FCC OET BULLETIN 65 SUPPLEMENT C
IC RSS-102 ISSUE 2

SAR EVALUATION REPORT

For

iPhone
MODEL: A1303
FCC ID: BCGA1303A
IC: 579C-A1303A

REPORT NUMBER: 09U12393-5

ISSUE DATE: April 10, 2009

Prepared for

APPLE INC
1 INFINITE LOOP, MS-26A
CUPERTINO, CA 95014

Prepared by

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	April 10, 2009	Initial Issue	--

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	APPLE INC 1 INFINITE LOOP, MS-26A CUPERTINO, CA 95014
EUT DESCRIPTION:	iPhone
MODEL NUMBER:	A1303
DEVICE CATEGORY:	Portable
EXPOSURE CATEGORY:	General Population/Uncontrolled Exposure
DATE TESTED:	March 19 - 31, 2009

THE HIGHEST SAR VALUES:

FCC / IC Rule Parts	Frequency Range [MHz]	The Highest SAR Values (1g_mW/g)	Limit (mW/g)
22H / RSS-132	824 - 849	Head: 0.563 mW/g; Body: 0.670 mW/g	1.6
24E / RSS-133	1850 - 1910	Head: 1.19 mW/g; Body: 0.329 mW/g	1.6
15.247 / RSS-210	2400 – 2483.5	Head: 0.520 mW/g; Body: 0.061 mW/g	1.6

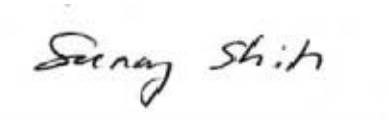
APPLICABLE STANDARDS AND TEST PROCEDURES:

STANDARDS AND TEST PROCEDURES	TEST RESULTS
• FCC OET Bulletin 65 Supplement C and the following specific Test Procedures: o KDB 941225 D01 SAR test for 3G devices o KDB 248227 D01 SAR measurement procedures for 802.11 a/b/g transmitters o KDB 648474 D01 SAR evaluation considerations for handsets with multiple transmitters and antennas	Pass
• RSS-102 ISSUE 2	Pass

Compliance Certification Services, Inc. (CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by CCS based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by CCS will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For CCS By:



SUNNY SHIH
ENGINEERING SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC OET Bulletin 65 Supplement C, IC RSS 102 Issue 2 and the following specific FCC Test Procedures.

- KDB 941225 D01 SAR test for 3G devices
- KDB 248227 D01 SAR measurement procedures for 802.11 a/b/g transmitters
- KDB 648474 D01 SAR evaluation considerations for handsets with multiple transmitters and antennas

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://ts.nist.gov/Standards/scopes/2000650.htm.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

Name of Equipment	Manufacturer	Type/Model	Serial Number	Cal. Due date		
				MM	DD	Year
Robot - Six Axes	Stäubli	RX90BL	N/A	N/A		
Robot Remote Control	Stäubli	CS7MB	3403-91535	N/A		
DASY4 Measurement Server	SPEAG	SEUMS001BA	1041	N/A		
Probe Alignment Unit	SPEAG	LB (V2)	261	N/A		
SAM Phantom (SAM1)	SPEAG	QD000P40CA	1185	N/A		
SAM Phantom (SAM2)	SPEAG	QD000P40CA	1050	N/A		
Oval Flat Phantom (ELI 4.0)	SPEAG	QD OVA001 B	1003	N/A		
Electronic Probe kit	HP	85070C	N/A	N/A		
S-Parameter Network Analyzer	Agilent	8753ES-6	MY40001647	11	14	2009
Signal Generator	Agilent	8753ES-6	MY40001647	11	14	2009
E-Field Probe	SPEAG	EX3DV3	3531	4	23	2009
Thermometer	ERTCO	639-1S	1718	5	28	2009
Data Acquisition Electronics	SPEAG	DAE3 V1	427	10	20	2009
System Validation Dipole	SPEAG	D2450V2	748	4	14	2009
System Validation Dipole	SPEAG	D5GHzV2	1003	11	21	2009
MXA Signal Analyzer	Agilent	N9020A	US48350984	10	23	2009
ESG Vector Signal Generator	Agilent	E4438C	US44271090	9	17	2010
Power Meter	Giga-tronics	8651A	8651404	1	11	2010
Power Sensor	Giga-tronics	80701A	1834588	1	11	2010
Amplifier	Mini-Circuits	ZVE-8G	90606	N/A		
Amplifier	Mini-Circuits	ZHL-42W	D072701-5	N/A		
Simulating Liquid	CCS	H1900	N/A	Within 24 hrs of first test		
Simulating Liquid	CCS	H1900	N/A	Within 24 hrs of first test		
Simulating Liquid	CCS	H835	N/A	Within 24 hrs of first test		
Simulating Liquid	CCS	M835	N/A	Within 24 hrs of first test		
Simulating Liquid	CCS	H2450	N/A	Within 24 hrs of first test		
Simulating Liquid	CCS	M2450	N/A	Within 24 hrs of first test		

4.2. MEASUREMENT UNCERTAINTY

Measurement uncertainty for 300 MHz – 3000 MHz

Uncertainty component	Tol. (±%)	Probe Dist.	Div.	Ci (1g)	Ci (10g)	Std. Unc.(±%)	
						Ui (1g)	Ui(10g)
Measurement System							
Probe Calibration	4.80	N	1	1	1	4.80	4.80
Axial Isotropy	4.70	R	1.732	0.707	0.707	1.92	1.92
Hemispherical Isotropy	9.60	R	1.732	0.707	0.707	3.92	3.92
Boundary Effects	1.00	R	1.732	1	1	0.58	0.58
Linearity	4.70	R	1.732	1	1	2.71	2.71
System Detection Limits	1.00	R	1.732	1	1	0.58	0.58
Readout Electronics	1.00	N	1	1	1	1.00	1.00
Response Time	0.80	R	1.732	1	1	0.46	0.46
Integration Time	2.60	R	1.732	1	1	1.50	1.50
RF Ambient Conditions - Noise	1.59	R	1.732	1	1	0.92	0.92
RF Ambient Conditions - Reflections	0.00	R	1.732	1	1	0.00	0.00
Probe Positioner Mechnical Tolerance	0.40	R	1.732	1	1	0.23	0.23
Probe Positioning With Respect to Phantom Shell	2.90	R	1.732	1	1	1.67	1.67
algorithms for max. SAR evaluation	3.90	R	1.732	1	1	2.25	2.25
Test sample Related							
Test Sample Positioning	1.10	N	1	1	1	1.10	1.10
Device Holder Uncertainty	3.60	N	1	1	1	3.60	3.60
Power and SAR Drift Measurement	5.00	R	1.732	1	1	2.89	2.89
Phantom and Tissue Parameters							
Phantom Uncertainty	4.00	R	1.732	1	1	2.31	2.31
Liquid Conductivity - Target	5.00	R	1.732	0.64	0.43	1.85	1.24
Liquid Conductivity - Meas.	8.60	N	1	0.64	0.43	5.50	3.70
Liquid Permittivity - Target	5.00	R	1.732	0.6	0.49	1.73	1.41
Liquid Permittivity - Meas.	3.30	N	1	0.6	0.49	1.98	1.62
Combined Standard Uncertainty	RSS					11.44	10.49
Expanded Uncertainty (95% Confidence Interval)	K=2					22.87	20.98

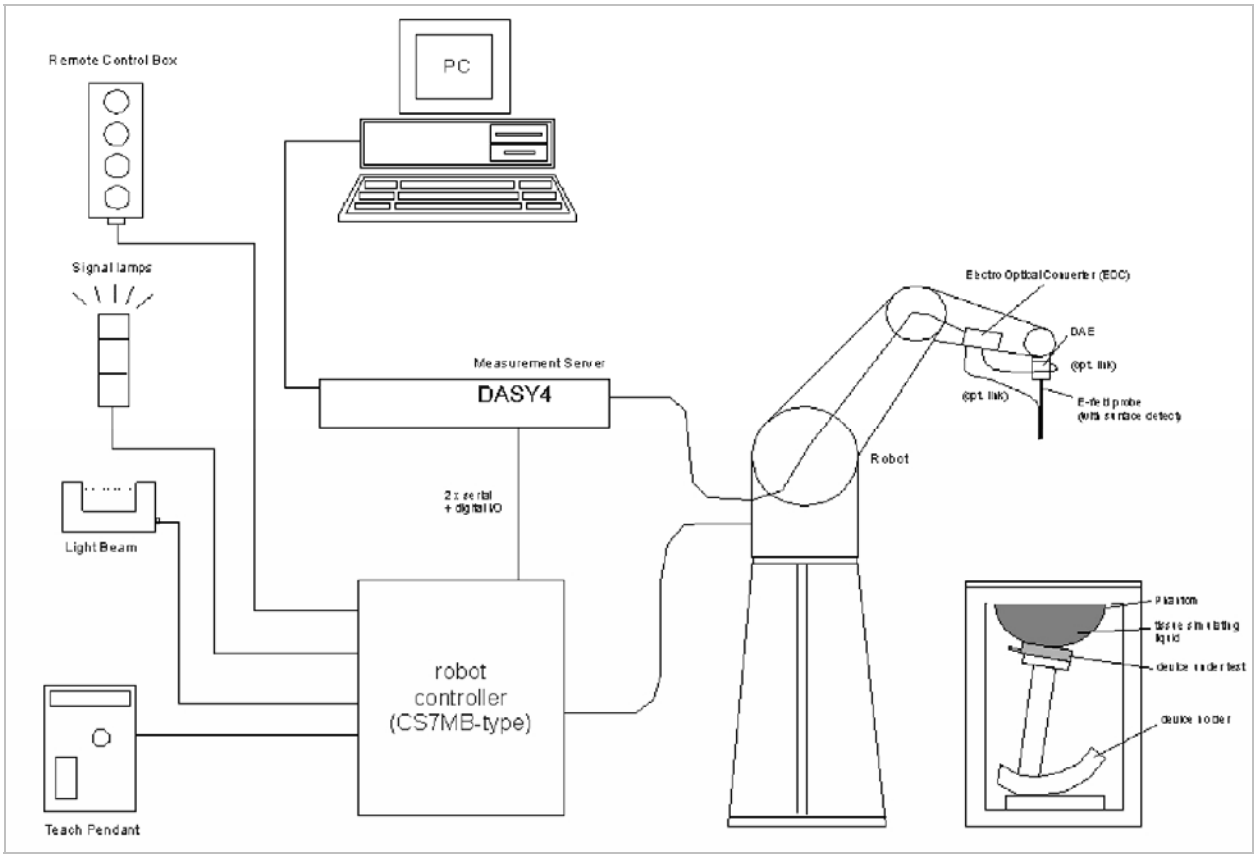
Notesfor table
1. Tol. - tolerance in influence quaitity
2. N - Nomal
3. R - Rectangular
4. Div. - Divisor used to obtain standard uncertainty
5. Ci - is te sensitivity coefficient

5. EQUIPMENT UNDER TEST

iPhone with GSM850/1900, UMTS850/1900 and WiFi/Bluetooth

Normal operation:	• Held to head • Worn on body (LCD facing-In; LCD facing-out) with 1.5 cm separation distance (air-gap)
Body Worn Accessory:	Headset
Antenna(s):	Internal
Other radio modules in host:	• 802.11bg • Bluetooth

6. SYSTEM SPECIFICATIONS



The DASY4 system for performing compliance tests consists of the following items:

- A standard high precision 6-axis robot (Stäubli RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- A computer operating Windows 2000 or Windows XP.
- DASY4 software.
- Remote controls with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom enabling testing left-hand and right-hand usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- Validation dipole kits allowing to validate the proper functioning of the system.

7. COMPOSITION OF INGREDIENTS FOR TISSUE SIMULATING LIQUIDS

The following tissue formulations are provided for reference only as some of the parameters have not been thoroughly verified. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation.

Ingredients (% by weight)	Frequency (MHz)									
	450		835		915		1900		2450	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	41.45	52.4	41.05	56.0	54.9	40.4	62.7	73.2
Salt (NaCl)	3.95	1.49	1.45	1.4	1.35	0.76	0.18	0.5	0.5	0.04
Sugar	56.32	46.78	56.0	45.0	56.5	41.76	0.0	58.0	0.0	0.0
HEC	0.98	0.52	1.0	1.0	1.0	1.21	0.0	1.0	0.0	0.0
Bactericide	0.19	0.05	0.1	0.1	0.1	0.27	0.0	0.1	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.8	0.0
DGBE	0.0	0.0	0.0	0.0	0.0	0.0	44.92	0.0	0.0	26.7
Dielectric Constant	43.42	58.0	42.54	56.1	42.0	56.8	39.9	54.0	39.8	52.5
Conductivity (S/m)	0.85	0.83	0.91	0.95	1.0	1.07	1.42	1.45	1.88	1.78

Salt: 99+% Pure Sodium Chloride Sugar: 98+% Pure Sucrose

Water: De-ionized, 16 MΩ+ resistivity HEC: Hydroxyethyl Cellulose

DGBE: 99+% Di(ethylene glycol) butyl ether, [2-(2-butoxyethoxy)ethanol]

Triton X-100 (ultra pure): Polyethylene glycol mono [4-(1,1, 3, 3-tetramethylbutyl)phenyl]ether

8. LIQUID PARAMETERS CHECK

The simulating liquids should be checked at the beginning of a series of SAR measurements to determine of the dielectric parameters are within the tolerances of the specified target values. The relative permittivity and conductivity of the tissue material should be within ± 5% of the values given in the table below.

Reference Values of Tissue Dielectric Parameters for Head and Body Phantom (for 150 – 3000 MHz and 5800 MHz)

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in IEEE Standard 1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in a human head. Other head and body tissue parameters that have not been specified in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations and extrapolated according to the head parameters specified in IEEE Standard 1528.

Target Frequency (MHz)	Head		Body	
	ε_r	σ (S/m)	ε_r	σ (S/m)
150	52.3	0.76	61.9	0.8
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.9	55.2	0.97
900	41.5	0.97	55	1.05
915	41.5	0.98	55	1.06
1450	40.5	1.2	54	1.3
1610	40.3	1.29	53.8	1.4
1800 – 2000	40	1.4	53.3	1.52
2450	39.2	1.8	52.7	1.95
3000	38.5	2.4	52	2.73
5800	35.3	5.27	48.2	6

(ε_r = relative permittivity, σ = conductivity and ρ = 1000 kg/m^3)

8.1. LIQUID CHECK RESULTS FOR 1900 MHZ

Simulating Liquid Dielectric Parameters for Head 1900 MHz

Room Ambient Temperature = 25°C; Relative humidity = 35% Measured by: Sunny Shih

f (MHz)	Head Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
1900	e'	41.210	Relative Permittivity (ϵ_r):	41.2104	40.0	3.03	± 5
	e"	13.426	Conductivity (σ):	1.41916	1.40	1.37	± 5

Liquid temperature: 24 deg. C
March 19, 2009 10:58 AM

Frequency	e'	e"
1710000000.	42.0696	12.7879
1720000000.	42.0158	12.8454
1730000000.	41.9905	12.9356
1740000000.	41.9778	12.9925
1750000000.	41.9752	13.0678
1760000000.	41.9008	13.1064
1770000000.	41.8363	13.1232
1780000000.	41.7501	13.0888
1790000000.	41.6936	13.0797
1800000000.	41.6308	13.1123
1810000000.	41.5614	13.1370
1820000000.	41.4818	13.1626
1830000000.	41.4329	13.2332
1840000000.	41.4093	13.3212
1850000000.	41.3813	13.3996
1860000000.	41.3261	13.4528
1870000000.	41.2744	13.4579
1880000000.	41.2548	13.4177
1890000000.	41.2406	13.3984
1900000000.	**41.2104**	**13.4264**
1910000000.	41.1444	13.5028

The conductivity (σ) can be given as:

$$\sigma = \omega \varepsilon_0 e'' = 2 \pi f \varepsilon_0 e''$$

where f = target f * 10^6

$\varepsilon_0 = 8.854 * 10^{-12}$

Simulating Liquid Dielectric Parameters for Head 1900 MHz

Room Ambient Temperature = 25°C; Relative humidity = 35% Measured by: Sunny Shih

f (MHz)	Head Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
1900	e'	40.252	Relative Permittivity (ϵ_r):	40.2519	40.0	0.63	± 5
	e"	13.770	Conductivity (σ):	1.45545	1.40	3.96	± 5

Liquid temperature: 24 deg. C
March 20, 2009 07:49 AM

Frequency	e'	e"
1710000000.	41.3673	13.0372
1720000000.	41.2911	13.0320
1730000000.	41.2469	13.0517
1740000000.	41.2275	13.1096
1750000000.	41.1989	13.2416
1760000000.	41.0860	13.3752
1770000000.	40.9610	13.4447
1780000000.	40.8622	13.4426
1790000000.	40.8252	13.4432
1800000000.	40.7894	13.4586
1810000000.	40.7337	13.4406
1820000000.	40.6825	13.3987
1830000000.	40.6795	13.3787
1840000000.	40.7030	13.4517
1850000000.	40.6420	13.5905
1860000000.	40.4853	13.7144
1870000000.	40.3124	13.7430
1880000000.	40.2402	13.7228
1890000000.	40.2454	13.7136
1900000000.	**40.2519**	**13.7697**
1910000000.	40.1934	13.8350

The conductivity (σ) can be given as:

$$\sigma = \omega \varepsilon_0 e'' = 2 \pi f \varepsilon_0 e''$$

where f = target $f * 10^6$

$\varepsilon_0 = 8.854 * 10^{-12}$

Simulating Liquid Dielectric Parameters for Muscle 1900 MHz

Room Ambient Temperature = 25°C; Relative humidity = 35% Measured by: Sunny Shih

f (MHz)	Muscle Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
1900	e'	53.799	Relative Permittivity (ϵ_r):	53.7991	53.3	0.94	± 5
	e"	14.184	Conductivity (σ):	1.49928	1.52	-1.36	± 5

Liquid temperature: 24 deg. C
March 20, 2009 01:31 PM

Frequency	e'	e"
1710000000.	54.3748	13.5928
1720000000.	54.3399	13.6862
1730000000.	54.3587	13.7784
1740000000.	54.3655	13.8358
1750000000.	54.3813	13.8705
1760000000.	54.3280	13.8830
1770000000.	54.2661	13.8662
1780000000.	54.1953	13.8247
1790000000.	54.1188	13.8002
1800000000.	54.0627	13.8469
1810000000.	53.9841	13.9031
1820000000.	53.8971	14.0006
1830000000.	53.8649	14.0864
1840000000.	53.8413	14.1868
1850000000.	53.8449	14.2331
1860000000.	53.8415	14.2452
1870000000.	53.8347	14.2236
1880000000.	53.8482	14.1906
1890000000.	53.8335	14.1616
1900000000.	**53.7991**	**14.1844**
1910000000.	53.7189	14.2657

The conductivity (σ) can be given as:

$$\sigma = \omega \varepsilon_0 e'' = 2 \pi f \varepsilon_0 e''$$

where f = target f * 10^6

$\varepsilon_0 = 8.854 * 10^{-12}$

8.2. LIQUID CHECK RESULTS FOR 835 MHZ

Simulating Liquid Dielectric Parameters for Head 835 MHz

Room Ambient Temperature = 25°C; Relative humidity = 40% Measured by: Sunny Shih

f (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
835	e'	41.8	Relative Permittivity (ε_r):	41.806	41.5	0.74	± 5
	e''	19.5	Conductivity (σ):	0.907	0.90	0.72	± 5

Liquid temperature: 24 deg. C
March 27, 2009 02:55 PM

Frequency	e'	e''
770000000.	42.6137	19.8274
775000000.	42.5950	19.8213
780000000.	42.5296	19.8053
785000000.	42.4833	19.7734
790000000.	42.4359	19.7753
795000000.	42.3691	19.7826
800000000.	42.2978	19.7693
805000000.	42.2148	19.7487
810000000.	42.1248	19.6981
815000000.	42.0666	19.6610
820000000.	41.9839	19.6099
825000000.	41.9128	19.5776
830000000.	41.8554	19.5526
835000000.	**41.8059**	**19.5152**
840000000.	41.7488	19.5224
845000000.	41.6969	19.5073
850000000.	41.6266	19.4977
855000000.	41.5793	19.4922
860000000.	41.5260	19.4989
865000000.	41.4925	19.4999
870000000.	41.3709	19.4755
875000000.	41.3475	19.5044
880000000.	41.2913	19.5224
885000000.	41.2481	19.5467
890000000.	41.1921	19.5245
895000000.	41.1251	19.4960
900000000.	41.0787	19.4668
905000000.	41.0035	19.4218
910000000.	40.9365	19.3849
915000000.	40.9004	19.3343

The conductivity (σ) can be given as:

$$\sigma = \omega \varepsilon_0 e'' = 2 \pi f \varepsilon_0 e''$$

where f = target f * 10^6

$\varepsilon_0 = 8.854 * 10^{-12}$

Simulating Liquid Dielectric Parameters for Muscle 900 MHz

Room Ambient Temperature = 25°C; Relative humidity = 40% Measured by: Sunny Shih

f (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
835	e'	53.6	Relative Permittivity (ε_r):	53.583	55.2	-2.93	± 5
	e"	21.3	Conductivity (σ):	0.989	0.97	2.00	± 5

Liquid temperature: 24 deg. C
March 27, 2009 10:40 AM

Frequency	e'	e"
785000000.	54.1229	21.5989
790000000.	54.0766	21.5888
795000000.	54.0278	21.5682
800000000.	53.9937	21.5541
805000000.	53.9434	21.5230
810000000.	53.8755	21.4873
815000000.	53.7974	21.4669
820000000.	53.7316	21.4147
825000000.	53.6990	21.3901
830000000.	53.6429	21.3132
835000000.	**53.5828**	**21.2993**
840000000.	53.5238	21.2852
845000000.	53.4887	21.2736
850000000.	53.4570	21.2390
855000000.	53.3905	21.1959
860000000.	53.3427	21.2004
865000000.	53.3171	21.1751
870000000.	53.2699	21.1474
875000000.	53.2214	21.1418
880000000.	53.2017	21.1253
885000000.	53.1691	21.1562
890000000.	53.1184	21.1094
895000000.	53.0918	21.0958
900000000.	53.0775	21.0984
905000000.	53.0322	21.0193
910000000.	52.9745	21.0131
915000000.	52.9056	20.9754
920000000.	52.8563	20.9202
925000000.	52.8220	20.8750
930000000.	52.8094	20.8572
935000000.	52.7588	20.7937
940000000.	52.7335	20.7914
945000000.	52.6913	20.7455

The conductivity (σ) can be given as:

$$\sigma = \omega \varepsilon_0 e'' = 2 \pi f \varepsilon_0 e''$$

where f = target f * 10^6

$\varepsilon_0 = 8.854 * 10^{-12}$

8.3. LIQUID CHECK RESULTS FOR 2450 MHZ

Simulating Liquid Dielectric Parameters for Head 2450 MHz

Room Ambient Temperature = 25°C; Relative humidity = 40% Measured by: Sunny Shih

f (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
2450	e'	38.1	Relative Permittivity (ϵ_r):	38.057	39.2	-2.92	± 5
	e"	13.8	Conductivity (σ):	1.882	1.80	4.55	± 5

Liquid Temperature: 24 deg. C
March 30, 2009 09:40 AM

Frequency	e'	e"
2400000000.	38.2477	13.6073
2405000000.	38.2133	13.6589
2410000000.	38.1865	13.6990
2415000000.	38.1642	13.7272
2420000000.	38.1258	13.7520
2425000000.	38.1162	13.7783
2430000000.	38.1007	13.7765
2435000000.	38.0980	13.7836
2440000000.	38.0892	13.7930
2445000000.	38.0799	13.8082
2450000000.	**38.0572**	**13.8070**
2455000000.	38.0257	13.8213
2460000000.	38.0023	13.8154
2465000000.	37.9660	13.7901
2470000000.	37.9379	13.7746
2475000000.	37.9180	13.7689
2480000000.	37.9187	13.7681
2485000000.	37.9159	13.7730
2490000000.	37.9060	13.7920
2495000000.	37.8823	13.8335
2500000000.	37.8622	13.8857

The conductivity (σ) can be given as:

$$\sigma = \omega \varepsilon_0 e'' = 2 \pi f \varepsilon_0 e''$$

where f = target f * 10^6

$\varepsilon_0 = 8.854 * 10^{-12}$

Simulating Liquid Dielectric Parameters for Head 2450 MHz

Room Ambient Temperature = 25°C; Relative humidity = 40% Measured by: Sunny Shih

f (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
2450	e'	37.6	Relative Permittivity (ϵ_r):	37.609	39.2	-4.06	± 5
	e"	13.8	Conductivity (σ):	1.884	1.80	4.65	± 5

Liquid Temperature: 24 deg. C
March 31, 2009 09:21 AM

Frequency	e'	e"
2400000000.	37.8712	13.5896
2405000000.	37.8167	13.6193
2410000000.	37.7752	13.6442
2415000000.	37.7439	13.6747
2420000000.	37.7061	13.6968
2425000000.	37.6829	13.7265
2430000000.	37.6659	13.7431
2435000000.	37.6524	13.7571
2440000000.	37.6338	13.7779
2445000000.	37.6263	13.8088
2450000000.	**37.6089**	**13.8205**
2455000000.	37.6026	13.8288
2460000000.	37.6013	13.8194
2465000000.	37.5903	13.8180
2470000000.	37.5886	13.8145
2475000000.	37.5997	13.8331
2480000000.	37.6062	13.8393
2485000000.	37.6010	13.8441
2490000000.	37.5901	13.8617
2495000000.	37.5642	13.8972
2500000000.	37.5403	13.9282

The conductivity (σ) can be given as:

$$\sigma = \omega \varepsilon_0 e'' = 2 \pi f \varepsilon_0 e''$$

where f = target f * 10^6

$\varepsilon_0 = 8.854 * 10^{-12}$

Simulating Liquid Dielectric Parameters for Muscle 2450 MHz

Room Ambient Temperature = 25°C; Relative humidity = 40% Measured by: Sunny Shih

f (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
2450	e'	52.9	Relative Permittivity (ϵ_r):	52.908	52.7	0.39	± 5
	e"	14.4	Conductivity (σ):	1.968	1.95	0.94	± 5

Liquid Temperature: 24 deg. C
March 31, 2009 99:24 AM

Frequency	e'	e"
2400000000.	53.0466	14.2222
2405000000.	53.0118	14.2868
2410000000.	52.9782	14.3460
2415000000.	52.9638	14.3808
2420000000.	52.9313	14.3893
2425000000.	52.9192	14.4102
2430000000.	52.9143	14.4334
2435000000.	52.9363	14.4295
2440000000.	52.9458	14.4305
2445000000.	52.9248	14.4404
2450000000.	**52.9078**	**14.4413**
2455000000.	52.8736	14.4495
2460000000.	52.8548	14.4221
2465000000.	52.8175	14.4039
2470000000.	52.7935	14.3839
2475000000.	52.7854	14.3816
2480000000.	52.7827	14.3918
2485000000.	52.7913	14.4103
2490000000.	52.7755	14.4537
2495000000.	52.7638	14.5114
2500000000.	52.7437	14.6002

The conductivity (σ) can be given as:

$$\sigma = \omega \varepsilon_0 e'' = 2 \pi f \varepsilon_0 e''$$

where f = target f * 10^6

$\varepsilon_0 = 8.854 * 10^{-12}$

9. SYSTEM CHECK

The system performance check is performed prior to any usage of the system in order to guarantee reproducible results. The system performance check verifies that the system operates within its specifications of ±10%.

System Performance Check Measurement Conditions

- The measurements were performed in the flat section of the SAM twin phantom filled with Head or Body simulating liquid of the following parameters.
- The DASY4 system with an Isotropic E-Field Probe EX3DV3 was used for the measurements.
- The dipole was mounted on the small tripod so that the dipole feed point was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10 mm (above 1 GHz) and 15 mm (below 1 GHz) from dipole center to the simulating liquid surface.
- The coarse grid with a grid spacing of 15 mm was aligned with the dipole.
  For 5 GHz band - The coarse grid with a grid spacing of 10 mm was aligned with the dipole.
- Special 7x7x7 fine cube was chosen for cube
- Distance between probe sensors and phantom surface was set to 3 mm.
  For 5 GHz band - Distance between probe sensors and phantom surface was set to 2.5 mm
- The dipole input power (forward power) was 250 mW±3%.
- The results are normalized to 1 W input power.

IEEE Standard 1528-2003 Numerical reference SAR values (W/kg) for reference dipole and flat phantom

Frequency (MHz)	Distance (mm)	1g SAR [W/kg]	10g SAR [W/kg]	Local SAR at surface (above feed-point)
300	15	3	2	4.4
450	15	4.9	3.3	7.2
835	15	9.5	6.2	4.1
900	15	10.8	6.9	16.4
1450	10	29	16	5.02
1800	10	38.1	19.8	69.5
1900	10	39.7	20.5	72.1
2000	10	41.1	21.1	74.6
2450	10	52.4	24	104.2
3000	10	63.8	25.7	104.2

Note: All SAR values normalized to 1 W forward power.

9.1. SYSTEM CHECK RESULTS FOR D1900V2

System Validation Dipole: D1900V2 SN: 5d043

Date: March 19, 2009
Ambient Temperature = 25°C; Relative humidity = 35% Measured by: Sunny Shih

Medium	CW Signal (MHz)	Forward power (mW)	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
Head	1900	250	1g SAR:	37.1	39.7	-6.55	±10
			10g SAR:	19.2	20.5	-6.34	

Date: March 20, 2009
Ambient Temperature = 25°C; Relative humidity = 35% Measured by: Sunny Shih

Medium	CW Signal (MHz)	Forward power (mW)	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
Head	1900	250	1g SAR:	39.7	39.7	0.00	±10
			10g SAR:	20.6	20.5	0.49	

9.2. SYSTEM CHECK RESULTS FOR D835V2

System Validation Dipole: D835V2 SN:4d002

Date: March 27, 2009
Ambient Temperature = 25°C; Relative humidity = 40% Measured by: Sunny Shih

Medium	CW Signal (MHz)	Forward power (mW)	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
Head	835	250	1g SAR:	9.36	9.5	-1.47	±10
			10g SAR:	6.1	6.2	-1.61	

9.3. SYSTEM CHECK RESULTS FOR D2450V2

System Validation Dipole: D2450V2 SN: 748

Date: March 30, 2009
Ambient Temperature = 25°C; Relative humidity = 40% Measured by: Sunny Shih

Medium	CW Signal (MHz)	Forward power (mW)	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
Head	2450	250	1g SAR:	53.5	52.4	2.10	±10
			10g SAR:	24.3	24	1.25	

Date: March 31, 2009
Ambient Temperature = 25°C; Relative humidity = 40% Measured by: Sunny Shih

Medium	CW Signal (MHz)	Forward power (mW)	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
Head	2450	250	1g SAR:	53.1	52.4	1.34	±10
			10g SAR:	24.3	24	1.25	

10. OUTPUT POWER VERIFICATION

10.1. GSM

GSM (GMSK)

Band	Ch No.	Frequency	Conducted output power (dBm)	
			Average	Peak
GSM850	128	824.2	32.7	
	190	836.6	32.7	
	251	848.8	32.7	
GSM1900	512	1850.2	30.7	
	661	1880	30.8	
	810	1909.8	31.0	

GPRS (GMSK) - Coding Scheme: MCS4

Band	Ch No.	Frequency	Conducted output power (dBm)			
			Average		Peak	
			1 slot	2 slot	1 slot	2 slot
GSM850	128	824.2	32.8	31.2		
	190	836.6	32.9	31.2		
	251	848.8	32.8	31.2		
GSM1900	512	1850.2	30.8	28.2		
	661	1880	30.9	28.3		
	810	1909.8	31.0	28.5		

EGPRS (8PSK) - Coding Scheme: MCS9

Band	Ch No.	Frequency	Conducted output power (dBm)			
			Average		Peak	
			1 slot	2 slot	1 slot	2 slot
GSM850	128	824.2	27.4	27.5		
	190	836.6	27.3	27.5		
	251	848.8	27.2	27.3		
GSM1900	512	1850.2	26.5	26.9		
	661	1880	26.2	26.6		
	810	1909.8	26.0	26.3		

10.2. UMTS RELEASE 99

The following 4 Sub-tests were completed according to procedures in section 5.2 of 3GPP TS34.121. A summary of these settings are illustrated below:

	Mode	Rel99
	Subtest	-
WCDMA General Settings	Loopback Mode	Test Mode 1
	Rel99 RMC	12.2kbps RMC
	HSDPA FRC	Not Applicable
	HSUPA Test	Not Applicable
	Power Control Algorithm	Algorithm2
	βc	Not Applicable
	βd	Not Applicable
	βec	Not Applicable
	βc/βd	8/15
	βhs	Not Applicable
	βed	Not Applicable

Results

Rel 99 (12.2kps RMC)

Band	Mode	UL Ch No.	DL Ch No.	f (MHz)	O/P Power (dBm)
UMTS850 (Band V)	Rel 99 12.2kps RMC	4132	4357	826.4	23.7
		4183	4408	836.6	23.8
		4233	4458	846.6	23.9
UMTS1900 (Band II)	Rel 99 12.2kps RMC	9262	9662	1852.4	22.2
		9400	9800	1880.0	22.3
		9538	9938	1907.6	22.3

10.3. UMTS HSDPA

The following 4 Sub-tests were completed according to Release 5 procedures in section 5.2 of 3GPP TS34.121. A summary of these settings are illustrated below:

	Mode	Rel5 HSDPA	Rel5 HSDPA	Rel5 HSDPA	Rel5 HSDPA
	Subtest	1	2	3	4
WCDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set1			
	HSUPA Test	Not Applicable			
	Power Control Algorithm	Algorithm 2			
	βc	2/15	12/15	15/15	15/15
	βd	15/15	15/15	8/15	4/15
	Bd (SF)	64			
	βec	-	-	-	-
	βc/βd	2/15	12/15	15/8	15/4
	βhs	4/15	24/15	30/15	30/15
	βed	Not Applicable			
	CM (dB)	0	1	1.5	1.5
HSDPA Specific Settings	DACK	8			
	DNAK	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback (Table 5.2B.4)	4ms			
	CQI Repetition Factor (Table 5.2B.4)	2			
	Ahs = βhs/βc	30/15			

Results

Rel 5 HSDPA

Band	Mode	UL Ch No.	DL Ch No.	f (MHz)	O/P Power (dBm)
UMTS850 (Band V)	Subtest 1	4132	4357	826.4	23.7
		4183	4408	836.6	23.8
		4233	4458	846.6	23.9
	Subtest 2	4132	4357	826.4	22.8
		4183	4408	836.6	22.9
		4233	4458	846.6	23.0
	Subtest 3	4132	4357	826.4	22.7
		4183	4408	836.6	22.8
		4233	4458	846.6	22.9
	Subtest 4	4132	4357	826.4	21.7
		4183	4408	836.6	21.8
		4233	4458	846.6	22.0
UMTS1900 (Band II)	Subtest 1	9262	9662	1852.4	22.1
		9400	9800	1880.0	22.2
		9538	9938	1907.6	22.2
	Subtest 2	9262	9662	1852.4	21.2
		9400	9800	1880.0	21.3
		9538	9938	1907.6	21.2
	Subtest 3	9262	9662	1852.4	21.2
		9400	9800	1880.0	21.3
		9538	9938	1907.6	21.3
	Subtest 4	9262	9662	1852.4	20.2
		9400	9800	1880.0	20.3
		9538	9938	1907.6	20.3

10.4. WIFI

The cable assembly insertion loss of 21.4 dB (including 20 dB pad and 1.4 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

RESULTS

Murata, 339S0072

802.11b

Ch. No.	f (MHz)	Average Conducted power (dBm)
1	2412	16.50
6	2437	16.80
11	2462	16.60

802.11g

Ch. No.	f (MHz)	Average Conducted power (dBm)
1	2412	16.50
6	2437	16.70
11	2462	16.50

Mitsumi, 339S0077

802.11b

Ch. No.	f (MHz)	Average Conducted power (dBm)
1	2412	16.50
6	2437	16.70
11	2462	16.60

802.11g

Ch. No.	f (MHz)	Average Conducted power (dBm)
1	2412	16.50
6	2437	16.70
11	2462	16.50

11. SUMMARY OF TEST RESULTS

If the SAR measured at the middle channel for each test configuration is at least 3.0 dB (0.8 mW/g) lower than the SAR limit (1.6 mW/g), testing at the high and low channels is optional for such test configuration(s).

11.1. UMTS1900

11.1.1. LEFT HAND SIDE

Test position	Mode	UL Ch No.	DL Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
Touch	Rel 99 12.2kps RMC	9262	9662	1852.4	1.16	1.6
		9400	9800	1880.0	1.12	
		9538	9938	1907.6	1.04	
Tilt (15°)	Rel 99 12.2kps RMC	9262	9662	1852.4		1.6
		9400	9800	1880.0	0.390	
		9538	9938	1907.6		

11.1.2. RIGHTHAND SIDE

Test position	Mode	UL Ch No.	DL Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
Touch	Rel 99 12.2kps RMC	9262	9662	1852.4	**1.19**	1.6
		9400	9800	1880.0	1.13	
		9538	9938	1907.6	0.99	
Tilt (15°)	Rel 99 12.2kps RMC	9262	9662	1852.4		1.6
		9400	9800	1880.0	0.547	
		9538	9938	1907.6		

11.1.3. BODY WORN

Test position	Mode	Sep. dist. (mm)	UL Ch No.	DL Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
LCD up	Rel 99 12.2kps RMC	15	9262	9662	1852.4		1.6
			9400	9800	1880.0	0.280	
			9538	9938	1907.6		
LCD down	Rel 99 12.2kps RMC	15	9262	9662	1852.4		1.6
			9400	9800	1880.0	**0.329**	
			9538	9938	1907.6		
LCD down	HSDPA Subtest 1	15	9262	9662	1852.4		1.6
			9400	9800	1880.0	0.329	
			9538	9938	1907.6		

11.2. GSM1900

11.2.1. LEFT HAND SIDE

Test position	Mode	Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
Touch	GSM	512	1850.2		1.6
		661	1880.0	0.790	
		810	1909.8		
Tilt (15°)	GSM	512	1850.2		1.6
		661	1880.0	0.281	
		810	1909.8		

11.2.2. RIGHTHAND SIDE

Test position	Mode	Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
Touch	GSM	512	1850.2		1.6
		661	1880.0	0.749	
		810	1909.8		
Tilt (15°)	GSM	512	1850.2		1.6
		661	1880.0	0.404	
		810	1909.8		

11.2.3. BODY WORN

Test position	Mode	Sep. dist. (mm)	Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
LCD up	GPRS 2 slots	15	512	1850.2		1.6
			661	1880.0	0.217	
			810	1909.8		
LCD down	GPRS 2 slots	15	512	1850.2		1.6
			661	1880.0	0.263	
			810	1909.8		
LCD down	GSM	15	512	1850.2		1.6
			661	1880.0	0.229	
			810	1909.8		

11.3. UMTS850

11.3.1. LEFT HAND SIDE

Test position	Mode	UL Ch No.	DL Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
Touch	Rel 99 12.2kps RMC	4132	4357	826.4		1.6
		4183	4408	836.6	0.461	
		4233	4458	846.6		
Tilt (15°)	Rel 99 12.2kps RMC	4132	4357	826.4		1.6
		4183	4408	836.6	0.277	
		4233	4458	846.6		

11.3.2. RIGHTHAND SIDE

Test position	Mode	UL Ch No.	DL Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
Touch	Rel 99 12.2kps RMC	4132	4357	826.4		1.6
		4183	4408	836.6	**0.563**	
		4233	4458	846.6		
Tilt (15°)	Rel 99 12.2kps RMC	4132	4357	826.4		1.6
		4183	4408	836.6	0.329	
		4233	4458	846.6		

11.3.3. BODY WORN

Test position	Mode	Sep. dist. (mm)	UL Ch No.	DL Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
LCD up	Rel 99 12.2kps RMC	15	4132	4357	826.4		1.6
			4183	4408	836.6	0.347	
			4233	4458	846.6		
LCD down	Rel 99 12.2kps RMC	15	4132	4357	826.4		1.6
			4183	4408	836.6	0.662	
			4233	4458	846.6		
LCD down	HSDPA Subtest 1	15	4132	4357	826.4		1.6
			4183	4408	836.6	**0.670**	
			4233	4458	846.6		

11.4. GSM850

11.4.1. LEFT HAND SIDE

Test position	Mode	Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
Touch	GSM	128	824.2		1.6
		190	836.6	0.418	
		251	848.8		
Tilt (15°)	GSM	128	824.2		1.6
		190	836.6	0.233	
		251	848.8		

11.4.2. RIGHTHAND SIDE

Test position	Mode	Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
Touch	GSM	128	824.2		1.6
		190	836.6	0.524	
		251	848.8		
Tilt (15°)	GSM	128	824.2		1.6
		190	836.6	0.305	
		251	848.8		

11.4.3. BODY WORN

Test position	Mode	Sep. dist. (mm)	Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
LCD up	GPRS 2 slots	15	128	824.2		1.6
			190	836.6	0.386	
			251	848.8		
LCD down	GPRS 2 slots	15	128	824.2		1.6
			190	836.6	0.628	
			251	848.8		
LCD down	GSM	15	128	824.2		1.6
			190	836.6	0.434	
			251	848.8		

11.5. WIFI (Murata - WH)

11.5.1. LEFT HAND SIDE

Test position	Mode	Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
Touch	802.11b	1	2412		1.6
		6	2437	0.520	
		11	2462		
Tilt (15°)	802.11b	1	2412		1.6
		6	2437	0.451	
		11	2462		

11.5.2. RIGHT HAND SIDE

Test position	Mode	Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
Touch	802.11b	1	2412		1.6
		6	2437	0.480	
		11	2462		
Tilt (15°)	802.11b	1	2412		1.6
		6	2437	0.480	
		11	2462		

11.5.3. BODY

Test position	Mode	Sep. dist. (mm)	Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
LCD up	802.11b	15	1	2412		1.6
			6	2437	0.060	
			11	2462		
LCD down	802.11b	15	1	2412		1.6
			6	2437	0.061	
			11	2462		

11.6. WIFI (Mitsumi - BK)

11.6.1. LEFT HAND SIDE

Test position	Mode	Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
Touch	802.11b	1	2412		1.6
		6	2437	0.187	
		11	2462		
Tilt (15°)	802.11b	1	2412		1.6
		6	2437	0.226	
		11	2462		

11.6.2. RIGHT HAND SIDE

Test position	Mode	Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
Touch	802.11b	1	2412		1.6
		6	2437	0.249	
		11	2462		
Tilt (15°)	802.11b	1	2412		1.6
		6	2437	0.254	
		11	2462		

11.6.3. BODY

Test position	Mode	Sep. dist. (mm)	Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
LCD up	802.11b	15	1	2412		1.6
			6	2437	0.016	
			11	2462		
LCD down	802.11b	15	1	2412		1.6
			6	2437	0.009	
			11	2462		

12. KDB 648474 SAR HANDSETS MULTI XMITER ASSESSMENT

EUT Description:	iPhone (GSM/GPRS/EDGE/WCDMA/HSDPA) with 802.11 b/g and Bluetooth embedded.
Co-located Tx:	• WWAN can transmit simultaneously with 802.11g • WWAN can transmit simultaneously with Bluetooth • 802.11g and Bluetooth cannot transmit simultaneously
Antenna Separation distances:	• 7.5 cm - WWAN antenna-to-Bluetooth antenna • 7.5 cm - WWAM antenna-to-WiFi (802.11g) • 0.0 cm - WiFi (802.11g)-to-Bluetooth antenna (WiFi (802.11g)-to-Bluetooth are sharing a common antenna)
Highest 1-g SAR @ Right hand side touch position:	**WWAN: 1.19** mW/g; WiFi (802.11g): 0.48 mW/g ➢ The sum of the 1-g SAR: 1.67 (>1.6 mW/g) Separation distances between peaks SAR in area scans: 6.0 cm (see page 33 in this report.
Highest 1-g SAR @ Left hand side touch position:	**WiFi (802.11g): 0.52** mW/g;Part 22H/24E: 1.16 mW/g ➢ The sum of the 1-g SAR: 1.68 (>1.6 mW/g) Separation distances between peaks SAR in area scans: 6.2 cm (see page 34 in this report. **Bluetooth: Bluetooth:** Conducted average power is below Pref/12mW, stand alone SAR evaluation is not required
Antenna Pair SAR to Peak Location Separation Ratio:	☒ < 0.3 1.67 / 6.0 = 0.278 (WWAN - WiFi), ☐ ≥ 0.3 1.68 / 6.2 = 0.270 (WWAN - WiFi)
Simultaneous TX SAR:	☒ No ☐ Yes (Measure Simultaneous Transmission SAR with Volume Scans for All Required Antennas)

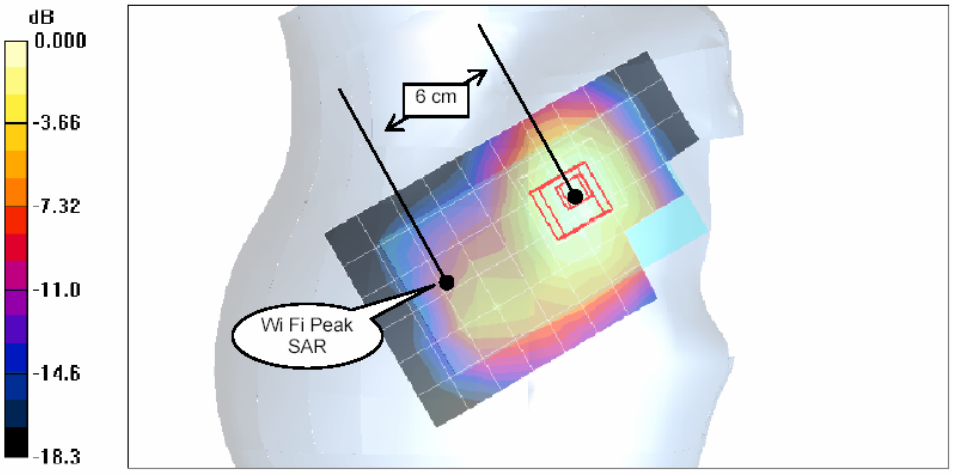
CONCLUSION:

- Since the antenna pair SAR to peak location separation ratio is less than 0.3, simultaneously SAR evaluation is not required.
- Based upon KDB 628591 TCB exclusion list, smart phone with embedded 802.11 b/g radio and BT radios is not subject to TCB exclusion list.

Separation distances between Peaks SAR in area scans

WWAN Max 1g SAR: 1.19 mW/g

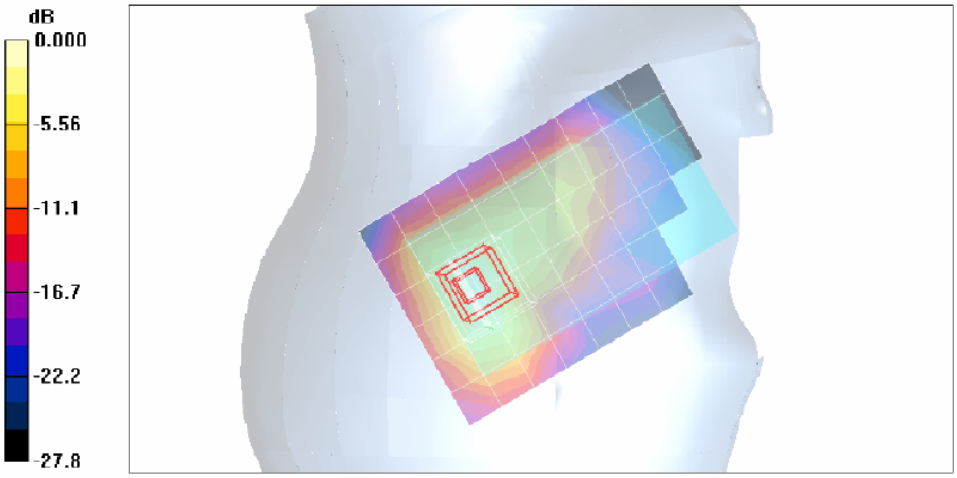
R-Touch - L-ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 12.6 V/m; Power Drift = -0.053 dB
Peak SAR (extrapolated) = 1.61 W/kg
SAR(1 g) = 1.19 mW/g; SAR(10 g) = 0.787 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.35 mW/g



0 dB = 1.35mW/g

WiFi Max 1g SAR: 0.48 mW/g

R-Touch_802.11b - M-ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz
Reference Value = 17.3 V/m; Power Drift = -0.137 dB
Peak SAR (extrapolated) = 1.15 W/kg
SAR(1 g) = 0.480 mW/g; SAR(10 g) = 0.228 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.614 mW/g

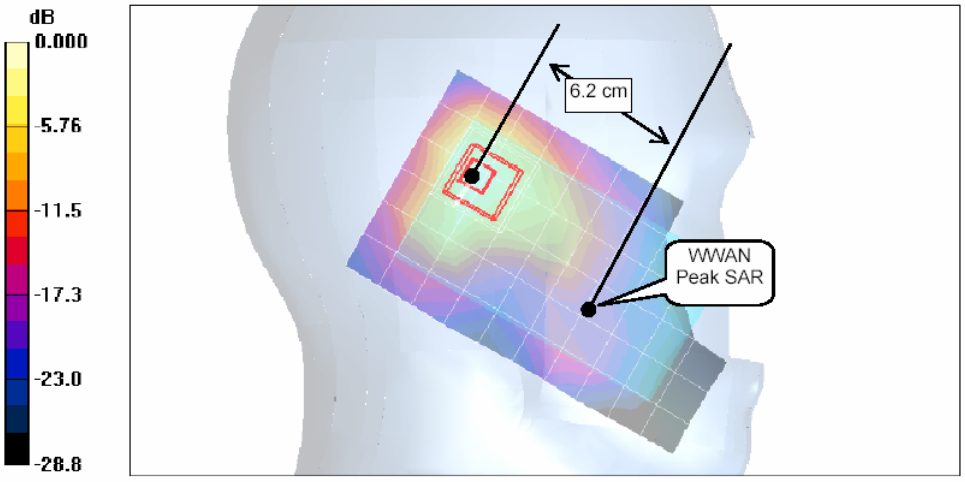


0 dB = 0.614mW/g

Separation distances between Peaks SAR in area scans

WiFi Max 1g SAR: 0.52 mW/g

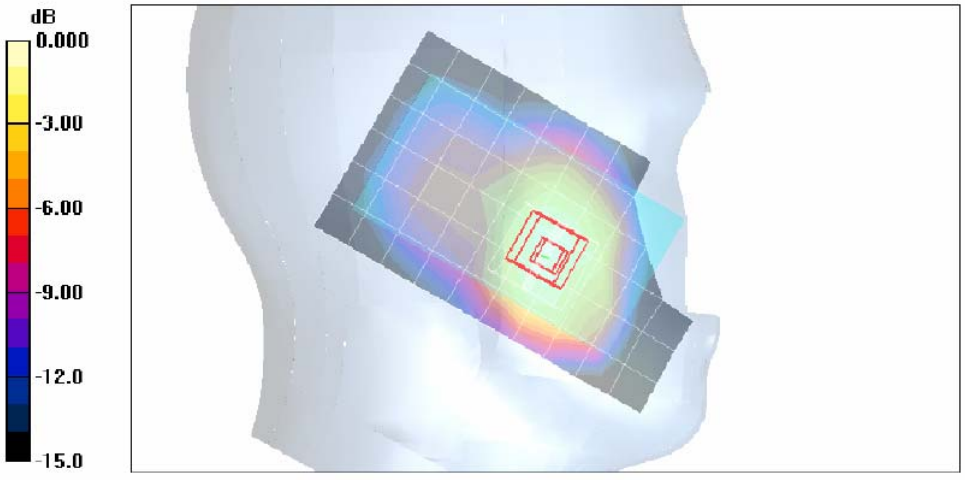
L-Touch_802.11b - M-ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz
Reference Value = 13.9 V/m; Power Drift = -0.068 dB
Peak SAR (extrapolated) = 1.02 W/kg
SAR(1 g) = 0.520 mW/g; SAR(10 g) = 0.241 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.683 mW/g



0 dB = 0.683mW/g

WWAN Max 1g SAR: 1.16 mW/g

L-Touch - L-ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 11.6 V/m; Power Drift = 0.230 dB
Peak SAR (extrapolated) = 1.59 W/kg
SAR(1 g) = 1.16 mW/g; SAR(10 g) = 0.794 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.31 mW/g



0 dB = 1.31mW/g

13. WORST-CASE SAR TEST PLOTS

WORST-CASE SAR PLOT for UMTS1900 **HEAD** POSITION

Date/Time: 3/19/2009 3:18:28 PM

Test Laboratory: Compliance Certification Services

UMTS1900 Right Hand Side

DUT: Apple; Type: iPhone; Serial: 8891002C3NQ

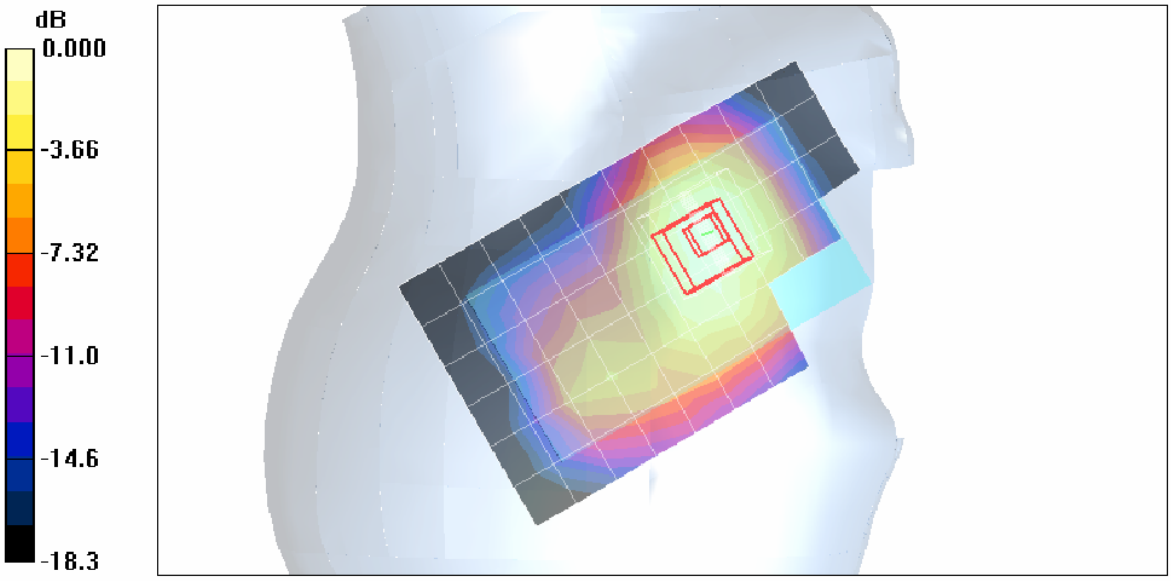
Communication System: PCS 1900; Frequency: 1852.4 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1852.4 MHz; σ = 1.38 mho/m; ε_r = 41.4; ρ = 1000 kg/m^3
Phantom section: Right Section

Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(8.99, 8.99, 8.99); Calibrated: 4/23/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 10/20/2008
- Phantom: SAM 2 (Twin); Type: SAM 2; Serial: 1050
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

R-Touch - L-ch/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.24 mW/g

R-Touch - L-ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 12.6 V/m; Power Drift = -0.053 dB
Peak SAR (extrapolated) = 1.61 W/kg
SAR(1 g) = 1.19 mW/g; SAR(10 g) = 0.787 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.35 mW/g



0 dB = 1.35mW/g

WORST-CASE SAR PLOT for UMTS1900 **BODY** POSITION

Date/Time: 3/20/2009 6:38:41 PM

Test Laboratory: Compliance Certification Services

UMTS1900 Body

DUT: Apple; Type: iPhone; Serial: 8891002C3NQ

Communication System: PCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.48 mho/m; ε_r = 53.8; ρ = 1000 kg/m^3
Phantom section: Flat Section

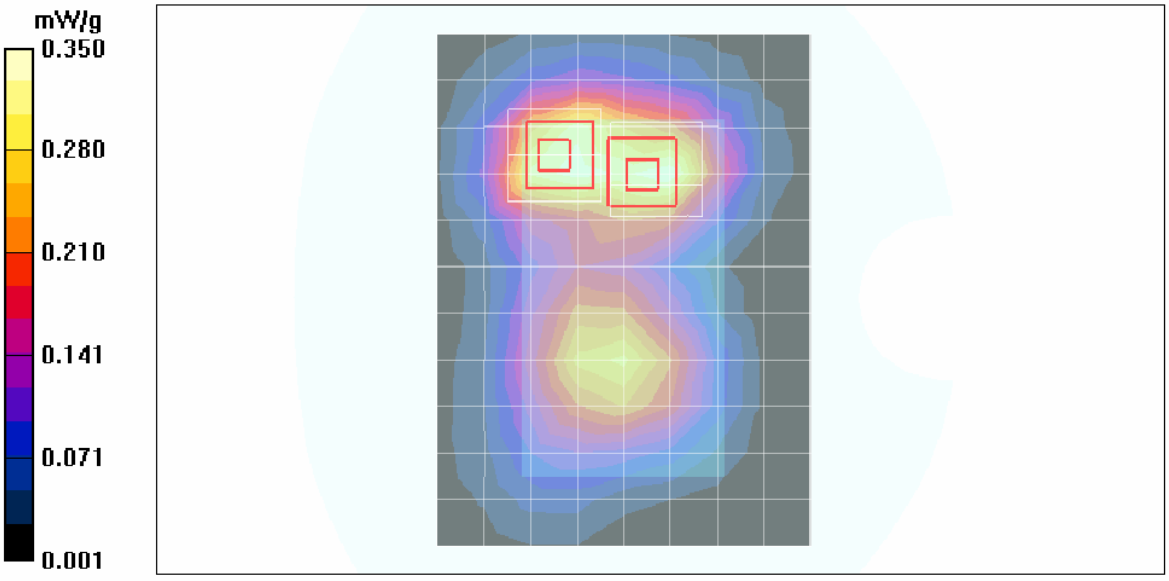
Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(8.7, 8.7, 8.7); Calibrated: 4/23/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn500; Calibrated: 11/16/2007
- Phantom: SAM 2 (Twin); Type: SAM 2; Serial: 1050
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

LCD down - Rel 99 Mid-ch/Area Scan (9x12x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.350 mW/g

LCD down - Rel 99 Mid-ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 11.3 V/m; Power Drift = -0.855 dB
Peak SAR (extrapolated) = 0.514 W/kg
SAR(1 g) = 0.329 mW/g; SAR(10 g) = 0.200 mW/g
Maximum value of SAR (measured) = 0.395 mW/g

LCD down - Rel 99 Mid-ch/Zoom Scan (7x7x9)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 11.3 V/m; Power Drift = -0.855 dB
Peak SAR (extrapolated) = 0.465 W/kg
SAR(1 g) = 0.303 mW/g; SAR(10 g) = 0.187 mW/g
Maximum value of SAR (measured) = 0.356 mW/g



WORST-CASE SAR PLOT for GSM1900 - **HEAD** POSITION

Date/Time: 3/20/2009 10:01:03 AM

Test Laboratory: Compliance Certification Services

GSM1900 Left Hand Side

DUT: Apple; Type: iPhone; Serial: 8891002C3NQ

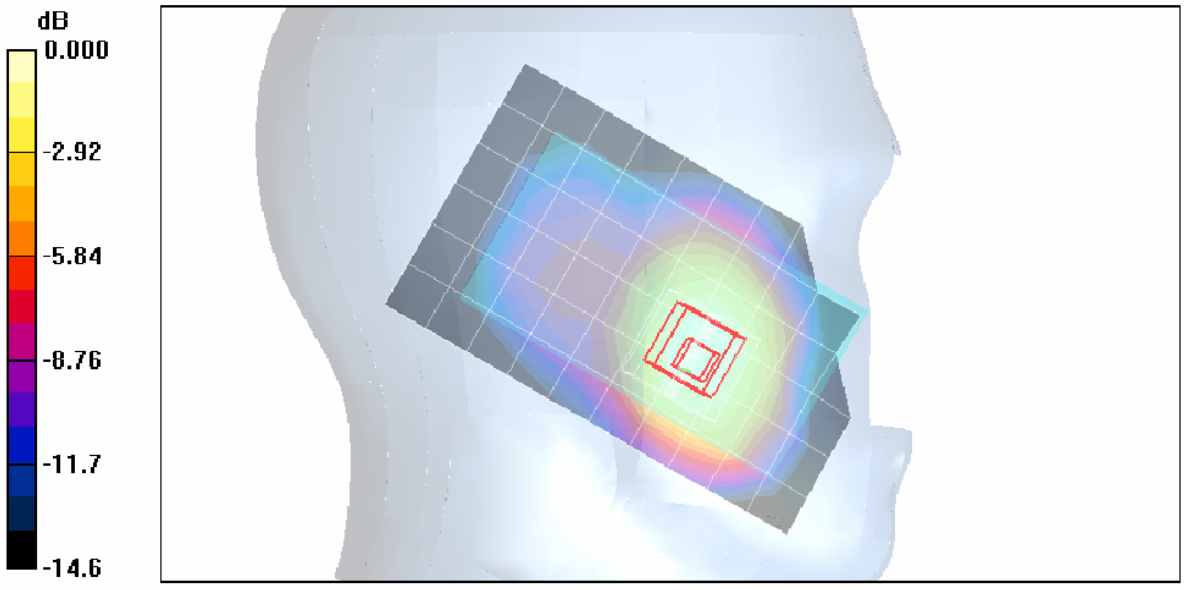
Communication System: PCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:8
Medium parameters used: f = 1880 MHz; σ = 1.44 mho/m; ε_r = 40.2; ρ = 1000 kg/m^3
Phantom section: Left Section

Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(8.99, 8.99, 8.99); Calibrated: 4/23/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 10/20/2008
- Phantom: SAM 2 (Twin); Type: SAM 2; Serial: 1050
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

L-Touch - M-ch/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.877 mW/g

L-Touch - M-ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 9.34 V/m; Power Drift = 0.047 dB
Peak SAR (extrapolated) = 1.09 W/kg
SAR(1 g) = 0.790 mW/g; SAR(10 g) = 0.530 mW/g
Maximum value of SAR (measured) = 0.899 mW/g



0 dB = 0.899mW/g

WORST-CASE SAR PLOT for GSM 1900 - **BODY** POSITION

Date/Time: 3/20/2009 2:09:18 PM

Test Laboratory: Compliance Certification Services

GSM1900 Body

DUT: Apple; Type: iPhone; Serial: 8891002C3NQ

Communication System: PCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:4
Medium parameters used: f = 1880 MHz; σ = 1.48 mho/m; ε_r = 53.8; ρ = 1000 kg/m^3
Phantom section: Flat Section

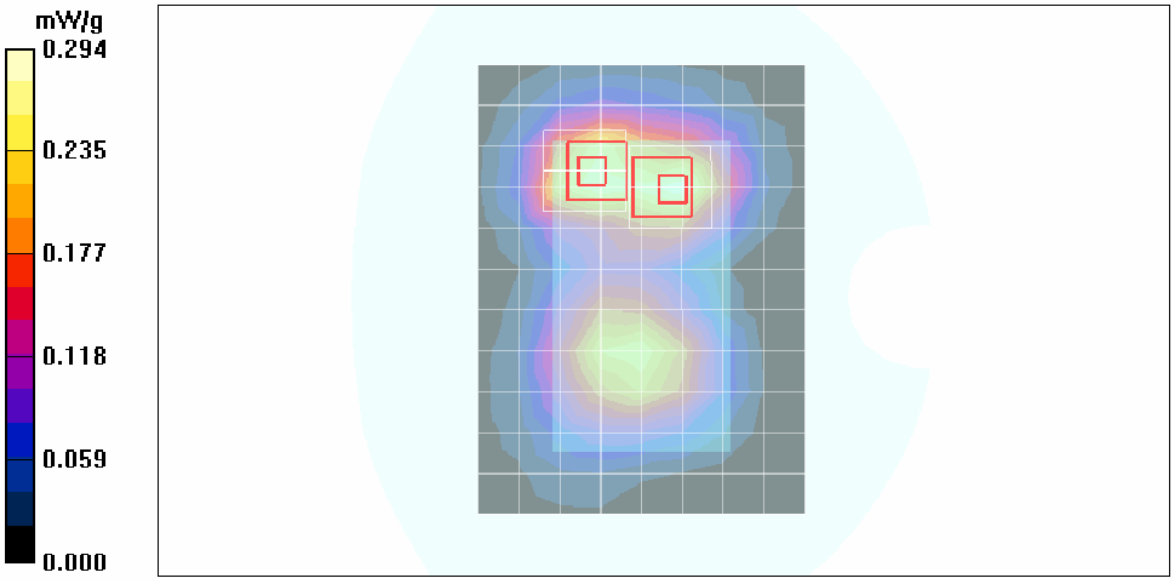
Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(8.7, 8.7, 8.7); Calibrated: 4/23/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn500; Calibrated: 11/16/2007
- Phantom: SAM 2 (Twin); Type: SAM 2; Serial: 1050
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

LCD down - GPRS 2 slot Mid-ch/Area Scan (9x12x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.294 mW/g

LCD down - GPRS 2 slot Mid-ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 9.79 V/m; Power Drift = 0.035 dB
Peak SAR (extrapolated) = 0.384 W/kg
SAR(1 g) = 0.249 mW/g; SAR(10 g) = 0.155 mW/g
Maximum value of SAR (measured) = 0.293 mW/g

LCD down - GPRS 2 slot Mid-ch/Zoom Scan (7x7x9)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 9.79 V/m; Power Drift = 0.035 dB
Peak SAR (extrapolated) = 0.411 W/kg
SAR(1 g) = 0.263 mW/g; SAR(10 g) = 0.160 mW/g
Maximum value of SAR (measured) = 0.312 mW/g



WORST-CASE SAR PLOT for UMTS850 - **HEAD** POSITION

Date/Time: 3/28/2009 9:31:13 AM

Test Laboratory: Compliance Certification Services

Right Hand Side

DUT: Apple; Type: iPhone; Serial: 8891002C3NQ

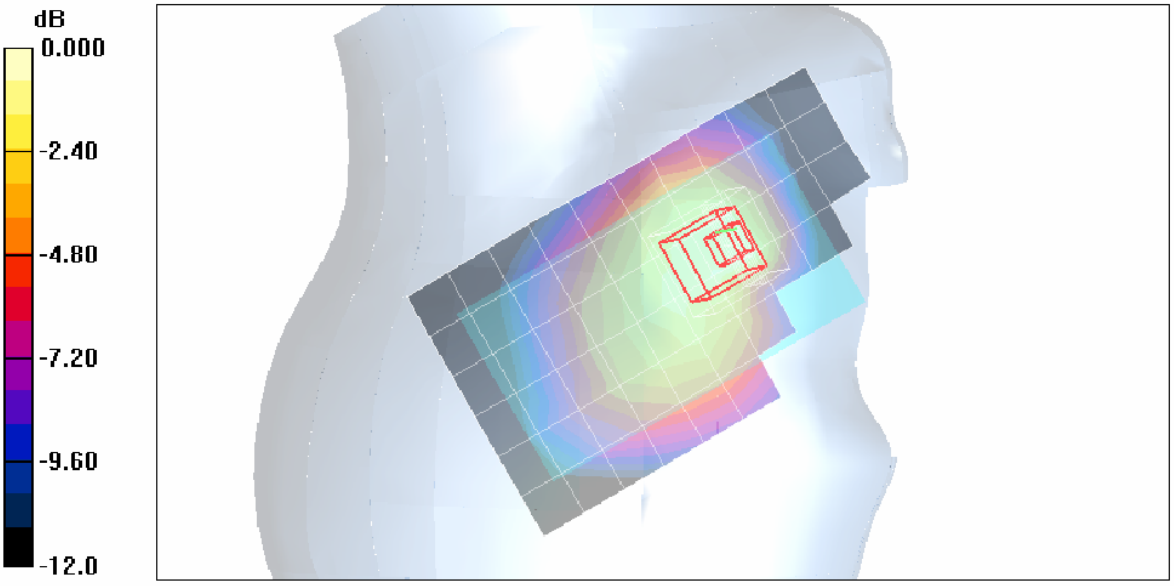
Communication System: Cell Band - GSM/WCDMA; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.908 mho/m; ε_r = 41.8; ρ = 1000 kg/m^3
Phantom section: Right Section

Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(10.95, 10.95, 10.95); Calibrated: 4/23/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 10/20/2008
- Phantom: SAM 2 (Twin); Type: SAM 2; Serial: 1050
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

R-Touch - M-ch/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.531 mW/g

R-Touch - M-ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 9.61 V/m; Power Drift = -0.003 dB
Peak SAR (extrapolated) = 0.766 W/kg
SAR(1 g) = 0.563 mW/g; SAR(10 g) = 0.391 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.631 mW/g



0 dB = 0.631mW/g

WORST-CASE SAR PLOT for UMTS850 - **BODY** POSITION

Date/Time: 3/27/2009 4:51:31 PM

Test Laboratory: Compliance Certification Services

Body

DUT: Apple; Type: iPhone; Serial: 8891002C3NQ

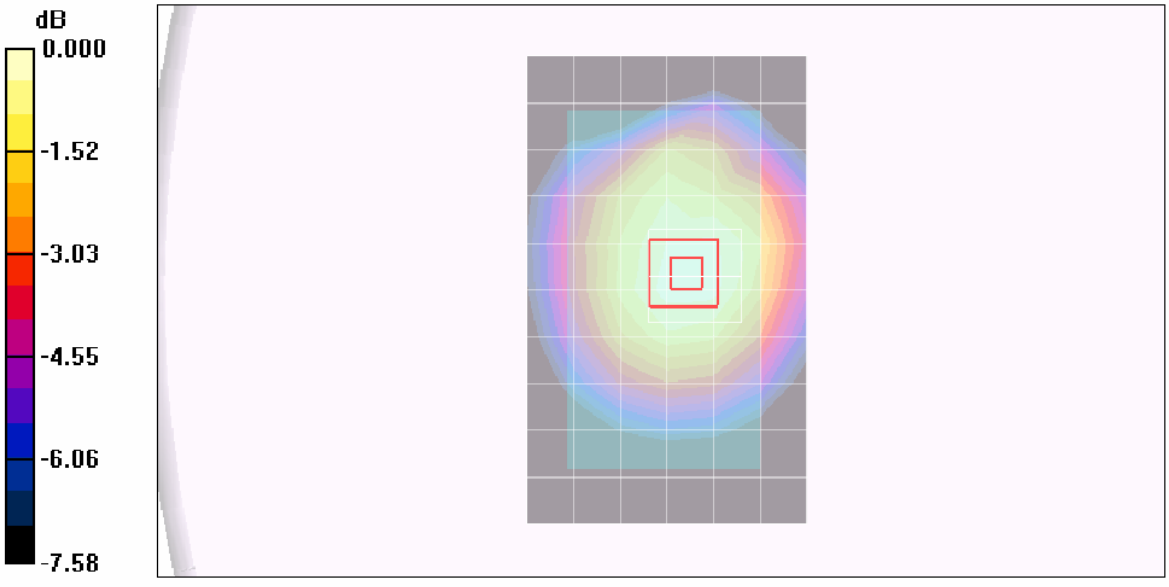
Communication System: Cell Band - GSM/WCDMA; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.991 mho/m; ε_r = 53.6; ρ = 1000 kg/m^3
Phantom section: Flat Section

Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(10.22, 10.22, 10.22); Calibrated: 4/23/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 10/20/2008
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

LCD down - HSDPA M-ch/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.705 mW/g

LCD down - HSDPA M-ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 22.4 V/m; Power Drift = 0.310 dB
Peak SAR (extrapolated) = 0.889 W/kg
SAR(1 g) = 0.670 mW/g; SAR(10 g) = 0.491 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.747 mW/g



0 dB = 0.747mW/g

WORST-CASE SAR PLOT for GSM850 - **HEAD** POSITION

Date/Time: 3/28/2009 11:13:29 AM

Test Laboratory: Compliance Certification Services

Right Hand Side

DUT: Apple; Type: iPhone; Serial: 8891002C3NQ

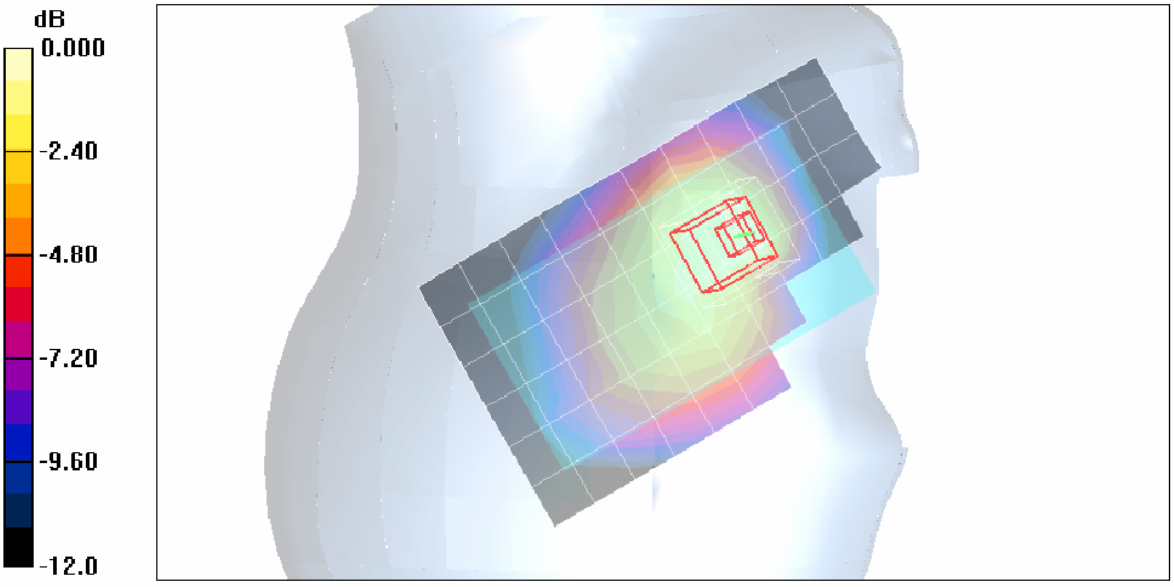
Communication System: Cell Band - GSM/WCDMA; Frequency: 836.6 MHz;Duty Cycle: 1:8
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.908 mho/m; ε_r = 41.8; ρ = 1000 kg/m^3
Phantom section: Right Section

Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(10.95, 10.95, 10.95); Calibrated: 4/23/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 10/20/2008
- Phantom: SAM 2 (Twin); Type: SAM 2; Serial: 1050
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

R-Touch - M-ch/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.498 mW/g

R-Touch - M-ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 9.14 V/m; Power Drift = 0.004 dB
Peak SAR (extrapolated) = 0.719 W/kg
SAR(1 g) = 0.524 mW/g; SAR(10 g) = 0.361 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.590 mW/g



0 dB = 0.590mW/g

WORST-CASE SAR PLOT for GSM850 - **BODY** POSITION

Date/Time: 3/27/2009 6:27:27 PM

Test Laboratory: Compliance Certification Services

Body

DUT: Apple; Type: iPhone; Serial: 8891002C3NQ

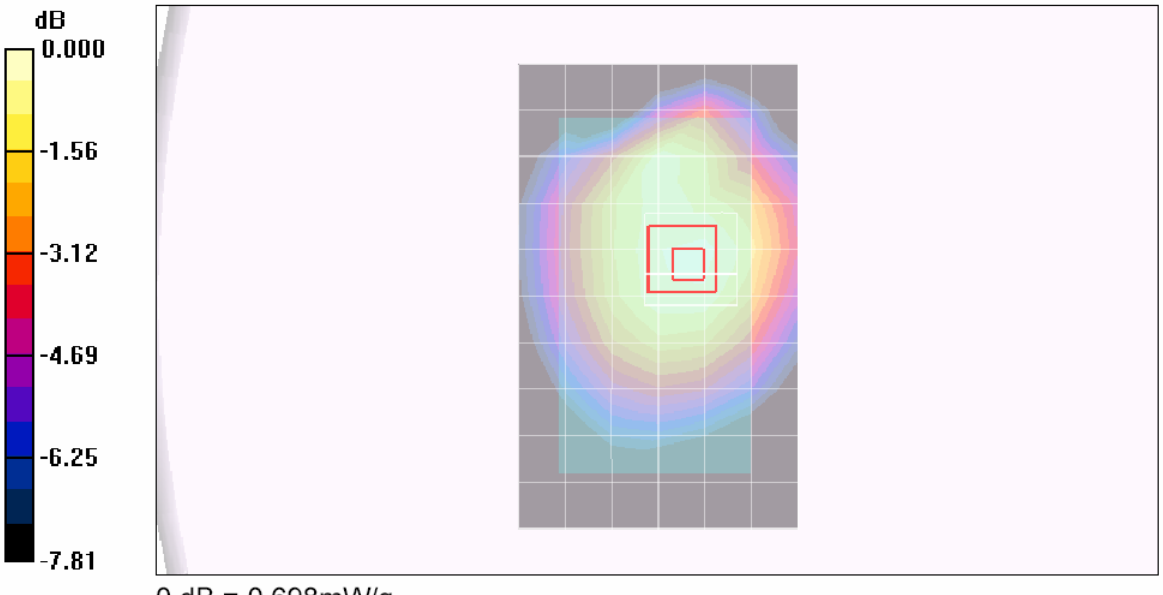
Communication System: Cell Band - GSM/WCDMA; Frequency: 836.6 MHz;Duty Cycle: 1:4
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.991 mho/m; ε_r = 53.6; ρ = 1000 kg/m^3
Phantom section: Flat Section

Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(10.22, 10.22, 10.22); Calibrated: 4/23/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 10/20/2008
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

LCD down - GPRS 2 Slots M-ch/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.650 mW/g

LCD down - GPRS 2 Slots M-ch/Zoom Scan 2 (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 21.2 V/m; Power Drift = 0.214 dB
Peak SAR (extrapolated) = 0.850 W/kg
SAR(1 g) = 0.628 mW/g; SAR(10 g) = 0.463 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.698 mW/g



0 dB = 0.698mW/g

WORST-CASE SAR PLOT for WIFI - **HEAD** POSITION

Date/Time: 3/30/2009 1:49:24 PM

Test Laboratory: Compliance Certification Services

Left Hand Side

DUT: Apple; Type: iPhone; Serial: 889031D03NP

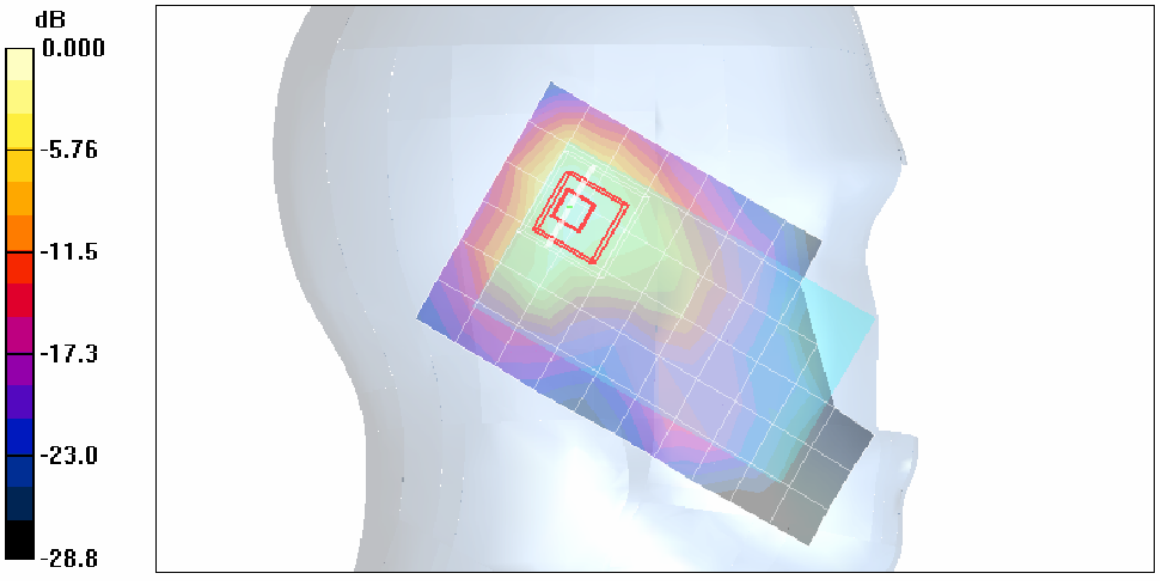
Communication System: 802.11bg; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.87 mho/m; ε_r = 38.1; ρ = 1000 kg/m^3
Phantom section: Left Section

Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(8.05, 8.05, 8.05); Calibrated: 4/23/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 10/20/2008
- Phantom: SAM 2 (Twin); Type: SAM 2; Serial: 1050
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

L-Touch_802.11b - M-ch/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.616 mW/g

L-Touch_802.11b - M-ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 13.9 V/m; Power Drift = -0.068 dB
Peak SAR (extrapolated) = 1.02 W/kg
SAR(1 g) = 0.520 mW/g; SAR(10 g) = 0.241 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.683 mW/g



0 dB = 0.683mW/g

WORST-CASE SAR PLOT for WIFI - **BODY** POSITION

Date/Time: 3/31/2009 9:47:28 AM

Test Laboratory: Compliance Certification Services

Body

DUT: Apple; Type: iPhone; Serial: 889031D03NP

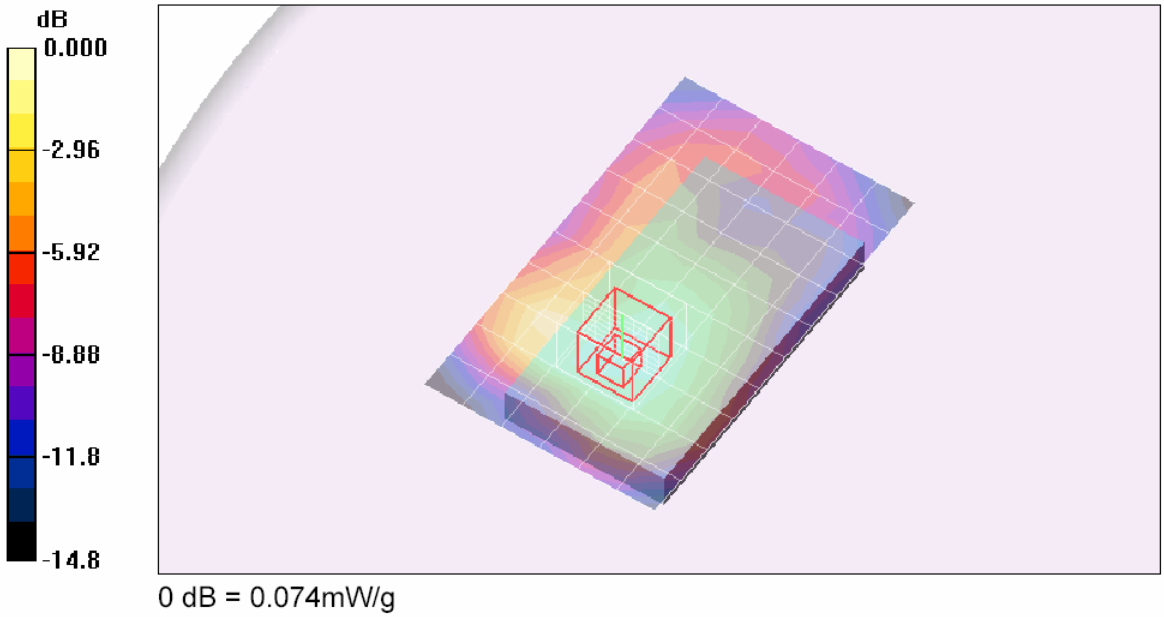
Communication System: 802.11bg; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.96 mho/m; ε_r = 52.9; ρ = 1000 kg/m^3
Phantom section: Flat Section

Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(7.91, 7.91, 7.91); Calibrated: 4/23/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 10/20/2008
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

LCD down 802.11b - M-ch/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.074 mW/g

LCD down 802.11b - M-ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 3.21 V/m; Power Drift = 0.160 dB
Peak SAR (extrapolated) = 0.110 W/kg
SAR(1 g) = 0.061 mW/g; SAR(10 g) = 0.036 mW/g
Info: Interpolated medium parameters used for SAR evaluation.



0 dB = 0.074mW/g

14. ATTACHMENTS

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