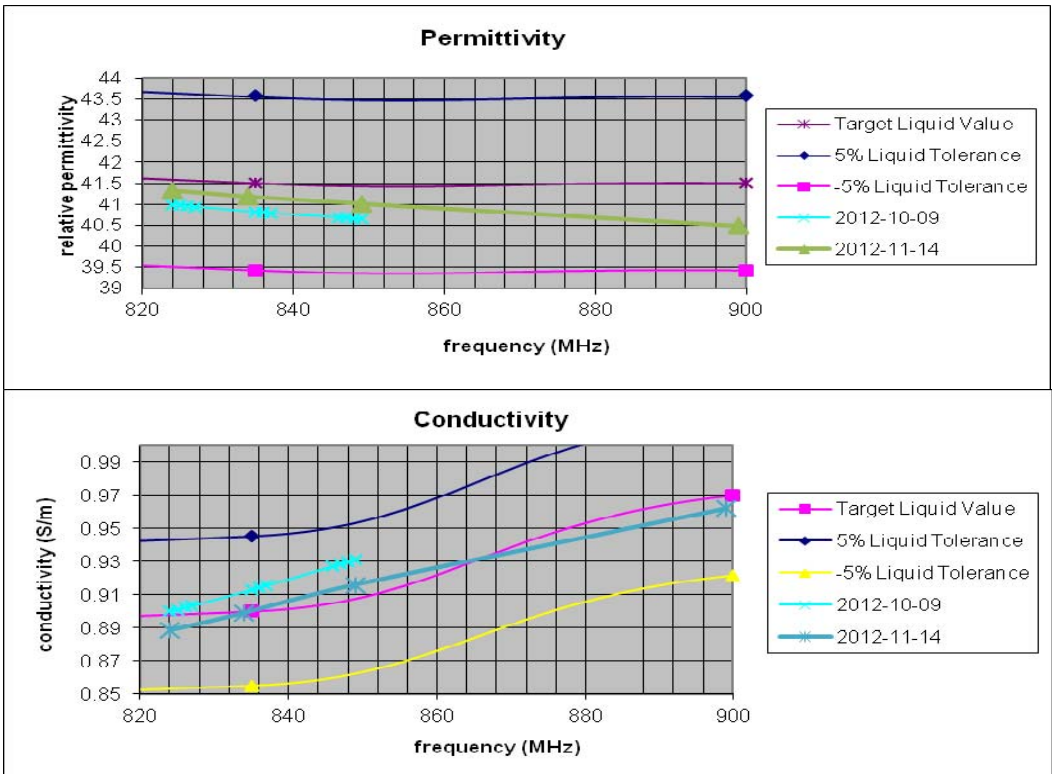
Tissue Parameters

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%

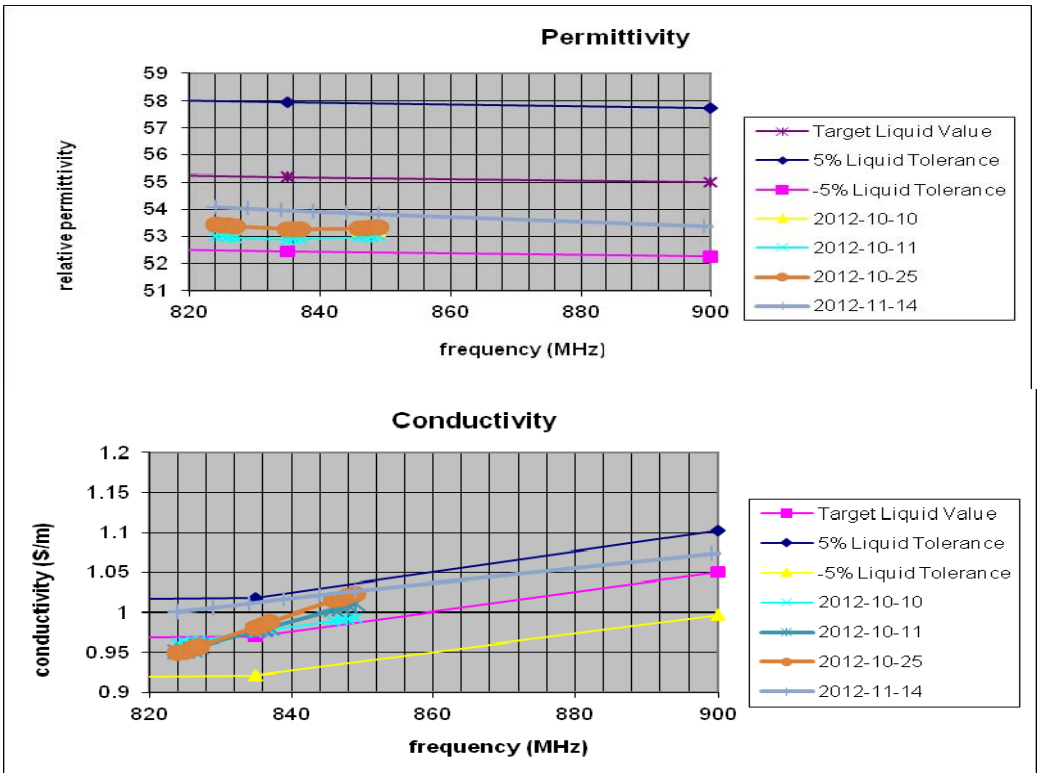
SAR measurements were made within 24 hours of the measurement of liquid parameters. Target liquid parameters are found in FCC OET Bulletin 65C. Relative permittivity and conductivity are within ±5% of the target.

850MHz Head Liquid:



Date	Freq. (MHz)	Rel. Perm.	Condy (S/m)
2012-10-09	824	40.984	0.9004
	825	40.9916	0.9011
	826	40.9484	0.9025
	827	40.9389	0.9034
	835	40.815	0.9131
	836	40.8048	0.9144
	837	40.793	0.9155
	846	40.6924	0.9272
	847	40.6776	0.9287
	848	40.6664	0.93
	849	40.6603	0.9311
2012-11-14	824	41.3235	0.8885
	834	41.1794	0.899
	849	41.0092	0.916
	899	40.4776	0.9618

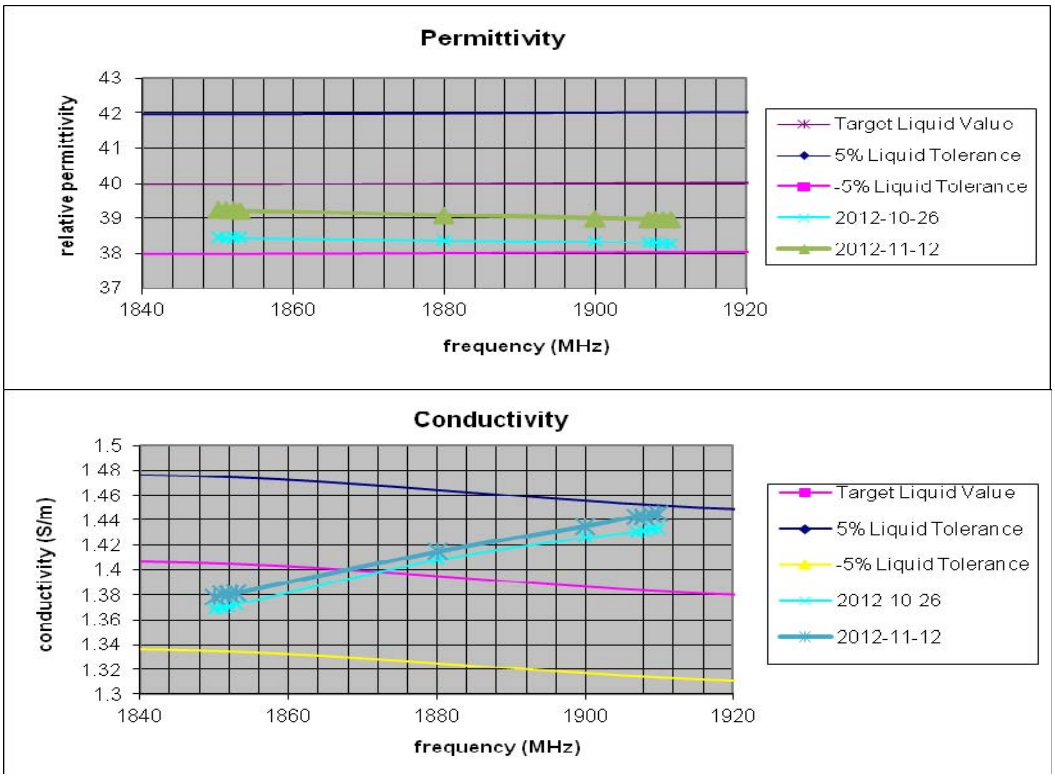
850MHz Body Liquid:



Date	Freq. (MHz)	Rel. Perm.	Condy (S/m)
2012-10-10	824	53.4218	0.9612
	825	53.4391	0.9626
	826	53.3974	0.9638
	827	53.383	0.9651
	835	53.2828	0.9753
	836	53.2768	0.9768
	837	53.27	0.9781
	846	53.1889	0.9895
	847	53.1789	0.9909
	848	53.1677	0.9922
	849	53.171	0.993
2012-10-11	824	53.0069	0.9506
	825	53.0183	0.9523
	826	52.9482	0.954
	827	52.9406	0.957
	835	52.8674	0.9768
	836	52.8814	0.9789
	837	52.8902	0.9813
	846	52.9477	1.004
	847	52.9732	1.0064
	848	52.9828	1.0083
	849	52.9989	1.0109

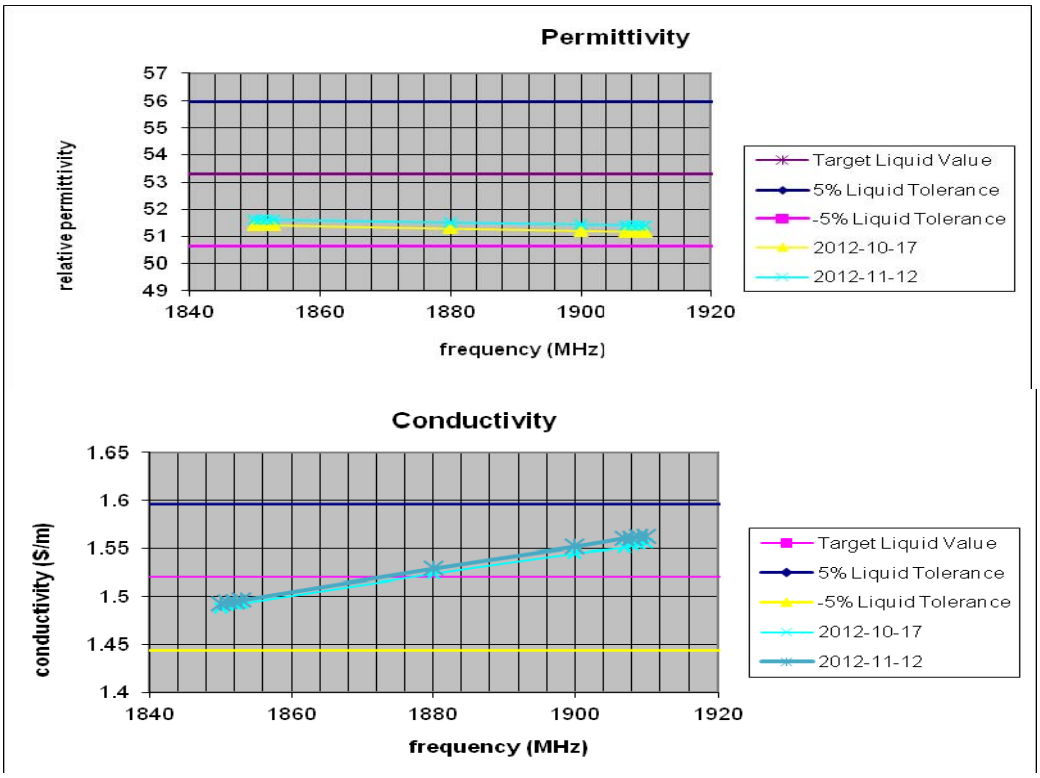
2012-10-25	824	53.4456	0.9495
	825	53.392	0.9508
	826	53.393	0.9547
	827	53.3717	0.9573
	835	53.2649	0.9815
	836	53.2489	0.985
	837	53.252	0.9881
	846	53.2751	1.0153
	847	53.298	1.0175
	848	53.3081	1.0206
	849	53.3246	1.0232
2012-11-14	824	54.0913	1.0013
	829	54.0344	1.0058
	834	53.9759	1.0114
	839	53.9233	1.0171
	844	53.8751	1.022
	849	53.8211	1.0272
	899	53.3773	1.0738
	904	53.3354	1.0783

1900MHz Head Liquid:



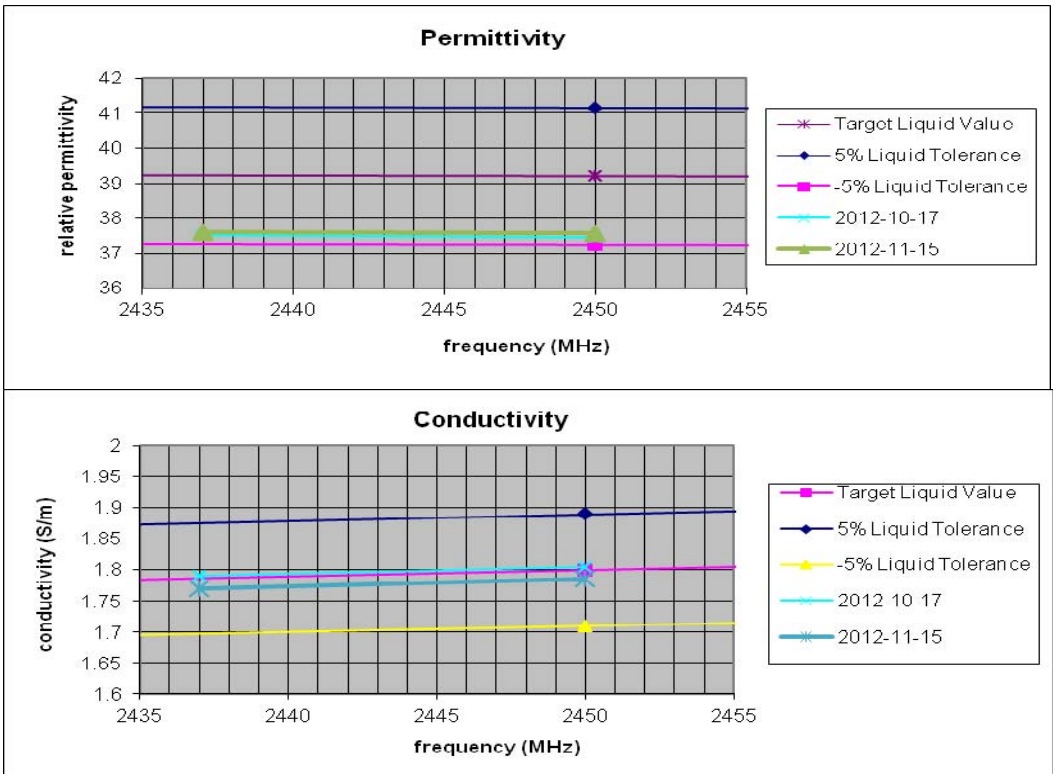
Date	Freq. (MHz)	Rel. Perm.	Condy (S/m)
2012-10-26	1850	38.4607	1.3684
	1851	38.4367	1.3694
	1852	38.4588	1.3704
	1853	38.4401	1.3723
	1880	38.3745	1.408
	1900	38.327	1.426
	1907	38.3073	1.4309
	1908	38.3014	1.4317
	1909	38.2896	1.4331
	1910	38.2833	1.4335
2012-11-12	1850	39.2243	1.3785
	1851	39.223	1.3808
	1852	39.2176	1.3808
	1853	39.2135	1.3819
	1880	39.0895	1.4147
	1900	39.0024	1.435
	1907	38.9681	1.4429
	1908	38.9632	1.4428
	1909	38.9598	1.4439
	1910	38.9587	1.445

1900MHz Body Liquid:



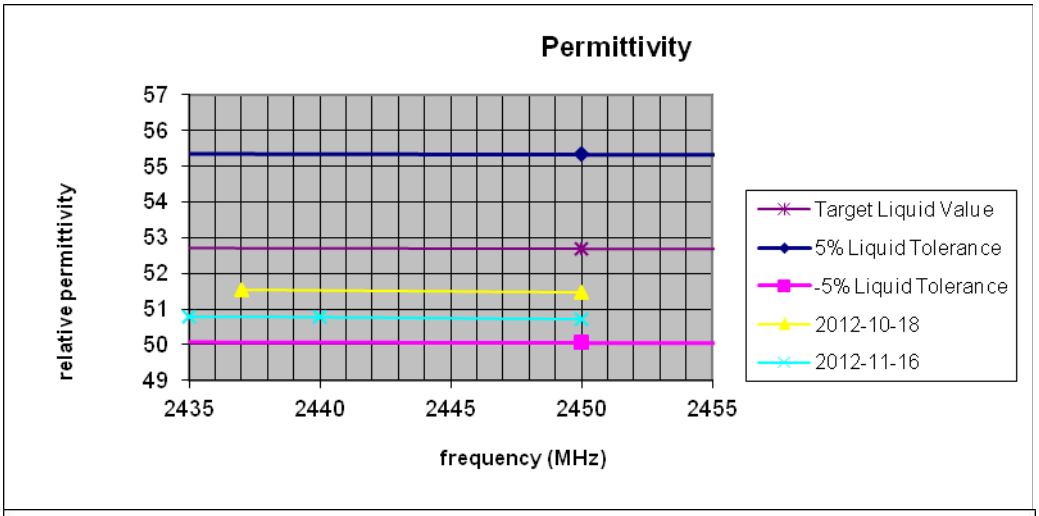
Date	Freq. (MHz)	Rel. Perm.	Condy (S/m)
2012-10-17	1850	51.3859	1.4886
	1851	51.395	1.4901
	1852	51.3868	1.4914
	1853	51.393	1.4928
	1880	51.2716	1.5238
	1900	51.1859	1.5451
	1907	51.1562	1.5508
	1908	51.1529	1.5534
	1909	51.1452	1.5545
	1910	51.1405	1.5555
2012-11-12	1850	51.6209	1.4928
	1851	51.6124	1.494
	1852	51.5967	1.4945
	1853	51.6121	1.4965
	1880	51.5065	1.5292
	1900	51.4315	1.552
	1907	51.4076	1.5607
	1908	51.3948	1.561
	1909	51.3928	1.5622
	1910	51.3899	1.5626

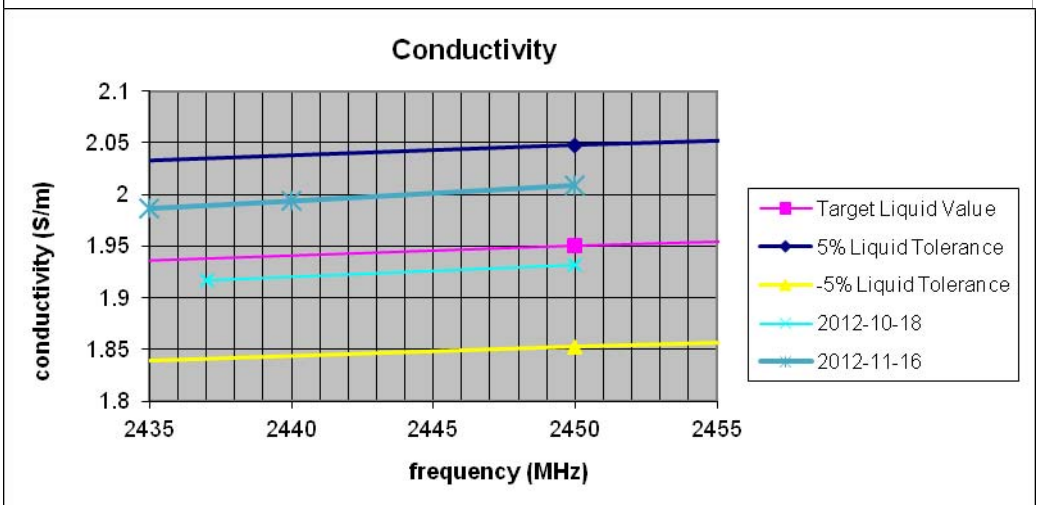
2450MHz Head Liquid:



Date	Freq. (MHz)	Rel. Perm.	Condy (S/m)
2012-10-17	2437	37.5016	1.7901
	2450	37.4448	1.8037
2012-11-15	2437	37.6186	1.7703
	2450	37.5609	1.7846

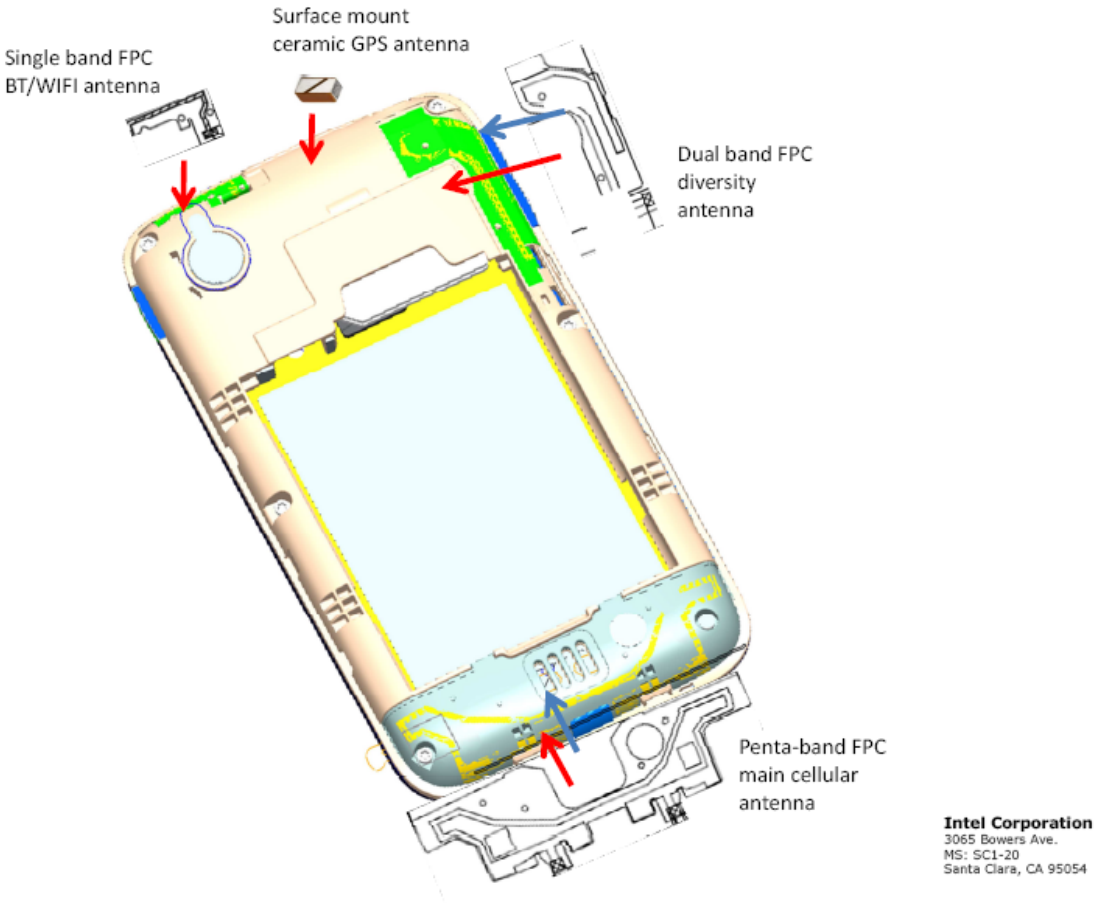
2450MHz Body Liquid:

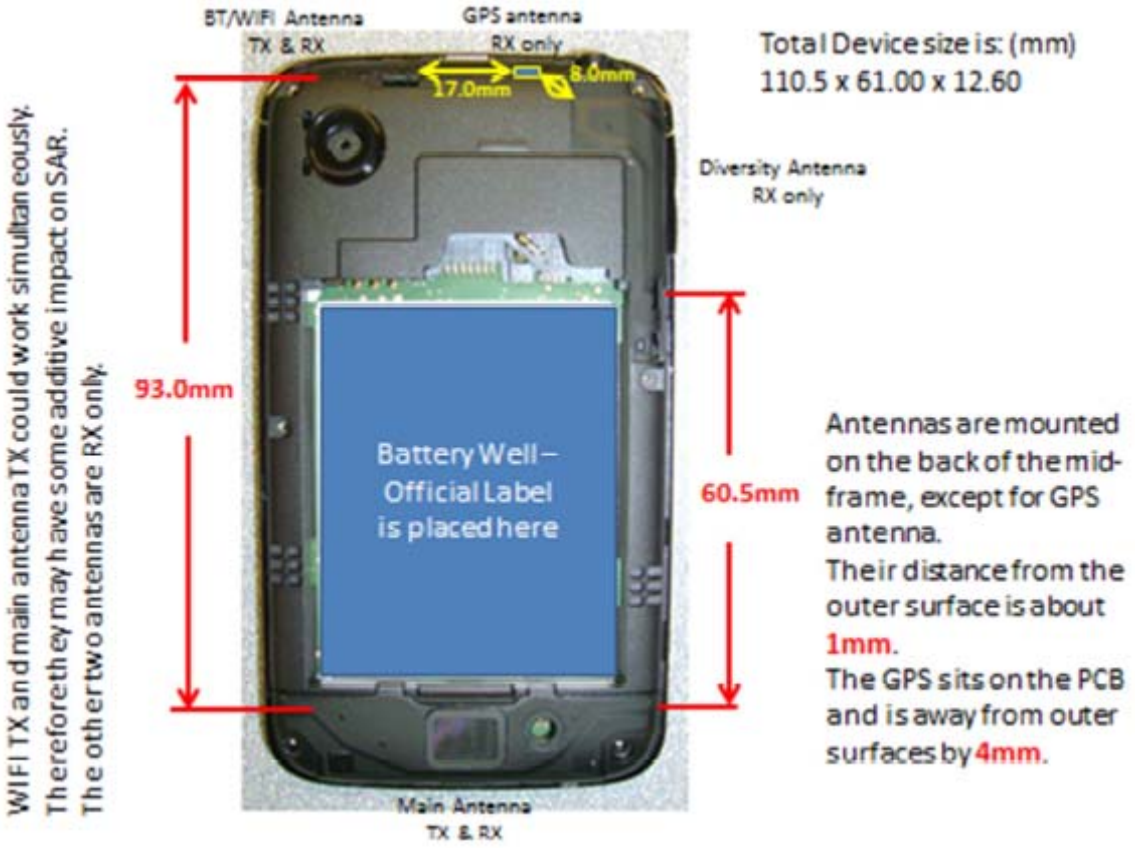




Date	Freq. (MHz)	Rel. Perm.	Condy (S/m)
2012-10-18	2437	51.5222	1.9164
	2450	51.4743	1.9317
2012-11-16	2435	50.7919	1.9861
	2440	50.7749	1.9934
	2450	50.7047	2.0088

Antenna Locations




BT/WIFI Antenna
TX & RX
GPS antenna
RX only
17.0mm
8.0mm
Total Device size is: (mm)
110.5 x 61.00 x 12.60
Diversity Antenna
RX only
93.0mm
Battery Well –
Official Label
is placed here
60.5mm
Antennas are mounted on the back of the mid-frame, except for GPS antenna.
Their distance from the outer surface is about 1mm.
The GPS sits on the PCB and is away from outer surfaces by 4mm.
WIFI TX and main antenna TX could work simultaneously.
Therefore they may have some additive impact on SAR.
The other two antennas are RX only.
Main Antenna
TX & RX

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
Eliptical 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	2010/10/13	2013/10/13
Data Acquisition Electronics	SPEAG	DAE4	1265	2011/05/13	2013/05/13
SAR Probe	SPEAG	ES3DV3	3244	2011/10/25	2012/10/25
SAR Probe	SPEAG	ES3DV3	3260	2012/09/25	2013/09/25

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
Eliptical 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

Shared Equipment

Instrument description	Supplier / Manufacturer	Model	Serial No.	Calibration (date)	Calibration Due (date)
850 MHz Head Tissue Simulant	SPEAG	HSL 900	110922-1	2012/10/09 – 2012/11/14	N/A
850 MHz Body Tissue Simulant	SPEAG	MSL 900	100518-7	2012/10/10 – 2012/11/14	N/A
1900 MHz Head Tissue Simulant	SPEAG	HSL 1900	100615-3	2012/10/26	N/A
1900 MHz Head Tissue Simulant	SPEAG	HSL 1900	100530-2	2012/11/12	N/A
1900 MHz Body Tissue Simulant	SPEAG	MSL 1900	110530-3	2012/10/17 – 2012/11/12	N/A
2450 MHz Head Tissue Simulant	SPEAG	HSL 2450	100615-2	2012/10/17 – 2012/11/15	N/A
2450 MHz Body Tissue Simulant	SPEAG	MSL 2450	100530-1	2012/10/18 – 2012/11/16	N/A
835 MHz Dipole	SPEAG	D835V2	4D113	2011-01-10	2013-01-10
1900 MHz Dipole	SPEAG	D1900V2	5D135	2011-01-05	2013-01-05
2450 MHz Dipole	SPEAG	D2450V2	859	2011-01-05	2013-01-05
900 MHz Dipole	SPEAG	D900V2	1D118	2012-04-12	2013-04-12
1900 MHz Dipole	SPEAG	D1900V2	5D140	2012-04-12	2013-04-12
2450 MHz Dipole	SPEAG	D2450V2	706	2012-04-12	2013-04-12
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

Dipole Calibration Extension:

KDB 450824 states that the return-loss and impedance of dipoles should be measured at least annually to ensure dipoles meet specification. Section 1c) states the return loss should not deviate by more than 20% (0.79 dB) of the previuos measurement. Section 1d) states the real or imaginary parts of the impedance should not deviate by more than 5 Ω from the previous measurement.

Measurements were made with the dipole against the flat phantom, filled with head or body liquid for the respective frequency.

Head Simulating Liquid

Dipole	835 MHz SN: 4d113	1900 MHz SN: 5d135	2450 MHz SN: 859
Date Measured	2012/02/28	2012/04/04	2012/04/04
Measured Return-Loss [dB]	-30.56	-22.3	-27.3
Target Return-Loss [dB]	-30.1	-22.2	-27.7
Return-Loss Deviation [dB]	**0.46**	**-0.1**	**-0.4**
Measured Real Impedance [Ω]	47.58	52.9	57.6
Target Real Impedance [Ω]	52.3	52.8	52.7
Real Impedance Deviation [Ω]	**-4.72**	**0.1**	**4.9**
Measured Imaginary Impedance [Ω]	-1.50	3.5	2.6
Target Imaginary Impedance [Ω]	-2.2	7.6	3.3
Imaginary Impedance Deviation [Ω]	**0.7**	**-4.1**	**-0.7**

Muscle Simulating Liquid

Dipole	835 MHz SN: 4d113	1900 MHz SN: 5d135	2450 MHz SN: 859
Date Measured	2012/03/05	2012/03/05	2012/01/25
Measured Return-Loss [dB]	-27.304	-21.620	-26.567
Target Return-Loss [dB]	-26.8	-22	-26.5
Return-Loss Deviation [dB]	**-0.50**	**0.38**	**-.067**
Measured Real Impedance [Ω]	45.08	44.29	45.045
Target Real Impedance [Ω]	48.1	47.3	48.7
Real Impedance Deviation [Ω]	**-3.02**	**-3.01**	**3.655**
Measured Imaginary Impedance [Ω]	-5.90	5.62	-0.25
Target Imaginary Impedance [Ω]	-4.1	7.3	4.5
Imaginary Impedance Deviation [Ω]	**-1.8**	**-1.68**	**4.75**