RESEARCH IN MOTION	Appendices for the BlackBerry 7100t Wireless Handheld Model No. RAQ40GW test report			
Author Data	Dates of Test	Test Report No	FCC ID:	
Daoud Attayi	June 29 – July 07, 2004	RIM-0094-0407-03	L6AQAP40GV	N

APPENDIX D: PROBE & DIPOLE CALIBRATION DATA

RESEARCH IN MOTION	Appendices for the BlackBerry 7100t Wireless Handheld Model No. RAQ40GW test report			
Author Data	Dates of Test	Test Report No	FCC ID:	
Daoud Attayi	June 29 – July 07, 2004	RIM-0094-0407-03	L6AQAP40GW	

Calibration Laboratory of Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland

RIM

Client

-

Object(s)	ET3DV6 - SN	1643	
5,000,07	LIDDIG ON		
alibration procedure(s)	QA CAL-01.v2 Calibration on	cedure for dosimetric E-field prob	
	consider, pro		
alibration date:	October 9, 200	03	
ondition of the calibrated item	In Tolerance (	according to the specific calibration	n document)
his calibration statement documer	ts traceability of M&TE	used in the calibration procedures and conformity of	the procedures with the ISO/IEC
7025 international standard.			
I calibrations have been conducte	d in the closed laborato	ry facility: environment temperature 22 +/- 2 degrees	s Celsius and humidity < 75%.
alibration Equipment used (M&TE	critical for calibration)		
odel Type	ID #		
and the second s		Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
ower meter EPM E4419B	GB41293874	2-Apr-03 (METAS, No 252-0250)	Scheduled Calibration Apr-04
ower meter EPM E4419B ower sensor E4412A	GB41293874 MY41495277	2-Apr-03 (METAS, No 252-0250) 2-Apr-03 (METAS, No 252-0250)	Apr-04 Apr-04
ower meter EPM E4419B ower sensor E4412A oference 20 dB Attenuator	GB41293874 MY41495277 SN: 5086 (20b)	2-Apr-03 (METAS, No 252-0250)	Apr-04
ower meter EPM E4419B ower sensor E4412A eference 20 dB Attenuator uke Process Calibrator Type 702	GB41293874 MY41495277 SN: 5086 (20b) SN: 6295803	2-Apr-03 (METAS, No 252-0250) 2-Apr-03 (METAS, No 252-0250)	Apr-04 Apr-04
ower meter EPM E4419B ower sensor E4412A eference 20 dB Attenuator uke Process Calibrator Type 702 ower sensor HP 8481A	GB41293874 MY41495277 SN: 5086 (20b) SN: 6295803 MY41092180	2-Apr-03 (METAS, No 252-0250) 2-Apr-03 (METAS, No 252-0250) 3-Apr-03 (METAS No. 251-0340 8-Sep-03 (Sintrel SCS No. E-030020) 18-Sep-02 (Agilent, No. 20020918)	Apr-04 Apr-04 Apr-04
ower meter EPM E4419B ower sensor E4412A eference 20 dB Attenuator uke Process Calibrator Type 702 ower sensor HP 8481A	GB41293874 MY41495277 SN: 5086 (20b) SN: 6295803	2-Apr-03 (METAS, No 252-0250) 2-Apr-03 (METAS, No 252-0250) 3-Apr-03 (METAS No. 251-0340 8-Sep-03 (Sintrel SCS No. E-030020)	Apr-04 Apr-04 Apr-04 Sep-04
ower meter EPM E4419B ower sensor E4412A eference 20 dB Attenuator luke Process Calibrator Type 702 ower sensor HP 8481A F generator HP 8684C	GB41293874 MY41495277 SN: 5086 (20b) SN: 6295803 MY41092180	2-Apr-03 (METAS, No 252-0250) 2-Apr-03 (METAS, No 252-0250) 3-Apr-03 (METAS No. 251-0340 8-Sep-03 (Sintrel SCS No. E-030020) 18-Sep-02 (Agilent, No. 20020918)	Apr-04 Apr-04 Apr-04 Sep-04 In house check: Oct 03
ower meter EPM E4419B ower sensor E4412A eference 20 dB Attenuator luke Process Calibrator Type 702 ower sensor HP 8481A F generator HP 8684C	GB41293874 MY41495277 SN: 5086 (20b) SN: 6295803 MY41092180 US3642U01700	2-Apr-03 (METAS, No 252-0250) 2-Apr-03 (METAS, No 252-0250) 3-Apr-03 (METAS No. 251-0340 8-Sep-03 (Sintrel SCS No. E-030020) 18-Sep-02 (Agilent, No. 20020918) 4-Aug-99 (SPEAG, in house check Aug-02)	Apr-04 Apr-04 Apr-04 Sep-04 In house check: Oct 03 In house check: Aug-05
ower meter EPM E4419B ower sensor E4412A eference 20 dB Attenuator luke Process Calibrator Type 702 ower sensor HP 8481A F generator HP 8684C etwork Analyzer HP 8753E	GB41293874 MY41495277 SN: 5086 (20b) SN: 6295803 MY41092180 US3642U01700 US37390585	2-Apr-03 (METAS, No 252-0250) 2-Apr-03 (METAS, No 252-0250) 3-Apr-03 (METAS No. 251-0340 8-Sep-03 (Sintrel SCS No. E-030020) 18-Sep-02 (Agilent, No. 20020918) 4-Aug-99 (SPEAG, in house check Aug-02) 18-Oct-01 (Agilent, No. 24BR1033101)	Apr-04 Apr-04 Apr-04 Sep-04 In house check: Oct 03 In house check: Aug-05 In house check: Oct 03
ower meter EPM E4419B ower sensor E4412A eference 20 dB Attenuator luke Process Calibrator Type 702 ower sensor HP 8481A F generator HP 8684C etwork Analyzer HP 8753E alibrated by:	GB41293874 MY41495277 SN: 5086 (20b) SN: 6295803 MY41092180 US3642U01700 US37390585 Name Nico Vettert	2-Apr-03 (METAS, No 252-0250) 2-Apr-03 (METAS, No 252-0250) 3-Apr-03 (METAS No. 251-0340 8-Sep-03 (Sintrel SCS No. E-030020) 18-Sep-02 (Agilent, No. 20020918) 4-Aug-99 (SPEAG, in house check Aug-02) 18-Oct-01 (Agilent, No. 24BR1033101) Function	Apr-04 Apr-04 Apr-04 Sep-04 In house check: Oct 03 In house check: Aug-05 In house check: Oct 03
ower meter EPM E4419B ower sensor E4412A eference 20 dB Attenuator uke Process Calibrator Type 702 ower sensor HP 8481A F generator HP 8684C etwork Analyzer HP 8753E alibrated by:	GB41293874 MY41495277 SN: 5086 (20b) SN: 6295803 MY41092180 US3642U01700 US37390585 Name	2-Apr-03 (METAS, No 252-0250) 2-Apr-03 (METAS, No 252-0250) 3-Apr-03 (METAS No. 251-0340 8-Sep-03 (Sintrel SCS No. E-030020) 18-Sep-02 (Agilent, No. 20020918) 4-Aug-99 (SPEAG, in house check Aug-02) 18-Oct-01 (Agilent, No. 24BR1033101) Function	Apr-04 Apr-04 Apr-04 Sep-04 In house check: Oct 03 In house check: Aug-05 In house check: Oct 03
ower meter EPM E4419B ower sensor E4412A leference 20 dB Attenuator luke Process Calibrator Type 702 ower sensor HP 8481A IF generator HP 8684C letwork Analyzer HP 8753E alibrated by:	GB41293874 MY41495277 SN: 5086 (20b) SN: 6295803 MY41092180 US3642U01700 US37390585 Name Nico Vettert	2-Apr-03 (METAS, No 252-0250) 2-Apr-03 (METAS, No 252-0250) 3-Apr-03 (METAS No. 251-0340 8-Sep-03 (Sintrel SCS No. E-030020) 18-Sep-02 (Agilent, No. 20020918) 4-Aug-99 (SPEAG, in house check Aug-02) 18-Oct-01 (Agilent, No. 24BR1033101) Function	Apr-04 Apr-04 Apr-04 Sep-04 In house check: Oct 03 In house check: Aug-05 In house check: Oct 03
ower meter EPM E4419B ower sensor E4412A eference 20 dB Attenuator uke Process Calibrator Type 702 ower sensor HP 8481A F generator HP 8684C etwork Analyzer HP 8753E alibrated by:	GB41293874 MY41495277 SN: 5086 (20b) SN: 6295803 MY41092180 US3642U01700 US37390585 Name Nico Vetterti	2-Apr-03 (METAS, No 252-0250) 2-Apr-03 (METAS, No 252-0250) 3-Apr-03 (METAS No. 251-0340 8-Sep-03 (Sintrel SCS No. E-030020) 18-Sep-02 (Agilent, No. 20020918) 4-Aug-99 (SPEAG, in house check Aug-02) 18-Oct-01 (Agilent, No. 24BR1033101) Function Technician	Apr-04 Apr-04 Apr-04 Sep-04 In house check: Oct 03 In house check: Aug-05 In house check: Oct 03 Signature
ower meter EPM E4419B ower sensor E4412A eference 20 dB Attenuator luke Process Calibrator Type 702 ower sensor HP 8481A F generator HP 8684C etwork Analyzer HP 8753E alibrated by:	GB41293874 MY41495277 SN: 5086 (20b) SN: 6295803 MY41092180 US3642U01700 US37390585 Name Nico Vetterti Katja Pokovic	2-Apr-03 (METAS, No 252-0250) 2-Apr-03 (METAS, No 252-0250) 3-Apr-03 (METAS No. 251-0340 8-Sep-03 (Sintrel SCS No. E-030020) 18-Sep-02 (Aglient, No. 20020918) 4-Aug-99 (SPEAG, in house check Aug-02) 18-Oct-01 (Aglient, No. 24BR1033101) Function Technician Laboratory Director	Apr-04 Apr-04 Apr-04 Sep-04 In house check: Oct 03 In house check: Aug-05 In house check: Oct 03 Signature

This report shall <u>NOT</u> be reproduced except in full without the written consent of Kesearch in Motion Limited

RESEARCH IN MOTION	11	Appendices for the BlackBerry 7100t Wireless Handheld Model No. RAQ40GW test report				
Author Data	Dates of Test	Test Report No	FCC ID:			
Daoud Attayi	June 29 – July 07, 2004	RIM-0094-0407-03	L6AQAP40	GW		

Schmid & Partner Engineering AG

s <u>p e a g</u>

Zeughausstrasse 43, 8004 Zurich, Switzerland Phone +41 1 245 9700, Fax +41 1 245 9779 info@speag.com, http://www.speag.com

# Probe ET3DV6

# SN:1643

Manufactured:November 7, 2001Last calibration:September 24, 2002Recalibrated:October 9, 2003

Calibrated for DASY Systems (Note: non-compatible with DASY2 system!)

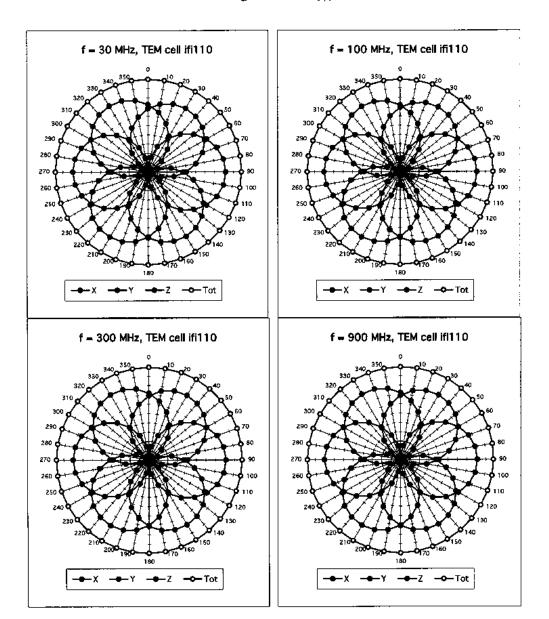
Page 1 of 9

RESEARCH IN MOTION	Appendices for the BlackE Model No. RAQ40GW tes	2	andheld	Page 4(27)
Author Data	Dates of Test	Test Report No	FCC ID:	
Daoud Attayi	June 29 – July 07, 2004	RIM-0094-0407-03	L6AQAP40	GW

ET3DV6	SN:1643					Octol	ber 9, 2003
DAS	Y - Param	eters o	f Probe: ET	3DV6 SN:1	643		
Sensit	ivity in Free	Space		Diode Co	mpressio	on	
	NormX	1.7	<b>3</b> μV/(V/m) <sup>2</sup>		DCP X	96	mV
	NormY	1.8	<b>8 μV/(V/m)<sup>2</sup></b>		DCP Y	96	mV
	NormZ	1.8	1 μV/(V/m) <sup>2</sup>		DCP Z	96	mV
Sensiti	vity in Tissue	e Simulati	ng Liquid				
Head	90	0 MHz	ε <sub>r</sub> = 41.5 :	± 5% σ =	0.97 ± 5%	mho/m	
Valid for f	=800-1000 MHz v	vith Head Tiss	ue Simulating Liquid ac	cording to EN 50361	, P1528-200	х	
	ConvF X	6.	5 ± 9.5% (k=2)		Boundary ef	ffect:	
	ConvF Y	6.	5 ± 9.5% (k=2)		Alpha	0.37	
	ConvF Z	6.	5 ± 9.5% (k=2)		Depth	2.72	
Head	180	0 MHz	ε <sub>r</sub> = 40.0 :	± 5% σ=	1.40 ± 5%	mho/m	
Valid for f	=1710-1910 MHz	with Head Tis	sue Simulating Liquid a	ccording to EN 5036	51, P1528-20	ox	
	ConvF X	5.	2 ± 9.5% (k=2)		Boundary ef	ffect:	
	ConvF Y	5.	2 ± 9.5% (k=2)		Alpha	0.47	
	ConvF Z	5.	2 ± 9.5% (k=2)		Depth	2.87	
Bound	lary Effect						
Head	90	0 MHz	Typical SAR gradi	ent: 5 % per mm			
	Probe Tip to	Boundary			1 mm	2 mm	
	SAR <sub>be</sub> [%]		prrection Algorithm		10.8	6.3	
	SAR <sub>be</sub> [%]	With Corre	ction Algorithm		0.4	0.6	
Head	180	0 MHz	Typical SAR gradi	ent: 10 % per mm			
	Probe Tip to	Boundary			1 mm	2 mm	
	SAR <sub>be</sub> [%]		prrection Algorithm		14.5	10.1	
	SAR <sub>be</sub> [%]	With Corre	ction Algorithm		0.2	0.1	
Senso	r Offset						
	Probe Tip to	Sensor Cente	er	2.7		mm	
	Optical Surfa	ce Detection		1.4 ± 0.2		mm	
				0			
			Page 2 of	9			

RESEARCH IN MOTION	11	Appendices for the BlackBerry 7100t Wireless Handheld Model No. RAQ40GW test report				
Author Data	Dates of Test	Test Report No	FCC ID:			
Daoud Attayi	June 29 – July 07, 2004	RIM-0094-0407-03	L6AQAP40	GW		

October 9, 2003

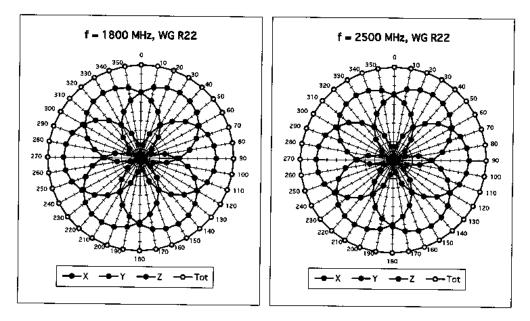


## Receiving Pattern ( $\phi$ ), $\theta = 0^{\circ}$

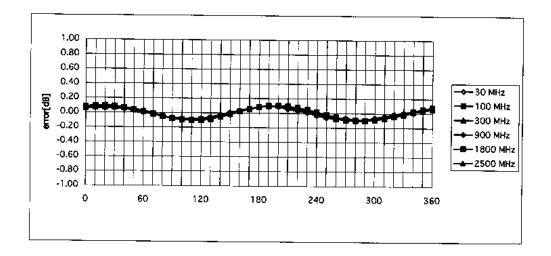


RESEARCH IN MOTION	11	Appendices for the BlackBerry 7100t Wireless Handheld Model No. RAQ40GW test report				
Author Data	Dates of Test	Test Report No	FCC ID:			
Daoud Attayi	June 29 – July 07, 2004	RIM-0094-0407-03	L6AQAP40	GW		

October 9, 2003



Isotropy Error ( $\phi$ ),  $\theta = 0^{\circ}$ 



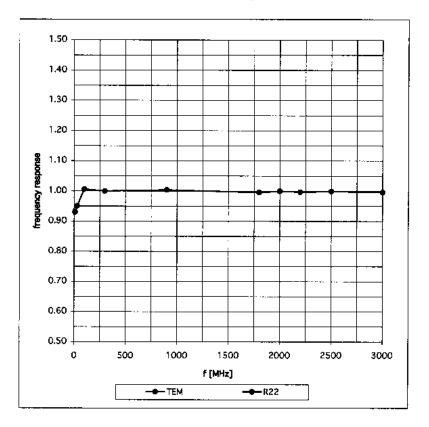


RESEARCH IN MOTION	11	Appendices for the BlackBerry 7100t Wireless Handheld Model No. RAQ40GW test report			
Author Data	Dates of Test	Test Report No	FCC ID:		
Daoud Attayi	June 29 – July 07, 2004	RIM-0094-0407-03	L6AQAP40	GW	

October 9, 2003

### **Frequency Response of E-Field**

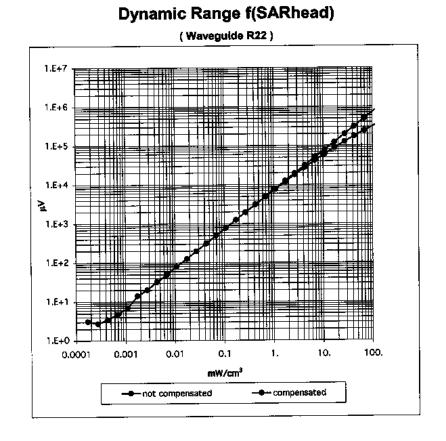
(TEM-Cell:ifi110, Waveguide R22)

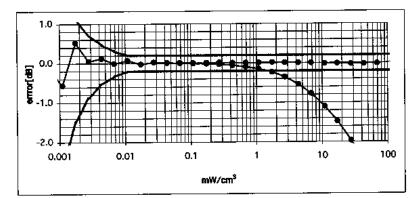


Page 5 of 9

RESEARCH IN MOTION	11	Appendices for the BlackBerry 7100t Wireless Handheld Model No. RAQ40GW test report				
Author Data	Dates of Test	Test Report No	FCC ID:			
Daoud Attayi	June 29 – July 07, 2004	RIM-0094-0407-03	L6AQAP40GW			

#### October 9, 2003

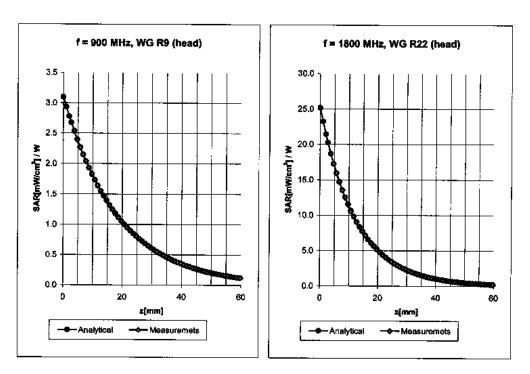






RESEARCH IN MOTION		Appendices for the BlackBerry 7100t Wireless Handheld Model No. RAQ40GW test report			
Author Data	Dates of Test	Test Report No	FCC ID:		
Daoud Attayi	June 29 – July 07, 2004	RIM-0094-0407-03	L6AQAP40GW		

#### October 9, 2003



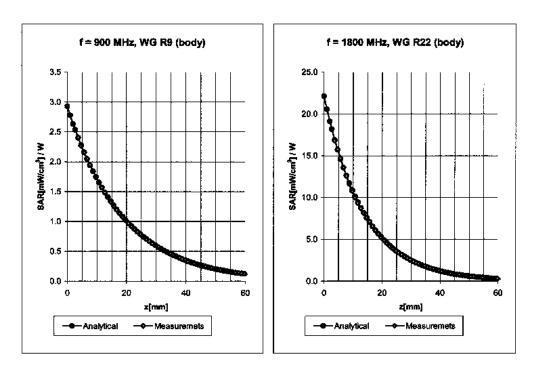
### **Conversion Factor Assessment**

Head	900 MHz	약= 41.5 ± 5%	a = 0.97 ± 5% mł	no/m
Valid for f=800-10	00 MHz with Head Tis	sue Simulating Liquid according to EN	I 50361, P1528-200X	
Conv	FX 6.	5 ± 9.5% (k=2)	Boundary effect	t:
Conv	FY 6.	5 ± 9.5% (k=2)	Alpha	0.37
Conv	FZ 6.	5 ± 9.5% (k=2)	Depth	2.72
Head	1800 MHz	e₁= 40.0 ± 5%	or≡ 1.40 ± 5%4 mml	no/m
Valid for f=1710-19	910 MHz with Head Ti	ssue Simulating Liquid according to E	N 50361, P1528-200)	ĸ
Conv	FX 5.	<b>2</b> ± 9.5% (k=2)	Boundary effect	t:
Conv	FY 5.	<b>2</b> ± 9.5% (k=2)	Alpha	0.47
Conv	FZ 5.	2 ± 9.5% (k=2)	Depth	2.87

Page 7 of 9

RESEARCH IN MOTION	Appendices for the BlackE Model No. RAQ40GW tes	5	andheld	Page 10(27)
Author Data	Dates of Test	Test Report No	FCC ID:	
Daoud Attayi	June 29 – July 07, 2004	RIM-0094-0407-03	L6AQAP40	GW

#### October 9, 2003



### **Conversion Factor Assessment**

Body	900 MHz		६= 55.0± 5%	or≡ 1.05 ± 5% m	ho/m
Valid for f=	800-1000 MHz with Bod	y Tissue Simul	ating Liquid according to	OET 65 Suppl. C	
	ConvF X	6.3 ± 9.5	% (k=2)	Boundary effect	ct:
	ConvF Y	6.3 ± 9.5	% (k=2)	Alpha	0.43
	ConvF Z	6.3 ± 9.5	% (k=2)	Depth	2.49
Body	1800 MHz		&= 53.3 ± 5%	or≡ 1.52 ± 5% m	ho/m
Valid for f=	1710-1910 MHz with Bo	dy Tissue Sime	ulating Liquid according t	to OET 65 Suppl. C	
	ConvF X	<b>4.8</b> ± 9.5	% (k=2)	Boundary effec	ct:
	ConvF Y	4.8 ± 9.5	% (k=2)	Alpha	0.57
	ConvF Z	<b>4.8</b> ± 9.5	% (k=2)	Depth	2.74

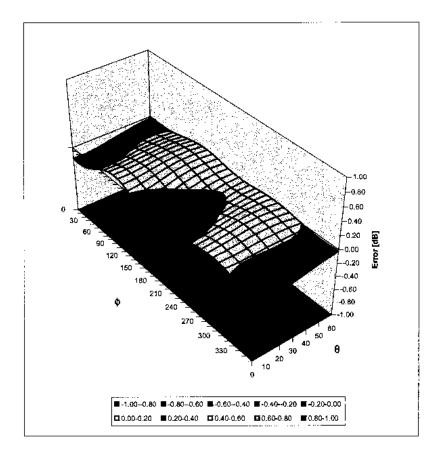
Page 8 of 9

RESEARCH IN MOTION	e e			Page 11(27)
Author Data	Dates of Test	Test Report No	FCC ID:	
Daoud Attayi	June 29 – July 07, 2004	RIM-0094-0407-03	L6AQAP40	GW

October 9, 2003

### **Deviation from Isotropy in HSL**

Error (θ,φ), f = 900 MHz



Page 9 of 9

RESEARCH IN MOTION	Appendices for the BlackE Model No. RAQ40GW tes	2	andheld	Page 12(27)
Author Data	Dates of Test	Test Report No	FCC ID:	
Daoud Attayi	June 29 – July 07, 2004	RIM-0094-0407-03	L6AQAP40	GW

Calibration Laboratory of Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland

Client RIM Client Client

Dbject(s)	D835V2 - SN	446	rol (* 945 * 550) stol (* 1915) Stol (* 1915) Stol (* 1915)
alibration procedure(s)	OA CAL-05 v Calibration pr	2 ocedure for dipole validation kits	
Calibration date:	Accession of State of	003	en de la companya de La companya de la comp
salibilaton bale.			langi,klasi kiti attiri sek
Condition of the calibrated item	In Tolerance	(according to the specific calibration	on document)
<b>TR</b> .T		۲۰۰۰	
7025 international standard.	ients traceability of MG I	É used in the calibration procedures and conformity	or the procedures with the ISO/IEC
All calibrations have been conduc	cled in the closed laborat	tory facility: environment temperature 22 +/- 2 degre	es Celsius and humidity < 75%.
Calibration Equipment used (M&	TE oritical for calibration)	)	
Model Type		Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
RF generator R&S SML-03 Power sensor HP 8481A	100698 MY41092317	27-Mar-2002 (R&S, No. 20-92389) 18-Oct-02 (Agilent, No. 20021018)	In house check: Mar-05 Oct-04
Power sensor HP 8481A	US37292783	30-Oct-02 (METAS, No. 252-0236)	Oct-03
Power meter EPM E442	GB37480704	30-Oct-02 (METAS, No. 252-0236)	Oct-03
Network Analyzer HP 8753E	US37390585	18-Oct-01 (Agilem, No. 24BR1033101)	In house check: Oct 03
	Name	Function	Signature
Calibrated by:	ludith Mueller	Technican	Jarullal
Approved by:	Kalja Pokovic	Leboratory Director	n san san sa
			plan pg-
			Date issued: August 22, 2003
This calibration certificate is issue Calibration Laboratory of Schmid		fution until the accreditation process (based on ISO/ AG is completed	IEC 17025 International Standard) for
			IEC 17025 International Standard) for

Copyright 2004, Research In Motion Limited This report shall <u>NOT</u> be reproduced except in full without the written consent of Research In Motion Limited

RESEARCH IN MOTION	Appendices for the BlackE Model No. RAQ40GW tes	5	andheld	Page 13(27)
Author Data	Dates of Test	Test Report No	FCC ID:	
Daoud Attayi	June 29 – July 07, 2004	RIM-0094-0407-03	L6AQAP40	GW

Schmid & Partner Engineering AG S D C a g

Zeughausstrasse 43, 8004 Zurich, Switzerland Phone +41 1 245 9700, Fax +41 1 245 9779 info@speag.com, http://www.speag.com

# DASY

# **Dipole Validation Kit**

Type: D835V2

Serial: 446

Manufactured: October 24, 2001 Calibrated: August 21, 2003

RESEARCH IN MOTION	Appendices for the BlackE Model No. RAQ40GW tes	2	andheld	Page 14(27)
Author Data	Dates of Test	Test Report No	FCC ID:	
Daoud Attayi	June 29 – July 07, 2004	RIM-0094-0407-03	L6AQAP40	GW

#### 1. Measurement Conditions

The measurements were performed in the flat section of the SAM twin phantom filled with head simulating solution of the following electrical parameters at 835 MHz:

Relative Dielectricity	43.3	± 5%
Conductivity	0.91 mho/m	± 5%

The DASY4 System with a dosimetric E-field probe ET3DV6 (SN:1507, Conversion factor 6.7 at 835 MHz) was used for the measurements.

The dipole was mounted on the small tripod so that the dipole feedpoint 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 <u>15mm</u> from dipole center to the solution surface. The included distance spacer was used during measurements for accurate distance positioning.

The coarse grid with a grid spacing of 15mm was aligned with the dipole. The 7x7x7 fine cube was chosen for cube integration.

The dipole input power (forward power) was 250 mW  $\pm$  3 %. The results are normalized to 1W input power.

#### 2. SAR Measurement with DASY4 System

Standard SAR-measurements were performed according to the measurement conditions described in section 1. The results (see figure supplied) have been normalized to a dipole input power of 1W (forward power). The resulting averaged SAR-values measured with the dosimetric probe ET3DV6 SN:1507 and applying the <u>advanced extrapolation</u> are:

averaged over $1 \text{ cm}^3$ (1 g) of tissue:	<b>9.60 mW/g</b> ± 16.8 % (k=2) <sup>1</sup>
averaged over 10 cm <sup>3</sup> (10 g) of tissue:	<b>6.24 mW/g ±</b> 16.2 % $(k=2)^{1}$

1 validation uncertainty

RESEARCH IN MOTION	Appendices for the BlackE Model No. RAQ40GW tes	5	andheld	Page 15(27)
Author Data	Dates of Test	Test Report No	FCC ID:	
Daoud Attayi	June 29 – July 07, 2004	RIM-0094-0407-03	L6AQAP40	GW

#### 3. Dipole Impedance and Return Loss

The impedance was measured at the SMA-connector with a network analyzer and numerically transformed to the dipole feedpoint. The transformation parameters from the SMA-connector to the dipole feedpoint are:

Electrical delay:	1.395 ns	(one direction)
Transmission factor:	0.983	(voltage transmission, one direction)

The dipole was positioned at the flat phantom sections according to section 1 and the distance spacer was in place during impedance measurements.

Feedpoint impedance at 835 MHz:	$\operatorname{Re}\{Z\} = 48.9 \Omega$
	$\operatorname{Im} \{Z\} = -5.5 \Omega$
Return Loss at 835 MHz	-24.9 dB

#### 4. Handling

Do not apply excessive force to the dipole arms, because they might bend. Bending of the dipole arms stresses the soldered connections near the feedpoint leading to a damage of the dipole.

#### 5. Design

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

#### 6. Power Test

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

RESEARCH IN MOTION	Appendices for the BlackBerry 7100t Wireless Handheld 16(27) Model No. RAQ40GW test report				
Author Data	Dates of Test	Test Report No	FCC ID:		
Daoud Attayi	June 29 – July 07, 2004	RIM-0094-0407-03	L6AQAP40	GW	

Page 1 of 1 Date/Time: 08/21/03 10:03:51

Test Laboratory: SPEAG, Zurich, Switzerland File Name: <u>SN446\_SN1507\_HSL835\_210803.da4</u>

#### DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN446 Program: Dipole Calibration

Communication System: CW-835; Frequency: 835 MHz;Duty Cycle: 1:1 Medium: HSL 835 MHz ( $\sigma = 0.91$  mho/m,  $\varepsilon_r = 43.28$ ,  $\rho = 1000$  kg/m<sup>3</sup>) Phantom section: Flat Section Measurement Standard: DASY4 (High Precision Assessment)

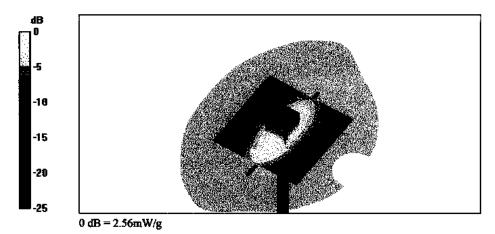
**DASY4** Configuration:

- Probe: ET3DV6 SN1507; ConvF(6.7, 6.7, 6.7); Calibrated: 1/18/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 SN411; Calibrated: 1/16/2003
- Phantom: SAM with CRP TP1006; Type: SAM 4.0; Serial: TP:1006
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

Pin = 250 mW; d = 15 mm/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm Reference Value = 55.3 V/m Power Drift = -0.02 dB Maximum value of SAR = 2.55 mW/g

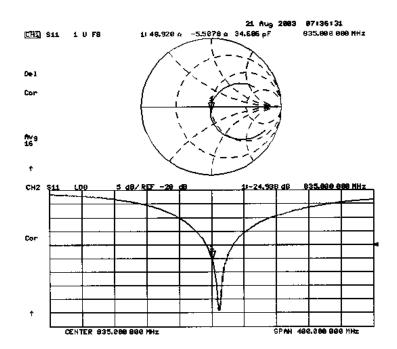
**Pin = 250 mW; d = 15 mm/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm Peak SAR (extrapolated) = 3.52 W/kg SAR(1 g) = 2.4 mW/g; SAR(10 g) = 1.56 mW/g

Reference Value = 55.3 V/m Power Drift = -0.02 dB Maximum value of SAR = 2.56 mW/g



RESEARCH IN MOTION	Appendices for the BlackBerry 7100t Wireless Handheld Model No. RAQ40GW test report			Page 17(27)
Author Data	Dates of Test	Test Report No	FCC ID:	
Daoud Attayi	June 29 – July 07, 2004	RIM-0094-0407-03	L6AQAP40	GW

446



RESEARCH IN MOTION	Appendices for the BlackBerry 7100t Wireless Handheld 18(27) Model No. RAQ40GW test report				
Author Data	tes of Test Test Report No FCC ID:				
Daoud Attayi	June 29 – July 07, 2004	RIM-0094-0407-03	L6AQAP40GW		

Calibration Laboratory of Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland

### Client RIM PERSON STREET

CALIBRATION	CERTIFICA		
Object(s)	D1900V2 - SM	1545	
Calibration procedure(s)		2 ocadure for dipole validation kits	
Calibration date:	August 22, 20	<b>03</b> (* 1994)	
Condition of the calibrated item	In Tolerance (	according to the specific calibration	on document)
17025 international standard.	ted in the closed laborat	Eused in the calibration procedures and conformity ory facility: environment temperature 22 +/- 2 degre	
Model Type RF generator R&S SML-03 Power sensor HP 8481A Power sensor HP 8481A Power meter EPM E442 Network Analyzer HP 8753E	ID # 100698 MY41092317 US37292783 GB37480704 US37390585	Cal Date (Calibrated by, Certificate, No.) 27-Mar-2002 (R&S, No. 20-92389) 18-Oct-02 (Agilent, No. 20021018) 30-Oct-02 (METAS, No. 252-0236) 30-Oct-02 (METAS, No. 252-0236) 18-Oct-01 (Agilent, No. 24BR1033101)	Scheduled Calibration In house check: Mar-05 Oct-04 Oct-03 Oct-03 In house check: Oct 03
Calibrated by:	Name Lutits Mueller	Function <b>Technician</b>	Signature Ministrice
Approved by:	Kátja Pokovic	Laboratory Director	flow the
			Z Date issued: August 24, 2003
This calibration certificate is issue Calibration Laboratory of Schmid		lution until the accreditation process (based on ISO) AG is completed.	/IEC 17025 International Standard) for
880-KP0301061-A			Page 1 (3)

RESEARCH IN MOTION	Appendices for the BlackBerry 7100t Wireless Handheld 19(27) Model No. RAQ40GW test report				
Author Data	Dates of Test	Test Report No	FCC ID:		
Daoud Attayi	June 29 – July 07, 2004	RIM-0094-0407-03	L6AQAP40	GW	

Schmid & Partner Engineering AG

<u>speag</u>

Zeughausstrasse 43, 6004 Zurich. Switzerland Phone +41 1 245 9700, Fax +41 1 245 9779 info@speeg.com, http://www.speeg.com

# DASY

# **Dipole Validation Kit**

# Type: D1900V2

## Serial: 545

Manufactured: November 15, 2001 Calibrated: August 22, 2003

RESEARCH IN MOTION	Appendices for the BlackBerry 7100t Wireless Handheld Model No. RAQ40GW test report				
Author Data	Dates of Test	Test Report No	FCC ID:		
Daoud Attayi	June 29 – July 07, 2004	RIM-0094-0407-03	L6AQAP40	GW	

#### 1. Measurement Conditions

The measurements were performed in the flat section of the SAM twin phantom filled with head simulating solution of the following electrical parameters at 1900 MHz:

Relative Dielectricity	40.2	± 5%
Conductivity	1.46 mbo/m	± 5%

The DASY4 System with a dosimetric E-field probe ET3DV6 (SN:1507, Conversion factor 5.2 at 1900 MHz) was used for the measurements.

The dipole was mounted on the small tripod so that the dipole feedpoint 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 <u>10mm</u> from dipole center to the solution surface. The included distance spacer was used during measurements for accurate distance positioning.

The coarse grid with a grid spacing of 15mm was aligned with the dipole. The 7x7x7 fine cube was chosen for cube integration.

The dipole input power (forward power) was 250 mW  $\pm$  3 %. The results are normalized to 1W input power.

#### 2. SAR Measurement with DASY4 System

Standard SAR-measurements were performed according to the measurement conditions described in section 1. The results (see figure supplied) have been normalized to a dipole input power of 1W (forward power). The resulting averaged SAR-values measured with the dosimetric probe ET3DV6 SN:1507 and applying the <u>advanced extrapolation</u> are:

averaged over $1 \text{ cm}^3$ (1 g) of tissue:	<b>41.2 mW/g</b> $\pm$ 16.8 % (k=2) <sup>1</sup>
averaged over 10 cm <sup>3</sup> (10 g) of tissue:	<b>21.3 mW/g</b> $\pm$ 16.2 % (k=2) <sup>1</sup>

validation uncertainty

RESEARCH IN MOTION	Appendices for the BlackBerry 7100t Wireless Handheld 21(27) Model No. RAQ40GW test report				
Author Data	Dates of Test	Test Report No	FCC ID:		
Daoud Attayi	June 29 – July 07, 2004	RIM-0094-0407-03	L6AQAP40	GW	

#### 3. Dinole Immediance and Return Loss

The impedance was measured at the SMA-connector with a network analyzer and numerically transformed to the dipole feedpoint. The transformation parameters from the SMA-connector to the dipole feedpoint are:

Electrical delay:	1.198 ns	(one direction)
Transmission factor:	0.984	(voltage transmission, one direction)

The dipole was positioned at the flat phantom sections according to section 1 and the distance spacer was in place during impedance measurements.

Feedpoint impedance at 1900 MHz:	Re{Z} = 49.7 Ω
	lm (Z) = 0,96 Ω
Return Loss at 1900 MHz	-39.9 dB

#### 4. Handling

Do not apply excessive force to the dipole arms, because they might bend. Bending of the dipole arms stresses the soldered connections near the feedpoint leading to a damage of the dipole.

#### 5. Design

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

Small end caps have been added to the dipole arms in order to improve matching when loaded according to the position as explained in Section 1. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

#### 6. Power Test

After long term use with 40W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

RESEARCH IN MOTION	Appendices for the BlackBerry 7100t Wireless Handheld 22(27) Model No. RAQ40GW test report				
Author Data	Dates of Test	Test Report No	FCC ID:		
Daoud Attayi	June 29 – July 07, 2004	RIM-0094-0407-03	L6AQAP40	GW	

Page 1 of 1 Date/Time: 08/22/03 15:40:53

Test Laboratory: SPEAG, Zurich, Switzerland File Name: SN545\_SN1507\_HSL1900\_220803.da4

#### DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN545 Program: Dipole Calibration

Communication System: CW-1900; Frequency: 1900 MHz; Duty Cycle: 1:1 Medium: HSL 1900 MHz ( $\sigma = 1.46$  mbo/m,  $\varepsilon_r = 40.17$ ,  $\rho = 1000$  kg/m<sup>3</sup>) Phantom section: Flat Section Measurement Standard: DASY4 (High Precision Assessment)

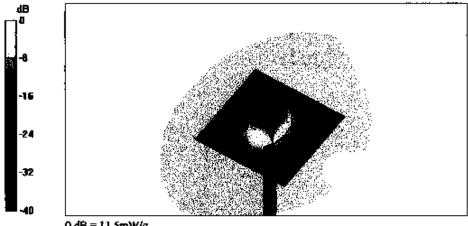
DASY4 Configuration:

- Probe: ET3DV6 SN1507; ConvF(5.2, 5.2, 5.2); Calibrated: 1/18/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 SN411; Calibrated: I/16/2003
- Phantom: SAM with CRP TP1006; Type: SAM 4.0; Serial: TP:1006
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

Pin = 250 mW; d = 10 mm/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm Reference Value = 93.6 V/m Power Drift = 0.05 dB Maximum value of SAR = 11.5 mW/g

Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Peak SAR (extrapolated) = 17.7 W/kg

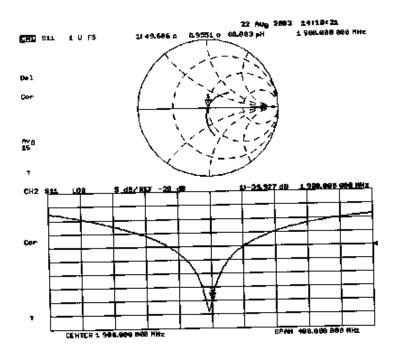
SAR(1 g) = 10.3 mW/g; SAR(10 g) = 5.32 mW/g Reference Value = 93.6 V/m Power Drift = 0.05 dB Maximum value of SAR = 11.5 mW/g



 $0 \, dB = 11.5 \, mW/g$ 

RESEARCH IN MOTION	Appendices for the BlackBerry 7100t Wireless Handheld Model No. RAQ40GW test report			
Author Data	Dates of Test	Test Report No	FCC ID:	
Daoud Attayi	June 29 – July 07, 2004	RIM-0094-0407-03	L6AQAP40GW	

545



RESEARCH IN MOTION	Appendices for the BlackBerry 7100t Wireless Handheld Model No. RAQ40GW test report			
Author Data	Dates of Test	Test Report No	FCC ID:	
Daoud Attayi	June 29 – July 07, 2004	RIM-0094-0407-03	L6AQAP40	GW

## APPENDIX E: SAR SET UP PHOTOS

RESEARCH IN MOTION	Appendices for the BlackBerry 7100t Wireless Handheld Model No. RAQ40GW test report			
Author Data	Dates of Test	Test Report No	FCC ID:	
Daoud Attayi	June 29 – July 07, 2004	RIM-0094-0407-03	L6AQAP40GW	



Figure E1. Left ear configuration

RESEARCH IN MOTION	Appendices for the BlackBerry 7100t Wireless Handheld Model No. RAQ40GW test report			
Author Data	Dates of Test	Test Report No	FCC ID:	
Daoud Attayi	June 29 – July 07, 2004	RIM-0094-0407-03	L6AQAP40GW	

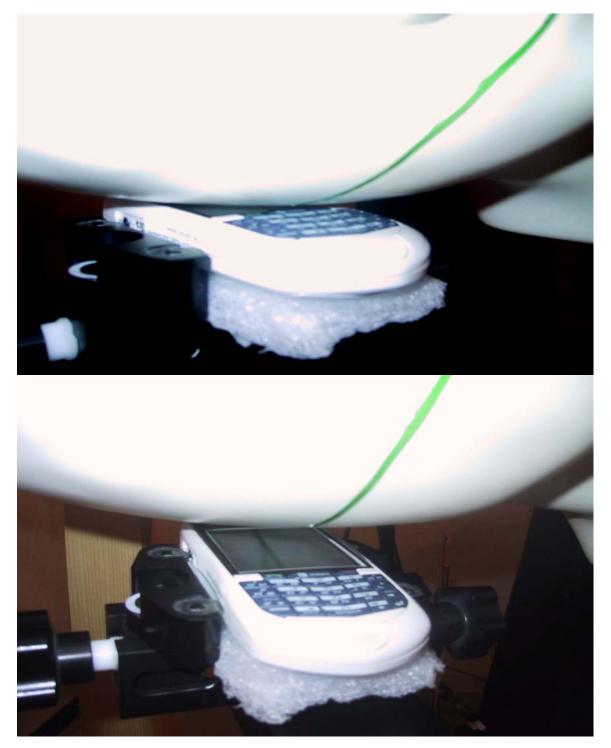


Figure E2. Right ear configuration

RESEARCH IN MOTION	Appendices for the BlackBerry 7100t Wireless Handheld Model No. RAQ40GW test report			
Author Data	Dates of Test	Test Report No	FCC ID:	
Daoud Attayi	June 29 – July 07, 2004	RIM-0094-0407-03	L6AQAP40GW	



Figure E3. Body worn configuration with holster and headset