Head Tissue Simulating Liquids

Application	Specific absorption rate according to standards (e.g., IEC 62209-x, IEEE 1528)		
Packaging	Plastic container of 10 liters with nozzle		
Life Time	Life time and stability of the liquid depend on usage, storage, and handling of tissue simulating liquid		
Options	Tissue simulating liquids for frequencies outside the below listed ranges are available upon request (please contact info@speag.swiss)		
Head Tissue	Parameters according to IEEE 1528 / IEC 62209-1/ IEC 62209-2 / FCC KDB 865664		
Narrow-Band Solutions (±5% Tolerance)	**Product** HSL300V2 HSL450V2 HSL750V2 HSL900V2	**Test Frequency (MHz)** 300 450 750 835, 900	**Main Ingredients** Water, Sugar Water, Sugar Water, Sugar Water, Sugar
Broad-Band Solutions (±5% Tolerance)	**Product** HBBL1350-1850V3 HBBL1550-1950V3 HBBL1900-3800V3 HBBL3500-5800V5	**Test Frequency (MHz)** 1450 – 1800 1750 – 1850 1950 – 3000 3500 – 5800	**Main Ingredients** Water, Tween Water, Tween Water, Tween Water, Oil
Broad-Band Solutions (±10% Tolerance)	**Product** HBBL4-250V3 HBBL1350-1850V3 HBBL1550-1950V3 HBBL1900-3800V3 HBBL600-10000V6	**Test Frequency (MHz)** 4 – 250 1300 – 1850 1550 – 1950 1900 – 3800 600 – 10000	**Main Ingredients** Water, Tween Water, Tween Water, Tween Water, Tween Water, Oil

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Measurement Certificate / Material Test

Item Name	**Head Tissue Simulating Liquid (HBBL600-10000V6)**
Product No.	SL AAH U16 BD (Batch: 180208-1)
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

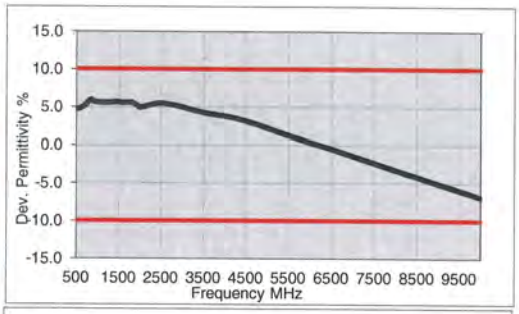
Ambient Condition	22°C ; 30% humidity
TSL Temperature	22°C
Test Date	8-Feb-18
Operator	WM

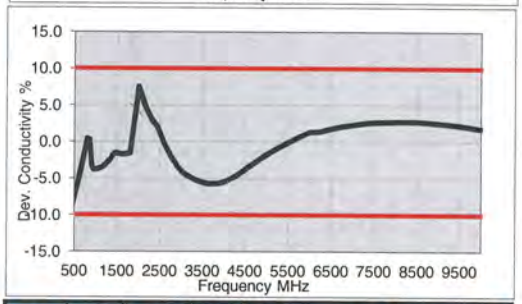
Additional Information

TSL Density
TSL Heat-capacity

Results

	Measured			Target		Diff.to Target [%]	
f [MHz]	e'	e''	sigma	eps	sigma	Δ-eps	Δ-sigma
800	44.1	20.3	0.90	41.7	0.90	5.8	0.3
825	44.1	19.9	0.91	41.6	0.91	6.0	0.4
835	44.1	19.7	0.92	41.5	0.91	6.1	0.9
850	44.0	19.4	0.92	41.5	0.92	6.0	0.4
900	43.9	18.7	0.94	41.5	0.97	5.8	-3.1
1400	42.9	14.9	1.16	40.6	1.18	5.7	-1.6
1450	42.8	14.7	1.18	40.5	1.20	5.7	-1.7
1600	42.6	14.2	1.26	40.3	1.28	5.7	-1.9
1625	42.6	14.1	1.28	40.3	1.30	5.8	-1.4
1640	42.6	14.1	1.29	40.3	1.31	5.8	-1.2
1650	42.5	14.1	1.29	40.2	1.31	5.6	-1.8
1700	42.4	14.0	1.32	40.2	1.34	5.6	-1.6
1750	42.3	13.9	1.35	40.1	1.37	5.5	-1.5
1800	42.3	13.8	1.38	40.0	1.40	5.7	-1.4
1810	42.3	13.8	1.39	40.0	1.40	5.7	-0.7
1825	42.3	13.7	1.40	40.0	1.40	5.7	0.0
1850	42.2	13.7	1.41	40.0	1.40	5.5	0.7
1900	42.1	13.6	1.44	40.0	1.40	5.3	2.9
1950	42.0	13.6	1.47	40.0	1.40	5.0	5.0
2000	42.0	13.5	1.51	40.0	1.40	5.0	7.9
2050	41.9	13.5	1.54	39.9	1.44	5.0	6.6
2100	41.8	13.5	1.57	39.8	1.49	5.0	5.4
2150	41.8	13.5	1.61	39.7	1.53	5.2	5.0
2200	41.7	13.4	1.64	39.6	1.58	5.2	3.9
2250	41.6	13.4	1.68	39.6	1.62	5.2	3.6
2300	41.6	13.4	1.72	39.5	1.67	5.4	3.2
2350	41.5	13.4	1.76	39.4	1.71	5.4	2.9
2400	41.4	13.5	1.80	39.3	1.76	5.4	2.5
2450	41.4	13.5	1.84	39.2	1.80	5.6	2.2
2500	41.3	13.5	1.88	39.1	1.85	5.5	1.4
2550	41.2	13.5	1.92	39.1	1.91	5.4	0.6
2600	41.1	13.6	1.96	39.0	1.96	5.4	-0.2
3500	39.6	14.1	2.75	37.9	2.91	4.3	-5.5
3700	39.2	14.3	2.94	37.7	3.12	4.1	-5.7





5200	36.7	15.9	4.61	36.0	4.66	1.9	-1.0
5250	36.6	16.0	4.67	35.9	4.71	1.8	-0.9
5300	36.5	16.0	4.72	35.9	4.76	1.7	-0.7
5500	36.1	16.2	4.96	35.6	4.96	1.3	-0.1
5600	35.9	16.3	5.08	35.5	5.07	1.1	0.2
5700	35.7	16.4	5.19	35.4	5.17	0.9	0.5
5800	35.6	16.5	5.31	35.3	5.27	0.8	0.8
6000	35.2	16.6	5.55	35.1	5.48	0.4	1.3
6500	34.3	17.1	6.18	34.5	6.07	-0.5	1.8
7000	33.4	17.5	6.81	33.9	6.65	-1.4	2.3
7500	32.5	17.8	7.43	33.3	7.24	-2.3	2.7
8000	31.7	18.1	8.06	32.7	7.84	-3.2	2.8
8500	30.8	18.4	8.68	32.1	8.45	-4.2	2.8
9000	30.0	18.6	9.31	31.5	9.08	-5.1	2.6
9500	29.1	18.8	9.93	31.0	9.71	-5.9	2.2
10000	28.3	19.0	10.55	30.4	10.36	-6.9	1.8

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Measurement Certificate / Material Test

Item Name	**Head Tissue Simulating Liquid (HBBL4-250V3)**
Product No.	SL AAH 005 AD (Batch: 211221-1)
Manufacturer	SPEAG

Measurement Method

TSL dielectric parameters measured using calibrated DAK probe.

Setup Validation

Validation results were within ± 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	7-Jan-22
Operator	JML

Additional Information

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

	Measured			Target		Diff.to Target [%]	
f [MHz]	ε'	ε''	sigma	eps	sigma	Δ-eps	Δ-sigma
5	53.7	2584.30	0.71	55.5	0.75	-3.2	-4.9
10	53.7	1282.57	0.71	55.5	0.75	-3.2	-4.9
15	53.5	855.85	0.71	55.3	0.75	-3.4	-4.8
20	53.3	642.50	0.71	55.1	0.75	-3.3	-4.7
25	53.1	514.52	0.72	55.0	0.75	-3.5	-4.6
30	52.9	429.24	0.72	55.0	0.75	-3.9	-4.5
35	52.7	368.36	0.72	54.9	0.75	-4.1	-4.4
40	52.5	322.73	0.72	54.8	0.75	-4.2	-4.2
45	52.3	287.27	0.72	54.7	0.75	-4.3	-4.1
50	52.1	258.93	0.72	54.6	0.75	-4.4	-4.0
55	52.0	235.78	0.72	54.4	0.75	-4.5	-3.9
60	51.8	216.52	0.72	54.3	0.75	-4.6	-3.8
65	51.7	200.24	0.72	54.2	0.75	-4.6	-3.7
70	51.6	186.31	0.73	54.1	0.75	-4.6	-3.6
75	51.5	174.24	0.73	54.0	0.75	-4.7	-3.4
80	51.4	163.70	0.73	53.9	0.75	-4.7	-3.3
85	51.2	154.40	0.73	53.8	0.75	-4.7	-3.1
90	51.1	146.15	0.73	53.7	0.75	-4.7	-2.9
95	51.0	138.77	0.73	53.5	0.75	-4.7	-2.8
100	50.9	132.14	0.74	53.4	0.75	-4.7	-2.6
105	50.8	126.15	0.74	53.3	0.76	-4.7	-2.4
110	50.7	120.71	0.74	53.2	0.76	-4.7	-2.2
115	50.6	115.75	0.74	53.1	0.76	-4.7	-2.1
120	50.5	111.21	0.74	53.0	0.76	-4.7	-1.9
125	50.4	107.03	0.74	52.9	0.76	-4.7	-1.7
130	50.3	103.18	0.75	52.8	0.76	-4.7	-1.5
135	50.1	99.62	0.75	52.6	0.76	-4.7	-1.3
140	50.0	96.32	0.75	52.5	0.76	-4.7	-1.1
145	49.9	93.24	0.75	52.4	0.76	-4.7	-0.8
150	49.8	90.38	0.75	52.3	0.76	-4.7	-0.6
155	49.7	87.70	0.76	52.1	0.76	-4.5	-0.8
160	49.6	85.20	0.76	51.8	0.77	-4.2	-1.0
165	49.5	82.84	0.76	51.8	0.77	-4.0	-1.2
170	49.4	80.63	0.76	51.4	0.77	-3.7	-1.4
175	49.4	78.55	0.76	51.1	0.78	-3.5	-1.6
180	49.3	76.58	0.77	50.9	0.78	-3.2	-1.8
185	49.2	74.72	0.77	50.7	0.78	-3.0	-2.0
190	49.1	72.96	0.77	50.4	0.79	-2.7	-2.2
195	49.0	71.29	0.77	50.2	0.79	-2.4	-2.3
200	48.9	69.71	0.78	50.0	0.80	-2.1	-2.5
205	48.8	68.20	0.78	49.7	0.80	-1.9	-2.7
210	48.7	66.77	0.78	49.5	0.80	-1.6	-2.8
215	48.6	65.41	0.78	49.3	0.81	-1.3	-3.0
220	48.6	64.10	0.78	49.0	0.81	-1.0	-3.2
225	48.5	62.86	0.79	48.8	0.81	-0.7	-3.3
230	48.4	61.67	0.79	48.6	0.82	-0.4	-3.5
235	48.3	60.54	0.79	48.3	0.82	0.0	-3.6
240	48.2	59.45	0.79	48.1	0.82	0.3	-3.8
245	48.1	58.41	0.80	47.9	0.83	0.6	-3.9
250	48.1	57.41	0.80	47.6	0.83	0.9	-4.1