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

3 Composition / Information on ingredients

3.2 Mixtures

Description: Aqueous solution with surfactants and inhibitors

beclarable, or nazardous 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 ₁₆	< 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:

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 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 A3LSMS906U	PCTEST SAR EVALUATION REPORT	Approved by: Quality Manager
Test Dates:	DUT Type:	APPENDIX C:
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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

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

	Measu	red	We S	Targe	t	Diff.to Targ	get [%]	15.0							
[MHz]	e'	9"	sigma	eps	sigma	Δ-eps	∆-sigma	10.0		32 340					
600	56.3	26.8	0.89	56.1	0.95	0.3	-6.3	%							
750	55.8	22.6	0.94	55.5	0.96	0.5	-2.1	0.0		_					
800	55.7	21.6	0.96	55.3	0.97	0.7	-1.0	E				NEWS	1197		
825	55.7	21.1	0.97	55.2	0.98	8.0	-1.0		1						
835	55.7	20.9	0.98	55.1	0.99	1.0	-0.5	e -10.0	RG S		bu-lu	Mark de	PROPERTY.	ali di	
850	55.6	20.7	0.98	55.2	0.99	0.8	-1.0	-15.0	500	1500	2500	2500	4500	550	00
900	55.5	19.9	1.00	55.0	1.05	0.9	-4.8		300	1500	Freque	ncy 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	100		PERMIT	Sept Per	Paris A	2010	
1600	54.4	15.3	1.36	53.8	1.39	1.1	-2.2	%			1				-
1625	54.4	15.3	1.38	53.8	1.41	1.2	-2.1	Conductivity 0.0 0.0	1	1	1			/	
1640	54.4	15.2	1.39	53.7	1.42	1.3	-2.1	onpr o.o	Λ	~	1		/		
1650	54.3	15.2	1.39	53.7	1.43	1.1	-2.8		/-						
1700	54.2	15.1	1.43	53.6	1.46	1.2	-2.1	à-10.0	3800			1000		M-ST	9
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	ncy MHz	1000		
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	-
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	
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	4
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	1
****	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
1950														-2.0	1
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	
	53.8 53.8	14.8 14.7	1.64	53.3 53.2	1.52	1.1	7.9 7.0	5500 5600	47.7 47.5	19.2 19.3	5.86 6.01	48.6 48.5	5.65 5.77	-2.1	2
2000	3600000		1000							2,400					
2000 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	2
2000 2050 2100	53.8 53.7	14.7 14.7	1.68 1.72	53.2 53.2	1.57 1.62	1.1	7.0 6.2	5600 5700	47.5 47.3	19.3 19.4	6.01 6.16	48.5 48.3	5.77 5.88	-2.1 -2.3	
2000 2050 2100 2150	53.8 53.7 53.7	14.7 14.7 14.7	1.68 1.72 1.76	53.2 53.2 53.1	1.57 1.62 1.66	1.1 1.0 1.1	7.0 6.2 6.0	5600 5700 5800	47.5 47.3 47.0	19.3 19.4 19.6	6.01 6.16 6.32	48.5 48.3 48.2	5.77 5.88 6.00	-2.1 -2.3 -2.4	
2000 2050 2100 2150 2200	53.8 53.7 53.7 53.6	14.7 14.7 14.7 14.7	1.68 1.72 1.76 1.80	53.2 53.2 53.1 53.0	1.57 1.62 1.66 1.71	1.1 1.0 1.1 1.1	7.0 6.2 6.0 5.3	5600 5700 5800 6000	47.5 47.3 47.0	19.3 19.4 19.6	6.01 6.16 6.32	48.5 48.3 48.2	5.77 5.88 6.00	-2.1 -2.3 -2.4	
2000 2050 2100 2150 2200 2250	53.8 53.7 53.7 53.6 53.5	14.7 14.7 14.7 14.7 14.8	1.68 1.72 1.76 1.80 1.85	53.2 53.1 53.0 53.0	1.57 1.62 1.66 1.71 1.76	1.1 1.0 1.1 1.1 1.0	7.0 6.2 6.0 5.3 5.1	5600 5700 5800 6000 6500	47.5 47.3 47.0	19.3 19.4 19.6	6.01 6.16 6.32	48.5 48.3 48.2	5.77 5.88 6.00	-2.1 -2.3 -2.4	
2000 2050 2100 2150 2200 2250 2300	53.8 53.7 53.7 53.6 53.5 53.5	14.7 14.7 14.7 14.7 14.8 14.8	1.68 1.72 1.76 1.80 1.85 1.89	53.2 53.2 53.1 53.0 53.0 52.9	1.57 1.62 1.66 1.71 1.76 1.81	1.1 1.0 1.1 1.1 1.0	7.0 6.2 6.0 5.3 5.1 4.4	5600 5700 5800 6000 6500 7000	47.5 47.3 47.0	19.3 19.4 19.6	6.01 6.16 6.32	48.5 48.3 48.2	5.77 5.88 6.00	-2.1 -2.3 -2.4	
2000 2050 2100 2150 2200 2250 2300 2350	53.8 53.7 53.7 53.6 53.5 53.5 53.4	14.7 14.7 14.7 14.7 14.8 14.8	1.68 1.72 1.76 1.80 1.85 1.89	53.2 53.2 53.1 53.0 53.0 52.9 52.8	1.57 1.62 1.66 1.71 1.76 1.81 1.85	1.1 1.0 1.1 1.1 1.0 1.1	7.0 6.2 6.0 5.3 5.1 4.4 4.9	5600 5700 5800 6000 6500 7000 7500	47.5 47.3 47.0	19.3 19.4 19.6	6.01 6.16 6.32	48.5 48.3 48.2	5.77 5.88 6.00	-2.1 -2.3 -2.4	
2000 2050 2100 2150 2200 2250 2300 2350 2400	53.8 53.7 53.7 53.6 53.5 53.5 53.4 53.3	14.7 14.7 14.7 14.7 14.8 14.8 14.8	1.68 1.72 1.76 1.80 1.85 1.89 1.94	53.2 53.2 53.1 53.0 53.0 52.9 52.8	1.57 1.62 1.66 1.71 1.76 1.81 1.85 1.90	1.1 1.0 1.1 1.1 1.0 1.1 1.1	7.0 6.2 6.0 5.3 5.1 4.4 4.9	5600 5700 5800 6000 6500 7000 7500 8000	47.5 47.3 47.0	19.3 19.4 19.6	6.01 6.16 6.32	48.5 48.3 48.2	5.77 5.88 6.00	-2.1 -2.3 -2.4	
2000 2050 2100 2150 2200 2250 2300 2350 2400 2450	53.8 53.7 53.7 53.6 53.5 53.5 53.4 53.3 53.3	14.7 14.7 14.7 14.7 14.8 14.8 14.8 14.8	1.68 1.72 1.76 1.80 1.85 1.89 1.94 1.98 2.03	53.2 53.2 53.1 53.0 53.0 52.9 52.8 52.8 52.7	1.57 1.62 1.66 1.71 1.76 1.81 1.85 1.90	1.1 1.0 1.1 1.1 1.0 1.1 1.1 1.0	7.0 6.2 6.0 5.3 5.1 4.4 4.9 4.2	5600 5700 5800 6000 6500 7000 7500 8000 8500	47.5 47.3 47.0	19.3 19.4 19.6	6.01 6.16 6.32	48.5 48.3 48.2	5.77 5.88 6.00	-2.1 -2.3 -2.4	

Figure C-2 600 - 6000 MHz Body Tissue Equivalent Matter

FCC ID A3LSMS906U	PCTEST*	SAR EVALUATION REPORT	SAMSUNG	Approved by: Quality Manager
Test Dates:	DUT Type:			APPENDIX C:
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Measurement Certificate / Material Test

Item Name Head Tissue Simulating Liquid (HBBL600-10000V6)

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

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

	Measu	ired		Targe	t	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 ·						
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	0.0 -5.0	5 94					
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	3-10.0 -15.0	Service Contract	0 100	electricis.		Physical St.	85.7
850	43.8	19.9	0.94	41.5	0.92	5.5	2.6		00 150	0.000.0	2500 450	0 5500 6	500 7500	ore
900	43.7	19.1	0.96	41.5	0.97	5.3	-1.0	5	00 150	0 2500	Frequenc		500 /500	000
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	EE N				1000	
1600	42.4	14.4	1.28	40.3	1.28	5.2	-0.3	*		٨				
1625	42.4	14.4	1.30	40.3	1.30	5.3	0.1	\$ 0.0	A _					
1640	42.4	14.3	1.31	40.3	1.31	5.3	0.3	duct	10	1				
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	015.0 -						
1750	42.2	14.1	1.37	40.1	1.37	5.3	-0.1		00 150	2500 3	3500 450	0 5500 6	500 7500	850
1800	42.1	14.0	1.40	40.0	1.40	5.3	0.0				Frequen	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	3
1825	42.1	13.9	1.42	40.0	1.40	5.3	1.4	3700	39.0	14.3	2.95	37.7	3.12	3
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	1
1900	41.9	13.8	1.46	40.0	1.40	4.7	4.3	5250	36.4	16.0	4.67	35.9	4.71	1
1000					1.40	4.7	6.4	5300	36.3	16.0	4.72	35.9	4.76	1
1950	41.9	13.8	1.49	40.0	1.40				100000000000000000000000000000000000000		21000	00.0		
	41.9 41.8	13.8 13.7	1.49	40.0	1.40	4.5	9.3	5500	35.9	16.2	4.96	35.6	4.96	0
1950	1				11000	4.5 4.5	9.3 8.0		35.9 35.7		No.		4.96 5.07	1.0
1950 2000	41.8	13.7	1.53	40.0	1.40			5500		16.2	4.96	35.6	71000	0
1950 2000 2050	41.8 41.7	13.7	1.53	40.0 39.9	1.40 1.44	4.5	8.0	5500 5600	35.7	16.2 16.3	4.96 5.07	35.6 35.5	5.07	0
1950 2000 2050 2100	41.8 41.7 41.7	13.7 13.7 13.7	1.53 1.56 1.60	40.0 39.9 39.8	1.40 1.44 1.49	4.5 4.7	8.0 7.5	5500 5600 5700	35.7 35.5	16.2 16.3 16.4	4.96 5.07 5.19	35.6 35.5 35.4	5.07 5.17	0
1950 2000 2050 2100 2150	41.8 41.7 41.7 41.6	13.7 13.7 13.7 13.6	1.53 1.56 1.60 1.63	40.0 39.9 39.8 39.7	1.40 1.44 1.49 1.53	4.5 4.7 4.7	8.0 7.5 6.3	5500 5600 5700 5800	35.7 35.5 35.4	16.2 16.3 16.4 16.5	4.96 5.07 5.19 5.31	35.6 35.5 35.4 35.3	5.07 5.17 5.27	0 0 -0
1950 2000 2050 2100 2150 2200	41.8 41.7 41.7 41.6 41.5	13.7 13.7 13.7 13.6 13.6	1.53 1.56 1.60 1.63 1.67	40.0 39.9 39.8 39.7 39.6	1.40 1.44 1.49 1.53 1.58	4.5 4.7 4.7 4.7	8.0 7.5 6.3 5.8	5500 5600 5700 5800 6000	35.7 35.5 35.4 35.0	16.2 16.3 16.4 16.5 16.6	4.96 5.07 5.19 5.31 5.54	35.6 35.5 35.4 35.3 35.1	5.07 5.17 5.27 5.48	0 0 0 -0 -1
1950 2000 2050 2100 2150 2200 2250	41.8 41.7 41.7 41.6 41.5 41.5	13.7 13.7 13.7 13.6 13.6 13.6	1.53 1.56 1.60 1.63 1.67 1.70	40.0 39.9 39.8 39.7 39.6 39.6	1.40 1.44 1.49 1.53 1.58 1.62	4.5 4.7 4.7 4.7 4.9	8.0 7.5 6.3 5.8 4.8	5500 5600 5700 5800 6000 6500	35.7 35.5 35.4 35.0 34.1	16.2 16.3 16.4 16.5 16.6 17.1	4.96 5.07 5.19 5.31 5.54 6.17	35.6 35.5 35.4 35.3 35.1 34.5	5.07 5.17 5.27 5.48 6.07	0 0 0 -0
1950 2000 2050 2100 2150 2200 2250 2300	41.8 41.7 41.7 41.6 41.5 41.5	13.7 13.7 13.7 13.6 13.6 13.6	1.53 1.56 1.60 1.63 1.67 1.70	40.0 39.9 39.8 39.7 39.6 39.6 39.5	1.40 1.44 1.49 1.53 1.58 1.62 1.67	4.5 4.7 4.7 4.7 4.9	8.0 7.5 6.3 5.8 4.8 4.4	5500 5600 5700 5800 6000 6500 7000	35.7 35.5 35.4 35.0 34.1 33.2	16.2 16.3 16.4 16.5 16.6 17.1	4,96 5.07 5.19 5.31 5.54 6.17 6.78	35.6 35.5 35.4 35.3 35.1 34.5 33.9	5.07 5.17 5.27 5.48 6.07 6.65	0 0 -0 -1 -2
1950 2000 2050 2100 2150 2200 2250 2300 2350	41.8 41.7 41.7 41.6 41.5 41.5 41.3	13.7 13.7 13.7 13.6 13.6 13.6 13.6	1.53 1.56 1.60 1.63 1.67 1.70 1.74	40.0 39.9 39.8 39.7 39.6 39.6 39.5 39.4	1.40 1.44 1.49 1.53 1.58 1.62 1.67	4.5 4.7 4.7 4.7 4.9 4.9	8.0 7.5 6.3 5.8 4.8 4.4	5500 5600 5700 5800 6000 6500 7000 7500	35.7 35.5 35.4 35.0 34.1 33.2 32.3	16.2 16.3 16.4 16.5 16.6 17.1 17.4	4.96 5.07 5.19 5.31 5.54 6.17 6.78 7.40	35.6 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	0 0 0 -0 -1 -2 -2
1950 2000 2050 2100 2150 2200 2250 2300 2350 2400	41.8 41.7 41.7 41.6 41.5 41.5 41.4 41.3	13.7 13.7 13.7 13.6 13.6 13.6 13.6 13.6	1.53 1.56 1.60 1.63 1.67 1.70 1.74 1.78	40.0 39.9 39.8 39.7 39.6 39.6 39.5 39.4 39.3	1.40 1.44 1.49 1.53 1.58 1.62 1.67 1.71	4.5 4.7 4.7 4.7 4.9 4.9 4.9	8.0 7.5 6.3 5.8 4.8 4.4 4.0 3.7	5500 5600 5700 5800 6000 6500 7000 7500 8000	35.7 35.5 35.4 35.0 34.1 33.2 32.3 31.5	16.2 16.3 16.4 16.5 16.6 17.1 17.4 17.7	4.96 5.07 5.19 5.31 5.54 6.17 6.78 7.40 8.01	35.6 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	0 0 0 -0 -1 -2 -2 -2 -3
1950 2000 2050 2100 2150 2200 2250 2300 2350 2400 2450	41.8 41.7 41.7 41.6 41.5 41.4 41.3 41.2	13.7 13.7 13.6 13.6 13.6 13.6 13.6 13.6 13.6	1.53 1.56 1.60 1.63 1.67 1.70 1.74 1.78 1.82	40.0 39.9 39.8 39.7 39.6 39.6 39.5 39.4 39.3	1.40 1.44 1.49 1.53 1.58 1.62 1.67 1.71 1.76	4.5 4.7 4.7 4.9 4.9 4.9 5.1	8.0 7.5 6.3 5.8 4.8 4.4 4.0 3.7 2.8	5500 5600 5700 5800 6000 6500 7000 7500 8000 8500	35.7 35.5 35.4 35.0 34.1 33.2 32.3 31.5 30.6	16.2 16.3 16.4 16.5 16.6 17.1 17.4 17.7 18.0	4.96 5.07 5.19 5.31 5.54 6.17 6.78 7.40 8.01 8.63	35.6 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	

Figure C-3 600 - 6000 MHz Head Tissue Equivalent Matter

FCC ID A3LSMS90	6U PCTEST	SAR EVALUATION REPORT	SAMSUNG	Approved by: Quality Manager
Test Dates:	DUT Type:			APPENDIX C:
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