



# **SAR Evaluation Report**

**IN ACCORDANCE WITH THE REQUIREMENTS OF  
FCC OET BULLETIN 65 SUPPLEMENT C AND IC RSS-102**

**FOR**

**LINK WIRELESS TELEPHONE**

**MODELS: PTB400, PTB410, AND PTB450**

**FCC ID: IYGPTB400**

**REPORT NUMBER: 06U10635-1**

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**Revision History**

Rev.	Issued date	Revisions	Revised By
--	12-5-06	Initial issue	HS

**CERTIFICATE OF COMPLIANCE (SAR EVALUATION)****DATES OF TEST:** 11/30 – 12/04/2006

APPLICANT: ADDRESS:	SPECTRALINK CORPORATION 5755 CENTRAL AVENUE, BOULDER, COLORADO 80301, USA
FCC ID: MODEL:	ITYGPTB400 PTB400, PTB410 (with vibrator), and PTB450 (with vibrator and back-lit)
DEVICE CATEGORY: EXPOSURE CATEGORY:	Portable Device General Population/Uncontrolled Exposure

The EUT is a Cordless Phone That Operates at 900MHz band.

Test Sample is a:	Production Unit	
Rule Parts	Frequency Range [MHz]	The Highest SAR Values [1g]
FCC 15.247 & IC RSS-102	902 - 927MHz	Head: 0.065 mW/g Body: 0.022 mW/g

Testing has been carried out in accordance with:

**47CFR §2.1093** - Radiofrequency Radiation Exposure Evaluation: Portable Devices

**FCC OET Bulletin 65 (Edition 97-01), Supplement C (Edition 01-01)** - Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields

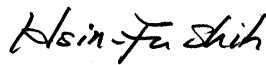
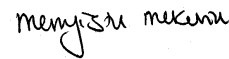
**RSS-102** - Evaluation Procedure for Mobile and Portable Radio Transmitters with Respect to Health Canada's Safety Code 6 for Exposure of Humans to Radio Frequency Fields

**IEEE 1528\_2003** - IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques

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 Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

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**1 EQUIPMENT UNDER TEST (EUT) DESCRIPTION**

The EUT is a Cordless Phone That Operates at 900MHz band.	
Model difference description:	The PTB400 is the basic phone, the PTB410 is a basic phone with a vibrator added, and the PTB450 is a basic phone with a vibrator and back-lit keypad added. There are no other differences between these models, same radio boards, same components, and same enclosures.
Normal operation:	Head and Body Position
Accessory:	Holster Manufactured by Company SpectraLink Corp. Model # PTO335
Earphone/Headset Jack:	Manufactured by Plantronics, Model # PTH100
Duty cycle:	10%
Power supply:	Nickel Metal Hydride Battery Manufactured by SpectraLink Corp., Model # PTS360

## 2 FACILITIES AND ACCREDITATION

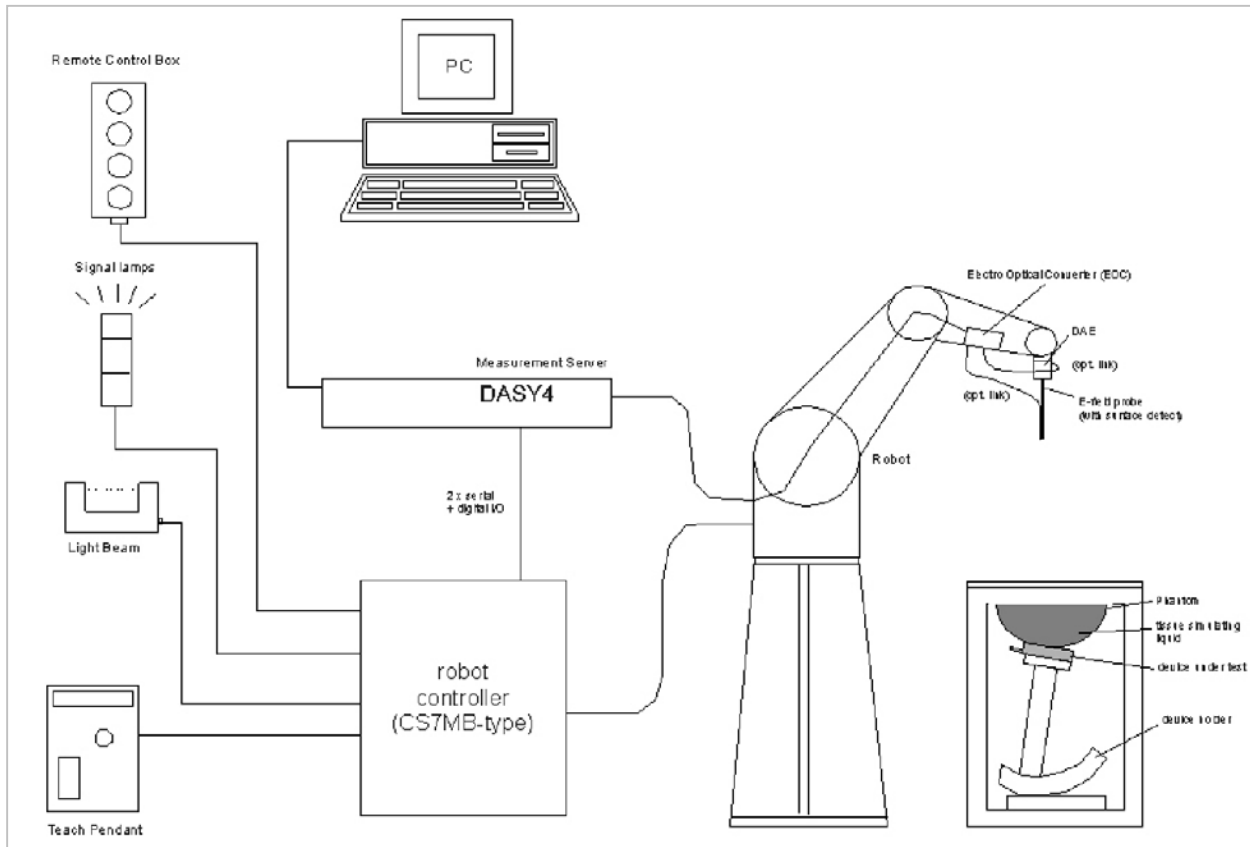
The test sites and measurement facilities used to collect data are located at 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.4, ANSI C63.7 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."



CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://www.ccsemc.com>.

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### 3 SYSTEM DESCRIPTION



#### 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.

### 3.1 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]

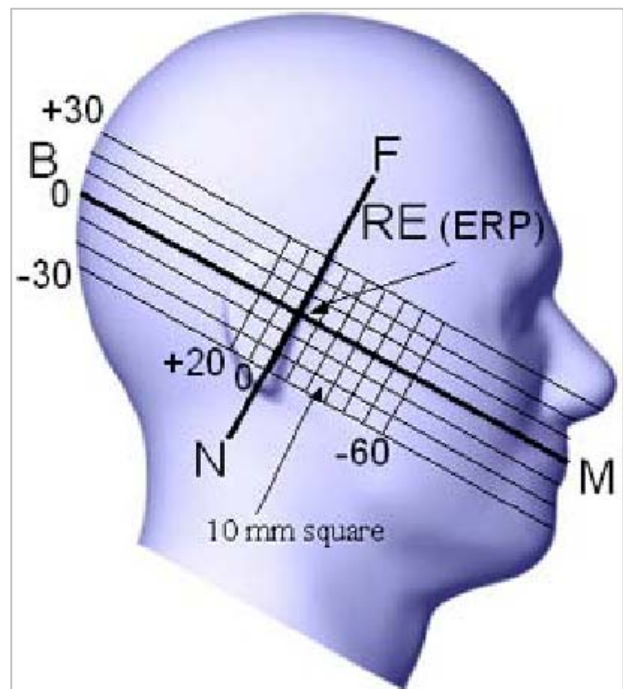
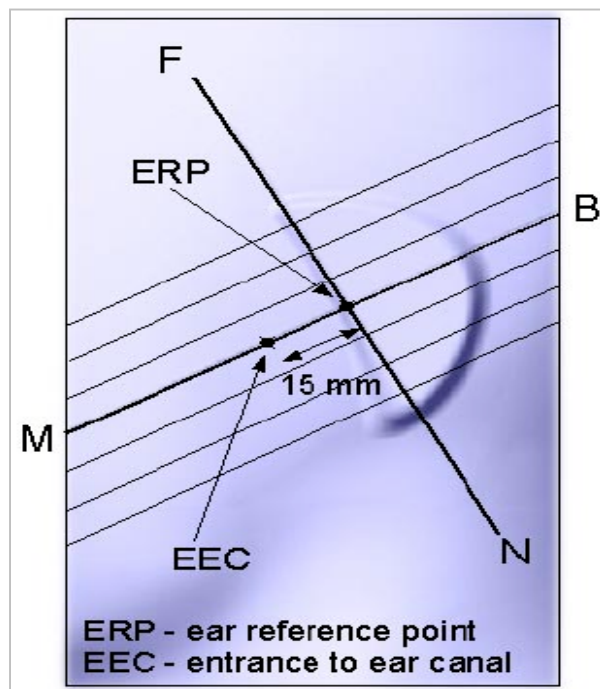
Triton X-100 (ultra pure): Polyethylene glycol mono [4-(1,1, 3, 3-tetramethylbutyl)phenyl]ether



**4 TEST POSITIONS FOR DEVICES OPERATING NEXT TO A PERSON’S EAR**

This category includes most wireless handsets with fixed, retractable or internal antennas located toward the top half of the device, with or without a foldout, sliding or similar keypad cover. The handset should have its earpiece located within the upper ¼ of the device, either along the centerline or off-centered, as perceived by its users. This type of handset should be positioned 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”. The “test device reference point” should be located at the same level as the center of the earpiece region. The “vertical centerline” should bisect the front surface of the handset at its top and bottom edges. A “ear reference point” is located on the outer surface of the head phantom on each ear spacer. It is located 1.5 cm above the center of the ear canal entrance in the “phantom reference plane” defined by the three lines joining the center of each “ear reference point” (left and right) and the tip of the mouth.

A handset should be initially positioned with the earpiece region pressed against the ear spacer of a head phantom. For the SCC-34/SC-2 head phantom, the device should be positioned parallel to the “N-F” line defined along the base of the ear spacer that contains the “ear reference point”. For interim head phantoms, the device should be positioned parallel to the cheek for maximum RF energy coupling. The “test device reference point” is aligned to the “ear reference point” on the head phantom and the “vertical centerline” is aligned to the “phantom reference plane”. This is called the “initial ear position”. While maintaining these three alignments, the body of the handset is gradually adjusted to each of the following positions for evaluating SAR:



#### 4.1 CHEEK/TOUCH POSITION

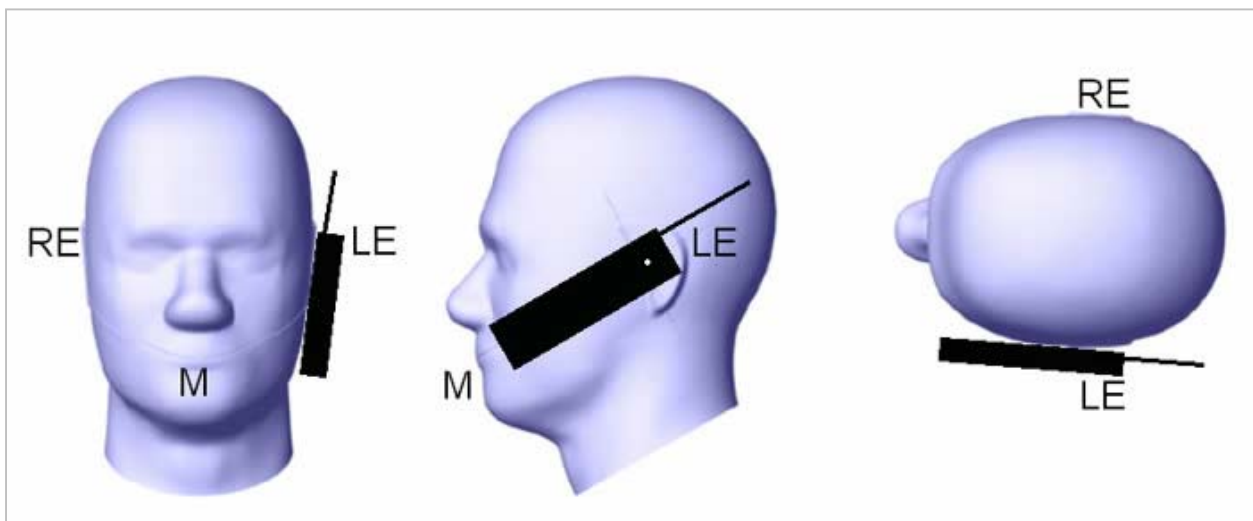
The device is brought toward the mouth of the head phantom by pivoting against the “ear reference point” or along the “N-F” line for the SCC-34/SC-2 head phantom.

This test position is established:

- i. When any point on the display, keypad or mouthpiece portions of the handset is in contact with the phantom.
- ii. (or) When any portion of a foldout, sliding or similar keypad cover opened to its intended self-adjusting normal use position is in contact with the cheek or mouth of the phantom.

For existing head phantoms – when the handset loses contact with the phantom at the pivoting point, rotation should continue until the device touches the cheek of the phantom or breaks its last contact from the ear spacer.

Cheek / Touch Position



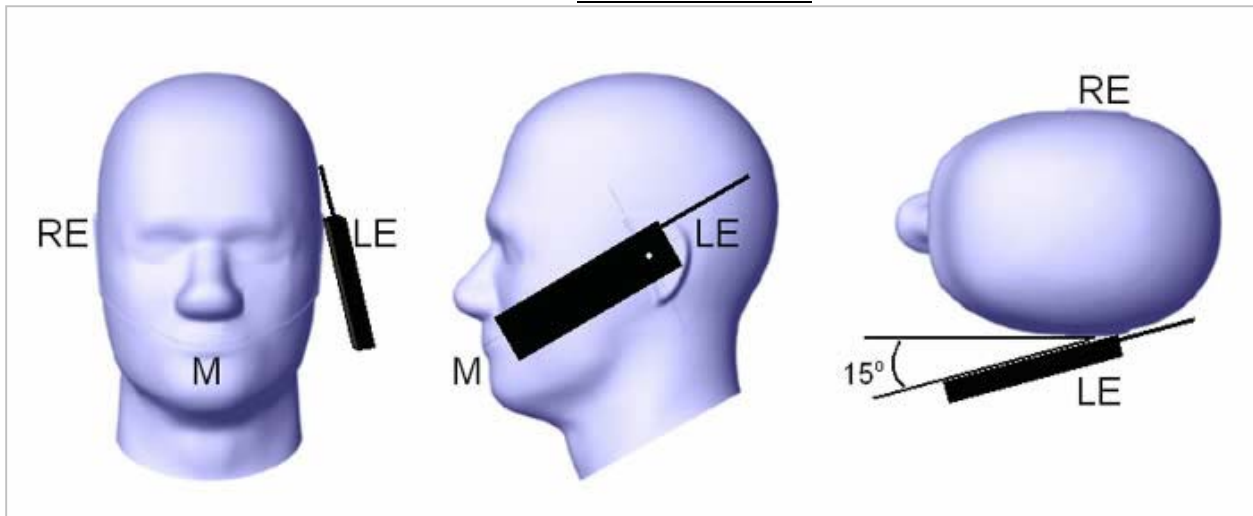
## 4.2 EAR/TILT POSITION

With the handset aligned in the “Cheek/Touch Position”:

- i. If the earpiece of the handset is not in full contact with the phantom's ear spacer (in the “Cheek/Touch position”) and the peak SAR location for the “Cheek/Touch” position is located at the ear spacer region or corresponds to the earpiece region of the handset, the device should be returned to the “initial ear position” by rotating it away from the mouth until the earpiece is in full contact with the ear spacer.
- ii. (otherwise) The handset should be moved (translated) away from the cheek perpendicular to the line passes through both “ear reference points” (note: one of these ear reference points may not physically exist on a split head model) for approximate 2-3 cm. While it is in this position, the device handset is tilted away from the mouth with respect to the “test device reference point” until the inside angle between the vertical centerline on the front surface of the phone and the horizontal line passing through the ear reference point is by  $15^\circ$ . After the tilt, it is then moved (translated) back toward the head perpendicular to the line passes through both “ear reference points” until the device touches the phantom or the ear spacer. If the antenna touches the head first, the positioning process should be repeated with a tilt angle less than  $15^\circ$  so that the device and its antenna would touch the phantom simultaneously. This test position may require a device holder or positioner to achieve the translation and tilting with acceptable positioning repeatability.

If a device is also designed to transmit with its keypad cover closed for operating in the head position, such positions should also be considered in the SAR evaluation. The device should be tested on the left and right side of the head phantom in the “Cheek/Touch” and “Ear/Tilt” positions. When applicable, each configuration should be tested with the antenna in its fully extended and fully retracted positions. These test configurations should be tested at the high, middle and low frequency channels of each operating mode; for example, AMPS, CDMA, and TDMA. If the SAR measured at the middle channel for each test configuration (left, right, Cheek/Touch, Tilt/Ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s). If the transmission band of the test device is less than 10 MHz, testing at the high and low frequency channels is optional.

Ear/Tilt  $15^\circ$  Position



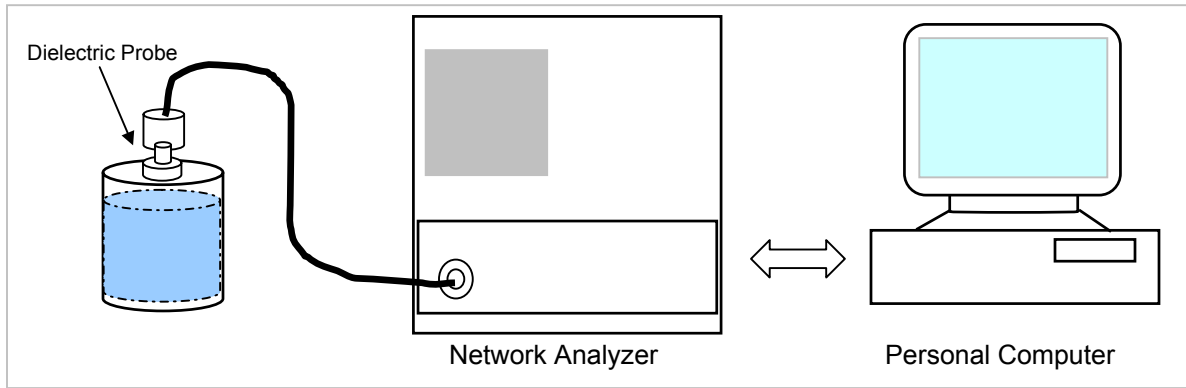
### 4.3 TEST POSITIONS FOR BODY-WORN AND OTHER SIMILAR CONFIGURATIONS

Without the belt-clips or holsters

Body-worn accessories may not always be supplied or available as options for some devices that are intended to be authorized for body-worn use. A separation distance of 1.5 cm between the back of the device and a flat phantom is recommended for testing body-worn SAR compliance under such circumstances. Other separation distances may be used, but they should not exceed 2.5 cm. In these cases, the device may use body-worn accessories that provide a separation distance greater than that tested for the device provided however that the accessory contains no metallic components.

**5 SIMULATING LIQUID PARAMETERS CHECK**

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



Set-up for liquid parameters check

**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	
	$\epsilon_r$	$\sigma$ (S/m)	$\epsilon_r$	$\sigma$ (S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
<b>900</b>	<b>41.5</b>	<b>0.97</b>	<b>55.0</b>	<b>1.05</b>
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800 – 2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95
3000	38.5	2.40	52.0	2.73
5800	35.3	5.27	48.2	6.00

( $\epsilon_r$  = relative permittivity,  $\sigma$  = conductivity and  $\rho = 1000 \text{ kg/m}^3$ )

5.1 SIMULATING LIQUID PARAMETER CHECK RESULT

Simulating Liquid Dielectric Parameters Check Result @ Head 900 MHz

Room Ambient Temperature =23 °C; Relative humidity = 35%

Measured by: Mengistu Mekuria

Simulating Liquid			Parameters		Measured	Target	Deviation (%)	Limit (%)	
f (MHz)	Temp. (°C)	Depth (cm)							
900	22	15	e'	40.3353	Relative Permittivity (e <sub>r</sub> ):	40.3353	41.5	-2.81	± 5
			e"	19.3835	Conductivity (σ):	0.97050	0.97	0.05	± 5

Liquid Check

Ambient temperature: 24.0 deg. C; Liquid temperature: 23.0 deg C

November 30, 2006 11:24 AM

Frequency	e'	e"
850000000.	40.8895	19.5709
860000000.	40.7680	19.5092
870000000.	40.6246	19.4657
880000000.	40.5092	19.4360
890000000.	40.3881	19.4092
<b>900000000.</b>	<b>40.3353</b>	<b>19.3835</b>
910000000.	40.2369	19.3618
920000000.	40.0916	19.3356
930000000.	39.9732	19.3219
940000000.	39.8319	19.2684
950000000.	39.7108	19.2389

The conductivity (σ) can be given as:

$$\sigma = \omega \epsilon_0 e'' = 2 \pi f \epsilon_0 e''$$

where  $f = \text{target } f * 10^6$

$\epsilon_0 = 8.854 * 10^{-12}$

Simulating Liquid Dielectric Parameters Check Result @ Head 900 MHz

Room Ambient Temperature =23 °C; Relative humidity =35%

Measured by: Mengistu Mekuria

Simulating Liquid			Parameters		Measured	Target	Deviation (%)	Limit (%)	
f (MHz)	Temp. (°C)	Depth (cm)							
900	22	15	e'	40.7498	Relative Permittivity (ε <sub>r</sub> ):	40.7498	41.5	-1.81	± 5
			e"	19.4452	Conductivity (σ):	0.97359	0.97	0.37	± 5

Liquid Check

Ambient temperature: 24.0 deg. C; Liquid temperature: 23.0 deg C

December 04, 2006 09:54 AM

Frequency	e'	e"
850000000.	41.3257	19.6455
860000000.	41.2189	19.5766
870000000.	41.0684	19.5221
880000000.	40.9608	19.4975
890000000.	40.8370	19.5087
<b>900000000.</b>	<b>40.7498</b>	<b>19.4452</b>
910000000.	40.6481	19.4071
920000000.	40.5513	19.3590
930000000.	40.4496	19.3331
940000000.	40.3233	19.3109
950000000.	40.2065	19.2774

The conductivity (σ) can be given as:

$$\sigma = \omega \epsilon_0 e'' = 2 \pi f \epsilon_0 e''$$

where  $f = \text{target } f * 10^6$

$$\epsilon_0 = 8.854 * 10^{-12}$$

Simulating Liquid Dielectric Parameters Check Result @ Muscle 900 MHz

Room Ambient Temperature = 23°C; Relative humidity = 35%

Measured by: Mengistu Mekuria

Simulating Liquid			Parameters		Measured	Target	Deviation (%)	Limit (%)	
f (MHz)	Temp. (°C)	Depth (cm)							
900	22	15	e'	53.6386	Relative Permittivity (ε <sub>r</sub> ):	53.6386	55.0	-2.48	± 5
			e"	20.3840	Conductivity (σ):	1.02059	1.05	-2.80	± 5

Liquid Check

Ambient temperature: 24.0 deg. C; Liquid temperature: 23.0 deg C

December 04, 2006 10:49 AM

Frequency	e'	e"
850000000.	54.0942	20.5242
860000000.	53.9866	20.4741
870000000.	53.8865	20.4331
880000000.	53.7917	20.4228
890000000.	53.7113	20.4389
<b>900000000.</b>	<b>53.6386</b>	<b>20.3840</b>
910000000.	53.5413	20.3501
920000000.	53.4476	20.3670
930000000.	53.3689	20.3474
940000000.	53.2346	20.3559
950000000.	53.1475	20.3459

The conductivity (σ) can be given as:

$$\sigma = \omega \epsilon_0 e'' = 2 \pi f \epsilon_0 e''$$

where  $f = target.f * 10^6$

$\epsilon_0 = 8.854 * 10^{-12}$



## 6 SYSTEM PERFORMANCE 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  $\pm 10\%$ .

### System Performance Check Measurement Conditions

- The measurements were performed in the flat section of the SAM twin phantom filled with Head simulating liquid of the following parameters.
- The DASY4 system with an Isotropic E-Field Probe EX3DV3-SN: 3531 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 5 x 5 x 7 fine cube was chosen for cube integration(dx=dy=7.5mm; dz=5mm).  
For 5 GHz band - Special 8x8x8 fine cube was chosen for cube integration(dx=dy=4.3mm; dz=3mm)
- Distance between probe sensors and phantom surface was set to 4 mm.  
For 5 GHz band - Distance between probe sensors and phantom surface was set to 2.0mm
- The dipole input power (forward power) was 250 mW $\pm 3\%$ .
- The results are normalized to 1 W input power.

### Reference SAR Values for body-tissue

IEEE Standard 1528-2003 Recommended Reference Value.

Frequency (MHz)	Distance (mm)	1g SAR [W/kg]	10g SAR [W/kg]
300	15	3.0	2.0
450	15	4.9	3.3
835	15	9.6	6.2
<b>900</b>	<b>15</b>	<b>10.8</b>	<b>6.9</b>
1450	10	29.0	16.0
1800	10	38.1	19.8
1900	10	39.7	20.5
2000	10	41.1	21.1
2450	10	52.4	24.0
3000	10	63.8	25.7

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

**6.1 SYSTEM PERFORMANCE CHECK RESULTS**

**System Validation Dipole: D900V2 SN: 108**

Date: November, 30, 2006

Room Ambient Temperature =23 °C; Relative humidity = 35%

Measured by: Mengistu Mekuria

Head Simulating Liquid			SAR (mW/g)		Normalized to 1 W	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)						
900	22	15	1g	2.57	10.28	10.8	-4.81	± 10
			10g	1.65	6.6	6.9	-4.35	± 10

Date: December 4, 2006

Room Ambient Temperature =23 °C; Relative humidity =35%

Measured by: Mengistu Mekuria

Head Simulating Liquid			SAR (mW/g)		Normalized to 1 W	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)						
900	22	15	1g	2.56	10.24	10.8	-5.19	± 10
			10g	1.64	6.56	6.9	-4.93	± 10

## 7 SAR MEASUREMENT PROCEDURE

A summary of the procedure follows:

- a) A measurement of the SAR value at a fixed location is used as a reference value for assessing the power drop of the EUT. The SAR at this point is measured at the start of the test, and then again at the end of the test.
- b) The SAR distribution at the exposed flat section of the flat phantom is measured at a distance of 4 mm from the inner surface of the shell. The area covers the entire dimension of the EUT and the horizontal grid spacing is 15 mm x 15 mm. Based on this data, the area of the maximum absorption is determined by Spline interpolation. The first Area Scan covers the entire dimension of the EUT to ensure that the hotspot was correctly identified.

For 5 GHz band - The SAR distribution at the exposed flat section of the flat phantom is measured at a distance of 2.0 mm from the inner surface of the shell. The area covers the entire dimension of the EUT and the horizontal grid spacing is 10 mm x 10 mm. Based on this data, the area of the maximum absorption is determined by Spline interpolation. The first Area Scan covers the entire dimension of the EUT to ensure that the hotspot was correctly identified.

- c) Around this point, a volume of X=Y= 30 and Z=21 mm is assessed by measuring 5 x 5 x 7 mm points. On the basis of this data set, the spatial peak SAR value is evaluated with the following procedure:

For 5 GHz band - Around this point, a volume of X=Y=Z=30 mm is assessed by measuring 7 x 7 x 9 mm points. On the basis of this data set, the spatial peak SAR value is evaluated with the following procedure:

- (i) The data at the surface are extrapolated, since the centre of the dipoles is 1.2 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.3 mm. The extrapolation is based on a least square algorithm. A polynomial of the fourth order is calculated through the points in z-axes. This polynomial is then used to evaluate the points between the surface and the probe tip.
- (ii) The maximum interpolated value is searched with a straightforward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1 g and 10 g) are computed using the 3D-Spline interpolation algorithm. The 3D-Spline is composed of three one-dimensional splines with the "Not a knot"- condition (in x, y and z-direction). The volume is integrated with the trapezoidal – algorithm. One thousand points (10 x 10 x 10) are interpolated to calculate the averages.
- (iii) All neighbouring volumes are evaluated until no neighbouring volume with a higher average value is found.
- (iv) The SAR value at the same location as in Step (a) is again measured to evaluate the actual power drift.

## 7.1 DASY4 SAR MEASUREMENT PROCEDURE

### Step 1: Power Reference Measurement

The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The Minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. The minimum distance of probe sensors to surface is 2.1 mm. This distance cannot be smaller than the Distance of sensor calibration points to probe tip as defined in the probe properties (for example, 1.2 mm for an EX3DV3 probe type).

### Step 2: Area Scan

The Area Scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASY4 software can find the maximum locations even in relatively coarse grids. When an Area Scan has measured all reachable points, it computes the field maximal found in the scanned area, within a range of the global maximum. The range (in dB) is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE Standard 1528, EN 50361 and IEC 62209 standards, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan). If only one Zoom Scan follows the Area Scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of Zoom Scans has to be increased accordingly.

### Step 3: Zoom Scan

Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The Zoom Scan measures 5 x 5 x 7 points within a cube whose base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the Zoom Scan evaluates the averaged SAR for 1 g and 10 g and displays these values next to the job's label.

For 5 GHz band – Same as above except the Zoom Scan measures 7 x 7 x 9 points.

### Step 4: Power drift measurement

The Power Drift Measurement measures the field at the same location as the most recent power reference measurement within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the last Power Reference Measurement. This allows a user to monitor the power drift of the device under test within a batch process. The measurement procedure is the same as Step 1.

### Step 5: Z-Scan

The Z Scan measures points along a vertical straight line. The line runs along the Z-axis of a one-dimensional grid. In order to get a reasonable extrapolation, the extrapolated distance should not be larger than the step size in Z-direction.

## 8 PROCEDURE USED TO ESTABLISH TEST SIGNAL

The following procedures had been used to prepare the EUT for the SAR test.



The client provided cordless phones programmed to transmit at low, middle and high channel with maximum output power.

### 900MHz Band


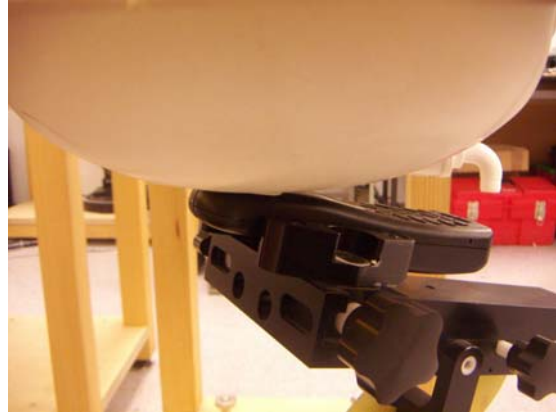
Channel	Frequency (MHz)	Power (dBm)
Low	902.4449	20.6
Middle	914.7314	20.6
High	926.9845	20.2

**9 SAR MEASUREMENT RESULTS**

**9.1 LEFT HAND SIDE**

					
Touch Position	Tilt (15°) Position				
<b>900MHz band</b>					
Test Position	Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated1) SAR 1g (mW/g)
Touch	<b>Low</b>	<b>902.5</b>	<b>0.063</b>	<b>-0.142</b>	<b>0.065</b>
	Middle	914.7	0.041	-0.160	0.043
	High	927.0	0.031	-0.196	0.032
Tilt (15°)	Low	902.5	0.022	0.000	0.022
	Middle	914.7			
	High	927.0			
Notes:					
1) The exact method of extrapolation is $\text{Measured SAR} \times 10^{(-\text{drift}/10)}$ . The SAR reported at the end of the measurement process by the DASY4 system can be scaled up by the Power drift to determine the SAR at the beginning of the measurement process.					
2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional.					
3) Please see attachments for the detailed measurement data and plots showing the maximum SAR location of the EUT.					
4) The battery was fully charged in accordance with manufacture's instructions prior to SAR measurements.					

**9.2 RIGHT HAND SIDE**

					
Touch Position	Tilt (15°) Position				
<b>900MHz band</b>					
Test Position	Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated1) SAR 1g (mW/g)
Touch	Low	902.5	0.039	-0.138	0.040
	Middle	914.7			
	High	927.0			
Tilt (15°)	Low	902.5	0.015	-0.111	0.016
	Middle	914.7			
	High	927.0			
Notes:					
1) The exact method of extrapolation is $\text{Measured SAR} \times 10^{(-\text{drift}/10)}$ . The SAR reported at the end of the measurement process by the DASY4 system can be scaled up by the Power drift to determine the SAR at the beginning of the measurement process.					
2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional.					
3) Please see attachments for the detailed measurement data and plots showing the maximum SAR location of the EUT.					
4) The battery was fully charged in accordance with manufacture's instructions prior to SAR measurements..					

**9.3 BODY POSITION WITH HOLSTER**



**900MHz band**

Test Position	Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated <sup>1)</sup> SAR 1g (mW/g)
Body Position with Holster	Low	902.5	0.022	0.005	0.022
	Middle	914.7			
	High	927.0			

Notes:

- 1) The exact method of extrapolation is  $\text{Measured SAR} \times 10^{(-\text{drift}/10)}$ . The SAR reported at the end of the measurement process by the DASY4 system can be scaled up by the Power drift to determine the SAR at the beginning of the measurement process.
- 2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional.
- 3) Please see attachments for the detailed measurement data and plots showing the maximum SAR location of the EUT.
- 4) The battery was fully charged in accordance with manufacture's instructions prior to SAR measurements.



**10 MEASUREMENT UNCERTAINTY**

**10.1 MEASUREMENT UNCERTAINTY FOR 300 MHz – 3000 MHz**

Uncertainty component	Tol. (±%)	Probe Dist.	Div.	Ci (1g)	Ci (10g)	Std. Unc.(±%)	
						Ui (1g)	Ui(10g)
<b>Measurement System</b>							
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 Mechanical 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
Extrapolation, interpolation, and integration algorithms for max. SAR evaluation	3.90	R	1.732	1	1	2.25	2.25
<b>Test sample Related</b>							
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
<b>Phantom and Tissue Parameters</b>							
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
<b>Combined Standard Uncertainty</b>			RSS			11.44	10.49
<b>Expanded Uncertainty (95% Confidence Interval)</b>			K=2			22.87	20.98
Notes for table							
1. Tol. - tolerance in influence quantity							
2. N - Nomal							
3. R - Rectangular							
4. Div. - Divisor used to obtain standard uncertainty							
5. Ci - is te sensitivity coefficient							

**11 EQUIPMENT LIST AND CALIBRATION**

<u>Name of Equipment</u>	<u>Manufacturer</u>	<u>Type/Model</u>	<u>Serial Number</u>	<u>Cal. Due date</u>
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
S-Parameter Network Analyzer	Agilent	8753ES-6	US39173569	2/9/07
Electronic Probe kit	Hewlett Packard	85070C	N/A	N/A
E-Field Probe	SPEAG	EX3DV4	3552	5/30/07
Thermometer	ERTCO	639-1S	1718	1/11/07
SAM Phantom (SAM1)	SPEAG	TP-1185	QD000P40CA	N/A
SAM Phantom (SAM2)	SPEAG	TP-1015	N/A	N/A
Data Acquisition Electronics	SPEAG	DAE4	558	1/20/07
System Validation Dipole	SPEAG	D900V2	108	2/22/08
Power Meter	Giga-tronics	8651A	8651404	12/27/06
Power Sensor	Giga-tronics	80701A	1834588	12/27/07
Amplifier	Mini-Circuits	ZVE-8G	0360	N/A
Amplifier	Mini-Circuits	ZHL-42W	D072701-5	N/A
Radio Communication Tester	Rohde & Schwarz	CMU 200	838114/032	3/21/07
Simulating Liquid	CCS	H900	N/A	Within 24 hrs of first test
Simulating Liquid	CCS	M900	N/A	Within 24 hrs of first test

12 PHOTOS

DUT



DUT

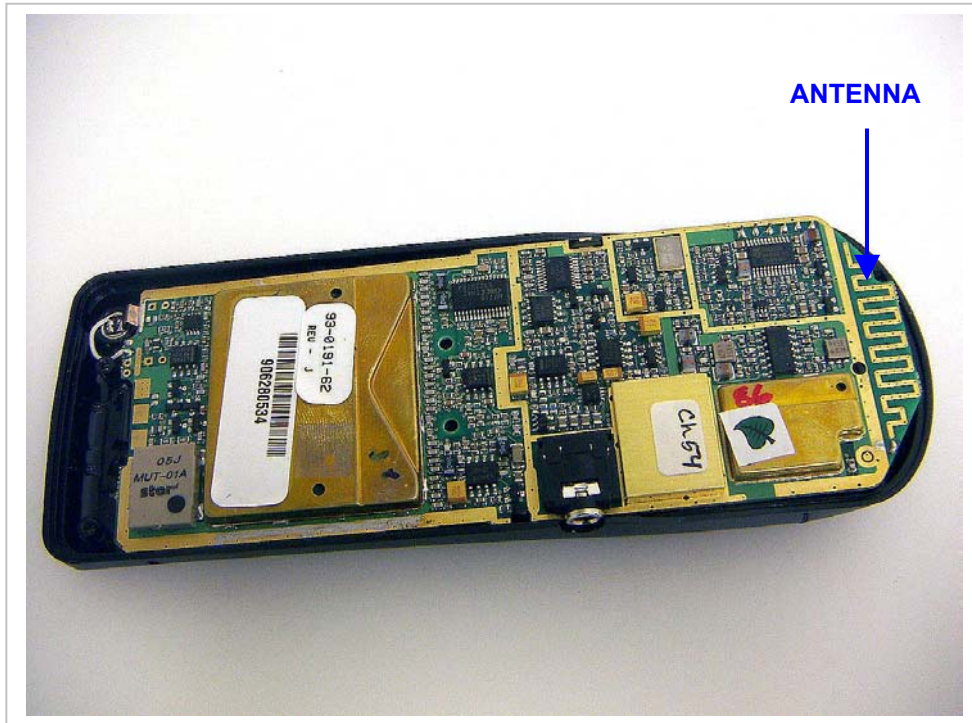


**DUT with HOLSTER**





**ANTENNA LOCATION**



**13 ATTACHMENTS**

<b>No.</b>	<b>Contents</b>	<b>No. Of Pages</b>
1	System Performance Check Plots	4
2	SAR Test Plots	9
3	Certificate of E-Field Probe - EXDV4SN3552	9
4	Certificate of System Validation Dipole - D900V2 SN:108	9

**END OF REPORT**