

TEST REPORT

Test Report No.: 1-5032/22-01-02-A



Deutsche
Akkreditierungsstelle
D-PL-12076-01-01

Testing Laboratory

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Accredited Test Laboratory:

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Applicant

Molex CVS Bochum GmbH

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Manufacturer

Molex CVS Bochum GmbH

Meesmannstr. 103

44807 Bochum, Germany

Test Standard/s

NONE

Tested according manufacturer requirements.

Test Item

Kind of test item: Wireless Charger
Device type: portable device
Model name: **WCH-303**
S/N serial number: "DUT 1 SAR"
FCC-ID: WJLWCH-303
ISED: 7847A -WCH303
Hardware status: C10
Software status: 23.3
Frequency: 127.55 kHz Charging frequency
Antenna: 3 Integrated coils
Battery option: 12V DC supply
Accessories: --
Test sample status: identical prototype
Exposure category: general population / uncontrolled environment



This test report is electronically signed and valid without handwritten signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

Test Report authorised:



Thomas Vogler
Lab Manager
Radio Labs

Test performed:



Marco Scigliano
Testing Manager
Radio Labs

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2 General information

2.1 Notes and disclaimer

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2.2 Application details

Date of receipt of order:	2022-10-07
Date of receipt of test item:	2022-10-10
Start of test:	2022-10-20
End of test:	2022-10-26

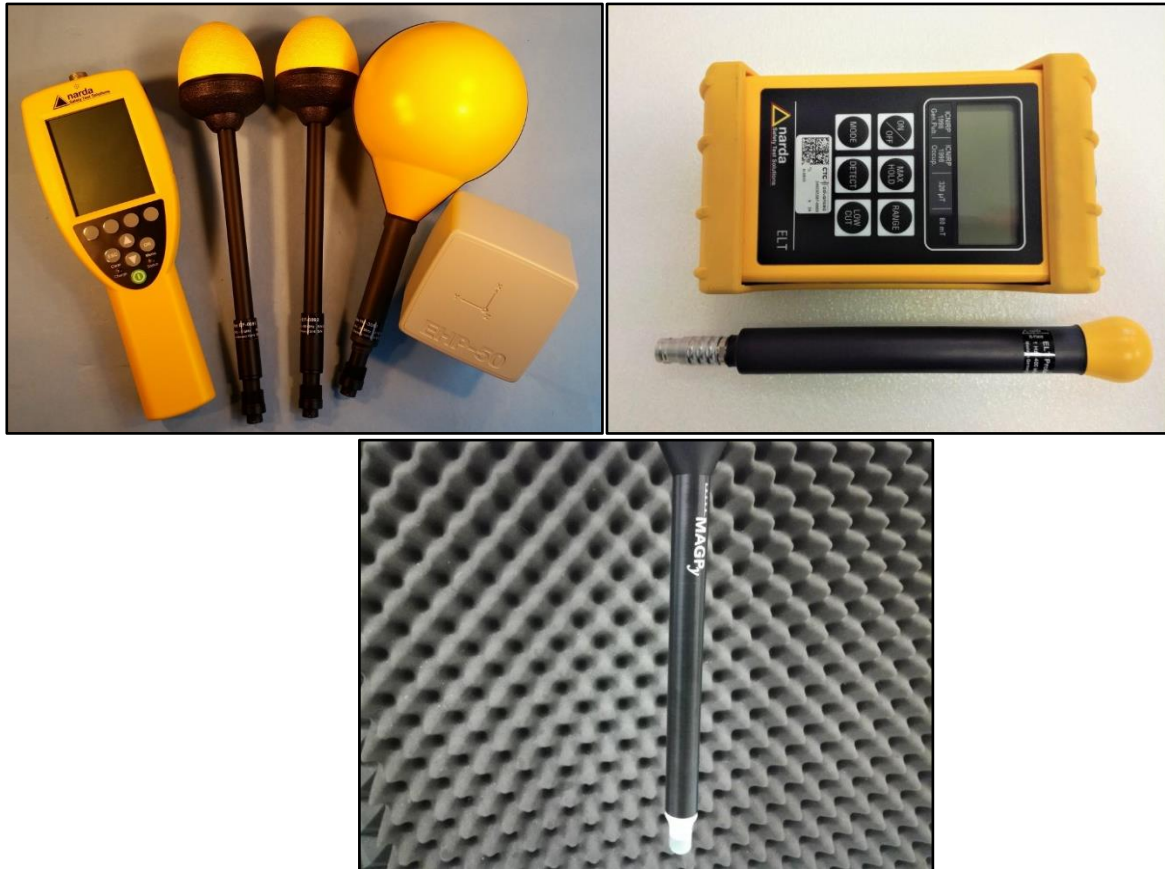
3 Test Environment

Ambient temperature:	20 – 24 °C
Relative humidity content:	40 – 50 %
Air pressure:	not relevant for this kind of testing
Power supply:	230 V / 50 Hz

4 Test Set-up

4.1 Measurement system

4.1.1 Broadband Electromagnetic Field Test system



A state of the art Broadband Electromagnetic Field Test system was used. The probes of the system are fitted with three sensors which measure the field strength of the X, Y and Z plane directions separately. The field strength is calculated by the instrument's processor by summing the squares of the three measured values.

The frequency range 5 Hz to 60 GHz is covered.

Depending on the used probe type Electric and Magnetic Field or Electric Field only is detectable.

• EHP-50D	5 Hz to 100 kHz	Electric and Magnetic Field
• EHP-50F	5 Hz to 400 kHz	Electric and Magnetic Field
• HF 3061	300 kHz to 30 MHz	Magnetic Field
• EF 0691	100 kHz to 6 GHz	Electric Field
• EF 6092	100 MHz to 60 GHz	Electric Field
• ELT 400 3cm ²	1 Hz to 400 kHz	Magnetic Field
• MAGPy-H3D	3 kHz to 10 MHz	Magnetic Field

4.1.2 Test equipment list

	Manufacturer	Device	Type	Serial number	Last Calibration
☐	Narda	Electric and Magnetic Field Meter	NBM-550	F-0319	2021-03-10
☐	Narda	Electric and Magnetic Field Meter	NBM-520	D-1234	2019-05-15
☐	Narda	Electric and Magnetic Field Meter	ELT 400	N-0915	2021-07-26
☐	Narda	Electric Field Probe (100 kHz - 6 GHz)	EF 0691	G-0027	2021-03-10
☐	Narda	Electric Field Probe (100 MHz - 60 GHz)	EF 6092	A-0071	2019-05-15
☐	Narda	Magnetic Field Probe (300 kHz to 30 MHz)	HF 3061	D-0404	2021-02-23
☐	Narda	Electric and Magnetic Field Analyser (5 Hz – 100 kHz)	EHP-50D	230WX50108	2021-03-03
☐	Narda	Electric and Magnetic Field Analyser (5 Hz – 400 kHz)	EHP-50F	000WX60907	2020-10-14
☐	Narda	Magnetic Field Probe (1 Hz – 400 kHz)	B-Field 3cm ²	C-0393	2021-07-26
☒	SPEAG	MAGPy Field Probe	MAGPy-H3D/DAS	1013/1023	2021-06-20

☒ Devices used during the test

☐ Devices not used during the test

4.1.3 Uncertainties

The probe uncertainties stated by the manufacturer are considered to be the main relevant and dominant issues.

4.1.3.1 Typical uncertainty of MAGPy-H3D probe

Uncertainty Table for MAGPy-H3D

Uncertainty Budgets

6.1.1 Preliminary Uncertainty Budget of the MAGPy-H3D Probe

Uncertainty Source	Tolerance (dB)	Distr.	Div.	ci	Std.Unc. (dB)
Probe uncertainty					
Amplitude calibration uncertainty	0.47	norm	1	1	0.47
Probe anisotropy	0.5	rect	$\sqrt{3}$	1	0.29
Probe dynamic linearity	0.15	rect	$\sqrt{3}$	1	0.09
Probe frequency domain response	0.25	rect	$\sqrt{3}$	1	0.14
Gradient uncertainty	0.1	rect	$\sqrt{3}$	1	0.06
Parasitic E-field sensitivity	0.1	rect	$\sqrt{3}$	1	0.06
Detection limit	0.15	rect	$\sqrt{3}$	1	0.09
Readout electronics	0	norm	1	1	0
Probe positioning	0.19	norm	1	1	0.19
Repeatability	0.1	norm	1	1	0.10
Combined uncertainty (k=1)					0.63
Expanded uncertainty (k=2)					1.24

4.1.4 Validation procedure

Before performing the tests the empty test chamber was checked for system immanent frequency responses. The following background signal level was detected. All levels are small enough to allow accurate proof of the limits to be considered.

Probe	Frequency Range	Magnetic Flux Density (B) in μT	Magnetical Field Strength in A/m	Electrical Field Strength in V/m	Remark
MAGPy-H3D	3 kHz – 10 MHz	0.023	0.018	--	

4.1.5 Definition of test position and distances

In absence of an equipment specific regulation with given test distances, all not further noted test positions were measured in "touched" mode, the probe radome touching the DUT at the defined test position. Due to the mechanical concept of the used probe a distance between DUT surface and electrical centre of the probe antennas remains.

Probe type	Maximum distance (cm)	
	Magnetic Field	Electrical Field
MAGPy-H3D	0.7	--

4.1.6 Measurement with MAGPy-H3D probe / DASY 8 WPT-System

The DASY8 WPT-System is a complete high precision robot-based evaluation platform for demonstrating compliance of wireless power transfer (WPT) devices according to IEC PAS 63184:2021(Chapter 8 "Measurement and numerical combination methods") and enables fully automated compliance testing.

It is composed of the isotropic probe MAGPy-H3D, the reference amplitude and phase probe (MAGPy-RA ϕ), and the data acquisition system (MAGPy-DAS) mounted to the DASY8 robot via the emergency stop (MAGPy-ES). The induced electric (E-) fields and specific absorption rate (SAR) are assessed with Sim4Life's Quasi-Static EM Solver (P-EM-QS) using only the measured data. The dedicated graphical user interface (GUI) fully automates the testing workflow.

This allows for Laboratory evaluation of WPT devices and any other local electromagnetic source not requiring magnetic (H-) field volume scans exceeding 2000 x 1000 x 1500 mm:

- Evaluation of H-field (3 kHz – 10 MHz)
- Demonstration of compliance (3 kHz and 4 MHz) according to IEC PAS 63184:2021

NOTE:

For this report the DASY8 WPT system was only used for its advanced positioning possibilities and accuracy to perform basic H-field measurements in the close range of the EUT. Thus for no further complex system check procedures needed to be applied. The system noise level was measured before conducting the H-field measurements on the EUT.

4.2 Test results – Line scan at defined middle of the coil

STEP 1:

Defined start position on the surface of the EUT. (Start position)

STEP 2:

Line measurement from the surface of the EUT to a sufficient height (perpendicular).

TEST RESULTS:

distance between sensor and EUT-surface [mm]	H - field [A/m]	$H_{\text{previous}}/H_{\text{Actual}} < 6\text{dB}^{(1)}$	$H_{\text{Max}} > 10 \cdot H_{\text{Actual}}^{(2)}$
7*	1141.44	--	--
8	1067.31	TRUE	FALSE
9	989.28	TRUE	FALSE
10	916.68	TRUE	FALSE
11	842.19	TRUE	FALSE
12	787.72	TRUE	FALSE
13	731.11	TRUE	FALSE
14	674.62	TRUE	FALSE
15	626.66	TRUE	FALSE
16	582.65	TRUE	FALSE
17	540.93	TRUE	FALSE
18	503.75	TRUE	FALSE
19	468.50	TRUE	FALSE
20	436.27	TRUE	FALSE
21	406.17	TRUE	FALSE
22	376.91	TRUE	FALSE
23	352.93	TRUE	FALSE
24	329.61	TRUE	FALSE
25	307.23	TRUE	FALSE
26	287.86	TRUE	FALSE
27	269.30	TRUE	FALSE
28	252.26	TRUE	FALSE
29	236.50	TRUE	FALSE
30	221.72	TRUE	FALSE
31	207.91	TRUE	FALSE
32	194.92	TRUE	FALSE
33	182.738	TRUE	FALSE
34	171.863	TRUE	FALSE
35	160.407	TRUE	FALSE
36	152.681	TRUE	FALSE
37	144.238	TRUE	FALSE
38	136.255	TRUE	FALSE
39	128.219	TRUE	FALSE
40	121.587	TRUE	FALSE

distance between sensor and EUT-surface [mm]	H - field [A/m]	$H_{\text{Previous}}/H_{\text{Actual}} < 6\text{dB}^{1)}$	$H_{\text{Max}} > 10 \cdot H_{\text{Actual}}^{2)}$
41	114.359	TRUE	FALSE
42	107.430	TRUE	TRUE
43	103.026	TRUE	TRUE
44	94.393	TRUE	TRUE
45	92.419	TRUE	TRUE
46	87.803	TRUE	TRUE
47	0.009	FALSE	TRUE
48	78.924	TRUE	TRUE
49	74.858	TRUE	TRUE
50	71.630	TRUE	TRUE
51	66.286	TRUE	TRUE
52	0.013	FALSE	TRUE
53	61.922	TRUE	TRUE
54	58.887	TRUE	TRUE
55	56.396	TRUE	TRUE
56	52.954	TRUE	TRUE
57	50.846	TRUE	TRUE
58	0.009	FALSE	TRUE
59	0.009	TRUE	TRUE
60	0.010	TRUE	TRUE
61	0.009	TRUE	TRUE
62	0.009	TRUE	TRUE
63	39.528	TRUE	TRUE
64	0.009	FALSE	TRUE
65	0.008	TRUE	TRUE
66	0.009	TRUE	TRUE
67	0.009	TRUE	TRUE
68	0.008	TRUE	TRUE
69	0.010	TRUE	TRUE
70	0.009	TRUE	TRUE
71	0.008	TRUE	TRUE
72	27.568	TRUE	TRUE
73	0.009	FALSE	TRUE
74	0.008	TRUE	TRUE

¹⁾ The column shows if the deviation from the actual measurement point to the previous measured one is less than 6dB.

²⁾ The column shows if ten times the actual value is less than the highest measured H-field.

*)MAGPy probe touching the surface of the EUT

NOTE: For test positions see photo documentation (Annex A).

4.3 Test results – Line scan at found max. position

STEP 1:

Determination of max position on the surface of the EUT. (Found max. position)

STEP 2:

Line measurement from the surface of the EUT to a sufficient height (perpendicular).

TEST RESULTS:

distance between sensor and EUT-surface [mm]	H - field [A/m]	$H_{\text{Previous}}/H_{\text{Actual}} < 6\text{dB}^{(1)}$	$H_{\text{Max}} > 10 \cdot H_{\text{Actual}}^{(2)}$
7*	1565.26	--	--
8	1447.41	TRUE	FALSE
9	1336.74	TRUE	FALSE
10	1233.06	TRUE	FALSE
11	1142.12	TRUE	FALSE
12	1059.71	TRUE	FALSE
13	981.77	TRUE	FALSE
14	909.58	TRUE	FALSE
15	845.07	TRUE	FALSE
16	784.71	TRUE	FALSE
17	729.63	TRUE	FALSE
18	677.35	TRUE	FALSE
19	630.67	TRUE	FALSE
20	586.68	TRUE	FALSE
21	546.96	TRUE	FALSE
22	509.15	TRUE	FALSE
23	474.96	TRUE	FALSE
24	443.93	TRUE	FALSE
25	414.29	TRUE	FALSE
26	387.14	TRUE	FALSE
27	362.70	TRUE	FALSE
28	339.56	TRUE	FALSE
29	318.30	TRUE	FALSE
30	298.64	TRUE	FALSE
31	280.33	TRUE	FALSE
32	263.46	TRUE	FALSE
33	247.541	TRUE	FALSE
34	233.190	TRUE	FALSE
35	219.547	TRUE	FALSE
36	206.853	TRUE	FALSE
37	195.480	TRUE	FALSE
38	184.298	TRUE	FALSE
39	173.898	TRUE	FALSE
40	164.167	TRUE	FALSE

distance between sensor and EUT-surface [mm]	H - field [A/m]	$H_{\text{Previous}}/H_{\text{Actual}} < 6\text{dB}^{1)}$	$H_{\text{Max}} > 10 \cdot H_{\text{Actual}}^{2)}$
41	155.191	TRUE	TRUE
42	147.671	TRUE	TRUE
43	139.992	TRUE	TRUE
44	132.600	TRUE	TRUE
45	125.417	TRUE	TRUE
46	118.012	TRUE	TRUE
47	113.473	TRUE	TRUE
48	107.716	TRUE	TRUE
49	102.792	TRUE	TRUE
50	97.879	TRUE	TRUE
51	93.239	TRUE	TRUE
52	88.680	TRUE	TRUE
53	84.547	TRUE	TRUE
54	80.814	TRUE	TRUE
55	76.556	TRUE	TRUE
56	73.771	TRUE	TRUE
57	70.452	TRUE	TRUE
58	67.167	TRUE	TRUE
59	64.549	TRUE	TRUE
60	61.087	TRUE	TRUE
61	59.169	TRUE	TRUE
62	56.744	TRUE	TRUE
63	54.296	TRUE	TRUE
64	52.179	TRUE	TRUE
65	49.722	TRUE	TRUE
66	48.082	TRUE	TRUE
67	46.038	TRUE	TRUE
68	44.317	TRUE	TRUE
69	42.723	TRUE	TRUE
70	40.310	TRUE	TRUE
71	39.509	TRUE	TRUE
72	38.035	TRUE	TRUE
73	36.567	TRUE	TRUE
74	35.204	TRUE	TRUE

¹⁾ The column shows if the deviation from the actual measurement point to the previous measured one is less than 6dB.

²⁾ The column shows if ten times the actual value is less than the highest measured H-field.

*)MAGPy probe touching the surface of the EUT

NOTE: For test positions see photo documentation (Annex A).

Annex A: Photo documentation

Photo 1: DASY 8 WPT set up



Photo 2: EUT on test bank



Photo 3: System Orientation

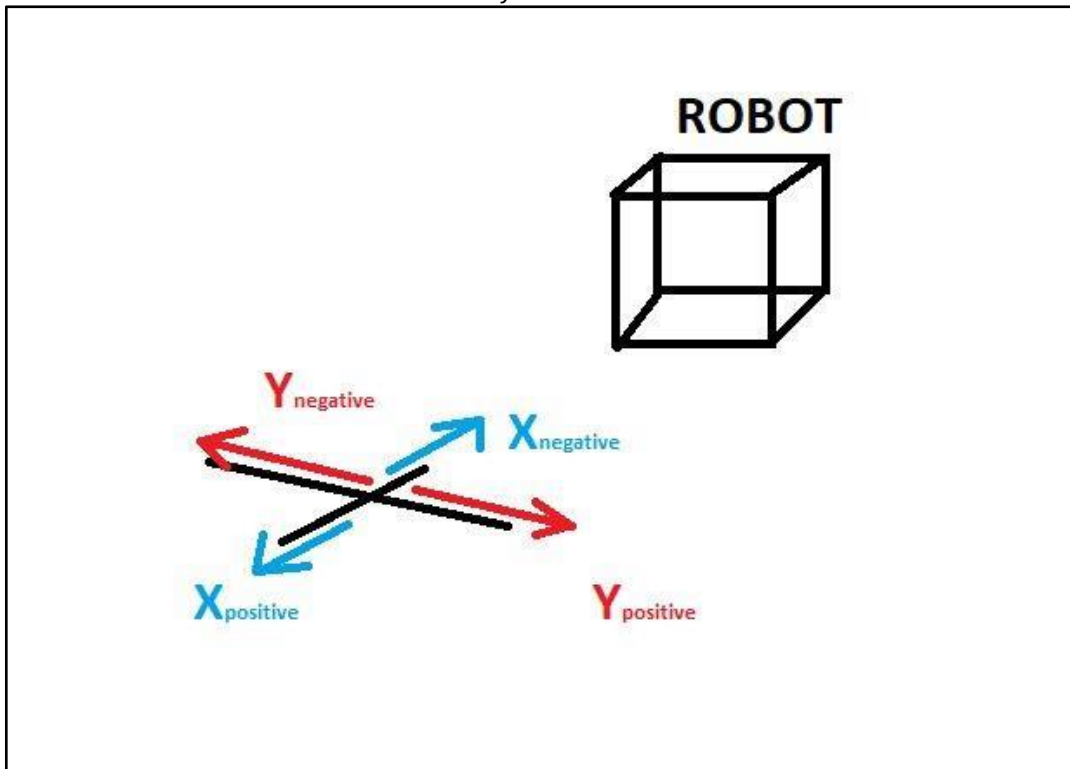


Photo 4: EUT – Top side view



Photo 5: Test pictures – Start position (Coil 1 centre – top side)

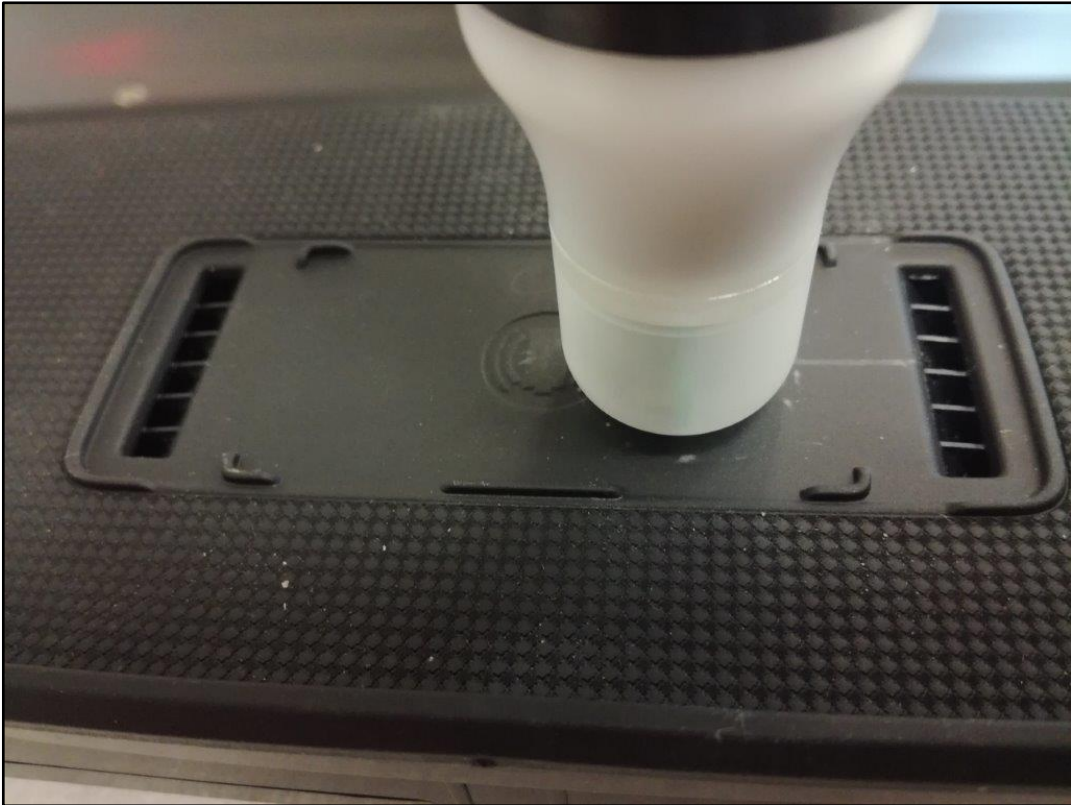


Photo 6: Test pictures – Found max. position (Coil 1 – top side)



Annex B: Document History

Version	Applied Changes	Date of Release
	Initial Release	2023-03-01
-A	Changed manufacturer/applicant address on page 1.	2023-04-04

Annex C: Further Information**Glossary**

BW	-	Bandwidth
DTS	-	Distributed Transmission System
DUT	-	Device under Test
EUT	-	Equipment under Test
HW	-	Hardware
Inv. No.	-	Inventory number
N/A	-	not applicable
S/N	-	Serial Number
SW	-	Software