MET Laboratories, Inc. *Safety Certification - EMI - Telecom Environmental Simulation*
914 WEST PATAPSCO AVENUE • BALTIMORE, MARYLAND 21230-3432 • PHONE (410) 354-3300 • FAX (410) 354-3313
33439 WESTERN AVENUE • UNION CITY, CALIFORNIA 94587 • PHONE (510) 489-6300 • FAX (510) 489-6372
3162 BELICK STREET • SANTA CLARA, CALIFORNIA 95054 • PHONE (408 748-3585 • FAX (510) 489-6372

Dosimetric Assessment
Test Report

for the

Cisco Systems

Tested and Evaluated In Accordance With
FCC OET 65 Supplement C: 01-01

Prepared for

Cisco Systems, Inc
3650 Cisco Way Building B
San Jose, CA 95134

Engineering Statement: The measurements shown in this report were made in accordance with the procedures specified in Supplement C to OET Bulletin 65 of the Federal Communications Commission (FCC) Guidelines [FCC 2001] and Industry Canada RSS-102 for uncontrolled exposure. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment evaluated is capable of compliance for localized specific absorption rate (SAR) for uncontrolled environment/general population exposure limits specified in ANSI/IEEE Std. C95.1-1999.

SAR Evaluation
Certificate of Compliance

APPLICANT: Cisco Systems

Applicant Name and Address: **Cisco Systems, Inc**
3650 Cisco way Building B
San Jose, CA 95134

Test Location: MET Laboratories, Inc.
3162 Belick Street
Santa Clara, CA 95054
USA

EUT:	CP-7925G-EX-K9 802.11abg Phone & Bluetooth IP Phone					
Date of Receipt:	August 3, 2010					
RF exposure environment:	Uncontrolled Exposure/General Population					
RF exposure category:	Portable					
Power supply:	3.7V 1100mAh Std Battery 3.7V 1400mAh Ext Battery					
Antenna:	Internal					
Production/prototype:	Production					
Modulation:	DTS					
Duty Cycle:	100%					
TX Range:	2400-2483.5MHz 802.11 b	2400-2483.5MHz 802.11 g	5180-5240MHz 802.11 a	5260-5320MHz 802.11 a	5470-5725MHz 802.11 a	5745-5805MHz 802.11 a
Max SAR Measured	**SAR 1g (W/kg)**					
Head:	0.25	0.29	0.68	0.60	1.12	1.04
Body:	0.16	0.20	0.70	0.70	0.60	0.33

Shawn McMillen
Wireless Manager

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INTRODUCTION

This measurement report demonstrates that the Cisco Systems CP-7925G-EX-K9 802.11abg Phone & Bluetooth IP Phone described within this report complies with the Specific Absorption Rate (SAR) RF exposure requirements specified in ANSI/IEEE Std. C95.1-1999 and FCC 47 CFR §2.1093 for the Uncontrolled Exposure/General population environment. The test procedures described in FCC OET Bulletin 65, Supplement C, Edition 01-01 were employed.

A description of the device under test, device operating configuration and test conditions, measurement and site description, methodology and procedures used in the evaluation, equipment used, detailed summary of the test results and the various provisions of the rules are included in this dosimetric assessment test report.

SAR DEFINITION

Specific Absorption Rate (SAR) is defined as the time derivative (rate) of the incremental energy (*dU*) absorbed by (dissipated in) an incremental mass (*dm*) contained in a volume element (*dV*) of a given density (*ρ*). It is also defined as the rate of RF energy absorption per unit mass at a point in an absorbing body (see Fig. 1.1).

$$SAR = \frac{d}{dt}\left(\frac{dU}{dm}\right) = \frac{d}{dt}\left(\frac{dU}{\rho dv}\right)$$

Figure 1.1
SAR Mathematical Equation

SAR is expressed in units of Watts per Kilogram (W/kg).

$$SAR = \sigma E^2 / \rho$$

where:

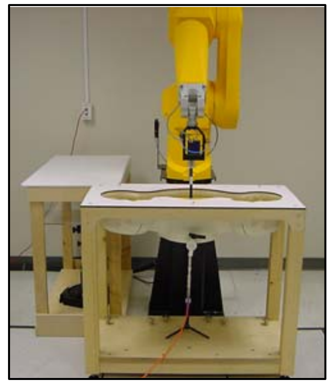
σ - conductivity of the tissue - simulant material (S/m)
ρ - mass density of the tissue - simulant material (kg/m3)
E - Total RMS electric field strength (V/m)

NOTE: The primary factors that control rate of energy absorption were found to be the wavelength of the incident field in relations to the dimensions and geometry of the irradiated organism, the orientation of the organism in relation to the polarity of field vectors, the presence of reflecting surfaces, and whether conductive contact is made by the organism with a ground plane.

DESCRIPTION OF DEVICE UNDER TEST (EUT)

<table>
<tr><td>Applicant:</td><td colspan="3">Cisco Systems</td></tr>
<tr><td>Description of Test Item:</td><td colspan="3">CP-7925G-EX-K9 802.11abg Phone & Bluetooth IP Phone</td></tr>
<tr><td>Supply Voltage:</td><td colspan="3">3.7V 1100mAh Std Battery
3.7V 1400mAh Ext Battery</td></tr>
<tr><td>Antenna Type(s) Tested:</td><td colspan="3">Internal</td></tr>
<tr><td rowspan="3">Accessories:</td><td>Item</td><td>Part Number</td><td>Model Number</td></tr>
<tr><td>Belt Clip</td><td>CP-HOLSTER-7925G</td><td>74-5473-01</td></tr>
<tr><td>Leather Carry Case</td><td>CP-CASE-7925G</td><td>74-5472-01</td></tr>
<tr><td>Modes of Operation:</td><td colspan="3">DSSS and OFDM</td></tr>
<tr><td>Duty Cycle Tested:</td><td colspan="3">100%</td></tr>
<tr><td>Application Type:</td><td colspan="3">Certification</td></tr>
<tr><td>Exposure Category:</td><td colspan="3">Uncontrolled Exposure/General Population</td></tr>
<tr><td>FCC and IC Rule Part(s):</td><td colspan="3">FCC 47 CFR §2.1093, Part 15.407 part E</td></tr>
<tr><td>Standards:</td><td colspan="3">IEEE Std. 1528-2003, FCC OET Bulletin 65, Supplement C, Edition 01-01</td></tr>
</table>

SAR MEASUREMENT SYSTEM



MET Laboratories, Inc SAR measurement facility utilizes the DASY4 Professional Dosimetric Assessment System (DASY™) manufactured by Schmid & Partner Engineering AG (SPEAG™) of Zurich, Switzerland for performing SAR compliance tests. The DASY4 measurement system is comprised of the measurement server, robot controller, computer, near-field probe, probe alignment sensor, specific anthropomorphic mannequin (SAM) phantom, and various planar phantoms for brain and/or body SAR evaluations. The robot is a six-axis industrial robot performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF). The Cell controller system contain the power supply, robot controller, teach pendant (Joystick), and remote control, is used to drive the robot motors. The Staubli robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the DASY4 measurement server. The DAE4 utilizes a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16-bit AD-converter and a command decoder and control logic unit.

Transmission to the DASY4 measurement server is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe-mounting device includes two different sensor systems for frontal and sidewise probe contacts. The sensor systems are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer.

MEASUREMENT SUMMARY

HEAD SAR MEASUREMENT RESULTS (2450MHz) Band								
Freq (MHz)	Chan	Test Mode	Data Rate	Cond. Pwr. Before (dBm)	Battery Type	Phantom Section	EUT Test Position	Measured SAR 1g (W/kg)
2437.0	Mid	b mode	1 Mbps	15.51	Standard	Left Head	Touch	0.153
2437.0	Mid	b mode	1 Mbps	15.51	Standard	Left Head	Tilt	0.244
2437.0	Mid	b mode	1 Mbps	15.51	Standard	Right Head	Touch	0.189
2437.0	Mid	b mode	1 Mbps	15.51	Standard	Right Head	Tilt	0.259
2437.0	Mid	g mode	6 Mbps	15.9	Standard	Left Head	Touch	0.185
2437.0	Mid	g mode	6 Mbps	15.9	Standard	Left Head	Tilt	0.295
2437.0	Mid	g mode	6 Mbps	15.9	Standard	Right Head	Touch	0.232
2437.0	Mid	g mode	6 Mbps	15.9	Standard	Right Head	Tilt	0.286
2437.0	Mid	g mode	6 Mbps	15.9	Extended	Left Head	Tilt	0.249

ANSI/IEEE C95.1 1992 – SAFETY LIMIT 1.6 W/kg (averaged over 1 gram) Spatial Peak – Uncontrolled Environment/General Population				
Measured Mixture Type	2450 MHz Head		Date Tested	June 29, 2010
Dielectric Constant εr	IEEE Target	Measured	Duty Cycle	100%
	39.2	38.6	Ambient Temperature (C)	22.5
Conductivity σ (mho/m)	IEEE Target	Measured	Fluid Temperature (C)	22.0
	1.80	1.87	Fluid Depth	≥15cm

BODY SAR MEASUREMENT RESULTS (2450MHz) Band									
Freq (MHz)	**Chan**	**Test Mode**	**Data Rate**	**Cond. Pwr. Before (dBm)**	**Battery Type**	**Phantom Section**	**Accessory**	**Position**	**Measured SAR 1g (W/kg)**
2437.0	Mid	b mode	1 Mbps	15.51	Standard	Planar	Plastic Holster	Body	0.165
2437.0	Mid	b mode	1 Mbps	15.51	Standard	Planar	Leather Holster	Body	0.05
2437.0	Mid	g mode	6 Mbps	15.9	Standard	Planar	Plastic Holster	Body	0.201
2437.0	Mid	g mode	6 Mbps	15.9	Standard	Planar	Leather Holster	Body	0.063
2437.0	Mid	g mode	6 Mbps	15.9	Extended	Planar	Plastic Holster	Body	0.20
2437.0	Mid	g mode + Bluetooth	6 Mbps	15.9	Standard	Planar	Plastic Holster	Body	0.213
ANSI/IEEE C95.1 1992 – SAFETY LIMIT 1.6 W/kg (averaged over 1 gram) Spatial Peak – Uncontrolled Environment/General Population									

Measured Mixture Type	2450 MHz Body		**Date Tested**	July 15, 2010
Dielectric Constant εr	**IEEE Target**	**Measured**	**Duty Cycle**	100%
	52.7	52.0	**Ambient Temperature (C)**	22.5
Conductivity σ (mho/m)	**IEEE Target**	**Measured**	**Fluid Temperature (C)**	21.5
	1.95	1.93	**Fluid Depth**	≥15cm

<table>
<tr><th colspan="9">HEAD SAR MEASUREMENT RESULTS (5180MHz) Band</th></tr>
<tr><th>Freq (MHz)</th><th>Chan</th><th>Test Mode</th><th>Data Rate</th><th>Cond. Pwr. Before (dBm)</th><th>Battery Type</th><th>Phantom Section</th><th>EUT Test Position</th><th>Measured SAR 1g (W/kg)</th></tr>
<tr><td>5180</td><td>36</td><td>a mode</td><td>6 Mbps</td><td>14.51</td><td>Standard</td><td>Left Head</td><td>Touch</td><td>0.595</td></tr>
<tr><td>5180</td><td>36</td><td>a mode</td><td>6 Mbps</td><td>14.51</td><td>Standard</td><td>Left Head</td><td>Tilt</td><td>0.688</td></tr>
<tr><td>5180</td><td>36</td><td>a mode</td><td>6 Mbps</td><td>14.51</td><td>Standard</td><td>Right Head</td><td>Touch</td><td>0.673</td></tr>
<tr><td>5180</td><td>36</td><td>a mode</td><td>6 Mbps</td><td>14.51</td><td>Standard</td><td>Right Head</td><td>Tilt</td><td>0.76</td></tr>
<tr><th colspan="9">ANSI/IEEE C95.1 1992 – SAFETY LIMIT
1.6 W/kg (averaged over 1 gram)
Spatial Peak – Uncontrolled Environment/General Population</th></tr>
</table>

<table>
<tr><th>Measured Mixture Type</th><td colspan="3">5180 MHz Head</td><th>Date Tested</th><td>July 13-15, 2010</td></tr>
<tr><th rowspan="4">Dielectric Constant
εr</th><th>IEEE Target</th><th colspan="2">Measured</th><th>Duty Cycle</th><td>100%</td></tr>
<tr><td rowspan="3">36.0</td><td>7/13</td><td>34.58</td><th rowspan="3">Ambient Temperature (C)</th><td rowspan="3">22</td></tr>
<tr><td>7/14</td><td>34.65</td></tr>
<tr><td>7/15</td><td>34.66</td></tr>
<tr><th rowspan="4">Conductivity
σ (mho/m)</th><th>IEEE Target</th><th colspan="2">Measured</th><th>Fluid Depth</th><td>≥15cm</td></tr>
<tr><td rowspan="3">4.66</td><td>7/13</td><td>4.82</td><th rowspan="3">Fluid Temperature (C)</th><td rowspan="3">21.7</td></tr>
<tr><td>7/14</td><td>4.81</td></tr>
<tr><td>7/15</td><td>4.82</td></tr>
</table>

HEAD SAR MEASUREMENT RESULTS (5240MHz) Band								
Freq (MHz)	**Chan**	**Test Mode**	**Data Rate**	**Cond. Pwr. Before (dBm)**	**Battery Type**	**Phantom Section**	**EUT Test Position**	**Measured SAR 1g (W/kg)**
5240	48	a mode	6 Mbps	14.6	Standard	Left Head	Touch	0.534
5240	48	a mode	6 Mbps	14.6	Standard	Left Head	Tilt	0.642
5240	48	a mode	6 Mbps	14.6	Standard	Right Head	Touch	0.565
5240	48	a mode	6 Mbps	14.6	Standard	Right Head	Tilt	0.659
ANSI/IEEE C95.1 1992 – SAFETY LIMIT 1.6 W/kg (averaged over 1 gram) Spatial Peak – Uncontrolled Environment/General Population								

Measured Mixture Type	5240 MHz Head			**Date Tested**	July 13-15, 2010
Dielectric Constant εr	**IEEE Target**	**Measured**		**Duty Cycle**	100%
	36.0	7/13	34.58	**Ambient Temperature (C)**	22
		7/14	34.65		
		7/15	34.66		
Conductivity σ (mho/m)	**IEEE Target**	**Measured**			≥15cm
	4.66	7/13	4.82	**Fluid Temperature (C)**	21.7
		7/14	4.81		
		7/15	4.82		

HEAD SAR MEASUREMENT RESULTS (5260MHz) Band								
Freq (MHz)	**Chan**	**Test Mode**	**Data Rate**	**Cond. Pwr. Before (dBm)**	**Battery Type**	**Phantom Section**	**EUT Test Position**	**Measured SAR 1g (W/kg)**
5260	52	a mode	6 Mbps	14.5	Standard	Left Head	Touch	0.529
5260	52	a mode	6 Mbps	14.5	Standard	Left Head	Tilt	0.603
5260	52	a mode	6 Mbps	14.5	Standard	Right Head	Touch	0.541
5260	52	a mode	6 Mbps	14.5	Standard	Right Head	Tilt	0.605

<table>
<tr><th colspan="6">ANSI/IEEE C95.1 1992 – SAFETY LIMIT
1.6 W/kg (averaged over 1 gram)
Spatial Peak – Uncontrolled Environment/General Population</th></tr>
<tr><td>Measured Mixture Type</td><td colspan="3">5260 MHz Head</td><td>Date Tested</td><td>July 13-15, 2010</td></tr>
<tr><td rowspan="4">Dielectric Constant
εr</td><td>IEEE Target</td><td colspan="2">Measured</td><td>Duty Cycle</td><td>100%</td></tr>
<tr><td rowspan="3">36.0</td><td>7/13</td><td>34.58</td><td rowspan="3">Ambient Temperature (C)</td><td rowspan="3">22</td></tr>
<tr><td>7/14</td><td>34.65</td></tr>
<tr><td>7/15</td><td>34.66</td></tr>
<tr><td rowspan="4">Conductivity
σ (mho/m)</td><td>IEEE Target</td><td colspan="2">Measured</td><td></td><td>≥15cm</td></tr>
<tr><td rowspan="3">4.66</td><td>7/13</td><td>4.82</td><td rowspan="3">Fluid Temperature (C)</td><td rowspan="3">21.7</td></tr>
<tr><td>7/14</td><td>4.81</td></tr>
<tr><td>7/15</td><td>4.82</td></tr>
</table>

HEAD SAR MEASUREMENT RESULTS (5320MHz) Band								
Freq (MHz)	**Chan**	**Test Mode**	**Data Rate**	**Cond. Pwr. Before (dBm)**	**Battery Type**	**Phantom Section**	**EUT Test Position**	**Measured SAR 1g (W/kg)**
5320	64	a mode	6 Mbps	14.07	Standard	Left Head	Touch	0.409
5320	64	a mode	6 Mbps	14.07	Standard	Left Head	Tilt	0.579
5320	64	a mode	6 Mbps	14.07	Standard	Right Head	Touch	0.495
5320	64	a mode	6 Mbps	14.07	Standard	Right Head	Tilt	0.524

ANSI/IEEE C95.1 1992 – SAFETY LIMIT
1.6 W/kg (averaged over 1 gram)
Spatial Peak – Uncontrolled Environment/General Population

Measured Mixture Type	5320 MHz Head			**Date Tested**	July 13-15,2010
Dielectric Constant εr	**IEEE Target**	**Measured**		**Duty Cycle**	100%
	36.0	7/13	34.58	**Ambient Temperature (C)**	22
		7/14	34.65		
		7/15	34.66		
Conductivity σ (mho/m)	**IEEE Target**	**Measured**			≥15cm
	4.66	7/13	4.82	**Fluid Temperature (C)**	21.7
		7/14	4.81		
		7/15	4.82		

HEAD SAR MEASUREMENT RESULTS (5520MHz) Band								
Freq (MHz)	Chan	Test Mode	Data Rate	Cond. Pwr. Before (dBm)	Battery Type	Phantom Section	EUT Test Position	Measured SAR 1g (W/kg)
5520	104	a mode	6 Mbps	13.7	Standard	Left Head	Touch	0.672
5520	104	a mode	6 Mbps	13.7	Standard	Left Head	Tilt	0.778
5520	104	a mode	6 Mbps	13.7	Standard	Right Head	Touch	0.657
5520	104	a mode	6 Mbps	13.7	Standard	Right Head	Tilt	0.797

ANSI/IEEE C95.1 1992 – SAFETY LIMIT
1.6 W/kg (averaged over 1 gram)
Spatial Peak – Uncontrolled Environment/General Population

Measured Mixture Type	5520 MHz Head			Date Tested	July 13-15, 2010
Dielectric Constant εr	IEEE Target	Measured		Duty Cycle	100%
	35.6	7/13	34.03	Ambient Temperature (C)	22
		7/14	34.15		
		7/15	35.17		
Conductivity σ (mho/m)	IEEE Target	Measured		Fluid Depth	≥15cm
	4.96	7/13	5.13	Fluid Temperature (C)	21.7
		7/14	5.13		
		7/15	5.13		

HEAD SAR MEASUREMENT RESULTS (5580MHz) Band								
Freq (MHz)	**Chan**	**Test Mode**	**Data Rate**	**Cond. Pwr. Before (dBm)**	**Battery Type**	**Phantom Section**	**EUT Test Position**	**Measured SAR 1g (W/kg)**
5580	116	a mode	6 Mbps	13.9	Standard	Left Head	Touch	0.974
5580	116	a mode	6 Mbps	13.9	Standard	Left Head	Tilt	1.12
5580	116	a mode	6 Mbps	13.9	Standard	Right Head	Touch	0.829
5580	116	a mode	6 Mbps	13.9	Standard	Right Head	Tilt	0.954
5580	116	a mode	6 Mbps	13.9	Extended	Left Head	Tilt	0.943

ANSI/IEEE C95.1 1992 – SAFETY LIMIT 1.6 W/kg (averaged over 1 gram) Spatial Peak – Uncontrolled Environment/General Population					
Measured Mixture Type	5580 MHz Head			**Date Tested**	July 13-15, 2010
Dielectric Constant εr	**IEEE Target**	**Measured**		**Duty Cycle**	100%
	35.6	7/13	34.03	**Ambient Temperature (C)**	22
		7/14	34.15		
		7/15	35.17		
Conductivity σ (mho/m)	**IEEE Target**	**Measured**			≥15cm
	4.96	7/13	5.13	**Fluid Temperature (C)**	21.7
		7/14	5.13		
		7/15	5.13		

HEAD SAR MEASUREMENT RESULTS (5620MHz) Band								
Freq (MHz)	**Chan**	**Test Mode**	**Data Rate**	**Cond. Pwr. Before (dBm)**	**Battery Type**	**Phantom Section**	**EUT Test Position**	**Measured SAR 1g (W/kg)**
5620	124	a mode	6 Mbps	12.78	Standard	Left Head	Touch	0.76
5620	124	a mode	6 Mbps	12.78	Standard	Left Head	Tilt	0.86
5620	124	a mode	6 Mbps	12.78	Standard	Right Head	Touch	0.644
5620	124	a mode	6 Mbps	12.78	Standard	Right Head	Tilt	0.785

ANSI/IEEE C95.1 1992 – SAFETY LIMIT
1.6 W/kg (averaged over 1 gram)
Spatial Peak – Uncontrolled Environment/General Population

<table>
<tr><td>Measured Mixture Type</td><td colspan="3">5620 MHz Head</td><td>Date Tested</td><td>July 13-15, 2010</td></tr>
<tr><td rowspan="4">Dielectric Constant εr</td><td>IEEE Target</td><td colspan="2">Measured</td><td>Duty Cycle</td><td>100%</td></tr>
<tr><td rowspan="3">35.6</td><td>7/13</td><td>34.03</td><td rowspan="3">Ambient Temperature (C)</td><td rowspan="3">22</td></tr>
<tr><td>7/14</td><td>34.15</td></tr>
<tr><td>7/15</td><td>35.17</td></tr>
<tr><td rowspan="4">Conductivity σ (mho/m)</td><td>IEEE Target</td><td colspan="2">Measured</td><td></td><td>≥15cm</td></tr>
<tr><td rowspan="3">4.96</td><td>7/13</td><td>5.13</td><td rowspan="3">Fluid Temperature (C)</td><td rowspan="3">21.7</td></tr>
<tr><td>7/14</td><td>5.13</td></tr>
<tr><td>7/15</td><td>5.13</td></tr>
</table>

HEAD SAR MEASUREMENT RESULTS (5680MHz) Band								
Freq (MHz)	**Chan**	**Test Mode**	**Data Rate**	**Cond. Pwr. Before (dBm)**	**Battery Type**	**Phantom Section**	**EUT Test Position**	**Measured SAR 1g (W/kg)**
5680	136	a mode	6 Mbps	11.57	Standard	Left Head	Touch	0.594
5680	136	a mode	6 Mbps	11.57	Standard	Left Head	Tilt	0.704
5680	136	a mode	6 Mbps	11.57	Standard	Right Head	Touch	0.577
5680	136	a mode	6 Mbps	11.57	Standard	Right Head	Tilt	0.599

ANSI/IEEE C95.1 1992 – SAFETY LIMIT
1.6 W/kg (averaged over 1 gram)
Spatial Peak – Uncontrolled Environment/General Population

Measured Mixture Type	5680 MHz Head			**Date Tested**	July 13-15, 2010
Dielectric Constant εr	**IEEE Target**	**Measured**		**Duty Cycle**	100%
	35.6	7/13	34.03	**Ambient Temperature (C)**	22
		7/14	34.15		
		7/15	35.17		
Conductivity σ (mho/m)	**IEEE Target**	**Measured**			≥15cm
	4.96	7/13	5.13	**Fluid Temperature (C)**	21.7
		7/14	5.13		
		7/15	5.13		

HEAD SAR MEASUREMENT RESULTS (5745MHz) Band								
Freq (MHz)	Chan	Test Mode	Data Rate	Cond. Pwr. Before (dBm)	Battery Type	Phantom Section	EUT Test Position	Measured SAR 1g (W/kg)
5745	149	a mode	6 Mbps	11.65	Standard	Left Head	Touch	0.797
5745	149	a mode	6 Mbps	11.65	Standard	Left Head	Tilt	0.896
5745	149	a mode	6 Mbps	11.65	Standard	Right Head	Touch	0.72
5745	149	a mode	6 Mbps	11.65	Standard	Right Head	Tilt	0.808

ANSI/IEEE C95.1 1992 – SAFETY LIMIT
1.6 W/kg (averaged over 1 gram)
Spatial Peak – Uncontrolled Environment/General Population

Measured Mixture Type	5745 MHz Head			**Date Tested**	July 13-15, 2010
Dielectric Constant εr	**IEEE Target**	**Measured**		**Duty Cycle**	100%
	35.3	7/13	33.6	**Ambient Temperature (C)**	22
		7/14	33.6		
		7/15	33.7		
Conductivity σ (mho/m)	**IEEE Target**	**Measured**		**Fluid Depth**	≥15cm
	5.27	7/13	5.51	**Fluid Temperature (C)**	21.7
		7/14	5.50		
		7/15	5.50		

HEAD SAR MEASUREMENT RESULTS (5805MHz) Band								
Freq (MHz)	**Chan**	**Test Mode**	**Data Rate**	**Cond. Pwr. Before (dBm)**	**Battery Type**	**Phantom Section**	**EUT Test Position**	**Measured SAR 1g (W/kg)**
5805	161	a mode	6 Mbps	10.90	Standard	Left Head	Touch	0.921
5805	161	a mode	6 Mbps	10.90	Standard	Left Head	Tilt	1.04
5805	161	a mode	6 Mbps	10.90	Standard	Right Head	Touch	0.864
5805	161	a mode	6 Mbps	10.90	Standard	Right Head	Tilt	0.942

ANSI/IEEE C95.1 1992 – SAFETY LIMIT
1.6 W/kg (averaged over 1 gram)
Spatial Peak – Uncontrolled Environment/General Population

Measured Mixture Type	5805 MHz Head			**Date Tested**	July 13-15, 2010
Dielectric Constant εr	**IEEE Target**	**Measured**		**Duty Cycle**	100%
	35.3	7/13	33.6	**Ambient Temperature (C)**	22
		7/14	33.6		
		7/15	33.7		
Conductivity σ (mho/m)	**IEEE Target**	**Measured**		**Fluid Depth**	≥15cm
	5.27	7/13	5.51	**Fluid Temperature (C)**	21.7
		7/14	5.50		
		7/15	5.50		

BODY SAR MEASUREMENT RESULTS (5150-5825MHz) Band									
Freq (MHz)	**Chan**	**Test Mode**	**Data Rate**	**Cond. Pwr. Before (dBm)**	**Battery Type**	**Phantom Section**	**Accessory**	**Position**	**Measured SAR 1g (W/kg)**
5180	36	a mode	6 Mbps	14.51	Standard	Planar	Plastic Holster	Body	0.486
5240	48	a mode	6 Mbps	14.66	Standard	Planar	Plastic Holster	Body	0.402
5260	52	a mode	6 Mbps	14.50	Standard	Planar	Plastic Holster	Body	0.369
5320	64	a mode	6 Mbps	14.07	Standard	Planar	Plastic Holster	Body	0.254
5520	104	a mode	6 Mbps	13.66	Standard	Planar	Plastic Holster	Body	0.408
5580	116	a mode	6 Mbps	13.89	Standard	Planar	Plastic Holster	Body	0.628
5580	124	a mode	6 Mbps	13.89	Extended	Planar	Plastic Holster	Body	0.552
5620	124	a mode	6 Mbps	12.78	Standard	Planar	Plastic Holster	Body	0.505
5680	136	a mode	6 Mbps	11.57	Standard	Planar	Plastic Holster	Body	0.337
5745	149	a mode	6 Mbps	11.65	Standard	Planar	Plastic Holster	Body	0.31
5805	161	a mode	6 Mbps	10.90	Standard	Planar	Plastic Holster	Body	0.33
ANSI/IEEE C95.1 1992 – SAFETY LIMIT 1.6 W/kg (averaged over 1 gram) Spatial Peak – Uncontrolled Environment/General Population									

Measured Mixture Type	5200-5500-5800 MHz Body				**Date Tested**	July 09-12, 2010
Dielectric Constant εr	**Freq. (MHz**	**IEEE Target**	**Measured July 09, 2010**	**Measured July 12, 2010**	**Duty Cycle**	100%
	5200	49.0	46.90	48.16	**Ambient Temperature (C)**	22
	5500	48.6	46.45	47.52		
	5800	48.2	45.81	46.88		
Conductivity σ (mho/m)	**Freq. (MHz**	**IEEE Target**	**Measured July 09, 2010**	**Measured July 12, 2010**	**Fluid Temperature (C)**	21.7
	5200	5.30	5.37	5.40	**Fluid Depth**	≥15cm
	5500	5.65	5.80	5.83		
	5800	6	6.27	6.30		

BODY SAR MEASUREMENT RESULTS (5150-5825MHz) Band									
Freq (MHz)	**Chan**	**Test Mode**	**Data Rate**	**Cond. Pwr. Before (dBm)**	**Battery Type**	**Phantom Section**	**Accessory**	**Position**	**Measured SAR 1g (W/kg)**
5180	36	a mode	6 Mbps	14.51	Standard	Planar	Leather Holster	Body	0.678
5240	48	a mode	6 Mbps	14.66	Standard	Planar	Leather Holster	Body	0.708
5240	48	a mode	6 Mbps	14.50	Extended	Planar	Leather Holster	Body	0.144
5260	64	a mode	6 Mbps	14.07	Standard	Planar	Leather Holster	Body	0.700
5320	104	a mode	6 Mbps	13.66	Standard	Planar	Leather Holster	Body	0.057
5520	116	a mode	6 Mbps	13.89	Standard	Planar	Leather Holster	Body	0.093
5580	124	a mode	6 Mbps	13.89	Standard	Planar	Leather Holster	Body	0.169
5620	124	a mode	6 Mbps	12.78	Standard	Planar	Leather Holster	Body	0.112
5680	136	a mode	6 Mbps	11.57	Standard	Planar	Leather Holster	Body	0.079
5745	149	a mode	6 Mbps	11.65	Standard	Planar	Leather Holster	Body	0.061
5805	161	a mode	6 Mbps	10.90	Standard	Planar	Leather Holster	Body	0.107
ANSI/IEEE C95.1 1992 – SAFETY LIMIT 1.6 W/kg (averaged over 1 gram) Spatial Peak – Uncontrolled Environment/General Population									

Measured Mixture Type	5200-5500-5800 MHz Body				**Date Tested**	July 09-12, 2010
Dielectric Constant εr	**Freq. (MHz**	**IEEE Target**	**Measured July 09, 2010**	**Measured July 12, 2010**	**Duty Cycle**	100%
	5200	49.0	46.90	48.16	**Ambient Temperature (C)**	22
	5500	48.6	46.45	47.52		
	5800	48.2	45.81	46.88		
Conductivity σ (mho/m)	**Freq. (MHz**	**IEEE Target**	**Measured July 09, 2010**	**Measured July 12, 2010**	**Fluid Temperature (C)**	21.7
	5200	5.30	5.37	5.40	**Fluid Depth**	≥15cm
	5500	5.65	5.80	5.83		
	5800	6	6.27	6.30		

DETAILS OF SAR EVALUATION

The Cisco Systems CP-7925G-EX-K9 802.11abg Phone was determined to be compliant for localized Specific Absorption Rate based on the test provisions and conditions described below.

1. The EUT was tested for both head and body SAR. For the head SAR both touch and tilt positions were measured on the left and right side of the SAM phantom. The position which produced the highest SAR was re-measured with the extended battery. The EUT was tested for body worn configurations with a plastic and leather holster. The EUT was evaluated for SAR with both the standard and extended batteries.

2. The EUT was placed into a test mode using Cisco's protocol software.

3. The EUT was tested with and without the Bluetooth on for 2.4GHz body only. Both the WLAN and the Bluetooth share the same antenna.

4. The SAR evaluations were performed with a fully charged battery.

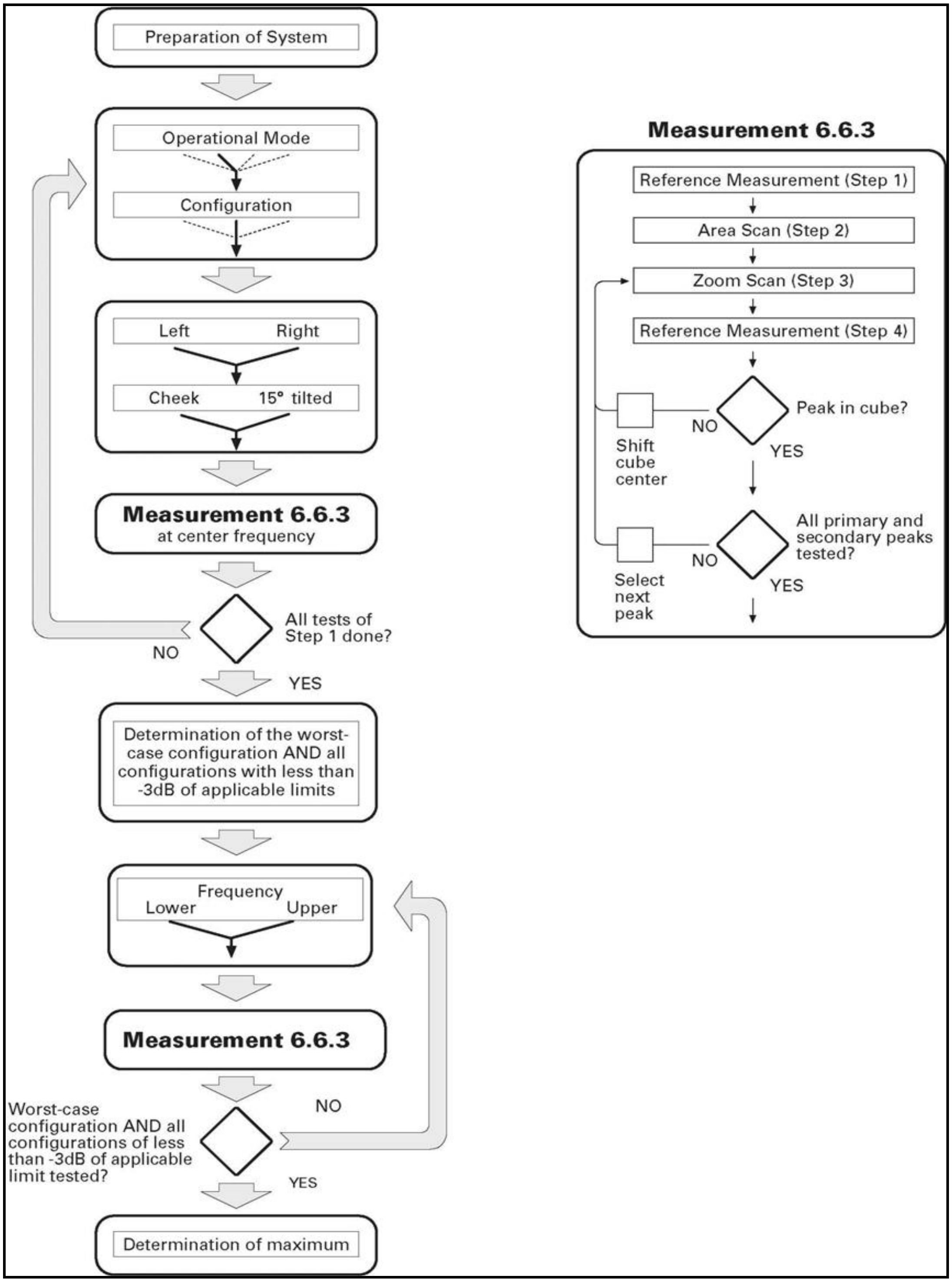
5. The EUT's RF power was measured before each SAR test using a Spectrum Analyzer. The measured drift during the SAR tests was used to determine if the conducted power stayed within the allowable limits.

6. The dielectric parameters of the simulated body fluid were measured prior to the evaluation using an 85070D Dielectric Probe Kit and an 8722D Network Analyzer.

7. The fluid and air temperature was measured prior to and after each SAR evaluation to ensure the temperature remained within ±2 deg C of the temperature of the fluid when the dielectric properties were measured.

8. During the SAR evaluations if a distribution produced several hotspots over the course of the area scan, each hotspot was evaluated separately.

FLOW CHART OF THE RECOMMENDED PRACTICES AND PROCEDURES



EAR Reference Point

Figure 12.1 shows the front, back and side views of the SAM Twin Phantom. The point M is the reference point for the center of the mouth, LE is the left ear reference point (ERP), and RE is the right ERP. The ERPs are 15mm posterior to the entrance to the ear canal (EEC) along the B-M line (Back-Mouth), as shown in Figure 12.2. The plane passing through the two ear canals and M is defined as the Reference Plane. The line N-F (Neck-Front) is perpendicular to the reference plane and passing through the RE (or LE) is called the Reference Pivoting. Line B-M is perpendicular to the N-F line. Both N-F and B-M lines are marked on the external phantom shell to facilitate handset positioning.

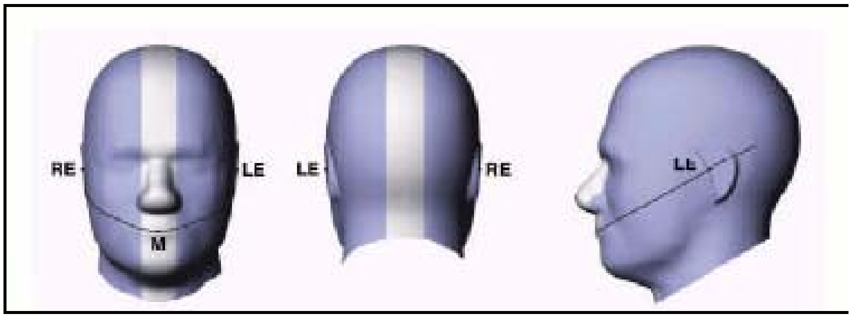


Figure 12.1. Front, back and side view of SAM Twin Phantom

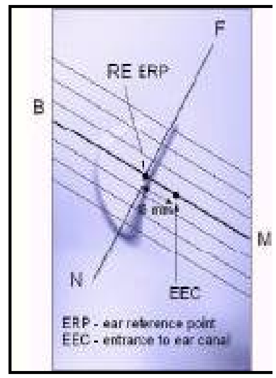


Figure 12.2. Side view of ERPs

HANDSET REFERENCE POINTS

Two imaginary lines on the handset were established: the vertical centerline and the horizontal line. The test device was placed in a normal operating position with the test device reference point located along the vertical centerline on the front of the device aligned to the ear reference point (See Fig. 12.3). The test device reference point was than located at the same level as the center of the ear reference point. The test device was positioned so that the vertical centerline was bisecting the front surface of the handset at it s top and bottom edges, positioning the ear reference point on the outer surface of the both the left and right head phantoms on the ear reference point.

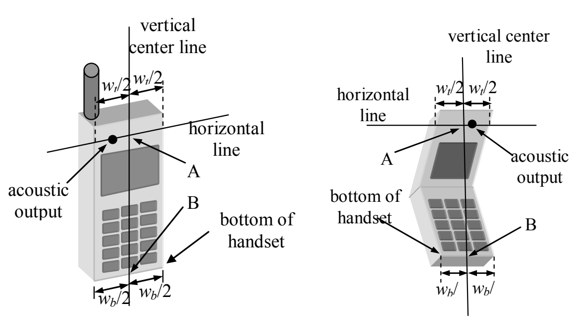


Figure 12.3
Handset Vertical Center & Horizontal Line Reference Points

POSITIONING FOR CHEEK/TOUCH

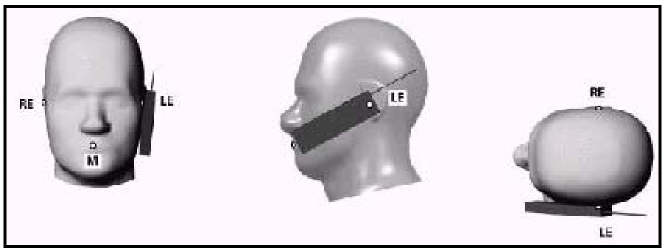
1. The test device was positioned with the handset close to the surface of the phantom such that point A is on the (virtual) extension of the line passing through points RE and LE on the phantom, such that the plane defined by the vertical center line and the horizontal line of the phone is approximately parallel to the sagittal plane of the phantom.

2. The handset was translated towards the phantom along the line passing through RE & LE until the handset touches the ear.

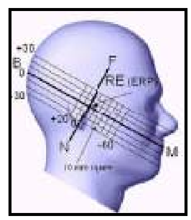
3. While maintaining the handset in this plane, the handset was rotated around the LE-RE line until the vertical centerline was in the plane normal to MB-NF including the line MB (reference plane).

4. The phone was hen rotated around the vertical centerline until the phone (horizontal line) was symmetrical was respect to the line NF.

5. While maintaining the vertical centerline in the reference plane, keeping point A on the line passing through RE and LE, and maintaining the phone contact with the ear, the handset was rotated about the line NF until any point on the handset made contact with a phantom point below the ear (cheek). See Figure 12.5)



Front, Side and Top View of Cheek/Touch Position



Side view with relevant markings

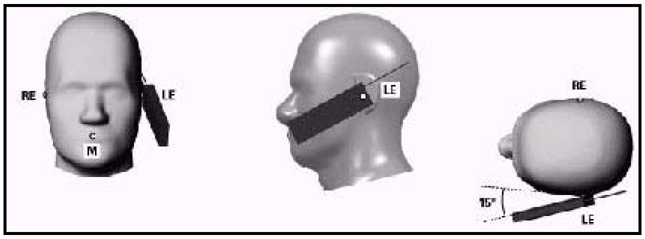
POSITIONING FOR EAR/15 DEGREE TILE

With the test device aligned in the Cheek/Touch Position:

1. While maintaining the orientation of the phone, the phone was retracted parallel to the reference plane far enough to enable a rotation of the phone by 15 degree.

2. The phone was then rotated around the horizontal line by 15 degree.

3. While maintaining the orientation of the phone, the phone was moved parallel to the reference plane until any part of the phone touches the head. (In this position, point A was located on the line RE-LE). The tilted position is obtained when the contact is on the pinna. If the contact was at any location other than the pinna, the angle of the phone would then be reduced. The tilted position was obtained when any part of the phone was in contact of the ear as well as a second part of the phone was in contact with the head.



Front, Side and Top View of Ear/15 Tilt Position

EVALUATION PROCEDURES

The evaluation was performed in the applicable area of the phantom depending on the type of device being tested.

(i) For devices held to the ear during normal operation, both the left and right ear positions were evaluated using the SAM phantom.
(ii) For body-worn and face-held devices a planar phantom was used.

The SAR was determined by a pre-defined procedure within the DASY4 software. Upon completion of a reference check, the exposed region of the phantom was scanned near the inner surface with a grid spacing of 15mm x 15mm.

An area scan was determined as follows:

Based on the defined area scan grid, a more detailed grid is created to increase the points by a factor of 10. The interpolation function then evaluates all field values between corresponding measurement points.

A linear search is applied to find all the candidate maxima. Subsequently, all maxima are removed that are >2 dB from the global maximum. The remaining maxima are then used to position the cube scans.

A 1g and 10g spatial peak SAR was determined as follows:

For frequencies ≤4.5GHz a 32mm x 32mm x 34mm (7x7x7 data points) zoom scan was assessed at the position where the greatest V/m was detected. For frequencies ≥4.5GHz a 28mm x 28mm x 24mm (7x7x9 data points) zoom scan was assessed at the position where the greatest V/m was detected. The data at the surface was extrapolated since the distance from the probes sensors to the surface is 3.9cm. A least squares fourth-order polynomial was used to generate points between the probe detector and the inner surface of the phantom.

Interpolated data is used to calculate the average SAR over 1g and 10g cubes by spatially discretizing the entire measured cube. The volume used to determine the averaged SAR is a 1mm grid (42875 interpolated points).

Z-Scan was determined as follows:

The Z-scan measures points along a vertical straight line. The line runs along a line normal to the inner surface of the phantom surface.

DATA EVALUATION PROCEDURES

The DASY4 post processing software (SEMCAD) automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software:

Probe Parameters:	- Sensitivity	$Norm_i$, a_{i0}, a_{i1}, a_{i2}
	- Conversion Factor	$ConvF_i$
	- Dipole Compression Point	dcp_i
Device parameters:	- Frequency	f
	- Crest factor	cf
Media parameters:	- Conductivity	σ
	- Density	ρ

These parameters must be set correctly in the software. They can be found in the component documents or be imported into the software from the configuration files issued for the DASY components. In the direct measuring mode of the multimeter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used. The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC - transmission factor from the diode to the evaluation electronics. If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given as:

$$V_i = U_i + U_i^2 \cdot \frac{cf}{dcp_i}$$

with V_i = Compensated signal of channel i (i = x, y, z)
U_i = Input signal of channel i (i = x, y, z)
cf = Crest factor of exciting field (DASY parameter)
dcp_i = Diode compression point (DASY parameter)

From the compensated input signals the primary field data for each channel can be evaluated:

$$\text{E}-\text{fieldprobes}: \quad E_i = \sqrt{\frac{V_1}{Norm_i \cdot ConvF}}$$

$$\text{H}-\text{fieldprobes}: \quad H_i = \sqrt{V_i} \cdot \frac{a_{i0} + a_{i1} f + a_{i2} f^2}{f}$$

with V_i = Compensated signal of channel i (i = x, y, z)
$Norm_i$ = Sensor sensitivity of channel i (i = x, y, z)
$\mu V/(V/m)^2$ for E-field probes
$ConvF$ = Sensitivity enhancement in solution
a_{ij} = Sensor sensitivity factors for H-field probes
f = Carrier frequency (GHz)
E_i = Electric field strength of channel i in V/m
H_i = Magnetic field strength of channel i in A/m

The RSS value of the field components gives the total field strength (Hermitian magnitude):

$$E_{tot} = \sqrt{E_x^2 + E_y^2 + E_z^2}$$

The primary field data are used to calculate the derived field units.

$$SAR = E_{tot}^2 \cdot \frac{\sigma}{\rho \cdot 1'000}$$

with SAR = local specific absorption rate in mW/g
E_{tot} = total field strength in V/m
σ = conductivity in [mho/m] or [Siemens/m]
ρ = equivalent tissue density in g/cm3

Note that the density is normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid.

The power flow density is calculated assuming the excitation field as a free space field.

$$P_{pwe} = \frac{E_{tot}^2}{3770} \quad \text{or} \quad P_{pwe} = H_{tot}^2 \cdot 37.7$$

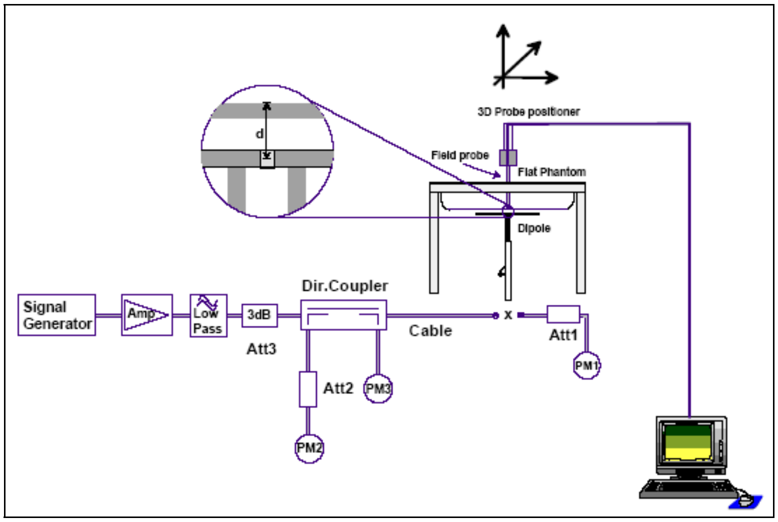
with P_{pwe} = Equivalent power density of a plane wave in mW/cm2
E_{tot} = total electric field strength in V/m
H_{tot} = total magnetic field strength in A/m

SYSTEM PERFORMANCE CHECK

Prior to the SAR evaluation a system check was performed in the planar section of the SAM phantom with a 2450MHz dipole and a 5-6GHz dipole. The dielectric parameters of the simulated brain fluid were measured prior to the system performance check using an 85070D Dielectric Probe Kit and an 8722D Network Analyzer. A forward power of 250mW was applied to the dipole and the system was verified to a tolerance of +10%. All results were normalized to 1W.

Test Date	Fluid Type (MHz)	SAR 1g (W/kg)		Permittivity Constant εr		Conductivity σ (mho/m)		Ambient Temp. (C)	Fluid Temp. (C)	Fluid Depth (cm)
		Calibrated Target	Measured	IEEE Target	Measured	IEEE Target	Measured			
06/29/10	2450 Head	62.0±5%	61.2	39.2 ±5%	38.7	1.80±10%	1.87	21.0	22.0	≥15
07/15/10	2450 Body	55.6±5%	53.2	52.7 ±5%	52.0	1.95±10%	1.93	22.0	22.0	≥15
07/09/10	5200 Body	70.4±5%	72.8	49.0 ±5%	46.9	5.30±10%	5.37	20.0	20.0	≥15
07/09/10	5500 Body	71.2±5%	74.0	48.6 ±5%	46.4	5.65±10%	5.79	22.0	21.0	≥15
07/09/10	5800 Body	60.8±5%	63.6	48.2 ±5%	45.8	6.00±10%	6.27	22.0	21.0	≥15
07/12/10	5200 Body	70.4±5%	73.2	49.0 ±5%	48.2	5.30±10%	5.39	23.0	22.0	≥15
07/12/10	5500 Body	71.2±5%	74.4	48.6 ±5%	47.5	5.65±10%	5.83	23.0	22.0	≥15
07/12/10	5800 Body	60.8±5%	63.6	48.2 ±5%	46.9	6.00±10%	6.29	21.0	22.0	≥15
07/13/10	5200 Head	76.8±5%	76.8	36.0 ±5%	34.6	4.66±10%	4.82	24.0	20.0	≥15
07/13/10	5500 Head	78.8±5%	78.4	35.6 ±5%	34.0	4.96±10%	5.13	22.0	21.0	≥15
07/13/10	5800 Head	74.8±5%	75.2	35.3 ±5%	33.5	5.27±10%	5.51	22.0	21.0	≥15
07/14/10	5200 Head	76.8±5%	76.4	36.0 ±5%	34.6	4.66±10%	4.81	21.0	22.0	≥15
07/14/10	5500 Head	78.8±5%	78.4	35.6 ±5%	34.1	4.96±10%	5.13	20.0	20.0	≥15
07/14/10	5800 Head	74.8±5%	74.8	35.3 ±5%	33.6	5.27±10%	5.50	22.0	21.0	≥15
07/15/10	5200 Head	76.8±5%	76.4	36.0 ±5%	34.7	4.66±10%	4.81	22.0	21.0	≥15
07/15/10	5500 Head	78.8±5%	78.4	35.6 ±5%	34.2	4.96±10%	5.13	21.0	22.0	≥15
07/15/10	5800 Head	74.8±5%	74.8	35.3 ±5%	33.7	5.27±10%	5.49	21.0	21.0	≥15

Note: The ambient and fluid temperatures were measured prior to the fluid parameter check and the system performance check. The temperatures listed in the table above were consistent for all measurement periods.


3D Probe positioner
Field probe
Flat Phantom
d
Dipole
Signal Generator
Amp
Low Pass
3dB
Att3
Dir.Coupler
Cable
x
Att1
PM1
Att2
PM3
PM2

SIMULATED EQUIVALENT TISSUES

Simulated Tissue Mixture (Proprietary)	
Ingredient	**5-6GHz Head and Body**
Water	60-78%
Salt	0.4-3.0%
Emulsifiers	0.5-15.0
Mineral Oil	11.0-36.0

Simulated Tissue Mixture		
Ingredient	**2450MHz Head**	**2450MHz Body**
Water	46.7%	73.3%
DGMBE	53.3%	26.7%

SAR SAFETY LIMITS

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EXPOSURE LIMITS	SAR (W/kg)	
	(General Population / Uncontrolled Exposure Environment)	(Occupational / Controlled Exposure Environment)
Spatial Average (averaged over the whole body)	0.08	0.4
Spatial Peak (averaged over any 1g of tissue)	1.60	8.0
Spatial Peak (hands/wrists/feet/ankles averaged over 10g)	4.0	20.0

Notes:

1. Uncontrolled exposure environments are locations where there is potential exposure of individuals who have no knowledge or control of their potential exposure.

2. Controlled exposure environments are locations where there is potential exposure of individuals who have knowledge of their potential exposure and can exercise control over their exposure.

ROBOT SYSTEM SPECIFICATIONS

1.1. SPECIFICATIONS

Positioner:

Robot:	Staubli Unimation Corp. Robot Model: RX90
Repeatability:	0.02 mm
No. of axis:	6

1.2. DATA ACQUISITION ELECTRONIC (DAE) SYSTEM:

Cell Controller

Processor:	Compaq Evo Clock Speed:2.4 GHz Operating System: Windows XP Professional

Data Converter

Features:	Signal Amplifier, multiplexer, A/D converter, and control logic
Software:	DASY4 software
Connecting Lines:	Optical downlink for data and status info. Optical uplink for commands and clock

Dasy4 Measurement Server

Function:	Real-time data evaluation for field measurements and surface detection
Hardware:	PC/104 166MHz Pentium CPU; 32 MB chipdisk; 64 MB RAM
Connections:	COM1, COM2, DAE, Robot, Ethernet, Service Interface

E-Field Probe

Model:	ET3DV6
Serial No.:	1793
Construction:	Triangular core fiber optic detection system
Frequency:	10 MHz to 6 GHz
Linearity:	± 0.2 dB (30 MHz to 3 GHz)

EX-Probe

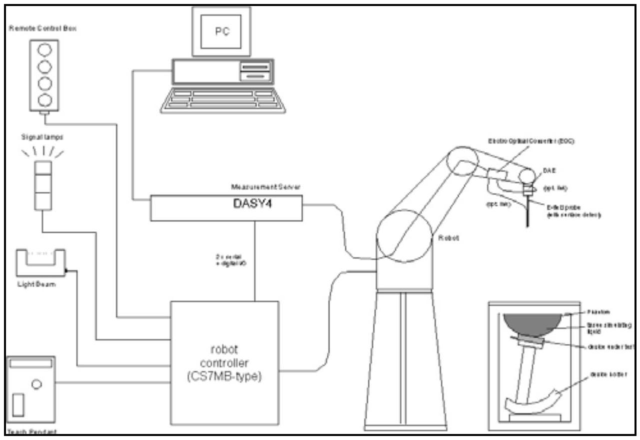
Model:	EX3DV4
Serial No.	3722
Construction:	Triangular core
Frequency:	10 MHz to > 6 GHz
Linearity:	± 0.2 dB (30 MHz to 6 GHz)

1.3. PHANTOM(S):

Validation & Evaluation Phantom

Type:	SAM V4.0C
Shell Material:	Fiberglass
Thickness:	2.0 ±0.1 mm
Volume:	Approx. 20 liters

SAR Measurement System



Measurement System Diagram

1.4. RX90BL ROBOT

The Stäubli RX90BL Robot is a standard high precision 6-axis robot with an arm extension for accommodating the data acquisition electronics (DAE).

1.5. ROBOT CONTROLLER

The CS7MB Robot Controller system drives the robot motors. The system consists of a power supply, robot controller, and remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.

1.6. LIGHT BEAM SWITCH

The Light Beam Switch (Probe alignment tool) allows automatic ”tooling” of the probe. During the process, the actual position of the probe tip with respect to the robot arm is measured as well as the probe length and the horizontal probe offset. The software then corrects all movements, so that the robot coordinates are valid for the probe tip. The repeatability of this process is better than 0.1 mm. If a position has been taught with an aligned probe, the same position will be reached with another aligned probe within 0.1 mm, even if the other probe has different dimensions. During probe rotations, the probe tip will keep its actual position.

1.7. DATA ACQUISITION ELECTRONICS

The Data Acquisition Electronics consists of a highly sensitive electrometer grade preamplifier with auto-zeroing, a channel and gain switching multiplexer, a fast 16-bit A/D converter and a command decoder and control logic unit. Some of the task the DAE performs is signal amplification, signal multiplexing, A/D conversion, and offset measurements. The DAE also contains the mechanical probe-mounting device, which contains two different sensor systems for frontal and sideways probe contacts used for probe collision detection and mechanical surface detection for controlling the distance between the probe and the inner surface of the phantom shell. Transmission from the DAE to the measurement server, via the EOC, is through an optical downlink for data and status information as well as an optical uplink for commands and the clock.

1.8. ELECTO-OPTICAL CONVERTER (EOC)

The Electro-Optical Converter performs the conversion between the optical and electrical of the signals for the digital communication to the DAE and for the analog signal from the optical surface detection. The EOC connects to, and transfers data to, the DASY4 measurement server. The EOC also contains the fiber optical surface detection system for controlling the distance between the probe and the inner surface of the phantom shell.

1.9. MEASUREMENT SERVER

The Measurement Server performs time critical tasks such as signal filtering, all real-time data evaluation for field measurements and surface detection, controls robot movements, and handles safety operation. The PC-operating system cannot interfere with these time critical processes. A watchdog supervises all connections, and disconnection of any of the cables to the measurement server will automatically disarm the robot and disable all program-controlled robot movements.

1.10. DOSIMETRIC PROBE

Dosimetric Probe is a symmetrical design with triangular core that incorporates three 3 mm long dipoles arranged so that the overall response is close to isotropic. The probe sensors are covered by an outer protective shell, which is resistant to organic solvents i.e. glycol. The probe is equipped with an optical multi-fiber line, ending at the front of the probe tip, for optical surface detection. This line connects to the EOC box on the robot arm and provides automatic detection of the phantom surface. The optical surface detection works in transparent liquids and on diffuse reflecting surfaces with a repeatability of better than ±0.1mm.

1.11. SAM PHANTOM

The SAM (Specific Anthropomorphic Mannequin) twin phantom is a fiberglass shell phantom with 2mm shell thickness (except the ear region where shell thickness increases to 6mm) integrated into a wooden table. The shape of the shell corresponds to the phantom defined by SCC34-SC2. It enables the dosimetric evaluation of left hand, right hand phone usage as well as body mounted usage at the flat phantom region. The flat section is also used for system validation and the length and width of the flat section are at least 0.75 λO and 0.6 λO respectively at frequencies of 824 MHz and above (λO = wavelength in air).

Reference markings on the phantom top allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot. A white cover is provided to cover the phantom during off-periods preventing water evaporation and changes in the liquid parameters. Free space scans of devices on the cover are possible. The phantom is filled with a tissue simulating liquid to a depth of at least 15 cm at each ear reference point. The bottom plate of the wooden table contains three pair of bolts for locking the device holder.

1.12. PLANAR PHANTOM

The planar phantom is constructed of Plexiglas material with a 2.0 mm shell thickness for face-held and body-worn SAR evaluations of handheld radio transceivers. The planar phantom is mounted on the wooden table of the DASY4 system.

1.13. VALIDATION PLANAR PHANTOM

The validation planar phantom is constructed of Plexiglas material with a 6.0 mm shell thickness for system validations at 450MHz and below. The validation planar phantom is mounted on the wooden table of the DASY4 system.

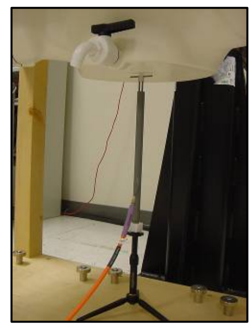
1.14. DEVICE HOLDER

The device holder is designed to cope with the different measurement positions in the three sections of the SAM phantom given in the standard. It has two scales, one for device rotation (with respect to the body axis) and one for device inclination (with respect to the line between the ear openings). The rotation center for both scales is the ear opening, thus the device needs no repositioning when changing the angles. The plane between the ear openings and the mouth tip has a rotation angle of 65°.

The DASY device holder has been made out of low-loss POM material having the following dielectric parameters: relative permittivity ε = 3 and loss tangent δ = 0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.

The dielectric properties of the liquid conform to all the tabulated values [2-5]. Liquids are prepared according to Annex A and dielectric properties are measured according to Annex B.

1.15. SYSTEM VALIDATION KITS



Power Capability: > 100 W (f < 1GHz); > 40 W (f > 1GHz)

Construction: Symmetrical dipole with l/4 balun Enables measurement of feed point impedance with NWA Matched for use near flat phantoms filled with brain simulating solutions Includes distance holder and tripod adaptor.

Frequency: 300, 450, 835, 1900, 2450 MHz, 5-6GHz

Return loss: >20 dB at specified validation position

Dimensions:
300 MHz Dipole: Length: 396mm; Overall Height:430 mm; Diameter: 6 mm
450 MHz Dipole: Length: 270 mm; Overall Height: 347 mm; Diameter: 6 mm
835 MHz Dipole: Length: 161 mm; Overall Height: 270 mm; Diameter: 3.6 mm
1900 MHz Dipole: Length: 68 mm; Overall Height: 219 mm; Diameter: 3.6 mm
2450 MHz Dipole: Length: 51.5 mm; Overall Height: 300 mm; Diameter: 3.6 mm
5-6GHz Dipole: Length: 26.0 mm; Overall Height: 170 mm; Diameter: 3.6 mm

TEST EQUIPMENT LIST

Test Equipment	Serial Number	Calibration Date
DASY4 System Robot EX3DV4 DAE3 2450MHz Dipole 5500MHz Dipole SAM Phantom V4.0C EUT Planar Phantom Validation Phantom	FO3/SX19A1/A/01 3722 584 1S2452 1S2571 N/A N/A N/A	N/A May 2010 April 2010 May 2010 June 2010 N/A N/A N/A
85070D Dielectric Probe Kt	N/A	N/A
83650B Signal Generator	3844A00910	August 2009
HP E4418B Power Meter	GB40205140	October 2009
Agilent E4407B	MY45102898	June 2009
HP 8482A Power Sensor	2607A11286	May 2010
HP 8722D Vector Network Analyzer	3S36140188	July 2010
HP EPM-442A Power Meter	GB37480766	June 2010
Mini-Circuits Power Amplifier	D111903#8	N/A
Mini-Circuits Power Amplifier	N902400810	N/A

MEASUREMENT UNCERTANTIES

UNCERTAINTY ASSESSMENT 300MHz-3GHz

Error Description	Tol. ±%	Prob. Dist.	Div.	c_i 1g	c_i 10g	Std Unc ±% (1g)	Std Unc ±% (10g)	v_i or v_{eff}
Measurement System								
Probe calibration	4.8	N	1	1	1	4.8	4.8	∞
Axial isotropy of the probe	4.7	R	√3	0.7	0.7	1.9	1.9	∞
Spherical isotropy of the probe	9.6	R	√3	0.7	0.7	3.9	3.9	∞
Boundary effects	1.0	R	√3	1	1	4.8	4.8	∞
Probe linearity	4.7	R	√3	1	1	2.7	2.7	∞
Detection limit	1.0	R	√3	1	1	0.6	0.6	∞
Readout electronics	1.0	N	1	1	1	1.0	1.0	∞
Response time	0.8	R	√3	1	1	0.5	0.5	∞
Integration time	2.6	R	√3	1	1	0.8	0.8	∞
RF ambient conditions	3.0	R	√3	1	1	0.43	0.43	∞
Mech. constraints of robot	0.4	R	√3	1	1	0.2	0.2	∞
Probe positioning	2.9	R	√3	1	1	1.7	1.7	∞
Extrapolation & integration	1.0	R	√3	1	1	2.3	2.3	∞
Test Sample Related								
Device positioning	2.9	N	1	1	1	2.23	2.23	145
Device holder uncertainty	3.6	N	1	1	1	5.0	5.0	5
Power drift	5.0	R	√3			2.9	2.9	∞
Phantom and Setup								
Phantom uncertainty	4.0	R	√3	1	1	2.3	2.3	∞
Liquid conductivity (target)	5.0	R	√3	0.64	0.43	1.8	1.2	∞
Liquid conductivity (measured)	2.5	N	1	0.64	0.43	1.6	1.1	∞
Liquid permittivity (target)	5.0	R	√3	0.6	0.5	1.7	1.4	∞
Liquid permittivity (measured)	2.5	N	1	0.6	0.5	1.5	1.2	∞
Combined Standard Uncertainty (k=1)		RSS				10.3	10.0	
Expanded Uncertainty (k=2) 95% Confidence Level						20.6	20.1	

Table 1. Worst-case uncertainty for DASY4 assessed according to IEEE P1528

The budget is valid for the frequency range 300MHz to 3GHz and represents a worst-case analysis.

UNCERTAINTY ASSESSMENT 3-6GHz

Error Description	Tol. ±%	Prob. Dist.	Div.	c_i 1g	c_i 10g	Std Unc ±% (1g)	Std Unc ±% (10g)	v_i or v_{eff}
Measurement System								
Probe calibration	4.8	N	1	1	1	8.3	8.3	∞
Axial isotropy of the probe	4.7	R	√3	0.7	0.7	1.9	1.9	∞
Spherical isotropy of the probe	9.6	R	√3	0.7	0.7	3.9	3.9	∞
Boundary effects	1.0	R	√3	1	1	0.6	0.6	∞
Probe linearity	4.7	R	√3	1	1	2.7	2.7	∞
Detection limit	1.0	R	√3	1	1	0.6	0.6	∞
Readout electronics	1.0	N	1	1	1	1.0	1.0	∞
Response time	0.8	R	√3	1	1	0.5	0.5	∞
Integration time	2.6	R	√3	1	1	1.5	1.5	∞
RF ambient conditions	3.0	R	√3	1	1	1.7	1.7	∞
Mech. constraints of robot	0.4	R	√3	1	1	0.2	0.2	∞
Probe positioning	2.9	R	√3	1	1	1.7	1.7	∞
Extrapolation & integration	1.0	R	√3	1	1	0.6	0.6	∞
Test Sample Related								
Device positioning	2.9	N	1	1	1	2.9	2.9	145
Device holder uncertainty	3.6	N	1	1	1	3.6	3.6	5
Power drift	5.0	R	√3			2.9	2.9	∞
Phantom and Setup								
Phantom uncertainty	4.0	R	√3	1	1	2.3	2.3	∞
Liquid conductivity (target)	5.0	R	√3	0.64	0.43	1.8	1.2	∞
Liquid conductivity (measured)	2.5	N	1	0.64	0.43	1.6	1.1	∞
Liquid permittivity (target)	5.0	R	√3	0.6	0.5	1.7	1.4	∞
Liquid permittivity (measured)	2.5	N	1	0.6	0.5	1.5	1.2	∞
Combined Standard Uncertainty (k=1)		RSS				12.3	12.1	
Expanded Uncertainty (k=2) 95% Confidence Level						24.6	24.2	

Table 2. Worst-case uncertainty for DASY4 assessed according to IEEE P1528

The budget is valid for the frequency range 3-6GHz and represents a worst-case analysis.

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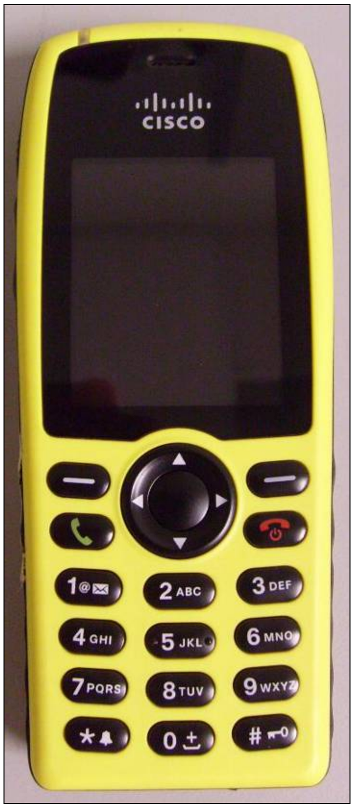
EUT PHOTOS



Photograph 1. Front of EUT

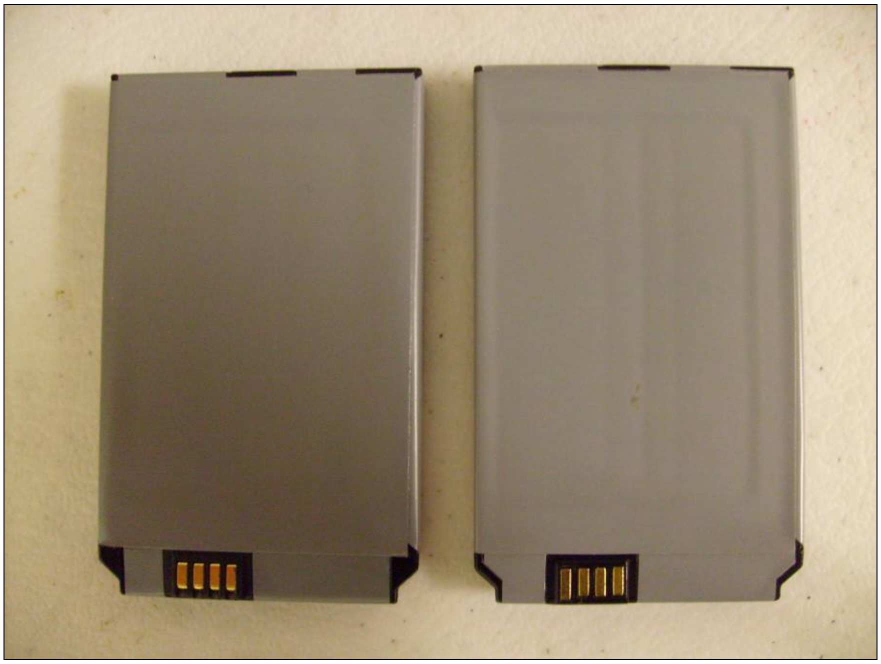
Photograph 2. Back of EUT

Photograph 3. EUT Label

Photograph 4. EUT in Leather Holster

Photograph 5. Side View of Leather Holster with belt clip

Photograph 6. Standard and extended batteries inside View

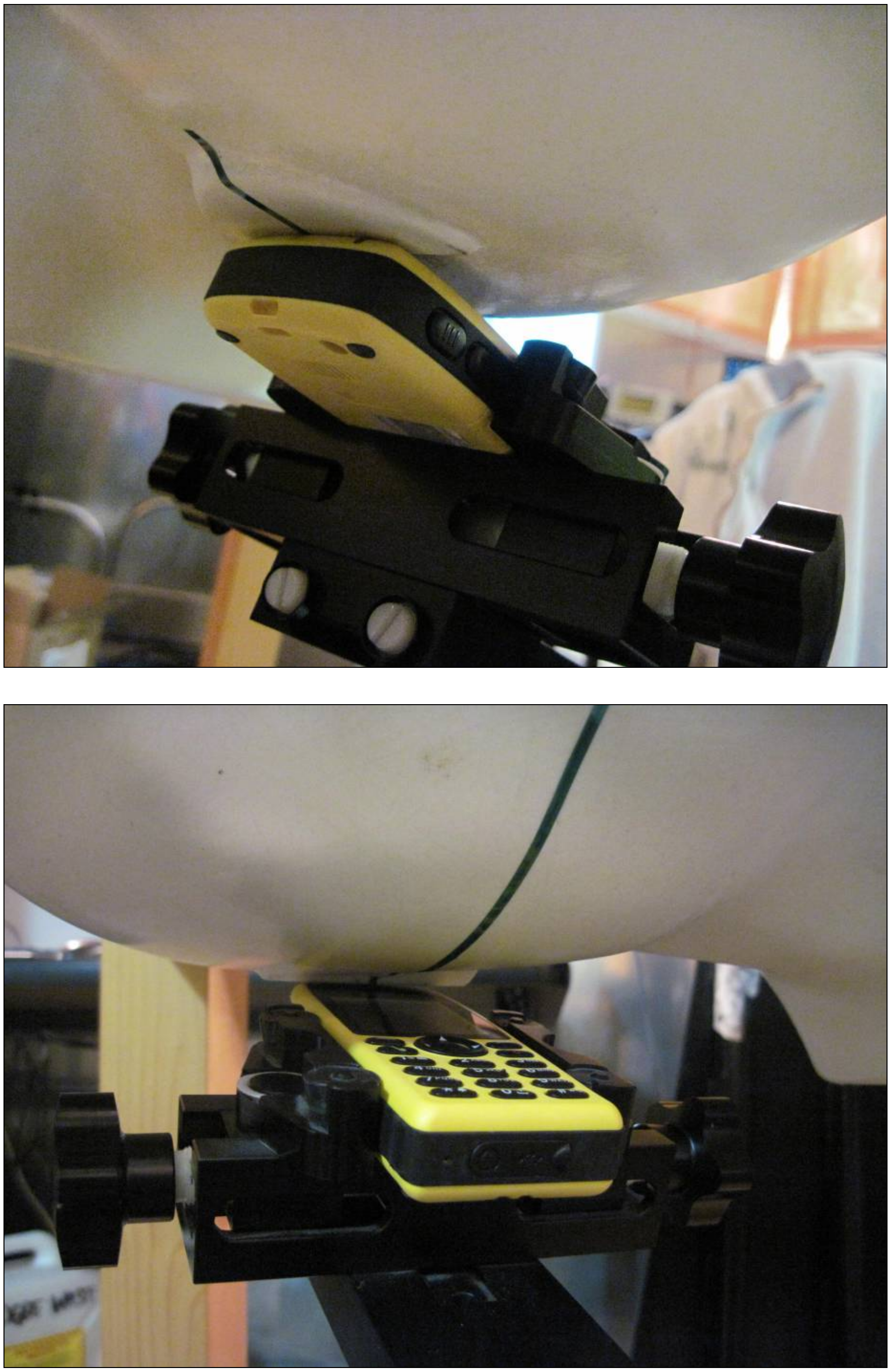


Photograph 7. Standard and extended batteries outside View

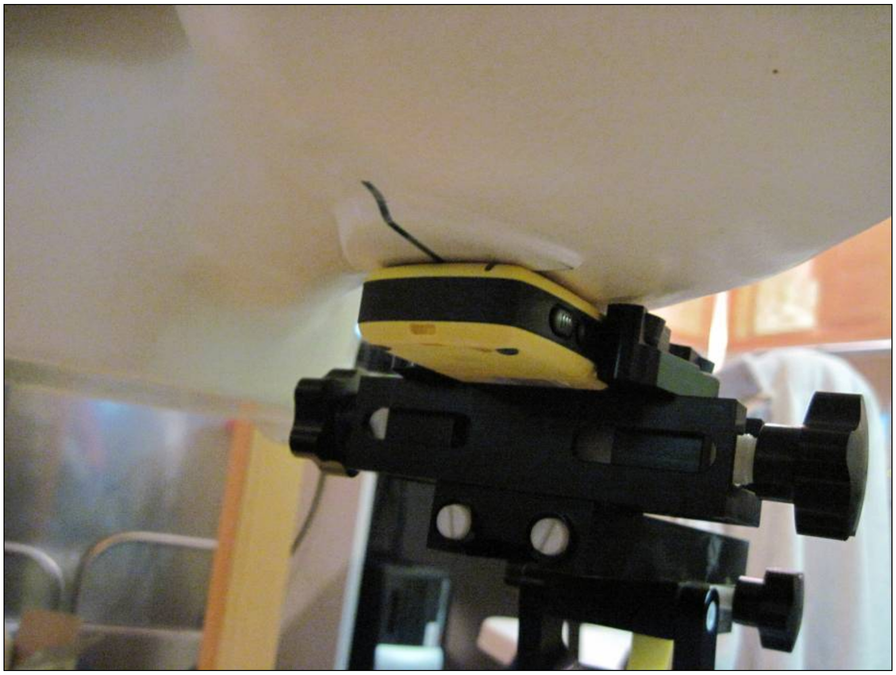
Photograph 8. Plastic Holster Front and Rear View

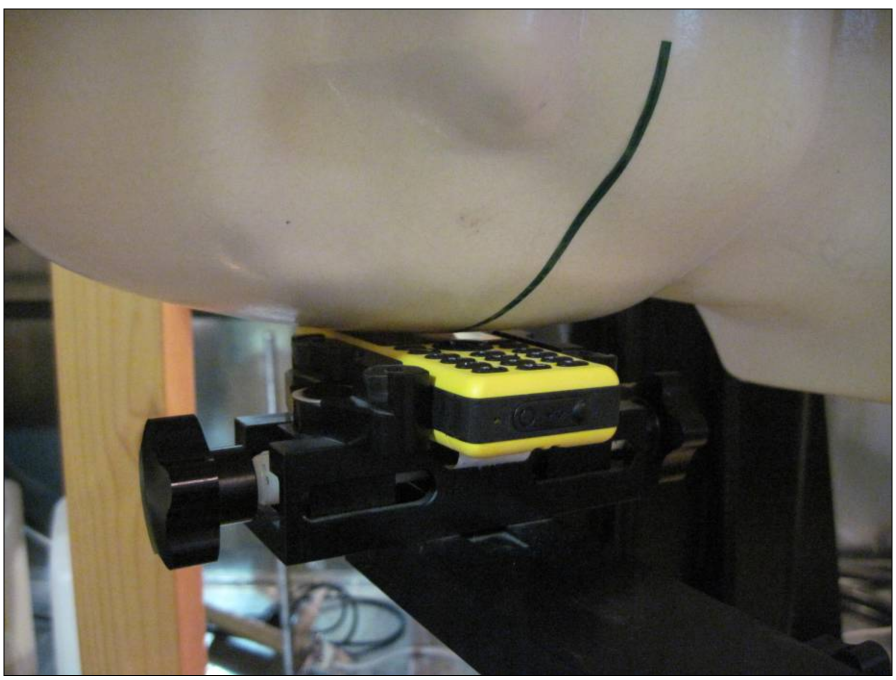
Photograph 9. EUT Mounted in Plastic Holster

TEST SET-UP

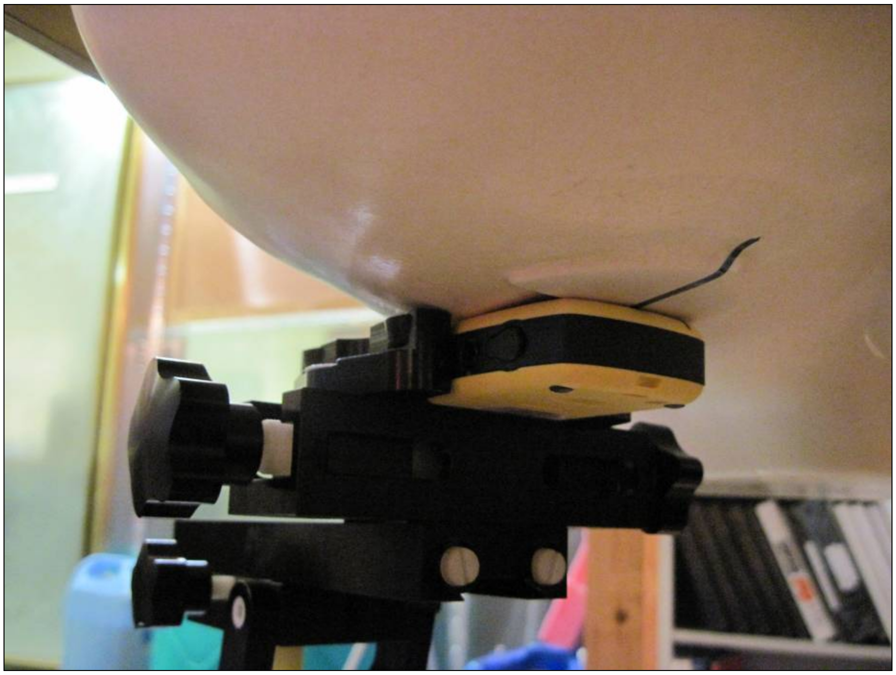


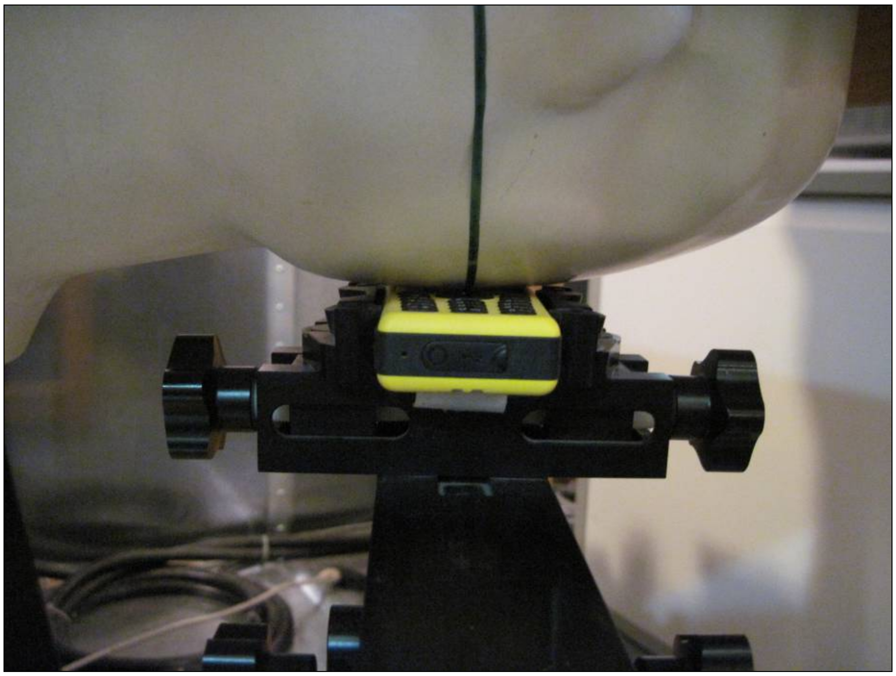
Photograph 10. Right Hand Tilt Position



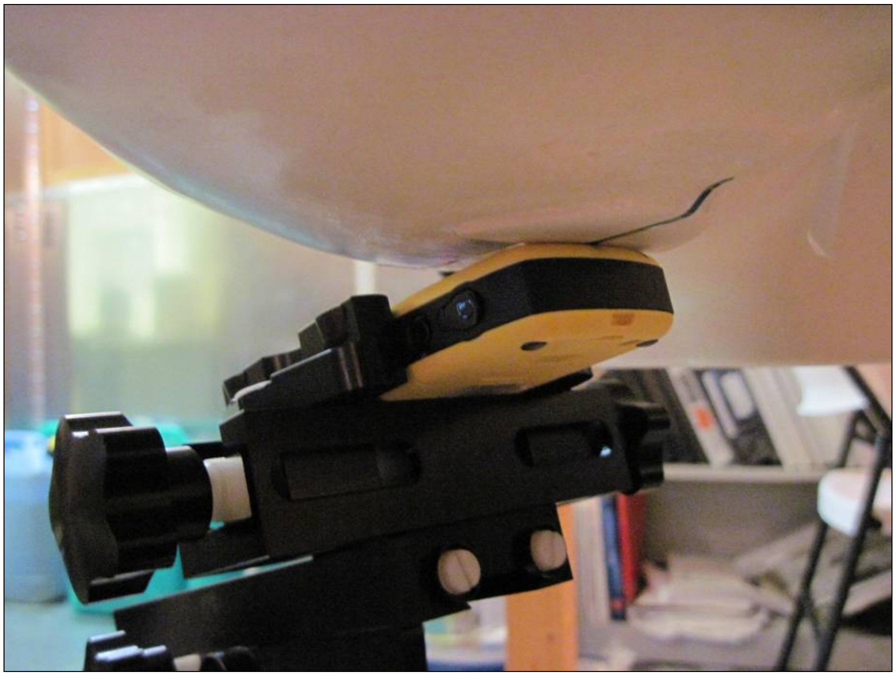


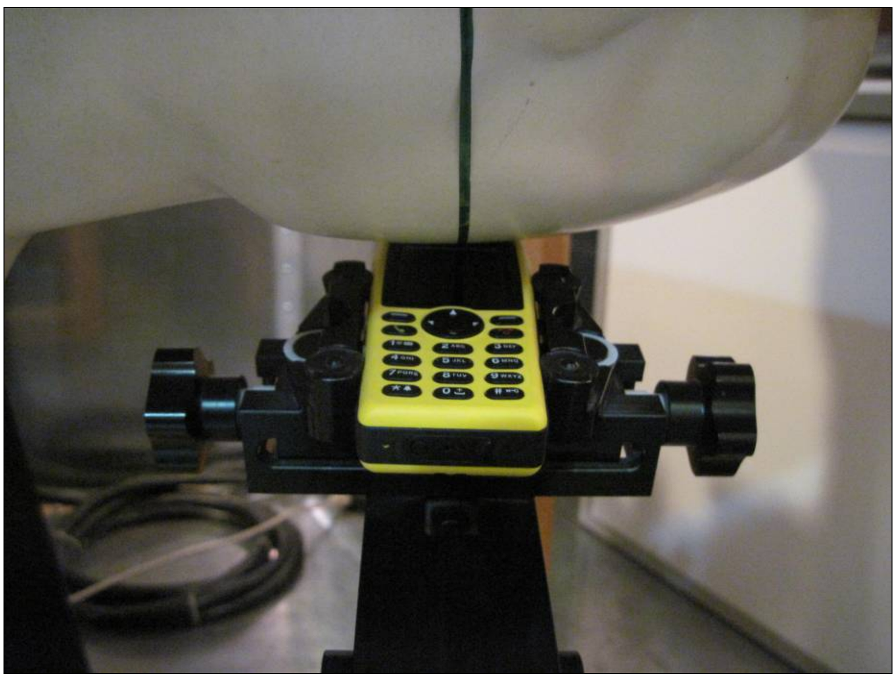
Photograph 11. Right Hand Touch Position



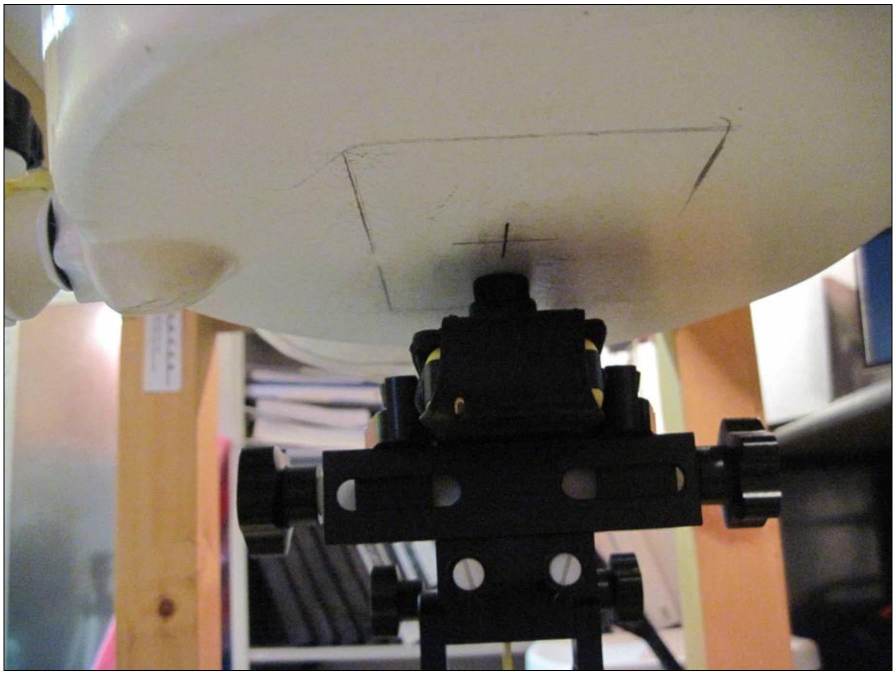


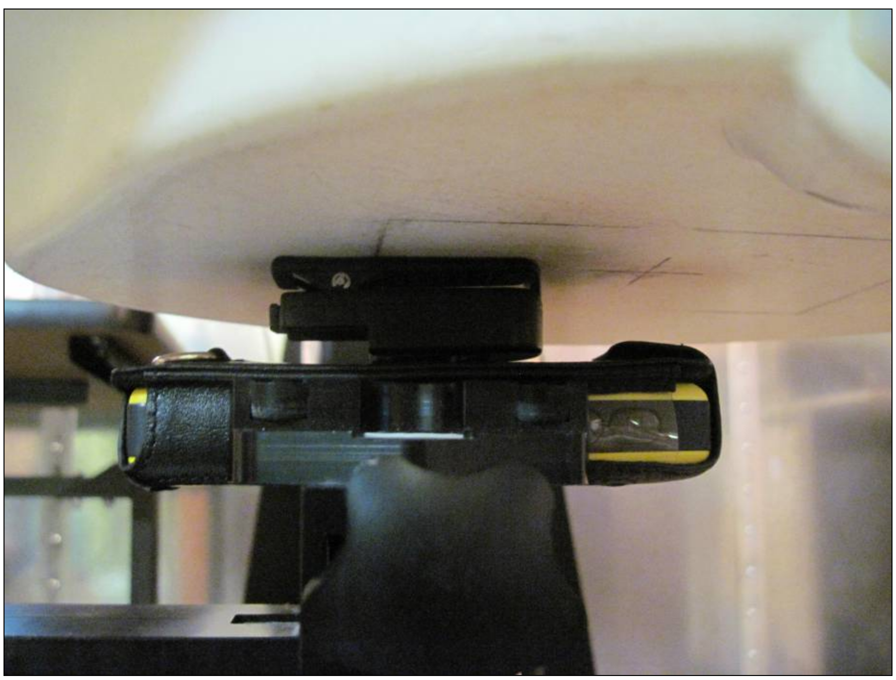
Photograph 12. Left Hand Touch Position



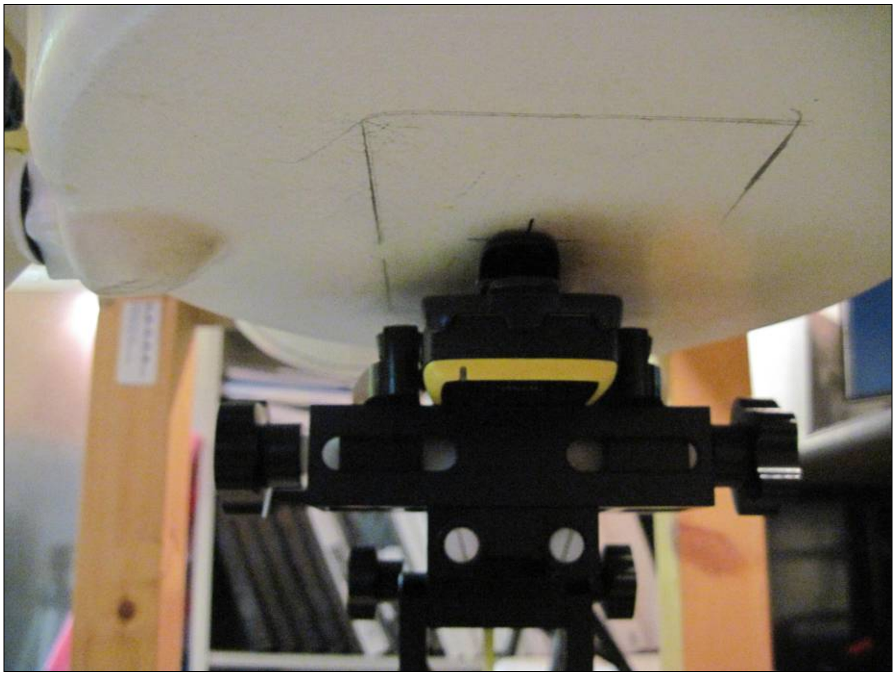


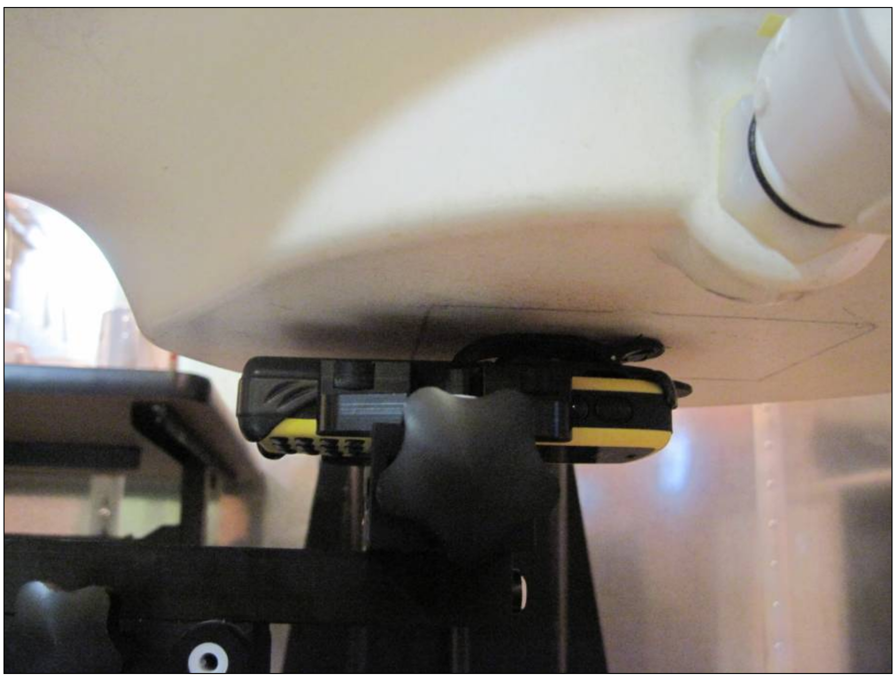
Photograph 13. Left Hand Tilt Position





Photograph 14. Body Worn Position with Leather Holster





Photograph 15. Body Worn Position with Plastic Holster

APPENDIX A - SAR MEASUREMENT DATA

APPENDIX B - SYSTEM PERFORMANCE CHECK

APPENDIX C – PROBE CALIBRATION CERTIFICATE

APPENDIX D – DIPOLE CALIBRATION CERTIFICATE

APPENDIX E - MEASURED FLUID DIELECTRIC PARAMETERS

APPENDIX F – PHANTOM CERTIFICATE OF CONFORMITY

