# APPENDIX C: SAR TISSUE SPECIFICATIONS

Measurement Procedure for Tissue verification:

- 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

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

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  $j = \sqrt{-1}$ .

### 3 Composition / Information on ingredients

**Description:** Aqueous solution with surfactants and inhibitors

Declarable, or hazardous components:

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;	
Reg.nr.: 01-2119489407-26-0000	Skin Irrit. 2, H315; Eye Irrit. 2, H319	
Additional information:	-	-

Additional information:

withheld as a trade secret.

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

# Figure C-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 A3LSMG996U	Proof to be peri of @ element	SAR EVALUATION REPORT	SAMSUNG	Approved by:  Quality Manager
Test Dates:	DUT Type:			APPENDIX C:
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# Measurement Certificate / Material Test

Item Name	Body Tissue Simulating Liquid (MBBL600-6000V6)
Product No.	SL AAM U16 BC (Batch: 200803-1)
Manufacturer	SPEAG

# Measurement Method

TSL dielectric parameters measured using calibrated DAK probe.

Target Parameters
Target parameters as defined in the KDB 865664 compliance standard.

Test Condition

Ambient Condition 22°C; 30% humidity
TSL Temperature 22°C

6-Aug-20 Operator

Additional Information
TSL Density
TSL Heat-capacity

12/13	Measured			Targe	t	Diff.to Targ	get [%]	15.0							
f [MHz]	e'	0"	sigma	eps	sigma	∆-eps	Δ-sigma	10.0		32 340					
600	56.3	26.8	0.89	56.1	0.95	0.3	-6.3	%	Marie .						
750	55.8	22.6	0.94	55.5	0.96	0.5	-2.1	Permittivity 0.0 0.0		_					
800	55.7	21.6	0.96	55.3	0.97	0.7	-1.0	E 0.0				MENE	250		_
825	55.7	21.1	0.97	55.2	0.98	0.8	-1.0		1						
835	55.7	20.9	0.98	55.1	0.99	1.0	-0.5	A -10.0	200		out le	October de	en e	ali di	
850	55.6	20.7	0.98	55.2	0.99	0.8	-1.0	-15.0	500	1500	2500	3500	4500	550	10
900	55.5	19.9	1.00	55.0	1.05	0.9	-4.8		300	1500	Freque	ency MHz	4500	550	~
1400	54.7	15.9	1.24	54.1	1.28	1.1	-3.1	15.0	1					2000	
1450	54.6	15.8	1.27	54.0	1.30	1.1	-2.3	10.0					Paris A	100	
1600	54.4	15.3	1.36	53.8	1.39	1.1	-2.2	%			-				-
1625	54.4	15.3	1.38	53.8	1.41	1.2	-2.1	Conductivity 0.0 0.0	9	1	1			/	
1640	54.4	15.2	1.39	53.7	1.42	1.3	-2.1	onpr o.o	Λ	1	1	1	/		
1650	54.3	15.2	1.39	53.7	1.43	1.1	-2.8		1-			_			
1700	54.2	15.1	1.43	53.6	1.46	1.2	-2.1	à-10.0	9.000		San I	1000		111-61	
1750	54.2	15.0	1.46	53.4	1.49	1.4	-2.0	-15.0	500	1500	2500	3500	4500	550	00
1800	54.1	14.9	1.50	53.3	1.52	1.5	-1.3		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	1000	Freque	3500 ncy MHz	4500	000	~
1810	54.1	14.9	1.51	53.3	1.52	1.5	-0.7	3500	51.4	16.0	3.11	51.3	3.31	0.2	-6.
1825	54.1	14.9	1.52	53.3	1.52	1.5	0.0	3700	51.1	16.2	3.34	51.1	3.55	0.1	-5.
1850	54.0	14.9	1.53	53.3	1.52	1.3	0.7	5200	48.3	18.7	5.42	49.0	5.30	-1.5	2.
1900	54.0	14.8	1.57	53.3	1.52	1.3	3.3	5250	48.2	18.8	5.50	49.0	5.36	-1.6	2.
1950	53.9	14.8	1.60	53.3	1.52	1.1	5.3	5300	48.1	18.9	5.57	48.9	5.42	-1.7	2.
2000	53.8	14.8	1.64	53.3	1.52	0.9	7.9	5500	47.7	19.2	5.86	48.6	5.65	-2.0	3.8
2050	53.8	14.7	1.68	53.2	1.57	1.1	7.0	5600	47.5	19.3	6.01	48.5	5.77	-2.1	4.
2100	53.7	14.7	1.72	53.2	1.62	1.0	6.2	5700	47.3	19.4	6.16	48.3	5.88	-2.3	4.1
2150	53.7	14.7	1.76	53.1	1.66	1.1	6.0	5800	47.0	19.6	6.32	48.2	6.00	-2.4	5.
2200	53.6	14.7	1.80	53.0	1.71	1.1	5.3	6000	46.6	19.8	6.62	47.9	6.23	-2.7	6.
2250	53.5	14.8	1.85	53.0	1.76	1.0	5.1	6500					- 1		
	53.5	14.8	1.89	52.9	1.81	1.1	4.4	7000					- 1		
2300	53.4	14.8	1.94	52.8	1.85	1.1	4.9	7500							
2300		14.8	1.98	52.8	1.90	1.0	4.2	8000					- 1		
	53.3	14.0					4.1	8500			-		- 1		
2350	53.3 53.3	14.9	2.03	52.7	1.95	1.1	4.1								
2350 2400		1000	2.03	52.7 52.6	1.95	1.1	2.5	9000							
2350 2400 2450	53.3	14.9	100000					9000 9500							

Figure C-2 600 – 5800 MHz Body Tissue Equivalent Matter

FCC ID A3LSMG996U	PCTEST* Proud to be part of @ element	SAR EVALUATION REPORT	SAMSUNG	Approved by:  Quality Manager
Test Dates:	DUT Type:			APPENDIX C:
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p e a S

35.9 4.71 1.2 -0.9

35.9 4.76 1.1 -0.7

35.6 4.96 0.7 -0.1 0.5

35.3 5.27 0.1 0.7

35.1 5.48 -0.2 1.2

34.5 6.07 -1.1 1.6

33.9 6.65 -2.0 2.0

33.3 7.24 -2.9 2.2

32.1 8.45 -4.7 2.1

31.5 9.08 -5.6 1.8

31.0 9.71 -6.5 1.3

7.84 -3.8 2.2

-5.1

-1.0

0.2

Zeughausstrasse 43, 8004 Zurich, Switzerland Phone +41 44 245 9700, Fax +41 44 245 9779 info@speag.com, http://www.speag.com

# Measurement Certificate / Material Test

Head Tissue Simulating Liquid (HBBL600-10000V6)

Product No. SL AAH U16 BC (Batch: 200805-4)

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 6-Aug-20 Test Date Operator CL

Additional Information
TSL Density

TSL Heat-capacity

1600	Measured			Target		Diff.to Tar	get [%]	15.0						
[MHz]	e'	e"	sigma	eps	sigma	∆-eps	∆-sigma	10.0					1	
600	44.7	25.7	0.86	42.7	0.88	4.6	-2.5	% 5.0	P A					
750	44.1	21.7	0.90	41.9	0.89	5.1	0.7							
800	44.0	20.7	0.92	41.7	0.90	5.6	2.5	Permittivity 0.0						
825	43.9	20.3	0.93	41.6	0.91	5.6	2.6	E -5.0						
835	43.9	20.1	0.94	41.5	0.91	5.7	3.1	\$ 10.0 -15.0	9000	- FOR	etal st			8
850	43.8	19.9	0.94	41.5	0.92	5.5	2.6		00.450	0.0500	0500 450	0 5500 0	500 7500	
900	43.7	19.1	0.96	41.5	0.97	5.3	-1.0	5	150	0 2500	Frequent		500 7500	5
1400	42.7	15.1	1.18	40.6	1.18	5.2	0.0	15.0						
1450	42.6	14.9	1.20	40.5	1.20	5.2	0.0	10.0						
1600	42.4	14.4	1.28	40.3	1.28	5.2	-0.3	×		٨				į
1625	42.4	14.4	1.30	40.3	1.30	5.3	0.1	5.0	A					ij
1640	42.4	14.3	1.31	40.3	1.31	5.3	0.3	0.0	10	/				
1650	42.3	14.3	1.31	40.2	1.31	5.1	-0.2	5.0 5.0 5.0 5.0						
1700	42.2	14.2	1.34	40.2	1.34	5.1	-0.2	≥10.0	ARCHE			Market S	100000	i
1750	42.2	14.1	1.37	40.1	1.37	5.3	-0.1	å15.0 ·	00 150	2500 :	3500 450	0 5500 6	500 7500	,
1800	42.1	14.0	1.40	40.0	1.40	5.3	0.0		35 355		Frequer	ncy MHz		
1810	42.1	14.0	1.41	40.0	1.40	5.3	0.7	3500	39.4	14.2	2.77	37.9	2.91	Ī
1825	42.1	13.9	1.42	40.0	1.40	5.3	1.4	2000000	1000					
1025			1.46	40.0			1.00	3700	39.0	14.3	2.95	37.7	3.12	l
1850	42.0	13.9	1.43	40.0	1.40	5.0	2.1	3700 5200	39.0 36.4	14.3 15.9	2.95 4.61	37.7 36.0	3.12 4.66	
	SECTION			77 SESSE		10000	0.57/8	7.561,640			77		(0-1)	
1850	42.0	13.9	1.43	40.0	1.40	5.0	2.1	5200	36.4	15.9	4.61	36.0	4.66	
1850 1900	42.0 41.9	13.9 13.8	1.43 1.46	40.0 40.0	1.40 1.40	5.0 4.7	2.1 4.3	5200 5250	36.4 36.4	15.9 16.0	4.61 4.67	36.0 35.9	4.66 4.71	
1850 1900 1950	42.0 41.9 41.9	13.9 13.8 13.8	1.43 1.46 1.49	40.0 40.0 40.0	1.40 1.40 1.40	5.0 4.7 4.7	2.1 4.3 6.4	5200 5250 5300	36.4 36.4 36.3	15.9 16.0 16.0	4.61 4.67 4.72	36.0 35.9 35.9	4.66 4.71 4.76	
1850 1900 1950 2000	42.0 41.9 41.9 41.8	13.9 13.8 13.8 13.7	1.43 1.46 1.49 1.53	40.0 40.0 40.0 40.0	1.40 1.40 1.40 1.40	5.0 4.7 4.7 4.5	2.1 4.3 6.4 9.3	5200 5250 5300 5500	36.4 36.3 35.9	15.9 16.0 16.0 16.2	4.61 4.67 4.72 4.96	36.0 35.9 35.9 35.6	4.66 4.71 4.76 4.96	
1850 1900 1950 2000 2050	42.0 41.9 41.9 41.8 41.7	13.9 13.8 13.8 13.7 13.7	1.43 1.46 1.49 1.53 1.56	40.0 40.0 40.0 40.0 39.9	1.40 1.40 1.40 1.40 1.44	5.0 4.7 4.7 4.5 4.5	2.1 4.3 6.4 9.3 8.0	5200 5250 5300 5500 5600	36.4 36.4 36.3 35.9 35.7	15.9 16.0 16.0 16.2 16.3	4.61 4.67 4.72 4.96 5.07	36.0 35.9 35.9 35.6 35.5	4.66 4.71 4.76 4.96 5.07	
1850 1900 1950 2000 2050 2100	42.0 41.9 41.9 41.8 41.7	13.9 13.8 13.8 13.7 13.7	1.43 1.46 1.49 1.53 1.56 1.60	40.0 40.0 40.0 40.0 39.9 39.8	1.40 1.40 1.40 1.40 1.44 1.49	5.0 4.7 4.7 4.5 4.5 4.7	2.1 4.3 6.4 9.3 8.0 7.5	5200 5250 5300 5500 5600 5700	36.4 36.4 36.3 35.9 35.7 35.5	15.9 16.0 16.0 16.2 16.3 16.4	4.61 4.67 4.72 4.96 5.07 5.19	36.0 35.9 35.9 35.6 35.5 35.4	4.66 4.71 4.76 4.96 5.07 5.17	
1850 1900 1950 2000 2050 2100 2150	42.0 41.9 41.9 41.8 41.7 41.7	13.9 13.8 13.8 13.7 13.7 13.7	1.43 1.46 1.49 1.53 1.56 1.60 1.63	40.0 40.0 40.0 40.0 39.9 39.8 39.7	1.40 1.40 1.40 1.40 1.44 1.49	5.0 4.7 4.7 4.5 4.5 4.7	2.1 4.3 6.4 9.3 8.0 7.5 6.3	5200 5250 5300 5500 5600 5700 5800	36.4 36.4 36.3 35.9 35.7 35.5 35.4	15.9 16.0 16.0 16.2 16.3 16.4 16.5	4.61 4.67 4.72 4.96 5.07 5.19 5.31	36.0 35.9 35.9 35.6 35.5 35.4 35.3	4.66 4.71 4.76 4.96 5.07 5.17 5.27	
1850 1900 1950 2000 2050 2100 2150 2200	42.0 41.9 41.8 41.7 41.7 41.6 41.5	13.9 13.8 13.8 13.7 13.7 13.7 13.6 13.6	1.43 1.46 1.49 1.53 1.56 1.60 1.63	40.0 40.0 40.0 40.0 39.9 39.8 39.7 39.6	1.40 1.40 1.40 1.40 1.44 1.49 1.53	5.0 4.7 4.7 4.5 4.5 4.7 4.7	2.1 4.3 6.4 9.3 8.0 7.5 6.3 5.8	5200 5250 5300 5500 5600 5700 5800 6000	36.4 36.3 35.9 35.7 35.5 35.4 35.0	15.9 16.0 16.0 16.2 16.3 16.4 16.5	4.61 4.67 4.72 4.96 5.07 5.19 5.31 5.54	36.0 35.9 35.9 35.6 35.5 35.4 35.3 35.1	4.66 4.71 4.76 4.96 5.07 5.17 5.27 5.48	
1850 1900 1950 2000 2050 2100 2150 2200 2250	42.0 41.9 41.8 41.7 41.7 41.6 41.5	13.9 13.8 13.7 13.7 13.7 13.6 13.6	1.43 1.46 1.49 1.53 1.56 1.60 1.63 1.67	40.0 40.0 40.0 39.9 39.8 39.7 39.6 39.6	1.40 1.40 1.40 1.44 1.49 1.53 1.58	5.0 4.7 4.7 4.5 4.5 4.7 4.7 4.7	2.1 4.3 6.4 9.3 8.0 7.5 6.3 5.8 4.8	5200 5250 5300 5500 5600 5700 5800 6000 6500	36.4 36.3 35.9 35.7 35.5 35.4 35.0 34.1	15.9 16.0 16.0 16.2 16.3 16.4 16.5 16.6	4,61 4,67 4,72 4,96 5,07 5,19 5,31 5,54 6,17	36.0 35.9 35.9 35.6 35.5 35.4 35.3 35.1 34.5	4.66 4.71 4.76 4.96 5.07 5.17 5.27 5.48 6.07	
1850 1900 1950 2000 2050 2100 2150 2200 2250 2300	42.0 41.9 41.8 41.7 41.7 41.6 41.5 41.5	13.9 13.8 13.7 13.7 13.7 13.6 13.6 13.6	1.43 1.46 1.49 1.53 1.56 1.60 1.63 1.67 1.70	40.0 40.0 40.0 39.9 39.8 39.7 39.6 39.6 39.5	1.40 1.40 1.40 1.40 1.44 1.53 1.58 1.62	5.0 4.7 4.7 4.5 4.5 4.7 4.7 4.7 4.9	2.1 4.3 6.4 9.3 8.0 7.5 6.3 5.8 4.8	5200 5250 5300 5500 5600 5700 5800 6000 6500 7000	36.4 36.3 35.9 35.7 35.5 35.4 35.0 34.1 33.2	15.9 16.0 16.0 16.2 16.3 16.4 16.5 16.6 17.1	4.61 4.67 4.72 4.96 5.07 5.19 5.31 5.54 6.17 6.78	36.0 35.9 35.6 35.5 35.4 35.3 35.1 34.5 33.9	4.66 4.71 4.76 4.96 5.07 5.17 5.27 5.48 6.07 6.65	
1850 1900 1950 2000 2050 2100 2150 2200 2250 2300 2350	42.0 41.9 41.8 41.7 41.6 41.5 41.5 41.4	13.9 13.8 13.7 13.7 13.7 13.6 13.6 13.6 13.6	1.43 1.46 1.49 1.53 1.56 1.60 1.63 1.67 1.70 1.74	40.0 40.0 40.0 39.9 39.8 39.7 39.6 39.6 39.5 39.4	1.40 1.40 1.40 1.40 1.44 1.53 1.58 1.62 1.67	5.0 4.7 4.7 4.5 4.5 4.7 4.7 4.7 4.9 4.9	2.1 4.3 6.4 9.3 8.0 7.5 6.3 5.8 4.8 4.4	5200 5250 5300 5500 5600 5700 5800 6000 6500 7000	36.4 36.3 35.9 35.7 35.5 35.4 35.0 34.1 33.2 32.3	15.9 16.0 16.0 16.2 16.3 16.4 16.5 16.6 17.1 17.4	4.61 4.67 4.72 4.96 5.07 5.19 5.31 5.54 6.17 6.78 7.40	36.0 35.9 35.9 35.6 35.5 35.4 35.3 35.1 34.5 33.9	4.66 4.71 4.76 4.96 5.07 5.17 5.27 5.48 6.07 6.65 7.24	
1850 1900 1950 2000 2050 2100 2150 2200 2250 2300 2350 2400	42.0 41.9 41.8 41.7 41.7 41.6 41.5 41.5 41.4 41.3	13.9 13.8 13.7 13.7 13.7 13.6 13.6 13.6 13.6 13.6	1.43 1.46 1.49 1.53 1.56 1.60 1.63 1.67 1.70 1.74 1.78	40.0 40.0 40.0 39.9 39.8 39.7 39.6 39.6 39.5 39.4 39.3	1.40 1.40 1.40 1.44 1.49 1.53 1.58 1.62 1.67 1.71	5.0 4.7 4.7 4.5 4.5 4.7 4.7 4.7 4.9 4.9 4.9	2.1 4.3 6.4 9.3 8.0 7.5 6.3 5.8 4.8 4.4 4.0 3.7	5200 5250 5300 5500 5600 5700 5800 6000 6500 7000 7500	36.4 36.3 35.9 35.7 35.5 35.4 35.0 34.1 33.2 32.3 31.5	15.9 16.0 16.0 16.2 16.3 16.4 16.5 16.6 17.1 17.4 17.7	4.61 4.67 4.72 4.96 5.07 5.19 5.31 5.54 6.17 6.78 7.40 8.01	36.0 35.9 35.9 35.6 35.5 35.4 35.3 35.1 34.5 33.9 33.3	4.66 4.71 4.76 4.96 5.07 5.17 5.27 5.48 6.07 6.65 7.24 7.84	
1850 1900 1950 2000 2050 2100 2150 2200 2250 2300 2350 2400 2450	42.0 41.9 41.8 41.7 41.6 41.5 41.5 41.4 41.3 41.2	13.9 13.8 13.7 13.7 13.7 13.6 13.6 13.6 13.6 13.6	1.43 1.46 1.49 1.53 1.56 1.60 1.63 1.67 1.70 1.74 1.78 1.82	40.0 40.0 40.0 39.9 39.8 39.7 39.6 39.6 39.5 39.4 39.3	1.40 1.40 1.40 1.44 1.49 1.53 1.58 1.62 1.67 1.71 1.76	5.0 4.7 4.7 4.5 4.5 4.7 4.7 4.7 4.9 4.9 4.9 5.1	2.1 4.3 6.4 9.3 8.0 7.5 6.3 5.8 4.8 4.4 4.0 3.7 2.8	5200 5250 5300 5500 5600 5700 5800 6000 6500 7000 7500 8000 8500	36.4 36.3 35.9 35.7 35.5 35.4 35.0 34.1 33.2 32.3 31.5 30.6	15.9 16.0 16.2 16.3 16.4 16.5 16.6 17.1 17.4 17.7 18.0	4.61 4.67 4.72 4.96 5.07 5.19 5.31 5.54 6.17 6.78 7.40 8.01 8.63	36.0 35.9 35.9 35.6 35.5 35.4 35.3 35.1 34.5 33.9 33.3 32.7	4.66 4.71 4.76 4.96 5.07 5.17 5.27 5.48 6.07 6.65 7.24 7.84 8.45	

Figure C-3 600 - 5800 MHz Head Tissue Equivalent Matter

FCC ID A3LSMG996U	PCTEST* Proud to be port of @ element	SAR EVALUATION REPORT	SAMSUNG	Approved by:  Quality Manager
Test Dates:	DUT Type:			APPENDIX C:
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