Tissue Parameters

Recipe for liquids below 1 GHz:
Water 35-58%
Sugar 40-60%
Salt 0-6%
Hydroxyethyl-cellulose <0.3%
Preventol-D7 0.1-0.7%

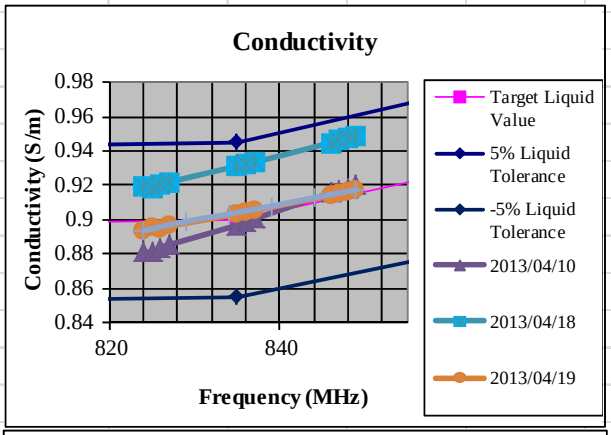
Recipe for liquids above 1-3 GHz:
Water 52-75%
DGBE 25-48%
Salt <1.0%

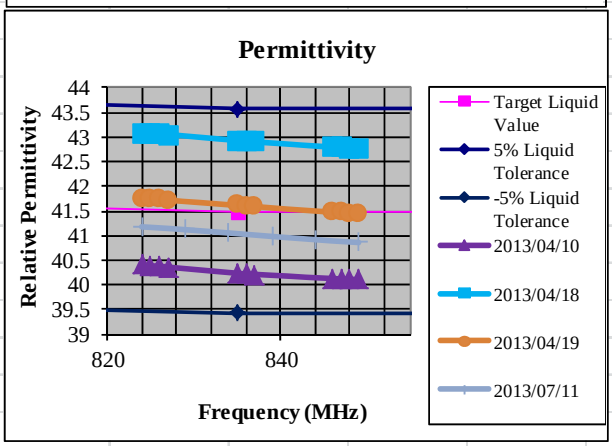
Recipe for liquids 5-6 GHz:
Water 60-80%
Esters, Emulsifiers, Inhibitors 20-40%
Sodium Chloride 0-1.5%

SAR measurements were made within 24 hours of the measurement of liquid parameters. Relative permittivity and conductivity are within ±5% of the target.

850 MHz Head Liquid

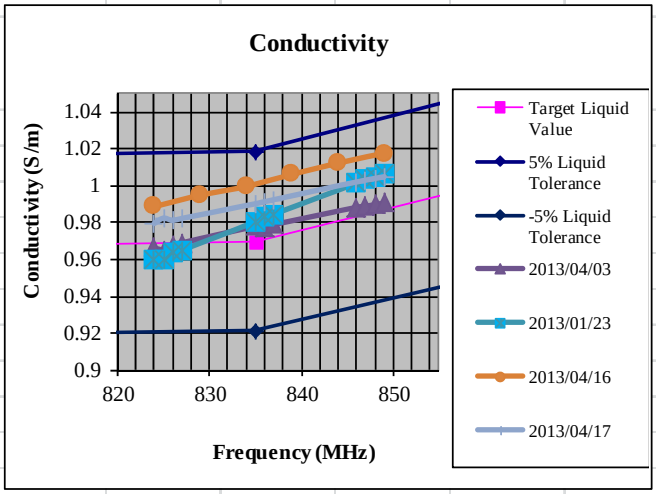
Date	Temp (°C)	Frequency (MHz)	Relative Permativity	Conductivity (S/m)
2013/04/10	21.2	824	40.4172	0.8812
		825	40.3842	0.8812
		826	40.3842	0.8838
		827	40.3636	0.8855
		835	40.2379	0.8968
		836	40.2243	0.8993
		837	40.2161	0.9005
		846	40.129	0.9157
		847	40.1251	0.9173
		848	40.1178	0.9187
		849	40.109	0.9206
2013/04/18	22.1	824	43.0902	0.9191
		825	43.09	0.9187
		826	43.0651	0.9207
		827	43.0539	0.9219
		835	42.9329	0.9313
		836	42.9215	0.9329
		837	42.9055	0.9334
		846	42.7983	0.9448
		847	42.7958	0.9461
		848	42.781	0.9473
		849	42.7713	0.9484
2013/04/19	22.3	824	41.7585	0.8933
		825	41.7353	0.8951
		826	41.7424	0.8947
		827	41.7207	0.8963
		835	41.6174	0.9032
		836	41.612	0.9044
		837	41.5913	0.9053
		846	41.4752	0.9141
		847	41.4661	0.915
		848	41.4569	0.9162
		849	41.4406	0.9168
2013/07/11	23.9	824	41.1812	0.8937
		829	41.1256	0.8991
		834	41.0575	0.9032
		839	40.9815	0.908
		844	40.9241	0.9127
		849	40.8613	0.9174

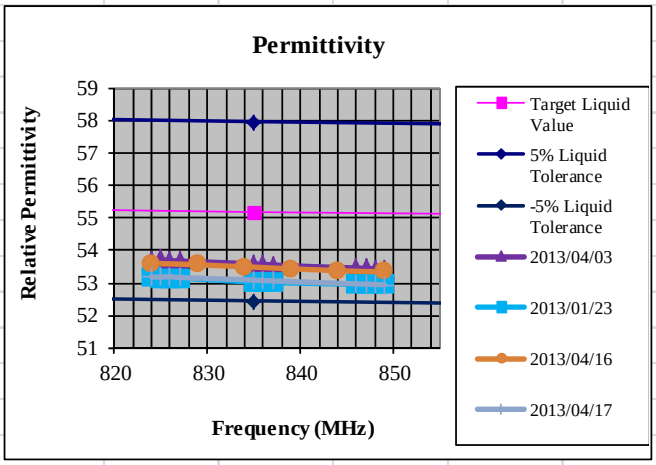




850 MHz Body Liquid

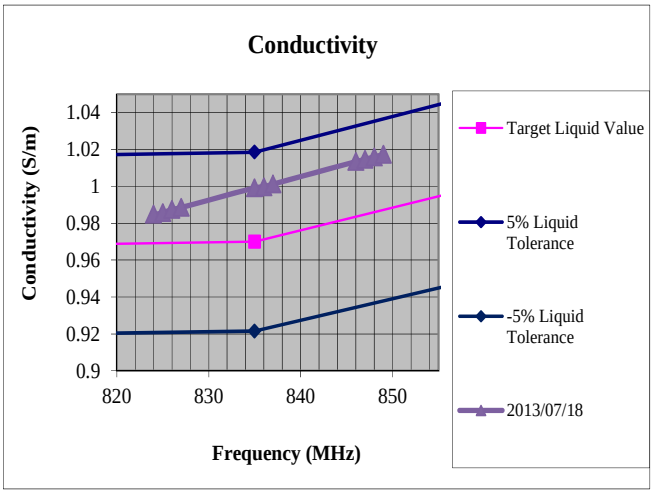
Date	Temp (°C)	Frequency (MHz)	Relative Permativity	Conductivity (S/m)
2013/04/03	21.9	824	53.7018	0.9663
		825	53.7237	0.9652
		826	53.69	0.9681
		827	53.6797	0.969
		835	53.5882	0.9779
		836	53.5751	0.9778
		837	53.5544	0.9789
		846	53.4611	0.9882
		847	53.4513	0.9889
		848	53.4403	0.9896
		849	53.4251	0.9907
2013/01/23	21	824	53.1984	0.9599
		825	53.1318	0.9598
		826	53.1635	0.9634
		827	53.1523	0.965
		835	53.0286	0.9804
		836	53.0142	0.9828
		837	53.015	0.9845
		846	52.9624	1.0013
		847	52.9619	1.0032
		848	52.9579	1.0046
		849	52.9575	1.0062
2013/04/16	22.5	824	53.6079	0.9886
		829	53.5657	0.9948
		834	53.4984	0.9995
		839	53.4364	1.0061
		844	53.3854	1.0122
		849	53.3419	1.0175
2013/04/17	23.5	824	53.1953	0.9795
		825	53.1816	0.9824
		826	53.1978	0.9811
		827	53.1714	0.9822
		835	53.0946	0.9902
		836	53.0783	0.9913
		837	53.0639	0.9924
		846	52.9762	1.002
		847	52.9673	1.003
		848	52.961	1.004
		849	52.9468	1.0048

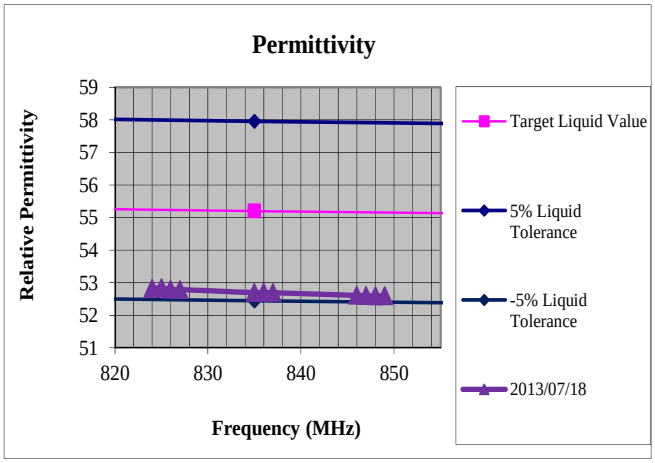




850 MHz Body Liquid

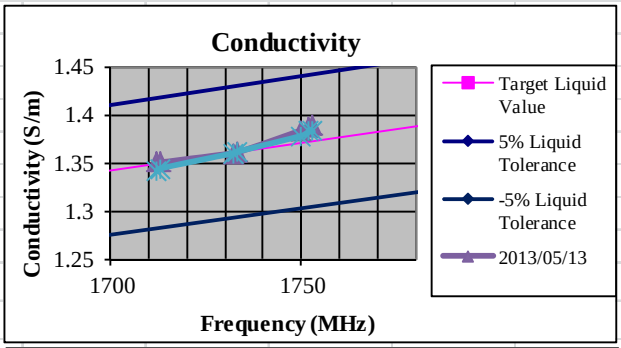
Date	Temp (°C)	Frequency (MHz)	Relative Permativity	Conductivity (S/m)
2013/07/18	21.6	824	52.815	0.9848
		825	52.8373	0.9856
		826	52.7882	0.9875
		827	52.7859	0.9885
		835	52.6923	0.9992
		836	52.6971	0.9996
		837	52.6892	1.0012
		846	52.6083	1.0134
		847	52.602	1.0146
		848	52.5949	1.0159
		849	52.5923	1.0172

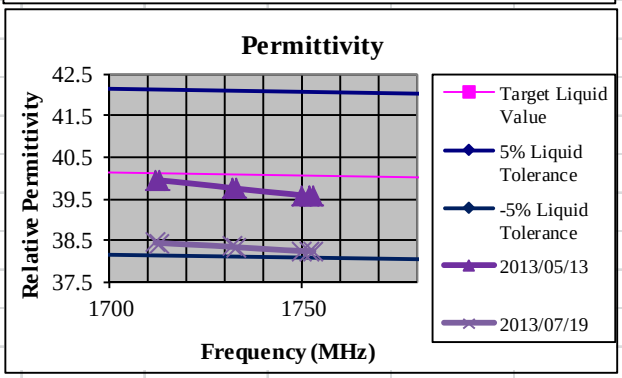




1750 MHz Head Liquid

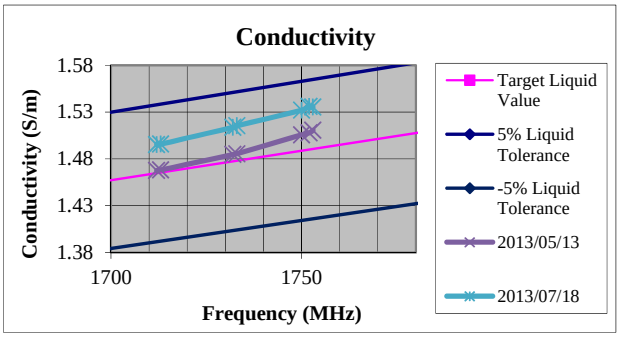
Date	Temp	Frequency	Relative	Conductivity
2013/05/13	22.3	1712	39.9533	1.3507
		1713	39.9474	1.3509
		1732	39.7603	1.3603
		1733	39.7433	1.3608
		1750	39.5861	1.384
		1752	39.5824	1.3868
		1753	39.572	1.3892
2013/07/19	21.5	1712	38.4423	1.3417
		1713	38.4347	1.3446
		1732	38.3438	1.3603
		1733	38.3324	1.3618
		1750	38.2405	1.3784
		1752	38.246	1.3827
		1753	38.2398	1.3828

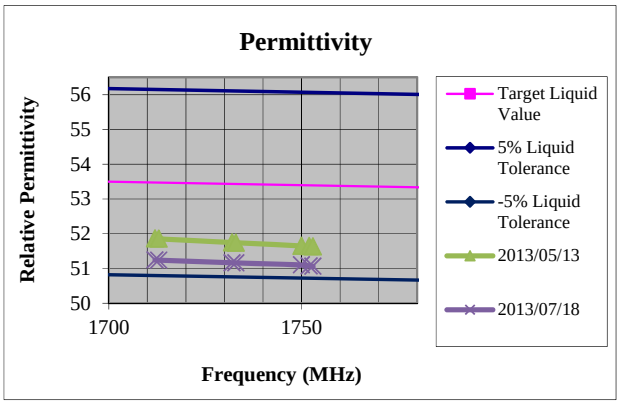




1750 MHz Body Liquid

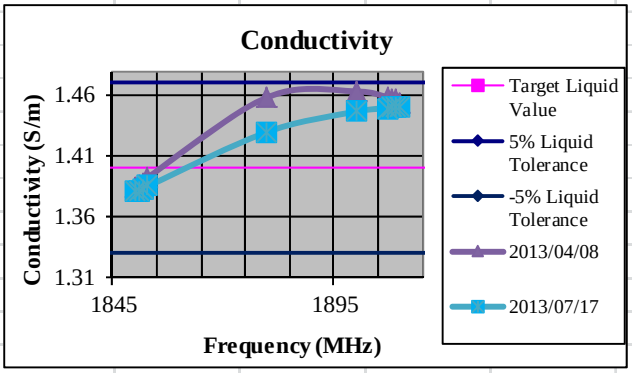
Date	Temp (°C)	Frequency (MHz)	Relative Permativity	Conductivity (S/m)
2013/05/13	22.3	1712	51.8651	1.4676
		1713	51.8541	1.4681
		1732	51.7478	1.4846
		1733	51.7428	1.4854
		1750	51.6513	1.5057
		1752	51.6386	1.5078
		1753	51.6313	1.5105
2013/07/18	21.8	1712	51.2443	1.4953
		1713	51.2408	1.4957
		1732	51.1658	1.5137
		1733	51.1628	1.5153
		1750	51.1023	1.532
		1752	51.0747	1.5359
		1753	51.0673	1.5352

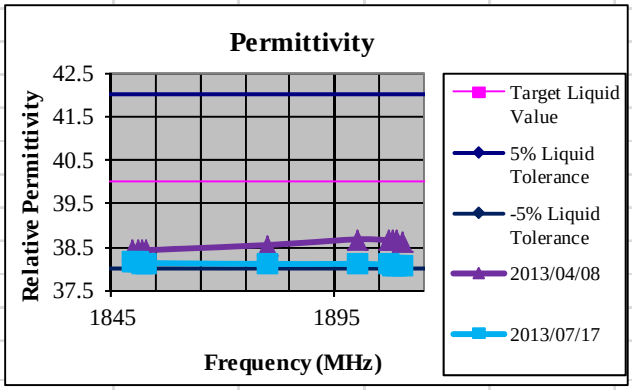




1900 MHz Head Liquid

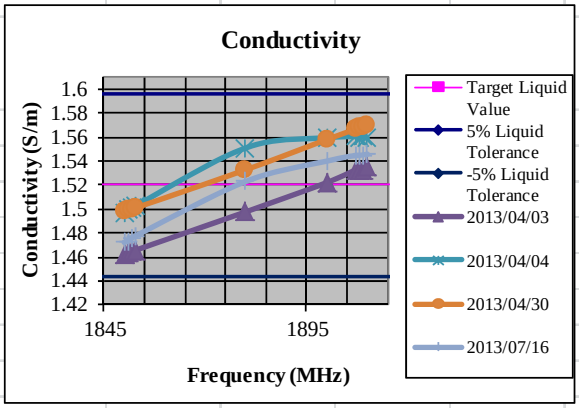
Date	Temp	Frequency	Relative	Conductivity
2013/04/08	21.6	1850	38.4543	1.3836
		1851	38.4306	1.3852
		1852	38.4451	1.3876
		1853	38.4369	1.3924
		1880	38.5534	1.4583
		1900	38.6858	1.4631
		1907	38.6622	1.4584
		1908	38.6537	1.4573
		1909	38.6479	1.4566
		1910	38.6403	1.4542
2013/07/17	21.5	1850	38.1613	1.3804
		1851	38.1538	1.3813
		1852	38.1406	1.3832
		1853	38.1399	1.3852
		1880	38.1177	1.4298
		1900	38.1212	1.4464
		1907	38.105	1.4494
		1908	38.0955	1.4506
		1909	38.087	1.4507
		1910	38.0797	1.451

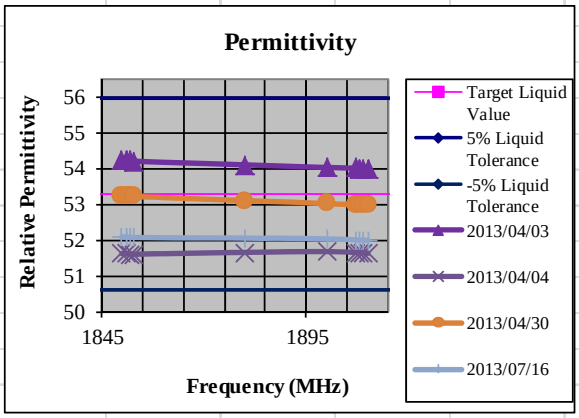




1900 MHz Body Liquid

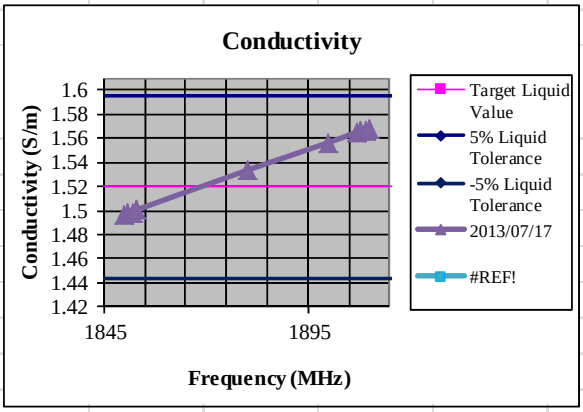
Date	Temp (°C)	Frequency (MHz)	Relative Permativity	Conductivity (S/m)
2013/04/03	21.5	1850	54.2327	1.4621
		1851	54.2324	1.4644
		1852	54.224	1.4648
		1853	54.2098	1.4659
		1880	54.1111	1.4977
		1900	54.0367	1.5221
		1907	54.0221	1.5325
		1908	54.0164	1.5322
		1909	54.0135	1.5334
		1910	54.0073	1.5354
2013/04/04	21.3	1850	51.6373	1.4972
		1851	51.6248	1.4998
		1852	51.6233	1.5016
		1853	51.6206	1.5031
		1880	51.6717	1.5512
		1900	51.6951	1.5596
		1907	51.6665	1.5605
		1908	51.658	1.56
		1909	51.6519	1.5606
		1910	51.6472	1.5591
2013/04/30	21.1	1850	53.2519	1.4976
		1851	53.2348	1.499
		1852	53.2257	1.5003
		1853	53.2279	1.5012
		1880	53.1133	1.5328
		1900	53.0307	1.5581
		1907	52.9965	1.5666
		1908	52.9969	1.5679
		1909	52.9982	1.5688
		1910	52.9947	1.5705
2013/07/16	22.1	1850	52.0998	1.4722
		1851	52.0992	1.4734
		1852	52.0913	1.4761
		1853	52.0839	1.478
		1880	52.0681	1.5231
		1900	52.0504	1.5401
		1907	52.0161	1.5448
		1908	52.0121	1.5449
		1909	52.0115	1.5452

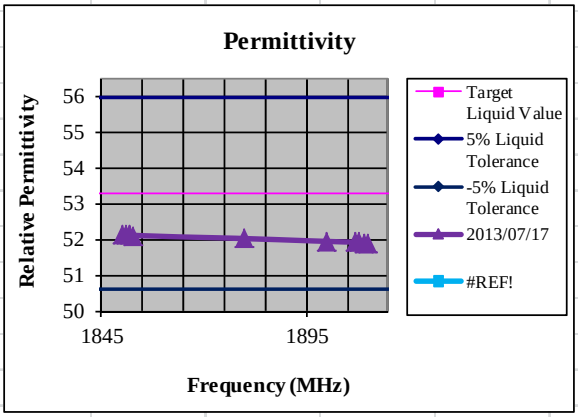




1900 MHz Body Liquid

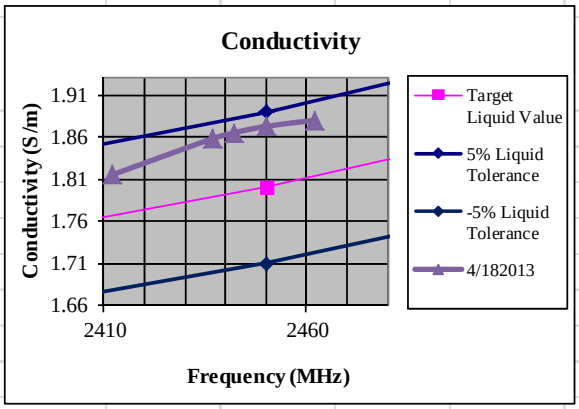
Date	Temp (°C)	Frequency (MHz)	Relative Permativity	Conductivity (S/m)
2013/07/17	20.8	1850	52.146	1.4958
		1851	52.1327	1.4979
		1852	52.1274	1.4984
		1853	52.1218	1.5005
		1880	52.0345	1.5333
		1900	51.9584	1.5564
		1907	51.933	1.5653
		1908	51.9291	1.5666
		1909	51.9182	1.567
		1910	51.9214	1.568

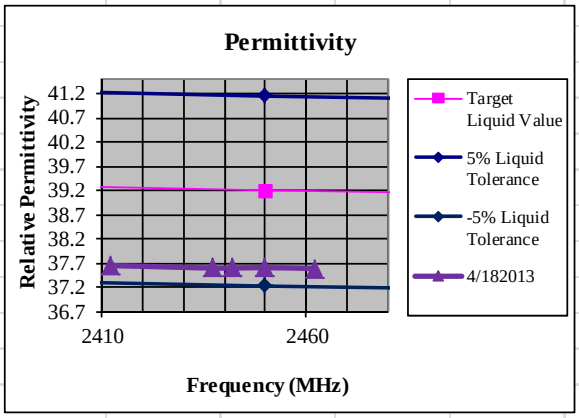




2450 MHz Head Liquid

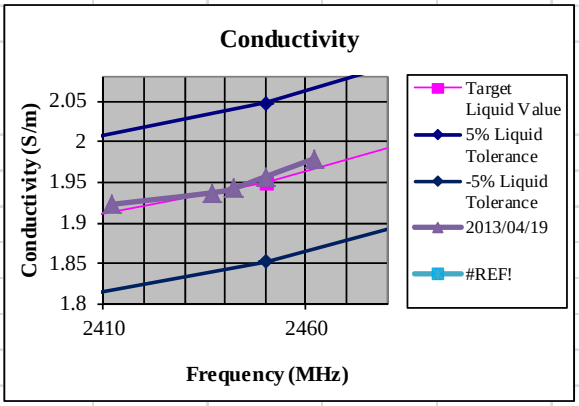
Date	Temp (°C)	Frequency (MHz)	Relative Permativity	Conductivity (S/m)
		2412	37.6588	1.8152
		2437	37.608	1.8587
		2442	37.6062	1.8648
		2450	37.6164	1.873
		2462	37.5993	1.8799
4/182013	23.6			

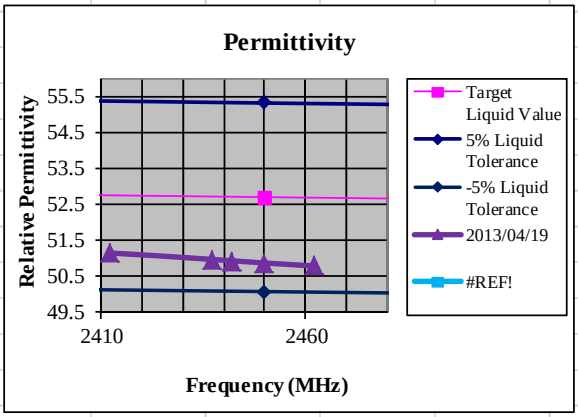




2450 MHz Body Liquid

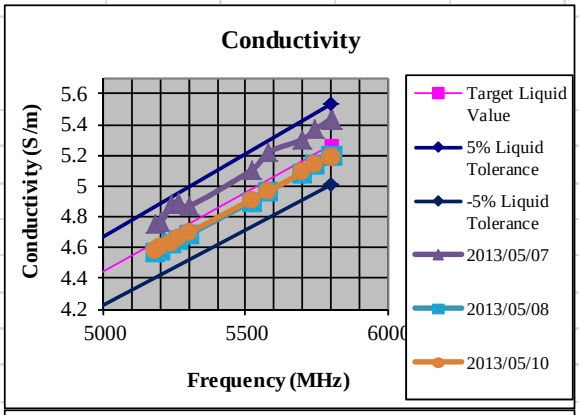
Date	Temp (°C)	Frequency (MHz)	Relative Permativity	Conductivity (S/m)
2013/04/19	22.3	2412	51.1485	1.9232
		2437	50.9746	1.9376
		2442	50.9268	1.9427
		2450	50.8698	1.9574
		2462	50.7867	1.9797

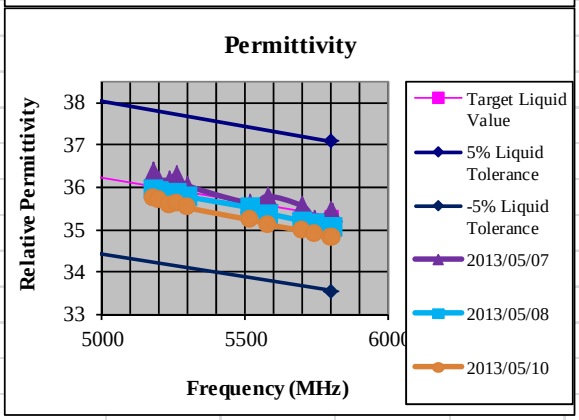




5000 MHz Head Liquid

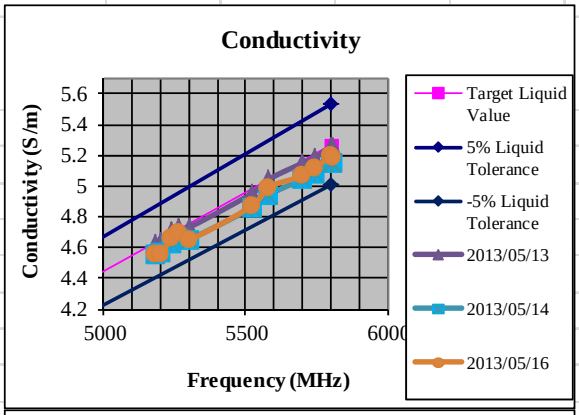
Date	Temp (°C)	Frequency (MHz)	Relative Permativity	Conductivity (S/m)
2013/05/07	21.6	5180	36.3608	4.7582
		5200	36.1897	4.7617
		5240	36.1804	4.8823
		5260	36.2874	4.8961
		5300	36.0408	4.8693
		5520	35.6286	5.1034
		5580	35.7957	5.2201
		5700	35.564	5.3031
		5745	35.2457	5.3678
		5800	35.4408	5.4353
		5805	35.3944	5.4281
2013/05/08	21.3	5180	35.974	4.5627
		5200	35.9292	4.5851
		5240	35.8557	4.6305
		5260	35.8537	4.6457
		5300	35.7823	4.6846
		5520	35.5179	4.8985
		5580	35.3859	4.9659
		5700	35.2151	5.0863
		5745	35.1581	5.1383
		5800	35.0865	5.1931
		5805	35.0691	5.1978
2013/05/10	21.3	5180	35.7371	4.5821
		5200	35.6932	4.6027
		5240	35.5583	4.6296
		5260	35.6113	4.6572
		5300	35.5192	4.6966
		5520	35.2316	4.9115
		5580	35.1284	4.9661
		5700	34.9726	5.0879
		5745	34.8838	5.1358
		5800	34.8284	5.1903
		5805	34.8195	5.1911

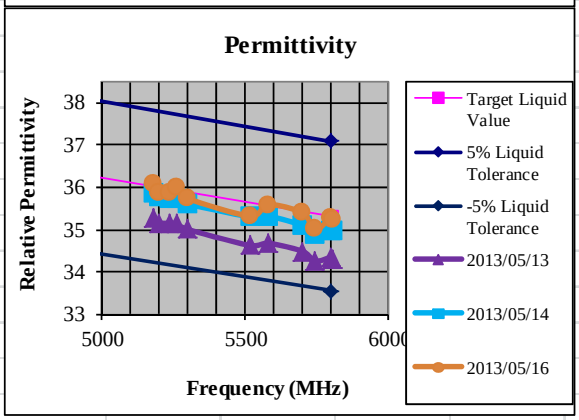




5000 MHz Head Liquid

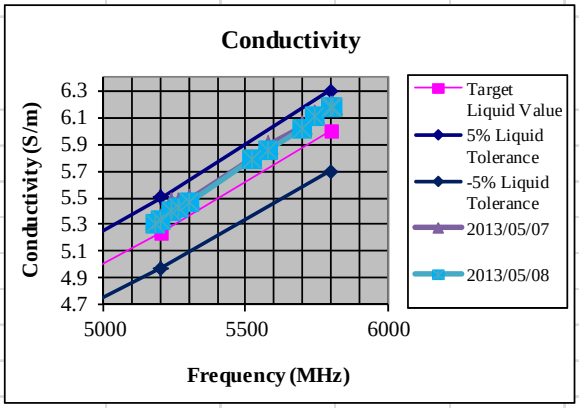
Date	Temp (°C)	Frequency (MHz)	Relative Permativity	Conductivity (S/m)
2013/05/13	21.5	5180	35.2876	4.6259
		5200	35.1691	4.635
		5240	35.1567	4.7062
		5260	35.145	4.7275
		5300	35.0099	4.7314
		5520	34.6302	4.9499
		5580	34.6838	5.0424
		5700	34.4961	5.1495
		5745	34.2631	5.1849
		5800	34.3569	5.258
		5805	34.3311	5.2574
2013/05/14	22.5	5180	35.8802	4.5534
		5200	35.7702	4.5632
		5240	35.7376	4.6285
		5260	35.7627	4.6561
		5300	35.611	4.6532
		5520	35.3048	4.8563
		5580	35.3266	4.9425
		5700	35.1033	5.0441
		5745	34.89	5.0861
		5800	35.0013	5.1527
		5805	34.9799	5.15
2013/05/16	20.7	5180	36.0682	4.5566
		5200	35.866	4.5585
		5240	35.8744	4.6663
		5260	35.9875	4.6919
		5300	35.7402	4.6499
		5520	35.3254	4.8695
		5580	35.5936	4.9923
		5700	35.4021	5.0645
		5745	35.0097	5.1147
		5800	35.2888	5.1991
		5805	35.261	5.1867

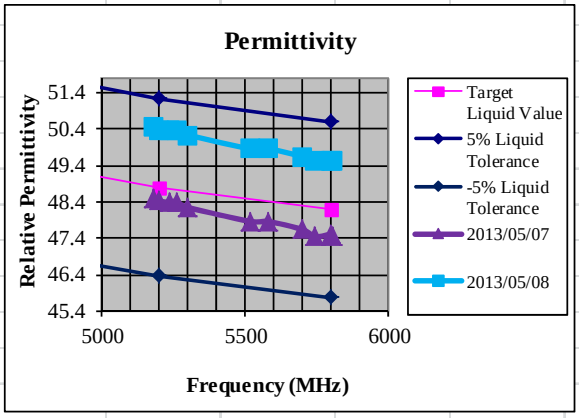




5000 MHz Body Liquid

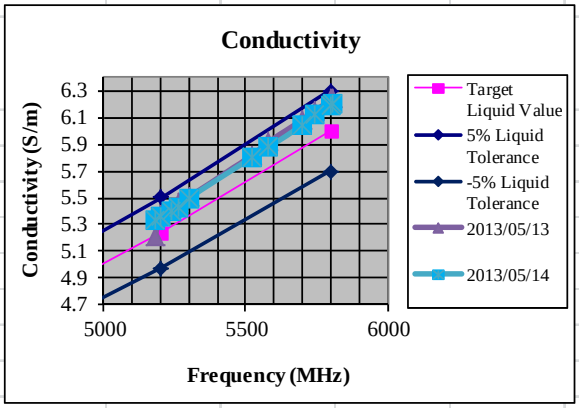
Date	Temp (°C)	Frequency (MHz)	Relative Permativity	Conductivity (S/m)
2013/05/07	23.5	5180	48.5187	5.33
		5200	48.4263	5.3513
		5240	48.3895	5.4631
		5260	48.419	5.4642
		5300	48.2535	5.4889
		5520	47.8649	5.7935
		5580	47.8667	5.8927
		5700	47.6453	6.0373
		5745	47.4519	6.1285
		5800	47.5175	6.1951
		5805	47.4686	6.1968
2013/05/08	22.8	5180	50.4601	5.3096
		5200	50.3885	5.3348
		5240	50.3861	5.406
		5260	50.3711	5.4322
		5300	50.2414	5.4666
		5520	49.8568	5.7842
		5580	49.8647	5.8604
		5700	49.6505	6.0198
		5745	49.5553	6.107
		5800	49.5309	6.1752
		5805	49.5131	6.1774
2013/05/09	22.3	5180	50.7975	5.4083
		5200	50.7664	5.4354
		5240	50.688	5.4783
		5260	50.6234	5.5152
		5300	50.5967	5.5696
		5520	50.2458	5.854
		5580	50.1322	5.9525
		5700	49.956	6.1253
		5745	49.9013	6.1824
		5800	49.7777	6.2646
		5805	49.7765	6.281

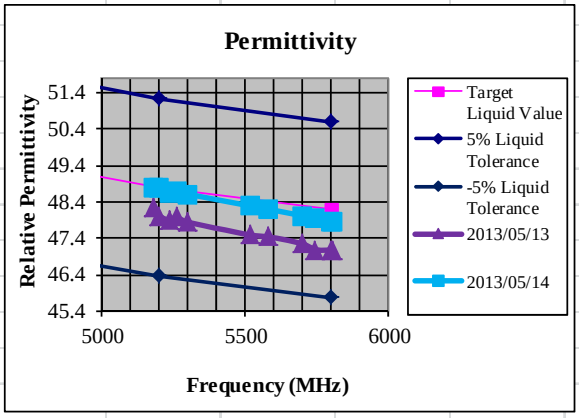




5000 MHz Body Liquid

Date	Temp (°C)	Frequency (MHz)	Relative Permativity	Conductivity (S/m)
2013/05/13	21.5	5180	48.2657	5.2098
		5200	48.0296	5.3727
		5240	47.8862	5.4312
		5260	47.9925	5.4692
		5300	47.8486	5.5076
		5520	47.4923	5.8167
		5580	47.446	5.916
		5700	47.2562	6.0845
		5745	47.0898	6.1491
		5800	47.081	6.2383
		5805	47.0614	6.238
2013/05/14	21.6	5180	48.8074	5.3333
		5200	48.8	5.358
		5240	48.6686	5.4004
		5260	48.6833	5.4294
		5300	48.6163	5.4986
		5520	48.2899	5.7988
		5580	48.2043	5.8758
		5700	48.0213	6.0455
		5745	47.9412	6.1177
		5800	47.8534	6.1911
		5805	47.8437	6.2011





Test Equipment

SAR1 Lab

Instrument description	Supplier / Manufacturer	Model	Serial No.	Calibration (date)	Calibration Due (date)
Robot	Staubli	TX90	F10/5D3NA 1/A/01	N/A	N/A
SAM Twin Phantom	SPEAG	SM 000 T01 DA	1592	N/A	N/A
Elliptical Phantom	SPEAG	QD OVA 001 BB	1092	N/A	N/A
Software	SPEAG	Dasy52.6.2.482	N/A	N/A	N/A
Device Holder	SPEAG	SD 000H01	N/A	N/A	N/A
Data Acquisition Electronics	SPEAG	DAE4	1233	2012/11/06	2013/11/06
SAR Probe	SPEAG	ES3DV3	3244	2012/11/07	2013/11/07

SAR 3 Lab

Instrument description	Supplier / Manufacturer	Model	Serial No.	Calibration (date)	Calibration Due (date)
Robot	Staubli	TX90	F11/5G2MA 1/C/01	N/A	N/A
SAM Twin Phantom	SPEAG	SM 000 T01 DA	1637	N/A	N/A
SAM Twin Phantom	SPEAG	SM 000 T01 DA	1638	N/A	N/A
Elliptical Phantom	SPEAG	QD OVA 001 BB	1124	N/A	N/A
Software	SPEAG	Dasy52.6.2.482	N/A	N/A	N/A
Device Holder	SPEAG	SD 000H01	N/A	N/A	N/A
Data Acquisition Electronics	SPEAG	DAE4	1266	2011/05/30	2014/05/30
SAR Probe	SPEAG	ES3DV3	3261	2012/08/17	2013/08/17
SAR Probe	SPEAG	ES3DV3	3261	2013/06/05	2014/06/05
SAR Probe	SPEAG	EX3DV4	3771	2012/08/22	2013/08/22

SAR 4 Lab

Instrument description	Supplier / Manufacturer	Model	Serial No.	Calibration (date)	Calibration Due (date)
Robot	Staubli	TX90	F11/5GW9A 1/A/01	N/A	N/A
SAM Twin Phantom	SPEAG	SM 000 T01 DA	1639	N/A	N/A
SAM Twin Phantom	SPEAG	SM 000 T01 DA	1640	N/A	N/A
Elliptical Phantom	SPEAG	QD OVA 001 BB	1125	N/A	N/A
Software	SPEAG	Dasy52.6.2.482	N/A	N/A	N/A
Device Holder	SPEAG	SD 000H01	N/A	N/A	N/A
Data Acquisition Electronics	SPEAG	DAE4	1265	2011/05/13	2014/05/13
Data Acquisition Electronics	SPEAG	DAE4	1265	2013/06/11	2014/06/11
SAR Probe	SPEAG	ES3DV3	3260	2012/09/25	2013/09/25
SAR Probe	SPEAG	EX3DV4	3786	2012/08/22	2013/08/22

Shared Equipment

Instrument description	Supplier / Manufacturer	Model	Serial No.	Calibration (date)	Calibration Due (date)
900 MHz Head Tissue Simulant	SPEAG	HSL 900	100922-1	2013/04/10 – 2013/07/11	N/A
900 MHz Body Tissue Simulant	SPEAG	MSL 900	110518-7	2013/04/03 – 2013/07/18	N/A
900 MHz Body Tissue Simulant	SPEAG	MSL 900	110818-1	2013/04/16 – 2013/04/17	N/A
1750 MHz Head Tissue Simulant	SPEAG	HSL 1750	100907-4	2013/5/13 – 2013/07/19	N/A
1750 MHz Body Tissue Simulant	SPEAG	HSL 1750	100824-2	2013/05/09 – 2013/07/18	N/A
1900 MHz Head Tissue Simulant	SPEAG	HSL 1900	110615-3	2013/04/08 – 2013/07/17	N/A
1900 MHz Body Tissue Simulant	SPEAG	MSL 1900	110615-4	2013/04/03 – 2013/07/17	N/A
2450 MHz Head Tissue Simulant	SPEAG	HSL 2450	110615-2	2013/04/18	N/A
2450 MHz Body Tissue Simulant	SPEAG	MSL 2450	110615-1	2013/04/19	N/A
5000 MHz Head Tissue Simulant	SPEAG	HSL 501	100901-1	2013/04/07 – 2013/05/16	N/A
5000 MHz Body Tissue Simulant	SPEAG	MSL 501	100823-1	2013/04/07 – 2013/05/14	N/A
835 MHz Dipole	SPEAG	D835V2	4d113	2012/11/05	2014/11/05
1900 MHz Dipole	SPEAG	D1900V2	5d135	2012/11/06	2014/11/06
2450 MHz Dipole	SPEAG	D2450V2	859	2012/11/07	2014/11/07
5000 MHz Dipole	SPEAG	D5GHzV2	1096	2012/11/13	2014/11/13
Network Analyzer	Agilent	FieldFox N9923A	MY51491621	2012/04/02	2014/04/02
Directional coupler	Werlatone	C6529	11249	N/A	N/A
RF Amplifier	Vectawave	VTL5400	N/A	N/A	N/A
Dielectric Measurement Kit	SPEAG	DAK-3.5	1023	2012/02/20	2014/02/20
Synthesized CW Generator	Agilent	8371213	US37101255	N/A	N/A
Power Meter	Agilent	E4419B	MY45101996	2011/07/29	2013/07/29
Power Sensor	Agilent	E9300A	MY41498484	2011/08/05	2013/08/05
Power Sensor	Agilent	E9300A	MY41498492	2011/08/05	2013/08/05
Radio Communications Tester	Rohde & Schwarz	CMU 200	101821	2011/05	2013/05
Radio Communications Tester	Rohde & Schwarz	CMU 200	109879	2011/05	2013/05
Radio Communications Tester	Rohde & Schwarz	CMU 200	110759	2011/05	2013/05

Equipment Calibration/Performance Documents:

Attached:
SAR Probe ES3DV3 Calibration Report
SAR Probe EX3DV4 Calibration Report
835 MHz Dipole Calibration Report
1900 MHz Dipole Calibration Report
2450 MHz Dipole Calibration Report
5000 MHz Dipole Calibration Report