

## 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%

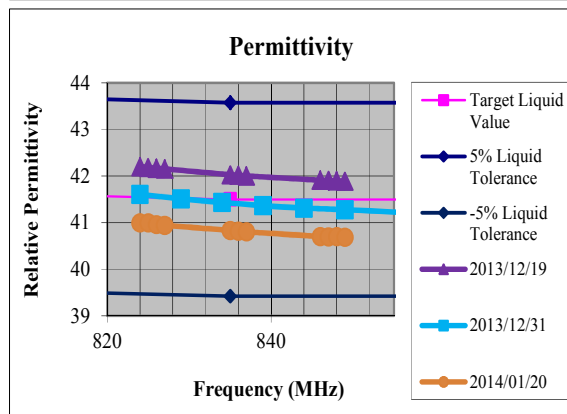
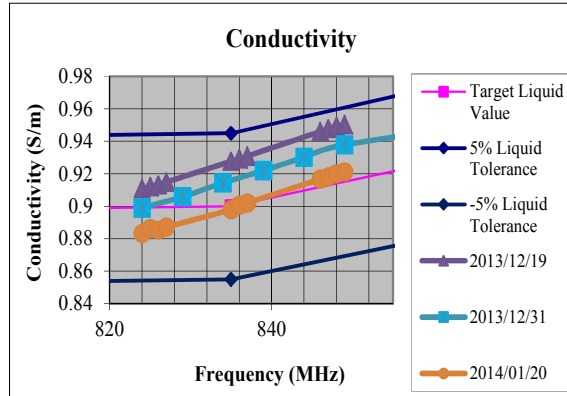
Esters, Emulsifiers, Inhibitors 20-40%

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.

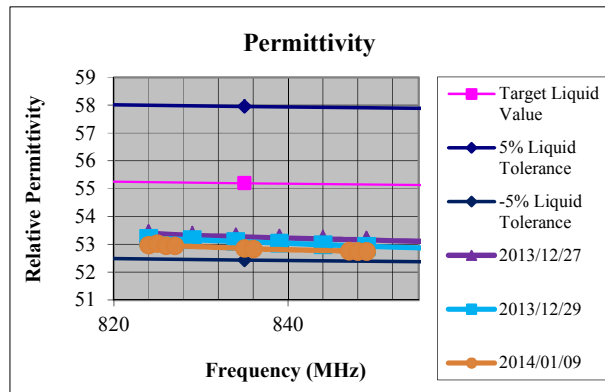
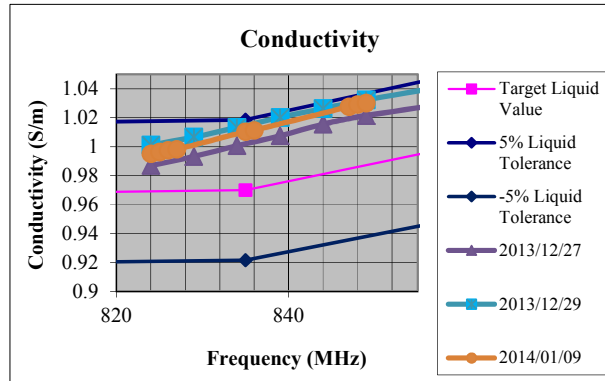
**850 MHz Head Liquid**

Date	Temp (°C)	Frequency (MHz)	Relative Permativity	Conductivity (S/m)
2013/12/19	20.6	824	42.2004	0.9109
		825	42.1866	0.9121
		826	42.1645	0.9132
		827	42.1546	0.9149
		835	42.0282	0.9277
		836	42.0175	0.9293
		837	42.0031	0.9309
		846	41.9111	0.946
		847	41.9093	0.9478
		848	41.899	0.9492
2013/12/31	20.6	824	41.606	0.8989
		829	41.5116	0.9059
		834	41.4373	0.9144
		839	41.3639	0.922
		844	41.3119	0.9302
		849	41.2784	0.9379
		899	40.8612	0.9744
		904	40.7634	0.9766
2014/01/20	20.4	824	40.9944	0.8833
		825	40.9943	0.8863
		826	40.9618	0.8854
		827	40.9443	0.8872
		835	40.8342	0.8979
		836	40.8184	0.9006
		837	40.8036	0.9021
		846	40.7041	0.9167
		847	40.6979	0.9182
		848	40.7009	0.9201
849	40.6874	0.9212		



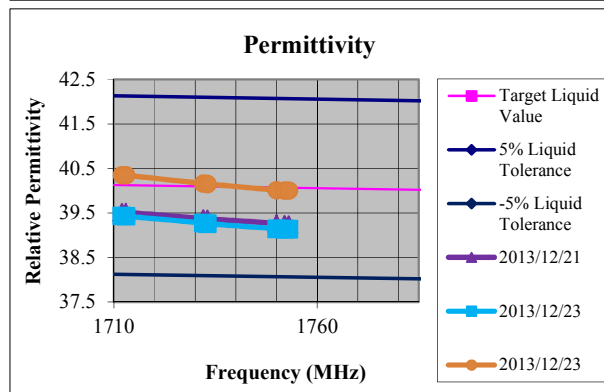
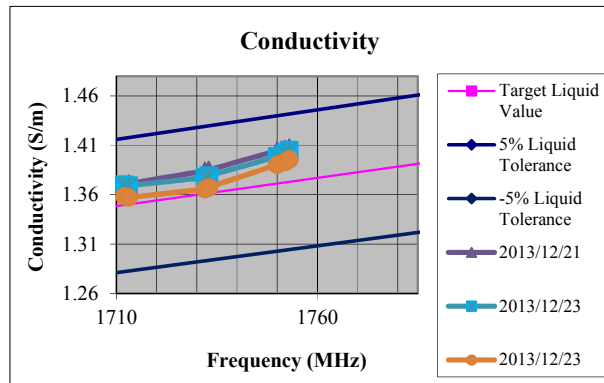
**850 MHz Body Liquid**

Date	Temp (°C)	Frequency (MHz)	Relative Permativity	Conductivity (S/m)
2013/12/27	21.3	824	53.4	0.9869
		829	53.3275	0.9932
		834	53.2789	1.0006
		839	53.2324	1.0075
		844	53.1917	1.0155
		849	53.1583	1.0215
		899	52.7459	1.0652
		904	52.6772	1.0698
2013/12/29	20.2	824	53.2186	1.0011
		829	53.1678	1.0066
		834	53.1077	1.0133
		839	53.0471	1.0202
		844	52.9886	1.0263
		849	52.934	1.0323
		899	52.4322	1.0836
		904	52.3837	1.088
2014/01/09	21.3	824	52.973	0.9951
		825	53.028	0.9964
		826	52.9558	0.9975
		827	52.9495	0.9981
		835	52.8555	1.0104
		836	52.8363	1.0113
		847	52.7601	1.0276
		848	52.7478	1.0291
849	52.7454	1.0302		



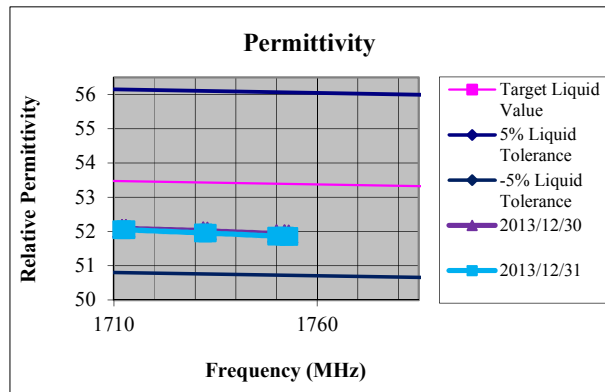
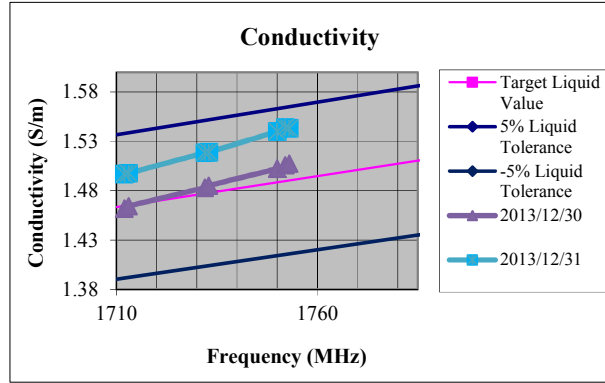
**1750 MHz Head Liquid**

Date	Temp (°C)	Frequency (MHz)	Relative Permativity	Conductivity (S/m)
2013/12/21	21.5	1712	39.5179	1.3699
		1713	39.5143	1.371
		1732	39.3771	1.3841
		1733	39.3679	1.3851
		1750	39.2651	1.4046
		1752	39.2493	1.4059
		1753	39.2411	1.4072
2013/12/23	21.2	1712	39.4334	1.3701
		1713	39.4283	1.3693
		1732	39.2744	1.3775
		1733	39.2597	1.3791
		1750	39.1464	1.3987
		1752	39.139	1.4024
2013/12/23	22.2	1712	40.3506	1.3585
		1713	40.3465	1.3572
		1732	40.1616	1.3658
		1733	40.1507	1.3674
		1750	40.0135	1.3905
		1752	40.0066	1.3935
		1753	40.0068	1.3958



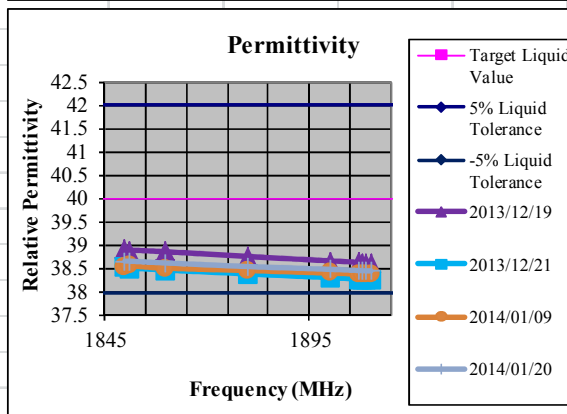
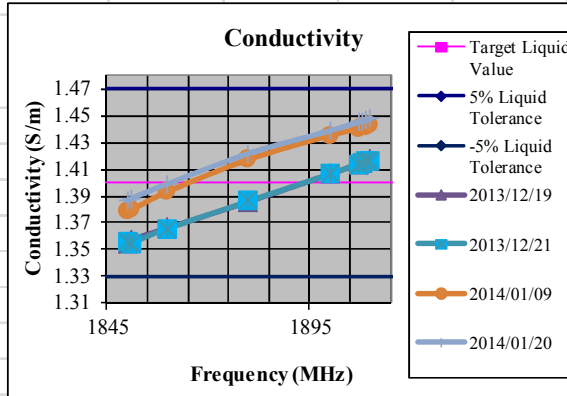
**1750 MHz Body Liquid**

Date	Temp (°C)	Frequency (MHz)	Relative Permativity	Conductivity (S/m)
2013/12/30	21.6	1712	52.0885	1.4619
		1713	52.0893	1.4644
		1732	52.025	1.4831
		1733	52.0189	1.4851
		1750	51.9409	1.5024
		1752	51.9447	1.5058
		1753	51.9334	1.5074
2013/12/31	20	1712	52.0546	1.4969
		1713	52.0531	1.4977
		1732	51.9583	1.5184
		1733	51.956	1.519
		1750	51.8669	1.5401
		1752	51.867	1.5439
		1753	51.8541	1.5434



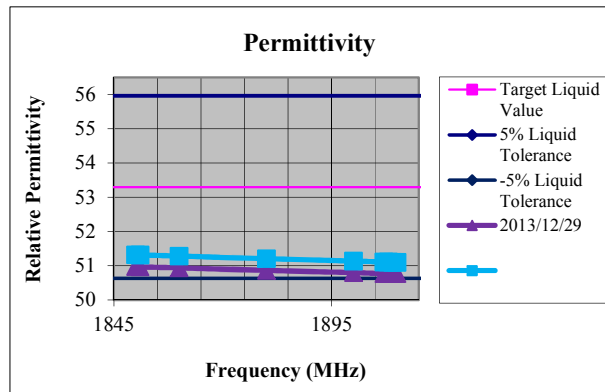
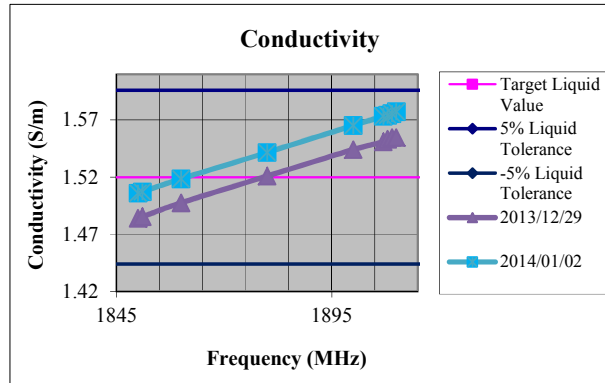
**1900 MHz Head Liquid**

Date	Temp (°C)	Frequency (MHz)	Relative Permativity	Conductivity (S/m)
2013/12/19	22.3	1850	38.9113	1.3548
		1851	38.902	1.3572
		1860	38.8647	1.3661
		1880	38.7642	1.3858
		1900	38.6694	1.4063
		1907	38.6398	1.4138
		1908	38.6309	1.4151
		1909	38.6214	1.4159
		1910	38.6205	1.4181
2013/12/21	21.7	1850	38.525	1.3557
		1851	38.5186	1.3551
		1860	38.4712	1.3657
		1880	38.3898	1.3861
		1900	38.3087	1.4063
		1907	38.2818	1.414
		1908	38.2853	1.4148
		1909	38.2745	1.4163
		1910	38.2714	1.4165
2014/01/09	22.1	1850	38.5553	1.3785
		1851	38.5628	1.3794
		1860	38.5128	1.3933
		1880	38.4625	1.4173
		1900	38.4054	1.4352
		1907	38.3881	1.44
		1908	38.3815	1.4413
		1909	38.3729	1.4418
		1910	38.3666	1.4432
2014/01/20	20.8	1850	38.6653	1.3862
		1851	38.6637	1.3882
		1860	38.6234	1.3991
		1880	38.5485	1.4218
		1900	38.4884	1.4387
		1907	38.4627	1.4451
		1908	38.4587	1.4461
		1909	38.4541	1.4468
		1910	38.4533	1.4484



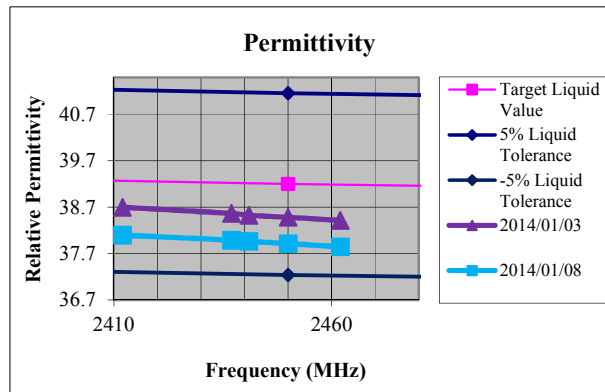
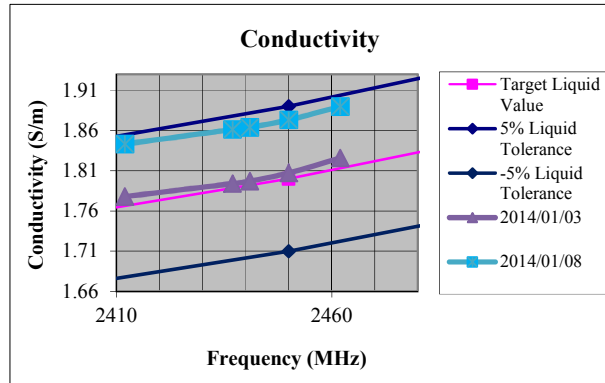
**1900 MHz Body Liquid**

Date	Temp (°C)	Frequency (MHz)	Relative Permativity	Conductivity (S/m)
2013/12/29	22	1850	50.9759	1.4841
		1851	50.9667	1.4853
		1860	50.9385	1.4975
		1880	50.8645	1.5209
		1900	50.7994	1.5441
		1907	50.7686	1.5508
		1908	50.7768	1.5532
		1909	50.7722	1.5547
2014/01/02	21.7	1850	51.3176	1.506
		1851	51.3146	1.5071
		1860	51.283	1.5185
		1880	51.2054	1.5416
		1900	51.138	1.5652
		1907	51.1087	1.5733
		1908	51.1069	1.5743
		1909	51.1008	1.5755
		1910	51.0964	1.5771



**2450 MHz Head Liquid**

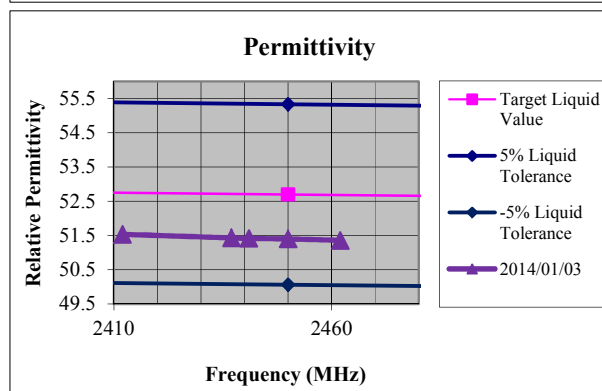
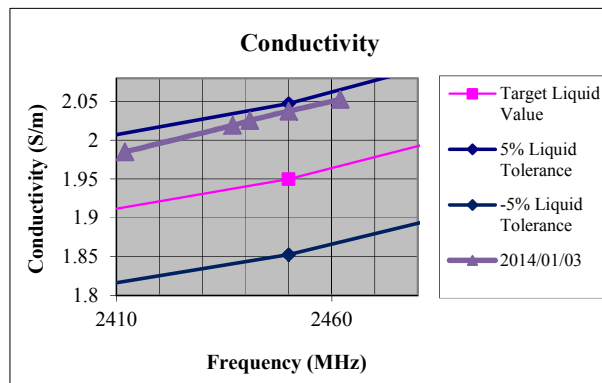
Date	Temp (°C)	Frequency (MHz)	Relative Permativity	Conductivity (S/m)
2014/01/03	24.82	2412	38.6998	1.7779
		2437	38.5677	1.7941
		2441	38.5266	1.7971
		2450	38.4836	1.8072
		2462	38.4185	1.8259
2014/01/08	24.1	2412	38.1004	1.8433
		2437	37.9902	1.8613
		2441	37.9637	1.864
		2450	37.9152	1.8733
		2462	37.8472	1.8899





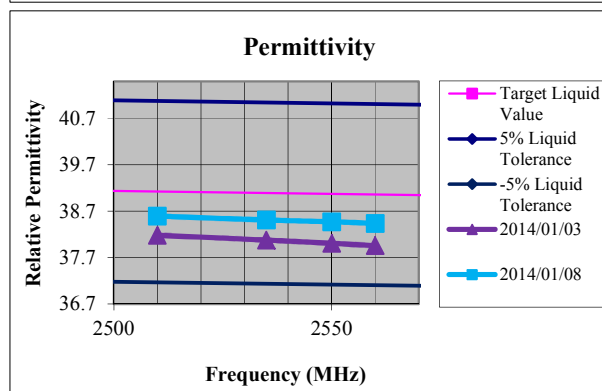
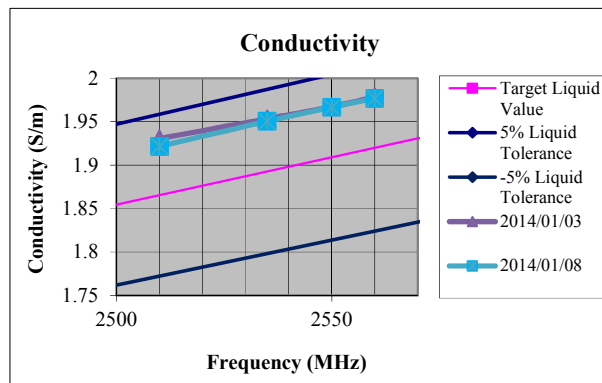
**2450 MHz Body Liquid**

Date	Temp (°C)	Frequency (MHz)	Relative Permativity	Conductivity (S/m)
2014/01/03	21.8	2412	51.5352	1.9851
		2437	51.43	2.0192
		2441	51.4182	2.0256
		2450	51.3996	2.0376
		2462	51.3591	2.0527



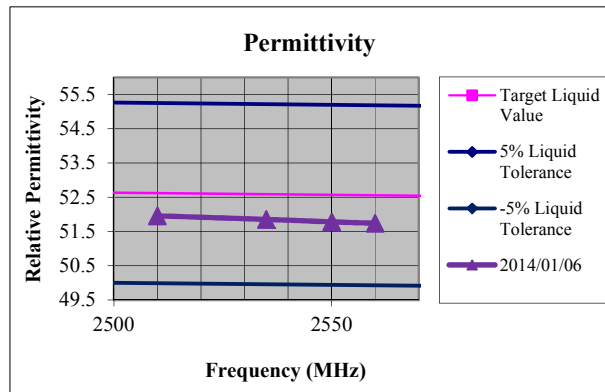
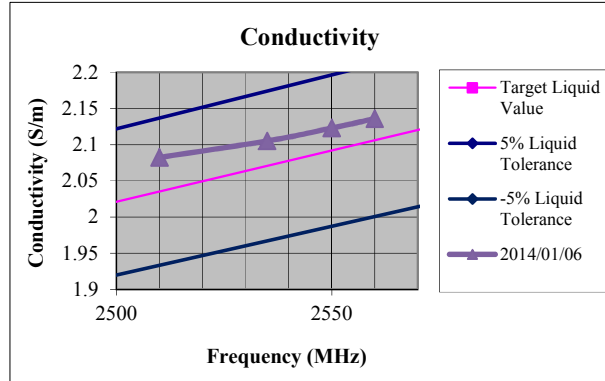
**2550 MHz Head Liquid**

Date	Temp (°C)	Frequency (MHz)	Relative Permativity	Conductivity (S/m)
2014/01/03	22	2510	38.1822	1.9306
		2535	38.0788	1.9533
		2550	38.009	1.9672
		2560	37.9575	1.9785
2014/01/08	23.4	2510	38.596	1.9216
		2535	38.5122	1.9505
		2550	38.4744	1.9667
		2560	38.4383	1.9769



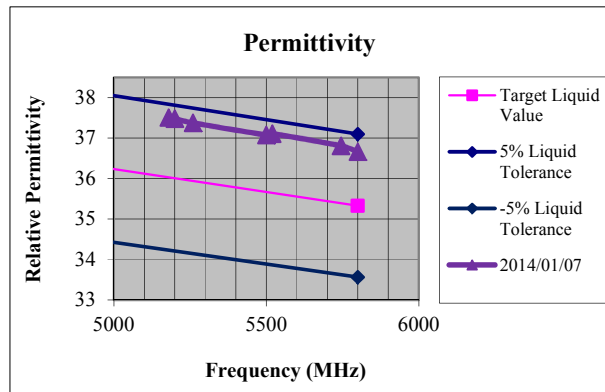
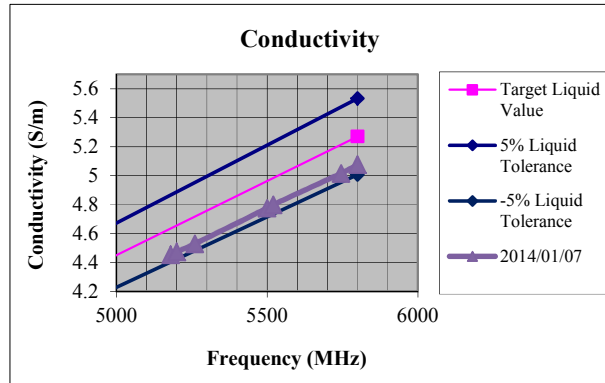
**2550 MHz Body Liquid**

Date	Temp (°C)	Frequency (MHz)	Relative Permativity	Conductivity (S/m)
2014/01/06	22.8	2510	51.9583	2.0823
		2535	51.8534	2.1051
		2550	51.7824	2.1229
		2560	51.7426	2.1361



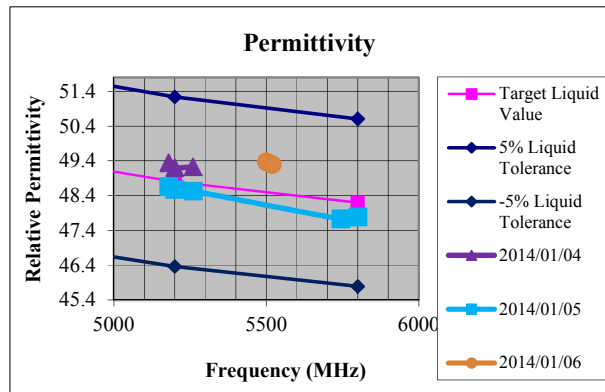
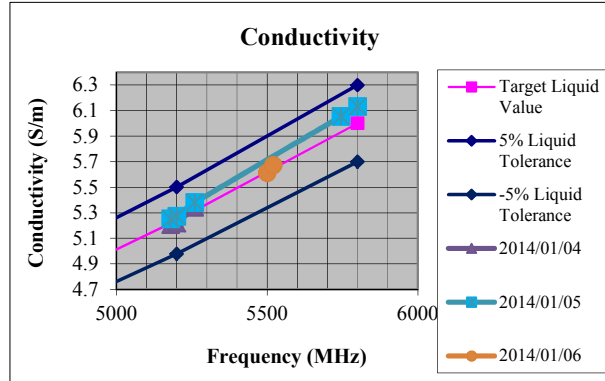
**5000 MHz Head Liquid**

Date	Temp (°C)	Frequency (MHz)	Relative Permativity	Conductivity (S/m)
2014/01/07	22.5	5180	37.5068	4.4523
		5200	37.4822	4.4721
		5260	37.3771	4.5288
		5500	37.0788	4.775
		5520	37.1085	4.7988
		5745	36.8083	5.0152
		5800	36.6618	5.0762



**5000 MHz Body Liquid**

Date	Temp (°C)	Frequency (MHz)	Relative Permativity	Conductivity (S/m)
2014/01/04	22.7	5180	49.344	5.2072
		5200	49.2017	5.2193
		5260	49.2316	5.3422
2014/01/05	22.8	5180	48.6665	5.252
		5200	48.5757	5.2716
		5260	48.5302	5.3793
		5745	47.7318	6.0538
2014/01/06	22.35	5500	49.3734	5.6143
		5520	49.2943	5.6738



### 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

#### 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

#### 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

**Shared Equipment**

<b>Instrument description</b>	<b>Supplier / Manufacturer</b>	<b>Model</b>	<b>Serial No.</b>	<b>Calibration (date)</b>	<b>Calibration Due (date)</b>
Data Acquisition Electronics	SPEAG	DAE4	1265	2013/06/11	2014/06/11
Data Acquisition Electronics	SPEAG	DAE4	1266	2013/08/15	2014/08/15
Data Acquisition Electronics	SPEAG	DAE4	1375	2013/06/10	2014/06/10
SAR Probe	SPEAG	ES3DV3	3260	2013/06/19	2014/06/19
SAR Probe	SPEAG	ES3DV3	3323	2013/06/12	2013/06/12
SAR Probe	SPEAG	EX3DV4	3771	2013/06/14	2014/06/14
900 MHz Head Tissue Simulant	SPEAG	HSL 900	100922-1	2013/12/19 – 2014/01/20	N/A
900 MHz Body Tissue Simulant	SPEAG	MSL 900	100818-1	2014/01/09	N/A
900 MHz Body Tissue Simulant	SPEAG	MSL 900	110614-1	2013/12/27 – 2013/12/29	N/A
1750 MHz Head Tissue Simulant	SPEAG	HSL 1750	100907-4	2013/12/21 – 2014/01/09	N/A
1750 MHz Body Tissue Simulant	SPEAG	MSL 1750	100824-2	2013/12/30 – 2014/01/02	N/A
1900 MHz Head Tissue Simulant	SPEAG	HSL 1900	110530-2	2013/12/19 – 2014/01/20	N/A
1900 MHz Body Tissue Simulant	SPEAG	MSL 1900	110530-3	2013/12/29 – 2014/01/02	N/A
2450 MHz Head Tissue Simulant	SPEAG	HSL 2450	110531-2	2014/01/03	N/A
2450 MHz Head Tissue Simulant	SPEAG	HSL 2450	100907-2	2014/01/08	N/A
2450 MHz Body Tissue Simulant	SPEAG	MSL 2450	110530-1	2014/01/03	N/A
2550 MHz Head Tissue Simulant	SPEAG	HBBL1900-3800	130605-1	2014/01/03 – 2014/01/08	N/A
2550 MHz Body Tissue Simulant	SPEAG	MBBL1900-3800	130619-1	2014/01/06	N/A
5000 MHz Head Tissue Simulant	SPEAG	HSL 501	100901-1	2014/01/07	N/A
5000 MHz Body Tissue Simulant	SPEAG	MSL 501	100823-1	2014/01/04 – 2014/01/06	N/A
835 MHz Dipole	SPEAG	D835V2	4d155	2013/06/06	2014/06/06
900 MHz Dipole	SPEAG	D900V2	1d152	2013/06/06	2014/06/06
1750 MHz Dipole	SPEAG	D1750V2	1094	2013/06/06	2014/06/06
1900 MHz Dipole	SPEAG	D1900V2	5d172	2013/06/10	2014/06/10
2450 MHz Dipole	SPEAG	D2450V2	911	2013/06/07	2014/06/07
2550 MHz Dipole	SPEAG	D2550V2	1009	2013/06/07	2014/06/07
5000 MHz Dipole	SPEAG	D5GHzV2	1154	2013/06/04	2014/06/04

<b>Instrument description</b>	<b>Supplier / Manufacturer</b>	<b>Model</b>	<b>Serial No.</b>	<b>Calibration (date)</b>	<b>Calibration Due (date)</b>
Network Analyzer	Agilent	FieldFox N9923A	MY51491621	2013/06/21	2014/06/21
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	1118	2013/06/11	2014/06/11
Synthesized CW Generator	Agilent	8371213	US37101255	N/A	N/A
Power Meter	Agilent	E4419B	MY45101996	2013/06/03	2015/06/03
Power Sensor	Agilent	E9300A	MY41498484	2013/06/04	2015/06/04
Power Sensor	Agilent	E9300A	MY41498492	2013/06/04	2015/06/04
Radio Communications Tester	Rohde & Schwarz	CMU 200	109879	2013/06	2015/06
Radio Communications Tester	Rohde & Schwarz	CMU 200	110759	2013/06	2015/06
Radio Communications Tester	Rohde & Schwarz	CMW500	127068	2013/06	2015/06



**Equipment Calibration/Performance Documents:**

*Attached:*

*SAR Probe ES3DV3 Calibration Report*

*SAR Probe EX3DV4 Calibration Report*

*835 MHz Dipole Calibration Report*

*900 MHz Dipole Calibration Report*

*1900 MHz Dipole Calibration Report*

*2450 MHz Dipole Calibration Report*

*2550 MHz Dipole Calibration Report*

*5000 MHz Dipole Calibration Report*