

EX3DV4 – SN:3825

July 16, 2020

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3825

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	0.43	0.38	0.42	$\pm 10.1\%$
DCP (mV) ^B	102.3	104.2	102.3	

Calibration Results for Modulation Response

UID	Communication System Name		A dB	B dB $\cdot\mu\text{V}$	C	D dB	VR mV	Max dev.	Max Unc ^E (k=2)
0	CW	X	0.00	0.00	1.00	0.00	172.1	$\pm 3.3\%$	$\pm 4.7\%$
		Y	0.00	0.00	1.00		163.9		
		Z	0.00	0.00	1.00		176.4		
10352-AAA	Pulse Waveform (200Hz, 10%)	X	20.00	96.07	23.53	10.00	60.0	$\pm 3.5\%$	$\pm 9.6\%$
		Y	68.00	102.00	23.00		60.0		
		Z	20.00	96.00	23.83		60.0		
10353-AAA	Pulse Waveform (200Hz, 20%)	X	20.00	99.21	24.12	6.99	80.0	$\pm 1.8\%$	$\pm 9.6\%$
		Y	11.85	84.40	17.32		80.0		
		Z	20.00	99.31	24.60		80.0		
10354-AAA	Pulse Waveform (200Hz, 40%)	X	20.00	107.74	26.98	3.98	95.0	$\pm 1.4\%$	$\pm 9.6\%$
		Y	20.00	91.69	18.28		95.0		
		Z	20.00	101.25	24.21		95.0		
10355-AAA	Pulse Waveform (200Hz, 60%)	X	20.00	119.32	31.01	2.22	120.0	$\pm 1.4\%$	$\pm 9.6\%$
		Y	20.00	96.42	19.35		120.0		
		Z	20.00	108.88	26.55		120.0		
10387-AAA	QPSK Waveform, 1 MHz	X	1.83	66.82	15.70	1.00	150.0	$\pm 1.8\%$	$\pm 9.6\%$
		Y	1.56	65.30	14.38		150.0		
		Z	1.86	66.38	15.56		150.0		
10388-AAA	QPSK Waveform, 10 MHz	X	2.44	69.13	16.40	0.00	150.0	$\pm 1.0\%$	$\pm 9.6\%$
		Y	2.04	66.66	15.03		150.0		
		Z	2.48	69.03	16.28		150.0		
10396-AAA	64-QAM Waveform, 100 kHz	X	3.01	70.97	19.10	3.01	150.0	$\pm 0.7\%$	$\pm 9.6\%$
		Y	2.75	70.29	18.57		150.0		
		Z	3.11	70.60	18.79		150.0		
10399-AAA	64-QAM Waveform, 40 MHz	X	3.52	67.07	15.83	0.00	150.0	$\pm 0.7\%$	$\pm 9.6\%$
		Y	3.40	66.65	15.43		150.0		
		Z	3.54	67.01	15.77		150.0		
10414-AAA	WLAN CCDF, 64-QAM, 40MHz	X	4.87	65.46	15.46	0.00	150.0	$\pm 1.4\%$	$\pm 9.6\%$
		Y	4.76	65.50	15.34		150.0		
		Z	4.93	65.44	15.44		150.0		

Note: For details on UID parameters see Appendix

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 Pages 5 and 6).

^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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Sensor Model Parameters

	C1 fF	C2 fF	α V^{-1}	T1 $ms.V^{-2}$	T2 $ms.V^{-1}$	T3 ms	T4 V^{-2}	T5 V^{-1}	T6
X	50.5	370.09	34.50	15.46	0.03	5.10	1.15	0.22	1.01
Y	40.2	290.46	33.54	9.01	0.59	4.98	2.00	0.00	1.01
Z	56.5	416.20	34.79	20.76	0.19	5.10	0.83	0.36	1.01

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	154.7
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

Note: Measurement distance from surface can be increased to 3-4 mm for an *Area Scan* job.

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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)	Unc (k=2)
750	41.9	0.89	9.71	9.71	9.71	0.48	0.80	± 12.0 %
835	41.5	0.90	9.60	9.60	9.60	0.43	0.80	± 12.0 %
900	41.5	0.97	9.34	9.34	9.34	0.44	0.85	± 12.0 %
1750	40.1	1.37	8.53	8.53	8.53	0.34	0.86	± 12.0 %
1900	40.0	1.40	8.28	8.28	8.28	0.29	0.91	± 12.0 %
1950	40.0	1.40	8.10	8.10	8.10	0.35	0.86	± 12.0 %
2450	39.2	1.80	7.44	7.44	7.44	0.36	0.93	± 12.0 %
3500	37.9	2.91	6.57	6.57	6.57	0.30	1.30	± 13.1 %
3700	37.7	3.12	6.50	6.50	6.50	0.35	1.30	± 13.1 %
5250	35.9	4.71	5.04	5.04	5.04	0.40	1.80	± 13.1 %
5600	35.5	5.07	4.65	4.65	4.65	0.40	1.80	± 13.1 %
5800	35.3	5.27	4.61	4.61	4.61	0.40	1.80	± 13.1 %

^C Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the 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. Validity of ConvF assessed at 6 MHz is 4-9 MHz, and ConvF assessed at 13 MHz is 9-19 MHz. Above 5 GHz frequency validity can be extended to ± 110 MHz.

^F At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. 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 frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

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Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha ^G	Depth ^G (mm)	Unc (k=2)
750	55.5	0.96	9.94	9.94	9.94	0.29	1.03	± 12.0 %
835	55.2	0.97	9.78	9.78	9.78	0.36	0.80	± 12.0 %
1750	53.4	1.49	7.98	7.98	7.98	0.34	0.86	± 12.0 %
1900	53.3	1.52	7.74	7.74	7.74	0.29	0.93	± 12.0 %
2450	52.7	1.95	7.47	7.47	7.47	0.33	0.95	± 12.0 %
3500	51.3	3.31	6.31	6.31	6.31	0.35	1.35	± 13.1 %
3700	51.0	3.55	6.24	6.24	6.24	0.40	1.35	± 13.1 %
5250	48.9	5.36	4.37	4.37	4.37	0.50	1.90	± 13.1 %
5600	48.5	5.77	3.81	3.81	3.81	0.50	1.90	± 13.1 %
5800	48.2	6.00	3.96	3.96	3.96	0.50	1.90	± 13.1 %

^C Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the 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. Validity of ConvF assessed at 6 MHz is 4-9 MHz, and ConvF assessed at 13 MHz is 9-19 MHz. Above 5 GHz frequency validity can be extended to ± 110 MHz.

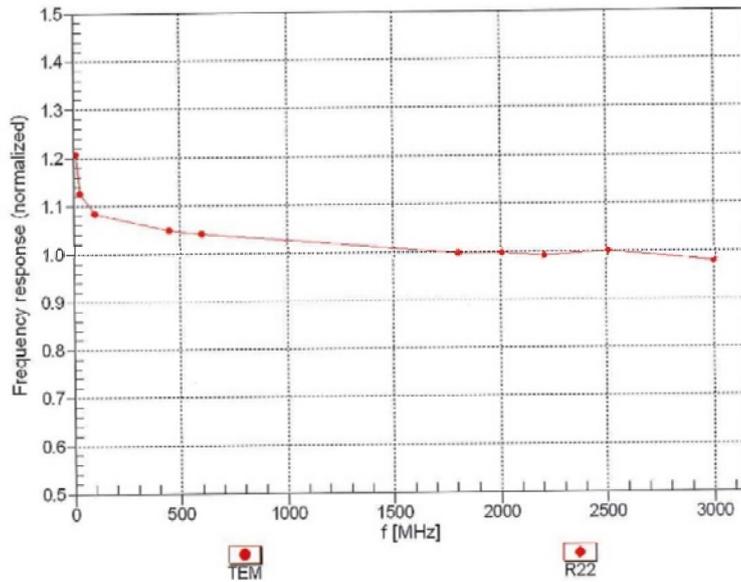
^F At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty 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 frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

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Frequency Response of E-Field (TEM-Cell:if1110 EXX, Waveguide: R22)



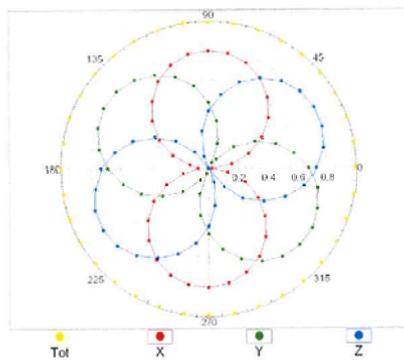
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ (k=2)

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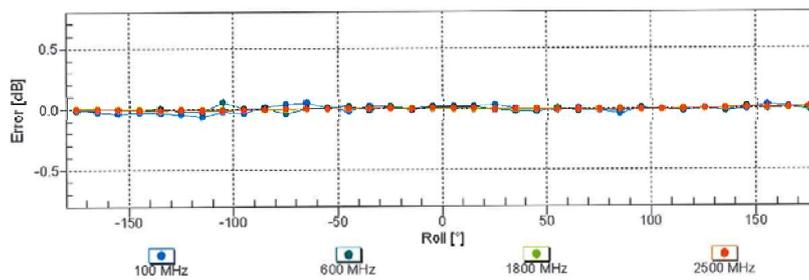
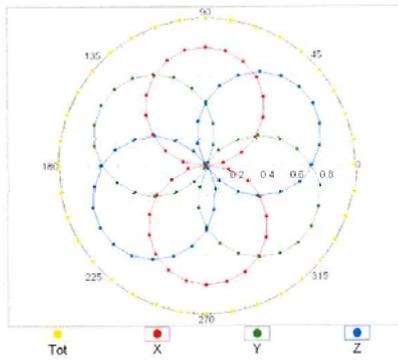
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Receiving Pattern (ϕ), $\theta = 0^\circ$

f=600 MHz,TEM



f=1800 MHz,R22



Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)