

## **Tissue Parameters**

### **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%

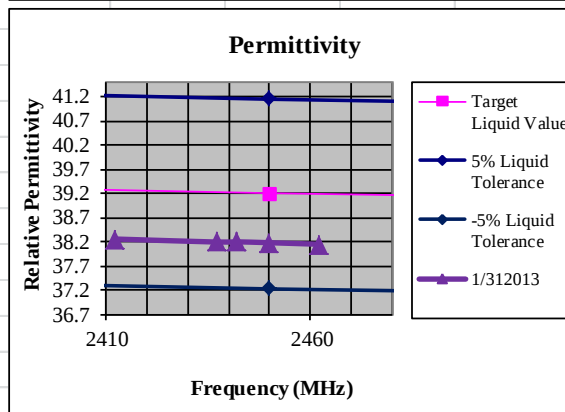
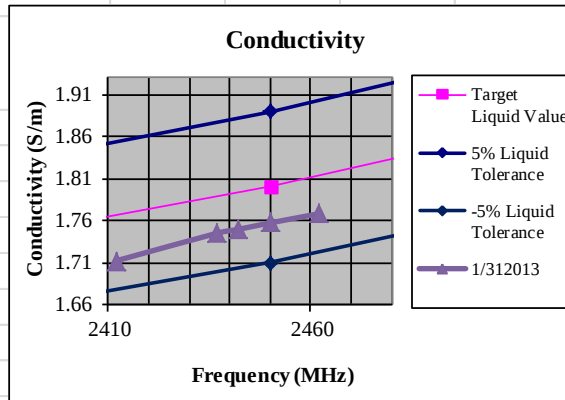
Esters, Emulsifiers, Inhibitors 20-40%

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.

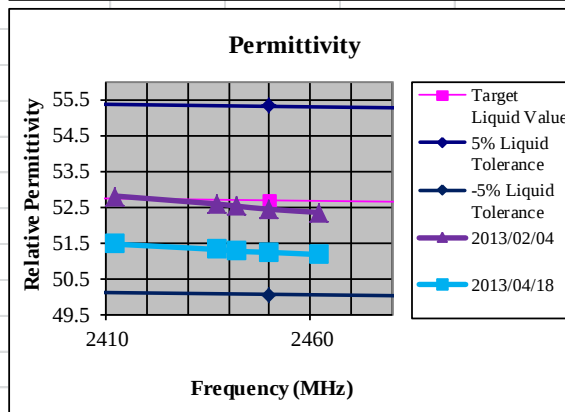
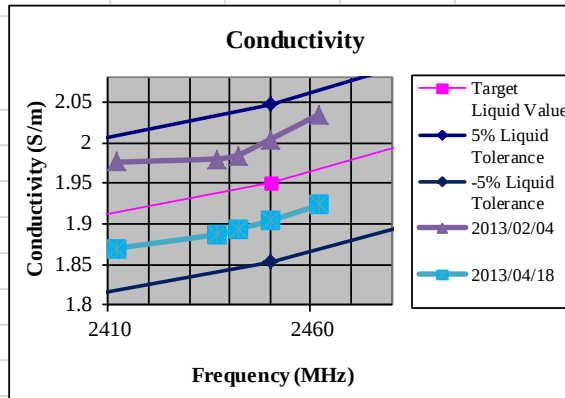
### 2450 MHz Head Liquid

| 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             |
|          |           |                 |                      |                    |
|          |           |                 |                      |                    |
|          |           |                 |                      |                    |
|          |           |                 |                      |                    |
|          |           |                 |                      |                    |



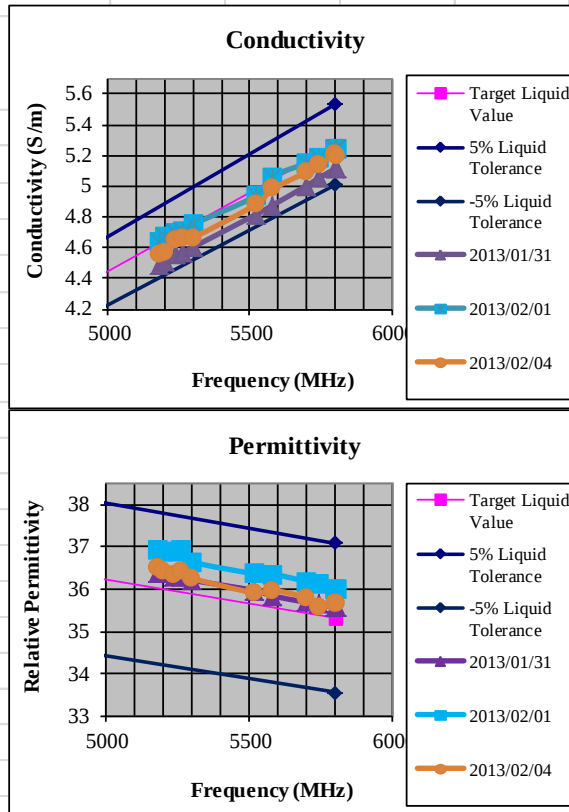
**2450 MHz Body Liquid**

| 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             |
|            |           |                 |                      |                    |



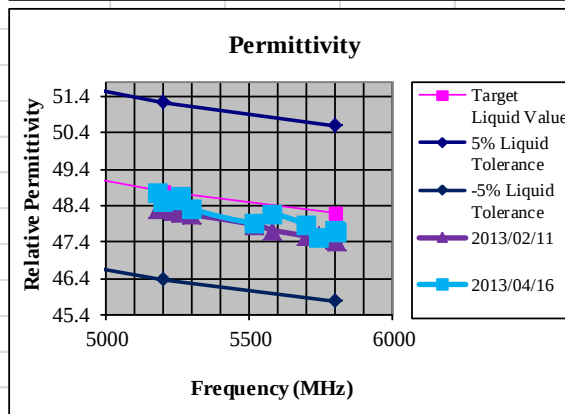
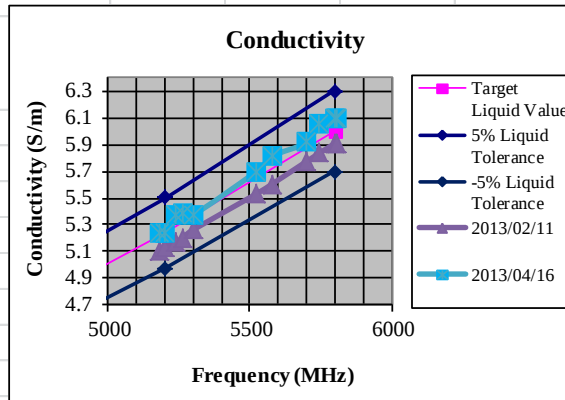
### 5000 MHz Head Liquid

| 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             |
|            |           | 5805            | 47.4363              | 5.913              |
| 2013/04/16 | 21.1      | 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<br>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<br>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<br>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) |
|-------------------------------|-------------------------|-----------------|------------|-------------------------|------------------------|
| 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                    |
| 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*