

<b>RTS</b> <b>RIM Testing Services</b>	Document <b>SAR Compliance Test Report for the BlackBerry® Smartphone  Model RCG41GW</b>	Page <b>1(34)</b>
	Author Data <b>Jean-Paul Hacquoil</b>	Dates of Test <b>April 01-07, April 30-May 07, May 20,  2009</b>
		FCC ID: <b>L6ARCG40GW</b>




## SAR Compliance Test Report

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**Statement of Compliance:** RIM Testing Services declares under its sole responsibility that the product to which this declaration relates, is in conformity with the appropriate RF exposure standards, recommendations and guidelines. It also declares that the product was tested in accordance with the appropriate measurement standards, guidelines and recommended practices.

**Device Category:** This BlackBerry® Smartphone is a portable device, designed to be used in direct contact with the user's head, hand and to be carried in approved accessories when carried on the user's body.

**RF exposure environment:** This device has been shown to be in compliance for localized specific absorption rate (SAR) for uncontrolled environment/general population exposure limits specified in OET Bulletin 65 Supplement C (Edition 01-01), FCC 96-326, IEEE Std. C95.1-1999, Health Canada's Safety Code 6, as reproduced in RSS-102 issue 2-2005 and has been tested in accordance with the measurement procedures specified in FCC OET Procedures, OET Bulletin 65 Supplement C (Edition 01-01), ANSI/IEEE Std. C95.3-1991, IEEE 1528-2003, IEC 62209-1-2005, DASY4 manual which follows draft IEC 62209 – Part 2 and Health Canada's Safety Code 6.

Tested and documented by:	Signatures	Date
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This test report: RTS-1615-0905-02 Rev 1, supersedes the previous version.

<b>RTS</b> <b>RIM Testing Services</b>	Document	<b>SAR Compliance Test Report for the BlackBerry® Smartphone  Model RCG41GW</b>		Page	<b>2(34)</b>
	Author Data	Dates of Test	Test Report No	FCC ID:	
<b>Jean-Paul Hacquoil</b>	<b>April 01-07, April 30-May 07, May 20,  2009</b>	<b>RTS-1615-0905-02 Rev 1</b>	<b>L6ARCG40GW</b>		

CONTENTS

SAR COMPLIANCE TEST REPORT ..... 1

    CONTENTS ..... 2

1.0 OPERATING CONFIGURATIONS AND TEST CONDITIONS ..... 4

    1.1 PICTURE OF DEVICE ..... 4

    1.2 ANTENNA DESCRIPTION ..... 4

    1.3 DEVICE DESCRIPTION ..... 4

    1.4 BODY WORN ACCESSORIES (HOLSTERS) ..... 5

    1.5 HEADSET ..... 5

    1.6 BATTERY ..... 5

    1.7 PROCEDURE USED TO ESTABLISH TEST SIGNAL ..... 5

    1.8 HIGHLIGHTS OF THE FCC OET SAR MEASUREMENT REQUIREMENTS FOR 3-6 GHZ AND  
MEASUREMENT PROCEDURES FOR 802.11 B/G TRANSMITTER ..... 6

    1.9 HIGHLIGHTS OF THE FCC OET SAR EVALUATION CONSIDERATIONS FOR HANDSETS WITH MULTIPLE  
TRANSMITTERS/ ANTENNAS & GSM/GPRS/EDGE PROCEDURE ..... 7

    2.1 SAR MEASUREMENT SYSTEM ..... 9

        2.1.1 EQUIPMENT LIST ..... 10

    2.2 DESCRIPTION OF THE TEST SETUP ..... 10

        2.2.1 DEVICE AND BASE STATION SIMULATOR SETUP ..... 10

        2.2.2 DASY SETUP ..... 11

3.0 ELECTRIC FIELD PROBE CALIBRATION ..... 11

    3.1 PROBE SPECIFICATIONS ..... 11

    3.2 PROBE CALIBRATION AND MEASUREMENT UNCERTAINTY ..... 11

4.0 SAR MEASUREMENT SYSTEM VERIFICATION ..... 12

    4.1 SYSTEM ACCURACY VERIFICATION FOR HEAD ADJACENT USE ..... 12

5.0 PHANTOM DESCRIPTION ..... 13

6.0 TISSUE DIELECTRIC PROPERTIES ..... 14

    6.1 COMPOSITION OF TISSUE SIMULANT ..... 14

        6.1.1 EQUIPMENT ..... 14

        6.1.2 PREPARATION PROCEDURE ..... 14

    6.2 ELECTRICAL PARAMETERS OF THE TISSUE SIMULATING LIQUID ..... 15

        6.2.1 EQUIPMENT ..... 16

        6.2.2 TEST CONFIGURATION ..... 16

        6.2.3 PROCEDURE ..... 16

7.0 SAR SAFETY LIMITS ..... 20

8.0 DEVICE POSITIONING ..... 21

    8.1 DEVICE HOLDER FOR SAM TWIN PHANTOM ..... 21

    8.2 DESCRIPTION OF THE TEST POSITIONING ..... 22

        8.2.1 TEST POSITIONS OF DEVICE RELATIVE TO HEAD ..... 22

            8.2.1.1 DEFINITION OF THE “CHEEK” POSITION ..... 23

            8.2.1.2 DEFINITION OF THE “TILTED” POSITION ..... 24

        8.2.2 BODY HOLSTER CONFIGURATION ..... 24

9.0 HIGH LEVEL EVALUATION ..... 25

    9.1 MAXIMUM SEARCH ..... 25

    9.2 EXTRAPOLATION ..... 25

    9.3 BOUNDARY CORRECTION ..... 25

    9.4 PEAK SEARCH FOR 1G AND 10G CUBE AVERAGED SAR ..... 25

10.0 MEASUREMENT UNCERTAINTY ..... 26

11.0 TEST RESULTS ..... 27

    11.1 SAR MEASUREMENT RESULTS AT HIGHEST POWER MEASURED AGAINST THE HEAD ..... 27

    11.2 SAR MEASUREMENT RESULTS AT HIGHEST POWER MEASURED AGAINST THE BODY USING  
ACCESSORIES ..... 30

12.0 REFERENCES ..... 33

<b>RTS</b> <b>RIM Testing Services</b>	Document <b>SAR Compliance Test Report for the BlackBerry® Smartphone Model RCG41GW</b>		Page <b>3(34)</b>
Author Data <b>Jean-Paul Hacquoil</b>	Dates of Test <b>April 01-07, April 30-May 07, May 20, 2009</b>	Test Report No <b>RTS-1615-0905-02 Rev 1</b>	FCC ID: <b>L6ARCG40GW</b>

APPENDIX A: SAR DISTRIBUTION COMPARISON FOR ACCURACY VERIFICATION

APPENDIX B: SAR DISTRIBUTION PLOTS - HEAD CONFIGURATION

APPENDIX C: SAR DISTRIBUTION PLOTS - BODY-WORN CONFIGURATION

APPENDIX D: PROBE & DIPOLE CALIBRATION DATA

APPENDIX E: PHOTOGRAPHS

<b>RTS</b> RIM Testing Services	Document <b>SAR Compliance Test Report for the BlackBerry® Smartphone Model RCG41GW</b>		Page <b>4(34)</b>
	Author Data <b>Jean-Paul Hacquoil</b>	Dates of Test <b>April 01-07, April 30-May 07, May 20, 2009</b>	Test Report No <b>RTS-1615-0905-02 Rev 1</b>
			FCC ID: <b>L6ARCG40GW</b>

## 1.0 OPERATING CONFIGURATIONS AND TEST CONDITIONS

### 1.1 Picture of Device

Please refer to Appendix E.  
**Figure 1. BlackBerry Smartphone**

### 1.2 Antenna description

<b>Type</b>	Internal fixed antenna
<b>Location</b>	Back bottom centre
<b>Configuration</b>	Internal fixed antenna

**Table 1. Antenna description**

### 1.3 Device description

<b>Device Model</b>	RCG41GW					
<b>FCC ID</b>	L6ARCG40GW					
<b>PIN</b>	20EB5E6A (EDGE/GSM/GPRS/Rev2), 20E44F5D (Bluetooth/Wifi/Rev1), 20F3607B (Wifi/Rev3)					
<b>Prototype or Production Unit</b>	Production					
<b>Mode(s) of Operation in North America</b>	1-slot GSM 850 GSM 1900	2-slots EDGE/GPRS 850/1900	Bluetooth	802.11b	802.11g	
<b>Maximum nominal conducted RF Output Power (dBm)</b>	33.00 30.00	30.50 27.00	8.67	17.50	16.00	
<b>Tolerance in Power Setting on centre channel (dB)</b>	± 0.50	± 0.50	N/A	± 0.50	± 0.50	
<b>Duty Cycle</b>	1:8	2:8	N/A	1:1	1:1	
<b>Tx Frequency Range (MHz)</b>	824.2 – 848.8 1850.2 – 1909.8	824.2 – 848.8 1850.2 – 1909.8	2402 - 2438	2412-2462	2412-2462	

**Table 2. Test device description**

The device supports GSM/EDGE/GPRS 900/1800 MHz bands that are not operational in North America, therefore no data is presented in this report for those bands.

<b>RTS</b> <b>RIM Testing Services</b>	Document <b>SAR Compliance Test Report for the BlackBerry® Smartphone  Model RCG41GW</b>		Page <b>5(34)</b>
	Author Data <b>Jean-Paul Hacquoil</b>	Dates of Test <b>April 01-07, April 30-May 07, May 20,  2009</b>	Test Report No <b>RTS-1615-0905-02 Rev 1</b>

#### 1.4 Body worn accessories (holsters)

The device has been tested with the following holsters which contain metal components and the separation distance between the device and the user's body is listed in the table below. The holsters are designed with the intended device orientation being with the LCD facing the belt clip. Proper positioning is vital for protection of the LCD display, and to help maximize the battery life of the device. The device can also be placed in the holster with the backside facing the belt clip. Body SAR measurements were carried out with the worst-case configuration front LCD side and backside towards the belt clip.

Holster	Model / Part Number	Separation (mm)
Vertical Holster #1	HDW-24208-002	19
Vertical Holster #2	HDW-24208-001	22
Horizontal Holster	HDW-24210-001	22

**Table 3: Body worn holster**

Please refer to Appendix E.  
**Figure 2. Body-worn holster**

#### 1.5 Headset

The device was tested with and without the following headset model numbers.

- 1) Headset #1      HDW-14322-003
- 2) Headset #2      HDW-15766-005
- 3) Headset #3      HDW-15765-001

#### 1.6 Battery

The device was tested with the following Lithium Ion Battery pack.

- 1) BAT-06860-004

#### 1.7 Procedure used to establish test signal

The device was put into test mode for SAR measurements by placing a voice call from a Rohde & Schwarz CMU 200 Communications Test Instrument. The power control level was set to command the device to transmit at full power at the specified frequency. Other parameters include: Channel type = full rate, discontinuous transmission off, frequency hopping off. A Rohde & Schwarz CBT Bluetooth Tester was used to establish a connection with the EUT's Bluetooth radio. Worst case SAR was evaluated with Bluetooth on.

<b>RTS</b> <b>RIM Testing Services</b>	Document <b>SAR Compliance Test Report for the BlackBerry® Smartphone Model RCG41GW</b>		Page <b>6(34)</b>
	Author Data <b>Jean-Paul Hacquoil</b>	Dates of Test <b>April 01-07, April 30-May 07, May 20, 2009</b>	Test Report No <b>RTS-1615-0905-02 Rev 1</b>

### 1.8 Highlights of the FCC OET SAR Measurement Requirements for 3-6 GHz and Measurement Procedures for 802.11 b/g Transmitter

- Maintained dielectric parameter uncertainty as close to  $\pm 5.0\%$  of the target value as possible.
- Liquid depth from SAM ERP or flat phantom was kept at 15 cm.
- Probe Requirement: Used SPEAG probe model EX3DV4 for 2.4 – 6 GHz SAR testing specs are outlined below:

Probe tip to sensor center	1.0 mm
Probe tip diameter is	2.5 mm
Probe calibration uncertainty	< 15 % for $f = 2.45$ to < 6.0 GHz
Probe calibration range	$\pm 100$ MHz

**Table 4: Probe specification requirements**

- Frequency Channel Configuration: 802.11 b/g modes are tested on “default test channels” 1, 6 and 11.
- For each frequency band, testing at higher rates and higher modulations is not required when the maximum average output power for each of these configurations is less than  $\frac{1}{4}$  dB higher than those measured at the lowest data rate.
- SAR is not required for 802.11g channels when the maximum average output power is less than  $\frac{1}{4}$  dB higher than that measured on the corresponding 802.11b channels.
- SAR test was conducted on each “default test channel” and each band with the worst case modulation that resulted in maximum duty cycle of 99.5 %.
- Conducted power measurements:

802.11b @ 1Mbps		802.11g @ 6Mbps	
Chan	Cond. Power (dBm)	Chan	Cond. Power (dBm)
1	17.00	1	12.60
6	17.30	6	16.00
11	17.60	11	13.30

**Table 5: 802.11 b/g channel vs. conducted power**

Data Rate (Mbps)	Mod.	802.11g	Data Rate (Mbps)	Mod.	802.11b
		Channel 6			Channel 6
		Cond. Power (dBm)			Cond. Power (dBm)
6	BPSK	15.90	1	BPSK	17.30
9	BPSK	15.85	2	DQPSK	17.25
12	QPSK	14.50	5.5	CCK	17.30
18	QPSK	14.30	11	CCK	17.20
24	16-QAM	13.00			
36	16-QAM	12.70			
48	64-QAM	10.60			
54	64-QAM	10.40			

**Table 6: 802.11 b/g modulation type/data rate vs. conducted power**

<b>RTS</b> <b>RIM Testing Services</b>	Document <b>SAR Compliance Test Report for the BlackBerry® Smartphone Model RCG41GW</b>	Page <b>7(34)</b>	
	Author Data <b>Jean-Paul Hacquoil</b>	Dates of Test <b>April 01-07, April 30-May 07, May 20, 2009</b>	Test Report No <b>RTS-1615-0905-02 Rev 1</b>

### 1.9 Highlights of the FCC OET SAR Evaluation Considerations for Handsets with Multiple Transmitters/ Antennas & GSM/GPRS/EDGE Procedure

#### Unlicensed Transmitters

When there is simultaneous transmission – Stand-alone SAR not required when

- output  $\leq 2 \cdot P_{Ref}$  and antenna is  $> 5.0$  cm from other antennas
- output  $\leq P_{Ref}$  and antenna is  $> 2.5$  cm from other antennas
- the other antenna(s), which are  $< 2.5$  cm away, has an output  $\leq P_{Ref}$  OR max 1g SAR  $< 1.2$  W/kg

Otherwise stand-alone SAR is required

- test SAR on highest output channel for each wireless mode and exposure condition
- if SAR for highest output channel is  $> 50\%$  of SAR limit, evaluate all channels according to normal procedure

#### Simultaneous Transmission SAR not required:

Unlicensed only

- when stand-alone 1-g SAR is not required and antenna is  $> 5$  cm from other antennas
- when the other antenna(s), which are  $< 2.5$  cm away, has an output  $\leq P_{Ref}$  OR max 1g SAR  $< 1.2$  W/kg

Licensed & Unlicensed

- when the sum of the 1-g SAR is  $< 1.6$  W/kg for each pair of simultaneous transmitting antennas.
- when SAR to antenna separation ratio of simultaneous transmitting antenna pair is  $< 0.3$

#### Simultaneous Transmission SAR required:

Licensed & Unlicensed

- antenna pairs with SAR to antenna separation ratio  $\geq 0.3$ ; test is only required for the configuration that results in the highest SAR in standalone configuration for each wireless mode and exposure condition.

	2.45	5.15 - 5.35	5.47 - 5.85	GHz
$P_{Ref}$	12	6	5	mW
Device output power should be rounded to the nearest mW to compare with values specified in this table.				

Table 7 – Output Power Thresholds for Unlicensed Transmitters

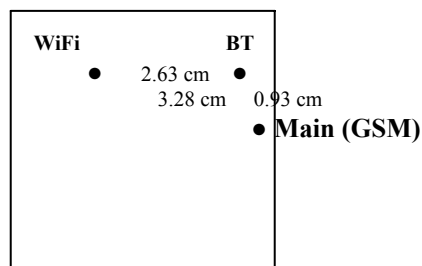


Figure 3: Back view of device showing closet distance between antenna pairs

<b>RTS</b> <b>RIM Testing Services</b>	Document <b>SAR Compliance Test Report for the BlackBerry® Smartphone Model RCG41GW</b>		Page <b>8(34)</b>
	Author Data <b>Jean-Paul Hacquoil</b>	Dates of Test <b>April 01-07, April 30-May 07, May 20, 2009</b>	Test Report No <b>RTS-1615-0905-02 Rev 1</b>

Mode	Configuration	Highest 1 g SAR (W/kg)
BT	Head-Right-Touch	0.001
	Body- Vertical Holster #1 - Back	0.000
802.11b/g	Head-Right-Touch	0.11
	Body- Vertical Holster #1 - Back	0.37
GSM/GPRS/EDGE/	Head-Right-Touch	1.22
	Body- Vertical Holster #1 - Back	0.83

**Table 8 – Highest SAR values for worst case configuration**

Based on the sum of 1-g SAR values for each pair of simultaneous transmitting antennas is <1.6W/kg, Simultaneous Transmission SAR is not required.



<b>RTS</b> <b>RIM Testing Services</b>	Document <b>SAR Compliance Test Report for the BlackBerry® Smartphone Model RCG41GW</b>	Page <b>9(34)</b>
	Author Data <b>Jean-Paul Hacquoil</b>	Dates of Test <b>April 01-07, April 30-May 07, May 20, 2009</b>
		FCC ID: <b>L6ARCG40GW</b>

## 2.0 DESCRIPTION OF THE TEST EQUIPMENT

### 2.1 SAR measurement system

SAR measurements were performed using a Dosimetric Assessment System (DASY4), an automated SAR measurement system manufactured by Schmid & Partner Engineering AG (SPEAG), of Zurich, Switzerland.

The DASY 4 system for performing compliance tests consists of the following items:

- A standard high precision 6-axis robot (Stäubli RX family) with controller 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 DAE module that performs the signal amplification, signal multiplexing, A/D 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 Electro-optical coupler (EOC).
- A unit to operate the optical surface detector that is connected to the EOC.
- The EOC performs the conversion from an optical signal into the digital electric signal of the DAE. The EOC is connected to the PC plug-in card.
- The functions of the PC plug-in card based on a DSP is to perform the time critical tasks such as signal filtering, surveillance of the robot operation fast movement interrupts.
- A computer operating Windows 2000.
- DASY 4 software version 4.7.
- Remote control 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 mobile phones.
- Tissue simulating liquid mixed according to the given recipes (see section 6.1).
- System validation dipoles allowing for the validation of proper functioning of the system.

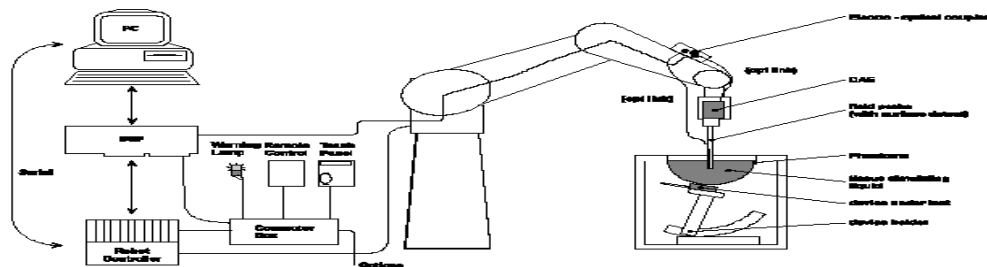


Figure 4. System Description

<b>RTS</b> <b>RIM Testing Services</b>	Document <b>SAR Compliance Test Report for the BlackBerry® Smartphone  Model RCG41GW</b>		Page <b>10(34)</b>
	Author Data <b>Jean-Paul Hacquoil</b>	Dates of Test <b>April 01-07, April 30-May 07, May 20,  2009</b>	Test Report No <b>RTS-1615-0905-02 Rev 1</b>

### 2.1.1 Equipment List

Manufacturer	Test Equipment	Model Number	Serial Number	Cal. Due Date
SCHMID & Partner Engineering AG	E-field probe	ET3DV6	1642	01/12/2010
SCHMID & Partner Engineering AG	Data Acquisition Electronics (DAE3)	DAE3 V1	472	03/03/2010
SCHMID & Partner Engineering AG	Data Acquisition Electronics (DAE3)	DAE3 V1	473	01/09/2010
SCHMID & Partner Engineering AG	Dipole Validation Kit	D835V2	446	01/05/2011
SCHMID & Partner Engineering AG	Dipole Validation Kit	D1900V2	545	01/06/2011
SCHMID & Partner Engineering AG	Dipole Validation Kit	D2450V2	747	11/06/2009
Agilent Technologies	Signal generator	8648C	4037U03155	09/20/2009
Agilent Technologies	Power meter	E4419B	GB40202821	09/19/2009
Agilent Technologies	Power sensor	8481A	MY41095417	10/30/2009
Agilent Technologies	Power meter	N1911A	MY45100905	05/01/2011
Agilent Technologies	Power sensor	N1921A	SG45240281	05/08/2010
Amplifier Research	Amplifier	5S1G4M3	300986	CNR
Agilent Technologies	Network analyzer	8753ES	US39174857	10/29/2009
Rohde & Schwarz	Base Station Simulator	CMU 200	109747	12/07/2009
Rohde & Schwarz	Bluetooth Tester CBT	CBT35	100370	12/09/2009

**Table 9. Equipment list**

## 2.2 Description of the test setup

Before SAR measurements are conducted, the device and the DASY equipment are setup as follows:

### 2.2.1 Device and base station simulator setup

- Power up the device.
- Turn on the base station simulator and set the radio channel and power to the appropriate values.
- Connect an antenna to the RF IN/OUT of the communication test set and place it close to the device.

<b>RTS</b> <b>RIM Testing Services</b>	Document <b>SAR Compliance Test Report for the BlackBerry® Smartphone Model RCG41GW</b>		Page <b>11(34)</b>
	Author Data <b>Jean-Paul Hacquoil</b>	Dates of Test <b>April 01-07, April 30-May 07, May 20, 2009</b>	Test Report No <b>RTS-1615-0905-02 Rev 1</b>

### 2.2.2 DASY setup

- Turn the computer on and log on to Windows 2000.
- Start the DASY4 software by clicking on the icon located on the Windows desktop.
- Mount the DAE unit and the probe. Turn on the DAE unit.
- Turn the Robot Controller on by turning the main power switch to the horizontal position
- Align the probe by clicking the ‘Align probe in light beam’ button.
- Open a file and configure the proper parameters - probe, medium, communications system etc.
- Establish a connection between the Device and the communications test instrument. Place the Device on the stand and adjust it under the phantom.
- Start SAR measurements.

## 3.0 ELECTRIC FIELD PROBE CALIBRATION

### 3.1 Probe Specifications

SAR measurements were conducted using the dosimetric probe ET3DV6, designed by Schmid & Partner Engineering AG for the measurement of SAR. The probe is constructed using the thin film technique, with printed resistive lines on ceramic substrates. It has a symmetrical design with triangular core, built-in optical fibre for the surface detection system and built-in shielding against static discharge. The probe is sensitive to E-fields and thus incorporates three small dipoles arranged so that the overall response is close to isotropic. The table below summarizes the technical data for the probe.

Property	Data
<b>Probe model ET3DV6</b>	
Frequency range	30 MHz – 3 GHz
Linearity	±0.1 dB
Directivity (rotation around probe axis)	≤ ±0.2 dB
Directivity (rotation normal to probe axis)	±0.4 dB
Dynamic Range	5 mW/kg – 100 W/kg
Probe positioning repeatability	±0.2 mm
Spatial resolution	< 0.125 mm <sup>3</sup>

**Table 10. Probe specifications**

### 3.2 Probe calibration and measurement uncertainty

The probe ET3DV6 was calibrated with an accuracy better than ±10% . The sensitivity parameters (NormX, NormY, NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe were tested. The probe calibration parameters are shown on Appendix D.

<b>RTS</b> <b>RIM Testing Services</b>	Document <b>SAR Compliance Test Report for the BlackBerry® Smartphone  Model RCG41GW</b>		Page <b>12(34)</b>
	Author Data <b>Jean-Paul Hacquoil</b>	Dates of Test <b>April 01-07, April 30-May 07, May 20,  2009</b>	Test Report No <b>RTS-1615-0905-02 Rev 1</b>

## 4.0 SAR MEASUREMENT SYSTEM VERIFICATION

Prior to conducting SAR measurements, the system was validated using the dipole validation kit and the flat section of the SAM phantom. A power level of 1.0W was applied to the dipole antenna. The verification results are in the table below with a comparison to reference values. Printouts are shown in Appendix A. All the measured parameters are within the allowed tolerances.

### 4.1 System accuracy verification for head adjacent use

f (MHz)	Limits / Measured	SAR (W/kg) 1 g / 10 g	Dielectric Parameters		Liquid Temp (°C)
			$\epsilon_r$	$\sigma$ [S/m]	
835	Measured (04/30/2009)	9.33 / 6.12	40.78	0.87	23.2
	Measured (05/04/2009)	9.52 / 6.25	40.12	0.88	22.1
	Recommended Limits	9.50 / 6.00	41.50	0.90	N/A
1900	Measured (05/06/2009)	41.3 / 21.7	38.29	1.43	22.1
	Recommended Limits	39.5 / 20.8	40.00	1.40	N/A
2450	Measured (04/01/2009)	56.8 / 26.3	37.92	1.82	23.0
	Measured (04/07/2009)	57.3 / 26.4	37.52	1.86	22.6
	Measured (05/20/2009)	56.9 / 26.1	37.50	1.85	21.7
	Recommended Limits	53.2 / 24.8	39.2	1.80	N/A

**Table 11. System accuracy (validation for head adjacent use)**

<b>RTS</b> <b>RIM Testing Services</b>	Document <b>SAR Compliance Test Report for the BlackBerry® Smartphone Model RCG41GW</b>	Page <b>13(34)</b>	
	Author Data <b>Jean-Paul Hacquoil</b>	Dates of Test <b>April 01-07, April 30-May 07, May 20, 2009</b>	Test Report No <b>RTS-1615-0905-02 Rev 1</b>

## 5.0 PHANTOM DESCRIPTION

The SAM Twin Phantom, manufactured by SPEAG, was used during the SAR measurements. The phantom is made of a fibreglass shell integrated with a wooden table.

The SAM Twin Phantom is a fibreglass shell phantom with 2 mm shell thickness. It has three measurement areas:

- Left side head
- Right side head
- Flat phantom

The phantom table dimensions are: 100x50x85 cm (LxWxH). The table is intended for use with freestanding robots.

The bottom shelf contains three pair of bolts for locking the device holder in place. The device holder positions are adjusted to the standard measurement positions in the three sections. Only one device holder is necessary if two phantoms are used (e.g., for different solutions).

A white cover is provided to top the phantom during off-periods to prevent water evaporation and changes in the liquid parameters. Free space scans of devices on the cover are possible; however the optical surface detector does not work properly at the cover surface. Place a sheet of white paper on the cover when using optical surface detection.

Liquid depth of  $\geq 15$  cm is maintained in the phantom for all the measurements.



**Figure 5. SAM Twin Phantom**

<b>RTS</b> RIM Testing Services	Document <b>SAR Compliance Test Report for the BlackBerry® Smartphone Model RCG41GW</b>		Page <b>14(34)</b>
	Author Data <b>Jean-Paul Hacquoil</b>	Dates of Test <b>April 01-07, April 30-May 07, May 20, 2009</b>	Test Report No <b>RTS-1615-0905-02 Rev 1</b>
		FCC ID: <b>L6ARCG40GW</b>	

## 6.0 TISSUE DIELECTRIC PROPERTIES

### 6.1 Composition of tissue simulant

The composition of the brain and muscle simulating liquids for 800-900 MHz and 1800-1900 MHz are shown in the table below.

INGREDIENT	MIXTURE 800-900MHz		MIXTURE 1800-1900MHz		MIXTURE 2450 MHz	
	Brain %	Muscle %	Brain %	Muscle %	Brain %	Muscle %
Water	40.29	65.45	55.24	69.91	55.0	68.75
Sugar	57.90	34.31	0	0	0	0
Salt	1.38	0.62	0.31	0.13	0	0
HEC	0.24	0	0	0	0	0
Bactericide	0.18	0.10	0	0	0	0
DGBE	0	0	44.45	29.96	40.0	31.25
Triton X-100	0	0	0	0	5.0	0

Table 12. Tissue simulant recipe

#### 6.1.1 Equipment

Manufacturer	Test Equipment	Model Number	Serial Number	Cal. Due Date
Pyrex, England	Graduated Cylinder	N/A	N/A	N/A
Pyrex, USA	Beaker	N/A	N/A	N/A
Acculab	Weight Scale	V1-1200	018WB2003	N/A
Control Company	Digital Thermometer	15-077-21	51129471	05/12/2009
Control Company	Digital Thermometer	23609-234	21352860	08/29/2009
IKA Works Inc.	Hot Plate	RC Basic	3.107433	N/A

Table 13. Tissue simulant preparation equipment

#### 6.1.2 Preparation procedure

##### 800-900 MHz liquids

- Fill the container with **water**. Begin heating and stirring.
- Add the **Cellulose**, the **preservative substance** and the **salt**. After several hours, the liquid will become more transparent again. The container must be covered to prevent evaporation.
- Add **Sugar**. Stir it well until the sugar is sufficiently dissolved.

<b>RTS</b> <b>RIM Testing Services</b>	Document <b>SAR Compliance Test Report for the BlackBerry® Smartphone  Model RCG41GW</b>		Page <b>15(34)</b>
	Author Data <b>Jean-Paul Hacquoil</b>	Dates of Test <b>April 01-07, April 30-May 07, May 20,  2009</b>	Test Report No <b>RTS-1615-0905-02 Rev 1</b>

- Keep the liquid hot but below the boiling point for at least an hour. The container must be covered to prevent evaporation.
- Remove the container from, and turn the hotplate off and allow the liquid to cool off to room temperature prior to performing dielectric measurements.

#### 1800-2450 MHz liquid

- Fill the container with water and place it on hotplate. Begin heating and stirring.
- Add the salt, Glycol/Triton X-100. The container must be covered to prevent evaporation.
- Keep the liquid hot enough to dissolve sugar for at least an hour. The container must be covered to prevent evaporation.
- Remove the container from, and turn the hotplate off and allow the liquid to cool off to room temperature prior to performing dielectric measurements.

### 6.2 Electrical parameters of the tissue simulating liquid

The tissue dielectric parameters shall be measured before a batch can be used for SAR measurements to ensure that the simulated tissue was properly made and will simulate the desired human characteristic. Limits and measured electrical parameters are shown in the table below.

Recommended limits are adopted from IEEE P1528-2003:

“Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques”, DASY 4 manual and from FCC Tissue Dielectric Properties web page at <http://www.fcc.gov/fcc-bin/dielec.sh>

f (MHz)	Tissue Type	Limits / Measured	Dielectric Parameters		Liquid Temp (°C)
			$\epsilon_r$	$\sigma$ [S/m]	
835	Head	Measured (04/30/2009)	40.78	0.87	23.2
		Measured (05/04/2009)	40.12	0.88	22.1
		Recommended Limits	41.50	0.90	N/A
	Muscle	Measured (05/04/2009)	52.68	0.94	22.7
		Recommended Limits	55.20	0.97	N/A
1900	Head	Measured (05/06/2009)	38.29	1.43	22.1
		Recommended Limits	40.00	1.40	N/A
	Muscle	Measured (05/06/2009)	50.78	1.53	22.6
		Recommended Limits	53.30	1.52	N/A
2450	Head	Measured (04/01/2009)	37.92	1.82	23.0
		Measured (04/07/2009)	37.52	1.86	22.6
		Measured (05/20/2009)	37.50	1.85	21.7
		Recommended Limits	39.2	1.80	N/A
	Muscle	Measured (04/02/2009)	50.23	1.96	22.8
		Measured (04/07/2009)	50.23	1.90	23.3
		Measured (05/20/2009)	50.10	2.04	22.0
Recommended Limits	52.7	1.95	N/A		

**Table 14. Electrical parameters of tissue simulating liquid**

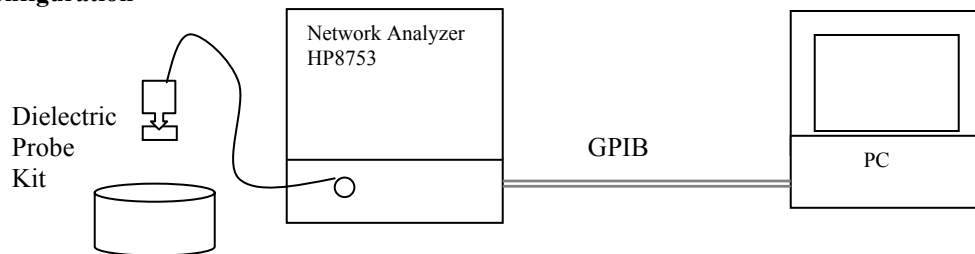
<b>RTS</b> RIM Testing Services	Document <b>SAR Compliance Test Report for the BlackBerry® Smartphone Model RCG41GW</b>	Page <b>16(34)</b>	
	Author Data <b>Jean-Paul Hacquoil</b>	Dates of Test <b>April 01-07, April 30-May 07, May 20, 2009</b>	Test Report No <b>RTS-1615-0905-02 Rev 1</b>

### 6.2.1 Equipment

Manufacturer	Test Equipment	Model Number	Serial Number	Cal. Due Date
Agilent Technologies	Network Analyzer	8753ES	US39174857	10/29/2009
Agilent Technologies	Dielectric probe kit	HP 85070C	US9936135	CNR
Dell	PC using GPIB card	GX110	347	N/A
Control Company	Digital Thermometer	15-077-21	51129471	05/12/2009

**Table 15. Equipment required for electrical parameter measurements**

### 6.2.2 Test Configuration



**Figure 6. Test configuration**

### 6.2.3 Procedure

1. Turn NWA on and allow at least 30 minutes for warm up.
2. Mount dielectric probe kit so that interconnecting cable to NWA will not be moved during measurements or calibration.
3. Pour de-ionized water and measure water temperature ( $\pm 1^\circ$ ).
4. Set water temperature in HP-Software (Calibration Setup).
5. Perform calibration.
6. Relative permittivity  $\epsilon_r = \epsilon'$  and conductivity can be calculated from  $\epsilon''$   

$$\sigma = \omega \epsilon_0 \epsilon''$$
7. Measure liquid shortly after calibration.
8. Stir the liquid to be measured. Take a sample (~50ml) with a syringe from the center of the liquid container.
9. Pour the liquid into a small glass flask. Hold the syringe at the bottom of the flask to avoid air bubbles.
10. Put the dielectric probe in the glass flask. Check that there are no air bubbles in front of the opening in the dielectric probe kit.
11. Perform measurements.
12. Adjust medium parameters in DASY4 for the frequencies necessary for the measurements ('Setup Config', select medium (e.g. Head 835 MHz) and press 'Option'-button.
13. Select the current medium for the frequency of the validation (e.g. Setup Medium Brain 835 MHz).

Sample calculation for 835 MHz head tissue dielectric parameters using data from Table 16.

Relative permittivity  $\epsilon_r = \epsilon' = 40.7802$

Conductivity  $\sigma = \omega \epsilon_0 \epsilon'' = (2\pi \times 835 \times 10^6)(8.854 \times 10^{-12})(18.7713) = 0.87 \text{ S/m}$



<b>RTS</b> RIM Testing Services	Document <b>SAR Compliance Test Report for the BlackBerry® Smartphone Model RCG41GW</b>	Page <b>17(34)</b>
	Author Data <b>Jean-Paul Hacquoil</b>	Dates of Test <b>April 01-07, April 30-May 07, May 20, 2009</b>
		FCC ID: <b>L6ARCG40GW</b>

## Title

### SubTitle

April 30, 2009 11:08 PM

Frequency	e'	e''
800.000000 MHz	41.1253	18.8282
805.000000 MHz	41.0605	18.8214
810.000000 MHz	41.0181	18.8142
815.000000 MHz	40.9570	18.8335
820.000000 MHz	40.9282	18.7909
825.000000 MHz	40.8627	18.8062
830.000000 MHz	40.8464	18.7661
835.000000 MHz	40.7802	18.7713
840.000000 MHz	40.6807	18.7651
845.000000 MHz	40.6403	18.7429
850.000000 MHz	40.5937	18.7330
855.000000 MHz	40.5141	18.7121
860.000000 MHz	40.4308	18.6925
865.000000 MHz	40.3649	18.6584
870.000000 MHz	40.2818	18.6499
875.000000 MHz	40.1865	18.6654
880.000000 MHz	40.1150	18.6542
885.000000 MHz	40.0656	18.6470
890.000000 MHz	39.9732	18.6424
895.000000 MHz	39.9400	18.6507
900.000000 MHz	39.8704	18.6499

Head

## Title

### SubTitle

May 04, 2009 03:50 PM

Frequency	e'	e''
800.000000 MHz	53.1746	20.3074
805.000000 MHz	53.1211	20.2526
810.000000 MHz	53.0223	20.2254
815.000000 MHz	52.9378	20.1716
820.000000 MHz	52.8723	20.1838
825.000000 MHz	52.8054	20.1414
830.000000 MHz	52.7537	20.1545
835.000000 MHz	52.6831	20.1416
840.000000 MHz	52.6041	20.1321
845.000000 MHz	52.5552	20.1120
850.000000 MHz	52.5270	20.1169
855.000000 MHz	52.4644	20.1128
860.000000 MHz	52.4380	20.1170
865.000000 MHz	52.4288	20.1361
870.000000 MHz	52.3843	20.1149
875.000000 MHz	52.3683	20.1677
880.000000 MHz	52.3416	20.1608
885.000000 MHz	52.3169	20.1847
890.000000 MHz	52.3124	20.1902
895.000000 MHz	52.2890	20.1714
900.000000 MHz	52.2635	20.1587

Muscle

Table 16. 835 MHz head and muscle tissue dielectric parameters

<b>RTS</b> RIM Testing Services	Document <b>SAR Compliance Test Report for the BlackBerry® Smartphone Model RCG41GW</b>	Page <b>18(34)</b>	
	Author Data <b>Jean-Paul Hacquoil</b>	Dates of Test <b>April 01-07, April 30-May 07, May 20, 2009</b>	Test Report No <b>RTS-1615-0905-02 Rev 1</b>

**Title**  
**SubTitle**  
May 06, 2009 11:15 AM

**Title**  
**SubTitle**  
May 06, 2009 04:48 PM

Frequency	e'	e''
1.800000000 GHz	38.7055	13.2744
1.805000000 GHz	38.6870	13.2920
1.810000000 GHz	38.6630	13.3098
1.815000000 GHz	38.6458	13.3385
1.820000000 GHz	38.6396	13.3398
1.825000000 GHz	38.6246	13.3612
1.830000000 GHz	38.6029	13.3807
1.835000000 GHz	38.6047	13.4040
1.840000000 GHz	38.5961	13.4394
1.845000000 GHz	38.5650	13.4465
1.850000000 GHz	38.5542	13.4475
1.855000000 GHz	38.5481	13.4605
1.860000000 GHz	38.5173	13.4913
1.865000000 GHz	38.5102	13.4871
1.870000000 GHz	38.4804	13.5086
1.875000000 GHz	38.4538	13.5251
1.880000000 GHz	38.4383	13.5350
1.885000000 GHz	38.3966	13.5402
1.890000000 GHz	38.3647	13.5513
1.895000000 GHz	38.3403	13.5550
<b>1.900000000 GHz</b>	<b>38.2944</b>	<b>13.5661</b>
1.905000000 GHz	38.2665	13.5868
1.910000000 GHz	38.2523	13.5961
1.915000000 GHz	38.2263	13.5952
1.920000000 GHz	38.2077	13.6249

Head

Frequency	e'	e''
1.800000000 GHz	51.1503	14.2605
1.810000000 GHz	51.1327	14.2939
1.820000000 GHz	51.0961	14.3148
1.830000000 GHz	51.0495	14.3514
1.840000000 GHz	51.0441	14.3713
1.850000000 GHz	51.0079	14.4032
1.860000000 GHz	50.9909	14.4012
1.870000000 GHz	50.9574	14.4277
1.880000000 GHz	50.9218	14.4703
1.890000000 GHz	50.8545	14.4983
<b>1.900000000 GHz</b>	<b>50.7834</b>	<b>14.5197</b>
1.910000000 GHz	50.7255	14.5583
1.920000000 GHz	50.6650	14.5997
1.930000000 GHz	50.6162	14.6243
1.940000000 GHz	50.5865	14.6606
1.950000000 GHz	50.5510	14.6883
1.960000000 GHz	50.5362	14.6942
1.970000000 GHz	50.5414	14.7244
1.980000000 GHz	50.4990	14.7311
1.990000000 GHz	50.4442	14.7495
2.000000000 GHz	50.3963	14.7622

Muscle

Table 17. 1900 MHz head and muscle tissue dielectric parameters

<b>RTS</b> RIM Testing Services	Document	Page	
	<b>SAR Compliance Test Report for the BlackBerry® Smartphone Model RCG41GW</b>		<b>19(34)</b>
Author Data	Dates of Test	Test Report No	FCC ID:
<b>Jean-Paul Hacquoil</b>	<b>April 01-07, April 30-May 07, May 20, 2009</b>	<b>RTS-1615-0905-02 Rev 1</b>	<b>L6ARCG40GW</b>

## Title

### SubTitle

May 11, 2009 11:53 PM

Frequency	e'	e''
2.400000000 GHz	37.7814	13.4042
2.405000000 GHz	37.7397	13.4158
2.410000000 GHz	37.7079	13.4223
2.415000000 GHz	37.6706	13.4116
2.420000000 GHz	37.6375	13.4330
2.425000000 GHz	37.6039	13.4603
2.430000000 GHz	37.5782	13.4733
2.435000000 GHz	37.5361	13.4995
2.440000000 GHz	37.5249	13.5335
2.445000000 GHz	37.5167	13.5843
2.450000000 GHz	37.5158	13.6236
2.455000000 GHz	37.5224	13.6651
2.460000000 GHz	37.5262	13.6927
2.465000000 GHz	37.5367	13.7282
2.470000000 GHz	37.5310	13.7635
2.475000000 GHz	37.5572	13.7808
2.480000000 GHz	37.5500	13.8036
2.485000000 GHz	37.5524	13.8213
2.490000000 GHz	37.5519	13.8251
2.495000000 GHz	37.5420	13.8338
2.500000000 GHz	37.5221	13.8400

Head

## Title

### SubTitle

April 07, 2009 09:41 PM

Frequency	e'	e''
2.400000000 GHz	50.5951	14.1385
2.405000000 GHz	50.5812	14.1187
2.410000000 GHz	50.5387	14.0900
2.415000000 GHz	50.5109	14.0583
2.420000000 GHz	50.4697	14.0033
2.425000000 GHz	50.4288	13.9843
2.430000000 GHz	50.3832	13.9675
2.435000000 GHz	50.3417	13.9389
2.440000000 GHz	50.2944	13.9321
2.445000000 GHz	50.2536	13.9247
2.450000000 GHz	50.2279	13.9353
2.455000000 GHz	50.1995	13.9494
2.460000000 GHz	50.1536	13.9814
2.465000000 GHz	50.1395	14.0360
2.470000000 GHz	50.1519	14.0620
2.475000000 GHz	50.1454	14.1222
2.480000000 GHz	50.1571	14.1673
2.485000000 GHz	50.1561	14.2428
2.490000000 GHz	50.1888	14.3130
2.495000000 GHz	50.2064	14.3586
2.500000000 GHz	50.2299	14.4115

Muscle

Table 18. 2450 MHz head and muscle tissue dielectric parameters

<b>RTS</b> <b>RIM Testing Services</b>	Document <b>SAR Compliance Test Report for the BlackBerry® Smartphone  Model RCG41GW</b>		Page <b>20(34)</b>
	Author Data <b>Jean-Paul Hacquoil</b>	Dates of Test <b>April 01-07, April 30-May 07, May 20,  2009</b>	Test Report No <b>RTS-1615-0905-02 Rev 1</b>

## 7.0 SAR SAFETY LIMITS

Standards/Guideline	Localized SAR Limit (W/kg) General public (uncontrolled)	Localized SAR Limits (W/kg) Workers (controlled)
ICNIRP (1998) Standard	2.0 (10g)	10.0 (10g)
IEEE C95.1 (1999) Standard	1.6 (1g)	8.0 (1g)

**Table 19. SAR safety limits for Controlled / Uncontrolled environment**

Human Exposure	Localized SAR Limits (W/kg) 10g, ICNIRP (1998) Standard	Localized SAR Limits (W/kg) 1g, IEEE C95.1 (1999) Standard
Spatial Average (averaged over the whole body)	0.08	0.08
Spatial Peak (averaged over any X g of tissue)	2.00	1.60
Spatial Peak (hands/wrists/feet/ankles averaged over 10 g)	4.00	4.00 (10g)

**Table 20. SAR safety limits**

**Uncontrolled Environments** are defined as locations where there is exposure of individuals who have no knowledge or control of their exposure.

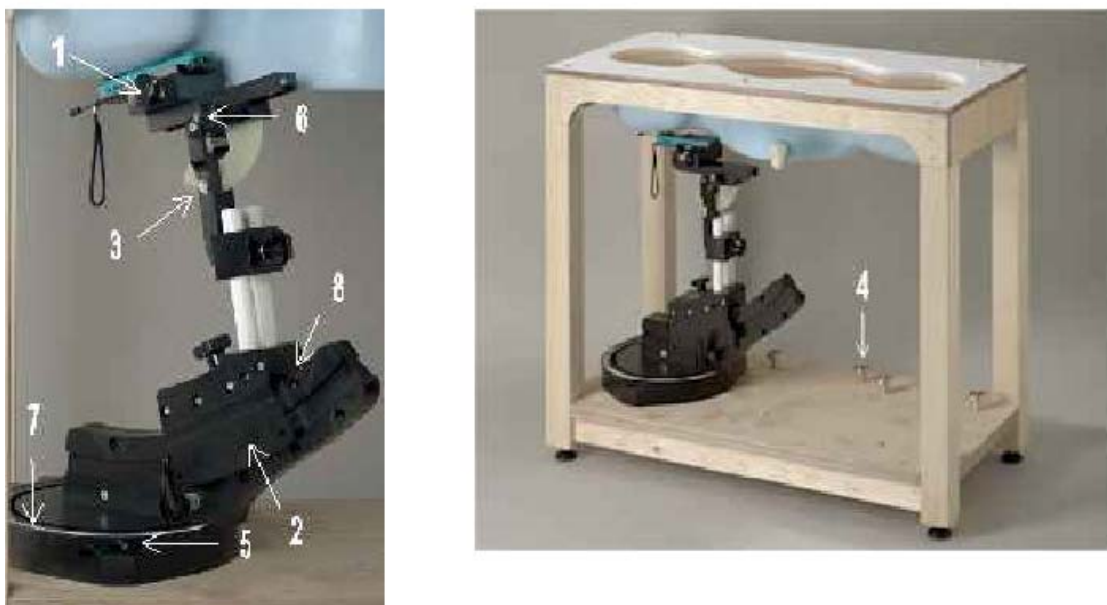
**Controlled Environments** are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation).

<b>RTS</b> <b>RIM Testing Services</b>	Document <b>SAR Compliance Test Report for the BlackBerry® Smartphone  Model RCG41GW</b>	Page <b>21(34)</b>	
	Author Data <b>Jean-Paul Hacquoil</b>	Dates of Test <b>April 01-07, April 30-May 07, May 20,  2009</b>	Test Report No <b>RTS-1615-0905-02 Rev 1</b>

## 8.0 DEVICE POSITIONING

### 8.1 Device holder for SAM Twin Phantom

The Device was positioned for all test configurations using the DASY4 holder. The device holder facilitates the rotation of the mounted transmitter in spherical coordinates whereby the rotation point is the ear opening. The devices can be easily, accurately and with repeatability positioned according to FCC and CENELEC specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).



**Figure 7. Device Holder**

1. Put the phone in the clamp mechanism (1) and hold it straight while tightening. (Curved phones or phones with asymmetrical ear pieces should be positioned so that the earpiece is in the symmetry plane of the clamp).
2. Adjust the sliding carriage (2) to 90°. Then adjust the phone holder angle (3) until the reference line of the phone is horizontal (parallel to the flat phantom bottom). The phone reference line is defined as the front tangential line between the earpiece and the center of the device bottom (or the center of the flip hinge). For devices with parallel front and backsides, the phone holder angle (3) is 0°.
3. Place the device holder at the desired phantom section and move it securely against the positioning pins (4). The screw in front of the turning plate can be applied for correct positioning (5). (Do not tighten it too strongly).
4. Shift the phone clamp (6) so that the earpiece is exactly below the ear marking of the phantom. The phone is now correctly positioned in the holder for all standard phantom measurements, even after changing the phantom or phantom section.
5. Adjust the device position angles to the desired measurement position.

<b>RTS</b> <b>RIM Testing Services</b>	Document <b>SAR Compliance Test Report for the BlackBerry® Smartphone Model RCG41GW</b>	Page <b>22(34)</b>	
	Author Data <b>Jean-Paul Hacquoil</b>	Dates of Test <b>April 01-07, April 30-May 07, May 20, 2009</b>	Test Report No <b>RTS-1615-0905-02 Rev 1</b>

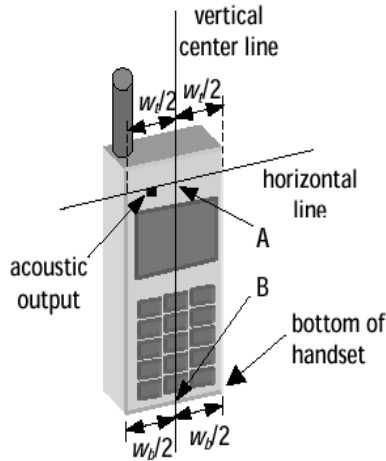
6. After fixing the device angles, move the phone fixture up until the phone touches the ear marking. (The point of contact depends on the design of the device and the positioning angle).

## 8.2 Description of the test positioning

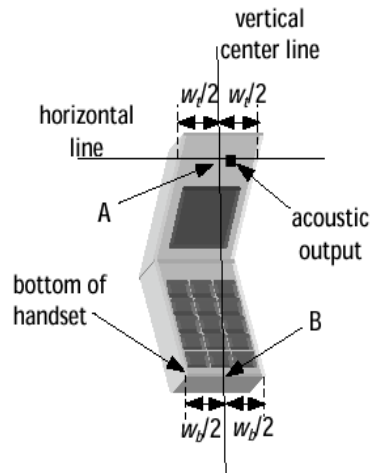
### 8.2.1 Test Positions of Device Relative to Head

The handset was tested in two test positions against the head phantom, the “cheek” position and the “tilted” position, on both left and right sides of the phantom.

The handset was tested in the above positions according to IEEE 1528- 2003 “Recommended Practice for Determining the Spatial-Peak Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques”.



**Figure 8a. Handset vertical and horizontal reference lines – fixed case**



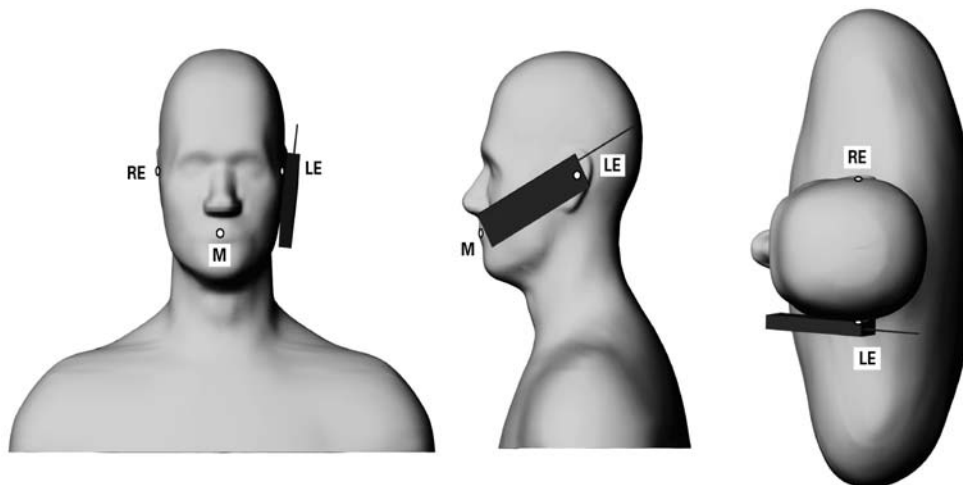
**Figure 8b. Handset vertical and horizontal reference lines – “clam-shell”**



<b>RTS</b> <b>RIM Testing Services</b>	Document <b>SAR Compliance Test Report for the BlackBerry® Smartphone  Model RCG41GW</b>	Page <b>23(34)</b>
	Author Data <b>Jean-Paul Hacquoil</b>	Dates of Test <b>April 01-07, April 30-May 07, May 20,  2009</b>
		FCC ID: <b>L6ARCG40GW</b>

### 8.2.1.1 Definition of the “cheek” position

- 1) Ready the handset for talk operation, if necessary. For example, for handsets with a cover piece, open the cover.
- 2) Define two imaginary lines on the handset: the vertical centerline and the horizontal line. The vertical centerline passes through two points on the front side of the handset: the midpoint of the width  $w_t$  of the handset at the level of the acoustic output (point A on Figures 8a and 8b), and the midpoint of the width  $w_b$  of the bottom of the handset (point B). The horizontal line is perpendicular to the vertical centerline and passes through the center of the acoustic output (see Figure 8a). The two lines intersect at point A. Note that for many handsets, point A coincides with the center of the acoustic output. However, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical centerline is not necessarily parallel to the front face of the handset (see Figure 8b), especially for clamshell handsets, handsets with flip pieces, and other irregularly shaped handsets.
- 3) Position 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 (see Figure 9), such that the plane defined by the vertical center line and the horizontal center line is in a plane approximately parallel to the sagittal plane of the phantom.
- 4) Translate the handset towards the phantom along the line passing through RE and LE until the handset touches the ear.
- 5) While maintaining the handset in this plane, rotate it around the LE-RE line until the vertical centerline is the plane normal to MB (“mouth-back”) - NF (“neck-front”) including the line MB (reference plane).
- 6) Rotate the phone around the vertical centerline until the phone (horizontal line) is symmetrical with respect to the line NF.
- 7) 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, rotate the handset about the line NF until any point on the handset is in contact with a phantom point below the ear (cheek).

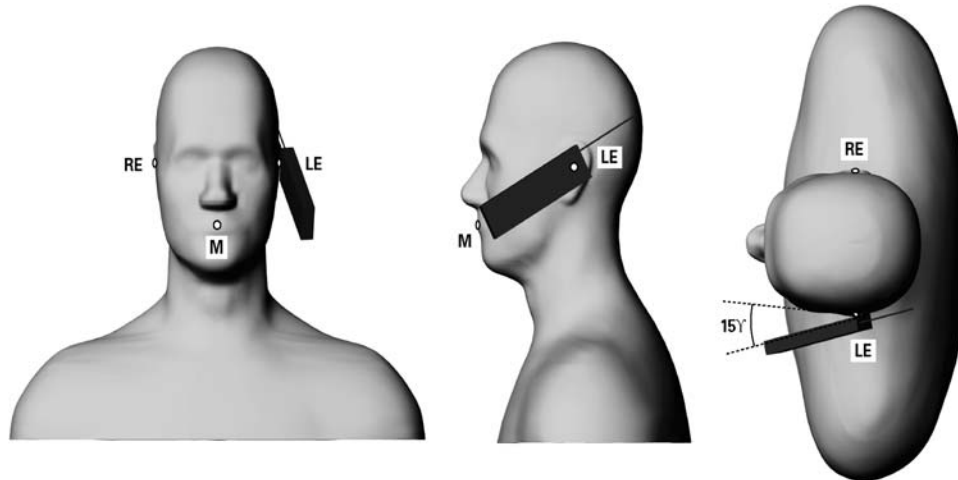


**Figure 9. Phone position 1, “cheek” or “touch” position. The reference points for the right ear (RE), left ear (LE) and mouth (M), which define the reference plane for phone positioning, are indicated. The shoulders are shown for illustration purposes only.**

<b>RTS</b> <b>RIM Testing Services</b>	Document <b>SAR Compliance Test Report for the BlackBerry® Smartphone Model RCG41GW</b>	Page <b>24(34)</b>	
	Author Data <b>Jean-Paul Hacquoil</b>	Dates of Test <b>April 01-07, April 30-May 07, May 20, 2009</b>	Test Report No <b>RTS-1615-0905-02 Rev 1</b>

### 8.2.1.2 Definition of the “Tilted” Position

- 1) Repeat steps 1 to 7 of 5.4.1 (in this report 8.2.1.1) to replace the device in the “cheek position.”
- 2) While maintaining the device in the reference plane (described above) and pivoting against the ear, move the device outward away from the mouth by an angle of 15 degrees, or until the antenna touches the phantom.



**Figure 10. Phone position 2, “tilted position.”** The reference points for the right ear (RE), left ear (LE) and mouth (M), which define the reference plane for phone positioning, are indicated. The shoulders are shown for illustration purposes only.

### 8.2.2 Body Holster Configuration

Body worn holsters, as shown on Figure 2, have been test with the device for FCC RF exposure compliance. The EUT was positioned in each holster case and the belt clip was placed against the flat section of the phantom. A headset was then connected to the device to simulate hands-free operation in a body worn holster configuration.



<b>RTS</b> <b>RIM Testing Services</b>	Document <b>SAR Compliance Test Report for the BlackBerry® Smartphone  Model RCG41GW</b>		Page <b>25(34)</b>
	Author Data <b>Jean-Paul Hacquoil</b>	Dates of Test <b>April 01-07, April 30-May 07, May 20,  2009</b>	Test Report No <b>RTS-1615-0905-02 Rev 1</b>

## 9.0 HIGH LEVEL EVALUATION

### 9.1 Maximum search

The maximum search is automatically performed after each coarse scan measurement. It is based on splines in two or three dimensions. The procedure can find the maximum for most SAR distributions even with relatively large grid spacing. After the coarse scan measurement, the probe is automatically moved to a position at the interpolated maximum. The following scan can directly use this position for reference, e.g., for a finer resolution grid or the cube evaluations.

### 9.2 Extrapolation

The extrapolation can be used in z-axis scans with automatic surface detection. The SAR values can be extrapolated to the inner phantom surface. The extrapolation distance is the sum of the probe sensor offset, the surface detection distance and the grid offset. The extrapolation is based on fourth order polynomial functions. The extrapolation is only available for SAR values.

### 9.3 Boundary correction

The correction of the probe boundary effect in the vicinity of the phantom surface is done in the standard (worst case) evaluation; the boundary effect is reduced by different weights for the lowest measured points in the extrapolation routine. The result is a slight overestimation of the extrapolated SAR values (2% to 8%) depending on the SAR distribution and gradient. The advanced evaluation makes a full compensation of the boundary effect before doing the extrapolation. This is only possible for probes with specifications on the boundary effect.

### 9.4 Peak search for 1g and 10g cube averaged SAR

The 1g and 10g peak evaluations are only available for the predefined cube 5x5x7 scan. The routines are verified and optimized for the grid dimensions used in these cube measurements.

The measured volume of 30x30x30mm with 7.5mm resolution in (x,y) and 5mm resolution in z axis amounts to 175 measurement points. The first procedure is an extrapolation (incl. Boundary correction) to get the points between the lowest measured plane and the surface. The next step uses 3D interpolation to get all points within the measured volume in a 1mm grid. In the last step, a 1g cube is placed numerically into the volume and its averaged SAR is calculated. This cube is then moved around until the highest averaged SAR is found. This last procedure is repeated for a 10 g cube. If the highest SAR is found at the edge of the measured volume, the system will issue a warning: higher SAR values might be found outside of the measured volume. In that case the cube measurement can be repeated, using the new interpolated maximum as the center.

<b>RTS</b> RIM Testing Services	Document	SAR Compliance Test Report for the BlackBerry® Smartphone Model RCG41GW		Page	26(34)
	Author Data	Dates of Test	Test Report No	FCC ID:	
Jean-Paul Hacquoil	April 01-07, April 30-May 07, May 20, 2009	RTS-1615-0905-02 Rev 1	L6ARCG40GW		

## 10.0 MEASUREMENT UNCERTAINTY

<b>DASY4 Uncertainty Budget</b> According to IEEE P1528 [1]								
Error Description	Uncertainty value	Prob. Dist.	Div.	( $c_1$ ) 1g	( $c_2$ ) 10g	Std. Unc. (1g)	Std. Unc. (10g)	( $v_i$ ) $v_{eff}$
<b>Measurement System</b>								
Probe Calibration	±4.8%	N	1	1	1	±4.8%	±4.8%	∞
Axial Isotropy	±4.7%	R	√3	0.7	0.7	±1.9%	±1.9%	∞
Hemispherical Isotropy	±9.6%	R	√3	0.7	0.7	±3.9%	±3.9%	∞
Boundary Effects	±1.0%	R	√3	1	1	±0.6%	±0.6%	∞
Linearity	±4.7%	R	√3	1	1	±2.7%	±2.7%	∞
System Detection Limits	±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%	∞
Probe Positioner	±0.4%	R	√3	1	1	±0.2%	±0.2%	∞
Probe Positioning	±2.9%	R	√3	1	1	±1.7%	±1.7%	∞
Max. SAR Eval.	±1.0%	R	√3	1	1	±0.6%	±0.6%	∞
<b>Test Sample Related</b>								
Device Positioning	±2.9%	N	1	1	1	±2.9%	±2.9%	145
Device Holder	±3.6%	N	1	1	1	±3.6%	±3.6%	5
Power Drift	±5.0%	R	√3	1	1	±2.9%	±2.9%	∞
<b>Phantom and Setup</b>								
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 (meas.)	±2.5%	N	1	0.64	0.43	±1.6%	±1.1%	∞
Liquid Permittivity (target)	±5.0%	R	√3	0.6	0.49	±1.7%	±1.4%	∞
Liquid Permittivity (meas.)	±2.5%	N	1	0.6	0.49	±1.5%	±1.2%	∞
Combined Std. Uncertainty						±10.3%	±10.0%	330
Expanded STD Uncertainty						±20.6%	±20.1%	

Table 21. Worst-Case uncertainty budget for DASY4 assessed according to IEEE P1528.

Source: Schmid & Partner Engineering AG.

[1] The budget is valid for the frequency range 300MHz - 3 GHz and represents a worst-case analysis. For specific tests and configurations, the uncertainty could be considerably smaller.

<b>RTS</b> <b>RIM Testing Services</b>	Document <b>SAR Compliance Test Report for the BlackBerry® Smartphone  Model RCG41GW</b>		Page <b>27(34)</b>
	Author Data <b>Jean-Paul Hacquoil</b>	Dates of Test <b>April 01-07, April 30-May 07, May 20,  2009</b>	Test Report No <b>RTS-1615-0905-02 Rev 1</b>

## 11.0 TEST RESULTS

### 11.1 SAR Measurement results at highest power measured against the head

Test Position	Mode	f (MHz)	Cond. Output Power (dBm)	Liquid Temp. (°C)	SAR, averaged over 1 g		
					Measured (W/kg)	Power Drift (dB)	*Extrapolated (W/kg)
Left Head Cheek	2-slots GSM/EDGE 850 MHz	824.2	30.7	22.5	0.768	0.056	0.77
		836.8	30.6	22.2	0.830	0.084	0.83
		848.8	30.5	22.0	0.863	-0.036	0.86
Left Head Cheek	1-slot GSM 850 MHz	824.2	33.5				
		836.8	33.4				
		848.8	33.2	22.1	0.919	0.074	0.92
Left Head 15° Tilt	1-slot GSM 850 MHz	824.2	33.5				
		836.8	33.4				
		848.8	33.2	21.8	0.506	-0.122	0.51
Right Head Cheek	2-slots GSM/EDGE 850 MHz	824.2	30.7				
		836.8	30.6				
		848.8	30.5	22.1	0.851	-0.042	0.85
Right Head Cheek	1-slot GSM 850 MHz	824.2	33.5	21.7	0.820	0.016	0.82
		836.8	33.4	21.8	0.827	-0.056	0.83
		848.8	33.2	22.0	0.849	-0.003	0.85
Right Head 15° Tilt	2-slots GSM/EDGE 850 MHz	824.2	30.7				
		836.8	30.6				
		848.8	30.5	22.1	0.500	-0.039	0.50

**Table 22. SAR results for head configuration**

\* Note: If the power drift is  $\leq -0.200$  dB, the extrapolated SAR is calculated using the formula:  
Extrapolated SAR = (Measured SAR) \*  $10^{(|\text{Power Drift (dB)}| / 10)}$

<b>RTS</b> <b>RIM Testing Services</b>	Document <b>SAR Compliance Test Report for the BlackBerry® Smartphone  Model RCG41GW</b>		Page <b>28(34)</b>
	Author Data <b>Jean-Paul Hacquoil</b>	Dates of Test <b>April 01-07, April 30-May 07, May 20,  2009</b>	Test Report No <b>RTS-1615-0905-02 Rev 1</b>
			FCC ID: <b>L6ARCG40GW</b>

Test Position	Mode	f (MHz)	Cond. Output Power (dBm)	Liquid Temp. (°C)	SAR, averaged over 1 g		
					Measured (W/kg)	Power Drift (dB)	*Extrapolated (W/kg)
Left Head Cheek	2-slots GSM/EDGE 1900 MHz	1850.2	27.1	21.8	0.726	-0.181	0.73
		1880.0	27.0	21.9	0.639	-0.101	0.64
		1909.8	26.6	21.7	0.544	0.016	0.54
Left Head Cheek	1-slot GSM 1900 MHz	1850.2	30.6	21.6	0.798	-0.187	0.80
		1880.0	30.5				
		1909.8	29.9				
Left Head 15° Tilt	1-slot GSM 1900 MHz	1850.2	30.6	21.5	0.613	0.155	0.61
		1880.0	30.5				
		1909.8	29.9				
Right Head Cheek	2-slots GSM/EDGE 1900 MHz	1850.2	27.1	21.6	1.040	0.122	1.04
		1880.0	27.0				
		1909.8	26.6				
Right Head Cheek	1-slot GSM 1900 MHz	1850.2	30.6	21.7	1.220	-0.144	<b>1.22</b>
		1880.0	30.5	21.5	1.100	0.007	1.10
		1909.8	29.9	21.5	0.854	-0.023	0.85
Right Head 15° Tilt	1-slot GSM 1900 MHz	1850.2	30.6	21.5	0.466	0.037	0.47
		1880.0	30.5				
		1909.8	29.9				

**Table 23. SAR results for GSM/EDGE 1900 for head configuration**

<b>RTS</b> <b>RIM Testing Services</b>	Document <b>SAR Compliance Test Report for the BlackBerry® Smartphone  Model RCG41GW</b>		Page <b>29(34)</b>
	Author Data <b>Jean-Paul Hacquoil</b>	Dates of Test <b>April 01-07, April 30-May 07, May 20,  2009</b>	Test Report No <b>RTS-1615-0905-02 Rev 1</b>
			FCC ID: <b>L6ARCG40GW</b>

Test Position	Mode	f (MHz)	Cond. Output Power (dBm)	Liquid Temp. (°C)	SAR, averaged over 1 g		
					Measured (W/kg)	Power Drift (dB)	*Extrapolated (W/kg)
Left Head Cheek	802.11 b 2450 MHz	2412	17.00	23.2	0.139	-0.838	0.17
		2437	17.30	22.7	0.088	0.343	0.09
		2462	17.60	22.8	0.075	0.225	0.08
Left Head 15° Tilt	802.11 b 2450 MHz	2412	17.00	22.7	0.095	-0.116	0.10
		2437	17.30				
		2462	17.60				
Right Head Cheek	802.11 b 2450 MHz	2412	17.00	23.0	0.076	0.203	0.08
		2437	17.30	22.9	0.047	-0.166	0.05
		2462	17.60	22.2	0.045	0.089	0.04
Right Head 15° Tilt	802.11 b 2450 MHz	2412	17.00	22.3	0.072	-0.138	0.07
		2437	17.30				
		2462	17.60				
Left Head Cheek	BT 2450 MHz	2402	8.33				
		2441	8.33	23.0	0.002	-2.05	0.003
		2483	8.67				
Right Head Cheek	BT 2450 MHz	2402	8.33				
		2441	8.33	23.3	0.001	4.59	0.001
		2483	8.67				

**Table 24. Head SAR results for BT and WiFi/WLAN/802.11b modes**

Test Position	Mode	f (MHz)	Cond. Output Power (dBm)	Liquid Temp. (°C)	SAR, averaged over 1 g		
					Measured (W/kg)	Power Drift (dB)	*Extrapolated (W/kg)
Left Head Cheek	802.11 b 2450 MHz	2412	17.00	22.1	0.236	0.017	0.24
		2437	17.30	22.0	0.219	-0.096	0.22
		2462	17.60	21.7	0.287	0.000	0.29
Right Head Cheek	802.11 b 2450 MHz	2412	17.00				
		2437	17.30				
		2462	17.60	21.8	0.113	-0.150	0.11

**Table 25. Head SAR results for WiFi/WLAN/802.11b modes for Rev 3**

<b>RTS</b> RIM Testing Services	Document <b>SAR Compliance Test Report for the BlackBerry® Smartphone Model RCG41GW</b>		Page <b>30(34)</b>
	Author Data <b>Jean-Paul Hacquoil</b>	Dates of Test <b>April 01-07, April 30-May 07, May 20, 2009</b>	Test Report No <b>RTS-1615-0905-02 Rev 1</b>
			FCC ID: <b>L6ARCG40GW</b>

## 11.2 SAR measurement results at highest power measured against the body using accessories

Mode	Freq. (MHz)	Cond. Power (dBm)	Holster type / device configuration	Liquid Temp. (°C)	SAR, averaged over 1 g		
					Measured (W/kg)	Power Drift (dB)	*Extrapolated (W/kg)
2slots GPRS 850 MHz	824.2	30.7	Vertical Holster #1, back side facing	22.5	0.834	0.065	<b>0.83</b>
	836.8	30.6	Vertical Holster #1, back side facing	22.2	0.747	0.101	0.75
	848.8	30.5	Vertical Holster #1, back side facing	22.3	0.659	-0.125	0.66
	824.2	30.7	Vertical Holster #1, front side facing	22.3	0.621	-0.096	0.62
	824.2	30.7	Vertical Holster #1, headset #1, back side facing	22.1	0.724	-0.073	0.72
	824.2	30.7	Vertical Holster #1, headset #2, back side facing	22.0	0.474	0.008	0.47
	824.2	30.7	Vertical Holster #1, headset #3, back side facing	22.0	0.549	-0.036	0.55
	824.2	30.7	Vertical Holster #2, back side facing	22.0	0.703	-0.030	0.70
	824.2	30.7	Horizontal Holster , back side facing	22.1	0.682	0.061	0.68
	824.2	30.7	No Holster, back side 25 mm away	22.0	0.507	-0.037	0.51

**Table 26. SAR results for GPRS850 body-worn configurations**

<b>RTS</b> <b>RIM Testing Services</b>	Document <b>SAR Compliance Test Report for the BlackBerry® Smartphone  Model RCG41GW</b>		Page <b>31(34)</b>
	Author Data <b>Jean-Paul Hacquoil</b>	Dates of Test <b>April 01-07, April 30-May 07, May 20,  2009</b>	Test Report No <b>RTS-1615-0905-02 Rev 1</b>

Mode	Freq. (MHz)	Cond. Power (dBm)	Holster type / device configuration	Liquid Temp. (°C)	SAR, averaged over 1 g		
					Measured (W/kg)	Power Drift (dB)	*Extrapolated (W/kg)
2-slots GPRS 1900 MHz	1850.2	27.1	Vertical Holster #1, back side facing	21.8	0.344	0.017	0.34
	1880.0	27.0	Vertical Holster #1, back side facing	22.1	0.383	0.013	0.38
	1909.8	26.6	Vertical Holster #1, back side facing	22.0	0.417	-0.057	0.42
	1909.8	26.6	Vertical Holster #1, front side facing	22.0	0.202	-0.043	0.20
	1909.8	26.6	Vertical Holster #1, headset #1, back side facing	22.4	0.396	0.071	0.40
	1909.8	26.6	Vertical Holster #1, headset #2, back side facing	22.3	0.357	-0.009	0.36
	1909.8	26.6	Vertical Holster #1, headset #3, back side facing	22.1	0.358	0.013	0.36
	1909.8	26.6	Vertical Holster #2, back side facing	22.3	0.246	-0.078	0.25
	1909.8	26.6	Horizontal Holster , back side facing	22.2	0.259	0.009	0.26
	1909.8	26.6	No Holster, back side 25 mm away	22.0	0.208	0.043	0.21

**Table 27. SAR results for GPRS1900 body-worn configurations**

<b>RTS</b> RIM Testing Services	Document <b>SAR Compliance Test Report for the BlackBerry® Smartphone Model RCG41GW</b>		Page <b>32(34)</b>
	Author Data <b>Jean-Paul Hacquoil</b>	Dates of Test <b>April 01-07, April 30-May 07, May 20, 2009</b>	Test Report No <b>RTS-1615-0905-02 Rev 1</b>
			FCC ID: <b>L6ARCG40GW</b>

Mode	Freq. (MHz)	Cond. Power (dBm)	Holster type / device configuration	Liquid Temp. (°C)	SAR, averaged over 1 g		
					Measured (W/kg)	Power Drift (dBm)	*Extrapolated (W/kg)
802.11b/ WLAN 2450 MHz	2412	17.00	Vertical Holster #2, back side facing	22.5	0.084	-0.163	0.08
	2412	17.30	Vertical Holster #2, front side facing	22.7	0.0003	0.308	0.0003
	2412	17.60	Horizontal Holster, back side facing	22.8	0.112	-0.111	0.11
	2437	17.00	Horizontal Holster, back side facing	22.7	0.060	-0.118	0.06
	2462	17.00	Horizontal Holster, back side facing	22.7	0.093	-0.118	0.09
	2412	17.00	Horizontal Holster, front side facing	22.7	0.017	-0.099	0.02
	2412	17.00	Horizontal Holster, headset, back side facing	22.9	0.076	-0.126	0.08
	2412	17.00	No Holster, back side 25 mm away	22.8	0.056	0.052	0.06
Bluetooth	2441	8.33	Horizontal Holster, back side facing	22.9	0.0008	1.13	0.0008
	2441	8.33	Vertical Holster #2, Back side facing	23.0	0.0008	0.745	0.0008

**Table 28. SAR results for body-worn configurations**

Mode	Freq. (MHz)	Cond. Power (dBm)	Holster type / device configuration	Liquid Temp. (°C)	SAR, averaged over 1 g		
					Measured (W/kg)	Power Drift (dBm)	*Extrapolated (W/kg)
802.11b/ WLAN 2450 MHz	2412	17.00	Vertical Holster #1, back side facing	21.6	0.353	-0.210	0.37
	2437	17.30	Vertical Holster #1, back side facing	21.7	0.370	-0.120	0.37
	2462	17.60	Vertical Holster #1, back side facing	21.7	0.324	0.068	0.32
	2437	17.30	Vertical Holster #1, headset #1, back side facing	21.8	0.331	-0.080	0.33
	2437	17.30	Vertical Holster #1, headset #2, back side facing	21.8	0.317	0.008	0.32
	2437	17.30	Vertical Holster #1, headset #3, back side facing	21.7	0.299	0.026	0.30

**Table 29. SAR results for body-worn configurations for Rev 3**



<b>RTS</b> <b>RIM Testing Services</b>	Document <b>SAR Compliance Test Report for the BlackBerry® Smartphone  Model RCG41GW</b>		Page <b>33(34)</b>
	Author Data <b>Jean-Paul Hacquoil</b>	Dates of Test <b>April 01-07, April 30-May 07, May 20,  2009</b>	Test Report No <b>RTS-1615-0905-02 Rev 1</b>

## 12.0 REFERENCES

- [1] IEEE 1528-2003: Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques.
- [2] EN 50360: 2001, Product standard to demonstrate the compliance of mobile phones with the basic restrictions related to human exposure to electromagnetic fields (300 MHz – 3 GHz)
- [3] EN 50361: 2001, Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz – 3 GHz)
- [4] ICNIRP, International Commission on Non-Ionizing Radiation Protection (1998), Guidelines for limiting exposure in time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz).
- [5] Council Recommendation 1999/519/EC of July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz)
- [6] IEEE C95.3-1991, IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields – RF and Microwave.
- [7] IEEE C95.1-1999, IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.
- [8] FCC OET Bulletin 65 (Edition 97-01) Supplement C (Edition 01-01), Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields.
- [9] FCC 96-326, Guidelines for Evaluating the Environmental Effects of Radio-Frequency Radiation.
- [10] DASY 4 DOSIMETRIC ASSESSMENT SYSTEM SOFTWARE MANUAL V4.7 Schmid & Partner Engineering AG, June 2006 which follows draft IEC 62209 – Part 2.
- [11] Health Canada, Safety Code 6, 1999: Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency range from 3 kHz to 300 GHz.
- [12] RSS-102, issue 2-2005: 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.
- [13] IEC 62209-1, First Edition-2005: Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures –Part 1: Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)
- [14] FCC OET SAR Measurement Requirements for 3 – 6 GHz, October, 2006.
- [15] FCC OET SAR Measurement Procedures for 802.11 a/b/g Transmitters, May, 2007.

<b>RTS</b> <b>RIM Testing Services</b>	Document <b>SAR Compliance Test Report for the BlackBerry® Smartphone Model RCG41GW</b>		Page <b>34(34)</b>
Author Data <b>Jean-Paul Hacquoil</b>	Dates of Test <b>April 01-07, April 30-May 07, May 20, 2009</b>	Test Report No <b>RTS-1615-0905-02 Rev 1</b>	FCC ID: <b>L6ARCG40GW</b>

[16] FCC OET SAR Evaluation Considerations for Handsets with Multiple Transmitters & Antennas, September, 2008.

[17] FCC OET SAR Test Reduction Procedure for GSM/GPRS/EDGE, December, 2008.

[18] FCC OET SAR Probe Calibration and System Verification Considerations for Measurements at 150 MHz – 3 GHz, January, 2007.

[19] FCC OET RF Exposure Procedures for Mobile and Portable Devices, January, 2009.

[20] FCC OET SAR Measurements Procedures for 3G Devices, October, 2007.