

15.29 SAR Tissue Ingredients

SAR Tissue Ingredients

Body Tissue Simulating Liquids					
Body Tissue (Muscle)	Parameters according to FCC KDB 865664 D01				
Narrow – Band Solutions (±5% tolerance)	Product	Test Frequency [MHz]	Main Ingredients		
	MSL750V2	750	Water, Sugar		
	MSL900V2	835, 900	Water, Sugar		
	MSL1750V2	1750	Water, DGBE		
	MSL1900V2	1900	Water, DGBE		
Broad – Band Solutions (± 5% tolerance)	Product	Test Frequency [MHz]	Main Ingredients		
	MBBL3500–5800V5	3500–5800	Water, Oil		

MSL750

The Item is composed of the following ingredients:

- H₂O Water, 35 – 58%
 - Sucrose Sugar, white, refined, 40 – 60%
 - NaCl Sodium Chloride, 0 – 6%
 - Hydroxyethyl-cellulose Medium Viscosity (CAS# 9004-62-0), <0.3%
 - Preventol-D7 Preservative: aqueous preparation, (CAS# 55965-84-9), containing 5-chloro-2-methyl-3(2H)-isothiazolone and 2-methyl-3(2H)-isothiazolone, 0.1 – 0.7%
- Relevant for safety; Refer to the respective Safety Data Sheet*.

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Measurement Certificate / Material Test

Item Name	Body Tissue Simulating Liquid (MSL 750)
Product No.	SL AAM 075 AA (Charge: 111107-3)
Manufacturer	SPEAG

Measurement Method

TSL dielectric parameters measured using calibrated OCP probe (type DAK).

Target Parameters

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

Test Condition

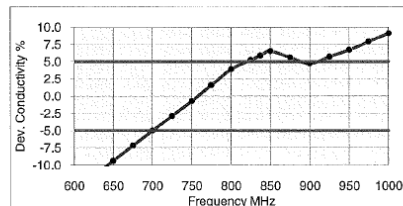
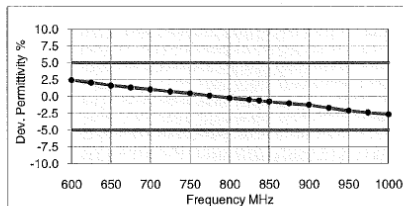
Ambient Condition 22°C ; 30% humidity
 TSL Temperature 22°C
 Test Date 9-Nov-11

Additional Information

TSL Density 1.212 g/cm³
 TSL Heat-capacity 3.006 kJ/(kg*K)

Results

f [MHz]	Measured			Target		Diff. to Target [%]	
	HP-e'	HP-e''	sigma	eps	sigma	Δ-eps	Δ-sigma
600	57.5	24.52	0.82	56.1	0.95	2.4	-14.0
625	57.2	24.24	0.84	56.0	0.95	2.0	-11.7
650	56.8	23.96	0.87	55.9	0.96	1.6	-9.3
675	56.6	23.68	0.89	55.8	0.96	1.3	-7.2
700	56.3	23.41	0.91	55.7	0.96	1.0	-5.0
725	56.0	23.17	0.93	55.6	0.96	0.7	-2.8
750	55.8	22.93	0.96	55.5	0.96	0.4	-0.7
775	55.5	22.75	0.98	55.4	0.97	0.1	1.6
800	55.2	22.58	1.01	55.3	0.97	-0.2	3.9
825	55.0	22.43	1.03	55.2	0.98	-0.5	5.2
838	54.8	22.35	1.04	55.2	0.98	-0.6	5.9
850	54.7	22.27	1.05	55.2	0.99	-0.8	6.5
875	54.5	22.12	1.08	55.1	1.02	-1.0	5.6
900	54.3	21.97	1.10	55.0	1.05	-1.3	4.7
925	54.0	21.84	1.12	55.0	1.06	-1.7	5.7
950	53.8	21.72	1.15	54.9	1.08	-2.1	6.7
975	53.6	21.63	1.17	54.9	1.09	-2.4	7.9
1000	53.4	21.53	1.20	54.8	1.10	-2.7	9.1



MSL900V2

The Item is composed of the following ingredients:

- H₂O Water, 35 – 58%
 - Sucrose Sugar, white, refined, 40 – 60%
 - NaCl Sodium Chloride, 0 – 6%
 - Hydroxyethyl-cellulose Medium Viscosity (CAS# 9004-62-0), <0.3%
 - Preventol-D7 Preservative: aqueous preparation, (CAS# 55965-84-9), containing 5-chloro-2-methyl-3(2H)-isothiazolone and 2-methyl-3(2H)-isothiazolone, 0.1 – 0.7%
- Relevant for safety; Refer to the respective Safety Data Sheet*.

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Measurement Certificate / Material Test

Item Name	Body Tissue Simulating Liquid (MSL900V2)
Product No.	SL AAM 090 CA (Charge: 130313-2)
Manufacturer	SPEAG

Measurement Method

TSL dielectric parameters measured using calibrated OCP 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.

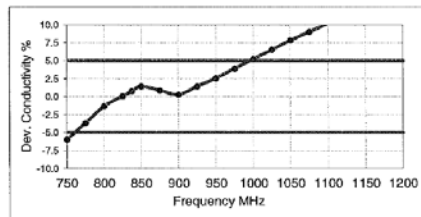
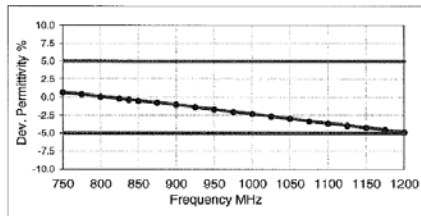
Test Condition

Ambient Environment temperatur (22 ± 3)°C and humidity < 70%.
 TSL Temperature 22°C
 Test Date 13-Mar-13
 Operator IEN

Additional Information

TSL Density 1.294 g/cm³
 TSL Heat-capacity 3.003 kJ/(kg*K)

f [MHz]	Measured			Target		Diff.to Target [%]	
	HP-e'	HP-e''	sigma	eps	sigma	Δ-eps	Δ-sigma
700	56.4	22.03	0.86	55.7	0.96	1.3	-10.6
725	56.2	21.87	0.88	55.6	0.96	1.0	-8.3
750	55.9	21.71	0.91	55.5	0.96	0.7	-6.0
775	55.7	21.58	0.93	55.4	0.97	0.4	-3.6
800	55.4	21.45	0.95	55.3	0.97	0.1	-1.3
825	55.1	21.33	0.98	55.2	0.98	-0.2	0.1
850	54.9	21.21	1.00	55.2	0.99	-0.5	1.5
875	54.7	21.13	1.03	55.1	1.02	-0.7	0.9
900	54.4	21.04	1.05	55.0	1.05	-1.0	0.3
925	54.2	20.96	1.08	55.0	1.06	-1.4	1.5
950	54.0	20.88	1.10	54.9	1.08	-1.7	2.6
975	53.8	20.83	1.13	54.9	1.09	-2.0	4.0
1000	53.6	20.78	1.16	54.8	1.10	-2.3	5.3
1025	53.3	20.74	1.18	54.8	1.11	-2.7	6.6
1050	53.1	20.69	1.21	54.7	1.12	-3.0	7.9
1075	52.9	20.64	1.23	54.7	1.13	-3.3	9.1
1100	52.7	20.59	1.26	54.7	1.14	-3.6	10.2
1125	52.5	20.58	1.29	54.6	1.15	-3.9	11.6
1150	52.3	20.57	1.32	54.6	1.17	-4.2	12.9
1175	52.0	20.53	1.34	54.5	1.18	-4.5	14.0
1200	51.8	20.48	1.37	54.5	1.19	-4.8	15.1



MSL1750V2

The Item is composed of the following ingredients:

- H2O Water, 52 – 75%
- C8H18O3 Diethylene glycol monobutyl ether (DGBE), 25 – 48%
(CAS-No. 112-34-5, EC-No. 203-961-6, EC-index-No. 603-096-00-8)
Relevant for safety; Refer to the respective Safety Data Sheet*.
- NaCl Sodium Chloride, <1.0%

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Measurement Certificate / Material Test

Item Name	Body Tissue Simulating Liquid (MSL1750V2)
Product No.	SL AAM 175 AA (Charge: 130212-3)
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.

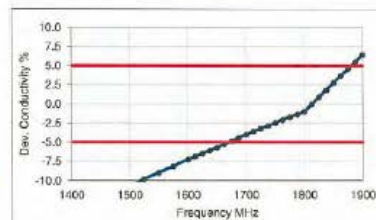
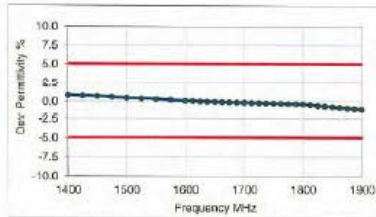
Test Condition

Ambient Environment temperatur (22 ± 3)°C and humidity < 70%.
TSL Temperature 22°C
Test Date 13-Feb-13
Operator DI

Additional Information

TSL Density 0.998 g/cm³
TSL Heat-capacity 3.693 kJ/(kg*K)

f [MHz]	Measured			Target			Diff. to Target [%]	
	HP-e'	HP-e''	sigma	eps	sigma	Δ-eps	Δ-sigma	
1400	54.5	14.00	1.09	54.1	1.28	0.8	-14.6	
1425	54.4	14.06	1.12	54.0	1.29	0.7	-13.5	
1450	54.4	14.13	1.14	54.0	1.30	0.7	-12.3	
1475	54.3	14.19	1.16	54.0	1.32	0.6	-11.5	
1500	54.2	14.25	1.19	53.9	1.33	0.5	-10.7	
1525	54.1	14.32	1.21	53.9	1.35	0.4	-9.8	
1550	54.0	14.38	1.24	53.9	1.36	0.3	-9.0	
1575	53.9	14.45	1.27	53.8	1.38	0.2	-8.1	
1600	53.8	14.52	1.29	53.8	1.39	0.1	-7.3	
1613	53.8	14.55	1.31	53.8	1.40	0.0	-5.9	
1625	53.8	14.58	1.32	53.8	1.41	0.0	-5.5	
1638	53.7	14.61	1.33	53.7	1.42	0.0	-5.1	
1650	53.7	14.64	1.34	53.7	1.43	-0.1	-5.7	
1663	53.6	14.68	1.36	53.7	1.43	-0.1	-5.3	
1675	53.6	14.71	1.37	53.6	1.44	-0.1	-4.8	
1688	53.5	14.75	1.38	53.6	1.45	-0.1	-4.4	
1700	53.5	14.79	1.40	53.6	1.46	-0.2	-4.0	
1713	53.4	14.82	1.41	53.5	1.46	-0.2	-3.6	
1725	53.4	14.85	1.43	53.5	1.47	-0.2	-3.2	
1738	53.3	14.88	1.44	53.5	1.48	-0.2	-2.8	
1750	53.3	14.92	1.45	53.4	1.49	-0.3	-2.4	
1763	53.2	14.94	1.47	53.4	1.50	-0.3	-2.1	
1775	53.2	14.97	1.48	53.4	1.50	-0.3	-1.7	
1788	53.1	15.00	1.49	53.3	1.51	-0.4	-1.3	
1800	53.1	15.03	1.50	53.3	1.52	-0.4	-1.0	
1813	53.1	15.07	1.52	53.3	1.52	-0.5	-0.1	
1825	53.0	15.10	1.53	53.3	1.52	-0.5	0.9	
1838	53.0	15.14	1.55	53.3	1.52	-0.6	1.8	
1850	52.9	15.18	1.56	53.3	1.52	-0.7	2.8	
1863	52.9	15.21	1.58	53.3	1.52	-0.8	3.7	
1875	52.8	15.24	1.59	53.3	1.52	-0.9	4.6	
1888	52.8	15.28	1.60	53.3	1.52	-1.0	5.5	
1900	52.7	15.31	1.62	53.3	1.52	-1.1	6.4	



MSL1900V2

The Item is composed of the following ingredients:

- H2O Water, 52 – 75%
- C8H18O3 Diethylene glycol monobutyl ether (DGBE), 25 – 48%
(CAS-No. 112-34-5, EC-No. 203-961-6, EC-index-No. 603-096-00-8)
Relevant for safety; Refer to the respective Safety Data Sheet*.
- NaCl Sodium Chloride, <1.0%

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Measurement Certificate / Material Test

Item Name	Body Tissue Simulating Liquid (MSL1900V2)
Product No.	SL AAM 190 AA (Charge: 130218-2)
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.

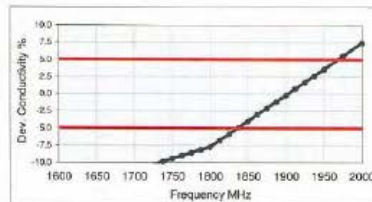
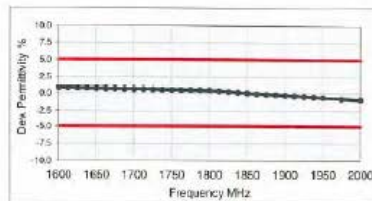
Test Condition

Ambient Environment temperatur (22 ± 3)°C and humidity < 70%.
TSL Temperature 22°C
Test Date 21-Feb-13
Operator DI

Additional Information

TSL Density 0.996 g/cm³
TSL Heat-capacity 3.947 kJ/(kg*K)

f [MHz]	Measured			Target		Diff. to Target [%]	
	HP-e ⁻¹	HP-e ⁻²	sigma	eps	sigma	Δ-eps	Δ-sigma
1600	54.2	13.31	1.19	53.8	1.39	0.8	-15.0
1613	54.2	13.36	1.20	53.8	1.40	0.8	-14.5
1625	54.1	13.40	1.21	53.8	1.41	0.7	-14.1
1638	54.1	13.44	1.22	53.7	1.42	0.7	-13.6
1650	54.1	13.48	1.24	53.7	1.43	0.7	-13.2
1663	54.0	13.53	1.25	53.7	1.43	0.7	-12.7
1675	54.0	13.57	1.26	53.8	1.44	0.7	-12.2
1688	53.9	13.62	1.28	53.8	1.45	0.6	-11.8
1700	53.9	13.66	1.29	53.8	1.46	0.6	-11.3
1713	53.8	13.71	1.31	53.8	1.46	0.6	-10.8
1725	53.8	13.76	1.32	53.5	1.47	0.6	-10.3
1738	53.8	13.80	1.33	53.5	1.48	0.5	-9.9
1750	53.7	13.85	1.35	53.4	1.49	0.5	-9.4
1763	53.7	13.89	1.36	53.4	1.50	0.5	-9.0
1775	53.6	13.93	1.38	53.4	1.50	0.5	-8.6
1788	53.6	13.97	1.39	53.3	1.51	0.4	-8.2
1800	53.5	14.00	1.40	53.3	1.52	0.4	-7.7
1813	53.5	14.05	1.42	53.3	1.52	0.3	-7.3
1825	53.4	14.09	1.43	53.3	1.52	0.2	-6.9
1838	53.4	14.14	1.45	53.3	1.52	0.1	-6.5
1850	53.3	14.18	1.46	53.3	1.52	0.0	-6.1
1863	53.3	14.22	1.47	53.3	1.52	0.0	-5.7
1875	53.2	14.27	1.49	53.3	1.52	-0.1	-5.3
1888	53.2	14.31	1.50	53.3	1.52	-0.2	-4.9
1900	53.2	14.35	1.52	53.3	1.52	-0.3	-4.5
1913	53.1	14.39	1.53	53.3	1.52	-0.4	-4.1
1925	53.1	14.43	1.55	53.3	1.52	-0.4	-3.7
1938	53.0	14.47	1.56	53.3	1.52	-0.5	-3.3
1950	53.0	14.51	1.57	53.3	1.52	-0.6	-2.9
1975	52.9	14.60	1.60	53.3	1.52	-0.7	-2.1
2000	52.8	14.68	1.63	53.3	1.52	-0.8	-1.2



MSL2450V2

The Item is composed of the following ingredients:

- H2O Water, 52 – 75%
- C8H18O3 Diethylene glycol monobutyl ether (DGBE), 25 – 48%
(CAS-No. 112-34-5, EC-No. 203-961-6, EC-index-No. 603-096-00-8)
Relevant for safety; Refer to the respective Safety Data Sheet*.
- NaCl Sodium Chloride, <1.0%

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Measurement Certificate / Material Test

Item Name	Body Tissue Simulating Liquid (MSL2450V2)
Product No.	SL AAM 245 BA (Charge: 130502-1)
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.

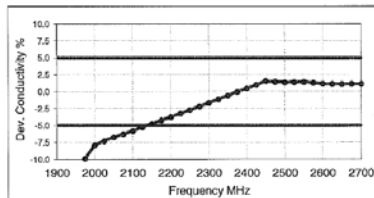
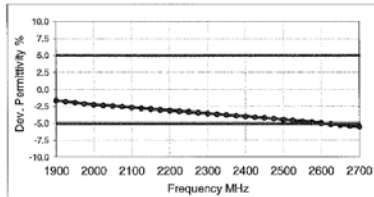
Test Condition

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

Additional Information

TSL Density	0.996 g/cm ³
TSL Heat-capacity	3.987 kJ/(kg·K)

f [MHz]	Measured			Target		Diff.to Target [%]	
	HP-e'	HP-e''	sigma	eps	sigma	Δ-eps	Δ-sigma
1900	52.5	12.14	1.28	53.3	1.52	-1.6	-15.6
1925	52.4	12.25	1.31	53.3	1.52	-1.7	-13.7
1950	52.3	12.35	1.34	53.3	1.52	-1.9	-11.8
1975	52.2	12.47	1.37	53.3	1.52	-2.1	-9.9
2000	52.1	12.59	1.40	53.3	1.52	-2.2	-7.9
2025	52.0	12.70	1.43	53.3	1.54	-2.3	-7.3
2050	52.0	12.82	1.46	53.2	1.57	-2.4	-6.7
2075	51.9	12.93	1.49	53.2	1.59	-2.5	-6.2
2100	51.8	13.03	1.52	53.2	1.62	-2.6	-5.6
2125	51.7	13.14	1.55	53.1	1.64	-2.7	-5.2
2150	51.6	13.25	1.58	53.1	1.66	-2.9	-4.7
2175	51.5	13.36	1.62	53.1	1.69	-3.0	-4.2
2200	51.4	13.46	1.65	53.0	1.71	-3.1	-3.7
2225	51.3	13.57	1.68	53.0	1.74	-3.2	-3.2
2250	51.2	13.67	1.71	53.0	1.76	-3.3	-2.7
2275	51.1	13.78	1.74	52.9	1.78	-3.4	-2.2
2300	51.0	13.89	1.78	52.9	1.81	-3.5	-1.6
2325	51.0	14.00	1.81	52.9	1.83	-3.6	-1.1
2350	50.9	14.11	1.84	52.8	1.85	-3.7	-0.6
2375	50.8	14.21	1.88	52.8	1.88	-3.8	0.0
2400	50.7	14.32	1.91	52.8	1.90	-3.9	0.5
2425	50.6	14.43	1.95	52.7	1.93	-4.1	1.1
2450	50.5	14.53	1.98	52.7	1.95	-4.2	1.6
2475	50.4	14.63	2.02	52.7	1.99	-4.3	1.5
2500	50.3	14.73	2.06	52.6	2.02	-4.4	1.4
2525	50.2	14.85	2.09	52.6	2.06	-4.5	1.4
2550	50.1	14.96	2.12	52.6	2.09	-4.7	1.5
2575	50.0	15.06	2.16	52.5	2.13	-4.8	1.3
2600	49.9	15.13	2.19	52.5	2.16	-4.9	1.2
2625	49.8	15.23	2.22	52.5	2.20	-5.1	1.2
2650	49.7	15.33	2.26	52.4	2.23	-5.2	1.2
2675	49.6	15.43	2.30	52.4	2.27	-5.3	1.2
2700	49.5	15.52	2.33	52.4	2.30	-5.5	1.2



MBBL3500-5800V5

The Item is composed of the following ingredients:

- Water 60 – 80%
- Esters, Emulsifiers, Inhibitors 20 – 40%
- Sodium salt 0 – 1.5%

Safety relevant ingredients according to Swiss and EU directives: none

Safety relevant ingredients according to other directives:

- CAS 26399-02-0 10 – 28% Oleic acid, alkylester

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Measurement Certificate / Material Test

Item Name	Body Tissue Simulating Liquid (MBBL3500-5800V5)
Product No.	SL AAM 501 EA (Charge: 130528-2)
Manufacturer	SPEAG

Measurement Method

TSL dielectric parameters measured using calibrated OCP 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	29-May-13
Operator	IEN

Additional Information

TSL Density	
TSL Heat-capacity	

f (MHz)	Measured			Target			Diff. to Target (%)	
	HP-ε'	HP-ε''	sigma	eps	sigma	Δ-eps	Δ-sigma	
3400	51.9	16.39	3.10	51.5	3.20	0.9	-3.0	
3500	51.8	16.43	3.20	51.3	3.31	0.9	-3.4	
3600	51.7	16.52	3.31	51.2	3.43	1.0	-3.5	
3700	51.5	16.60	3.42	51.1	3.55	0.9	-3.6	
3800	51.4	16.65	3.52	50.9	3.66	1.0	-3.9	
3900	51.3	16.72	3.63	50.8	3.78	1.0	-4.0	
4000	51.2	16.83	3.74	50.6	3.90	1.1	-4.0	
4100	51.0	16.91	3.86	50.5	4.01	1.0	-3.9	
4200	50.9	17.04	3.98	50.4	4.13	1.0	-3.7	
4300	50.8	17.23	4.12	50.2	4.25	1.1	-3.0	
4400	50.6	17.40	4.26	50.1	4.37	1.0	-2.4	
4500	50.4	17.51	4.38	50.0	4.48	0.9	-2.3	
4600	50.2	17.63	4.51	49.8	4.60	0.7	-1.9	
4700	50.0	17.72	4.63	49.7	4.72	0.6	-1.8	
4800	49.9	17.81	4.75	49.6	4.83	0.7	-1.7	
4850	49.9	18.00	4.86	49.5	4.89	0.6	-0.6	
4900	49.9	17.96	4.90	49.4	4.95	0.8	-1.0	
4950	49.6	18.07	4.98	49.4	5.01	0.5	-0.5	
5000	49.7	18.14	5.05	49.3	5.07	0.8	-0.3	
5050	49.5	18.13	5.09	49.2	5.12	0.6	-0.7	
5100	49.4	18.26	5.18	49.2	5.18	0.5	0.0	
5150	49.3	18.26	5.23	49.1	5.24	0.4	-0.2	
5200	49.2	18.38	5.32	49.0	5.30	0.4	0.4	
5250	49.1	18.38	5.37	48.9	5.36	0.3	0.2	
5300	49.0	18.50	5.45	48.9	5.42	0.2	0.6	
5350	49.0	18.52	5.51	48.8	5.47	0.4	0.6	
5400	48.8	18.58	5.58	48.7	5.53	0.1	0.9	
5450	48.8	18.66	5.66	48.7	5.59	0.3	1.2	
5500	48.7	18.64	5.70	48.6	5.65	0.2	0.9	
5550	48.6	18.76	5.79	48.5	5.71	0.1	1.4	
5600	48.6	18.76	5.85	48.5	5.77	0.3	1.4	
5650	48.4	18.87	5.93	48.4	5.82	0.0	1.8	
5700	48.4	18.89	5.99	48.3	5.88	0.1	1.8	
5750	48.3	18.99	6.08	48.3	5.94	0.1	2.3	
5800	48.2	19.01	6.13	48.2	6.00	0.0	2.2	
5850	48.1	19.10	6.22	48.1	6.06	-0.1	2.7	
5900	48.1	19.16	6.29	48.1	6.12	0.1	2.8	

