

TEST REPORT
No.: 17-1-0106801T14a-C1

According to:
FCC Regulations
§1.1310
§ 2.1091 & 2.1093

for
Bury GmbH & Co. KG

BMW Universal Wireless Charging Station
01.1978.000
+
Cup holder
01.2041.000








Laboratory Accreditation and Listings		
  Deutsche Akkreditierungsstelle D-PL-12047-01-04 Accredited EMC-Test Laboratory	 Industry Canada Reg. No.: 3462D-1 Reg. No.: 3462D-2 Reg. No.: 3462D-3	 Voluntary Controls for Electromagnetic Emissions Reg. No.: R-4452, C-20009, T-20006, G-20013
 AUTHORIZED RF LABORATORY	 Authorized™ Test Lab Lab Code: 20011130-00	 FEDERAL COMMUNICATIONS COMMISSION U.S.A. MRA US-EU 0003
accredited according to DIN EN ISO/IEC 17025		
<p>CETECOM GmbH Laboratory Radio Communications & Electromagnetic Compatibility Im Teelbruch 116 • 45219 Essen • Germany Registered in Essen, Germany, Reg. No.: HRB Essen 8984 Tel.: + 49 (0) 20 54 / 95 19-954 • Fax: + 49 (0) 20 54 / 95 19-964 E-mail: info@cetecom.com • Internet: www.cetecom.com</p>		

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The listed attachments are an integral part of this report.	

1. Summary of test results

The test results apply exclusively to the test samples as presented in this Report. The CETECOM GmbH does not assume responsibility for any conclusions and generalizations taken in conjunction with other specimens or samples of the type of the item presented to tests.

The Equipment Under Test (in this report, hereinafter referred as EUT) is a wireless charger. The charger is operated at Frequency 110kHz – 205kHz.

TEST OVERVIEW

No. of Diagram group	Test Cases	Port	References, Standards & Limits		EUT set-up	EUT op-mode	Measured values	Result
			FCC	Limits				
1.1	Electric field strength	5cm distance to EUT	§1.1310 §2.1091 §2.1093	614 (V/m)	1	1	all values are below the regulatory limits	passed
1.1	Electric field strength	15cm distance to EUT	§1.1310 §2.1091 §2.1093	614 (V/m)	1	1	all values are below the regulatory limits	passed
1.2	Magnetic field strength	5cm distance to EUT	§1.1310 §2.1091 §2.1093	1.63 (A/m)	1	1	all values are below the regulatory limits	Passed
1.2	Magnetic field strength	15/20cm distance to EUT	§1.1310 §2.1091 §2.1093	1.63 (A/m)	1	1	all values are more than 50% below the regulatory limits	Passed

Remark:

Following tests have been performed to show compliance with applicable Standards:

FCC §1.1310, §2.1091 §2.1093

OET Bulletin 65 Supplement C

KDB 680106 D01 V03.

Additional to KDB 680106 D01 V03 tests were performed due to customer declaration with 5cm distance between edge/top of EUT and probe.

The current version of the Test Report CETECOM_17_1_0106801T14a-C1 replaces the Test Report CETECOM_17_1_0106801T01 dated 2018-10-31. The replaced test report is herewith invalid.

.....
Dipl.-Ing. Niels Jeß
Responsible for test section

.....
W. Markus
Responsible for test report

2. Administrative Data

2.1. Identification of the testing laboratory

Company name:	CETECOM GmbH
Address:	Im Teelbruch 116 45219 Essen - Kettwig Germany
Responsible for testing laboratory:	Dipl.-Ing. Niels Jeß

2.2. Test location

2.2.1. Test laboratory "CTC"

Company name:	see chapter 2.1. Identification of the testing laboratory
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2.3. Organizational items

Responsible for test report :	W. Markus
Receipt of EUT:	2018-09-25
Date(s) of test:	2018-10-30, 2018-11-12
Date of report:	2018-11-12

Version of template:	12.11

2.4. Applicant's details

Applicant's name:	Bury GmbH & Co. KG
Address:	Robert-Koch-Str. 1-7 32584, Löhne Germany
Contact person:	Mr. Johann Dshus

2.5. Manufacturer's details

Manufacturer's name:	Bury Sp. z o.o.
Address:	Wojska Polskiego 4 39-300 Mielec Poland

3. Equipment under test (EUT)

3.1. Technical data of main EUT declared by applicant

Main function	Wireless Charger with Powerbank		
Type	01.1978.000A		
Frequency range	110kHz – 205kHz		
Max. nominal power	5W		
Antenna Type	A11, one coil		
Power supply	<input checked="" type="checkbox"/> 12V DC		
Special EMI components	--		
EUT sample type	<input type="checkbox"/> Production	<input checked="" type="checkbox"/> Pre-Production	<input type="checkbox"/> Engineering
FCC label attached	<input type="checkbox"/> yes	<input checked="" type="checkbox"/> no	

3.2. EUT: Type, S/N etc. and short descriptions used in this test report

Short description*)	EUT	Type	S/N serial number	HW hardware status	SW software status
EUT A	BMW Universal Wireless Charging Station	Wireless Charger with Powerbank 01.1978.000	318012287171	4653P4	101
EUT B	Cup holder	BMW CUPHOLDER WITH USB C Connector 01.2041.000	318012504030	002	--

*) EUT short description is used to simplify the identification of the EUT in this test report.

3.3. Auxiliary Equipment (AE): Type, S/N etc. and short descriptions

AE short description *)	Auxiliary Equipment	Type	S/N serial number	HW hardware status	SW software status
AE 1	USB type C to type C cable	DUBLE TYPE C CHARGER CABLE Y-C477BK	--	Rev 3.1	--
AE 2	USB type C charger	BMW OEM CHARGER TYPE C	--	--	--
AE 3	Avid Qi Receiver Simulator	102-01	00000337	--	--

*) AE short description is used to simplify the identification of the auxiliary equipment in this test report.

4. DESCRIPTION OF TEST SET-UP's

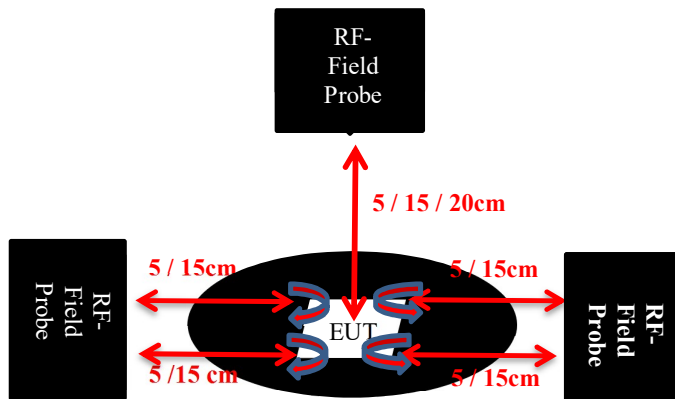
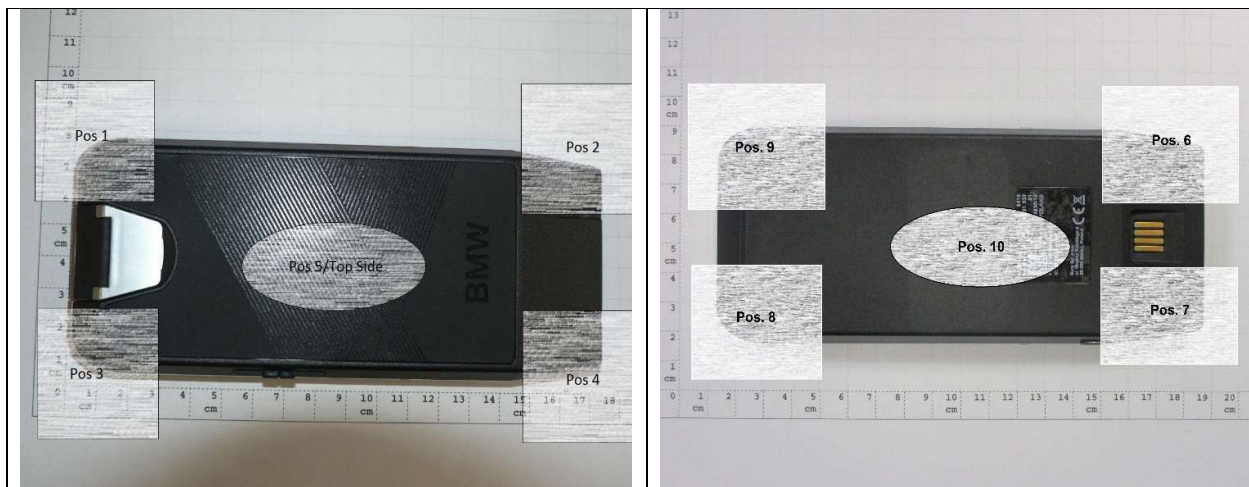
4.1. Test Set-up for configuration

The RF exposure test is performed in shielded room.

The EUT was placed on a table.

The measurement probe was surrounding point 1 to point 4 at a distance of 5cm and 15cm from the EUT and 5cm and 20 cm above the top surface (point 5) for H-filed strength

The measurement probe was surrounding point 1 to point 4 at a distance of 5cm and 15cm from the EUT and 5cm and 15cm above the top surface (point 5) for E-filed strength



Schematic: Test set-up for RF exposure measurements

5. Maximum Permissible RF Exposure

5.1.FCC References & Limits

FCC Rules: §1.1310, § 2.1093

The criteria used for the evaluation of human exposure to radio frequency radiation is listed in table 1 according FCC §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this.

Note 1 to table 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provide those persons are fully aware for a exposure and can control over their exposure. Limits for occupational/controlled exposures also apply in situations when an individual is transient through a location where occupational/controlled apply provided he or she is made aware of the potential for exposure.

Note 2 to table 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)—Continued

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
30–300	61.4	0.163	1.0	6
300–1500 .....	.....	.....	f/300	6
1500–100,000 .....	.....	.....	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	30
30–300	27.5	0.073	0.2	30
300–1500 .....	.....	.....	f/1500	30
1500–100,000 .....	.....	.....	1.0	30

f = frequency in MHz

So applicable limits in this case are as follows:

§1.1310 LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Table 1(B) Limits for General Population/Uncontrolled Exposure

0.3–1,34 MHz: Electric field: 614 V/m

0.3–1,34 MHz: Magnetic field: 1.63 A/m

5.2. E-Field Results

5.2.1. Test location and equipment (for reference numbers please see chapter 'List of test equipment')

test location	<input checked="" type="checkbox"/> CETECOM Essen (Chapter 2.2.1)	<input type="checkbox"/> Please see Chapter 2.2.2	<input type="checkbox"/> Please see Chapter 2.2.3
equipment	<input checked="" type="checkbox"/> 686 EHP-200A	<input type="checkbox"/>	<input type="checkbox"/>
signaling	<input type="checkbox"/> 017 CMD 65	<input type="checkbox"/> 323 CMD 55	<input type="checkbox"/> 340 CMD 55
signaling	<input type="checkbox"/> 298 CMU	<input type="checkbox"/> 460 CMU	<input type="checkbox"/> 295 RACAL
line voltage	<input checked="" type="checkbox"/> 12V DC		<input type="checkbox"/> 392 MT8820A

5.2.2. Test condition and test set-up

link to test system (if used):	<input type="checkbox"/> air link	<input type="checkbox"/> cable connection
EUT-grounding (if different to chapter 3.5)	<input type="checkbox"/> none	<input type="checkbox"/> with power supply
Equipment set up	-	<input type="checkbox"/> additional connection
Climatic conditions	Temperature: 24 °C	Rel. humidity: 31 %

5.2.3. Results

Table 1:
The aggregate E-Field strenghts at 15cm surrounding the device:

EUT Type and S/N or EUT set-up no.			Set- up 1	
EUT operating mode or operating mode no.			EUT operating mode 1 (90% charging level)	
Frequency Range (kHz)	Position	Distance between EUT and Field probe (m)	E-field (V/m)	E-field Limit (V/m)
125	1	0.15	1,05	614
125	2	0.15	1,02	614
125	3	0.15	1,09	614
125	4	0.15	1,07	614
125	6	0.15	0,12	614
125	7	0.15	0,14	614
125	8	0.15	0,12	614
125	9	0.15	0,10	614
125	10	0.15	0,17	614

Remarks:

EUT Type and S/N or EUT set-up no.			Set- up 1	
EUT operating mode or operating mode no.			EUT operating mode 2 (50% charging level)	
Frequency Range (kHz)	Position	Distance between EUT and Field probe (m)	E-field (V/m)	E-field Limit (V/m)
125	1	0.15	1,50	614
125	2	0.15	1,33	614
125	3	0.15	1,22	614
125	4	0.15	1,40	614
125	6	0.15	0,14	614
125	7	0.15	0,16	614
125	8	0.15	0,19	614
125	9	0.15	0,14	614
125	10	0.15	0,21	614

Remarks:

EUT Type and S/N or EUT set-up no.			Set- up 1	
EUT operating mode or operating mode no.			EUT operating mode 3 (5% charging level)	
Frequency Range (kHz)	Position	Distance between EUT and Field probe (m)	E-field (V/m)	E-field Limit (V/m)
125	1	0.15	1,82	614
125	2	0.15	1,69	614
125	3	0.15	1,45	614
125	4	0.15	1,59	614
125	6	0.15	0,22	614
125	7	0.15	0,23	614
125	8	0.15	0,23	614
125	9	0.15	0,25	614
125	10	0.15	0,26	614

Remarks:

Table 2:
The aggregate E-Field strenghts at 15cm above the top of the device:

EUT Type and S/N or EUT set-up no.			Set- up 1	
EUT operating mode or operating mode no.			EUT operating mode 1 (5% charging level)	
Frequency Range (kHz)	Position	Distance between EUT and Field probe (m)	E-field (V/m)	E-field Limit (V/m)
125	5	0.15	3,82	614

Remarks:

EUT Type and S/N or EUT set-up no.			Set- up 1	
EUT operating mode or operating mode no.			EUT operating mode 2 (50% charging level)	
Frequency Range (kHz)	Position	Distance between EUT and Field probe (m)	E-field (V/m)	E-field Limit (V/m)
125	5	0.15	1,93	614

Remarks:

EUT Type and S/N or EUT set-up no.			Set- up 1	
EUT operating mode or operating mode no.			EUT operating mode 3 (90% charging level)	
Frequency Range (kHz)	Position	Distance between EUT and Field probe (m)	E-field (V/m)	E-field Limit (V/m)
125	5	0.15	1,45	614

Remarks:

Max E-Field, 15cm distance between EUT and probe (top side)

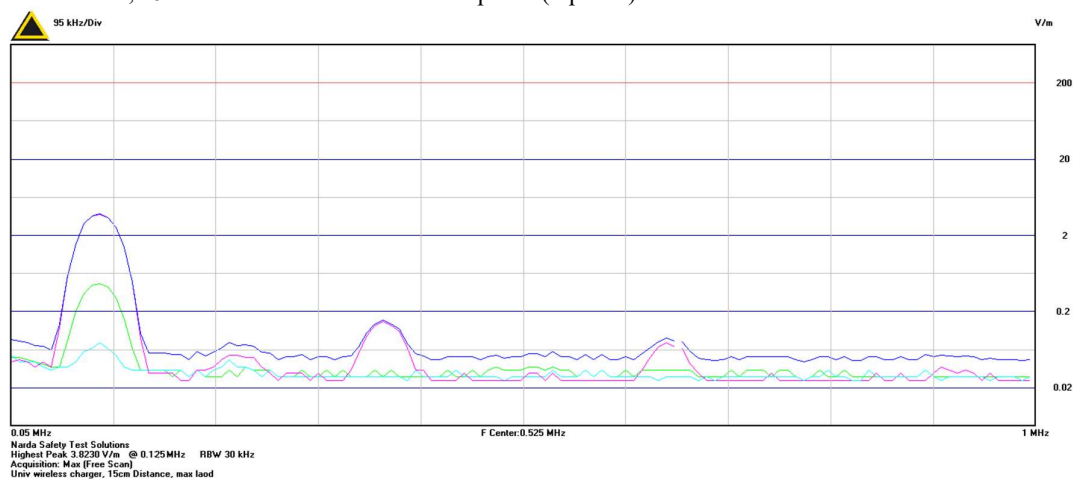


Table 3:
The aggregate E-Field strenghts at 5cm surrounding the device:

EUT Type and S/N or EUT set-up no.			Set- up 1	
EUT operating mode or operating mode no.			EUT operating mode 1 (90% charging level)	
Frequency Range (kHz)	Position	Distance between EUT and Field probe (m)	E-field (V/m)	E-field Limit (V/m)
125	1	0.05	4,05	614
125	2	0.05	4,02	614
125	3	0.05	4,09	614
125	4	0.05	4,07	614
125	6	0.05	0,16	614
125	7	0.05	0,18	614
125	8	0.05	0,24	614
125	9	0.05	0,26	614
125	10	0.05	0,29	614

Remarks:

EUT Type and S/N or EUT set-up no.			Set- up 1	
EUT operating mode or operating mode no.			EUT operating mode 2 (50% charging level)	
Frequency Range (kHz)	Position	Distance between EUT and Field probe (m)	E-field (V/m)	E-field Limit (V/m)
125	1	0.05	2,50	614
125	2	0.05	2,33	614
125	3	0.05	2,22	614
125	4	0.05	2,40	614
125	6	0.05	0,21	614
125	7	0.05	0,26	614
125	8	0.05	0,39	614
125	9	0.05	0,34	614
125	10	0.05	0,49	614

Remarks:

EUT Type and S/N or EUT set-up no.			Set- up 1	
EUT operating mode or operating mode no.			EUT operating mode 3 (5% charging level)	
Frequency Range (kHz)	Position	Distance between EUT and Field probe (m)	E-field (V/m)	E-field Limit (V/m)
125	1	0.05	2,82	614
125	2	0.05	2,69	614
125	3	0.05	2,45	614
125	4	0.05	2,59	614
125	6	0.05	0,42	614
125	7	0.05	0,45	614
125	8	0.05	0,46	614
125	9	0.05	0,48	614
125	10	0.05	0,50	614

Remarks:

Table 4:
The aggregate E-Field strenghts at 5cm above the top of the device:

EUT Type and S/N or EUT set-up no.			Set- up 1	
EUT operating mode or operating mode no.			EUT operating mode 1 (5% charging level)	
Frequency Range (kHz)	Position	Distance between EUT and Field probe (m)	E-field (V/m)	E-field Limit (V/m)
125	5	0.05	11,21	614

Remarks:

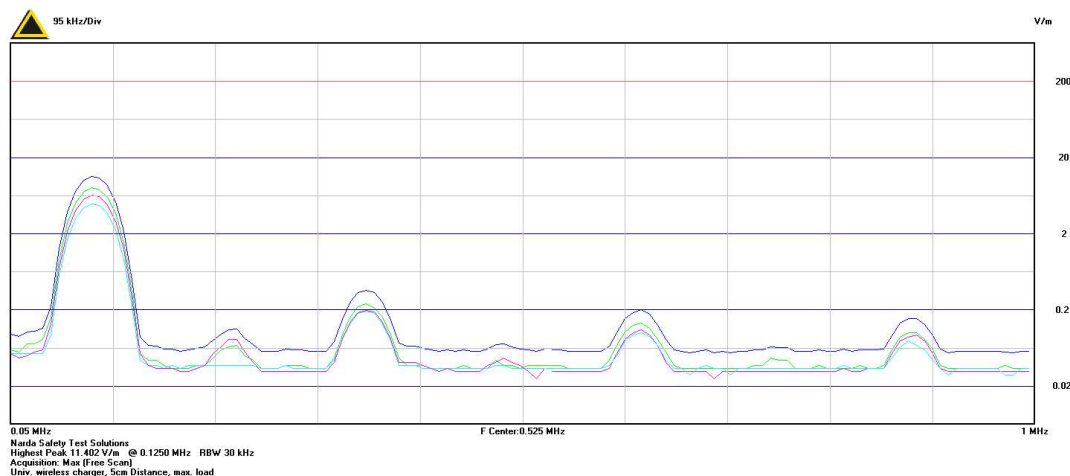
EUT Type and S/N or EUT set-up no.			Set- up 1	
EUT operating mode or operating mode no.			EUT operating mode 1 (50% charging level)	
Frequency Range (kHz)	Position	Distance between EUT and Field probe (m)	E-field (V/m)	E-field Limit (V/m)
125	5	0.05	7,02	614

Remarks:

EUT Type and S/N or EUT set-up no.			Set- up 1	
EUT operating mode or operating mode no.			EUT operating mode 1 (90% charging level)	
Frequency Range (kHz)	Position	Distance between EUT and Field probe (m)	E-field (V/m)	E-field Limit (V/m)
125	5	0.05	3,43	614

Remarks:

Max E-Field, 15cm distance between EUT and probe (top side)



5.3. H-Field Results

5.3.1. Test location and equipment (for reference numbers please see chapter 'List of test equipment')

test location	<input checked="" type="checkbox"/> CETECOM Essen (Chapter 2.2.1)	<input type="checkbox"/> Please see Chapter 2.2.2	<input type="checkbox"/> Please see Chapter 2.2.3
equipment	<input checked="" type="checkbox"/> 686 EHP-200A	<input type="checkbox"/>	<input type="checkbox"/>
signaling	<input type="checkbox"/> 017 CMD 65	<input type="checkbox"/> 323 CMD 55	<input type="checkbox"/> 340 CMD 55
signaling	<input type="checkbox"/> 298 CMU	<input type="checkbox"/> 460 CMU	<input type="checkbox"/> 295 RACAL
line voltage	<input checked="" type="checkbox"/> 12V DC		<input type="checkbox"/> 392 MT8820A

5.3.2. Test condition and test set-up

link to test system (if used):	<input type="checkbox"/> air link	<input type="checkbox"/> cable connection	
EUT-grounding (if different to chapter 3.5)	<input type="checkbox"/> none	<input type="checkbox"/> with power supply	<input type="checkbox"/> additional connection
Equipment set up	-		-
Climatic conditions	Temperature: 24 °C		Rel. humidity: 31 %

Table 5:
The aggregate H-Field strenghts at 15cm surrounding the device:

EUT Type and S/N or EUT set-up no			Set-up 1			
EUT operating mode or operating mode no.			EUT operating mode 1 (90% charging level)			
Frequency Range (kHz)	Position	Distance between EUT and Field probe (m)	H-field (A/m)	H-field Limit (A/m)	H-field Limit – 50% (A/m) ¹⁾	Result
125	1	0.15	0,13	1.63	0,815	passed
125	2	0.15	0,15	1.63	0,815	passed
125	3	0.15	0,14	1.63	0,815	passed
125	4	0.15	0,14	1.63	0,815	passed
125	5	0.15	0,31	1.63	--	passed
125	6	0.15	0,02	1.63	0,815	passed
125	7	0.15	0,02	1.63	0,815	passed
125	8	0.15	0,03	1.63	0,815	passed
125	9	0.15	0,03	1.63	0,815	passed
125	10	0.15	0,05	1.63	0,815	passed

Remarks: ¹⁾ according KDB 680106 D01 V03

EUT Type and S/N or EUT set-up no.			Set-up 1			
EUT operating mode or operating mode no.			EUT operating mode 2 (50% charging level)			
Frequency Range (kHz)	Position	Distance between EUT and Field probe (m)	H-field (A/m)	H-field Limit (A/m)	H-field Limit – 50% (A/m) ¹⁾	Result
125	1	0.15	0,17	1.63	0,815	passed
125	2	0.15	0,18	1.63	0,815	passed
125	3	0.15	0,16	1.63	0,815	passed
125	4	0.15	0,18	1.63	0,815	passed
125	5	0.15	0,46	1.63	--	passed
125	6	0.15	0,03	1.63	0,815	passed
125	7	0.15	0,03	1.63	0,815	passed
125	8	0.15	0,05	1.63	0,815	passed
125	9	0.15	0,04	1.63	0,815	passed
125	10	0.15	0,07	1.63	0,815	passed

Remarks: ¹⁾ according KDB 680106 D01 V03

EUT Type and S/N or EUT set-up no.			Set-up 1			
EUT operating mode or operating mode no.			EUT operating mode 3 (5% charging level)			
Frequency Range (kHz)	Position	Distance between EUT and Field probe (m)	H-field (A/m)	H-field Limit (A/m)	H-field Limit – 50% (A/m) ¹⁾	Result
125	1	0.15	0,22	1.63	0,815	passed
125	2	0.15	0,20	1.63	0,815	passed
125	3	0.15	0,19	1.63	0,815	passed
125	4	0.15	0,21	1.63	0,815	passed
125	5	0.15	0,57	1.63	--	passed
125	6	0.15	0,04	1.63	0,815	passed
125	7	0.15	0,04	1.63	0,815	passed
125	8	0.15	0,06	1.63	0,815	passed
125	9	0.15	0,05	1.63	0,815	passed
125	10	0.15	0,09	1.63	0,815	passed

Remarks: ¹⁾ according KDB 680106 D01 V03

Max H-Field, 15cm Distance between EUT and probe (top of the device)

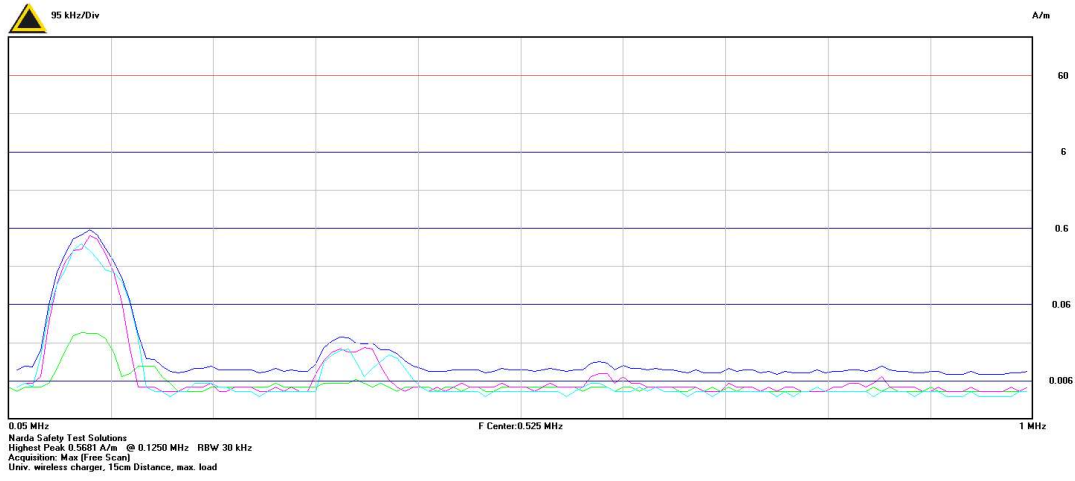


Table 6:
The aggregate H-Field strenghts at 20cm above the top of the device:

EUT Type and S/N or EUT set-up no.			Set-up 1			
EUT operating mode or operating mode no.			EUT operating mode 1 (90% charging level)			
Frequency Range (kHz)	Position	Distance between EUT and Field probe (m)	H-field (A/m)	H-field Limit (A/m)	H-field Limit – 50% (A/m) ¹⁾	Result
117,5	5	0.2	0,22	1.63	0,815	passed

Remarks: ¹⁾ according KDB 680106 D01 V03

EUT Type and S/N or EUT set-up no.			Set-up 1			
EUT operating mode or operating mode no.			EUT operating mode 2 (50% charging level)			
Frequency Range (kHz)	Position	Distance between EUT and Field probe (m)	H-field (A/m)	H-field Limit (A/m)	H-field Limit – 50% (A/m) ¹⁾	Result
117,5	5	0.2	0,24	1.63	0,815	passed

Remarks: ¹⁾ according KDB 680106 D01 V03

EUT Type and S/N or EUT set-up no.			Set-up 1			
EUT operating mode or operating mode no.			EUT operating mode 3 (5% charging level)			
Frequency Range (kHz)	Position	Distance between EUT and Field probe (m)	H-field (A/m)	H-field Limit (A/m)	H-field Limit – 50% (A/m) ¹⁾	Result
117,5	5	0.2	0,31	1.63	0,815	passed

Remarks: ¹⁾ according KDB 680106 D01 V03

Max H-Field, 20cm Distance between EUT and probe (top side)

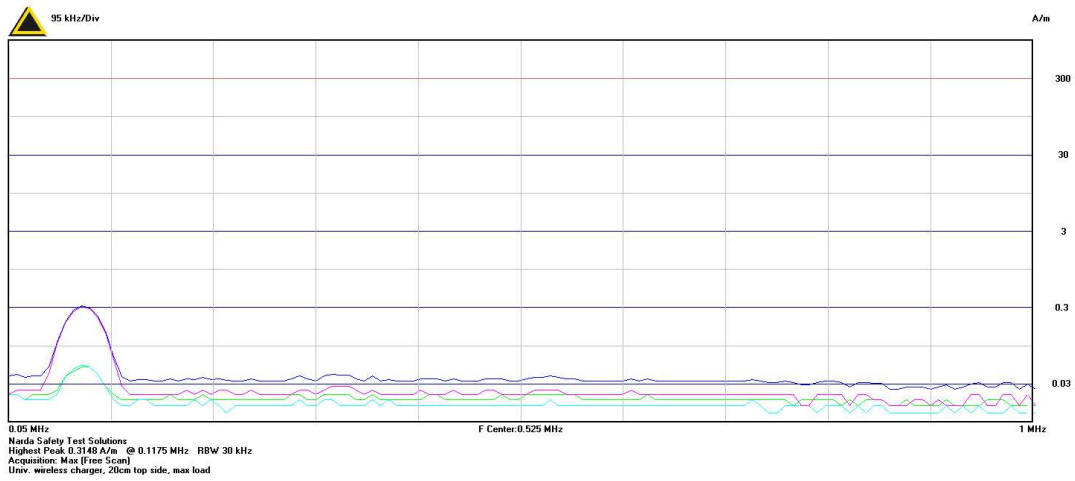


Table 7:
The aggregate H-Field strenghts at 5cm surrounding the device:

EUT Type and S/N or EUT set-up no.			Set-up 1		
EUT operating mode or operating mode no.			EUT operating mode 1 (90% charging level)		
Frequency Range (kHz)	Position	Distance between EUT and Field probe (m)	H-field (A/m)	H-field Limit (A/m)	Result
125	1	0.05	0,41	1.63	passed
125	2	0.05	0,40	1.63	passed
125	3	0.05	0,39	1.63	passed
125	4	0.05	0,41	1.63	passed
125	6	0.05	0,13	1.63	passed
125	7	0.05	0,14	1.63	passed
125	8	0.05	0,24	1.63	passed
125	9	0.05	0,23	1.63	passed
125	10	0.05	0,31	1.63	passed

Remarks:

EUT Type and S/N or EUT set-up no.			Set-up 1		
EUT operating mode or operating mode no.			EUT operating mode 2 (50% charging level)		
Frequency Range (kHz)	Position	Distance between EUT and Field probe (m)	H-field (A/m)	H-field Limit (A/m)	Result
125	1	0.05	0,62	1.63	passed
125	2	0.05	0,60	1.63	passed
125	3	0.05	0,60	1.63	passed
125	4	0.05	0,63	1.63	passed
125	6	0.05	0,18	1.63	passed
125	7	0.05	0,15	1.63	passed
125	8	0.05	0,31	1.63	passed
125	9	0.05	0,31	1.63	passed
125	10	0.05	0,39	1.63	passed

Remarks:

EUT Type and S/N or EUT set-up no.			Set-up 1		
EUT operating mode or operating mode no.			EUT operating mode 3 (5% charging level)		
Frequency Range (kHz)	Position	Distance between EUT and Field probe (m)	H-field (A/m)	H-field Limit (A/m)	Result
125	1	0.05	1,04	1.63	passed
125	2	0.05	1.08	1.63	passed
125	3	0.05	1,09	1.63	passed
125	4	0.05	0,98	1.63	passed
125	6	0.05	0,14	1.63	passed
125	7	0.05	0,19	1.63	passed
125	8	0.05	0,31	1.63	passed
125	9	0.05	0,29	1.63	passed
125	10	0.05	0,47	1.63	passed

Remarks:

Table 8:
The aggregate H-Field strenghts at 5cm above the top of the device:

EUT Type and S/N or EUT set-up no.			Set-up 1		
EUT operating mode or operating mode no.			EUT operating mode 1 (90% charging level)		
Frequency Range (kHz)	Position	Distance between EUT and Field probe (m)	H-field (A/m)	H-field Limit (A/m)	Result
125	5	0.05	1,00	1.63	passed

Remarks:

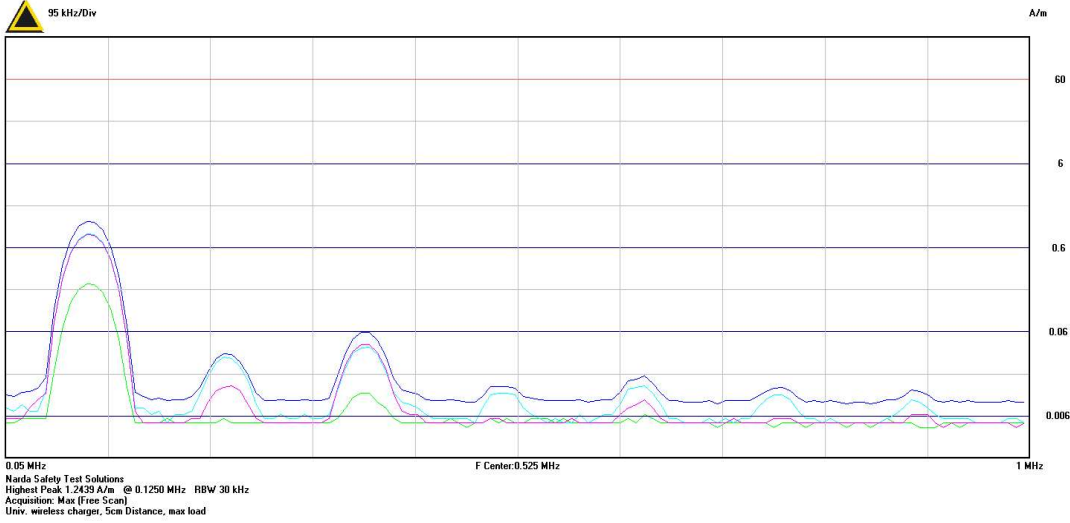
EUT Type and S/N or EUT set-up no.			Set-up 1		
EUT operating mode or operating mode no.			EUT operating mode 2 (50% charging level)		
Frequency Range (kHz)	Position	Distance between EUT and Field probe (m)	H-field (A/m)	H-field Limit (A/m)	Result
125	5	0.05	1,16	1.63	passed

Remarks:

EUT Type and S/N or EUT set-up no.			Set-up 1		
EUT operating mode or operating mode no.			EUT operating mode 3 (5% charging level)		
Frequency Range (kHz)	Position	Distance between EUT and Field probe (m)	H-field (A/m)	H-field Limit (A/m)	Result
125	5	0.05	1,24	1.63	passed

Remarks:

Max H-Field, 5cm Distance between EUT and probe (top side)



6. Measurement uncertainties

The reported uncertainties are calculated based on the standard uncertainty multiplied with the appropriate coverage factor **k**, such that a confidence level of approximately 95% is achieved.

For uncertainty determination, each component used in the concrete measurement set-up was taken in account and its contribution to the overall uncertainty according to its statistical distribution calculated.

Following table shows expectable uncertainties for each measurement type performed.

RF-Measurement	Frequency range	Calculated uncertainty based on a confidence level of 95%	Remarks:
Power Output conducted	9 kHz .. 20 GHz	1.0 dB	--
Power Output radiated	30 MHz .. 4 GHz	3.17 dB	Substitution method
Conducted emissions on antenna ports	9 kHz .. 20 GHz	1.0 dB	--
Radiated emissions enclosure	9 kHz .. 30 MHz	5.0 dB	Magnetic field
	9 MHz .. 1 GHz	5.0 dB	E-Field
	30 MHz .. 1 GHz	4.2 dB	E-Field
	1 GHz .. 20 GHz	3.17 dB	Substitution method
Occupied bandwidth	9 kHz .. 4 GHz	0.1272 ppm (Delta Marker)	Frequency error
		1.0 dB	Power
Emission bandwidth	9 kHz .. 4 GHz	0.1272 ppm (Delta Marker)	Frequency error
		1.0 dB	Power
Frequency stability	9 kHz .. 20 GHz	0.0636 ppm	--
Conducted emissions on AC-mains port (UCISPR)	9 kHz .. 150 kHz	4.0 dB	--
	150 kHz .. 30 MHz	3.6 dB	--

Table: measurement uncertainties, valid for conducted/radiated measurements

7. Accreditation details of CETECOM's laboratories and test sites

Ref.-No.	Accreditation Certificate	Valid for laboratory area or test site	Accreditation Body
-	D-PL-12047-01-01	All laboratories and test sites of CETECOM GmbH, Essen	DAkkS, Deutsche Akkreditierungsstelle GmbH
337 487 558 348 348	MRA US-EU 0003	Radiated Measurements 30 MHz to 1 GHz, 3 m / 10 m (OATS) Radiated Measurements 30 MHz to 1 GHz, 3 m (SAR) Radiated Measurements above 1 GHz, 3 m (FAR) Mains Ports Conducted Interference Measurements Telecommunication Ports Conducted Interference Measurement.	FCC, Federal Communications Commission Laboratory Division, USA (MRA US-EU 0003)
337 487 550 558	3462D-1 3462D-2 3462D-2 3462D-3	Radiated Measurements 30 MHz to 1 GHz, 3 m / 10 m (OATS) Radiated Measurements 30 MHz to 1 GHz, 3 m (SAR) Radiated Measurements 1 GHz to 6 GHz, 3 m (SAR) Radiated Measurements above 1 GHz, 3 m (FAR)	IC, Industry Canada Certification and Engineering Bureau
337 487 550 348	R-20013 G-20013 C-20009 T-20006	Radiated Measurements 30 MHz to 1 GHz, 3 m (SAR) Radiated Measurements 1 GHz to 6 GHz, 3 m (SAR) Mains Ports Conducted Interference Measurements Telecommunication Ports Conducted Interference Measurement.	VCCI, Voluntary Control Council for Interference by Information Technology Equipment, Japan

OATS = Open Area Test Site, SAR = Semi Anechoic Room, FAR = Fully Anechoic Room

8. Instruments and Ancillary

8.1. Used equipment “CTC”

The “Ref.-No” in the left column of the following tables allows the clear identification of the laboratory equipment.

8.1.1. Test software and firmware of equipment

Ref.-No.	Equipment	Type	Serial-No.	Version of Firmware or Software during the test
001	EMI Test Receiver	ESS	825132/017	Firm.= 1.21 , OTP=2.0, GRA=2.0
012	Signal Generator (EMS-cond.)	SMY 01	839069/027	Firm.= V 2.02
013	Power Meter (EMS cond.)	NRVD	839111/003	Firm.= V 1.51
017	Digital Radiocommunication Tester	CMD 60 M	844365/014	Firmware = V 3.52 .22.01.99, DECT = D2.87 13.01.99
053	Audio Analyzer	UPA3	860612/022	Firm. V 4.3
119	RT Harmonics Analyzer dig. Flickermeter	B10	G60547	Firm.= V 3.1DHG
140	Signal Generator	SMHU	831314/006	Firm.= 3.21
261	Thermal Power Sensor	NRV-Z55	825083/0008	EPROM-Datum 02.12.04, SE EE 1 B
262	Power Meter	NRV-S	825770/0010	Firm.= 2.6
263	Signal Generator	SMP 04	826190/0007	Firm.=3.21
264	Spectrum Analyzer	FSEK 30	826939/005	Bios=2.1, Analyzer= 3.20
295	Racal Digital Radio Test Set	6103	1572	UNIT Firmware= 4.04, SW-Main=4.04, SW-BBP=1.04, SW-DSP=1.02, Hardboot=1.02, Softboot=2.02
298	Univ. Radio Communication Tester	CMU 200	832221/091	R&S Test Firmware =3.53 /3.54 (current Testsoftw. f. all band used
323	Digital Radiocommunication Tester	CMD 55	825878/0034	Firm.= 3.52 .22.01.99
331	Climatic Test Chamber -40/+80 Grad	HC 4055	43146	TSI 1.53
335	CTC-EMS-Conducted	System EMS Conducted	-	EMC 32 V 8.52
340	Digital Radiocommunication Tester	CMD 55	849709/037	Firm.= 3.52 .22.01.99
355	Power Meter	URV 5	891310/027	Firm.= 1.31
365	10V Insertion Unit 50 Ohm	URV5-Z2	100880	Eprom Data = 31.03.08
366	Ultra Compact Simulator	UCS 500 M4	V0531100594	Firm. UCS 500=001925/3.06a02, rc=ISMIEC 4.10
371	Bluetooth Tester	CBT32	100153	CBT V5.30+ SW-Option K55, K57
377	EMI Test Receiver	ESCS 30	100160	Firm.= 2.30, OTP= 02.01, GRA= 02.36
378	Broadband RF Field Monitor	RadiSense III	03D00013SNO-08	Firm.= V.03D13
389	Digital Multimeter	Keithley 2000	0583926	Firm. = A13 (Mainboard) A02 (Display)
392	Radio Communication Tester	MT8820A	6K00000788	Firm.= 4.50 #005, IPL=4.01#001, OS=4.02#001, GSM=4.41#013, W-CDMA= 4.54#004, scenario= 4.52#002
436	Univ. Radio Communication Tester	CMU 200	103083	R&S Test Firmware Base=5.14, Mess-Software= GSM:5.14 WCDMA:5.14 (current Testsoftw. F. all band
441	CTC-SAR-EMI Cable Loss	System EMI field (SAR)	-	EMC 32 Version 8.52
442	CTC-SAR-EMS	System EMS field (SAR)	-	EMC 32 Version 8.40
443	CTC-FAR-EMI-RSE	System CTC-FAR-EMI-RSE	-	Spuri 7.2.5 or EMC 32 Ver. 9.15.00
444	CTC-FAR-EMS field	System-EMS-Field (FAR)	-	EMC 32 Version 9.15.00
460	Univ. Radio Communication Tester	CMU 200	108901	R&S Test Firmware Base=5.14, GSM=5.14 WCDMA=5.14 (current Testsoftw.,f. all band to be used,
489	EMI Test Receiver	ESU40	1000-30	Firmware=4.43 SP3, Bios=V5.1-16-3, Spec. =01.00
491	ESD Simulator dito	ESD dito	dito307022	V 2.30
524	Voltage Drop Simulator	VDS 200	0196-16	Software Nr. 000037 Version V4.20a01
526	Burst Generator	EFT 200 A	0496-06	Software Nr. 000034 Version V2.32
527	Micro Pulse Generator	MPG 200 B	0496-05	Software-Nr. 000030 Version V2.43
528	Load Dump Simulator	LD 200B	0496-06	Software-Nr. 000031 Version V2.35a01
546	Univ. Radio Communication Tester	CMU 200	106436	R&S Test Firmware Base=5.14, GSM=5.14 WCDMA=5.14 (current Testsoftw.,f. all band to be used
547	Univ. Radio Communication Tester	CMU 200	835390/014	R&S Test Firmware Base=V5.1403 (current Testsoftw., f. all band used, GSM = 5.14 WCDMA: = 5.14
584	Spectrum Analyzer	FSU 8	100248	2.82 SP3
597	Univ. Radio Communication Tester	CMU 200	100347	R&S Test Firmware Base=5.01, GSM=5.02 WCDMA= not installed, Mainboard= µP1=V.850
598	Spectrum Analyzer	FSEM 30 (Reserve)	831259/013	Firmware Bios 3.40 , Analyzer 3.40 Sp 2
620	EMI Test Receiver	ESU 26	100362	4.43 SP3
642	Wideband Radio Communication Tester	CMW 500	126089	Setup V03.26, Test programm component V03.02.20
692	Bluetooth Tester	CBT 32	100236	CBT V 5.40, FW: V.2.41 (FPGA Digital, V. 3.09 FPGA RF)

8.1.2. Single instruments and test systems

Ref.-No.	Equipment	Type	Serial-No.	Manufacturer	Interval of calibration	Remark	Cal due
487	System CTC NSA-Verification SAR-EMI	System EMI field (SAR) NSA	-	ETS Lindgren / CETECOM	24 M	-	31.03.2019
468	Digital Multimeter	Fluke 112	90090455	Fluke USA	36 M	-	30.04.2021
671	DC-power supply 0-5 A	EA-3013S	-	Elektro Automatik	pre-m	2	
686	Field Analyzer	EHP-200A	160WX30702	Narda Safety Test Solutions	24 M	-	29.03.2019

8.1.3. Legend

Note / remarks		Calibrated during system calibration:
	1a	System CTC-SAR-EMS (Ref.-No. 442)
	1b	System-CTC-EMS-Conducted (Ref.-No. 335)
	1c	System CTC-FAR-EMI-RSE (Ref.-No . 443)
	1d	System CTC-SAR-EMI (Ref.-No . 441)
	1e	System CTC-OATS (EMI radiated) (Ref.-No. 337)
	1 f	System CTC-CTIA-OTA (Ref.-No . 420)
	1 g	System CTC-FAR-EMS (Ref.-No . 444)
	2	Calibration or equipment check immediately before measurement
	3	Regulatory maintained equipment for functional check or support purpose
	4	Ancillary equipment without calibration e.g. mechanical equipment or monitoring equipment
	5	Test System

Interval of calibration	12 M	12 month
	24 M	24 month
	36 M	36 month
	24/12 M	Calibration every 24 months, between this every 12 months internal validation
	36/12 M	Calibration every 36 months, between this every 12 months internal validation
	Pre-m	Check before starting the measurement
	-	Without calibration

9. Versions of test reports (change history)

Version	Applied changes	Date of release
--	Initial release	2018-10-31
C1	Added measurements of backside of the EUT	2018-11-12

End of Test Report