On your side

TEST REPORT

WPC RF Exposure for certification

APPLICANT
Socket Mobile, Inc.

REPORT NO.
HCT-SR-2405-FI001

DATE OF ISSUE
May. 25, 2024

Tested by
Dong Sun, Kim (signature)

Technical Manager
Yun Jeang, Heo (signature)

HCT CO., LTD.
BongJai Huh / CEO

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TEST REPORT
FCC/ISED

REPORT NO.
HCT-SR-2405-FI001

DATE OF ISSUE
May. 25, 2024

FCC ID
LUBMA41-X
ISED ID
2529A-MA41X

Applicant	Socket Mobile, Inc. 40675 Encyclopedia Cir., Fremont, CA 94538, U.S.A.
Product Name	XtremeScan Case
Model Name	XC100
Series Model	XG930, XG940, XS930, XS940
Date of Test	Apr.08, 2024
Location of Test	■ Permanent Testing Lab ☐ On Site Testing Lab (Address: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si,
FCC Rule Part(s)	FCC Part 1 SUBPART I FCC Part 2 SUBPART J KDB 680106 D01
ISED Rule Part(s)	RSS-102:issue 6,RSS-102.SAR.Meas and RSS-216: Issue 2
Test Results	PASS [FCC MPE limit /ISED Safety code 6] Refer to the clause 5.

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REVISION HISTORY

The revision history for this test report is shown in table.

Revision No.	Date of Issue	Description
0	Feb. 20, 2024	Initial Release

Notice

Content
The results shown in this test report only apply to the sample(s), as received, provided by the applicant, unless otherwise stated. The test results have only been applied with the test methods required by the standard(s). The laboratory is not accredited for the test results marked *. Information provided by the applicant is marked **. Test results provided by external providers are marked ***. When confirmation of authenticity of this test report is required, please contact www.hct.co.kr The test results in this test report are not associated with the ((KS Q) ISO/IEC 17025) accreditation by KOLAS (Korea Laboratory Accreditation Scheme) / A2LA (American Association for Laboratory Accreditation) that are under the ILAC (International Laboratory Accreditation Cooperation) Mutual Recognition Agreement (MRA).

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1 Test Location

1.1 Test Laboratory.

Company Name:	HCT Co., LTD
Address:	74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of Korea
Telephone:	+82 31 645 6300
Fax.:	+82 31 645 6401

1.2 Test Facilities

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

Lab identifier	National Radio Research Agency (Designation No. KR0032)
	Company Number: 5944A

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2. DEVICE UNDER TEST DESCRIPTION

2.1. General information

Applicant Name:	Socket Mobile, Inc.
Model Name:	XC100
Series Model	XG930, XG940, XS930, XS940
Serial Number	001
EUT Type:	XtremeScan Case
FCC ID	LUBMA41-X
ISED ID	2529A-MA41X
Application Type:	Certification
RF Specification	Wireless Power Transfer
Transmitter Chain	1
Frequency Range	114.5 kHz
Max. Transmit Power	-0.3 dBuV/m @300 m
Number of Channels	1 Channel
Antenna Specification 1)	Loop antenna
Date(s) of Tests	Apr.08,2024

2.2. Test Configurations

METHODOLOGY	
FCC	680106 D01 Wireless Power Transfer v04.
ISED	RSS-102:issue 6,RSS-216

2.3 Description of DUT

A DUT is a case used in conjunction with a cell phone [iphone].

The DUT supports wireless charging to charge the installed cell phone at 114 kHz frequency from a wired DC power supply. Therefore, the wireless charging user condition of the DUT is Table Top, mobile condition.

The report contains the measurement results of RF exposure of the charging case in the charging state.

The report contains the measured RF exposure results of the DUT's charging function under mobile usage conditions.

Charging cable

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3. TEST EQUIPMENT

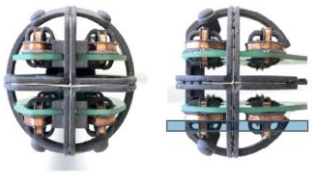
The following test and measurement equipment was used for the tests documented in this report

Manufacturer	Model name	Description	S/N	Calib. Date	Calib.Due
SPEAG	MAGPy-8H3D+E3D	Near-Field Electric and Magnetic Field sensor Probe	3054	12/08/2024	12/08/2025
SPEAG	V-Coil350_85	Validation Source	1021	03/27/2024	03/27/2025

DASY6 Module WPT is optimized for evaluating compliance of inductive Wireless Power Transfer (WPT) systems and any other magnetic-field sources operating in the 3 kHz–4MHz frequency range.

Module WPT V2.2 The MAGPy-8H3D+E3D V2 probe consists of eight isotropic H-field sub-probes and one isotropic E-field sub-probe that are all integrated inside the probe head with a flat tip. Each isotropic H-field sub-probe is comprised of three concentric orthogonal loop coil sensors. The isotropic E-field sub-probe is composed of three orthogonal sensors (x and y sensors are dipoles, and the sensor measuring the z component is a monopole).

The uncertainty due to the anisotropy of the magnetic loops and the plates capacitors in the probe is described in the probe manufacturer's specification [1]



Measurement probe specification		
Model	MAGPy-8H3D+E3D	SPR-002 issue 2
Frequency	3 kHz – 10 MHz	3 kHz – 10 MHz
Linearity [A/m or V/m]	H: 0.1–3200 A/m E: 0.1–2000 V/m	defined as a function of RL
Linearity error[dB]	H: <0.2 (typ.) E: <0.5 (typ.)	≤0.5
Sensitivity [A/m or V/m]	H: 0.1 A/m E: 0.08 V/m	H: ≤1 A/m E: ≤1 V/m
Sensor size[mm]	H: 10 mm E: 50 mm	≤ dmeas /1.7
Isotropy[dB]	<0.5 (typ.)	≤1
Dimensions	110mm×635mm×35mm (MAGPy-8H3D+E3D V2 & MAGPy-DAS V2)	
Application	Electric and Magnetic field	Electric and Magnetic field
The sensitive elements are located **approximately 7.5 mm** below the external surface for H-Field		

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4. RF Exposure limit

4.1 MAXIMUM PERMISSIBLE RF EXPOSURE_FCC

1.13010 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency(RF) radiation as specified in 1.1307(b), except in the case of portable devices which shall be evaluated according the provisions of 2.1093 of this chapter.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f^2)	6
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

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	27.5	0.073	0.2	30
300–1500	.....	.....	f/1500	30
1500–100,000	.....	.....	1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits 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 in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

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4.2 Electric and Magnetic Field Strength (3 kHz - 10 MHz)_ISED

The electric and magnetic field strength reference levels for devices employed by the general public (uncontrolled environment) and controlled-use devices (controlled environment) are summarized in table 5 and table 6.

Table 5 : Electric field strength reference levels

Frequency range (MHz)	Reference level basis	Reference level (E_{RL}) for uncontrolled environment (V_{RMS}/m)	Reference level (E_{RL}) for controlled environment (V_{RMS}/m)	Reference period
0.003 -10	NS	83	170	Instantaneous
1.10-10	SAR	$87/f^{0.5}$	N/A	6 minutes
1.29-10	SAR	N/A	$193/f^{0.5}$	6 minutes

Note: f is frequency in MHz.

Table 6 : Magnetic field strength reference levels

Frequency range (MHz)	Reference level basis	Reference level (H_{RL}) for uncontrolled environment (A_{RMS}/m)	Reference level (H_{RL}) for controlled environment (A_{RMS}/m)	Reference period
0.003-10	NS	90	180	Instantaneous
0.1-10	SAR	$0.73/f$	$1.6/f$	6 minutes

Note: f is frequency in MHz.

For both table 5 and table 6, refer to Health Canada's Safety Code 6 for relevant notes and additional information

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5. TEST RESULTS

5.1 System check

A system check is typically performed prior to any compliance evaluation. For the DASY6 Module WPT, a set of four system validation sources (3 kHz, 85 kHz, 400 kHz and 6.78 MHz) are available. These sources consist of series resonant spiral coils, fed with an integrated current source. The current source consists of an oscillator and an amplifier at the appropriate frequency. A monitoring port in the form of a SMB connector is available on the device to monitor the current through the coil. The port offers the voltage across a 1Ω resistor connected in series with the coil, therefore the current I corresponds to the measured voltage Vtest port (I = Vtest port). The voltage on the port can thus be monitored with an oscilloscope and this should be equal to the current through the coil.

Freq.	Date	Probe	Verification Source	Distance	Peak H-Field	Peak Jind [A/m2, rms]	Peak Eind [V/m, rms]			Peak H-Field	Peak Jind [A/m2, rms]	Peak Eind [V/m, rms]			Unc. [k=2]
					Target Value					measured Value					
		[S/N]	[S/N]	[mm]	[A/m]	Averg	Cube	local	Line .avg	[A/m]	Averg	Cube	local	Line .avg	[dB]
85 kHz	04/08/2024	3054	1021	0	209	2.39	3.41	3.45	3.45	202	2.38	3.39	3.43	3.43	1.13
				deviation from Target [dB]						-0.148	-0.018	-0.026	-0.025	-0.025	
				Distance	Peak H-Field	Peak Jind [A/m2, rms]	Peak Eind [V/m, rms]			Peak H-Field	Peak Jind [A/m2, rms]	Peak Eind [V/m, rms]			Unc. [k=2]
					Target Value					measured Value					
				[mm]	[A/m]	Averg	Cube	local	Line .avg	[A/m]	Averg	Cube	local	Line .avg	[dB]
				2	190	2.25	3.21	3.24	3.25	184	2.26	3.2	3.23	3.23	1.13
				deviation from Target [dB]						**-0.139**	**0.019**	**-0.014**	**-0.013**	**-0.027**	

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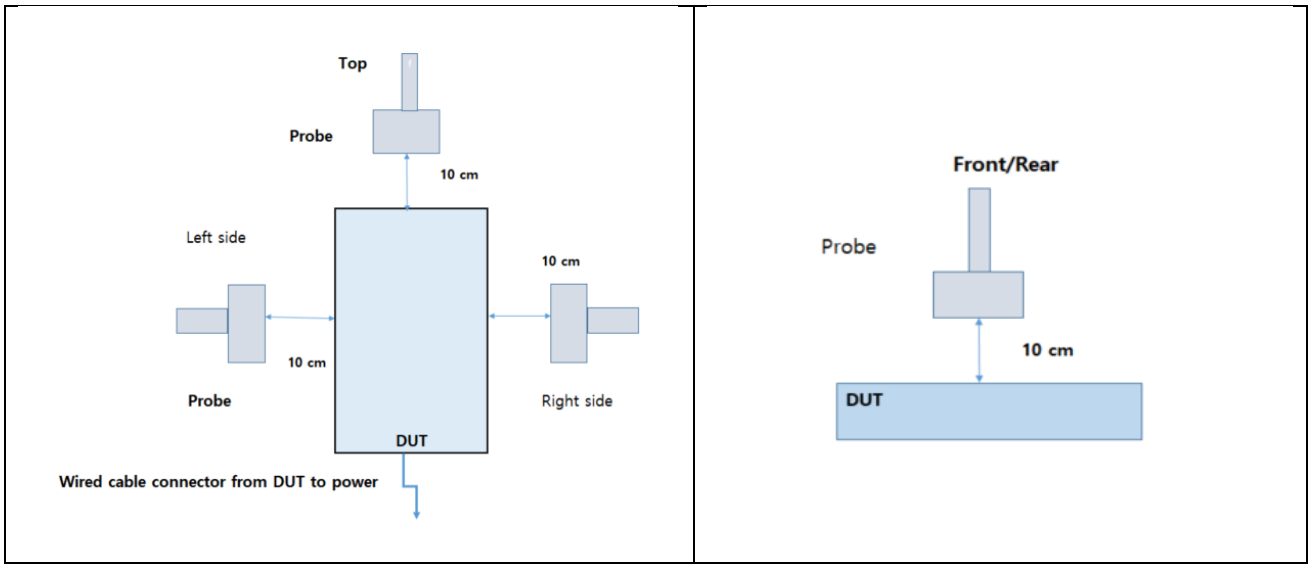
5.2 Measurement results for the Maximum Exposure Configuration

To confirm compliance with all regulatory standards of FCC and ISED, the distance between the DUT and the probe was set to 10 cm, and the measurement results showed that all FCC and ISED limits were complied with,



Test conditions

Test configuration	Frequency	Test distance	Maximum H-field [rms]	Maximum E-field [rms]	FCC Limit		ISED Limit	
	kHz	cm	A/m	V/m	A/m	V/m	A/m	V/m
Rear	114.5	10	**0.24392**	**0.53942**	1.63	614	6.38	83
Front			0.09431	0.20251				
Left			0.06272	0.15448				
Right			0.07187	0.18281				
Top			0.06018	0.14203				
Ratio of The worst case measurement results to limits[%]					**14.96**	**0.09**	**3.83**	**0.65**
Exposure ratio of the worst case for each Field					**0.150**	**0.001**	**0.038**	**0.006**

The side of the DUT was selected based on the screen side of the cell phone it is mounted on. and The bottom side was not measured because the DC power cable was connected to it.
The measurement results were in compliance with both FCC and ISED reference limits

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.5.3 Total Exposure-Thermal-based ER below 10 MHz

The exposure ratio EREH−SAR for transmitters operating between 100 kHz and 10 MHz for which compliance was determined against the SAR-based reference levels for the incident E- and/or H-fields is shown in equation (5).

$$ER_{EH-SAR,a} = \begin{cases} \left(\frac{H_{SAR,a}}{H_{RL-SAR,a}}\right)^2, & 100kHz \le f_a < f_{env} \\ \max\left[\left(\frac{E_{SAR,a}}{E_{RL-SAR,a}}\right)^2, \left(\frac{H_{SAR,a}}{H_{RL-SAR,a}}\right)^2\right], & f_{env} \le f_a < 10MHz \end{cases} \quad (5)$$

$ER_{EH\text{-}SAR,a}$ =Max[$(0.038)^2$,$(0.006)^2$]=0.0015

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Appendix A. Measurement Data

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cDASY6 Module WPT Measurement Report

Device under test

Info:
not set

Serial number:
not set

Scenario:
not set

Tool info

DASY software version:
cDASY6 Module WPT 2.4.0.4346

Probe model, serial no. and configuration date:
MAGPy-8H3D+E3Dv2, WP000201, *2023/12/13*

Software version:
2.0.49, *backend: 2.2.3*

Scan info

Center location:
x: 0.00 m, **y:** 0.00 m, **z:** 135.97 mm

Dimensions:
x: 169.0 mm, **y:** 169.0 mm, **z:** 36.7 mm

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

Completed on:
2024/04/18 19:12:33

Measurement results

Maximum H-field [RMS]:
MAGNITUDE: 243.92 mA/m
x: 62.91 mA/m, **y:** 60.43 mA/m, **z:** 227.79 mA/m

Maximum H-field location relative to DUT:
x: -25.67 mm, **y:** 11.00 mm, **z:** 23.17 mm

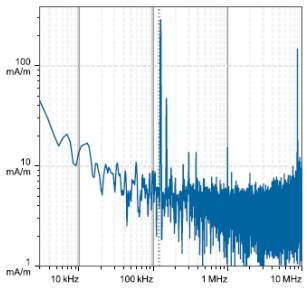
Maximum E-field [RMS]:
MAGNITUDE: 539.41 mV/m
x: 28.75 mV/m, **y:** 165.40 mV/m, **z:** 512.62 mV/m

Maximum E-field location relative to DUT:
x: -36.67 mm, **y:** 0.00 m, **z:** 15.67 mm

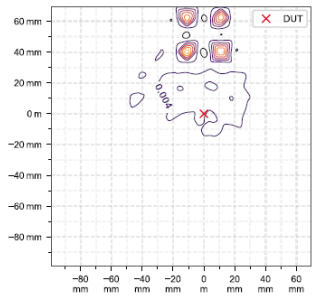
Distance to -20.0dB boundary:
7.33 mm

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

H-field magnitude [RMS] at maximum location



H-field magnitude [RMS] at lowest plane



Incident fields, and induced quantities in the anatomical model *(f = 119.72 kHz, σ = 0.750 S/m, tissue density = 1,000 kg/m³)*

	Peak incident fields [RMS]		Peak E_{ind} [V/m, RMS]			Peak J_{ind} [A/m², RMS]	psSAR [mW/kg]		H-field extent	Errors		
Distance [mm]	H_{inc} [A/m]	E_{inc} [V/m]	Cube avg.	Local	Line avg.	Surface avg.	1g avg.	10g avg.	-20 dB radius [mm]	Sign	Vector potential	Boundary effect
0.0	0.198	0.0406	0.000494	0.000532	0.000493	0.000252	0.0000000761	0.0000000319	39.1	8%	222%	100%

Standard compliance evaluation, Absolute *(with multi-frequency enhancement, total field evaluation)*

	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]	
Distance	pH_{inc}	pE_{inc}	pE_{ind}	psSAR	pH_{inc}	pE_{inc}	pJ_{ind}	psSAR	pH_{inc}	pE_{inc}	pE_{ind}	psSAR	pH_{inc}	pE_{inc}	pE_{ind}	psSAR	pH_{inc}	pE_{inc}	pE_{ind}	psSAR
[mm]	[A/m]	[V/m]	[V/m]	[mW/kg]	[A/m]	[V/m]	[A/m²]	[mW/kg]	[A/m]	[V/m]	[V/m]	[mW/kg]	[A/m]	[V/m]	[V/m]	[mW/kg]	[A/m]	[V/m]	[V/m]	[mW/kg]
0.0	0.198	0.0406	0.000495	0.0000000761	0.198	0.0406	0.000253	0.0000000761	0.198	0.0406	0.000495	0.0000000761	0.198	0.0406	N/A	0.0000000761	0.198	0.0406	0.000533	0.00000007

Standard compliance evaluation, Relative *(with multi-frequency enhancement, total field evaluation)*

	ICNIRP 2010/2020 [dB]				ICNIRP 1998 [dB]				IEEE 2019 [dB]				FCC [dB]				HC Code 6 [dB]			
	RL		BR		RL		BR		ERL		DRL		MPE		BR		RL		BR	
Distance [mm]	pH_{inc}	pE_{inc}	pE_{ind}	psSAR	pH_{inc}	pE_{inc}	pJ_{ind}	psSAR	pH_{inc}	pE_{inc}	pE_{ind}	psSAR	pH_{inc}	pE_{inc}	pE_{ind}	psSAR	pH_{inc}	pE_{inc}	pE_{ind}	psSAR
0.0	-40.5	-66.2	-90.3	-108.0	-28.0	-66.6	-59.5	-108.0	-58.3	-83.6	-94.1	-108.0	N/A	N/A	N/A	-103.2	-29.8	-66.2	-89.6	-103.2

Document generated at 2024/04/18 19:14:35, simulation performed at 2024/04/18 19:14:27 using Sim4Life version 7.2.4.14019

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Appendix B. System Check

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cDASY6 Module WPT Measurement Report

Device under test

Info:
not set

Serial number:
not set

Scenario:
not set

Tool info

DASY software version:
cDASY6 Module WPT 2.4.0.4346

Probe model, serial no. and configuration date:
MAGPy-8H3D+E3Dv2, WP000201, *2023/12/13*

Software version:
2.0.49, *backend: 2.2.3*

Scan info

Center location:
x: 0.00 m, y: 0.00 m, z: 35.51 mm

Dimensions:
x: 345.0 mm, y: 521.0 mm, z: 36.7 mm

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

Completed on:
2024/04/08 18:31:18

Measurement results

Maximum H-field [RMS]:
MAGNITUDE: 132.26 A/m
x: 111.89 A/m, y: 39.98 A/m, z: 58.09 A/m

Maximum H-field location relative to DUT:
x: -91.67 mm, y: 84.33 mm, z: 8.50 mm

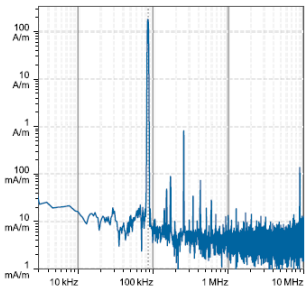
Maximum E-field [RMS]:
MAGNITUDE: 271.17 V/m
x: 7.16 V/m, y: 3.56 V/m, z: 271.05 V/m

Maximum E-field location relative to DUT:
x: 88.00 mm, y: 139.33 mm, z: 1.00 mm

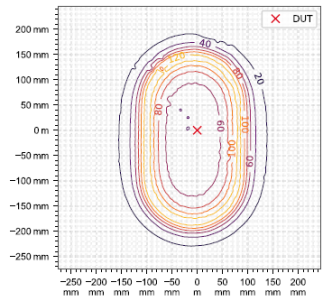
Distance to -20.0 dB boundary:
63.08 mm

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

H-field magnitude [RMS] at maximum location



H-field magnitude [RMS] at lowest plane



Incident fields, and induced quantities in the anatomical model *(f = 85.00 kHz, σ = 0.750 S/m, tissue density = 1,000 kg/m³)*

	Peak incident fields [RMS]		Peak E_{ind} [V/m, RMS]			Peak J_{ind} [A/m², RMS]	psSAR [mW/kg]		H-field extent	Errors		
Distance [mm]	H_{inc} [A/m]	E_{inc} [V/m]	Cube avg.	Local	Line avg.	Surface avg.	1g avg.	10g avg.	-20 dB radius [mm]	Sign	Vector potential	Boundary effect
0.0	202.0	271.0	3.39	3.43	3.43	2.38	6.72	5.06	182.0	1%	69%	41%
2.0	184.0	249.0	3.2	3.23	3.23	2.26	6.05	4.61	184.0	1%	69%	44%

Standard compliance evaluation, Absolute *(with multi-frequency enhancement, total field evaluation)*

	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]	
Distance	pH_{inc}	pE_{inc}	pE_{ind}	psSAR	pH_{inc}	pE_{inc}	pJ_{ind}	psSAR	pH_{inc}	pE_{inc}	pE_{ind}	psSAR	pH_{inc}	pE_{inc}	pE_{ind}	psSAR	pH_{inc}	pE_{inc}	pE_{ind}	psSAR
[mm]	[A/m]	[V/m]	[V/m]	[mW/kg]	[A/m]	[V/m]	[A/m²]	[mW/kg]	[A/m]	[V/m]	[V/m]	[mW/kg]	[A/m]	[V/m]	[V/m]	[mW/kg]	[A/m]	[V/m]	[V/m]	[mW/kg]
0.0	202.0	634.0	3.4	5.06	202.0	634.0	2.39	5.06	202.0	634.0	3.44	5.06	202.0	386.0	N/A	6.72	202.0	634.0	3.43	6.72
2.0	184.0	582.0	3.2	4.61	184.0	582.0	2.26	4.61	184.0	582.0	3.24	4.61	184.0	355.0	N/A	6.05	184.0	582.0	3.23	6.05

Standard compliance evaluation, Relative *(with multi-frequency enhancement, total field evaluation)*

	ICNIRP 2010/2020 [dB]				ICNIRP 1998 [dB]				IEEE 2019 [dB]				FCC [dB]				HC Code 6 [dB]			
	RL		BR		RL		BR		ERL		DRL		MPE		BR		RL		BR	
Distance [mm]	pH_{inc}	pE_{inc}	pE_{ind}	psSAR	pH_{inc}	pE_{inc}	pJ_{ind}	psSAR	pH_{inc}	pE_{inc}	pE_{ind}	psSAR	pH_{inc}	pE_{inc}	pE_{ind}	psSAR	pH_{inc}	pE_{inc}	pE_{ind}	psSAR
0.0	19.7	17.7	-10.5	-26.0	32.1	17.2	23.0	-26.0	1.9	0.3	-14.2	-26.0	7.0	13.4	N/A	N/A	27.4	17.7	-10.5	-23.8
2.0	18.9	16.7	-11.0	-25.4	31.7	16.2	22.0	-25.4	1.5	-0.5	-14.6	-26.4	6.2	12.6	N/A	N/A	26.6	16.9	-11.0	-24.2

Document generated at 2024/04/08 18:43:22 Simulation performed at 2024/04/08 18:43:29 using SimuLife version 7.2.4.14619

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Appendix C. Calibration Data

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Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

Client HCT
Gyeonggi-do, Republic of Korea

Certificate No: V-Coil350/85-1021_Mar24

CALIBRATION CERTIFICATE

Object	V-Coil350/85 - SN: 1021
Calibration procedure(s)	QA CAL-47.v13 Calibration Procedure for WPT Verification & Validation Sources
Calibration date:	March 7, 2024

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: 3065/3056	06-Apr-23 (MAGPy-8H3D+E3D-3065)	Apr-24
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**

결재	담당자	확인자
	지진희	
직위/성명	SW 지진희	CJ 차정호
일자	2024.03.22	2024.03.22

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

Issued: March 12, 2024

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Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

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%.

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Measurement Conditions

Software version	cDASY6 Module WPT	2.4.0.4346
	Notebook GUI	2.4.0.2
	Sim4Life	7.2.4
Scan setup	Grid dimensions	x: 609 mm, y: 609 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	209	1.13
2	190	1.13

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Appendix (Additional assessments outside the scope of SCS 0108)

Peak values of induced fields[1]

Distance (relative to source surface) (mm)	Induced peak current density, 1cm² area avg. (A/m²)	Induced peak E-field (V/m)			peak spatial SAR (mW/kg)	
		2mm cube avg.	Local	5mm line avg.	1g avg.	10g avg.
0	2.39	3.41	3.45	3.45	6.69	4.95
2	2.25	3.21	3.24	3.25	5.97	4.48

Voltage measurement

Total voltage (V)	Voltages at harmonics (dBc)
0.409	Highest harmonic: -46.5 2nd highest harmonic: -47.9

[1] determined for a virtual half-space phantom with tissue properties ε_r = 55, σ = 0.75 S/m, ρ=1000 kg/m³

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Measurement report

cDASY6 Module WPT Measurement Report

Device under test

Info:
V-Coil350/85

Serial number:
1021

Scenario:
source calibration

Tool info

DASY software version:
cDASY6 Module WPT 2.4.0.4346

Probe model, serial no. and configuration date:
MAGPy-8H3D+E3Dv2, WP000030, *2023/06/16*

Software version:
2.0.49, *backend: 2.2.3*

Scan info

Center location:
x: 5.04 mm, Y: -4.44 mm, z: 86.25 mm

Dimensions:
x: 389.0 mm, Y: 477.0 mm, z: 36.7 mm

Resolution:
x: 7.33 mm, Y: 7.33 mm, z: 7.33 mm

Completed on:
2024/03/07 13:29:26

Measurement results

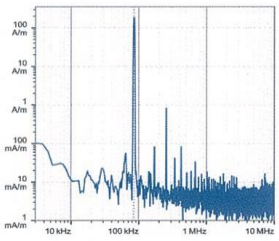
Maximum H-field [RMS]:
MAGNITUDE: 134.94 A/m
x: 130.33 A/m, Y: 4.77 A/m, z: 34.62 A/m

Maximum H-field location relative to DUT:
x: -91.67 mm, Y: -77.00 mm, z: 8.50 mm

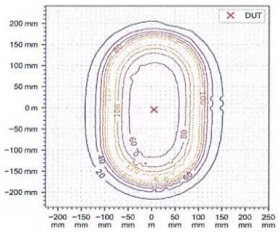
Distance to -20.0 dB boundary:
66.41 mm

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

H-field magnitude [RMS] at maximum location



H-field magnitude [RMS] at lowest plane



Incident fields, and induced quantities in the anatomical model *(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	Errors		
	H_{inc} [A/m]	Cube avg.	Local	Line avg.	Surface avg.	1g avg.	10g avg.	-20 dB radius [mm]	Sign	Vector potential	Boundary effect
0.0	209.0	3.41	3.45	3.45	2.39	6.69	4.95	181.0	1%	97%	35%
2.0	190.0	3.21	3.24	3.25	2.25	5.97	4.48	183.0	1%	97%	37%

Standard compliance evaluation, Absolute *(with multi-frequency enhancement, total field evaluation, coverage evaluation)*

	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]	
Distance	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
[mm]	[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]
0.0	209.0	25.6	4.95	209.0	2.4	4.95	209.0	13.4	4.95	209.0	N/A	6.69	209.0	36.6	6.69
2.0	190.0	24.2	4.48	190.0	2.26	4.48	190.0	12.6	4.48	190.0	N/A	5.97	190.0	34.5	5.97

Coverage factors: $w_{E_{ind,\ cube\ avg.}}$ = [7.51, 7.55], $w_{E_{ind,\ local}}$ = [10.62, 10.66], $w_{E_{ind,\ line\ avg.}}$ = [3.86, 3.88]

Standard compliance evaluation, Relative *(with multi-frequency enhancement, total field evaluation, coverage evaluation)*

	ICNIRP 2010/2020 [dB]			ICNIRP 1998 [dB]			IEEE 2019 [dB]			FCC [dB]			HC Code 6 [dB]		
	RL		BR	RL		BR	ERL	DRL		MPE	BR		RL	BR	
Distance [mm]	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
0.0	20.0	7.0	-26.1	32.4	23.0	-26.1	2.2	-2.5	-26.1	7.3	N/A	N/A	27.7	10.1	-23.8
2.0	19.1	6.5	-26.5	31.6	22.5	-26.5	1.3	-3.0	-26.5	6.5	N/A	N/A	26.9	9.6	-24.3

Coverage factors: $w_{E_{ind,\ cube\ avg.}}$ = [7.51, 7.55], $w_{E_{ind,\ local}}$ = [10.62, 10.66], $w_{E_{ind,\ line\ avg.}}$ = [3.86, 3.88]

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Accreditation No.: SCS 0108

Client	HCT Gyeonggi-do,Republic of Korea	Certificate No.	MAGPy-8H3D-3054

CALIBRATION CERTIFICATE

Object	MAGPy-8H3D+E3D SN:3054 MAGPy-DAS SN:3054
Calibration procedure(s)	QA CAL-46.v1 Calibration Procedure for MAGPy–8H3D+E3D Near-field Electric and Magnetic Field Sensor System
Calibration date	December 08, 2023

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 < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Oscilloscope	SN: 112135	25-Sep-23 (No. 17A1162175)	Sep-24
Reference 20 dB Attenuator	SN: CC2552 (20x)	04-Apr-23 (No. 217-03527)	Apr-24
Type-N mismatch	SN: 310982 / 06327	04-Apr-23 (No. 217-03528)	Apr-24

Secondary Standards	ID	Check Date (in house)	Scheduled Check
Network Analyzer E5061B	SN: MY49810822	In house check: Nov-23	In house check: Nov-24
TEM Cell	SN: S6029i	In house check: Nov-23	N.A
Plate Capacitor	SN: 6028i	In house check: Nov-23	In house check: Nov-24
Resonator (160kHz)	SN: 6030i	In house check: Nov-23	In house check: Nov-24

	Name	Function	Signature
Calibrated by	Aidonia Georgiadou	Laboratory Engineer	
Approved by	Sven Kühn	Technical Manager	

Issued: December 08, 2023

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결재	담당자	확인자
직위/성명	DL / 박정훈	CJ / 허윤정
일 자	2024 / 01.03	2024 / 01.03

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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

MAGPy-8H3D-E3D	Magnetic Amplitude and Gradient Probe – Eight H-field Sensors, Single E-field sensor
MAGPy-DAS	Magnetic Amplitude and Gradient Data Acquisition System

Calibration is Performed According to the Following Standards:

a) IEEE Std 1309-2013, "IEEE Standard for calibration of electromagnetic field sensors and probes, excluding antennas, from 9 kHz to 40 GHz", November 2013

Methods Applied and Interpretation of Parameters

- Calibration has been performed after the adjustment of the device.
- *Linearity*: Calibration of the linearity of the field reading over the specified dynamic range at 161.75 kHz. Influence of offset voltage is included in this measurement.
- *Frequency response*: Calibration of the field reading over the specified frequency range from 3.0 kHz to 10.0 MHz.
- Receiving Pattern: Assessed for H-field polarizations ϑ, and $\phi = 0° ... 360°$; $\vartheta = 90°$, and $\phi = 0° ... 360°$; for the XYZ sensors (in TEM-Cell at 4 kHz, 40 kHz, 400 kHz and 4 MHz).
- Receiving Pattern: Assessed for E-field polarizations ϑ, and $\phi = 0° ... 360°$; $\vartheta = 90°$, and $\phi = 0° ... 360°$; for the XYZ sensor (in parallel plate capacitor at 4 kHz, 40 kHz, 400 kHz and 4 MHz).

Calibration Uncertainty

The calibration uncertainty is 0.7 dB for the H-field readings and 1.06 dB for the E-field readings. The calibration uncertainty is specified over the frequency range from 3.0 kHz to 10.0 MHz and a dynamic range from 0.1 A/m to 3200 A/m and from 0.08 V/m to 2000 V/m respectively.

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%.

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MAGPy-8H3D+E3D SN:3054
MAGPy-DAS SN:3054

December 08, 2023

Measurement Conditions

Unit Type	MAGPy–8H3D+E3D (SP MGY 303 AA)	3054
	MAGPy–DAS (SE UMS 303 AC)	3054
	MAGPy FPGA Board	WP000201
Adjustment Date	Last MAGPy Adjustment	December 08, 2023
Firmware SW Version	MAGPy Firmware	Ver. 1.00
Backend SW Version	MAGPy Backend	Ver. 1.0.2
Calibration SW Version	MAGACAP	Ver. 1.0

Dynamic Range

Dynamic Range, H-field, Channel 0

H-field/(A/m) Applied			H-field/(A/m) Reading			Difference/(dB)			
x	y	z	x	y	z	x	y	z	Tolerance/(dB)
0.400	0.390	0.380	0.420	0.390	0.400	0.42	0.00	0.45	±1.00
0.550	0.530	0.520	0.560	0.530	0.540	0.16	0.00	0.33	±1.00
0.750	0.730	0.710	0.730	0.720	0.740	−0.23	−0.12	0.36	±1.00
0.980	0.950	0.920	0.970	0.950	0.940	−0.09	0.00	0.19	±1.00
1.32	1.29	1.25	1.35	1.30	1.25	0.20	0.07	0.00	±1.00
1.82	1.77	1.72	1.84	1.79	1.71	0.09	0.10	−0.05	±1.00
2.42	2.36	2.29	2.45	2.38	2.30	0.11	0.07	0.04	±0.20
3.24	3.15	3.06	3.25	3.18	3.04	0.03	0.08	−0.06	±0.20
4.39	4.28	4.15	4.40	4.29	4.17	0.02	0.02	0.04	±0.20
5.94	5.78	5.62	5.94	5.80	5.63	0.00	0.03	0.02	±0.20
8.00	7.78	7.56	7.98	7.80	7.57	−0.02	0.02	0.01	±0.20
10.7	10.4	10.1	10.7	10.4	10.1	0.00	0.00	0.00	±0.20
14.4	14.0	13.6	14.4	14.0	13.6	0.00	0.00	0.00	±0.20
19.4	18.9	18.4	19.4	18.9	18.4	0.00	0.00	0.00	±0.20
26.2	25.5	24.8	26.2	25.6	24.8	0.00	0.03	0.00	±0.20
35.0	34.1	33.1	35.1	34.2	33.3	0.02	0.03	0.05	±0.20
47.3	46.1	44.7	47.4	46.2	44.9	0.02	0.02	0.04	±0.20
63.9	62.3	60.5	64.2	62.6	60.8	0.04	0.04	0.04	±0.20
87.8	85.5	83.0	87.5	85.3	82.7	−0.03	−0.02	−0.03	±0.20
115	112	109	115	111	108	0.00	−0.08	−0.08	±0.20
158	154	149	157	153	149	−0.06	−0.06	0.00	±0.20
218	213	207	218	213	207	0.00	0.00	0.00	±0.20
302	294	286	297	289	281	−0.15	−0.15	−0.15	±0.20
444	433	421	440	428	416	−0.08	−0.10	−0.10	±0.20
611	596	579	609	593	576	−0.03	−0.04	−0.05	±0.20
909	886	861	915	892	866	0.06	0.06	0.05	±0.20
1370	1340	1300	1400	1360	1320	0.19	0.13	0.13	±0.30
1880	1830	1780	1940	1890	1840	0.27	0.28	0.29	±0.30
3020	2950	2870	3160	3080	2990	0.39	0.37	0.36	±0.50
3630	3540	3450	3820	3720	3620	0.44	0.43	0.42	±0.50

SPEAG H-field linearity tolerance criteria[1]:
±1.0 dB for applied H-fields < 2.0 A/m
±0.2 dB for applied H-fields ≥ 2.0 A/m and < 1000 A/m
±0.3 dB for applied H-fields ≥ 1000 A/m and < 2000 A/m
±0.4 dB for applied H-fields ≥ 2000 A/m and < 3000 A/m
±0.5 dB for applied H-fields ≥ 3000 A/m

[1] Calibration uncertainty not taken into account (shared risk 50%).

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MAGPy-8H3D+E3D SN:3054
MAGPy-DAS SN:3054

December 08, 2023

Dynamic Range, H-field, Channel 1

H-field/(A/m) Applied			H-field/(A/m) Reading			Difference/(dB)			
x	y	z	x	y	z	x	y	z	Tolerance/(dB)
0.400	0.400	0.390	0.420	0.410	0.410	0.42	0.21	0.43	±1.00
0.550	0.540	0.540	0.570	0.550	0.560	0.31	0.16	0.32	±1.00
0.750	0.740	0.730	0.760	0.760	0.760	0.12	0.23	0.35	±1.00
0.980	0.970	0.960	0.970	0.990	0.960	−0.09	0.18	0.00	±1.00
1.33	1.31	1.30	1.32	1.33	1.29	−0.07	0.13	−0.07	±1.00
1.82	1.79	1.78	1.82	1.81	1.78	0.00	0.10	0.00	±1.00
2.43	2.39	2.37	2.41	2.38	2.39	−0.07	−0.04	0.07	±0.20
3.25	3.20	3.17	3.25	3.18	3.17	0.00	−0.05	0.00	±0.20
4.41	4.34	4.31	4.42	4.33	4.31	0.02	−0.02	0.00	±0.20
5.97	5.87	5.82	5.97	5.84	5.85	0.00	−0.04	0.04	±0.20
8.03	7.90	7.83	8.01	7.90	7.85	−0.02	0.00	0.02	±0.20
10.7	10.5	10.4	10.7	10.6	10.5	0.00	0.08	0.08	±0.20
14.5	14.2	14.1	14.5	14.3	14.1	0.00	0.06	0.00	±0.20
19.5	19.2	19.1	19.5	19.2	19.1	0.00	0.00	0.00	±0.20
26.3	25.9	25.7	26.4	26.0	25.7	0.03	0.03	0.00	±0.20
35.1	34.6	34.3	35.3	34.7	34.5	0.05	0.03	0.05	±0.20
47.5	46.7	46.4	47.6	46.9	46.4	0.02	0.04	0.00	±0.20
64.2	63.2	62.7	64.5	63.5	63.0	0.04	0.04	0.04	±0.20
88.1	86.8	86.1	87.8	86.5	85.8	−0.03	−0.03	−0.03	±0.20
115	113	113	115	113	112	0.00	0.00	−0.08	±0.20
158	156	155	158	156	154	0.00	0.00	−0.06	±0.20
219	216	214	219	216	214	0.00	0.00	0.00	±0.20
303	298	296	298	293	291	−0.14	−0.15	−0.15	±0.20
446	440	436	441	434	432	−0.10	−0.12	−0.08	±0.20
614	605	600	610	601	598	−0.06	−0.06	−0.03	±0.20
912	899	892	918	905	900	0.06	0.06	0.08	±0.20
1370	1360	1350	1400	1380	1380	0.19	0.13	0.19	±0.30
1890	1860	1850	1950	1920	1910	0.27	0.28	0.28	±0.30
3030	2990	2970	3170	3120	3110	0.39	0.37	0.40	±0.50
3640	3590	3570	3830	3770	3760	0.44	0.42	0.45	±0.50

SPEAG H-field linearity tolerance criteria[1]:
±1.0dB for applied H-fields < 2.0A/m
±0.2dB for applied H-fields ≥ 2.0A/m and < 1000A/m
±0.3dB for applied H-fields ≥ 1000A/m and < 2000A/m
±0.4dB for applied H-fields ≥ 2000A/m and < 3000A/m
±0.5dB for applied H-fields ≥ 3000A/m

[1] Calibration uncertainty not taken into account (shared risk 50%).

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MAGPy-8H3D+E3D SN:3054
MAGPy-DAS SN:3054

December 08, 2023

Dynamic Range, H-field, Channel 2

H-field/(A/m) Applied			H-field/(A/m) Reading			Difference/(dB)			
x	y	z	x	y	z	x	y	z	Tolerance/(dB)
0.410	0.400	0.400	0.440	0.410	0.400	0.61	0.21	0.00	±1.00
0.560	0.540	0.540	0.600	0.550	0.550	0.60	0.16	0.16	±1.00
0.770	0.740	0.740	0.800	0.760	0.760	0.33	0.23	0.23	±1.00
1.00	0.970	0.960	1.00	0.980	0.980	0.00	0.09	0.18	±1.00
1.35	1.31	1.30	1.36	1.31	1.31	0.06	0.00	0.07	±1.00
1.86	1.80	1.79	1.87	1.79	1.78	0.05	−0.05	−0.05	±1.00
2.47	2.39	2.38	2.48	2.39	2.40	0.04	0.00	0.07	±0.20
3.31	3.20	3.19	3.31	3.21	3.20	0.00	0.03	0.03	±0.20
4.49	4.35	4.33	4.49	4.34	4.33	0.00	−0.02	0.00	±0.20
6.07	5.88	5.86	6.06	5.89	5.87	−0.01	0.01	0.01	±0.20
8.17	7.91	7.88	8.18	7.92	7.88	0.01	0.01	0.00	±0.20
10.9	10.6	10.5	10.9	10.6	10.5	0.00	0.00	0.00	±0.20
14.7	14.3	14.2	14.7	14.3	14.2	0.00	0.00	0.00	±0.20
19.9	19.2	19.2	19.9	19.3	19.1	0.00	0.05	−0.05	±0.20
26.8	25.9	25.9	26.9	26.0	25.8	0.03	0.03	−0.03	±0.20
35.8	34.6	34.5	35.9	34.8	34.6	0.02	0.05	0.03	±0.20
48.3	46.8	46.6	48.5	46.9	46.7	0.04	0.02	0.02	±0.20
65.3	63.3	63.0	65.6	63.6	63.3	0.04	0.04	0.04	±0.20
89.7	86.9	86.6	89.4	86.7	86.3	−0.03	−0.02	−0.03	±0.20
117	114	113	117	113	113	0.00	−0.08	0.00	±0.20
161	156	156	161	156	155	0.00	0.00	−0.06	±0.20
223	216	216	223	216	215	0.00	0.00	−0.04	±0.20
308	299	298	303	294	293	−0.14	−0.15	−0.15	±0.20
454	440	439	449	435	434	−0.10	−0.10	−0.10	±0.20
625	606	604	621	602	601	−0.06	−0.06	−0.04	±0.20
929	900	897	934	906	904	0.05	0.06	0.07	±0.20
1400	1360	1350	1430	1390	1380	0.18	0.19	0.19	±0.30
1920	1860	1860	1980	1920	1920	0.27	0.28	0.28	±0.30
3090	3000	2990	3220	3130	3120	0.36	0.37	0.37	±0.50
3710	3600	3590	3900	3780	3780	0.43	0.42	0.45	±0.50

SPEAG H-field linearity tolerance criteria[1]:
±1.0dB for applied H-fields < 2.0A/m
±0.2dB for applied H-fields ≥ 2.0A/m and < 1000A/m
±0.3dB for applied H-fields ≥ 1000A/m and < 2000A/m
±0.4dB for applied H-fields ≥ 2000A/m and < 3000A/m
±0.5dB for applied H-fields ≥ 3000A/m

[1] Calibration uncertainty not taken into account (shared risk 50%).

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MAGPy-8H3D+E3D SN:3054
MAGPy-DAS SN:3054

December 08, 2023

Dynamic Range, H-field, Channel 3

H-field/(A/m) Applied			H-field/(A/m) Reading			Difference/(dB)			
x	y	z	x	y	z	x	y	z	Tolerance/(dB)
0.410	0.400	0.390	0.440	0.400	0.400	0.61	0.00	0.22	±1.00
0.560	0.540	0.520	0.560	0.550	0.550	0.00	0.16	0.49	±1.00
0.770	0.740	0.720	0.770	0.760	0.720	0.00	0.23	0.00	±1.00
1.01	0.970	0.940	1.00	0.990	0.940	−0.09	0.18	0.00	±1.00
1.36	1.31	1.27	1.36	1.32	1.26	0.00	0.07	−0.07	±1.00
1.87	1.80	1.74	1.86	1.78	1.75	−0.05	−0.10	0.05	±1.00
2.49	2.40	2.32	2.49	2.38	2.31	0.00	−0.07	−0.04	±0.20
3.33	3.21	3.10	3.31	3.20	3.09	−0.05	−0.03	−0.03	±0.20
4.52	4.36	4.21	4.51	4.33	4.20	−0.02	−0.06	−0.02	±0.20
6.11	5.89	5.69	6.10	5.89	5.69	−0.01	0.00	0.00	±0.20
8.22	7.93	7.66	8.20	7.91	7.64	−0.02	−0.02	−0.02	±0.20
11.0	10.6	10.2	11.0	10.6	10.2	0.00	0.00	0.00	±0.20
14.8	14.3	13.8	14.8	14.3	13.8	0.00	0.00	0.00	±0.20
20.0	19.3	18.6	20.0	19.3	18.6	0.00	0.00	0.00	±0.20
27.0	26.0	25.1	27.0	26.1	25.1	0.00	0.03	0.00	±0.20
36.0	34.7	33.5	36.1	34.9	33.7	0.02	0.05	0.05	±0.20
48.6	46.9	45.3	48.8	47.0	45.5	0.04	0.02	0.04	±0.20
65.7	63.4	61.3	66.0	63.8	61.6	0.04	0.05	0.04	±0.20
90.2	87.1	84.1	90.0	86.9	83.8	−0.02	−0.02	−0.03	±0.20
118	114	110	118	114	110	0.00	0.00	0.00	±0.20
162	157	151	162	156	151	0.00	−0.06	0.00	±0.20
225	217	210	224	217	209	−0.04	0.00	−0.04	±0.20
310	300	290	305	295	285	−0.14	−0.15	−0.15	±0.20
457	441	426	452	436	421	−0.10	−0.10	−0.10	±0.20
628	607	587	625	604	583	−0.04	−0.04	−0.06	±0.20
934	902	872	940	909	878	0.06	0.07	0.06	±0.20
1410	1360	1320	1440	1390	1340	0.18	0.19	0.13	±0.30
1930	1870	1810	1990	1920	1860	0.27	0.23	0.24	±0.30
3100	3010	2900	3240	3110	3030	0.38	0.28	0.38	±0.50
3730	3610	3490	3920	3750	3670	0.43	0.33	0.44	±0.50

SPEAG H-field linearity tolerance criteria[1]:
±1.0dB for applied H-fields < 2.0A/m
±0.2dB for applied H-fields ≥ 2.0A/m and < 1000A/m
±0.3dB for applied H-fields ≥ 1000A/m and < 2000A/m
±0.4dB for applied H-fields ≥ 2000A/m and < 3000A/m
±0.5dB for applied H-fields ≥ 3000A/m

[1] Calibration uncertainty not taken into account (shared risk 50%).

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MAGPy-8H3D+E3D SN:3054
MAGPy-DAS SN:3054

December 08, 2023

Dynamic Range, H-field, Channel 4

H-field/(A/m) Applied			H-field/(A/m) Reading			Difference/(dB)			
x	y	z	x	y	z	x	y	z	Tolerance/(dB)
0.410	0.400	0.400	0.430	0.420	0.410	0.41	0.42	0.21	±1.00
0.560	0.550	0.540	0.570	0.580	0.550	0.15	0.46	0.16	±1.00
0.770	0.750	0.740	0.760	0.750	0.740	−0.11	0.00	0.00	±1.00
1.00	0.980	0.970	1.00	0.980	0.960	0.00	0.00	−0.09	±1.00
1.35	1.33	1.31	1.35	1.34	1.31	0.00	0.07	0.00	±1.00
1.86	1.82	1.80	1.86	1.84	1.80	0.00	0.09	0.00	±1.00
2.48	2.43	2.40	2.47	2.44	2.41	−0.04	0.04	0.04	±0.20
3.31	3.25	3.21	3.30	3.26	3.21	−0.03	0.03	0.00	±0.20
4.50	4.41	4.35	4.50	4.41	4.36	0.00	0.00	0.02	±0.20
6.08	5.97	5.89	6.08	5.97	5.89	0.00	0.00	0.00	±0.20
8.18	8.03	7.92	8.17	8.04	7.93	−0.01	0.01	0.01	±0.20
10.9	10.7	10.6	10.9	10.7	10.6	0.00	0.00	0.00	±0.20
14.7	14.5	14.3	14.8	14.5	14.3	0.06	0.00	0.00	±0.20
19.9	19.5	19.3	19.9	19.6	19.2	0.00	0.04	−0.05	±0.20
26.9	26.4	26.0	26.9	26.4	26.0	0.00	0.00	0.00	±0.20
35.8	35.2	34.7	35.9	35.3	34.9	0.02	0.02	0.05	±0.20
48.4	47.5	46.9	48.5	47.7	47.0	0.02	0.04	0.02	±0.20
65.4	64.2	63.4	65.7	64.6	63.7	0.04	0.05	0.04	±0.20
89.8	88.2	87.0	89.6	88.0	86.7	−0.02	−0.02	−0.03	±0.20
117	115	114	117	115	114	0.00	0.00	0.00	±0.20
161	159	156	161	158	156	0.00	−0.05	0.00	±0.20
223	220	217	223	219	217	0.00	−0.04	0.00	±0.20
309	303	300	303	298	295	−0.17	−0.14	−0.15	±0.20
455	447	441	450	441	436	−0.10	−0.12	−0.10	±0.20
625	615	607	623	611	604	−0.03	−0.06	−0.04	±0.20
930	914	902	936	920	909	0.06	0.06	0.07	±0.20
1400	1380	1360	1430	1410	1390	0.18	0.19	0.19	±0.30
1920	1890	1870	1990	1950	1930	0.31	0.27	0.27	±0.30
3090	3040	3000	3230	3170	3140	0.38	0.36	0.40	±0.50
3710	3650	3610	3900	3830	3800	0.43	0.42	0.45	±0.50

SPEAG H-field linearity tolerance criteria[1]:
±1.0dB for applied H-fields < 2.0A/m
±0.2dB for applied H-fields ≥ 2.0A/m and < 1000A/m
±0.3dB for applied H-fields ≥ 1000A/m and < 2000A/m
±0.4dB for applied H-fields ≥ 2000A/m and < 3000A/m
±0.5dB for applied H-fields ≥ 3000A/m

[1] Calibration uncertainty not taken into account (shared risk 50%).

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MAGPy-8H3D+E3D SN:3054
MAGPy-DAS SN:3054

December 08, 2023

Dynamic Range, H-field, Channel 5

H-field/(A/m) Applied			H-field/(A/m) Reading			Difference/(dB)			
x	y	z	x	y	z	x	y	z	Tolerance/(dB)
0.410	0.410	0.410	0.410	0.410	0.420	0.00	0.00	0.21	±1.00
0.560	0.550	0.560	0.550	0.560	0.560	−0.16	0.16	0.00	±1.00
0.770	0.760	0.770	0.770	0.770	0.780	0.00	0.11	0.11	±1.00
1.00	0.990	1.00	1.00	1.00	1.02	0.00	0.09	0.17	±1.00
1.35	1.34	1.35	1.37	1.33	1.37	0.13	−0.07	0.13	±1.00
1.86	1.84	1.86	1.88	1.83	1.87	0.09	−0.05	0.05	±1.00
2.48	2.45	2.47	2.51	2.45	2.48	0.10	0.00	0.04	±0.20
3.31	3.27	3.31	3.34	3.27	3.31	0.08	0.00	0.00	±0.20
4.50	4.44	4.49	4.52	4.46	4.49	0.04	0.04	0.00	±0.20
6.09	6.01	6.07	6.10	6.06	6.08	0.01	0.07	0.01	±0.20
8.19	8.09	8.17	8.20	8.16	8.17	0.01	0.07	0.00	±0.20
10.9	10.8	10.9	10.9	10.9	10.9	0.00	0.08	0.00	±0.20
14.8	14.6	14.7	14.8	14.7	14.7	0.00	0.06	0.00	±0.20
19.9	19.7	19.9	19.9	19.7	19.8	0.00	0.00	−0.04	±0.20
26.9	26.5	26.8	26.9	26.6	26.8	0.00	0.03	0.00	±0.20
35.9	35.4	35.8	35.9	35.6	36.0	0.00	0.05	0.05	±0.20
48.4	47.9	48.3	48.6	48.0	48.5	0.04	0.02	0.04	±0.20
65.5	64.7	65.4	65.8	65.0	65.7	0.04	0.04	0.04	±0.20
89.9	88.9	89.8	89.7	88.6	89.5	−0.02	−0.03	−0.03	±0.20
118	116	117	117	116	117	−0.07	0.00	0.00	±0.20
162	160	161	161	159	161	−0.05	−0.05	0.00	±0.20
224	221	224	224	221	223	0.00	0.00	−0.04	±0.20
309	306	309	304	300	304	−0.14	−0.17	−0.14	±0.20
455	450	455	450	445	450	−0.10	−0.10	−0.10	±0.20
626	619	626	623	616	623	−0.04	−0.04	−0.04	±0.20
931	920	930	937	927	937	0.06	0.07	0.07	±0.20
1400	1390	1400	1430	1420	1430	0.18	0.19	0.18	±0.30
1930	1910	1930	1990	1960	1990	0.27	0.22	0.27	±0.30
3090	3070	3100	3230	3200	3240	0.38	0.36	0.38	±0.50
3720	3680	3730	3910	3860	3920	0.43	0.41	0.43	±0.50

SPEAG H-field linearity tolerance criteria[1]:
±1.0dB for applied H-fields < 2.0A/m
±0.2dB for applied H-fields ≥ 2.0A/m and < 1000A/m
±0.3dB for applied H-fields ≥ 1000A/m and < 2000A/m
±0.4dB for applied H-fields ≥ 2000A/m and < 3000A/m
±0.5dB for applied H-fields ≥ 3000A/m

[1] Calibration uncertainty not taken into account (shared risk 50%).

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