

Appendix B: Tissue Stimulating Liquids, System Checks and System Validation

B.1. SAR System Check

Prior to SAR assessment, the system is verified to $\pm 10\%$ of the SAR measurement on the reference dipole at the time of calibration by the calibration facility. SAR System Validation was performed and complies with requirements per IEC/IEEE 62209-1528.

Table 1 System Check Results (SAR)

System	Frequency (MHz)	Tissue Type	Date	Amb. Temp. (°C)	Tissue Temp (°C)	Input Power (dBm)	Verification Source SN	Probe SN	DAE SN	Measured 1g SAR (W/Kg)	1W Target 1g SAR (W/Kg)	1W Normalized 1g SAR (W/Kg)	1g SAR Deviation	Measured 10g SAR (W/Kg)	1W Target 10g SAR (W/Kg)	1W Normalized 10g SAR (W/Kg)	10g SAR Deviation
Gamma	13	Head	6/17/2026	23.4	23.8	24.5	1041	7872	1843	0.140	0.457	0.497	8.70%	0.085	0.296	0.302	1.89%
Zeta	750	Head	4/29/2026	23.7	22.1	17	1235	7969	1933	0.408	8.690	8.141	-6.32%	0.273	5.690	5.447	-4.27%
Zeta	1640	Head	6/10/2026	20.6	20.6	17	356	7969	1933	1.620	34.200	32.323	-5.49%	0.889	18.600	17.738	-4.64%
Delta	1750	Head	4/29/2026	23.5	23.0	17	1205	7853	1844	1.780	36.500	35.516	-2.70%	0.950	19.200	18.955	-1.28%
Delta	1900	Head	4/29/2026	23.5	23.0	17	5d252	7853	1844	2.050	39.800	40.903	2.77%	1.070	21.000	21.349	1.66%
Zeta	1900	Head	6/27/2026	22.7	22.3	17	5d252	7969	1933	1.920	39.800	38.309	-3.75%	1.010	21.000	20.152	-4.04%
Zeta	2100	Head	6/27/2026	22.7	22.3	17	1068	7969	1933	2.090	44.200	41.701	-5.65%	1.060	22.300	21.150	-5.16%
Delta	2450	Head	4/28/2026	23.0	22.4	17	1112	7853	1844	2.500	50.600	49.882	-1.42%	1.170	23.700	23.345	-1.50%

B.2. Dielectric Parameters of the TSL

Table 2 SAR Tissue Dielectric Parameters

Date	Tissue Type	Liquid Temp (°C)	Frequency (MHz)	Conductivity Measured (σ)	Conductivity Target (σ)	Deviation	Permittivity measured (ϵ_r)	Permittivity Target (ϵ_r)	Deviation
4/28/2026	Head	22.9	2300	1.71	1.67	2.58%	40.7	39.5	3.24%
4/28/2026	Head	22.9	2350	1.74	1.71	1.91%	40.7	39.4	3.34%
4/28/2026	Head	22.9	2400	1.78	1.76	1.58%	40.6	39.3	3.41%
4/28/2026	Head	22.9	2450	1.82	1.80	1.18%	40.6	39.2	3.49%
4/28/2026	Head	22.9	2500	1.86	1.85	0.46%	40.5	39.1	3.45%
4/28/2026	Head	22.9	2550	1.90	1.91	-0.34%	40.4	39.1	3.39%
4/28/2026	Head	22.9	2600	1.95	1.96	-0.90%	40.3	39.0	3.39%
4/28/2026	Head	22.9	2650	1.99	2.02	-1.59%	40.2	38.9	3.29%
4/28/2026	Head	22.9	2700	2.03	2.07	-2.14%	40.1	38.9	3.24%
4/29/2026	Head	23.1	1600	1.27	1.28	-1.30%	41.4	40.3	2.72%
4/29/2026	Head	23.1	1650	1.29	1.31	-1.59%	41.3	40.2	2.65%
4/29/2026	Head	23.1	1700	1.32	1.34	-1.86%	41.2	40.2	2.63%
4/29/2026	Head	23.1	1750	1.34	1.37	-2.02%	41.2	40.1	2.71%
4/29/2026	Head	23.1	1800	1.37	1.40	-2.11%	41.1	40.0	2.80%
4/29/2026	Head	23.1	1850	1.40	1.40	0.16%	41.0	40.0	2.59%
4/29/2026	Head	23.1	1900	1.43	1.40	2.15%	41.0	40.0	2.42%
4/29/2026	Head	23.1	1950	1.46	1.40	4.60%	40.9	40.0	2.27%
4/29/2026	Head	23.1	2000	1.50	1.40	6.80%	40.8	40.0	2.06%
4/29/2026	Head	23.1	2050	1.53	1.44	6.04%	40.8	39.9	2.12%
4/29/2026	Head	23.1	2100	1.56	1.49	4.77%	40.7	39.8	2.09%
4/29/2026	Head	22.2	650	0.86	0.89	-2.81%	42.1	42.5	-0.97%
4/29/2026	Head	22.2	700	0.88	0.89	-1.47%	41.9	42.2	-0.75%
4/29/2026	Head	22.2	750	0.89	0.89	-0.23%	41.7	41.9	-0.56%
4/29/2026	Head	22.2	800	0.91	0.90	1.01%	41.6	41.7	-0.23%
4/29/2026	Head	22.2	850	0.92	0.92	0.82%	41.5	41.5	0.00%
4/29/2026	Head	22.2	900	0.94	0.97	-2.68%	41.3	41.5	-0.49%
4/29/2026	Head	22.2	950	0.96	0.99	-3.59%	41.2	41.4	-0.53%
6/10/2026	Head	20.9	1600	1.24	1.28	-3.58%	41.2	40.3	2.31%
6/10/2026	Head	20.9	1650	1.26	1.31	-3.81%	41.1	40.2	2.21%
6/10/2026	Head	20.9	1700	1.29	1.34	-3.91%	41.0	40.2	2.22%
6/10/2026	Head	20.9	1750	1.32	1.37	-4.00%	40.9	40.1	2.17%
6/10/2026	Head	20.9	1800	1.34	1.40	-3.98%	40.9	40.0	2.27%
6/10/2026	Head	20.9	1850	1.37	1.40	-1.82%	40.8	40.0	1.95%
6/10/2026	Head	20.9	1900	1.40	1.40	0.01%	40.7	40.0	1.87%
6/10/2026	Head	20.9	1950	1.44	1.40	2.58%	40.7	40.0	1.67%
6/10/2026	Head	20.9	2000	1.47	1.40	4.78%	40.6	40.0	1.53%
6/10/2026	Head	20.9	2050	1.50	1.44	4.15%	40.5	39.9	1.49%
6/10/2026	Head	20.9	2100	1.53	1.49	2.99%	40.4	39.8	1.49%
6/17/2026	Head	24.2	10	0.77	0.75	2.02%	51.1	55.0	-7.02%
6/17/2026	Head	24.2	15	0.77	0.75	2.01%	51.8	55.0	-5.78%
6/27/2026	Head	22.5	1600	1.23	1.28	-4.29%	41.8	40.3	3.81%
6/27/2026	Head	22.5	1650	1.25	1.31	-4.46%	41.7	40.2	3.74%
6/27/2026	Head	22.5	1700	1.28	1.34	-4.56%	41.7	40.2	3.81%
6/27/2026	Head	22.5	1750	1.31	1.37	-4.49%	41.6	40.1	3.81%
6/27/2026	Head	22.5	1800	1.34	1.40	-4.42%	41.6	40.0	3.90%
6/27/2026	Head	22.5	1850	1.37	1.40	-2.20%	41.5	40.0	3.63%
6/27/2026	Head	22.5	1900	1.40	1.40	-0.18%	41.4	40.0	3.54%
6/27/2026	Head	22.5	1950	1.43	1.40	2.39%	41.3	40.0	3.30%
6/27/2026	Head	22.5	2000	1.46	1.40	4.48%	41.2	40.0	3.09%
6/27/2026	Head	22.5	2050	1.50	1.44	3.63%	41.1	39.9	3.09%
6/27/2026	Head	22.5	2100	1.52	1.49	2.38%	41.1	39.8	3.14%

The above measured tissue parameters were used in the DASY software. The DASY software was used to perform interpolation to determine the dielectric parameters at the SAR test device frequencies (per KDB Publication 865664 D01v01r04 and IEEE 1528-2013 6.6.1.2). The tissue parameters listed in the SAR test plots may slightly differ from the table above due to significant digit rounding in the software.

The SAR values were compensated for deviations between the measured and required tissue dielectric properties, as described in IEEE 1528-2013. The SAR values were applied to only scale up the measured SAR values, and not downward, per KDB Publication 865664 D01v04r04.

B.3. FCC System Validation

Per FCC KDB Publication 865664 D02 Section 2.3 a) states “SAR system validation status and system verification results should be documented in a separate section of the SAR report, or as an attachment, to confirm measurement accuracy.”

The SAR systems used for evaluating this device were validated against its performance specifications prior to the SAR measurements.

Reference dipoles were used with the required tissue-equivalent media for system validation, according to the procedures outlined in FCC KDB Publication 865664 D01 and IEEE 1528-2013. Since SAR probe calibrations are frequency dependent, each probe calibration point was validated at a frequency within the valid frequency range of the probe calibration point.

Per FCC KDB 865664 D02, “the validation status should be documented according to the validation date(s), measurement frequencies, SAR probes, calibrated signal type(s) and tissue dielectric parameters.” A tabulated summary of the system validation status is provided accordingly:

Table 3 System Validation

System	Frequency (MHz)	Date	Probe	DAE	Probe CalF		Cond. (σ)	Perm (ϵ_r)	CW Validation			Mod Validation		
					Freq (MHz)	Tissue Type			Sensitivity	Probe Linearity	Probe Isotropy	Mod Type	Duty Factor	PAR
Gamma	13	11/14/2025	7872	1843	13	Head	0.695	52	PASS	PASS	PASS	N/A	N/A	N/A
Zeta	750	02/16/2026	7969	1933	750	Head	0.829	43.4	PASS	PASS	PASS	N/A	N/A	N/A
Zeta	1640	02/18/2026	7969	1933	1640	Head	1.27	43	PASS	PASS	PASS	TDD	PASS	N/A
Delta	1750	12/02/2025	7853	1844	1750	Head	1.35	39.57	PASS	PASS	PASS	N/A	N/A	N/A
Delta	1900	12/02/2025	7853	1844	1900	Head	1.44	39.5	PASS	PASS	PASS	GMSK	PASS	N/A
Zeta	1900	02/12/2026	7969	1933	1900	Head	1.33	38	PASS	PASS	PASS	GMSK	PASS	N/A
Zeta	2100	02/13/2026	7969	1933	2100	Head	1.46	37.7	PASS	PASS	PASS	TDD	PASS	N/A
Delta	2450	12/11/2025	7853	1844	2450	Head	1.8	39.9	PASS	PASS	PASS	OFDM	N/A	PASS

NOTE: The probes have been calibrated for both CW and modulated signals. Modulations in the table above represent test configurations for which the measurement system has been validated per FCC KDB Publication 865664 D01 for scenarios when CW probe calibrations are used with other signal types.

SAR systems were additionally validated for modulated signals with a periodic duty cycle or with a high PAR (peak to average ratio) >5 dB, such as OFDM according to FCC KDB Publication 865664 D01 v01r04.

B.4. Sample TSL Compositions

TSL recipes are proprietary to SPEAG. Since the composition is approximate to the actual liquids utilized, the manufacturer data sheets are provided below.

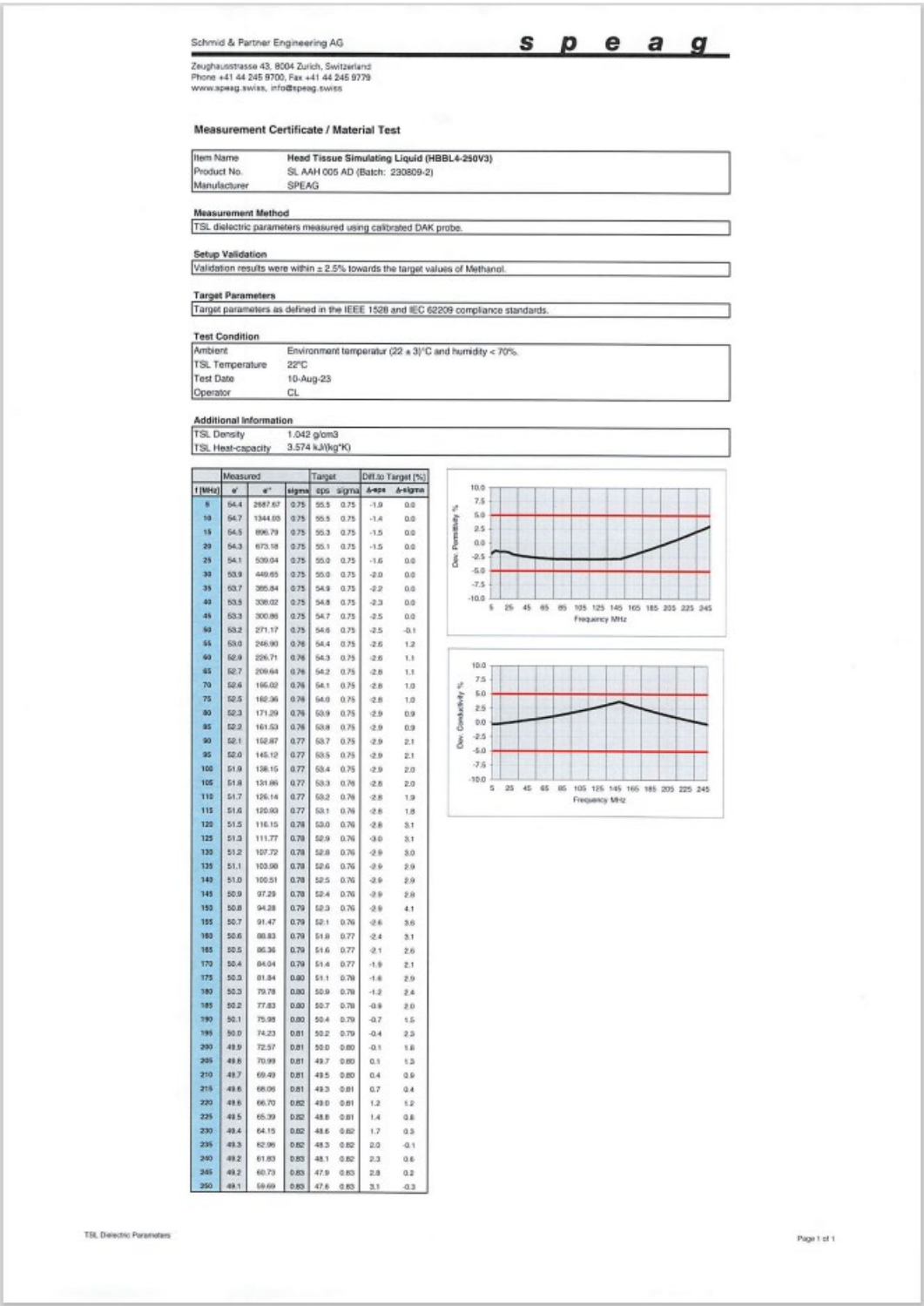


Figure 1 - Head TSL Calibration Certificate Example (4 – 250 MHz)

Measurement Certificate / Material Test

Item Name Head Tissue Simulating Liquid (HBBL600-10000V6)
Product No. SL AAH U16 BC (Batch: 230912-5)
Manufacturer SPEAG

Measurement Method

TSL dielectric parameters measured using calibrated DAK probe.

Target Parameters

Target parameters as defined in the IEEE 1528 and IEC 62209 compliance standards.

Test Condition

Ambient Condition 22°C ; 30% humidity

TSL Temperature 22°C

Test Date 14-Sep-23

Operator CL

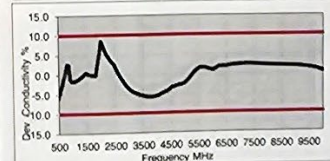
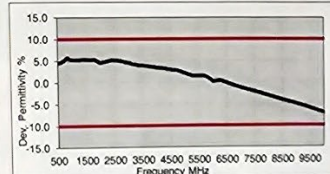
Additional Information

TSL Density

TSL Heat-capacity

Results

f [MHz]	Measured			Target		Diff. to Target [%]	
	e'	e''	sigma	eps	sigma	Δ-eps	Δ-sigma
600	44.7	25.6	0.86	42.7	0.88	4.6	-2.5
750	44.2	21.7	0.90	41.9	0.89	5.4	0.7
800	44.0	20.7	0.92	41.7	0.90	5.6	2.5
825	44.0	20.3	0.93	41.6	0.91	5.8	2.6
835	44.0	20.1	0.94	41.5	0.91	5.9	3.1
850	43.9	19.9	0.94	41.5	0.92	5.8	2.6
900	43.8	19.2	0.96	41.5	0.97	5.5	-1.0
1400	42.8	15.2	1.18	40.6	1.18	5.4	0.0
1450	42.7	15.0	1.21	40.5	1.20	5.4	0.8
1600	42.4	14.4	1.29	40.3	1.28	5.2	0.4
1625	42.4	14.4	1.30	40.3	1.30	5.3	0.1
1640	42.4	14.3	1.31	40.3	1.31	5.3	0.3
1650	42.4	14.3	1.31	40.2	1.31	5.4	-0.2
1700	42.3	14.2	1.34	40.2	1.34	5.3	-0.2
1750	42.2	14.1	1.37	40.1	1.37	5.3	-0.1
1800	42.1	14.0	1.40	40.0	1.40	5.3	0.0
1810	42.1	13.9	1.41	40.0	1.40	5.3	0.7
1825	42.1	13.9	1.42	40.0	1.40	5.3	1.4
1850	42.1	13.9	1.43	40.0	1.40	5.3	2.1
1900	42.0	13.8	1.46	40.0	1.40	5.0	4.3
1950	41.9	13.7	1.49	40.0	1.40	4.7	6.4
2000	41.8	13.7	1.52	40.0	1.40	4.5	8.6
2050	41.8	13.6	1.55	39.9	1.44	4.7	7.3
2100	41.7	13.6	1.59	39.8	1.49	4.7	6.8
2150	41.6	13.6	1.62	39.7	1.53	4.7	5.7
2200	41.6	13.5	1.66	39.6	1.58	4.9	5.2
2250	41.5	13.5	1.69	39.6	1.62	4.9	4.2
2300	41.4	13.5	1.73	39.5	1.67	4.9	3.8
2350	41.4	13.5	1.77	39.4	1.71	5.1	3.4
2400	41.3	13.6	1.81	39.3	1.76	5.1	3.1
2450	41.2	13.6	1.85	39.2	1.80	5.1	2.8
2500	41.2	13.6	1.89	39.1	1.85	5.3	1.9
2550	41.1	13.6	1.93	39.1	1.91	5.2	1.1
2600	41.0	13.6	1.97	39.0	1.96	5.1	0.3



3500	39.4	14.1	2.75	37.9	2.91	3.9	-5.5
3700	39.1	14.3	2.94	37.7	3.12	3.7	-5.8
5200	36.6	16.0	4.62	36.0	4.66	1.7	-0.8
5250	36.5	16.1	4.69	35.9	4.71	1.6	-0.3
5300	36.4	16.2	4.78	35.9	4.78	1.5	0.1
5500	36.2	16.4	5.03	35.6	4.96	1.5	1.3
5600	36.1	16.5	5.14	35.5	5.07	1.5	1.5
5700	35.9	16.5	5.25	35.4	5.17	1.2	1.4
5800	35.7	16.6	5.34	35.3	5.27	1.2	1.4
6000	35.1	16.5	5.52	35.1	5.48	0.2	0.9
6500	34.4	17.1	6.19	34.5	6.07	-0.1	1.9
7000	33.5	17.5	6.81	33.9	6.65	-1.3	2.4
7500	32.6	17.8	7.41	33.3	7.24	-2.1	2.4
8000	31.7	18.0	8.01	32.7	7.84	-3.1	2.2
8500	30.8	18.2	8.62	32.1	8.45	-4.1	2.0
9000	30.0	18.5	9.24	31.5	9.08	-4.9	1.9
9500	29.1	18.8	9.85	31.0	9.71	-5.9	1.4
10000	28.2	18.7	10.41	30.4	10.36	-7.0	0.5

TSL Dielectric Parameters

Figure 2 - Head TSL Calibration Certificate Example (600 – 10000 MHz)