SAR Evaluation Report

IN ACCORDANCE WITH THE REQUIREMENTS OF
FCC OET BULLETIN 65 SUPPLEMENT C
IC RSS 102 ISSUE 1 : 1999
AUSTRALIAN COMMUNICATIONS AUTHORITY (ACA) STANDARD "RADIOCOMMUNICATIONS (ELECTROMAGNETIC RADIATION-HUMAN EXPOSURE) STANDARD 2003", SCHEDULE 1 AND SCHEDULE 2
NEW ZEALAND STANDARD NZS 2772: PART 1: 1999

FOR

802.11BG COMPACT FLASH CARD INSTALLED IN 700C HANDHELD COMPUTER

MODEL: DRCB

FCC ID: EHADRCB

REPORT NUMBER: 06U10438-1

ISSUE DATE: JULY 25, 2006

Prepared for

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LAB CODE:200065-0

Revision History

Rev.	Issued date	Revisions	Revised By
--	July 25, 2006	Initial issue	HS

CERTIFICATE OF COMPLIANCE (SAR EVALUATION)

DATES OF TEST: July 21 and 24, 2006

APPLICANT: ADDRESS:	Intermec Technologies Corporation 550 Second Street SE, Cedar Rapids, IA 52401, United States
FCC ID: MODEL:	EHADRCB DRCB
DEVICE CATEGORY: EXPOSURE CATEGORY:	Portable Device General Population/Uncontrolled Exposure

802.11b/g transceiver is Installed in 700C Handheld Computer, including co-location with BTS080 Bluetooth radio and EM3420 CDMA module.

Test Sample is a:	Production unit		
Rule Parts	Frequency Range [MHz]	The Highest SAR Values [1g_mW/g]	Collocation SAR Values [1g_mW/g]
FCC 15.247 RSS102 AS/NZS	2412 - 2462	Body worn 1g: 0.021 Body worn 10g: 0.009 Head Positions 1g: 0.089 Head Positions 10g: 0.051	Body worn 1g: 0.384 Body worn 10g: 0.264 Head Positions 1g: 0.391 Head Positions 10g: 0.236

This wireless portable device has been shown to be capable of compliance for localized specific absorption rate (SAR) for General Population/Uncontrolled Exposure limits specified in ANSI/IEEE Std. C95.1-1992 and had been tested in accordance with the measurement procedures specified in FCC OET 65 Supplement C (Edition 01-01) and RSS 102.

This wireless portable device has been shown to be capable of compliance for localized specific absorption rate (SAR) for General Population limits specified in the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) standard and had been tested in accordance with the measurement procedures specified in Australian Communications Authority (ACA) standard “Radiocommunications (Electromagnetic Radiation-Human Exposure) Standard 2003”, Schedule 1 and Schedule 2 and New Zealand Standard “NZS 2772: Part 1: 1999”.

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.

Approved & Released For CCS By:

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Compliance Certification Services

Tested By:

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EMC Engineer
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1 EQUIPMENT UNDER TEST (EUT) DESCRIPTION

802.11b/g transceiver is Installed in 700C Handheld Computer, including co-location with BTS080 Bluetooth radio and EM3420 CDMA module.	
Normal operation:	Worn on body and head positions.
Accessory:	Holsters: 815-047-001, 815-047-002 Belt Clip: 805-612-001
Duty cycle:	98% for b mode 51% for g mode
Power supply:	7.2V, 17.3WH Lithium Ion Battery Pack

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."

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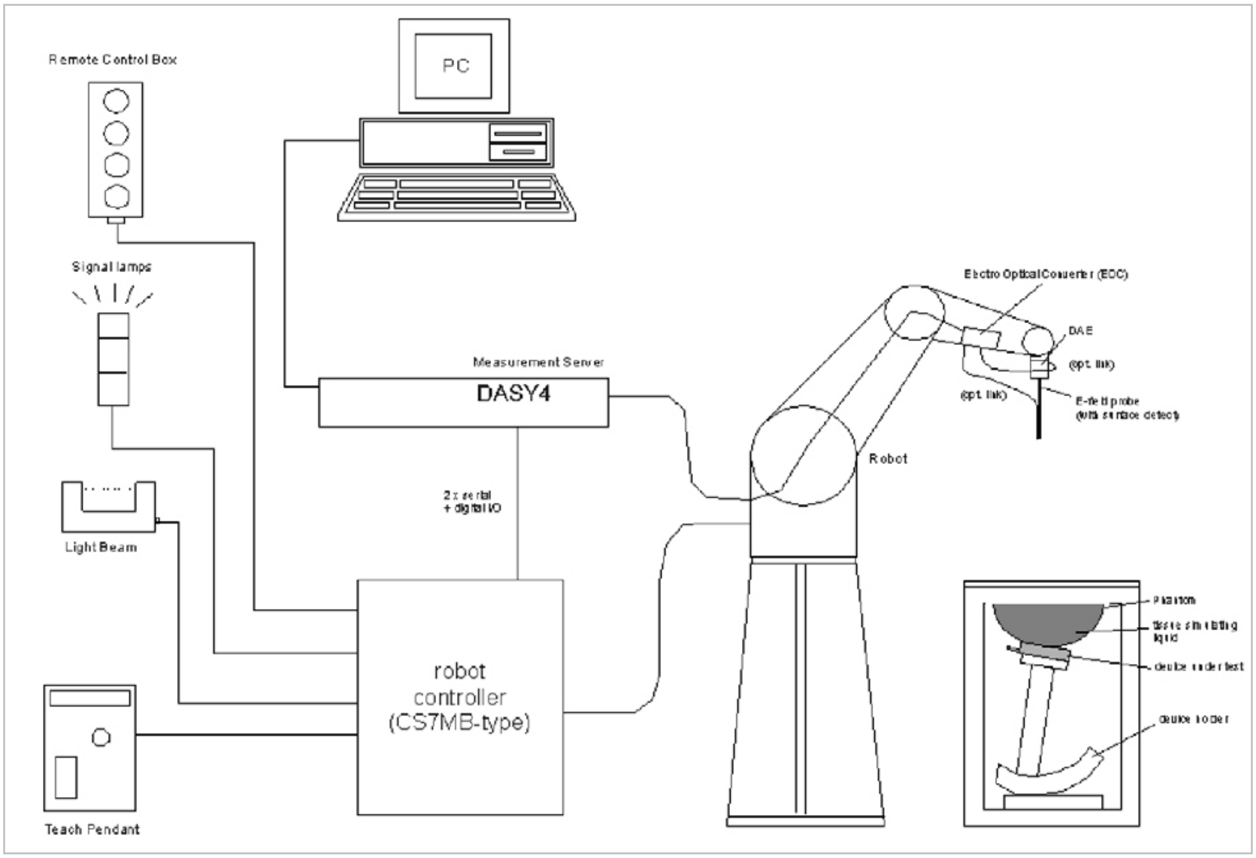
LAB CODE:200065-0

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

No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

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 SIMULATIG 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.

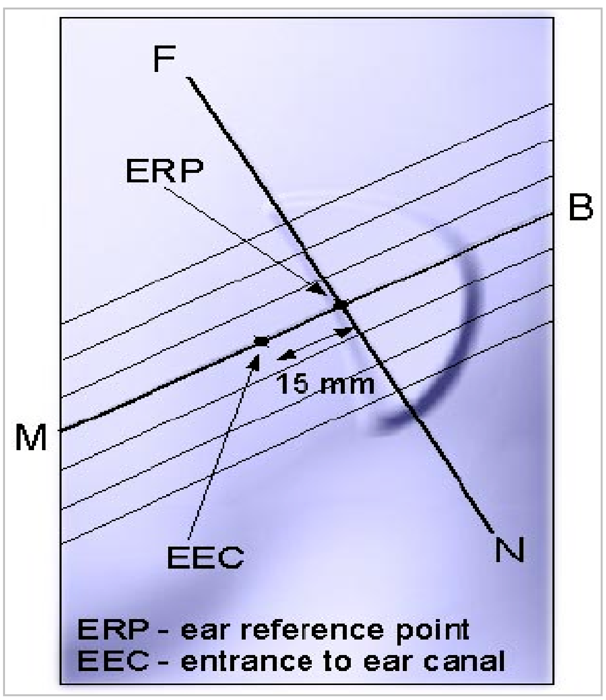
Ingredients (% by weight)	Frequency (MHz)									
	450		835		915		1900		2450	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	41.45	52.4	41.05	56.0	54.9	40.4	62.7	73.2
Salt (NaCl)	3.95	1.49	1.45	1.4	1.35	0.76	0.18	0.5	0.5	0.04
Sugar	56.32	46.78	56.0	45.0	56.5	41.76	0.0	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

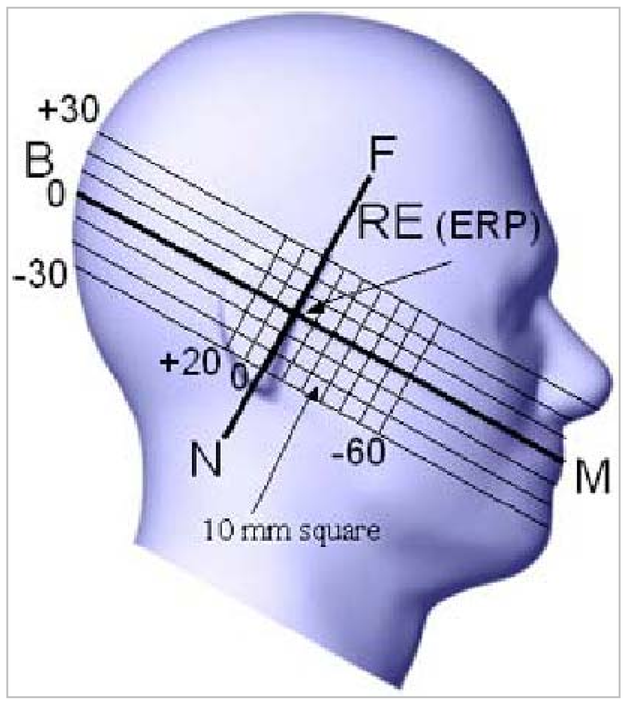
Salt: 99+% Pure Sodium Chloride Sugar: 98+% Pure Sucrose
Water: De-ionized, 16 MΩ+ resistivity HEC: Hydroxyethyl Cellulose
DGBE: 99+% Di(ethylene glycol) butyl ether, [2-(2-butoxyethoxy)ethanol]
Triton X-100 (ultra pure): Polyethylene glycol mono [4-(1,1, 3, 3-tetramethylbutyl)phenyl]ether

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

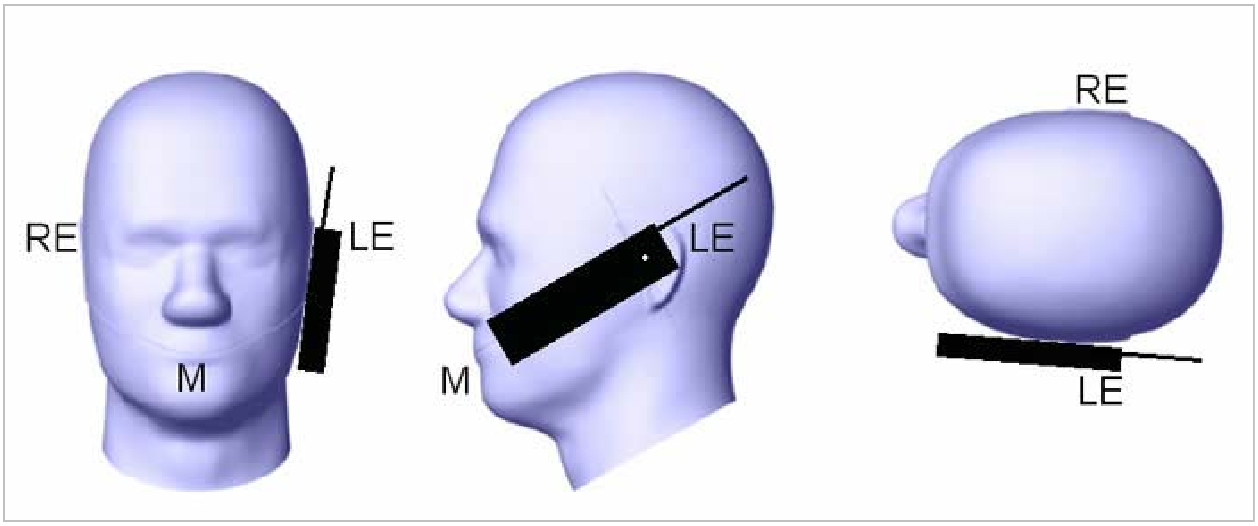
The device is brought toward the mouth of the head phantom by pivoting against the “ear reference point” or along the “N-F” line for the SCC-34/SC-2 head phantom.

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

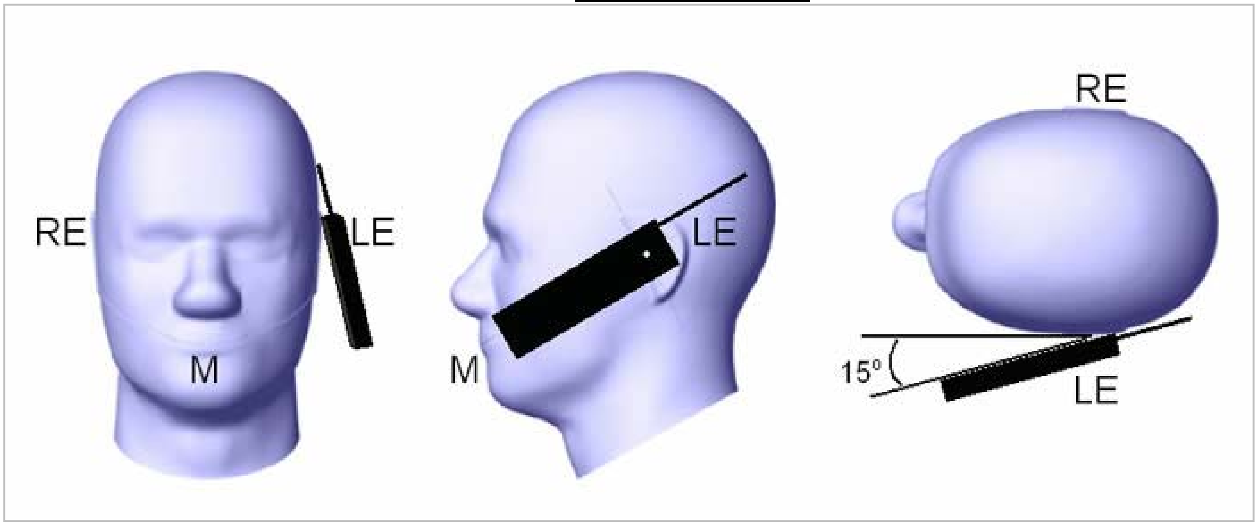
With the handset aligned in the "Cheek/Touch Position":

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 isby 15°. 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° 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, Tile/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.

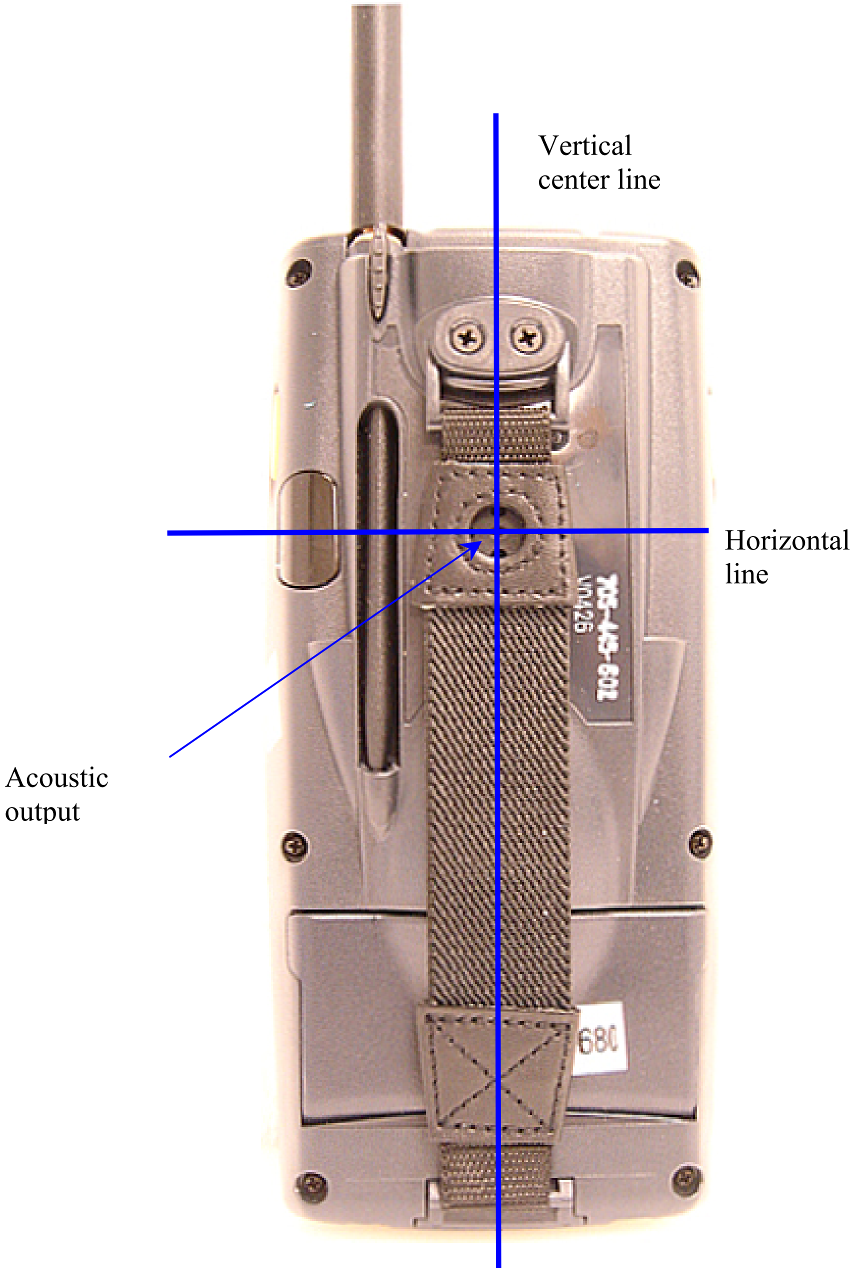
Ear/Tilt 15° Position



4.3 TEST POSITIONS FOR BODY-WORN AND OTHER SIMILAR CONFIGURATIONS

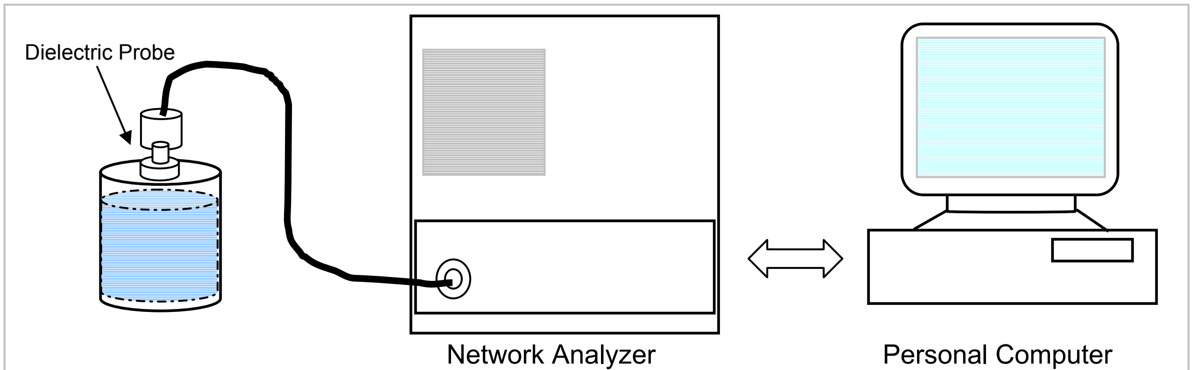
Without the belt-clips or holsters

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.


Vertical
center line
Horizontal
line
Acoustic
output

5 SIMULATING 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.



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	
	ε_r	σ (S/m)	ε_r	σ (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
900	41.5	0.97	55.0	1.05
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

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

Simulating Liquid Dielectric Parameter Check Result @ Head 2450 MHz

Room Ambient Temperature = 23°C; Relative humidity =45% Measured by: Ninous Davoudi

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
2450	22	15	e'	39.3541	Relative Permittivity (ε_r):	39.3541	39.2	0.39	± 5
			e"	13.7627	Conductivity (σ):	1.87581	1.80	4.21	± 5

Liquid Check
Ambient temperature: 23.0 deg. C; Liquid temperature: 22.0 deg C
July 24, 2006 09:55 AM

Frequency	e'	e"
2400000000.	39.5774	13.6302
2410000000.	39.5249	13.6356
2420000000.	39.4904	13.6514
2430000000.	39.4456	13.6905
2440000000.	39.4048	13.7264
2450000000.	39.3541	13.7627
2460000000.	39.3495	13.8188
2470000000.	39.3278	13.8701
2480000000.	39.2989	13.9053
2490000000.	39.2393	13.9590
2500000000.	39.1927	13.9651

The conductivity (σ) can be given as:

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

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

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

Simulating Liquid Dielectric Parameter Check Result @ Muscle 2450 MHz

Room Ambient Temperature = 23°C; Relative humidity = 50% Measured by: Ninous Davoudi

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
2450	22	15	e'	50.4589	Relative Permittivity (ϵ_r):	50.4589	52.7	-4.25	± 5
			e"	14.6243	Conductivity (σ):	1.99324	1.95	2.22	± 5

Liquid Check
Ambient temperature: 23.0 deg. C; Liquid temperature: 22.0 deg C
July 21, 2006 08:17 AM

Frequency	e'	e"
2400000000.	50.6440	14.4235
2410000000.	50.5963	14.4476
2420000000.	50.5751	14.4986
2430000000.	50.5340	14.5378
2440000000.	50.4920	14.5751
2450000000.	50.4589	14.6243
2460000000.	50.4117	14.6548
2470000000.	50.3849	14.6977
2480000000.	50.3388	14.7356
2490000000.	50.3030	14.7836
2500000000.	50.2774	14.8415

The conductivity (σ) can be given as:

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

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

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

Simulating Liquid Dielectric Parameter Check Result @ Muscle 2450 MHz

Room Ambient Temperature = 23°C; Relative humidity = 45% Measured by: Ninous Davoudi

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
2450	22	15	e'	50.9393	Relative Permittivity (ε_r):	50.9393	52.7	-3.34	± 5
			e"	14.9440	Conductivity (σ):	2.03682	1.95	4.45	± 5

Liquid Check
Ambient temperature: 23.0 deg. C; Liquid temperature: 22.0 deg C
July 24, 2006 09:08 AM

Frequency	e'	e"
2400000000.	51.1385	14.7563
2410000000.	51.1035	14.7742
2420000000.	51.0631	14.8138
2430000000.	51.0319	14.8688
2440000000.	50.9997	14.9035
2450000000.	50.9393	14.9440
2460000000.	50.9330	14.9852
2470000000.	50.8981	15.0439
2480000000.	50.8741	15.0862
2490000000.	50.8212	15.1427
2500000000.	50.7758	15.1536

The conductivity (σ) can be given as:

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

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

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

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 ±10%.

System Performance Check Measurement Conditions

- The measurements were performed in the flat section of the SAM twin phantom filled with Body 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±3%.
- The results are normalized to 1 W input power.

Reference SAR Values for body-tissue

In the table below, the numerical reference SAR values of a SPEAG validation dipoles placed below the flat phantom filled with body-tissue simulating liquid are given. The reference SAR values were calculated using the finite-difference time-domain method and the geometry parameters.

Dipole Type	Distance (mm)	Frequency (MHz)	SAR (1g) [W/kg]	SAR (10g) [W/kg]	SAR (peak) [W/kg]
D450V2	15	450	5.01	3.36	7.22
D835V2	15	835	9.71	6.38	14.1
D900V2	15	900	11.1	7.17	16.3
D1450V2	10	1450	29.6	16.6	49.8
D1800V2	10	1800	38.5	20.3	67.5
D1900V2	10	1900	39.8	20.8	69.6
D2000V2	10	2000	40.9	21.2	71.5
D2450V2	10	2450	51.2	23.7	97.6

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

System Validation Dipole: D2450V2 SN: 706

Date: July 21, 2006

Room Ambient Temperature = 23°C; Relative humidity = 50% Measured by: Ninous Davoudi

Body Simulating Liquid			SAR (mW/g)		Normalized to 1 W	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)						
2450	22	15	1g	12.90	51.6	51.2	0.78	± 10
			10g	5.87	23.48	23.7	-0.93	± 10

Date: July 24, 2006

Room Ambient Temperature = 23°C; Relative humidity = 45% Measured by: Ninous Davoudi

Body Simulating Liquid			SAR (mW/g)		Normalized to 1 W	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)						
2450	22	15	1g	13.10	52.4	51.2	2.34	± 10
			10g	6	24	23.7	1.27	± 10

7 SAR MEASURMENT 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 8 x 8 x 8 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 MEASURMENT 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 8 x 8 x 8 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 a special driver and program, FCCTest Utility version 1.01, which enable a user to control the power, frequency and mode.

The cable assembly insertion loss of 20.7dB (including 20.2 dB pad and 0.7 dB cable & connectors) was entered as an offset in the power meter to allow for direct reading of power.

b mode

Channel	Frequency (MHz)	Average Power (dBm)
Low	2412	15.2
Middle	2437	15.1
High	24.62	15.0

g mode

Channel	Frequency (MHz)	Average Power (dBm)
Low	2412	11.1
Middle	2437	11.2
High	24.62	11.1

9 SAR MEASURMENT RESULTS

9.1 BODY WORN

9.1.1 HOLSTER 1

802.11b (1Mbps)				
Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1] SAR 1g (mW/g)
1 6 11	2412 2437 2462	0.012	-0.140	0.012
802.11g (6 Mbps)				
Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1] SAR 1g (mW/g)
1 6 11	2412 2437 2462	0.004	-0.150	0.004

Wireless Module	f (MHz)	Measured SAR 1g (mW/g)	10g(Mw/g)	Power Drift (dB)	Extrapolated1) SAR 1g (mW/g)	Extrapolated1) SAR 10g (mW/g)
Bluetooth	2441	0.007	0.002	-0.201	0.007	0.003
CDMA	824.7	0.360	0.253	-0.057	0.365	0.256
WLAN	2437	0.012	0.005	-0.140	0.012	0.005
				Total SAR	**0.384**	**0.264**

Notes:

1) The exact method of extrapolation is Measured SAR x 10^(-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) Collocation with BTS080 Bluetooth module FCC ID: EHABTS080 and EM3420 CDMA module FCC ID: EHAEM3420 (See attachments and for more information see CCS project 053344-1).

9.1.2 HOLSTER 2

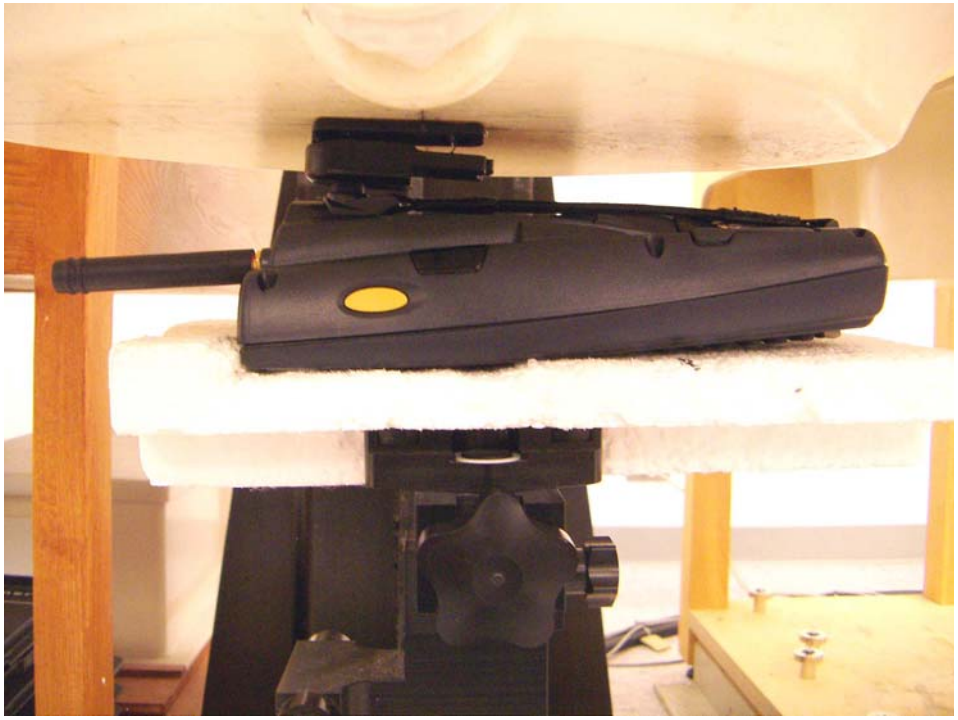
802.11b (1Mbps)				
Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
1	2412			
6	2437	0.021	0.000	**0.021**
11	2462			
802.11g (6 Mbps)				
Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
1	2412			
6	2437	0.010	0.000	0.010
11	2462			

Wireless Module	f (MHz)	Measured SAR 1g (mW/g)	10g(Mw/g)	Power Drift (dB)	Extrapolated1) SAR 1g (mW/g)	Extrapolated1) SAR 10g (mW/g)
Bluetooth	2441	0.004	0.001	-0.139	0.004	0.001
CDMA	824.7	0.263	0.176	-0.216	0.276	0.185
WLAN	2437	0.021	0.009	0.000	0.021	0.009
				Total SAR	0.301	0.196

Notes:

1) The exact method of extrapolation is Measured SAR x 10^(-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) Collocation with BTS080 Bluetooth module FCC ID: EHABTS080 and EM3420 CDMA module FCC ID: EHAEM3420 (See attachments and for more information see CCS project 053344-1).

9.1.3 BELT CLIP



802.11b (1Mbps)				
Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
1	2412			
6	2437	0.014	-0.129	0.014
11	2462			
802.11g (6 Mbps)				
Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
1	2412			
6	2437	0.008	0.000	0.008
11	2462			

Wireless Module	f (MHz)	Measured SAR 1g (mW/g)	Measured SAR 10g(Mw/g)	Power Drift (dB)	Extrapolated1) SAR 1g (mW/g)	Extrapolated1) SAR 10g (mW/g)
Bluetooth	2441	0.009	0.004	-0.277	0.009	0.004
CDMA	1880	0.160	0.076	-0.113	0.164	0.078
WLAN	2437	0.014	0.007	-0.129	0.014	0.007
				Total SAR	0.188	0.089

Notes:

1) The exact method of extrapolation is Measured SAR x 10^(-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) Collocation with BTS080 Bluetooth module FCC ID: EHABTS080 and EM3420 CDMA module FCC ID: EHAEM3420 (See attachments and for more information see CCS project 053344-1).

9.2 HEAD POSITIONS

9.2.1 LEFT TILT

802.11b (1Mbps)				
Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
1	2412	0.072	-0.169	0.075
6	2437	0.089	0.000	**0.089**
11	2462	0.067	0.000	0.067
802.11g (6 Mbps)				
Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
1	2412			
6	2437	0.028	0.000	0.028
11	2462			

Wireless Module	f (MHz)	Measured SAR 1g (mW/g)	Measured SAR 10g(Mw/g)	Power Drift (dB)	Extrapolated1) SAR 1g (mW/g)	Extrapolated1) SAR 10g (mW/g)
Bluetooth	2441	0.004	0.002	-0.252	0.004	0.002
CDMA	1880	0.189	0.122	-0.064	0.192	0.124
WLAN	2437	0.089	0.051	0.000	0.089	0.051
				Total SAR	0.285	0.177

Notes:

1) The exact method of extrapolation is Measured SAR x 10^(-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) Collocation with BTS080 Bluetooth module FCC ID: EHABTS080 and EM3420 CDMA module FCC ID: EHAEM3420 (Please attachments and for more information see CCS project 053344-1).

9.2.2 RIGHT TILT

802.11b (1Mbps)				
Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
1 6 11	2412 2437 2462	0.081	0.000	0.081
802.11g (6 Mbps)				
Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
1 6 11	2412 2437 2462	0.035	0.000	0.035

Wireless Module	f (MHz)	Measured SAR 1g (mW/g)	Measured SAR 10g(Mw/g)	Power Drift (dB)	Extrapolated1) SAR 1g (mW/g)	Extrapolated1) SAR 10g (mW/g)
Bluetooth	2441	0.004	0.002	-0.137	0.004	0.002
CDMA	1880	0.304	0.189	-0.033	0.306	0.190
WLAN	2437	0.081	0.044	0.000	0.081	0.044
				Total SAR	**0.391**	**0.236**

Notes:

1) The exact method of extrapolation is Measured SAR x 10^(-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) Collocation with BTS080 Bluetooth module FCC ID: EHABTS080 and EM3420 CDMA module FCC ID: EHAEM3420 (Please attachments and for more information see CCS project 053344-1).

10 MEASURMENT UNCERTAINTY

10.1 MEASURMENT 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
Extrapolation, interpolation, and integration 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

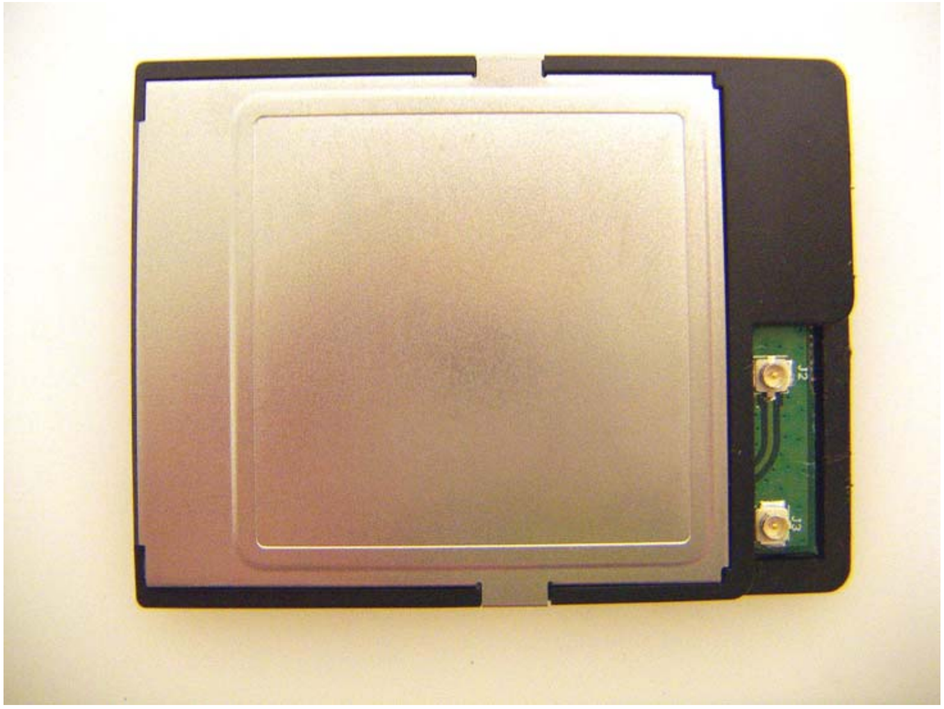
Notesfor table
1. Tol. - tolerance in influence quaitity
2. N - Nomal
3. R - Rectangular
4. Div. - Divisor used to obtain standard uncertainty
5. Ci - is te sensitivity coefficient

11 EQUIPMENT LIST AND CALIBRATION

Name of Equipment	Manufacturer	Type/Model	Serial Number	Cal. Due date
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	D2450V2	706	4/27/08
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	H2450	N/A	Within 24 hrs of first test
Simulating Liquid	CCS	M2450	N/A	Within 24 hrs of first test

12 PHOTOS

802.11BG COMPACT FLASH CARD



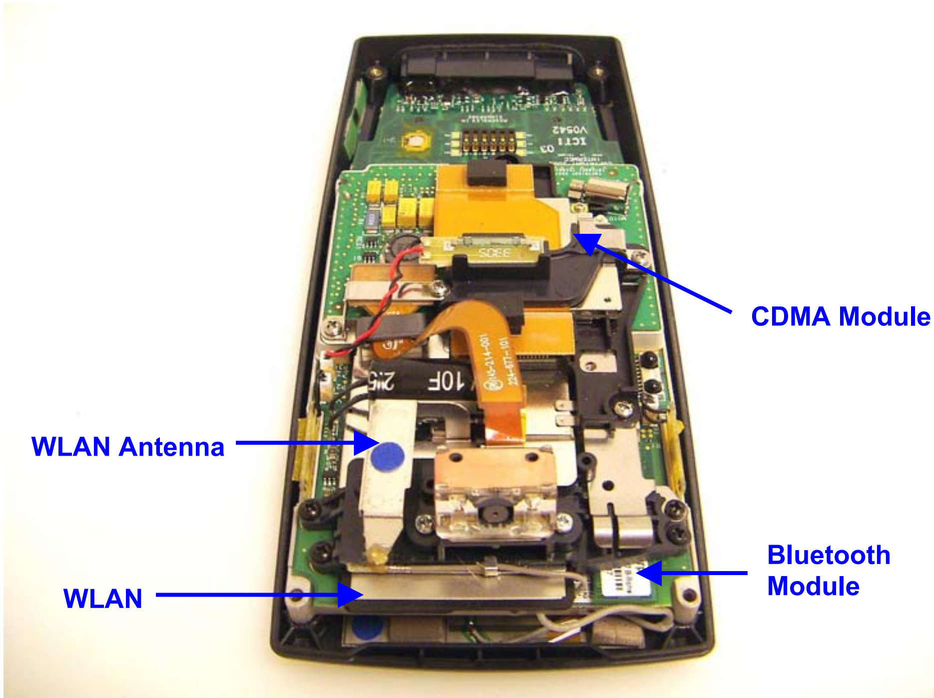
700C HANDHELD COMPUTER

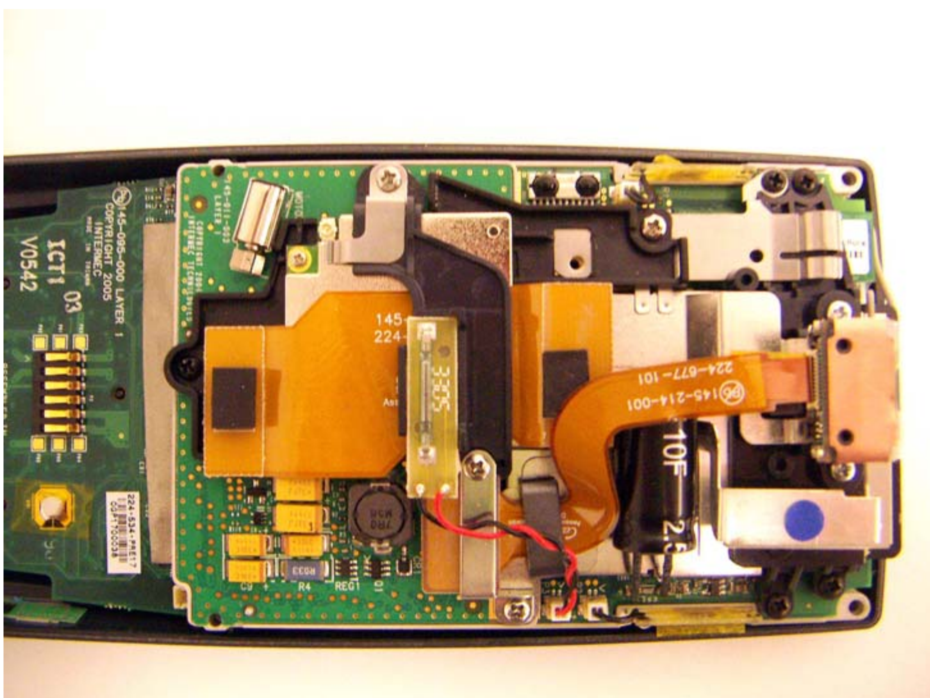
700C in 815-047-001 Holster

700C in 815-047-002 Holster

700C with Belt Clip

EUT Location





13 ATTACHMENTS

No.	Contents	No. Of Pages
1	System Performance Check Plots	4
2-1	SAR Test Plots-Body Worn	7
2-2	SAR Test Plots-Head Positions	7
2-3	SAR Test Plots-BT and CDMA Module	18
3	Certificate of E-Field Probe - EXDV4SN3552	9
4	Certificate of System Validation Dipole - D2450 SN:706	9

END OF REPORT