

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	2450	Head	12/27/2024	22.7	21.1	17	1112	7836	1839	2.510	50.600	50.081	-1.03%	1.180	23.700	23.544	-0.66%
Gamma	2450	Head	01/08/2025	21.6	20.8	17	1112	7836	1839	2.650	50.600	52.874	4.49%	1.240	23.700	24.741	4.39%
Gamma	5250	Head	01/08/2025	21.6	20.8	17	1396	7836	1839	3.750	77.900	74.822	-3.95%	1.070	22.400	21.349	-4.69%
Gamma	5750	Head	01/08/2025	21.6	20.8	17	1396	7836	1839	3.690	80.100	73.625	-8.08%	1.060	22.800	21.150	-7.24%

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
12/27/2024	Head	21.9	2400	1.79	1.76	1.91%	38.6	39.3	-1.70%
12/27/2024	Head	21.9	2450	1.83	1.80	1.44%	38.5	39.2	-1.71%
12/27/2024	Head	21.9	2480	1.85	1.83	0.84%	38.5	39.2	-1.76%
1/8/2025	Head	21.7	2400	1.81	1.76	3.00%	38.3	39.3	-2.50%
1/8/2025	Head	21.7	2450	1.85	1.80	2.61%	38.2	39.2	-2.49%
1/8/2025	Head	21.7	2480	1.87	1.83	2.08%	38.2	39.2	-2.54%
1/8/2025	Head	21.7	5150	4.38	4.60	-4.83%	33.3	36.0	-7.51%
1/8/2025	Head	21.7	5200	4.43	4.66	-4.77%	33.2	36.0	-7.60%
1/8/2025	Head	21.7	5250	4.49	4.71	-4.66%	33.1	35.9	-7.74%
1/8/2025	Head	21.7	5300	4.54	4.76	-4.59%	33.1	35.9	-7.79%
1/8/2025	Head	21.7	5350	4.59	4.81	-4.57%	33.0	35.8	-7.97%
1/8/2025	Head	21.7	5500	4.74	4.96	-4.49%	32.7	35.6	-8.19%
1/8/2025	Head	21.7	5550	4.79	5.01	-4.38%	32.6	35.6	-8.33%
1/8/2025	Head	21.7	5600	4.85	5.07	-4.28%	32.5	35.5	-8.42%
1/8/2025	Head	21.7	5650	4.90	5.12	-4.13%	32.4	35.5	-8.55%
1/8/2025	Head	21.7	5700	4.96	5.17	-4.03%	32.3	35.4	-8.68%
1/8/2025	Head	21.7	5750	5.01	5.22	-3.98%	32.3	35.4	-8.75%
1/8/2025	Head	21.7	5800	5.07	5.27	-3.83%	32.2	35.3	-8.89%

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 IEC/IEEE 62209-1528. The SAR values were applied to only scale up the measured SAR values, and not downward, per KDB Publication 865664 D01v04r04.

B.3. 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	2450	11/21/2024	7836	1839	2450	Head	1.824	38.955	PASS	PASS	PASS	OFDM	N/A	PASS
Gamma	5250	11/21/2024	7836	1839	5250	Head	4.494	34.126	PASS	PASS	PASS	OFDM	N/A	PASS
Gamma	5750	11/22/2024	7836	1839	5750	Head	5.038	33.263	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.

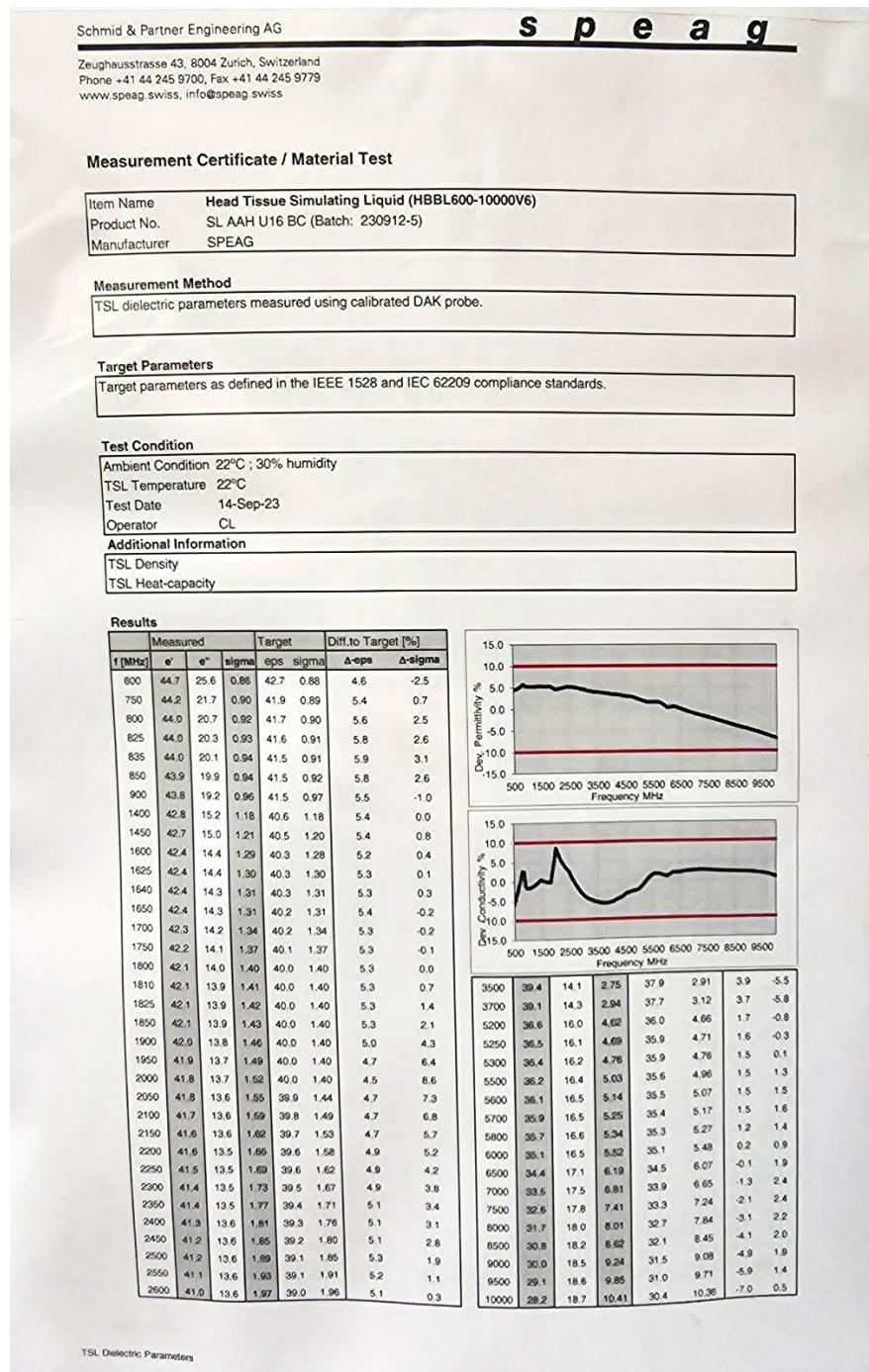


Figure 1 - Head TSL Calibration Certificate Example