EMV-150	<input type="checkbox"/>	Automotive Power fail module PFM 200N100.1	EMV-352
<input type="checkbox"/>	AC Artificial Network NNLK 8121 RC	EMV-151	<input type="checkbox"/>	Voltage Drop Symulator VDS 200Q100	EMV-353
<input type="checkbox"/>	AC Artificial Network NNLK 140	EMV- 153a-d	<input type="checkbox"/>	Arb. Generator AutoWave	EMV-354
<input type="checkbox"/>	EMI Receiver ESW44	EMV-200/1	<input type="checkbox"/>	Ultra Compact Symulator UCS 500N7	EMV-355
<input type="checkbox"/>	Signalgenerator 9 kHz – 40 GHz N5173B	EMV-201	<input type="checkbox"/>	Coupling decoupling network CNI 503B7 / 32 A	EMV-356
<input type="checkbox"/>	GPS Frequency normal B-88	EMV-202	<input type="checkbox"/>	Coupling decoupling network CNI 503B7 / 63 A	EMV-357
<input type="checkbox"/>	DC Power supply N5745A	EMV-203	<input type="checkbox"/>	Telecom Surge Generator TSurge 7	EMV-358
<input type="checkbox"/>	Spektrum Analyzator FSV40	EMV-205	<input type="checkbox"/>	Coupling decoupling network CNI 508N2	EMV-359
<input type="checkbox"/>	Thd Multimeter Model 2015	EMV-206	<input type="checkbox"/>	Coupling decoupling network CNV 504N2.2	EMV-360
<input type="checkbox"/>	Poweramplifier PAS15000	EMV- 207/abc	<input type="checkbox"/>	Immunity generator NSG4060/NSG4060-1	EMV-361
<input type="checkbox"/>	Inrush Current Source	EMV- 208/abc	<input type="checkbox"/>	Coupling network CDND M316-2	EMV-362
<input type="checkbox"/>	Arb.-generator Sycore	EMV-209	<input type="checkbox"/>	Coupling network CT419-5	EMV-363
<input type="checkbox"/>	Harmonics/Flicker analyzer ARS 16/3	EMV-210	<input type="checkbox"/>	ESD Generator NSG 437	EMV-364
<input type="checkbox"/>	Power Supply Regatron AC	EMV-214	<input type="checkbox"/>	Pulse Limiter VTSD 9561-F BNC	EMV-405
<input type="checkbox"/>	Power Supply Regatron DC	EMV-215	<input type="checkbox"/>	Transient emission BSM200N40+BS200N100	EMV- 450+451
<input type="checkbox"/>	Harmonics/Flicker analyser Zimmer	EMV-216	<input type="checkbox"/>	Cap. Coupling Clamp HFK	EMV-455
<input type="checkbox"/>	Flicker Impedanz Newtons4th 753	EMV-218	<input type="checkbox"/>	Mag. Field System MS100N+MC26100+MC2630	EMV- 456-458
<input type="checkbox"/>	Comemso	EMV-219			

**Division:**  
Industry & Energy

Test report number:  
2022-IN-AT-TICL-E-EX-  
000246-FG-001-Rev1

Page: 4 of 5

Date: 25.04.2023



## Appendix 1 (continued) Test equipment used

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

Division:  
Industry & Energy

Test report number:  
2022-IN-AT-TICL-E-EX-  
000246-FG-001-Rev1

Page: 5 of 5

Date: 25.04.2023

## Appendix 2 Photodocumentation

Division:  
Industry & Energy

Description: Front view

Test report reference:  
2022-IN-AT-TICL-E-EX-  
000246-FG-001-Rev1

Page: 1 of 8

Date: 25.04.2023



## Appendix 2 Photodocumentation

Division:  
Industry & Energy

Description: Rear view

Test report reference:  
2022-IN-AT-TICL-E-EX-  
000246-FG-001-Rev1

Page: 2 of 8

Date: 25.04.2023



## Appendix 2 Photodocumentation

Division:  
Industry & Energy

Description: Battery compartment opened

Test report reference:  
2022-IN-AT-TICL-E-EX-  
000246-FG-001-Rev1

Page: 3 of 8

Date: 25.04.2023



## Appendix 2 Photodocumentation

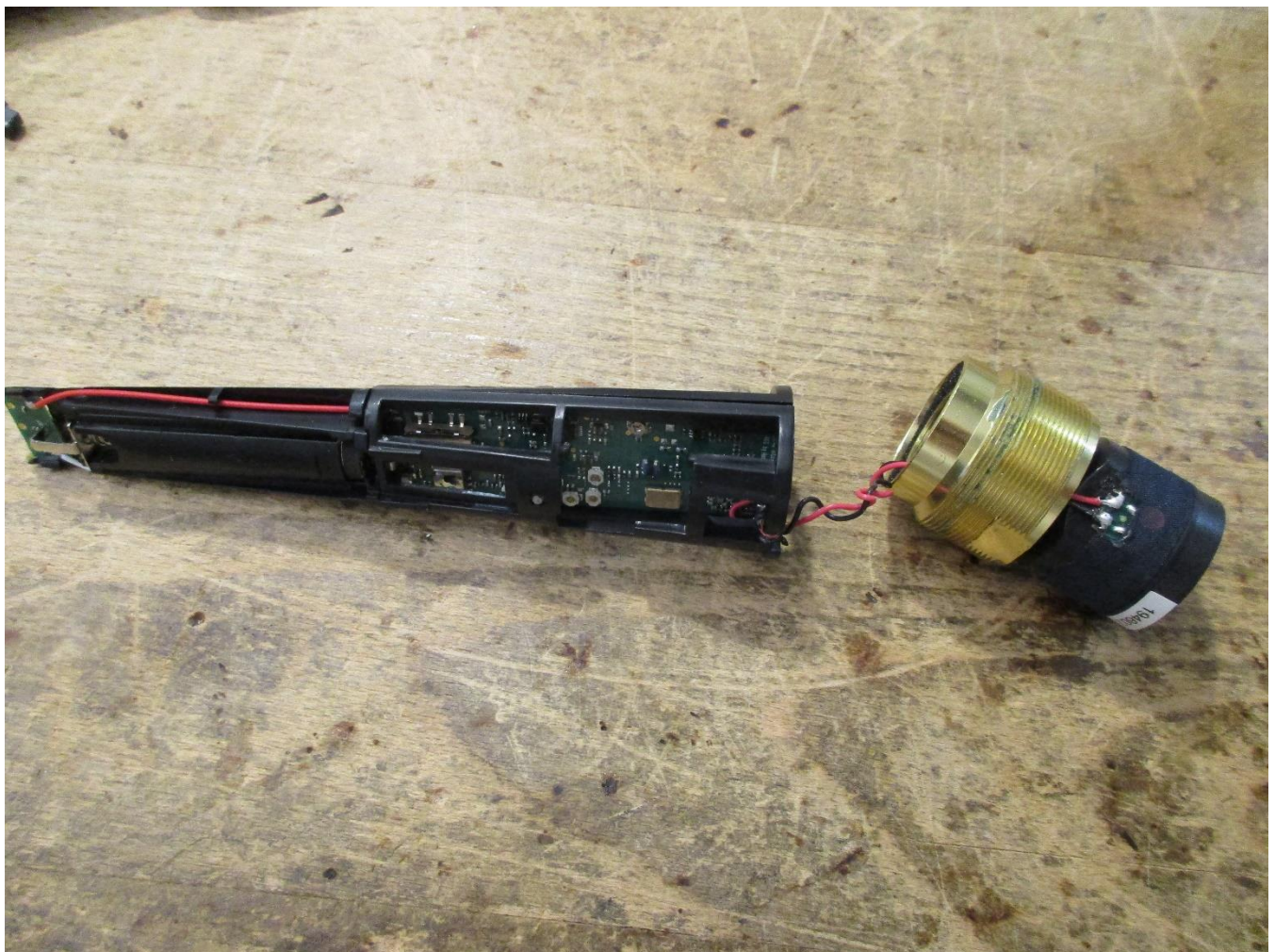
**Division:**  
Industry & Energy

Description: Case opened

Test report reference:  
2022-IN-AT-TICL-E-EX-  
000246-FG-001-Rev1

Page: 4 of 8

Date: 25.04.2023



## Appendix 2 Photodocumentation

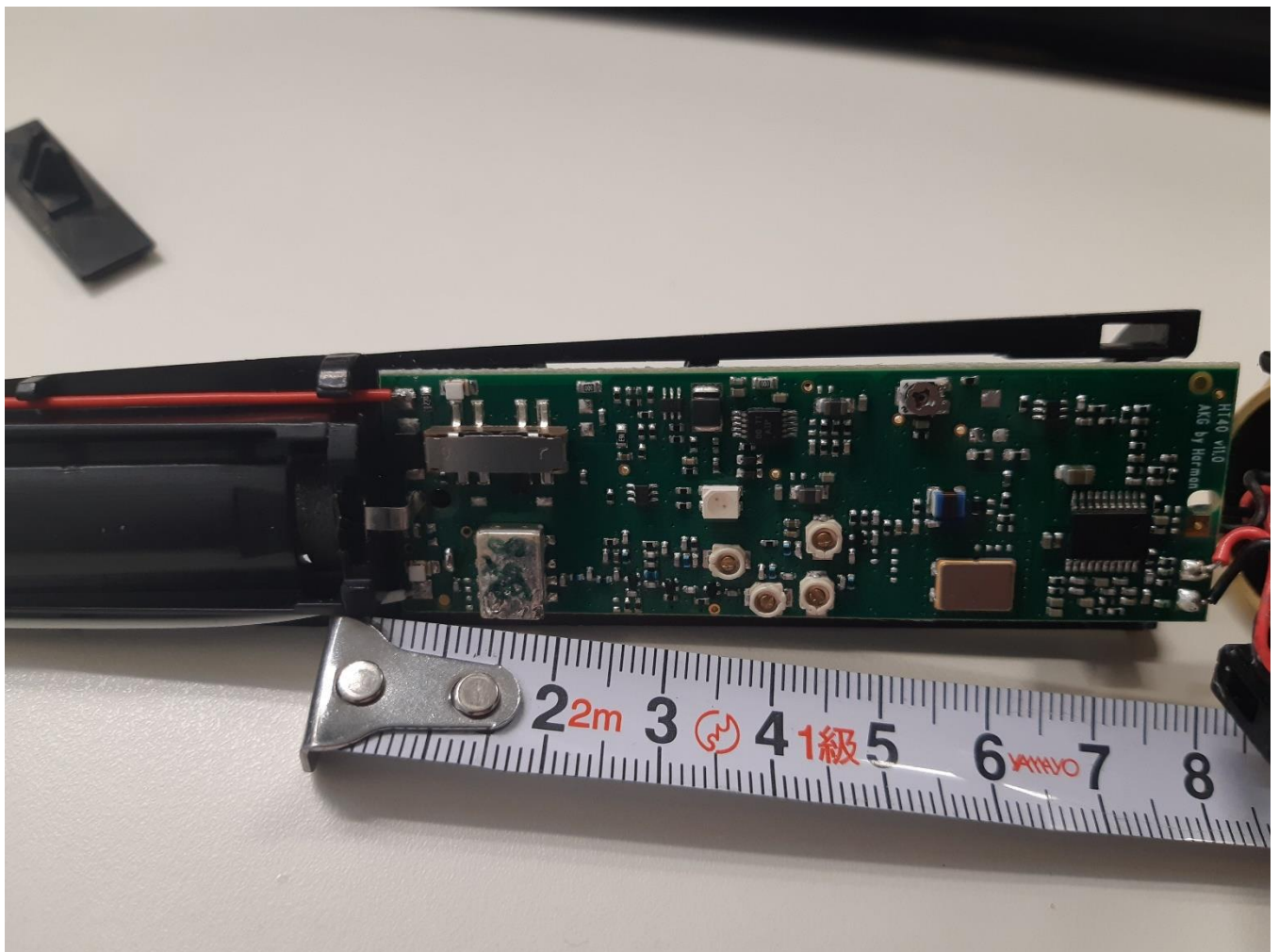
Division:  
Industry & Energy

Description: PCB view #1, Antenna close-up,  
measuring tape dimensions are in cm

Test report reference:  
2022-IN-AT-TICL-E-EX-  
000246-FG-001-Rev1

Page: 5 of 8

Date: 25.04.2023



## Appendix 2 Photodocumentation

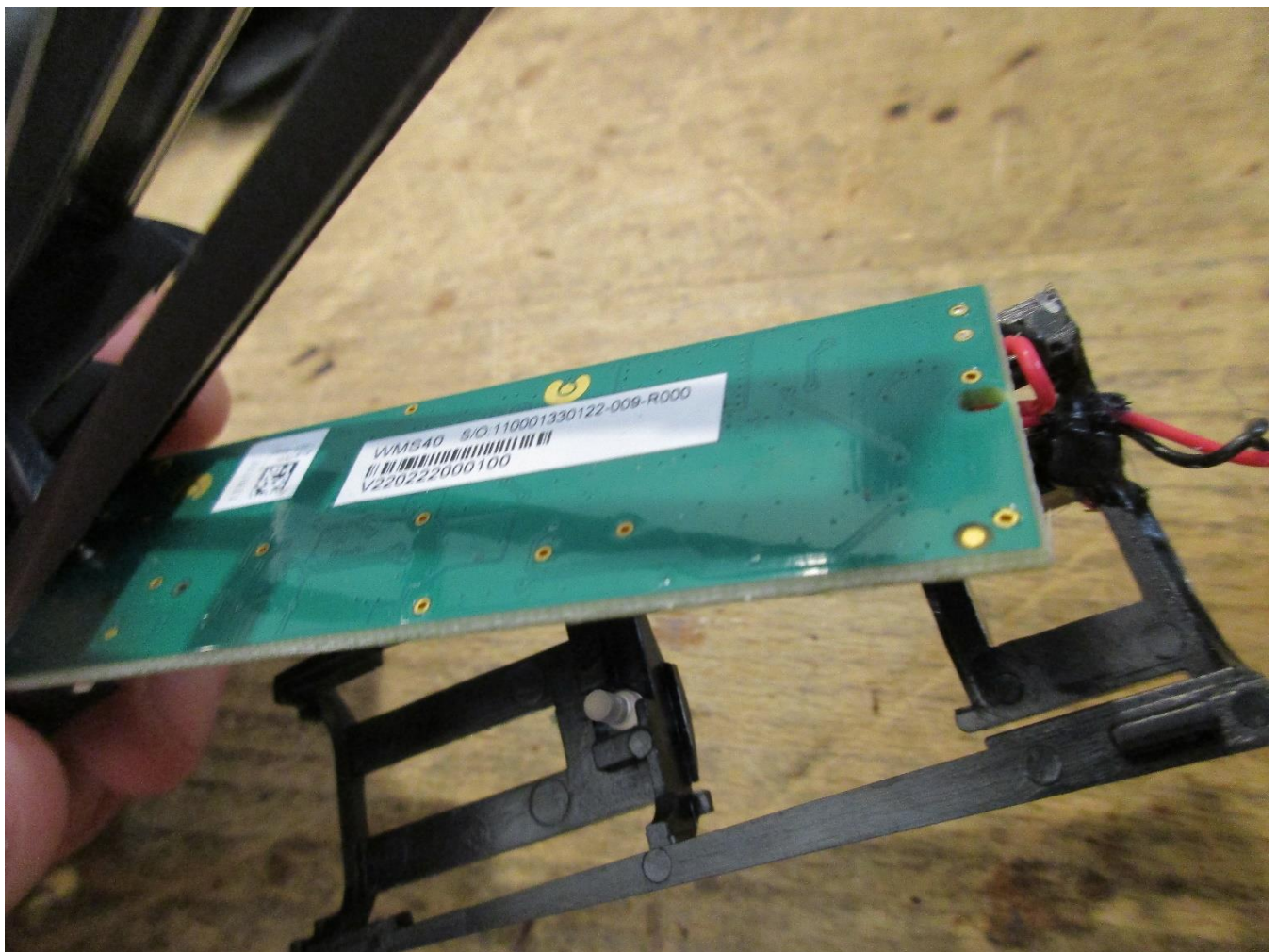
Division:  
Industry & Energy

Description: PCB view #2

Test report reference:  
2022-IN-AT-TICL-E-EX-  
000246-FG-001-Rev1

Page: 6 of 8

Date: 25.04.2023



## Appendix 2 Photodocumentation

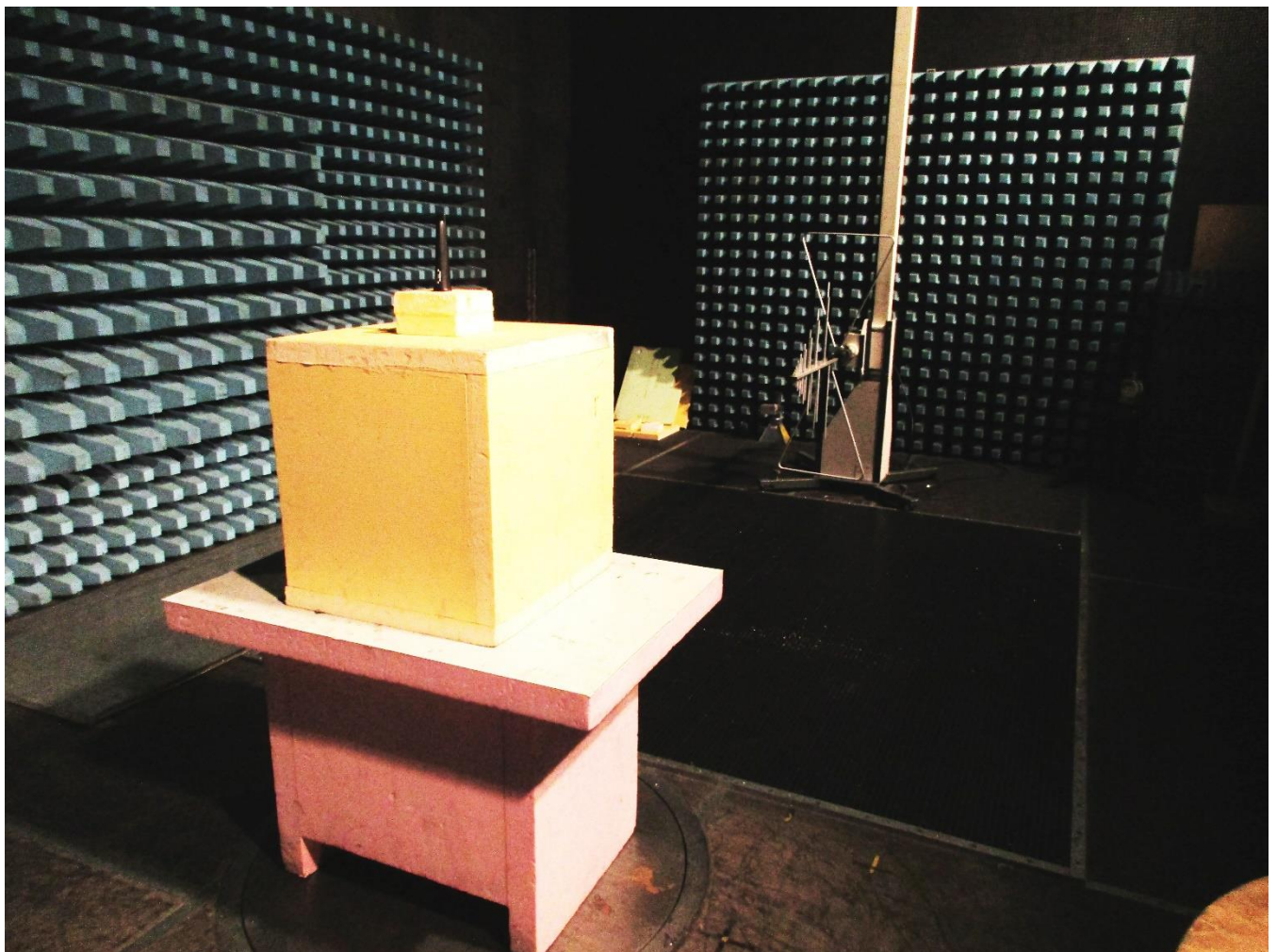
Division:  
Industry & Energy

Description: Test setup Emissions 25 MHz - 1 GHz

Test report reference:  
2022-IN-AT-TICL-E-EX-  
000246-FG-001-Rev1

Page: 7 of 8

Date: 25.04.2023





## Appendix 2 Photodocumentation

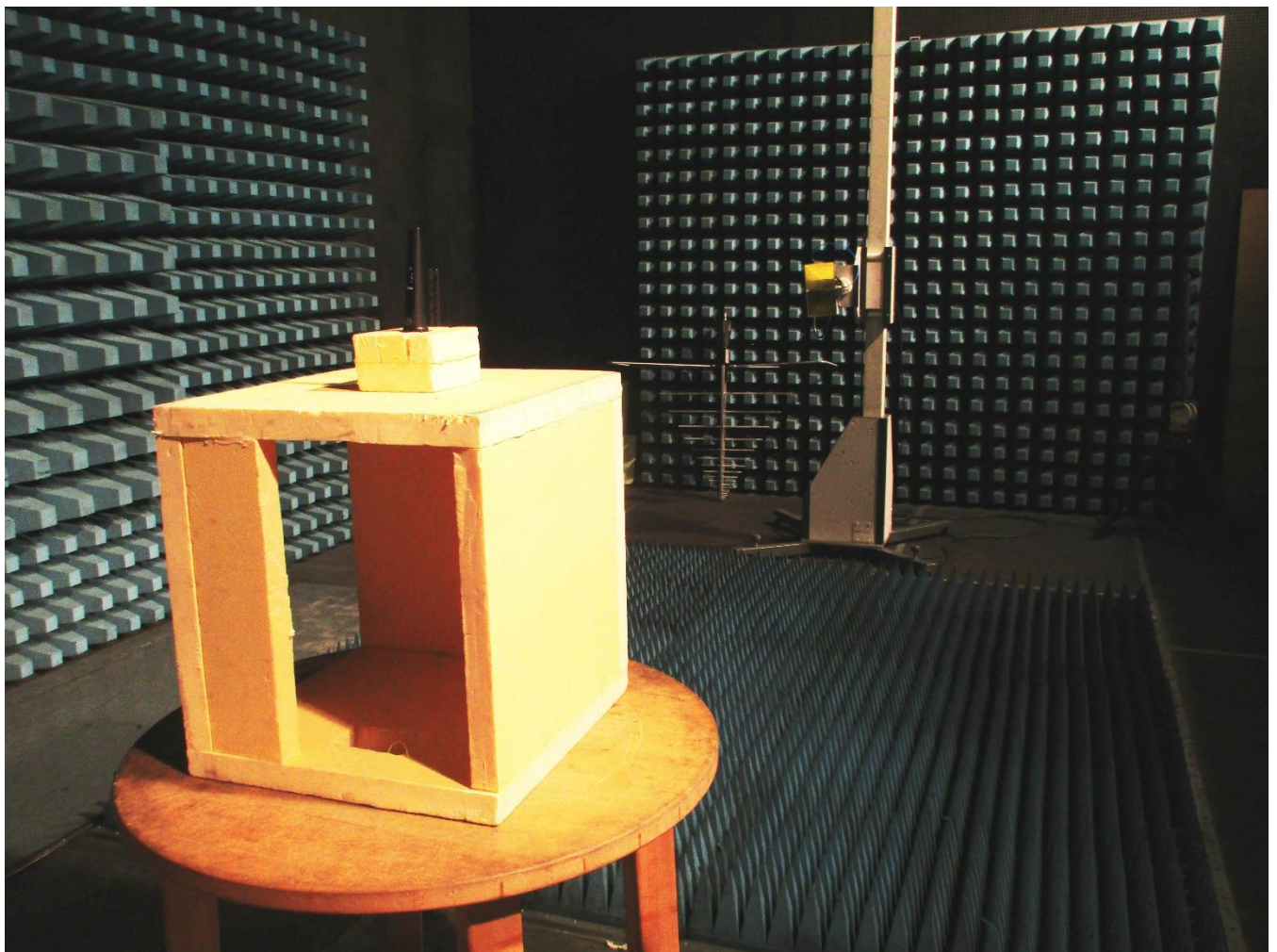
Division:  
Industry & Energy

Description: Test setup Emissions 1 - 6 GHz

Test report reference:  
2022-IN-AT-TICL-E-EX-  
000246-FG-001-Rev1

Page: 8 of 8

Date: 25.04.2023



--- END OF TEST REPORT ---

