

Head Tissue Simulating Liquids

Head Tissue	Parameters according to IEEE Std 1528-2013 / IEC 62209 / FCC KDB 865664 D01		
Narrow-Band Solutions (±5% tolerance)	Product	Test Frequency (MHz)	Main Ingredients
	HSL300V2	300	Water, Sugar
	HSL450V2	450	Water, Sugar
	HSL750V2	750	Water, Sugar
	HSL900V2	835, 900	Water, Sugar
	HSL1450V2	1450, 1500, 1640	Water, DGBE
	HSL1750V2	1750	Water, DGBE
	HSL1800V2	1800, 1900	Water, DGBE
	HSL1900V2	1900	Water, DGBE
	HSL1950V2	1950, 2000	Water, DGBE
	HSL2450V2	2450, 2600	Water, DGBE
Broad-Band Solutions (±5% tolerance)	Product	Test Frequency (MHz)	Main Ingredients
	HBBL30-250V3	30-250	Water, Tween
	HBBL1350-1850V3	1400-1800	Water, Tween
	HBBL1550-1950V3	1750-1900	Water, Tween
	HBBL1900-3800V3	1950-3000	Water, Tween
	HBBL3500-5800V5	3500-5800	Water, Oil

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Measurement Certificate / Material Test

Item Name	Head Tissue Simulating Liquid (HSL2450V2)
Product No.	SL AAH 245 BA (Charge: 130430-3)
Manufacturer	SPEAG

Measurement Method

TSL dielectric parameters measured using calibrated OCP probe.

Setup Validation

Validation results were within $\pm 2.5\%$ towards the target values of Methanol.

Target Parameters

Target parameters as defined in the IEEE 1528 and IEC 62209 compliance standards.

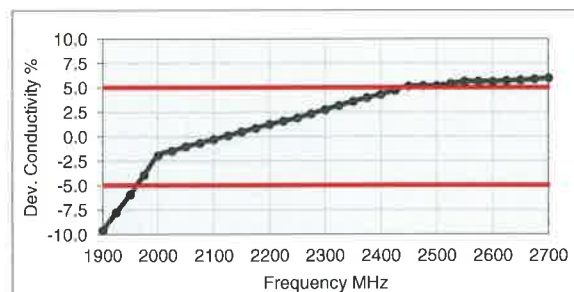
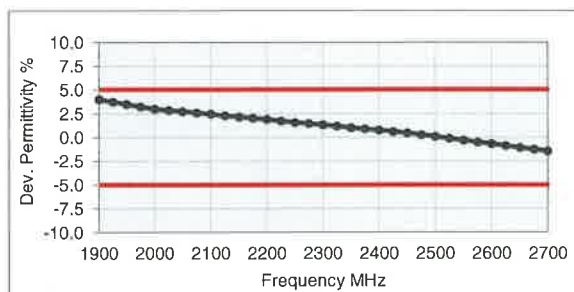
Test Condition

Ambient Environment temperatur (22 ± 3)°C and humidity < 70%.
 TSL Temperature **23°C**
 Test Date 2-May-13
 Operator CL

Additional Information

TSL Density 0.988 g/cm³
 TSL Heat-capacity 3.680 kJ/(kg*K)

f [MHz]	Measured			Target		Diff.to Target [%]	
	HP-e'	HP-e''	sigma	eps	sigma	Δ -eps	Δ -sigma
1900	41.6	11.98	1.27	40.0	1.40	4.0	-9.6
1925	41.5	12.06	1.29	40.0	1.40	3.8	-7.7
1950	41.4	12.15	1.32	40.0	1.40	3.5	-5.9
1975	41.3	12.24	1.35	40.0	1.40	3.3	-3.9
2000	41.2	12.34	1.37	40.0	1.40	3.0	-1.9
2025	41.1	12.44	1.40	40.0	1.42	2.9	-1.5
2050	41.0	12.54	1.43	39.9	1.44	2.8	-1.0
2075	40.9	12.62	1.46	39.9	1.47	2.6	-0.6
2100	40.8	12.71	1.48	39.8	1.49	2.5	-0.3
2125	40.7	12.80	1.51	39.8	1.51	2.3	0.1
2150	40.6	12.88	1.54	39.7	1.53	2.2	0.5
2175	40.5	12.97	1.57	39.7	1.56	2.0	0.9
2200	40.4	13.05	1.60	39.6	1.58	1.9	1.3
2225	40.3	13.13	1.63	39.6	1.60	1.7	1.6
2250	40.2	13.21	1.65	39.6	1.62	1.6	1.9
2275	40.1	13.30	1.68	39.5	1.64	1.5	2.4
2300	40.0	13.39	1.71	39.5	1.67	1.3	2.8
2325	39.9	13.48	1.74	39.4	1.69	1.2	3.2
2350	39.8	13.56	1.77	39.4	1.71	1.0	3.6
2375	39.7	13.64	1.80	39.3	1.73	0.9	4.0
2400	39.6	13.72	1.83	39.3	1.76	0.8	4.3
2425	39.5	13.80	1.86	39.2	1.78	0.6	4.8
2450	39.4	13.89	1.89	39.2	1.80	0.5	5.2
2475	39.3	13.96	1.92	39.2	1.83	0.3	5.2
2500	39.2	14.03	1.95	39.1	1.85	0.1	5.2
2525	39.1	14.12	1.98	39.1	1.88	-0.1	5.4
2550	39.0	14.22	2.02	39.1	1.91	-0.3	5.6
2575	38.9	14.28	2.05	39.0	1.94	-0.5	5.6
2600	38.7	14.34	2.07	39.0	1.96	-0.7	5.6
2625	38.6	14.41	2.10	39.0	1.99	-0.9	5.7
2650	38.5	14.48	2.13	38.9	2.02	-1.1	5.8
2675	38.4	14.55	2.17	38.9	2.05	-1.3	5.9
2700	38.3	14.62	2.20	38.9	2.07	-1.4	6.0



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Measurement Certificate / Material Test

Item Name **Head Tissue Simulating Liquid (HBBL3500-5800V5)**
 Product No. SL AAH 502 AB (Charge: 130123-1)
 Manufacturer SPEAG

Measurement Method

TSL dielectric parameters measured using calibrated OCP probe.

Setup Validation

Validation results were within $\pm 2.5\%$ 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 23-Jan-13
 Operator DI

Additional Information

TSL Density 0.985 g/cm³
 TSL Heat-capacity 3.383 kJ/(kg*K)

f [MHz]	Measured			Target		Diff.to Target [%]	
	HP-e'	HP-e''	sigma	eps	sigma	Δ-eps	Δ-sigma
3400	38.8	15.03	2.84	38.0	2.81	1.9	1.2
3500	38.6	15.00	2.92	37.9	2.91	1.8	0.3
3600	38.5	14.98	3.00	37.8	3.02	1.7	-0.5
3700	38.4	14.97	3.08	37.7	3.12	1.7	-1.2
3800	38.2	14.95	3.16	37.6	3.22	1.7	-1.8
3900	38.1	14.96	3.25	37.5	3.32	1.7	-2.3
4000	38.0	14.99	3.34	37.4	3.43	1.8	-2.6
4100	37.9	15.03	3.43	37.2	3.53	1.8	-2.8
4200	37.8	15.06	3.52	37.1	3.63	1.8	-3.0
4300	37.7	15.13	3.62	37.0	3.73	1.8	-3.1
4400	37.6	15.20	3.72	36.9	3.84	1.8	-3.0
4500	37.4	15.23	3.81	36.8	3.94	1.7	-3.2
4600	37.3	15.30	3.92	36.7	4.04	1.6	-3.1
4700	37.1	15.35	4.01	36.6	4.14	1.5	-3.1
4800	37.0	15.41	4.11	36.4	4.25	1.5	-3.1
4850	36.9	15.45	4.17	36.4	4.30	1.5	-3.0
4900	36.8	15.49	4.22	36.3	4.35	1.4	-2.9
4950	36.8	15.51	4.27	36.3	4.40	1.4	-2.9
5000	36.7	15.54	4.32	36.2	4.45	1.4	-2.9
5050	36.6	15.57	4.37	36.2	4.50	1.3	-2.8
5100	36.6	15.60	4.42	36.1	4.55	1.3	-2.8
5150	36.5	15.63	4.48	36.0	4.60	1.2	-2.7
5200	36.4	15.67	4.53	36.0	4.66	1.2	-2.6
5250	36.3	15.68	4.58	35.9	4.71	1.1	-2.7
5300	36.2	15.71	4.63	35.9	4.76	1.0	-2.6
5350	36.2	15.74	4.68	35.8	4.81	1.0	-2.6
5400	36.1	15.78	4.74	35.8	4.86	0.9	-2.5
5450	36.0	15.78	4.78	35.7	4.91	0.9	-2.6
5500	36.0	15.79	4.83	35.6	4.96	0.9	-2.6
5550	35.9	15.84	4.89	35.6	5.01	0.9	-2.5
5600	35.8	15.86	4.94	35.5	5.07	0.8	-2.5
5650	35.8	15.91	5.00	35.5	5.12	0.8	-2.2
5700	35.7	15.91	5.05	35.4	5.17	0.8	-2.4
5750	35.6	15.97	5.11	35.4	5.22	0.7	-2.1
5800	35.5	15.98	5.16	35.3	5.27	0.7	-2.1
5850	35.5	16.01	5.21	35.3	5.34	0.5	-2.4
5900	35.4	16.05	5.27	35.3	5.40	0.3	-2.4

