

APPENDIX D: SAR TISSUE SPECIFICATIONS

Measurement Procedure for Tissue verification:

- 1) The network analyzer and probe system was configured and calibrated.
- 2) The probe was immersed in the tissue. The tissue was placed in a nonmetallic container. Trapped air bubbles beneath the flange were minimized by placing the probe at a slight angle.
- 3) The complex admittance with respect to the probe aperture was measured
- 4) The complex relative permittivity ϵ' can be calculated from the below equation (Pournaropoulos and Misra):

$$Y = \frac{j2\omega\epsilon_r\epsilon_0}{[\ln(b/a)]^2} \int_a^b \int_a^b \int_0^\pi \cos\phi' \frac{\exp[-j\omega r(\mu_0\epsilon_r'\epsilon_0)^{1/2}]}{r} d\phi' d\rho' d\rho$$

where Y is the admittance of the probe in contact with the sample, the primed and unprimed coordinates refer to source and observation points, respectively, $r^2 = \rho^2 + \rho'^2 - 2\rho\rho' \cos\phi'$, ω is the angular frequency, and $j = \sqrt{-1}$.

3 Composition / Information on ingredients

3.2 Mixtures

Description: Aqueous solution with surfactants and inhibitors

Declarable, or hazardous components:

CAS: 107-21-1 EINECS: 203-473-3 Reg.nr.: 01-2119456816-28-0000	Ethanediol STOT RE 2, H373; Acute Tox. 4, H302	>1.0-4.9%
CAS: 68608-26-4 EINECS: 271-781-5 Reg.nr.: 01-2119527859-22-0000	Sodium petroleum sulfonate Eye Irrit. 2, H319	< 2.9%
CAS: 107-41-5 EINECS: 203-489-0 Reg.nr.: 01-2119539582-35-0000	Hexylene Glycol / 2-Methyl-pentane-2,4-diol Skin Irrit. 2, H315; Eye Irrit. 2, H319	< 2.9%
CAS: 68920-66-1 NLP: 500-236-9 Reg.nr.: 01-2119489407-26-0000	Alkoxyated alcohol, > C₁₆ Aquatic Chronic 2, H411; Skin Irrit. 2, H315; Eye Irrit. 2, H319	< 2.0%

Additional information:

For the wording of the listed risk phrases refer to section 16.

Not mentioned CAS-, EINECS- or registration numbers are to be regarded as Proprietary/Confidential.

The specific chemical identity and/or exact percentage concentration of proprietary components is withheld as a trade secret.

Figure D-1

Note: Liquid recipes are proprietary SPEAG. Since the composition is approximate to the actual liquids utilized, the manufacturer tissue-equivalent liquid data sheets are provided below.

FCC ID C3K2110	RF EXPOSURE PART 1 TEST REPORT	Approved by: Technical Manager
DUT Type: Portable Computing Device		APPENDIX D: Page 1 of 2

Measurement Certificate / Material Test

Item Name	Head Tissue Simulating Liquid (HBBL4-250V3)
Product No.	SL AAH 005 AD (Batch: 230324-2)
Manufacturer	SPEAG

Measurement Method

TSL dielectric parameters measured using calibrated DAK probe.

Setup Validation

Validation results were within $\pm 2.5\%$ towards the target values of Methanol.

Target Parameters

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

Test Condition

Ambient	Environment temperatur (22 ± 3)°C and humidity < 70%.
TSL Temperature	22°C
Test Date	27-Mar-23
Operator	WM

Additional Information

TSL Density	1.042 g/cm3
TSL Heat-capacity	3.574 kJ/(kg*K)

f [MHz]	Measured			Target			Diff. to Target (%)	
	ϵ'	ϵ''	sigma	eps	sigma	$\Delta\epsilon'$	$\Delta\sigma$	
5	52.9	2636.98	0.73	55.5	0.75	-4.6	-2.7	
10	53.3	1318.71	0.73	55.5	0.75	-3.9	-2.7	
15	53.2	879.92	0.73	55.3	0.75	-3.9	-2.7	
20	53.1	660.54	0.73	55.1	0.75	-3.6	-2.7	
25	53.0	528.94	0.74	55.0	0.75	-3.6	-1.3	
30	52.9	441.24	0.74	55.0	0.75	-3.8	-1.3	
35	52.8	379.63	0.74	54.9	0.75	-3.8	-1.3	
40	52.7	331.71	0.74	54.8	0.75	-3.8	-1.3	
45	52.6	295.25	0.74	54.7	0.75	-3.8	-1.4	
50	52.5	266.12	0.74	54.6	0.75	-3.8	-1.4	
55	52.4	242.31	0.74	54.4	0.75	-3.7	-1.5	
60	52.3	222.50	0.74	54.3	0.75	-3.7	-1.5	
65	52.2	205.74	0.74	54.2	0.75	-3.7	-1.6	
70	52.0	191.40	0.75	54.1	0.75	-3.9	-0.3	
75	51.9	178.98	0.75	54.0	0.75	-3.9	-0.4	
80	51.8	168.13	0.75	53.9	0.75	-3.9	-0.4	
85	51.7	158.56	0.75	53.8	0.75	-3.8	-0.5	
90	51.6	150.06	0.75	53.7	0.75	-3.8	-0.5	
95	51.5	142.46	0.75	53.5	0.75	-3.8	-0.6	
100	51.4	135.63	0.75	53.4	0.75	-3.8	-0.6	
105	51.3	129.46	0.76	53.3	0.76	-3.8	0.6	
110	51.1	123.86	0.76	53.2	0.76	-3.9	0.6	
115	51.0	118.75	0.76	53.1	0.76	-3.9	0.5	
120	50.9	114.07	0.76	53.0	0.76	-3.9	0.5	
125	50.8	109.77	0.76	52.9	0.76	-3.9	0.4	
130	50.7	105.80	0.77	52.8	0.76	-3.9	1.7	
135	50.6	102.13	0.77	52.6	0.76	-3.9	1.6	
140	50.5	98.73	0.77	52.5	0.76	-3.9	1.6	
145	50.4	95.56	0.77	52.4	0.76	-3.8	1.5	
150	50.3	92.61	0.77	52.3	0.76	-3.8	1.5	
155	50.3	89.86	0.77	52.1	0.76	-3.4	1.0	
160	50.2	87.27	0.78	51.8	0.77	-3.1	1.8	
165	50.1	84.85	0.78	51.6	0.77	-2.9	1.3	
170	50.0	82.57	0.78	51.4	0.77	-2.7	0.8	
175	49.9	80.42	0.78	51.1	0.78	-2.4	0.4	
180	49.8	78.39	0.78	50.9	0.78	-2.2	-0.1	
185	49.7	76.48	0.79	50.7	0.78	-1.9	0.7	
190	49.6	74.67	0.79	50.4	0.79	-1.6	0.2	
195	49.5	72.95	0.79	50.2	0.79	-1.4	-0.2	
200	49.4	71.32	0.79	50.0	0.80	-1.1	-0.7	
205	49.3	69.77	0.80	49.7	0.80	-0.9	0.1	
210	49.3	68.30	0.80	49.5	0.80	-0.4	-0.4	
215	49.2	66.90	0.80	49.3	0.81	-0.1	-0.8	
220	49.1	65.56	0.80	49.0	0.81	0.1	-1.3	
225	49.0	64.29	0.80	48.8	0.81	0.4	-1.7	
230	48.9	63.07	0.81	48.6	0.82	0.7	-0.9	
235	48.9	61.90	0.81	48.3	0.82	1.2	-1.4	
240	48.8	60.78	0.81	48.1	0.82	1.5	-1.8	
245	48.7	59.71	0.81	47.9	0.83	1.7	-2.2	
250	48.6	58.69	0.82	47.6	0.83	2.0	-1.5	

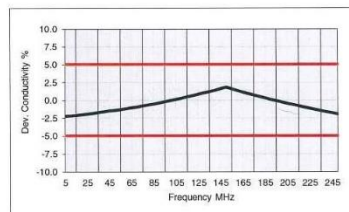
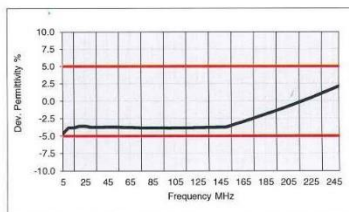


Figure D-2
5– 250 MHz Head Tissue Equivalent Matter

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