

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	Ethenediol 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.

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DUT Type: Wireless Earbuds		APPENDIX D: Page 1 of 2

Measurement Certificate / Material Test

Item Name	Head Tissue Simulating Liquid (HBBL000-10000V6)
Product No.	SL AAH U16 CA (Batch: 250317-1)
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 20-Mar-25

Operator CL

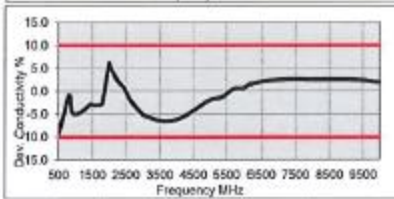
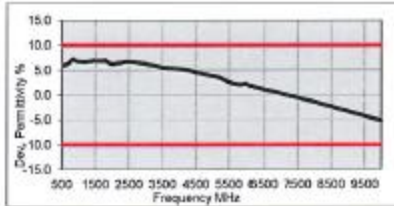
Additional Information

TSL Density

TSL Heat-capacity

Results

f [MHz]	Measured			Target		Diff. to Target [%]	
	ϵ'	ϵ''	sigma	eps	sigma	$\Delta\epsilon'$	$\Delta\epsilon''$
600	45.3	24.6	0.82	42.7	0.88	6.0	-7.0
750	44.7	20.9	0.87	41.9	0.89	6.6	-2.6
800	44.6	20.0	0.89	41.7	0.90	7.0	-0.8
825	44.5	19.8	0.90	41.6	0.91	7.0	-0.7
835	44.5	19.4	0.91	41.5	0.91	7.1	-0.2
850	44.4	19.2	0.91	41.5	0.92	7.0	-0.7
900	44.3	18.5	0.93	41.5	0.97	6.7	-4.1
1400	43.4	14.7	1.14	40.6	1.18	6.9	-3.3
1450	43.3	14.5	1.17	40.5	1.20	6.9	-2.5
1000	43.1	14.0	1.25	40.3	1.28	6.9	-2.7
1025	43.1	13.9	1.26	40.3	1.30	7.0	-3.0
1040	43.1	13.9	1.27	40.3	1.31	7.1	-2.8
1050	43.0	13.9	1.27	40.2	1.31	6.9	-3.3
1700	42.9	13.6	1.30	40.2	1.34	6.8	-3.1
1750	42.8	13.7	1.33	40.1	1.37	6.8	-3.0
1850	42.8	13.6	1.36	40.0	1.40	7.0	-2.9
1910	42.8	13.6	1.37	40.0	1.40	7.0	-2.1
1925	42.8	13.6	1.38	40.0	1.40	7.0	-1.4
1950	42.7	13.5	1.39	40.0	1.40	6.8	-0.7
1920	42.6	13.4	1.42	40.0	1.40	6.5	1.4
1950	42.5	13.4	1.45	40.0	1.40	6.3	3.6
2000	42.5	13.4	1.49	40.0	1.40	6.3	6.4
2050	42.4	13.3	1.52	39.9	1.44	6.2	5.2
2100	42.3	13.3	1.55	39.8	1.49	6.2	4.1
2150	42.3	13.3	1.59	39.7	1.53	6.5	3.7
2200	42.2	13.3	1.62	39.6	1.58	6.4	2.7
2250	42.1	13.3	1.66	39.6	1.62	6.4	2.3
2300	42.0	13.3	1.70	39.5	1.67	6.4	2.0
2350	42.0	13.3	1.74	39.4	1.71	6.7	1.7
2400	41.9	13.3	1.77	39.3	1.76	6.6	0.8
2450	41.8	13.3	1.81	39.2	1.80	6.6	0.6
2500	41.8	13.3	1.85	39.1	1.85	6.8	-0.2
2550	41.7	13.3	1.89	39.1	1.91	6.7	-1.0
2600	41.6	13.4	1.93	39.0	1.96	6.6	-1.7



3500	40.0	14.0	2.72	37.9	2.81	5.5	-6.5
3750	39.7	14.1	2.91	37.7	3.12	5.4	-8.6
5000	37.2	15.6	4.55	36.0	4.65	3.5	-1.5
5250	37.1	15.9	4.63	35.9	4.71	3.3	-1.5
5300	37.0	15.9	4.69	35.9	4.76	3.2	-1.5
5500	36.6	16.1	4.93	35.6	4.86	2.6	-0.7
5600	36.4	16.2	5.05	35.5	5.87	2.3	-0.1
5700	36.2	16.4	5.19	35.4	5.17	2.1	0.4
5800	36.0	16.4	5.30	35.3	5.27	2.0	0.6
6000	35.8	16.5	5.51	35.1	5.48	2.2	0.6
6500	34.8	17.1	6.20	34.5	6.97	1.1	2.1
7000	34.0	17.5	6.81	33.9	6.95	0.3	2.5
7500	33.1	17.8	7.43	33.3	7.24	-0.6	2.6
8000	32.2	18.1	8.04	32.7	7.84	-1.5	2.6
8500	31.4	18.3	8.67	32.1	8.45	-2.4	2.6
9000	30.5	18.6	9.31	31.5	9.08	-3.3	2.6
9500	29.6	18.8	9.94	31.0	9.71	-4.3	2.3
10000	28.8	19.0	10.58	30.4	10.36	-5.2	1.9

Figure D-2
600 –10000 MHz Head Tissue Equivalent Matter

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DUT Type: Wireless Earbuds		Technical Manager
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