

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):

$$Y = \frac{j2\omega\varepsilon_{r}\varepsilon_{0}}{\left[\ln(b/a)\right]^{2}} \int_{a}^{b} \int_{a}^{b} \int_{0}^{\pi} \cos\phi' \frac{\exp\left[-j\omega r(\mu_{0}\varepsilon_{r}^{'}\varepsilon_{0})^{1/2}\right]}{r} d\phi' d\rho' d\rho$$

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,  $r^2 = \rho^2 + {\rho'}^2 - 2\rho\rho' \cos \phi'$ ,  $\omega$  is the angular frequency, and  $j = \sqrt{-1}$ .

eclarable, or hazardous compon CAS: 107-21-1	Ethanediol	>1.0-4.9%
EINECS: 203-473-3	STOT RE 2, H373;	
Reg.nr.: 01-2119456816-28-0000	Acute Tox. 4, H302	
CAS: 68608-26-4	Sodium petroleum sulfonate	< 2.9%
EINECS: 271-781-5	Eye Irrit. 2, H319	
Reg.nr.: 01-2119527859-22-0000		
CAS: 107-41-5	Hexylene Glycol / 2-Methyl-pentane-2,4-diol	< 2.9%
EINECS: 203-489-0	Skin Irrit. 2, H315; Eye Irrit. 2, H319	
Reg.nr.: 01-2119539582-35-0000	-	
CAS: 68920-66-1	Alkoxylated alcohol, > C <sub>16</sub>	< 2.0%
NLP: 500-236-9	Aquatic Chronic 2, H411;	
	Skin Irrit. 2, H315; Eye Irrit. 2, H319	

### 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: A3LSMS711B	6 GHZ RF EXPOSURE EVALUATION	Approved by: Technical Manager	
<b>DUT Type:</b> Portable Handset		APPENDIX D: Page 2 of 3	
		REV 2	n

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s p e a g

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# Measurement Certificate / Material Test

Item Name	Head Tissue Simulating Liquid (HBBL600-10000V6)	
Product No.	SL AAH U16 BC (Batch: 230313-2)	
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.

Ambient Condition	22°C ; 30% humidity		
TSL Temperature	22°C	¥.	
Test Date	17-Mar-23		
Operator	WM		
Additional Inform	ation		
TSL Density			1
TSL Heat-capacity			

### Results

	Measu	ured	1000	Targe	ət	Diff.to Tar	get [%]	15.0	-						
f [MHz]	e'	e"	sigma	eps	sigma		∆-sigma								
600	44.9	24.8	0.83	42.7	0.88	5.1	-5.9	10.0	1000		a final				
750	44.2	21.0	0.88	41.9	0.89	5.4	-1.5		-	-	-	~			-
800	44.0	20.1	0.90	41.7	0.90	5.6	0.3	Permittivity 0.0				~	~		
825	44.0	19.8	0.91	41.6	0.91	5.8	0.4	E-5.0	-					-	_
835	44.0	19.6	0.92	41.5	0.91	5.9	0.9	2-10.0 -15.0	-						_
850	43.9	19.4	0.92	41.5	0.92	5.8	0.4				111	17. 6			
900	43.7	18.7	0.94	41.5	0.97	5.3	-3.1		500 150	00 2500		00 5500 6 ncy MHz	6500 7500	8500 9	500
1400	42.6	14.7	1.15	40.6	1.18	4.9	-2.5				rioquoi	ioy miniz			
1450	42.5	14.5	1.17	40.5	1.20	4.9	-2.5	15.0				- A -	E LL		
1600	42.3	14.0	1.25	40.3	1.28	4.9	-2.7	10.0	Pare la		10	1.11			
1625	42.3	13.9	1.26	40.3	1.30	5.0	-3.0	°, 200		A					1
1640	42.3	13.9	1.27	40.3	1.31	5.1	-2.8	0.0 0.0 0.0 0.0	1	11		~	-		
1650	42.2	13.9	1.27	40.2	1.31	4.9	-3.3	B-5.0	1	1	~	-			
1700	42.1	13.8	1.30	40.2	1.34	4.8	-3.1	Q10.0			1.	1 1	1		
1750	42.1	13.7	1.33	40.1	1.37	5.0	-3.0		500 150	0 2500	8500 450	0 5500 6	500 7500	9500.00	-00
1800	42.0	13.6	1.36	40.0	1.40	5.0	-2.9		100 100	0 2000		ncy MHz	500 7500	6500 9:	500
1810	42.0	13.6	1.37	40.0	1.40	5.0	-2.1	3500	39.3	13.9	2.70	37.9	2.91	3.6	-7.
1825	42.0	13.5	1.38	40.0	1.40	5.0	-1.4	3700	39.0	14.0	2.88	37.7	3.12	3.4	-7.
1850	42.0	13.5	1.39	40.0	1.40	5.0	-0.7	5200	36.5	15.8	4.58	36.0	4.66	1.3	-1.
1900	41.9	13.4	1.42	40.0	1.40	4.7	1.4	5250	36.4	16.0	4.66	35.9	4.71	1.4	-1.
1950	41.8	13.4	1.45	40.0	1.40	4.5	3.6	5300	36.4	16.1	4.73	35.9	4.76	1.5	-0.
	41.8	100	1 10	40.0	1.40	4.5									0.
2000	41.8	13.3	1.48	40.0	1.40	1.0	5.7	5500	36.3	16.2	4.97	35.6	4.96	1.8	
2000 2050	41.8	13.3	1.48	39.9	1.44	4.5	4.5	5500 5600	36.3 36.2	16.2 16.2	4.97 5.06	35.6 35.5	4.96 5.07	1.8	-0.
10000	1.11	10000													
2050	41.7	13.3	1.51	39.9	1.44	4.5	4.5	5600	36.2	16.2	5.06	35.5	5.07	1.8	-0.: -0.:
2050 2100	41.7 41.7	13.3 13.2	1.51 1.55	39.9 39.8	1.44 1.49	4.5 4.7	4.5 4.1	5600 5700	36.2 36.0	16.2 16.2	5.06 5.14	35.5 35.4	5.07 5.17	1.8 1.6	-0. -0.
2050 2100 2150	41.7 41.7 41.6	13.3 13.2 13.2	1.51 1.55 1.58	39.9 39.8 39.7	1.44 1.49 1.53	4.5 4.7 4.7	4.5 4.1 3.0	5600 5700 5800	36.2 36.0 35.7	16.2 16.2 16.2	5.06 5.14 5.22	35.5 35.4 35.3	5.07 5.17 5.27	1.8 1.6 1.2	-0.
2050 2100 2150 2200	41.7 41.7 41.6 41.5	13.3 13.2 13.2 13.2	1.51 1.55 1.58 1.62	39.9 39.8 39.7 39.6	1.44 1.49 1.53 1.58	4.5 4.7 4.7 4.7	4.5 4.1 3.0 2.7	5600 5700 5800 6000	36.2 36.0 35.7 35.0	16.2 16.2 16.2 16.4	5.06 5.14 5.22 5.48	35.5 35.4 35.3 35.1	5.07 5.17 5.27 5.48	1.8 1.6 1.2 -0.2	-0. -0. 0.
2050 2100 2150 2200 2250	41.7 41.7 41.6 41.5 41.4	13.3 13.2 13.2 13.2 13.2 13.2	1.51 1.55 1.58 1.62 1.65	39.9 39.8 39.7 39.6 39.6	1.44 1.49 1.53 1.58 1.62	4.5 4.7 4.7 4.7 4.7	4.5 4.1 3.0 2.7 1.7	5600 5700 5800 6000 6500	36.2 36.0 35.7 35.0 34.9	16.2 16.2 16.2 16.4 16.7	5.06 5.14 5.22 5.48 6.05	35.5 35.4 35.3 35.1 34.5	5.07 5.17 5.27 5.48 6.07	1.8 1.6 1.2 -0.2 1.2	-0. -0. -0. 1.(
2050 2100 2150 2200 2250 2300	41.7 41.7 41.6 41.5 41.4 41.3	13.3 13.2 13.2 13.2 13.2 13.2 13.2	1.51 1.55 1.58 1.62 1.65 1.69	39.9 39.8 39.7 39.6 39.6 39.5	1.44 1.49 1.53 1.58 1.62 1.67	4.5 4.7 4.7 4.7 4.7 4.6	4.5 4.1 3.0 2.7 1.7 1.4	5600 5700 5800 6000 6500 7000	36.2 36.0 35.7 35.0 34.9 33.7	16.2 16.2 16.2 16.4 16.7 17.2	5.06 5.14 5.22 5.48 6.05 6.72	35.5 35.4 35.3 35.1 34.5 33.9	5.07 5.17 5.27 5.48 6.07 6.65	1.8 1.6 1.2 -0.2 1.2 -0.6	-0. -0. 0.
2050 2100 2150 2200 2250 2300 2350	41.7 41.7 41.6 41.5 41.4 41.3 41.3	13.3 13.2 13.2 13.2 13.2 13.2 13.2 13.3	1.51 1.55 1.58 1.62 1.65 1.69 1.73	39.9 39.8 39.7 39.6 39.6 39.5 39.4	1.44 1.49 1.53 1.58 1.62 1.67 1.71	4.5 4.7 4.7 4.7 4.7 4.6 4.9	4.5 4.1 3.0 2.7 1.7 1.4 1.1	5600 5700 5800 6000 6500 7000 7500	36.2 36.0 35.7 35.0 34.9 33.7 32.5	16.2 16.2 16.2 16.4 16.7 17.2 17.6	5.06 5.14 5.22 5.48 6.05 6.72 7.34	35.5 35.4 35.3 35.1 34.5 33.9 33.3	5.07 5.17 5.27 5.48 6.07 6.65 7.24	1.8 1.6 1.2 -0.2 1.2 -0.6 -2.5	-0. -0. -0. 1.0 1.4
2050 2100 2150 2200 2250 2300 2350 2400	41.7 41.7 41.6 41.5 41.4 41.3 41.3 41.2	<ol> <li>13.3</li> <li>13.2</li> <li>13.2</li> <li>13.2</li> <li>13.2</li> <li>13.2</li> <li>13.3</li> <li>13.3</li> </ol>	1.51 1.55 1.58 1.62 1.65 1.69 1.73 1.77	39.9 39.8 39.7 39.6 39.6 39.5 39.4 39.3	1.44 1.49 1.53 1.58 1.62 1.67 1.71 1.76	4.5 4.7 4.7 4.7 4.7 4.6 4.9 4.9	4.5 4.1 3.0 2.7 1.7 1.4 1.1 0.8	5600 5700 5800 6000 6500 7000 7500 8000	36.2 36.0 35.7 35.0 34.9 33.7 32.5 31.4	16.2 16.2 16.4 16.7 17.2 17.6 17.9	5.06 5.14 5.22 5.48 6.05 6.72 7.34 7.97	35.5 35.4 35.3 35.1 34.5 33.9 33.3 32.7	5.07 5.17 5.27 5.48 6.07 6.65 7.24 7.84	1.8 1.6 1.2 -0.2 1.2 -0.6 -2.5 -3.9 -4.8	-0. -0. -0. 1.0 1.4 1.5
2050 2100 2150 2200 2250 2300 2350 2400 2450	41.7 41.7 41.6 41.5 41.4 41.3 41.3 41.3 41.2 41.1	<ol> <li>13.3</li> <li>13.2</li> <li>13.2</li> <li>13.2</li> <li>13.2</li> <li>13.3</li> <li>13.3</li> <li>13.3</li> </ol>	1.51 1.55 1.58 1.62 1.65 1.69 1.73 1.77 1.81	39.9 39.8 39.7 39.6 39.6 39.5 39.4 39.3 39.2	1.44 1.49 1.53 1.58 1.62 1.67 1.71 1.76 1.80	4.5 4.7 4.7 4.7 4.7 4.6 4.9 4.9 4.9	4.5 4.1 3.0 2.7 1.7 1.4 1.1 0.8 0.6	5600 5700 5800 6000 6500 7000 7500 8000 8500	36.2 36.0 35.7 35.0 34.9 33.7 32.5 31.4 30.6	16.2 16.2 16.4 16.7 17.2 17.6 17.9 18.1	5.06 5.14 5.22 5.48 6.05 6.72 7.34 7.97 8.57	35.5 35.4 35.3 35.1 34.5 33.9 33.3 32.7 32.1	5.07 5.17 5.27 5.48 6.07 6.65 7.24 7.84 8.45	1.8 1.6 1.2 -0.2 1.2 -0.6 -2.5 -3.9	-0. -0. -0. 1.4 1.4

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

FCC ID: A3LSMS711B	6 GHZ RF EXPOSURE EVALUATION	Approved by: Technical Manager
<b>DUT Type:</b> Portable Handset		APPENDIX D: Page 3 of 3
		REV 2

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