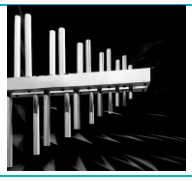
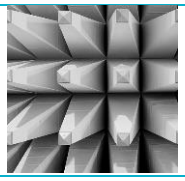




cetecom advanced

TEST REPORT

Test Report No.: 1-5031/22-01-02

DAkkS Deutsche Akkreditierungsstelle D-PL-12076-01-01

Testing Laboratory

CTC advanced GmbH
Untertuerkheimer Strasse 6 – 10
66117 Saarbruecken/Germany
Phone: + 49 681 5 98 - 0
Fax: + 49 681 5 98 - 9075
Internet: https://www.ctcadvanced.com
e-mail: mail@ctcadvanced.com

Accredited Test Laboratory:
The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2018-03) by the Deutsche Akkreditierungsstelle GmbH (DAkkS)
The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with the registration number: D-PL-12076-01-01.

Applicant

Molex Technologies GmbH
Mizarstraße 3
12529 Schönefeld/GERMANY

Phone: +49 3377 316 0

Contact: Ines Baufeld
e-mail: ines.baufeld@molex.com

Manufacturer

Molex Technologies GmbH
Mizarstraße 3
12529 Schönefeld/GERMANY

Test Standard/s

NONE	Tested according manufacturer requirements.

Test Item

Kind of test item:	Wireless Charger
Device type:	portable device
Model name:	**WCH-304**
S/N serial number:	"DUT 1 SAR"
FCC-ID:	RK7WCH-304
ISED:	4774A-WCH304
Hardware status:	H11
Software status:	T032
Frequency:	127.55 kHz Charging frequency
Antenna:	3 Integrated coils,
Power supply:	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
cn=Thomas Vogler, o=CTC advanced GmbH, ou=VOG-211118, email=thomas.vogler@ctcadvanced.com, c=DE
2023.04.03 14:06:56 +02'00'

Thomas Vogler
Lab Manager
Radio Labs

Test performed:

Marco Scigliano
cn=Marco Scigliano, o=CTC advanced GmbH, ou=SCI-211118, email=marco.scigliano@ctcadvanced.com, c=DE
2023.04.03 14:06:22 +02'00'

Marco Scigliano
Testing Manager
Radio Labs

1 Table of contents

2 General information

2.1 Notes and disclaimer

The test results of this test report relate exclusively to the test item specified in this test report. CTC advanced GmbH does not assume responsibility for any conclusions and generalisations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of CTC advanced GmbH.
This test report is electronically signed and valid without handwriting signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.
The testing service provided by CTC advanced GmbH has been rendered under the current "General Terms and Conditions for CTC advanced GmbH".
CTC advanced GmbH will not be liable for any loss or damage resulting from false, inaccurate, inappropriate or incomplete product information provided by the customer.
Under no circumstances does the CTC advanced GmbH test report include any endorsement or warranty regarding the functionality, quality or performance of any other product or service provided.
Under no circumstances does the CTC advanced GmbH test report include or imply any product or service warranties from CTC advanced GmbH, including, without limitation, any implied warranties of merchantability, fitness for purpose, or non-infringement, all of which are expressly disclaimed by CTC advanced GmbH.
All rights and remedies regarding vendor's products and services for which CTC advanced GmbH has prepared this test report shall be provided by the party offering such products or services and not by CTC advanced GmbH.
In no case this test report can be considered as a Letter of Approval.

2.2 Application details

Date of receipt of order:	2022-10-10
Date of receipt of test item:	2022-10-10
Start of test:	2022-10-20
End of test:	2022-10-25

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 3cm²	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 3cm²	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

Schmid & Partner Engineering AG, DASY8 Manual, June 2021 — 6-3

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-RAφ), 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]	$H_{Previous}/H_{Actual}$ < 6dB[1)]	H_{Max} > 10 · H_{Actual}[2)]
7*	1547.06	--	--
8	1431.28	TRUE	FALSE
9	1325.11	TRUE	FALSE
10	1222.15	TRUE	FALSE
11	1138.80	TRUE	FALSE
12	1055.42	TRUE	FALSE
13	979.86	TRUE	FALSE
14	910.91	TRUE	FALSE
15	845.95	TRUE	FALSE
16	782.31	TRUE	FALSE
17	726.98	TRUE	FALSE
18	677.11	TRUE	FALSE
19	630.53	TRUE	FALSE
20	587.05	TRUE	FALSE
21	546.92	TRUE	FALSE
22	510.17	TRUE	FALSE
23	475.85	TRUE	FALSE
24	444.44	TRUE	FALSE
25	415.65	TRUE	FALSE
26	388.68	TRUE	FALSE
27	363.99	TRUE	FALSE
28	341.27	TRUE	FALSE
29	319.66	TRUE	FALSE
30	300.18	TRUE	FALSE
31	281.84	TRUE	FALSE
32	265.11	TRUE	FALSE
33	249.358	TRUE	FALSE
34	234.749	TRUE	FALSE
35	221.190	TRUE	FALSE
36	208.494	TRUE	FALSE
37	196.811	TRUE	FALSE
38	185.954	TRUE	FALSE
39	175.806	TRUE	FALSE
40	166.357	TRUE	FALSE

distance between sensor and EUT-surface [mm]	H - field [A/m]	$H_{Previous}/H_{Actual}$ < 6dB[1)]	H_{Max} > 10 · H_{Actual}[2)]
41	157.405	TRUE	FALSE
42	149.182	TRUE	TRUE
43	141.358	TRUE	TRUE
44	134.085	TRUE	TRUE
45	127.297	TRUE	TRUE
46	120.900	TRUE	TRUE
47	114.895	TRUE	TRUE
48	109.237	TRUE	TRUE
49	104.014	TRUE	TRUE
50	99.009	TRUE	TRUE
51	94.394	TRUE	TRUE
52	90.003	TRUE	TRUE
53	85.816	TRUE	TRUE
54	81.973	TRUE	TRUE
55	78.258	TRUE	TRUE
56	74.833	TRUE	TRUE
57	71.486	TRUE	TRUE
58	68.405	TRUE	TRUE
59	65.474	TRUE	TRUE
60	62.653	TRUE	TRUE
61	60.044	TRUE	TRUE
62	57.549	TRUE	TRUE
63	55.216	TRUE	TRUE
64	52.981	TRUE	TRUE
65	50.908	TRUE	TRUE
66	48.882	TRUE	TRUE
67	46.974	TRUE	TRUE
68	45.160	TRUE	TRUE
69	43.431	TRUE	TRUE
70	41.794	TRUE	TRUE
71	40.238	TRUE	TRUE
72	38.770	TRUE	TRUE
73	37.346	TRUE	TRUE
74	36.003	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]	$H_{Previous}/H_{Actual}$ < 6dB[1)]	H_{Max} > 10 · H_{Actual}[2)]
7*	1578.79	--	--
8	1442.28	TRUE	FALSE
9	1334.63	TRUE	FALSE
10	1230.56	TRUE	FALSE
11	1131.85	TRUE	FALSE
12	1047.08	TRUE	FALSE
13	968.27	TRUE	FALSE
14	897.28	TRUE	FALSE
15	831.67	TRUE	FALSE
16	770.84	TRUE	FALSE
17	715.59	TRUE	FALSE
18	664.96	TRUE	FALSE
19	619.03	TRUE	FALSE
20	575.82	TRUE	FALSE
21	535.96	TRUE	FALSE
22	498.36	TRUE	FALSE
23	465.51	TRUE	FALSE
24	434.48	TRUE	FALSE
25	405.81	TRUE	FALSE
26	379.03	TRUE	FALSE
27	355.28	TRUE	FALSE
28	332.77	TRUE	FALSE
29	312.01	TRUE	FALSE
30	292.75	TRUE	FALSE
31	274.82	TRUE	FALSE
32	258.45	TRUE	FALSE
33	243.046	TRUE	FALSE
34	228.628	TRUE	FALSE
35	214.802	TRUE	FALSE
36	203.211	TRUE	FALSE
37	191.902	TRUE	FALSE
38	181.087	TRUE	FALSE
39	171.357	TRUE	FALSE
40	161.935	TRUE	FALSE

distance between sensor and EUT-surface [mm]	H - field [A/m]	$H_{Previous}/H_{Actual}$ < 6dB[1)]	H_{Max} > 10 · H_{Actual}[2)]
41	153.191	TRUE	TRUE
42	145.290	TRUE	TRUE
43	137.680	TRUE	TRUE
44	130.812	TRUE	TRUE
45	124.049	TRUE	TRUE
46	117.901	TRUE	TRUE
47	111.978	TRUE	TRUE
48	106.587	TRUE	TRUE
49	101.443	TRUE	TRUE
50	96.675	TRUE	TRUE
51	92.083	TRUE	TRUE
52	87.656	TRUE	TRUE
53	83.814	TRUE	TRUE
54	79.925	TRUE	TRUE
55	76.390	TRUE	TRUE
56	72.997	TRUE	TRUE
57	69.799	TRUE	TRUE
58	66.763	TRUE	TRUE
59	63.879	TRUE	TRUE
60	61.178	TRUE	TRUE
61	58.592	TRUE	TRUE
62	56.195	TRUE	TRUE
63	53.902	TRUE	TRUE
64	51.750	TRUE	TRUE
65	49.639	TRUE	TRUE
66	47.678	TRUE	TRUE
67	45.868	TRUE	TRUE
68	44.045	TRUE	TRUE
69	42.430	TRUE	TRUE
70	40.740	TRUE	TRUE
71	39.286	TRUE	TRUE
72	37.820	TRUE	TRUE
73	36.461	TRUE	TRUE
74	35.130	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

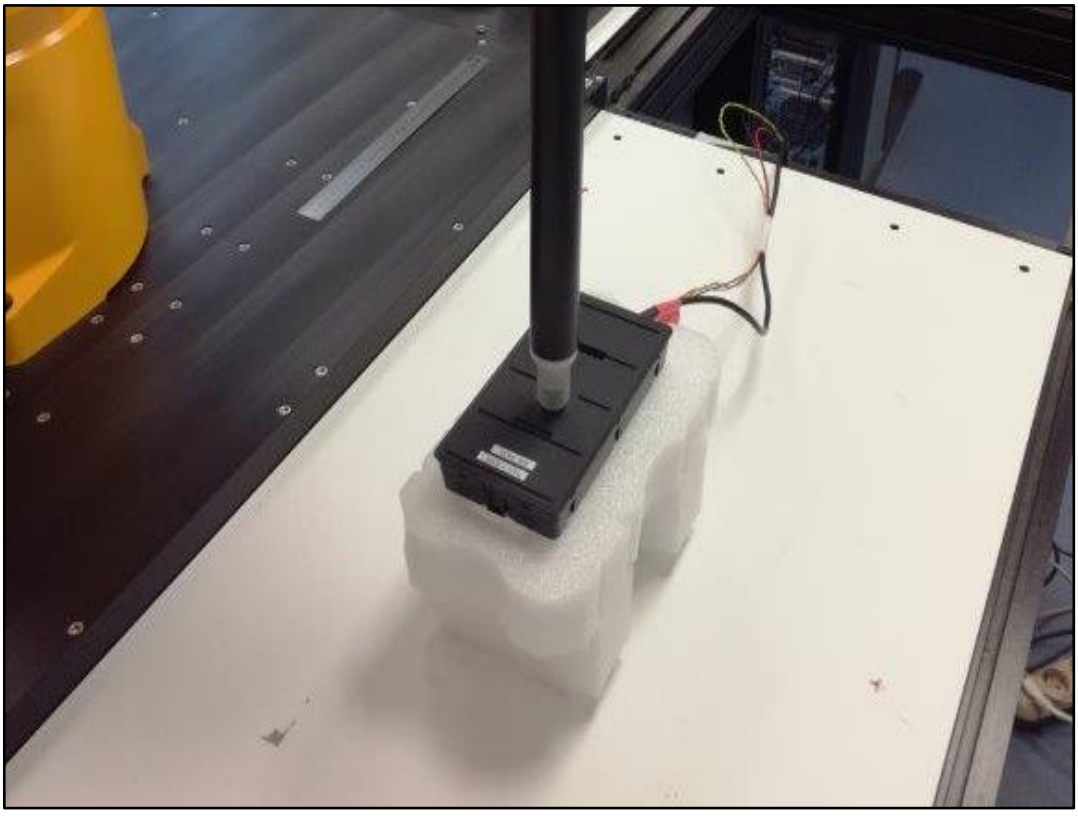


Photo 3: System Orientation

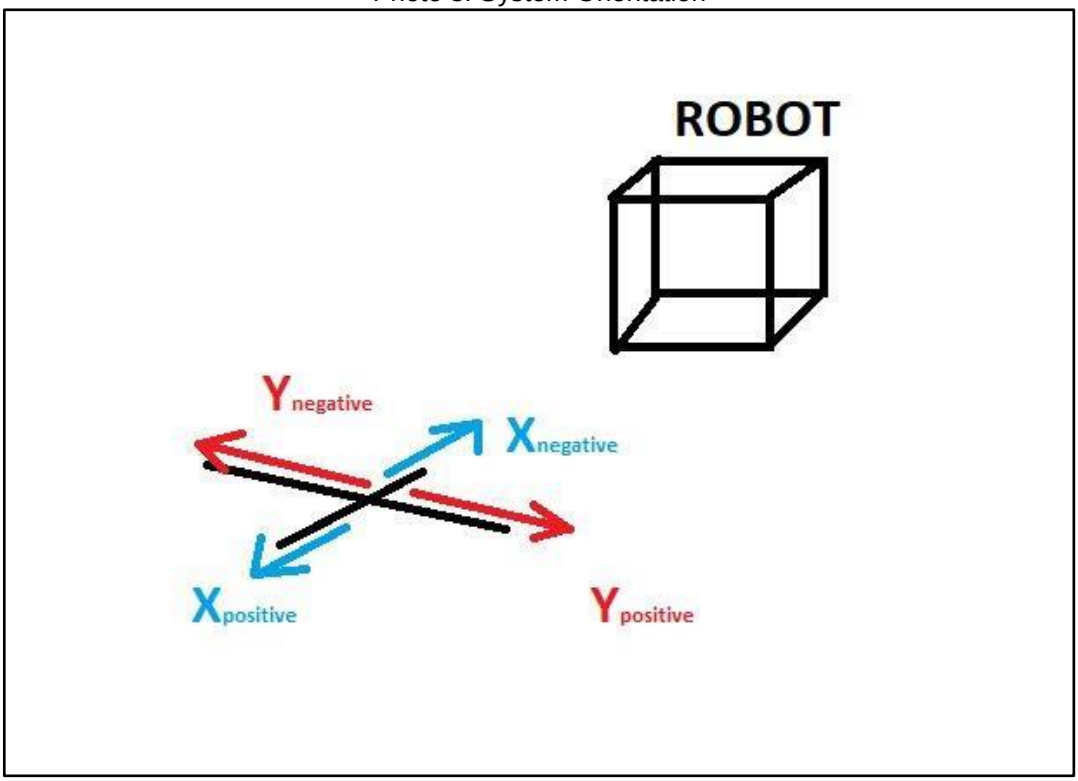


Photo 4: EUT – Top side view

Photo 5: Test pictures - Setting distance to EUT (touch - top side)
[Offset caused by Battery symbol]

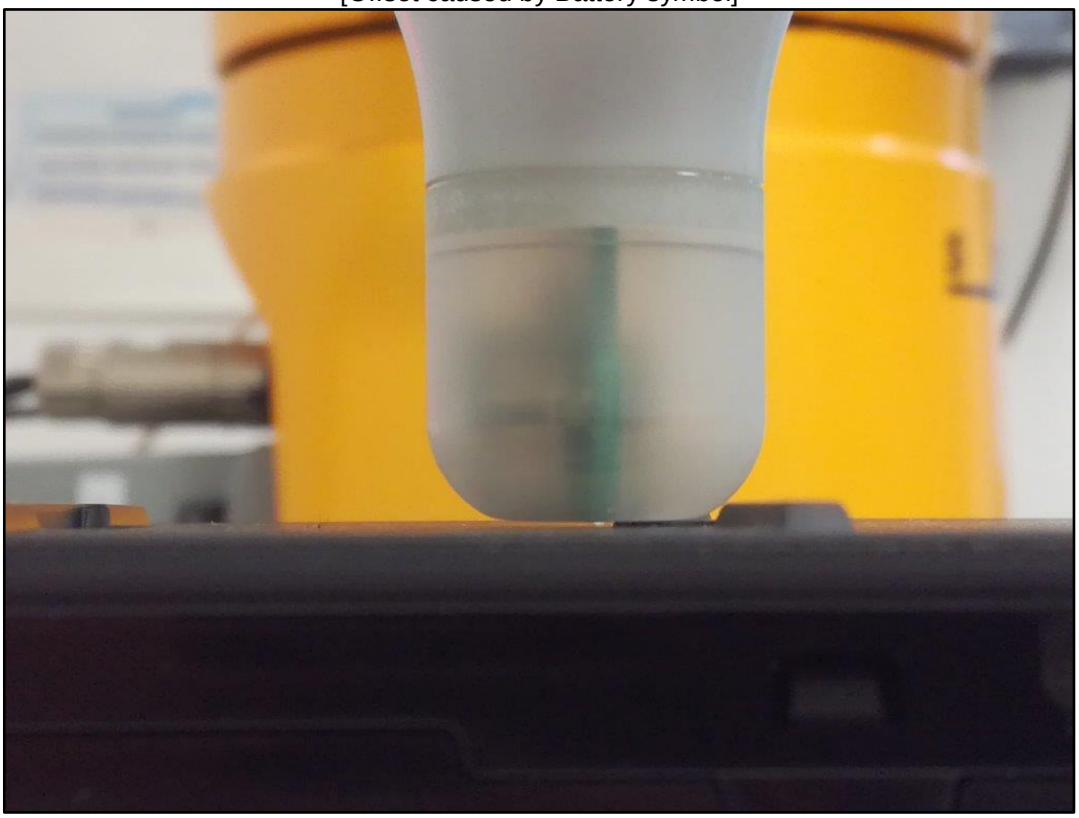


Photo 6: Test pictures – Start position (Coil 3 centre – top side)

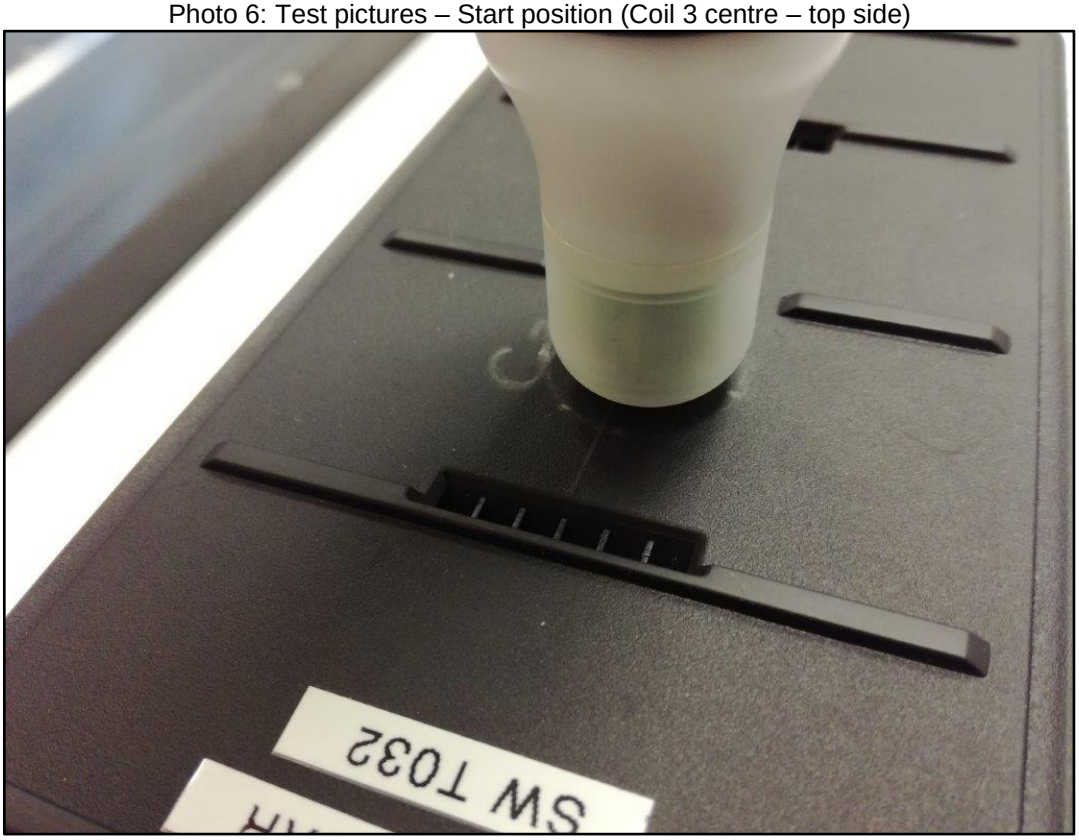
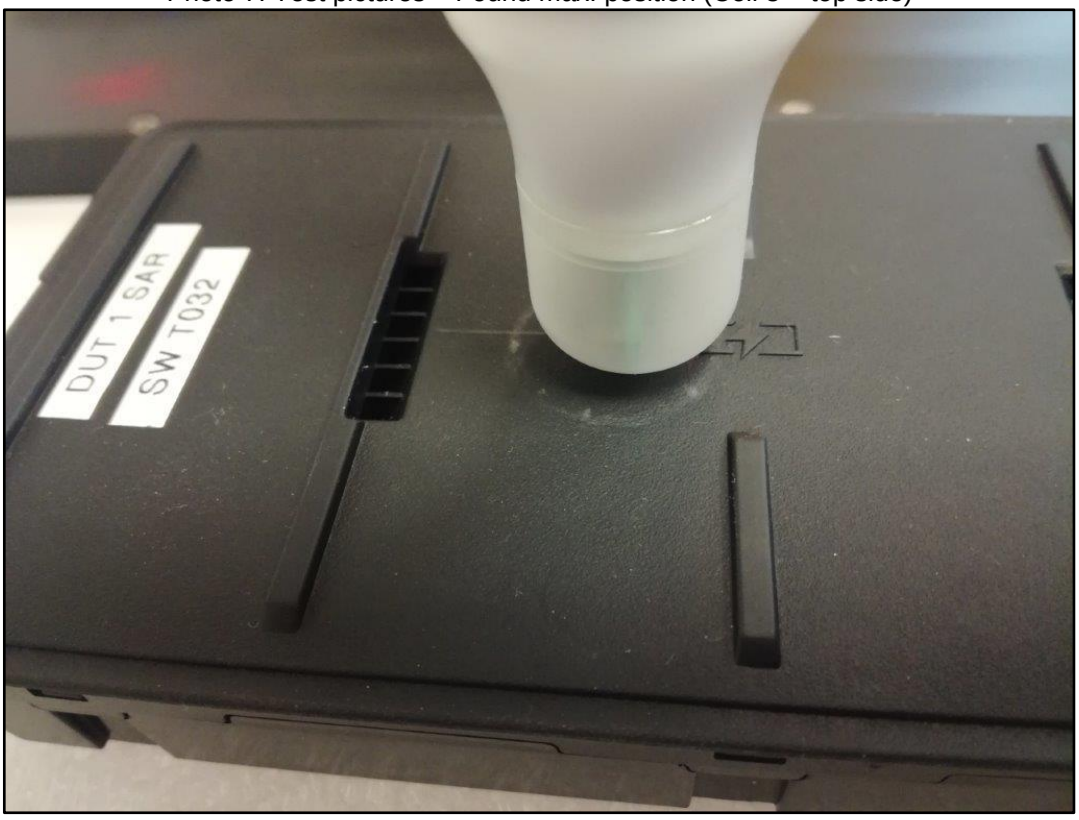


Photo 7: Test pictures – Found max. position (Coil 3 – top side)



Annex B: Document History

Version	Applied Changes	Date of Release
	Initial Release	2023-03-01

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