



In Collaboration with

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CALIBRATION LABORATORY

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DASY/EASY – Parameters of Probe: EX3DV4 – SN:3789

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc ($k=2$)
Norm($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	0.46	0.50	0.51	$\pm 10.0\%$
DCP(mV) ^B	102.6	101.8	100.5	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB $\sqrt{\mu\text{V}}$	C	D dB	VR mV	Unc ^E ($k=2$)
0	CW	X	0.0	0.0	1.0	0.00	161.9	$\pm 1.9\%$
		Y	0.0	0.0	1.0		171.4	
		Z	0.0	0.0	1.0		173.2	

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%.

^A The uncertainties of Norm X, Y, Z do not affect the E²-field uncertainty inside TSL (see Page 4).

^B Numerical linearization parameter: uncertainty not required.

^E Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

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Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz] ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha ^G	Depth ^G (mm)	Unct. (k=2)
750	41.9	0.89	9.10	9.10	9.10	0.13	1.47	± 12.7%
835	41.5	0.90	8.72	8.72	8.72	0.15	1.39	± 12.7%
1450	40.5	1.20	7.96	7.96	7.96	0.21	1.06	± 12.7%
1750	40.1	1.37	7.66	7.66	7.66	0.26	1.06	± 12.7%
1900	40.0	1.40	7.31	7.31	7.31	0.30	0.97	± 12.7%
2300	39.5	1.67	7.11	7.11	7.11	0.39	0.92	± 12.7%
2450	39.2	1.80	6.95	6.95	6.95	0.39	0.95	± 12.7%
2600	39.0	1.96	6.76	6.76	6.76	0.44	0.90	± 12.7%
3300	38.2	2.71	6.61	6.61	6.61	0.48	0.87	± 13.9%
3500	37.9	2.91	6.48	6.48	6.48	0.42	1.03	± 13.9%
3700	37.7	3.12	6.30	6.30	6.30	0.35	1.25	± 13.9%
3900	37.5	3.32	6.25	6.25	6.25	0.35	1.35	± 13.9%
4100	37.2	3.53	6.15	6.15	6.15	0.40	1.15	± 13.9%
4400	36.9	3.84	5.96	5.96	5.96	0.35	1.35	± 13.9%
4600	36.7	4.04	5.92	5.92	5.92	0.55	1.05	± 13.9%
4800	36.4	4.25	5.88	5.88	5.88	0.55	1.10	± 13.9%
5250	35.9	4.71	5.08	5.08	5.08	0.55	1.22	± 13.9%
5600	35.5	5.07	4.48	4.48	4.48	0.55	1.22	± 13.9%
5750	35.4	5.22	4.61	4.61	4.61	0.55	1.22	± 13.9%

^C Frequency validity above 300 MHz of ±100MHz only applies for DASY v4.4 and higher (Page 2), else it is restricted to ±50MHz. The uncertainty is the RSS of ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

^F At frequency up to 6 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ±10% if liquid compensation formula is applied to measured SAR values. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

^G Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for the frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.



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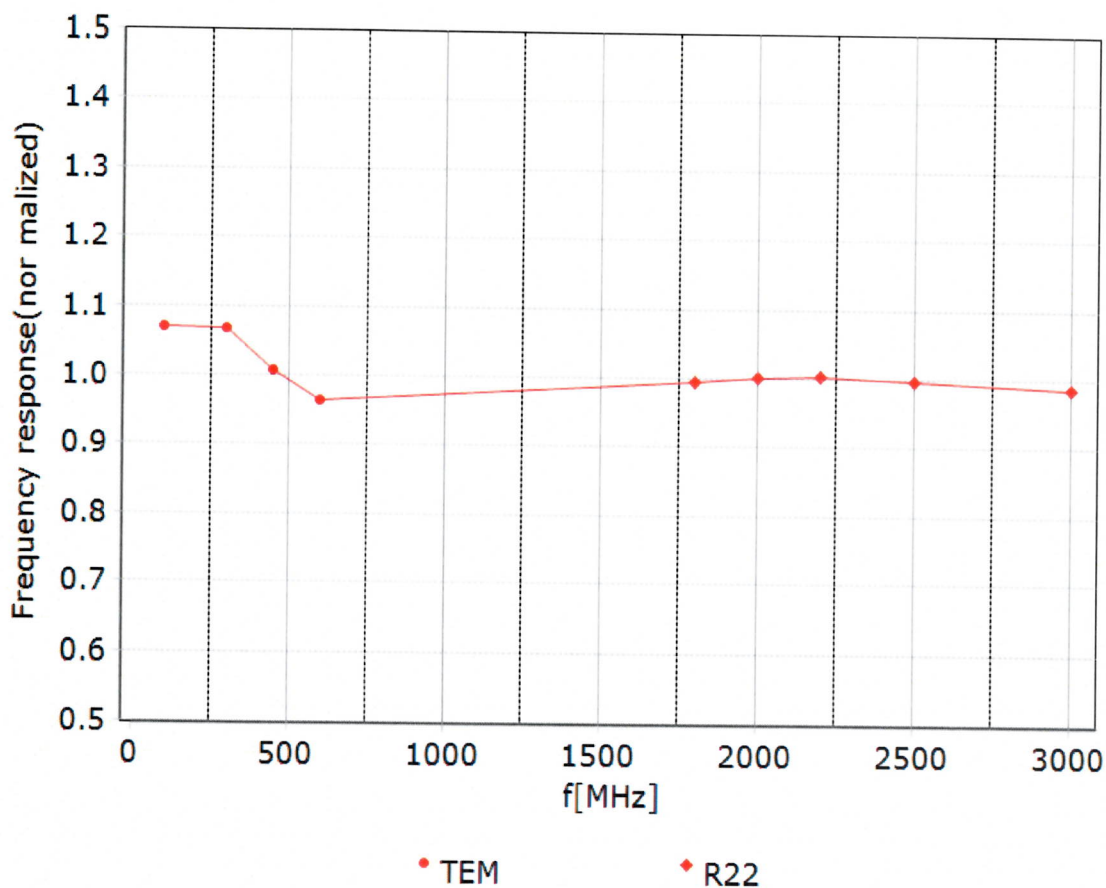
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Frequency Response of E-Field (TEM-Cell: ifi110 EXX, Waveguide: R22)

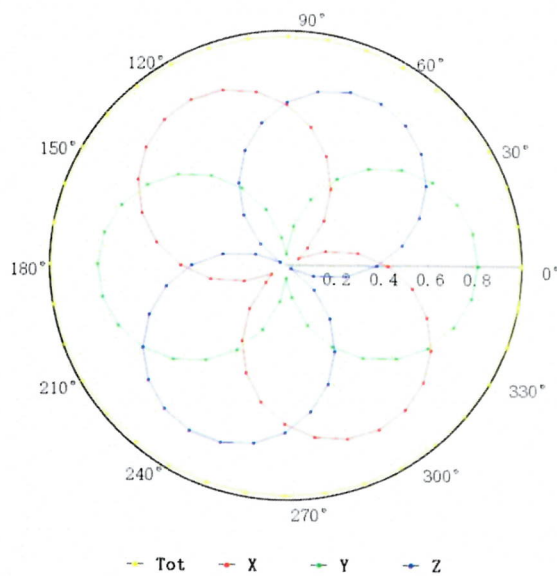


Uncertainty of Frequency Response of E-field: $\pm 7.4\%$ ($k=2$)

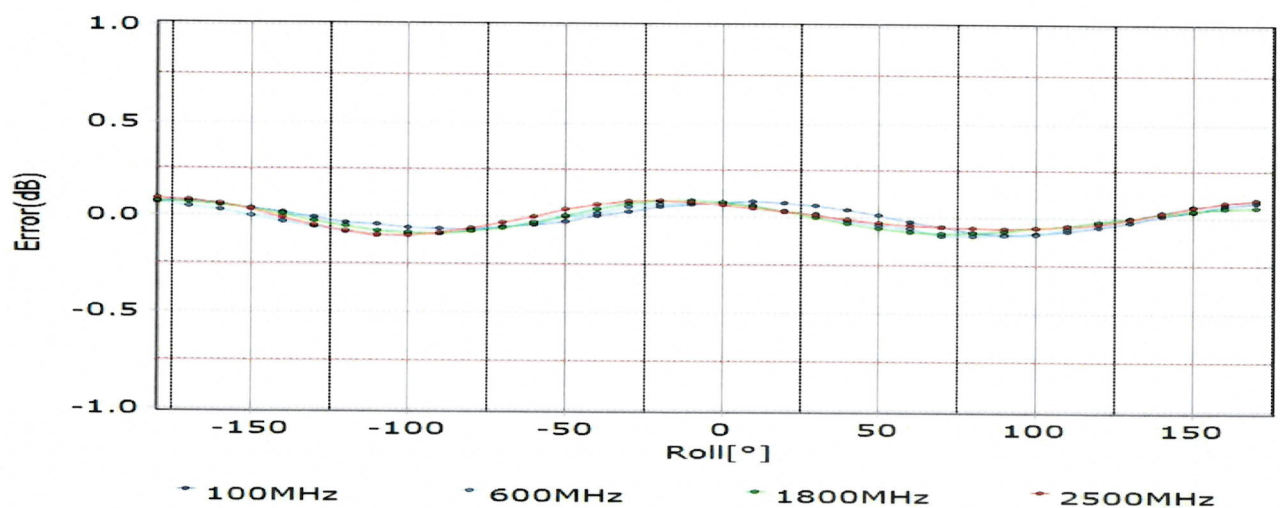
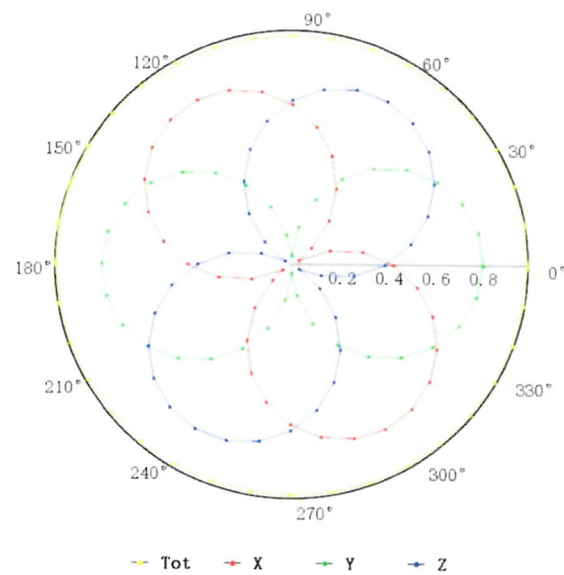
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Receiving Pattern (Φ), $\theta=0^\circ$

f=600 MHz, TEM



f=1800 MHz, R22



Uncertainty of Axial Isotropy Assessment: $\pm 1.2\%$ ($k=2$)

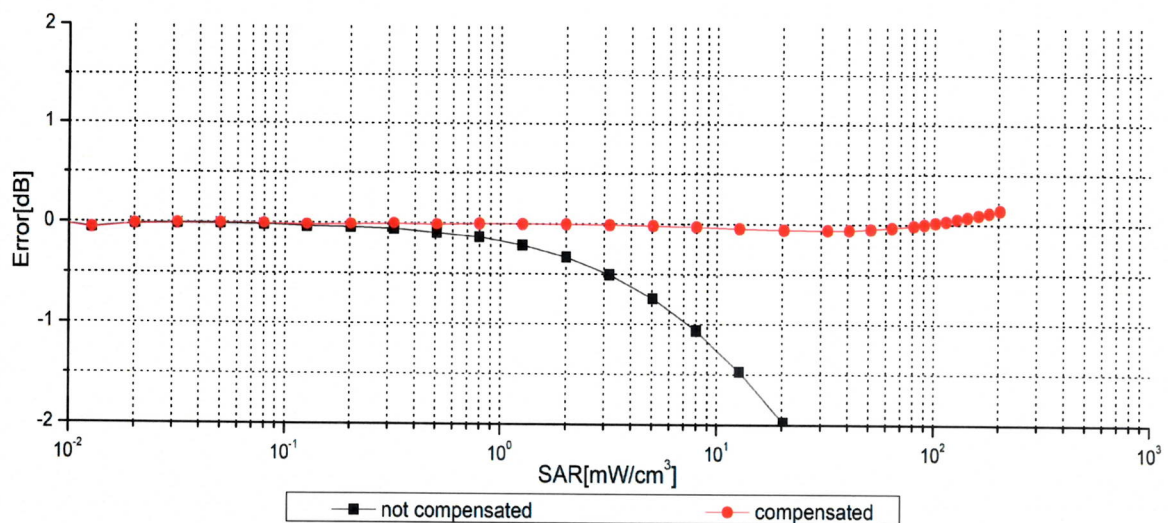
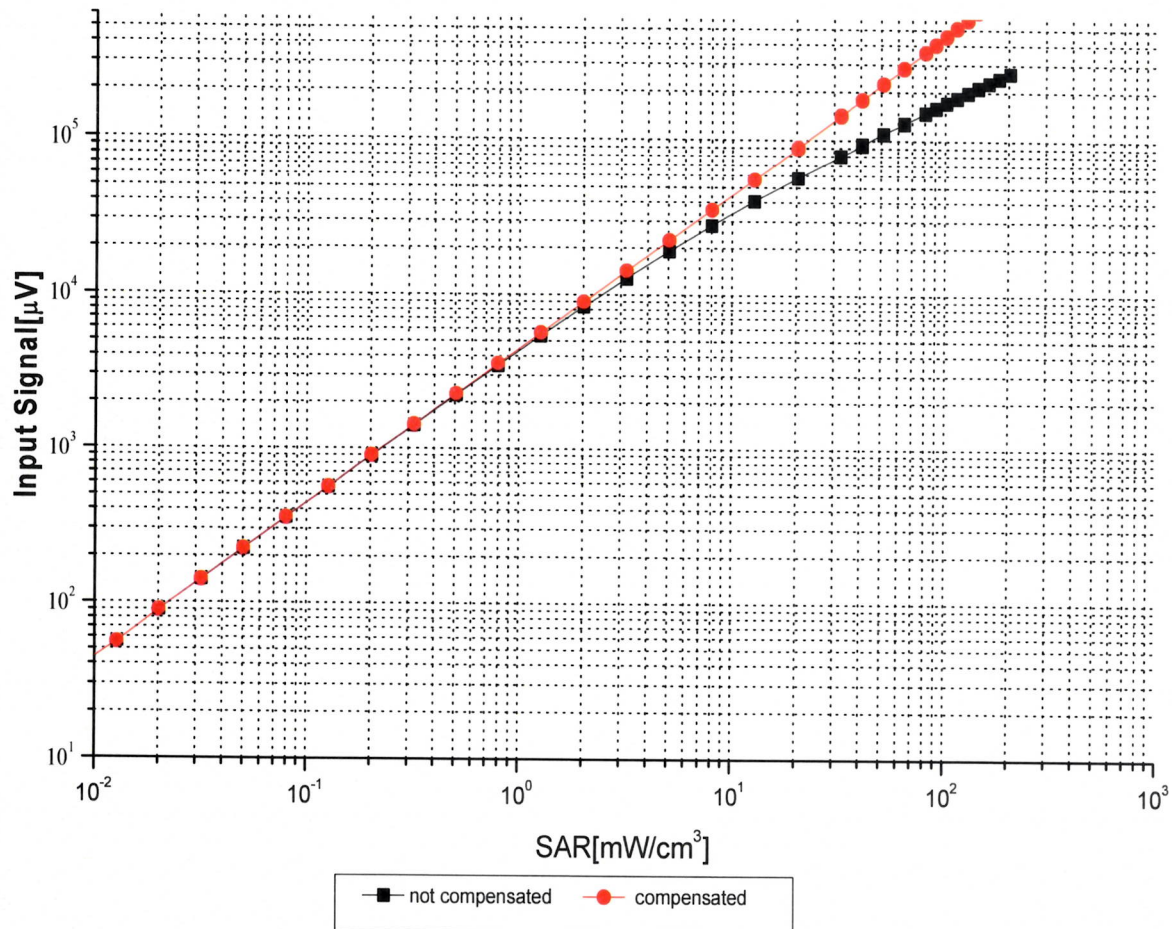
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Dynamic Range f(SAR_{head}) (TEM cell, f = 900 MHz)



Uncertainty of Linearity Assessment: ±0.9% (k=2)

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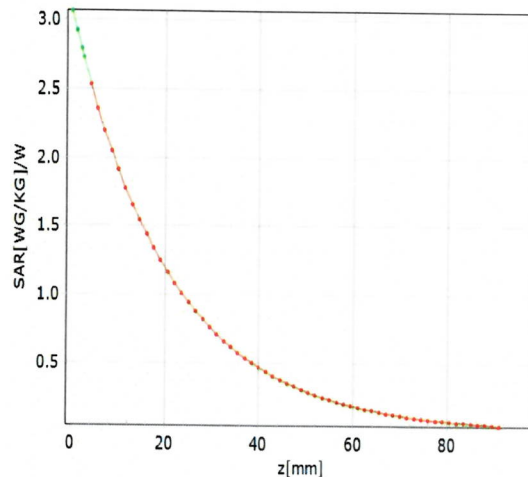
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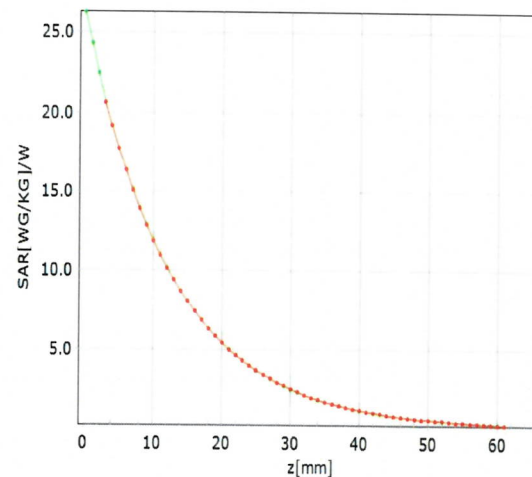
Conversion Factor Assessment

f=750 MHz,WGLS R9(H_convF)

f=1750 MHz,WGLS R22(H_convF)

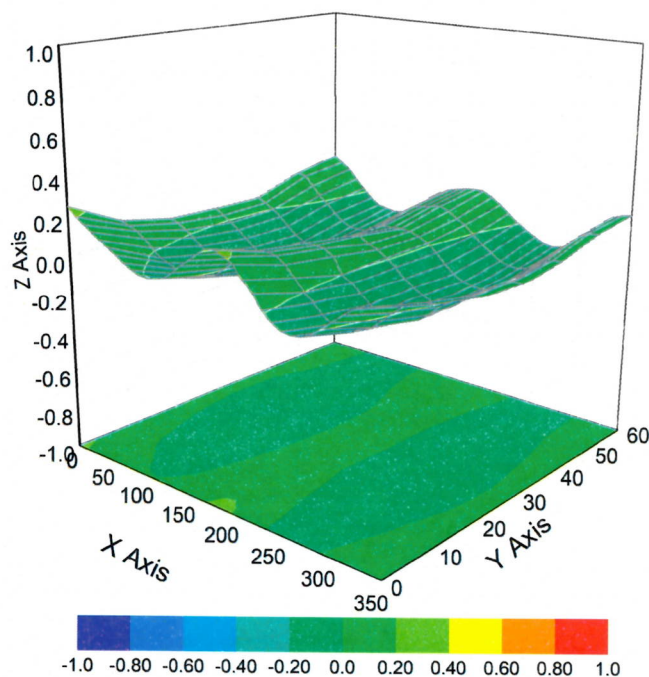


analytical measured



analytical measured

Deviation from Isotropy in Liquid



Uncertainty of Spherical Isotropy Assessment: $\pm 3.2\%$ ($k=2$)



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Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	43.6
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disable
Probe Overall Length	337mm
Probe Body Diameter	10mm
Tip Length	9mm
Tip Diameter	2.5mm
Probe Tip to Sensor X Calibration Point	1mm
Probe Tip to Sensor Y Calibration Point	1mm
Probe Tip to Sensor Z Calibration Point	1mm
Recommended Measurement Distance from Surface	1.4mm

Dipole D835V2- SN 4d105				
Head Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	$\Delta\Omega()$
2022/11/2	-27.5	/	50.3	/
2023/11/1	-27.3	0.73%	50.5	0.2 Ω

Dipole D1750V2 SN 1149				
Head Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	$\Delta\Omega()$
2022/6/17	-31.9	/	47.6	/
2023/6/14	-32.2	0.94%	48.9	1.3 Ω

Dipole D1950V3 SN 1138				
Head Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	$\Delta\Omega()$
2022/10/31	-31.2	/	49.5	/
2023/10/30	-31.5	0.96%	49.8	0.3 Ω

Dipole D2300V2 SN 1072				
Head Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	$\Delta\Omega()$
2022/6/16	-26	/	47.9	/
2023/6/13	-25.8	0.78%	48.8	0.9 Ω

Dipole D2450V2 SN 733				
Head Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	$\Delta\Omega()$
2022/11/2	-28.7	/	50.2	/
2023/11/1	-28.4	1.06%	50.4	0.2 Ω

Dipole D2600V2 SN 1125				
Head Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	$\Delta\Omega()$
2022/6/14	-25.1	/	46.9	/
2023/6/13	-24.7	1.62%	47.5	0.6 Ω

Dipole 5GHzV2 SN 1165					
Head Liquid					
Frequency(MHz)	Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	$\Delta\Omega$

5250	2022/11/1	-26.3	/	49	/
	2023/10/31	-26.2	0.38%	49.4	0.4Ω
5600	2022/11/1	-28.9	/	53.5	/
	2023/10/31	-29.1	0.69%	53.5	0.0Ω
5750	2022/11/1	-26.5	/	54.6	/
	2023/10/31	-26.7	0.75%	54.8	0.3Ω