

EX3DV4- SN:3617

January 23, 2017

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3617

### Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) <sup>C</sup>	Relative Permittivity <sup>F</sup>	Conductivity (S/m) <sup>F</sup>	ConvF X	ConvF Y	ConvF Z	Alpha <sup>G</sup>	Depth (mm)	Unc (k=2)
150	61.9	0.80	11.52	11.52	11.52	0.00	1.00	± 13.3 %
300	58.2	0.92	10.45	10.45	10.45	0.05	1.20	± 13.3 %
450	56.7	0.94	10.28	10.28	10.28	0.09	1.20	± 13.3 %
750	55.5	0.96	9.80	9.80	9.80	0.44	0.88	± 12.0 %
835	55.2	0.97	9.64	9.64	9.64	0.34	1.04	± 12.0 %
900	55.0	1.05	9.89	9.89	9.89	0.40	0.91	± 12.0 %
1450	54.0	1.30	8.43	8.43	8.43	0.32	0.80	± 12.0 %
1640	53.8	1.40	8.57	8.57	8.57	0.40	0.80	± 12.0 %
1750	53.4	1.49	8.21	8.21	8.21	0.28	1.08	± 12.0 %
1810	53.3	1.52	8.14	8.14	8.14	0.38	0.90	± 12.0 %
1900	53.3	1.52	7.95	7.95	7.95	0.29	1.06	± 12.0 %
2000	53.3	1.52	8.13	8.13	8.13	0.44	0.85	± 12.0 %
2100	53.2	1.62	8.49	8.49	8.49	0.27	1.01	± 12.0 %
2300	52.9	1.81	7.87	7.87	7.87	0.42	0.80	± 12.0 %
2450	52.7	1.95	7.80	7.80	7.80	0.34	0.80	± 12.0 %
2600	52.5	2.16	7.48	7.48	7.48	0.37	0.80	± 12.0 %
3500	51.3	3.31	6.70	6.70	6.70	0.25	1.20	± 13.1 %
3700	51.0	3.55	6.68	6.68	6.68	0.30	1.20	± 13.1 %
5200	49.0	5.30	5.25	5.25	5.25	0.35	1.90	± 13.1 %
5300	48.9	5.42	4.90	4.90	4.90	0.40	1.90	± 13.1 %
5500	48.6	5.65	4.52	4.52	4.52	0.45	1.90	± 13.1 %
5600	48.5	5.77	4.38	4.38	4.38	0.50	1.90	± 13.1 %
5800	48.2	6.00	4.44	4.44	4.44	0.50	1.90	± 13.1 %

<sup>C</sup> 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. Above 5 GHz frequency validity can be extended to ± 110 MHz.

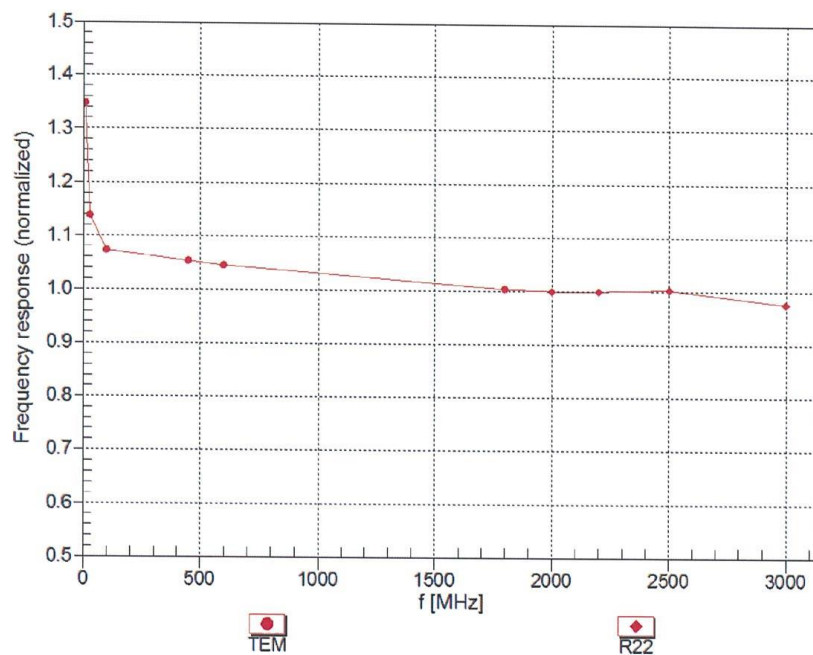
<sup>F</sup> At frequencies below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

<sup>G</sup> 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:ifi110 EXX, Waveguide: R22)

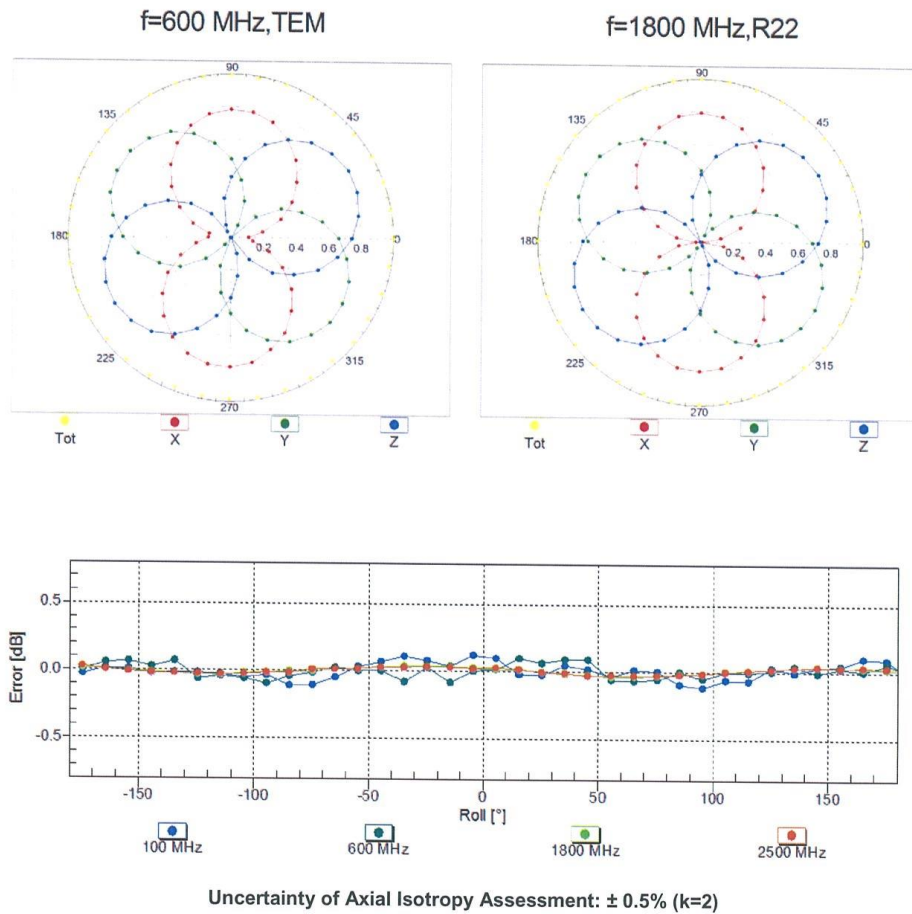


Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  ( $k=2$ )

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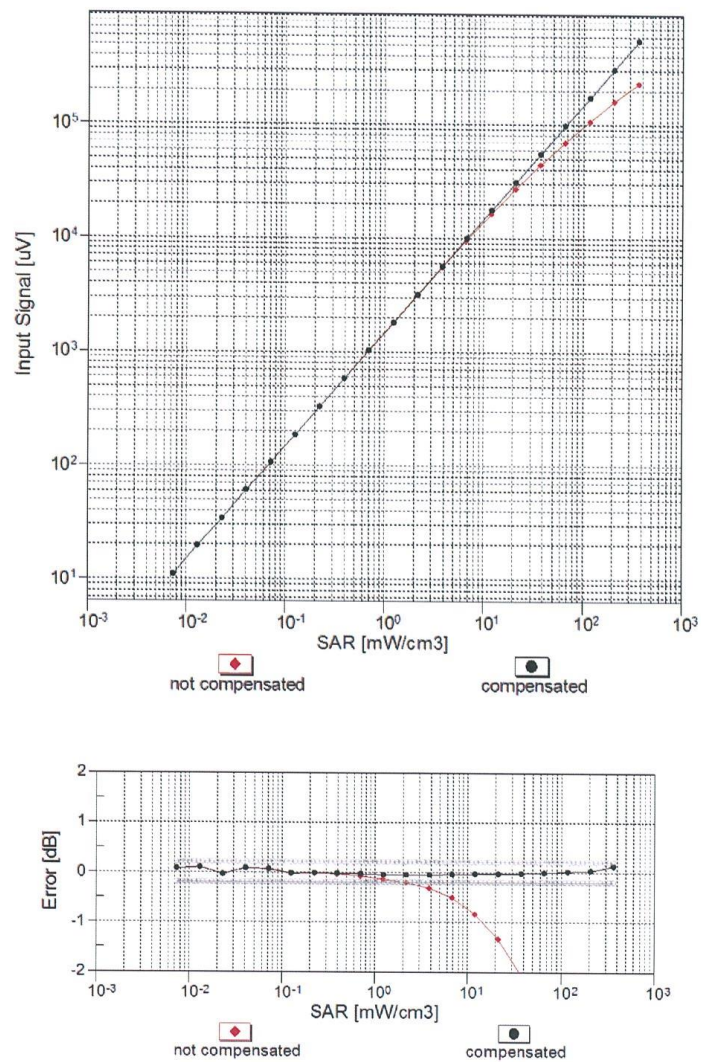
## Receiving Pattern ( $\phi$ ), $\theta = 0^\circ$



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### Dynamic Range f(SAR<sub>head</sub>) (TEM cell , f<sub>eval</sub>= 1900 MHz)

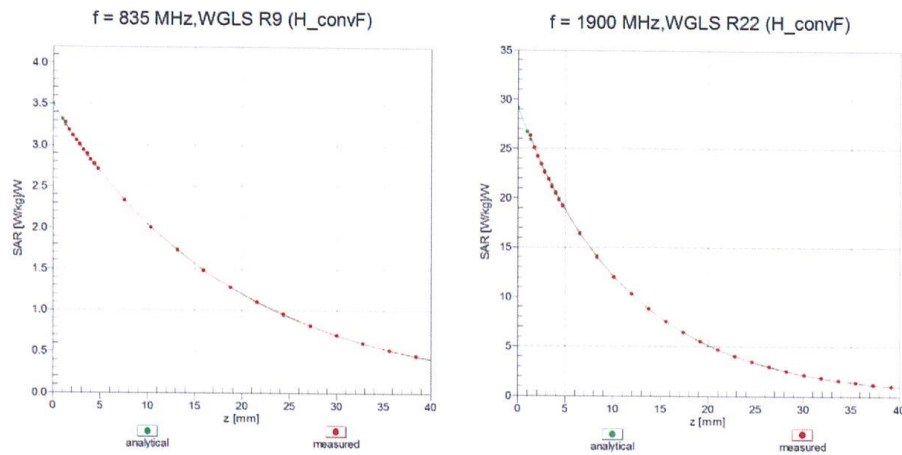


Uncertainty of Linearity Assessment:  $\pm 0.6\%$  (k=2)

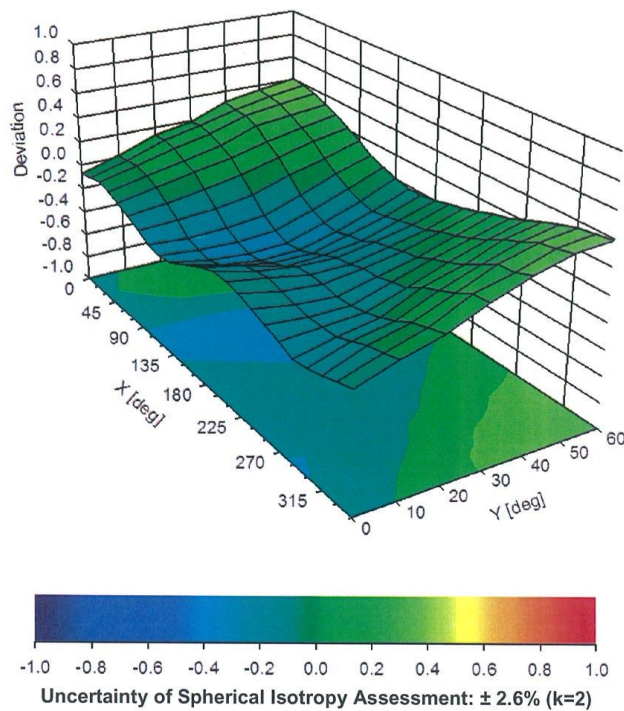
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## Conversion Factor Assessment



## Deviation from Isotropy in Liquid Error ( $\phi$ , $\theta$ ), f = 900 MHz







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### Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	15.6
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

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**Appendix: Modulation Calibration Parameters**

UID	Communication System Name		A dB	B dB $\sqrt{\mu V}$	C	D dB	VR mV	Max Unc <sup>E</sup> (k=2)
0	CW	X	0.00	0.00	1.00	0.00	131.8	$\pm 2.2\%$
		Y	0.00	0.00	1.00		122.9	
		Z	0.00	0.00	1.00		125.8	
10010- CAA	SAR Validation (Square, 100ms, 10ms)	X	2.84	66.36	10.97	10.00	20.0	$\pm 9.6\%$
		Y	3.32	68.94	12.67		20.0	
		Z	3.12	68.06	11.96		20.0	
10011- CAB	UMTS-FDD (WCDMA)	X	1.27	71.47	17.78	0.00	150.0	$\pm 9.6\%$
		Y	1.04	67.17	15.35		150.0	
		Z	1.16	69.28	16.60		150.0	
10012- CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps)	X	1.20	64.69	16.00	0.41	150.0	$\pm 9.6\%$
		Y	1.19	63.59	15.16		150.0	
		Z	1.21	64.29	15.71		150.0	
10013- CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps)	X	4.87	66.60	16.99	1.46	150.0	$\pm 9.6\%$
		Y	4.88	66.52	17.00		150.0	
		Z	4.92	66.57	17.06		150.0	
10021- DAC	GSM-FDD (TDMA, GMSK)	X	9.47	81.51	18.24	9.39	50.0	$\pm 9.6\%$
		Y	61.75	108.56	26.86		50.0	
		Z	53.58	105.05	25.44		50.0	
10023- DAC	GPRS-FDD (TDMA, GMSK, TN 0)	X	8.22	79.53	17.58	9.57	50.0	$\pm 9.6\%$
		Y	29.44	98.44	24.25		50.0	
		Z	30.04	97.47	23.50		50.0	
10024- DAC	GPRS-FDD (TDMA, GMSK, TN 0-1)	X	24.44	93.21	20.33	6.56	60.0	$\pm 9.6\%$
		Y	100.00	113.00	26.27		60.0	
		Z	100.00	111.00	25.30		60.0	
10025- DAC	EDGE-FDD (TDMA, 8PSK, TN 0)	X	6.38	79.53	29.41	12.57	50.0	$\pm 9.6\%$
		Y	2.99	58.04	17.81		50.0	
		Z	5.81	77.46	28.93		50.0	
10026- DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1)	X	9.44	90.11	30.93	9.56	60.0	$\pm 9.6\%$
		Y	7.21	83.29	28.38		60.0	
		Z	10.25	92.54	32.24		60.0	
10027- DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2)	X	100.00	107.74	22.89	4.80	80.0	$\pm 9.6\%$
		Y	100.00	112.97	25.41		80.0	
		Z	100.00	110.89	24.46		80.0	
10028- DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)	X	100.00	108.64	22.60	3.55	100.0	$\pm 9.6\%$
		Y	100.00	114.24	25.24		100.0	
		Z	100.00	112.11	24.30		100.0	
10029- DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2)	X	5.94	80.56	26.27	7.80	80.0	$\pm 9.6\%$
		Y	5.20	77.08	24.92		80.0	
		Z	6.43	82.37	27.30		80.0	
10030- CAA	IEEE 802.15.1 Bluetooth (GFSK, DH1)	X	23.00	92.08	19.29	5.30	70.0	$\pm 9.6\%$
		Y	100.00	111.27	24.96		70.0	
		Z	100.00	109.50	24.14		70.0	
10031- CAA	IEEE 802.15.1 Bluetooth (GFSK, DH3)	X	100.00	108.95	21.45	1.88	100.0	$\pm 9.6\%$
		Y	100.00	114.27	23.90		100.0	
		Z	100.00	112.91	23.33		100.0	

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10032-CAA	IEEE 802.15.1 Bluetooth (GFSK, DH5)	X	100.00	119.64	24.84	1.17	100.0	± 9.6 %
		Y	100.00	121.81	26.05		100.0	
		Z	100.00	122.15	26.15		100.0	
10033-CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH1)	X	5.83	81.72	20.58	5.30	70.0	± 9.6 %
		Y	5.42	80.76	20.51		70.0	
		Z	8.46	88.03	23.22		70.0	
10034-CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH3)	X	2.81	76.14	17.86	1.88	100.0	± 9.6 %
		Y	2.40	73.33	16.57		100.0	
		Z	3.18	77.72	18.71		100.0	
10035-CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH5)	X	2.22	74.44	17.19	1.17	100.0	± 9.6 %
		Y	1.83	71.02	15.47		100.0	
		Z	2.29	74.51	17.38		100.0	
10036-CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH1)	X	6.95	84.53	21.62	5.30	70.0	± 9.6 %
		Y	6.40	83.49	21.55		70.0	
		Z	10.82	92.04	24.57		70.0	
10037-CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH3)	X	2.63	75.37	17.53	1.88	100.0	± 9.6 %
		Y	2.27	72.64	16.27		100.0	
		Z	2.99	76.97	18.39		100.0	
10038-CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH5)	X	2.25	74.92	17.50	1.17	100.0	± 9.6 %
		Y	1.84	71.32	15.71		100.0	
		Z	2.32	74.97	17.67		100.0	
10039-CAB	CDMA2000 (1xRTT, RC1)	X	3.82	83.08	20.54	0.00	150.0	± 9.6 %
		Y	1.97	73.07	16.21		150.0	
		Z	2.56	76.79	18.23		150.0	
10042-CAB	IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Halfrate)	X	7.71	79.39	16.34	7.78	50.0	± 9.6 %
		Y	79.83	108.62	25.19		50.0	
		Z	93.04	108.57	24.66		50.0	
10044-CAA	IS-91/EIA/TIA-553 FDD (FDMA, FM)	X	0.00	104.62	0.01	0.00	150.0	± 9.6 %
		Y	0.00	95.69	0.58		150.0	
		Z	0.00	99.41	0.01		150.0	
10048-CAA	DECT (TDD, TDMA/FDM, GFSK, Full Slot, 24)	X	6.52	72.68	16.49	13.80	25.0	± 9.6 %
		Y	10.52	81.22	20.38		25.0	
		Z	9.87	80.03	19.57		25.0	
10049-CAA	DECT (TDD, TDMA/FDM, GFSK, Double Slot, 12)	X	6.61	75.53	16.40	10.79	40.0	± 9.6 %
		Y	11.92	85.24	20.59		40.0	
		Z	11.51	84.16	19.83		40.0	
10056-CAA	UMTS-TDD (TD-SCDMA, 1.28 Mcps)	X	8.88	82.16	20.80	9.03	50.0	± 9.6 %
		Y	9.13	83.53	21.77		50.0	
		Z	12.32	88.48	23.50		50.0	
10058-DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2-3)	X	4.55	75.82	23.67	6.55	100.0	± 9.6 %
		Y	4.22	73.68	22.84		100.0	
		Z	4.90	77.24	24.51		100.0	
10059-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps)	X	1.24	65.71	16.46	0.61	110.0	± 9.6 %
		Y	1.22	64.49	15.60		110.0	
		Z	1.25	65.42	16.27		110.0	
10060-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps)	X	22.30	115.19	30.40	1.30	110.0	± 9.6 %
		Y	3.40	86.34	22.38		110.0	
		Z	22.05	114.54	30.34		110.0	

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