

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%

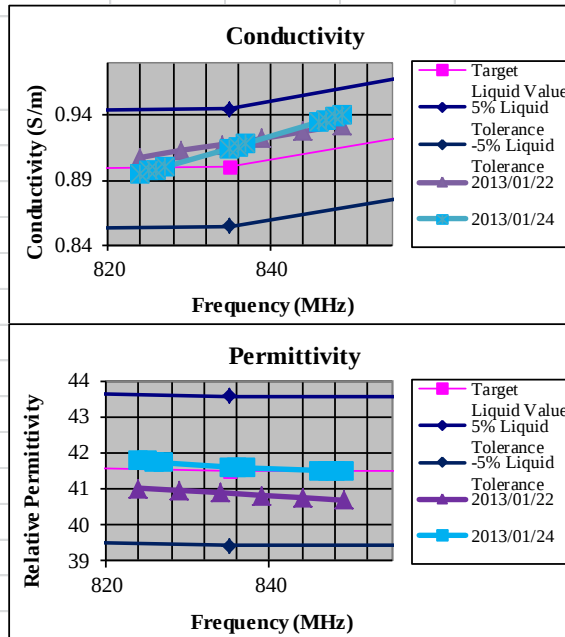
Esters, Emulsifiers, Inhibitors 20-40%

Sodium Chloride 0-1.5%

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

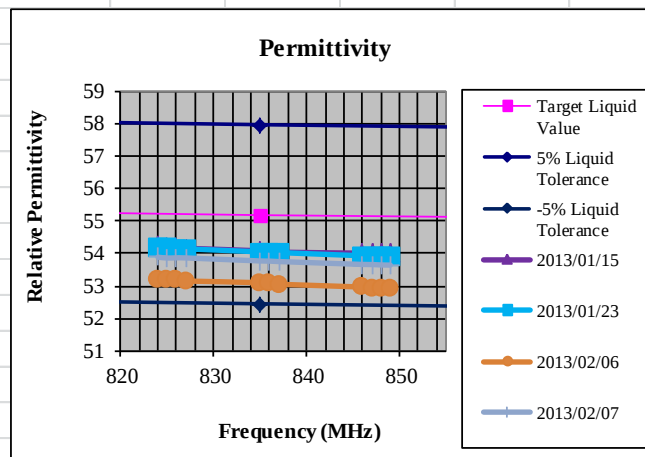
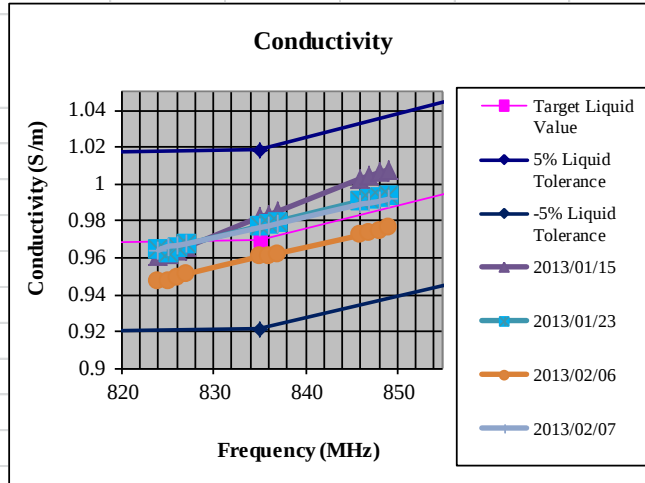
850 MHz Head Liquid

Date	Temp (°C)	Frequency (MHz)	Relative Permativity	Conductivity (S/m)
2013/01/22	20.5	824	41.0241	0.9076
		829	40.9605	0.9131
		834	40.8997	0.9175
		839	40.824	0.9221
		844	40.7612	0.9274
		849	40.688	0.9325
2013/01/24	21.7	824	41.7824	0.8949
		825	41.7895	0.8978
		826	41.7486	0.8983
		827	41.7253	0.9003
		835	41.6089	0.9145
		836	41.5974	0.916
		837	41.5855	0.9183
		846	41.515	0.9349
		847	41.5096	0.9365
		848	41.5068	0.9384
		849	41.5047	0.9398



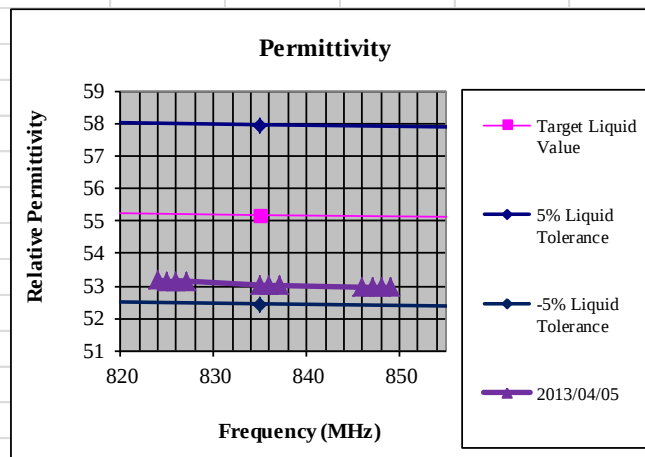
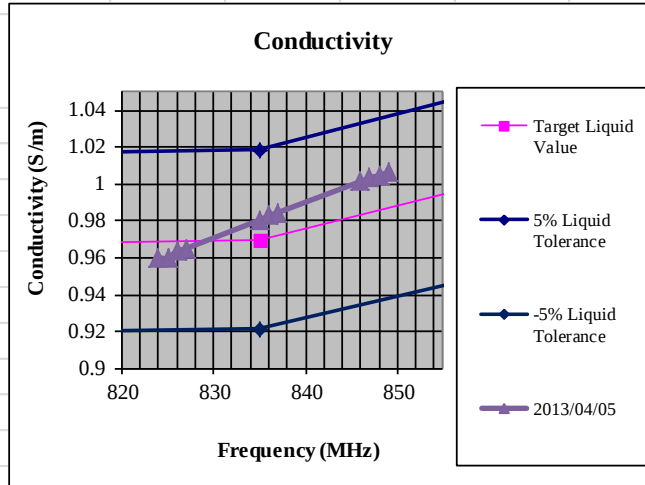
850 MHz Body Liquid

Date	Temp (°C)	Frequency (MHz)	Relative Permativity	Conductivity (S/m)
2013/01/15	20	824	54.2186	0.9606
		825	54.1801	0.9614
		826	54.1793	0.9637
		827	54.1614	0.9656
		835	54.0839	0.982
		836	54.0516	0.9834
		837	54.0422	0.9851
		846	54.0102	1.0029
		847	54.0101	1.0044
		848	54.0152	1.0061
2013/01/23	21	824	54.1794	0.9645
		825	54.1965	0.9632
		826	54.1459	0.9662
		827	54.144	0.9673
		835	54.0508	0.9771
		836	54.0459	0.9785
		837	54.0293	0.9798
		846	53.9318	0.9908
2013/02/06	20.8	847	53.9232	0.9921
		848	53.9148	0.993
		849	53.9012	0.9941
		824	53.1918	0.9477
		825	53.1975	0.9477
		826	53.172	0.9497
		827	53.1551	0.9511
		835	53.1029	0.9606
		836	53.0661	0.961
		837	53.0541	0.9623
2013/02/07	21	846	52.9687	0.9722
		847	52.9477	0.9737
		848	52.9437	0.9748
		849	52.936	0.976
		824	53.888	0.964
		825	53.8609	0.9661
		826	53.8688	0.9666
		827	53.8645	0.9675
		835	53.7718	0.9763
		836	53.7673	0.9772
		837	53.7535	0.9785
		846	53.6654	0.989
		847	53.6619	0.9896
		848	53.6493	0.9905
		849	53.6445	0.9917



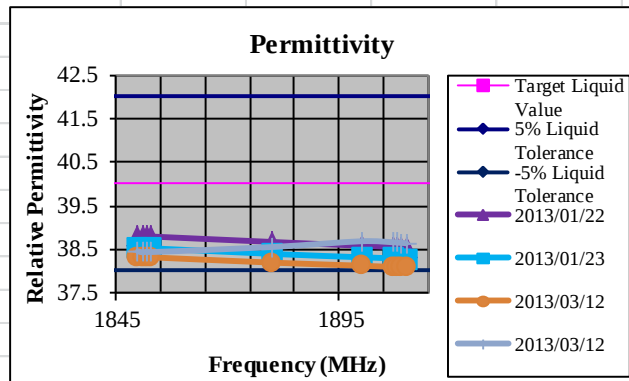
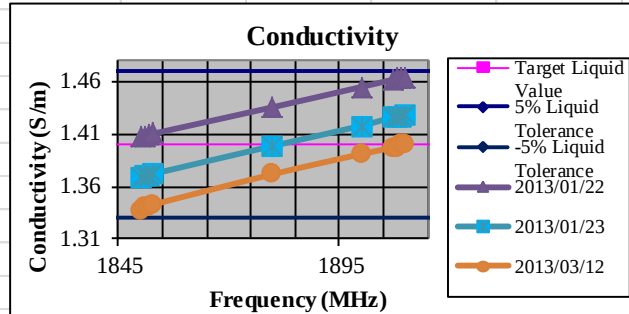
850 MHz Body Liquid Continued

Date	Temp (°C)	Frequency (MHz)	Relative Permativity	Conductivity (S/m)
2013/04/05	21.2	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



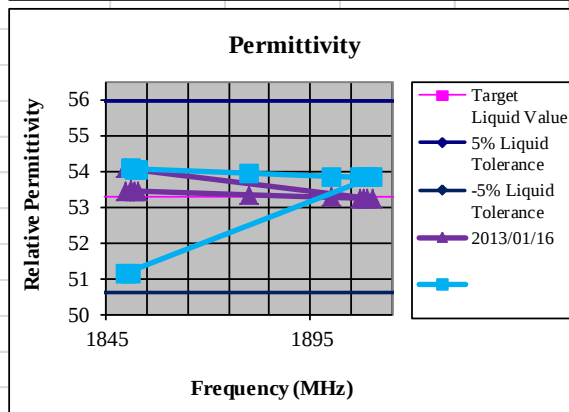
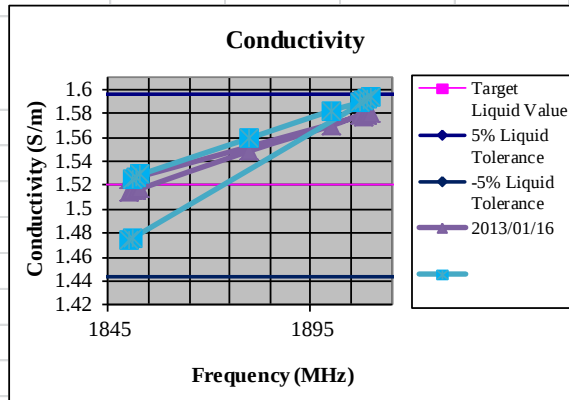
1900 MHz Head Liquid

Date	Temp	Frequency	Relative	Conductivity
2013/01/22	20	1850	38.8237	1.4066
		1851	38.8094	1.4079
		1852	38.804	1.409
		1853	38.7947	1.4102
		1880	38.6693	1.4353
		1900	38.5822	1.4545
		1907	38.5512	1.4613
		1908	38.5499	1.4627
		1909	38.5436	1.4633
		1910	38.5388	1.4638
2013/01/23	22.3	1850	38.5393	1.3685
		1851	38.5335	1.3699
		1852	38.5243	1.3708
		1853	38.5237	1.372
		1880	38.3948	1.3985
		1900	38.3174	1.4176
		1907	38.2927	1.4257
		1908	38.289	1.4264
		1909	38.2831	1.4267
		1910	38.2813	1.4285
2013/03/12	21	1850	38.3322	1.3373
		1851	38.3261	1.33961
		1852	38.3211	1.3402
		1853	38.3159	1.3428
		1880	38.1944	1.3716
		1900	38.1237	1.3907
		1907	38.093	1.3965
		1908	38.0869	1.3969
		1909	38.0801	1.3991
		1910	38.0735	1.3994
2013/03/12	21	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	38.6859	1.4631
		1907	38.6622	1.4584
		1908	38.6537	1.4573
		1909	38.6479	1.4566



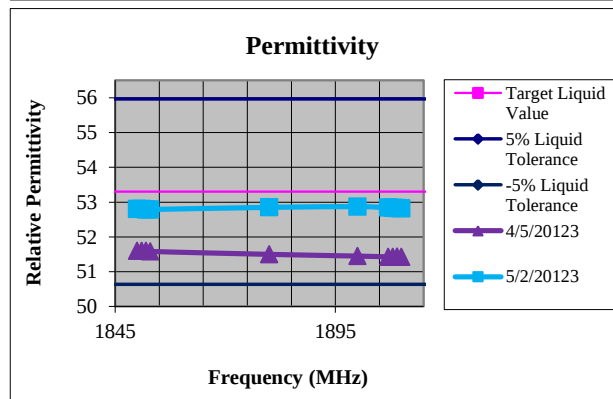
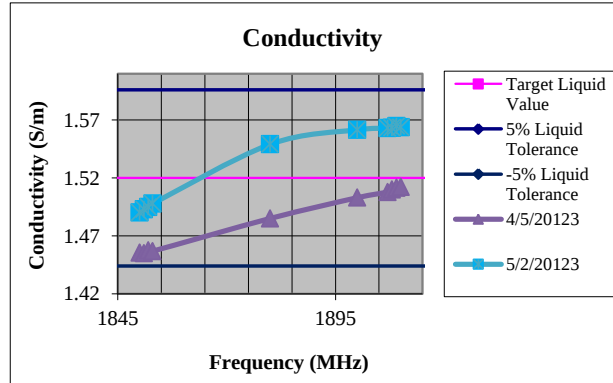
1900 MHz Body Liquid

Date	Temp (°C)	Frequency (MHz)	Relative Permativity	Conductivity (S/m)
2013/01/16	20.6	1850	53.4683	1.5141
		1851	53.4719	1.5163
		1852	53.4654	1.5161
		1853	53.4542	1.5172
		1880	53.3507	1.5489
		1900	53.2786	1.5698
		1907	53.2586	1.5788
		1908	53.2508	1.5783
		1909	53.2476	1.5793
		1910	53.2413	1.5804
2013/01/18	20.1	1850	54.0803	1.5247
		1851	54.0744	1.5247
		1852	54.068	1.5262
		1853	54.0706	1.5291
		1880	53.9535	1.5596
		1900	53.8641	1.5824
		1907	53.8414	1.5891
		1908	53.8399	1.5909
		1909	53.8356	1.5923
		1910	53.8355	1.5933
2013/02/07	22.7	1850	51.1746	1.4739
		1851	51.1707	1.4764
		1852	51.1682	1.4809
		1853	51.172	1.483
		1880	51.2817	1.5345
		1900	51.3367	1.5363
		1907	51.3	1.5334
		1908	51.2853	1.5327
		1909	51.2727	1.5327
		1910	51.2687	1.532
2013/02/08	22.7	1850	51.1653	1.457
		1851	51.163	1.4585
		1852	51.1593	1.4605
		1853	51.1667	1.4625
		1880	51.0747	1.4967
		1900	51.0048	1.5187
		1907	50.983	1.5264
		1908	50.9801	1.5265
		1909	50.9738	1.5277



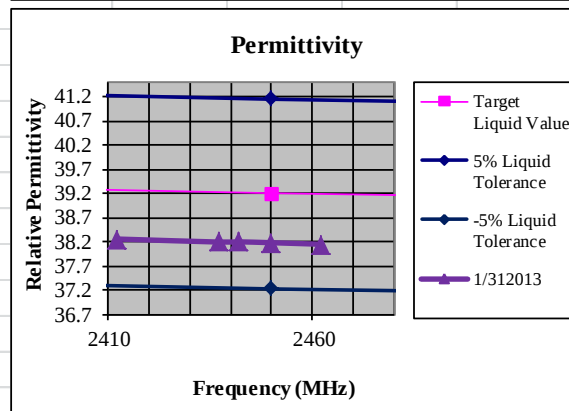
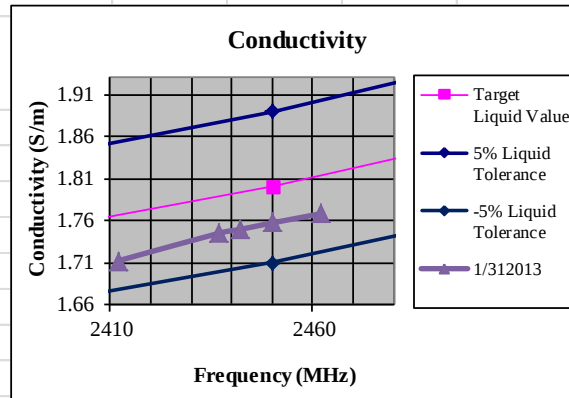
1900 MHz Body Liquid

Date	Temp (°C)	Frequency (MHz)	Relative Permativity	Conductivity (S/m)
4/5/20123	22.2	1850	51.598	1.4556
		1851	51.5989	1.455
		1852	51.5966	1.4575
		1853	51.5809	1.4569
		1880	51.4981	1.4851
		1900	51.4486	1.503
		1907	51.427	1.5079
		1908	51.4248	1.5101
		1909	51.4299	1.5115
		1910	51.4225	1.5123
5/2/20123	21.3	1850	52.8023	1.4903
		1851	52.8036	1.4929
		1852	52.7891	1.495
		1853	52.7888	1.4978
		1880	52.8497	1.5491
		1900	52.8703	1.5616
		1907	52.8407	1.563
		1908	52.8316	1.5634
		1909	52.8259	1.5648
		1910	52.8172	1.5637



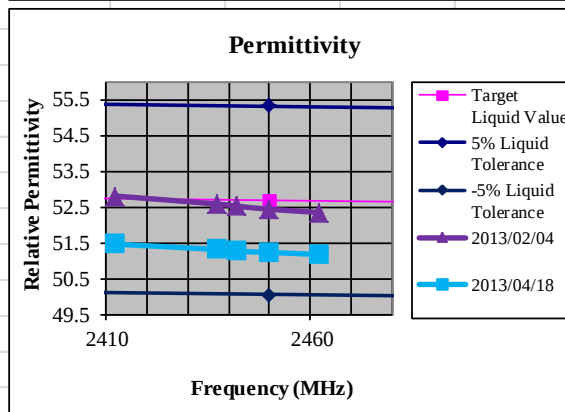
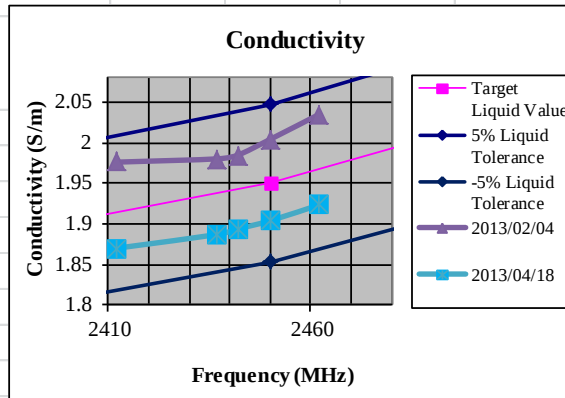
2450 MHz Head Liquid

Date	Temp (°C)	Frequency (MHz)	Relative Permativity	Conductivity (S/m)
1/312013	23.3	2412	38.2645	1.7125
		2437	38.2017	1.7454
		2442	38.2053	1.7497
		2450	38.1876	1.7575
		2462	38.1559	1.7684



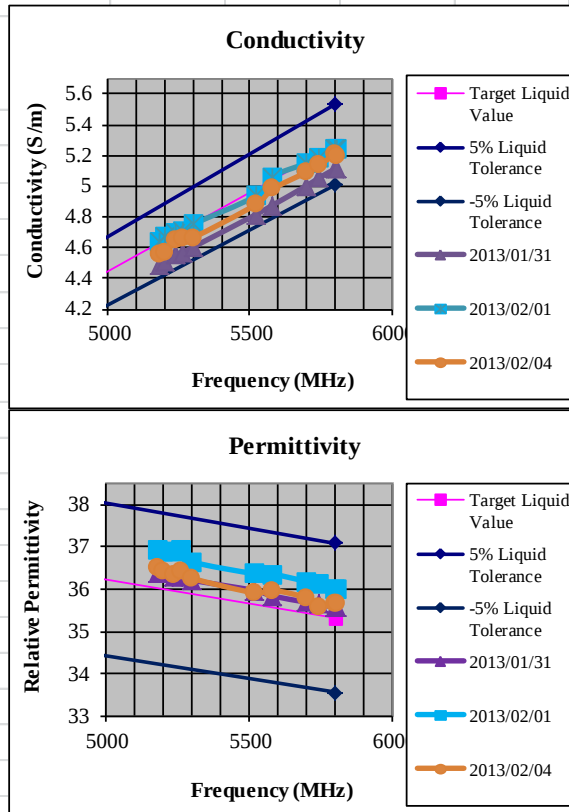
2450 MHz Body Liquid

Date	Temp (°C)	Frequency (MHz)	Relative Permativity	Conductivity (S/m)
2013/02/04	20.2	2412	52.8202	1.976
		2437	52.5956	1.9801
		2442	52.5343	1.9847
		2450	52.4467	2.0041
		2462	52.359	2.0347
2013/04/18	23.3	2412	51.4763	1.8699
		2437	51.3266	1.8869
		2442	51.2755	1.8937
		2450	51.2445	1.9038
		2462	51.1833	1.9232



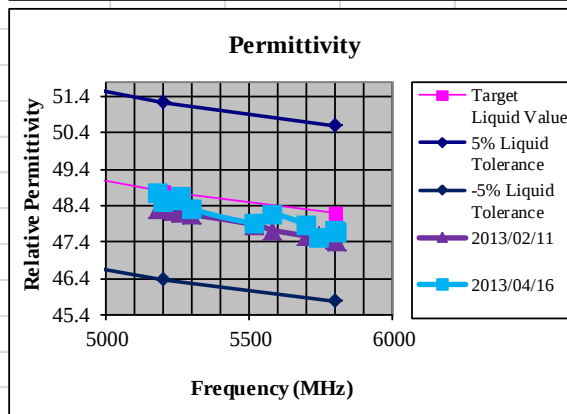
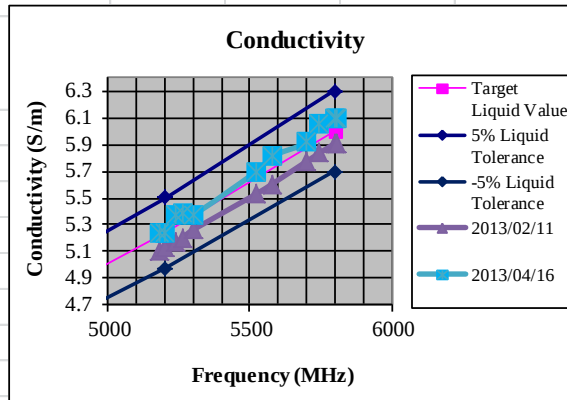
5000 MHz Head Liquid

Date	Temp (°C)	Frequency (MHz)	Relative Permativity	Conductivity (S/m)
2013/01/31	20.8	5180	36.3927	4.4846
		5200	36.3763	4.505
		5240	36.282	4.5524
		5260	36.2934	4.5667
		5300	36.2141	4.6041
		5520	35.9679	4.8146
		5580	35.8426	4.8764
		5700	35.6936	5.0031
		5745	35.6447	5.0549
		5800	35.5728	5.1126
		5805	35.5659	5.118
2013/02/01	21.6	5180	36.9453	4.6433
		5200	36.8699	4.6683
		5240	36.9088	4.7009
		5260	36.9126	4.707
		5300	36.6491	4.7533
		5520	36.3653	4.9356
		5580	36.3596	5.0626
		5700	36.1862	5.1499
		5745	36.1379	5.1859
		5800	36.0098	5.2422
		5805	36.0006	5.2457
2013/02/04	20.9	5180	36.508	4.5519
		5200	36.4073	4.5654
		5240	36.333	4.6529
		5260	36.4141	4.6585
		5300	36.2598	4.666
		5520	35.9119	4.8795
		5580	35.9777	4.9818
		5700	35.7998	5.0913
		5745	35.5944	5.1388
		5800	35.6749	5.2063
		5805	35.662	5.1998



5000 MHz Body Liquid

Date	Temp (°C)	Frequency (MHz)	Relative Permativity	Conductivity (S/m)
2013/02/11	23.7	5180	48.3244	5.1067
		5200	48.3298	5.1366
		5240	48.2415	5.1698
		5260	48.2068	5.1987
		5300	48.1541	5.263
		5520	47.8832	5.5275
		5580	47.7301	5.6072
		5700	47.5736	5.774
		5745	47.5856	5.8358
		5800	47.4485	5.9088
2013/04/16	21.1	5805	47.4363	5.913
		5180	48.7652	5.2327
		5200	48.4839	5.241
		5240	48.5654	5.3738
		5260	48.6318	5.3905
		5300	48.3137	5.3744
		5520	47.9213	5.6947
		5580	48.1705	5.8141
		5700	47.8631	5.9157
		5745	47.519	6.0534
		5800	47.7269	6.1009
		5805	47.6662	6.0916



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 Probe	SPEAG	EX3DV4	3739	2012/11/14	2013/11/14

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	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
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	2013/01/22 – 2013/01/24	N/A
900 MHz Body Tissue Simulant	SPEAG	MSL 900	110518-7	2013/01/14 – 2013/04/05	N/A
1900 MHz Head Tissue Simulant	SPEAG	HSL 1900	110615-3	2013/01/22 – 2013/04/08	N/A
1900 MHz Body Tissue Simulant	SPEAG	MSL 1900	110615-4	2013/01/16 – 2013/05/02	N/A
2450 MHz Head Tissue Simulant	SPEAG	HSL 2450	110615-2	2013/01/31	N/A
2450 MHz Body Tissue Simulant	SPEAG	MSL 2450	110615-1	2013/02/04 – 2013/04/18	N/A
5000 MHz Head Tissue Simulant	SPEAG	HSL 501	100901-1	2013/01/31 – 2013/02/04	N/A
5000 MHz Body Tissue Simulant	SPEAG	MSL 501	100823-1	2013/02/11 – 2013/04/16	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