



Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **UL**
Gyeonggi-do, Republic of Korea

Certificate No. **V-Coil350/85-1019_Aug25**

CALIBRATION CERTIFICATE

Object **V-Coil350/85V2 - SN: 1019**

Calibration procedure(s) **QA CAL-47.v13**
Calibration Procedure for WPT Verification & Validation Sources

Calibration date: **August 15, 2025**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 75%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
MAGPy-8H3D+E3D/DAS	SN: 3090/3078	22-Aug-24 (MAGPy-8H3D-3090_Aug24)	Aug-25

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
---------------------	------	-----------------------	-----------------

	Name	Function	Signature
Calibrated by:	Jingtian Xi	Project Leader	
Approved by:	Sven Kühn	Technical Manager	

Issued: August 18, 2025

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.



Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Glossary:

WPT wireless power transfer
V&V verification & validation

Calibration is Performed According to the Following Standards:

- Internal procedure QA CAL-47 Calibration procedure for WPT verification & validation sources from 3 kHz to 10 MHz
- IEC/IEEE 63164, "Assessment methods of the human exposure to electric and magnetic fields from wireless power transfer systems – Models, instrumentation, measurement and computational methods and procedures (Frequency range 3 kHz to 30 MHz)", draft standard, 2023

Additional Documentation:

- a) cDASY6/DASY8 Module WPT Manual

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* The V&V source is switched on for at least 30 minutes.
- *Source Positioning:* The V&V source is placed in the center of the UniPV1 phantom such that the source surface is parallel to phantom surface. The probe location used for DUT teaching is the top center of the coil (marked on the source casing). The probe distance is verified using mechanical gauges placed on the source surface.
- *H-field distribution:* H-field is measured in the volume above the V&V source in a rectilinear grid with a uniform grid step of 7.33 mm.

Calibrated Quantity

- Spatial peak of H-field (RMS value) at d mm from the DUT surface (extrapolated from measurements)

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

Software version	cDASY6 Module WPT	2.8.0.5184
	Notebook GUI	2.8.2.2
	Sim4Life	8.0.1
Scan setup	Grid dimensions	x: 477 mm, y: 389 mm, z: 36.7 mm
	Grid resolutions	dx, dy, dz: 7.33 mm
Nominal frequency	85 kHz	

Calibrated Quantities

Distance (relative to source surface) (mm)	Peak H-field (A/m)	Uncertainty (k=2) (dB)
0	220	1.13
2	200	1.13

Appendix (Additional assessments outside the scope of SCS 0108)

Peak values of induced fields¹

Distance (relative to source surface) (mm)	Induced peak current density, 1cm ² area avg. (A/m ²)	Induced peak E-field (V/m)			peak spatial SAR (mW/kg)	
		2mm cube avg.	Local	5mm line avg.	1g avg.	10g avg.
0	2.51	3.58	3.62	3.63	7.36	5.42
2	2.37	3.37	3.40	3.41	6.56	4.90

Voltage measurement

Total voltage (V)	Voltages at harmonics (dBc)
0.429	Highest harmonic: -47.0 2 nd highest harmonic: -48.3

¹ determined for a virtual half-space phantom with tissue properties $\epsilon_r = 55$, $\sigma = 0.75$ S/m, $\rho = 1000$ kg/m³ and a 2 mm thick phantom shell

Measurement report

cDASY6 Module WPT Measurement Report

Device under test	Tool info	Scan info
Info: V-Coil350/85	DASY software version: cDASY6 Module WPT 2.8.0.5184	Center location: x: -48.07 mm, y: -119.87 mm, z: 36.46 mm
Serial number: 1019	Probe model, serial no. and configuration date: MAGPy-8H3D+E3Dv2, WP000230, 2024/08/23	Dimensions: x: 477.0 mm, y: 388.8 mm, z: 36.6 mm
Scenario: Source Calibration	Software version: 2.8.8, backend: 2.2.36	Resolution: x: 7.33 mm, y: 7.33 mm, z: 7.33 mm
		Completed on: 2025/08/15 15:48:20

Measurement results

Maximum H-field [RMS]:
MAGNITUDE: 142.89 A/m
x: 122.92 A/m, y: 32.81 A/m, z: 65.05 A/m

Maximum H-field location relative to DUT:
x: 157.67 mm, y: 25.67 mm, z: 8.50 mm

Distance to -20.0 dB boundary:
62.66 mm

Offset relative to DUT:
x: 0.00 m, y: 0.00 m, z: 1.00 mm

H-field magnitude [RMS] at center location

H-field magnitude [RMS] at lowest plane

Incident fields and induced fields in the homogeneous phantom at the peak frequency (f = 85.00 kHz, σ = 0.750 S/m, tissue density = 1,000 kg/m³)

Distance [mm]	Peak incident fields [RMS]	Peak E _{ind} [V/m, RMS]			Peak J _{ind} [A/m², RMS]	psSAR [mW/kg]		H-field extent	Warnings		
	H _{inc} [A/m]	Cube avg.	Local	Line avg.	Surface avg.	1g avg.	10g avg.	-20 dB radius [mm]	Sign	Vector potential	Boundary effect
0.00	220	3.58	3.62	3.63	2.51	7.36	5.42	181	1%	76%	35%
2.00	200	3.37	3.40	3.41	2.37	6.56	4.90	183	1%	76%	37%

Compliance evaluation (Field values at the peak frequency) (f=85.00 kHz,)

Distance [mm]	ICNIRP 2010/2020			ICNIRP 1998			IEEE 2019			FCC			HC Code 6		
	RL [RMS]	BR [RMS]		RL [RMS]	BR [RMS]		ERL [RMS]	DRL [RMS]		MPE [RMS]	BR [RMS]		RL [RMS]	BR [RMS]	
	pH _{inc}	pE _{ind}	psSAR	pH _{inc}	pJ _{ind}	psSAR	pH _{inc}	pE _{ind}	psSAR	pH _{inc}	pE _{ind}	psSAR	pH _{inc}	pE _{ind}	psSAR
	[A/m]	[V/m]	[mW/kg]	[A/m]	[A/m²]	[mW/kg]	[A/m]	[V/m]	[mW/kg]	[A/m]	[V/m]	[mW/kg]	[A/m]	[V/m]	[mW/kg]
0.00	220	3.58	5.42	220	2.51	5.42	220	3.63	5.42	220	N/A	7.36	220	3.62	7.36
2.00	200	3.37	4.90	200	2.37	4.90	200	3.41	4.90	200	N/A	6.56	200	3.40	6.56

Compliance evaluation (Exposure ratios) (ratios in dB)

Distance [mm]	ICNIRP 2010/2020				ICNIRP 1998				IEEE 2019				FCC			HC Code 6			
	RL		BR		RL		BR		ERL		DRL		MPE		BR	RL		BR	
	pH _{inc}	pE _{ind}	psSAR		pH _{inc}	pJ _{ind}	psSAR		pH _{inc}	pE _{ind}	psSAR		pH _{inc}	pE _{ind}	psSAR	pH _{inc}	pE _{ind}	psSAR	
	NS	TH	NS	TH	N/A	NS	TH		NS	TH	NS	TH	N/A	N/A	TH	NS	TH	NS	TH
0.00	20.4	N/A	-10.1	N/A	32.9	23.4	N/A		2.62	N/A	-13.8	N/A	7.78	N/A	N/A	7.78	N/A	-10.0	N/A
2.00	19.6	N/A	-10.7	N/A	32.1	22.9	N/A		1.79	N/A	-14.3	N/A	6.95	N/A	N/A	6.95	N/A	-10.6	N/A



Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Client **UL**
Gyeonggi-do, Republic of Korea

Certificate No. **V-Coil50/400-1014_Aug25**

CALIBRATION CERTIFICATE

Object **V-Coil50/400V2 - SN: 1014**

Calibration procedure(s) **QA CAL-47.v13
Calibration Procedure for WPT Verification & Validation Sources**

Calibration date: **August 15, 2025**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 75%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
MAGPy-8H3D+E3D/DAS	SN: 3090/3078	22-Aug-24 (MAGPy-8H3D-3090_Aug24)	Aug-25

Secondary Standards	ID #	Check Date (in house)	Scheduled Check

Calibrated by: **Name**
Krešimir Franjić **Function**
Laboratory Technician

Approved by: **Sven Kühn** **Technical Manager**

Signature

Issued: August 15, 2025

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.



Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Glossary:

WPT wireless power transfer
V&V verification & validation

Calibration is Performed According to the Following Standards:

- Internal procedure QA CAL-47 Calibration procedure for WPT verification & validation sources from 3 kHz to 10 MHz
- IEC/IEEE 63164, "Assessment methods of the human exposure to electric and magnetic fields from wireless power transfer systems – Models, instrumentation, measurement and computational methods and procedures (Frequency range 3 kHz to 30 MHz)", draft standard, 2023

Additional Documentation:

- a) cDASY6/DASY8 Module WPT Manual

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* The V&V source is switched on for at least 30 minutes.
- *Source Positioning:* The V&V source is placed in the center of the UniPV1 phantom such that the source surface is parallel to phantom surface. The probe location used for DUT teaching is the top center of the coil (marked on the source casing). The probe distance is verified using mechanical gauges placed on the source surface.
- *H-field distribution:* H-field is measured in the volume above the V&V source in a rectilinear grid with a uniform grid step of 7.33 mm.

Calibrated Quantity

- Spatial peak of H-field (RMS value) at d mm from the DUT surface (extrapolated from measurements)

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

Software version	cDASY6 Module WPT	2.8.0.5184
	Notebook GUI	2.8.2.2
	Sim4Life	8.0.1
Scan setup	Grid dimensions	x: 125 mm, y: 125 mm, z: 36.7 mm
	Grid resolutions	dx, dy, dz: 7.33 mm
Nominal frequency	400 kHz	

Calibrated Quantities

Distance (relative to source surface) (mm)	Peak H-field (A/m)	Uncertainty (k=2) (dB)
0	284	1.13
2	249	1.13

Appendix (Additional assessments outside the scope of SCS 0108)

Peak values of induced fields¹

Distance (relative to source surface) (mm)	Induced peak current density, 1cm ² area avg. (A/m ²)	Induced peak E-field (V/m)			peak spatial SAR (mW/kg)	
		2mm cube avg.	Local	5mm line avg.	1g avg.	10g avg.
0	2.83	4.48	4.60	4.60	7.82	3.80
2	2.40	3.84	3.95	3.96	5.63	2.78

Voltage measurement

Total voltage (V)	Voltages at harmonics (dBc)
0.403	Highest harmonic: -33.2 2 nd highest harmonic: -33.5

¹ determined for a virtual half-space phantom with tissue properties $\epsilon_r = 55$, $\sigma = 0.75$ S/m, $\rho = 1000$ kg/m³ and a 2 mm thick phantom shell

Measurement report

cDASY6 Module WPT Measurement Report

Device under test

Info:
V-Coil50/400

Serial number:
1014

Scenario:
Source Calibration

Tool info

DASY software version:
cDASY6 Module WPT 2.8.0.5184

Probe model, serial no. and configuration date:
MAGPy-8H3D+E3Dv2, WP000230, 2024/08/23

Software version:
2.8.8, backend: 2.2.36

Scan info

Center location:
x: -149.47 mm, y: -282.67 mm, z: 36.41 mm

Dimensions:
x: 124.0 mm, y: 125.0 mm, z: 36.7 mm

Resolution:
x: 7.33 mm, y: 7.33 mm, z: 7.33 mm

Completed on:
2025/08/15 12:18:05

Measurement results

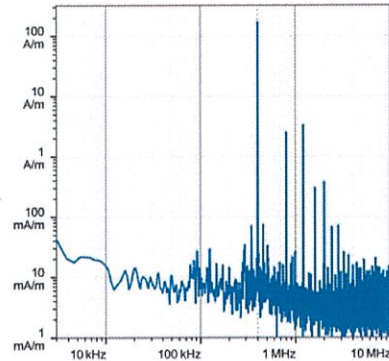
Maximum H-field [RMS]:
MAGNITUDE: 138.93 A/m
x: 24.60 A/m, y: 17.08 A/m, z: 135.67 A/m

Maximum H-field location relative to DUT:
x: -3.63 mm, y: 3.70 mm, z: 8.50 mm

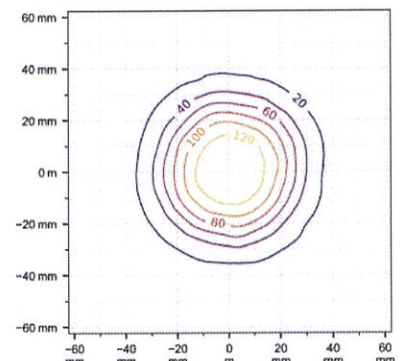
Distance to -20.0 dB boundary:
36.67 mm

Offset relative to DUT:
x: 36.70 mm, y: 36.70 mm, z: 1.00 mm

H-field magnitude [RMS] at center location



H-field magnitude [RMS] at lowest plane



Incident fields and induced fields in the homogeneous phantom at the peak frequency (f = 400.00 kHz, σ = 0.750 S/m, tissue density = 1,000 kg/m³)

Distance [mm]	Peak incident fields [RMS]	Peak E _{ind} [V/m, RMS]			Peak J _{ind} [A/m², RMS]	psSAR [mW/kg]		H-field extent	Warnings		
	H _{inc} [A/m]	Cube avg.	Local	Line avg.	Surface avg.	1g avg.	10g avg.	-20 dB radius [mm]	Sign	Vector potential	Boundary effect
0.00	284	4.48	4.60	4.60	2.83	7.82	3.80	38.7	1%	7%	17%
2.00	249	3.84	3.95	3.96	2.40	5.63	2.78	38.9	1%	7%	19%

Compliance evaluation (Field values at the peak frequency) (f=400.00 kHz,)

Distance [mm]	ICNIRP 2010/2020			ICNIRP 1998			IEEE 2019			FCC			HC Code 6		
	RL [RMS]		BR [RMS]	RL [RMS]		BR [RMS]	ERL [RMS]		DRL [RMS]	MPE [RMS]		BR [RMS]	RL [RMS]		BR [RMS]
	pH _{inc} [A/m]	pE _{ind} [V/m]	psSAR [mW/kg]	pH _{inc} [A/m]	pJ _{ind} [A/m²]	psSAR [mW/kg]	pH _{inc} [A/m]	pE _{ind} [V/m]	psSAR [mW/kg]	pH _{inc} [A/m]	pE _{ind} [V/m]	psSAR [mW/kg]	pH _{inc} [A/m]	pE _{ind} [V/m]	psSAR [mW/kg]
0.00	284	4.48	3.80	284	2.83	3.80	284	4.60	3.80	284	N/A	7.82	284	4.60	7.82
2.00	249	3.84	2.78	249	2.40	2.78	249	3.96	2.78	249	N/A	5.63	249	3.95	5.63

Compliance evaluation (Exposure ratios) (ratios in dB)

Distance [mm]	ICNIRP 2010/2020				ICNIRP 1998				IEEE 2019				FCC			HC Code 6			
	RL		BR		RL		BR		ERL		DRL		MPE		BR	RL		BR	
	pH _{inc}	pE _{ind}	psSAR	psSAR	pH _{inc}	pJ _{ind}	psSAR	psSAR	pH _{inc}	pE _{ind}	psSAR	psSAR	pH _{inc}	pE _{ind}	psSAR	pH _{inc}	pE _{ind}	psSAR	psSAR
0.00	22.6	27.3	-21.6	-27.2	43.8	11.0	-27.2	4.82	9.89	-25.2	-27.2	44.8	N/A	-23.1	9.98	43.8	-21.4	-23.1	-23.1
2.00	21.5	26.1	-23.0	-28.6	42.7	9.54	-28.6	3.66	8.73	-26.5	-28.6	43.7	N/A	-24.5	8.82	42.7	-22.7	-24.5	-24.5