

	<u>Date(s) of Evaluation</u> March 11 & April 03, 2009	<u>Test Report Serial No.</u> 030409OKC-T954-S90P	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	
	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	



Test Lab Certificate No. 2470.01

SAR TEST REPORT (FCC/IC)

RF EXPOSURE EVALUATION

SPECIFIC ABSORPTION RATE

APPLICANT / MANUFACTURER	THALES COMMUNICATIONS INC.				
DEVICE UNDER TEST (DUT)	PORTABLE MULTIBAND LAND MOBILE PTT RADIO TRANSCEIVER				
	MODES	ANALOG (FM) / DIGITAL (P25)			
FREQ. RANGE(S) UNDER TEST	700/800	763-775 MHz	793-805 MHz	806-824 MHz	851-869 MHz
DEVICE MODEL(S)	NAME	LIBERTY		NO.	4102023-501
DEVICE IDENTIFIER(S)	FCC ID:	OKC-4102023501		IC:	473C-4102023501
APPLICATION TYPE	FCC/IC Certification				
STANDARD(S) APPLIED	FCC 47 CFR §2.1093				
	Health Canada Safety Code 6				
PROCEDURE(S) APPLIED	FCC OET Bulletin 65, Supplement C (01-01)				
	FCC Mobile & Portable RF Exposure Proc. (KDB 447498 D01 v03r03)				
	Industry Canada RSS-102 Issue 2				
	IEEE 1528-2003		IEC 62209-1:2005		
FCC DEVICE CLASSIFICATION	Licensed Non-Broadcast Transmitter Held to Face (TNF)				
IC DEVICE CLASSIFICATION	Land Mobile Radio Transmitter/Receiver (27.41-960 MHz)				
RF EXPOSURE CATEGORY	Occupational / Controlled				
RF EXPOSURE EVALUATION(S)	Face-held & Body-worn				
DATE(S) OF EVALUATION	March 11 & April 03, 2009				
TEST REPORT SERIAL NO.	030409OKC-T954-S90P				
TEST REPORT REVISION NO.	Revision 1.2	Response to FCC		April 09, 2009	
	Revision 1.1	Add Appendix E		March 19, 2009	
	Revision 1.0	Initial Release		March 13, 2009	
TEST REPORT SIGNATORIES	Testing Performed By			Test Report Prepared By	
	Sean Johnston Celltech Labs Inc.			Jonathan Hughes Celltech Labs Inc.	
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TEST LAB ACCREDITATION(S)	 Test Lab Certificate No. 2470.01				

Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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DECLARATION OF COMPLIANCE SAR RF EXPOSURE EVALUATION

Test Lab Information	Name	CELLTECH LABS INC.							
	Address	21-364 Lougheed Road, Kelowna, B.C. V1X 7R8 Canada							
Applicant Information	Name	THALES COMMUNICATIONS INC.							
	Address	22605 Gateway Center Drive, Clarksburg, MD 20871 United States							
Standard(s) Applied	FCC	47 CFR §2.1093			IC	Health Canada Safety Code 6			
Procedure(s) Applied	FCC	OET Bulletin 65, Supplement C (Edition 01-01)							
	FCC	Mobile & Portable RF Exposure Procedures (KDB 447498 D01 v03r03)							
	IC	RSS-102 Issue 2	IEEE	1528-2003	IEC	62209-1:2005			
Application Type(s)	FCC/IC	New Certification							
Device Classification(s)	FCC	Licensed Non-Broadcast Transmitter Held to Face (TNF)							
	IC	Land Mobile Radio Transmitter/Receiver (27.41-960 MHz)							
Device RF Exposure Category	Portable	Occupational / Controlled Environment							
Device Identifier(s)	FCC ID:	OKC-4102023501							
	IC:	473C-4102023501							
Device Model (Name / No.)	Liberty 4102023-501								
Test Sample Serial No.	10007 (Identical Prototype)								
Device-Under-Test Description	Portable Multiband Push-To-Talk (PTT) Radio Transceiver								
Device Modes of Operation	Analog (FM) / Digital (P25)								
Frequency Range(s) Under Test	700 / 800	763.0-775.0 MHz		793.0-805.0 MHz		806.0-824.0 MHz		851.0-869.0 MHz	
Max. Conducted Power Tested	763.0 MHz	2.4 W	793.0 MHz	2.6 W	806.0 MHz	3.0 W	851.0 MHz	3.1 W	
	769.0 MHz	2.4 W	799.0 MHz	2.6 W	815.0 MHz	3.0 W	860.0 MHz	3.1 W	
	775.0 MHz	2.4 W	805.0 MHz	2.6 W	824.0 MHz	3.0 W	869.0 MHz	3.1 W	
Antenna Type(s) Tested	Detachable		Multiband Flex		P/N: 1600678-1		Length: 216 mm		
Battery Type(s) Tested	Lithium-ion		10.8 V		4.8 Ah		P/N: 1600691-2		
Body-worn Accessories Tested	Belt-Clip		Contains Metal Components				P/N: 40508		
	Belt-Holster		Contains Metal Components				P/N: 1600702-1		
Audio Accessories Tested	Speaker-Microphone (P/N: 1600696-01)								
Max. SAR Level(s) Evaluated	Face-held	0.566 W/kg	1g	50% duty cycle	Occupational / Controlled Exposure				
	Body-worn	2.43 W/kg	1g	50% duty cycle	Occupational / Controlled Exposure				
FCC/IC Spatial Peak SAR Limit	Head/Body	8.0 W/kg	1g	50% duty cycle	Occupational / Controlled Exposure				
Celltech Labs Inc. declares under its sole responsibility that this wireless portable device has demonstrated compliance with the Specific Absorption Rate (SAR) RF exposure requirements specified in FCC 47 CFR §2.1093 and Health Canada's Safety Code 6 for the Occupational / Controlled Exposure environment. The device was tested in accordance with the measurement procedures specified in FCC OET Bulletin 65, Supplement C (Edition 01-01), Industry Canada RSS-102 Issue 2, IEEE Standard 1528-2003 and IEC International Standard 62209-1:2005. All measurements were performed in accordance with the SAR system manufacturer recommendations. I attest to the accuracy of data. All measurements were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them. The results and statements contained in this report pertain only to the device(s) evaluated. This test report shall not be reproduced partially, or in full, without the prior written approval of Celltech Labs Inc.									
Test Report Approved By			Sean Johnston		Celltech Labs Inc.				



Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

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Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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1.0 INTRODUCTION

This measurement report demonstrates that the Thales Communications Inc. Model: Liberty 4102023-501 Portable Analog/Digital Multiband Land Mobile PTT Radio Transceiver (700/800 Band) complies with the SAR (Specific Absorption Rate) RF exposure requirements specified in FCC 47 CFR §2.1093 (see reference [1]) and Health Canada's Safety Code 6 (see reference [2]) for the Occupational / Controlled Exposure environment. The measurement procedures described in FCC OET Bulletin 65, Supplement C (Edition 01-01) (see reference [3]), IC RSS-102 Issue 2 (see reference [4]), IEEE Standard 1528-2003 (see reference [5]) and IEC International Standard 62209-1:2005 (see reference [6]) were employed. A description of the device, operating configuration, detailed summary of the test results, methodology and procedures used in the evaluation, equipment used and the various provisions of the rules are included within this test report.

2.0 SAR MEASUREMENT SYSTEM

Celltech Labs Inc. SAR measurement facility utilizes the Dosimetric Assessment System (DASY™) manufactured by Schmid & Partner Engineering AG (SPEAG™) of Zurich, Switzerland. The DASY4 measurement system is comprised of the measurement server, robot controller, computer, near-field probe, probe alignment sensor, specific anthropomorphic mannequin (SAM) phantom, and various planar phantoms for head and/or body SAR evaluations. The robot is a six-axis industrial robot performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF). A cell controller system contains the power supply, robot controller, teach pendant (Joystick), and remote control, is used to drive the robot motors. The Staubli robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the DASY4 measurement server. The DAE4 utilizes a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16-bit AD-converter and a command decoder and control logic unit. Transmission to the DASY4 measurement server is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe-mounting device includes two different sensor systems for frontal and sidewise probe contacts. The sensor systems are also used for mechanical surface detection and probe collision detection. The robot uses a controller with a built in VME-bus computer.



DASY4 SAR System with Plexiglas side planar phantom



DASY4 Measurement Server

Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
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Test Lab Certificate No. 2470.01

3.0 MEASUREMENT SUMMARY

SAR EVALUATION RESULTS

SAR Evaluation Results														
Test Type	Test Date	Freq.	Chan.	Batt. Type	Accessory Type(s)		Device Distance to Planar phantom		Cond. Power Before Test	Measured SAR 1g (W/kg)		SAR Drift During Test	Scaled SAR with droop 1g (W/kg)	
		Duty Cycle								dB	Duty Cycle			
		MHz			Body-worn	Audio	DUT	Antenna	Watts		100%	50%	100%	50%
Face	Mar-11	769.0	Mid 1	Li-ion	n/a	n/a	2.5 cm	5.5 cm	2.4	0.880	0.440	-1.09	1.13	0.566
Face	Mar-11	799.0	Mid 2	Li-ion	n/a	n/a	2.5 cm	5.5 cm	2.6	0.668	0.334	-0.133	0.689	0.344
Face	Mar-11	815.0	Mid 3	Li-ion	n/a	n/a	2.5 cm	5.5 cm	3.0	0.634	0.317	-1.77	0.953	0.477
Face	Mar-11	860.0	Mid 4	Li-ion	n/a	n/a	2.5 cm	5.5 cm	3.1	0.310	0.155	-2.51	0.553	0.276
Body	Apr-03	763.0	Low 1	Li-ion	Belt-Clip	Speaker-Mic	1.6 cm	2.0 cm	2.4	3.15	1.58	-1.45	4.40	2.20
					Belt-Holster	Speaker-Mic	2.0 cm	2.2 cm	2.4	2.94	1.47	-1.01	3.71	1.86
Body	Mar-11	769.0	Mid 1	Li-ion	Belt-Clip	Speaker-Mic	1.6 cm	2.0 cm	2.4	2.48	1.24	-0.764	2.96	1.48
					Belt-Holster	Speaker-Mic	2.0 cm	2.2 cm	2.4	3.11	1.56	-1.13	4.03	2.02
Body	Apr-03	775.0	High 1	Li-ion	Belt-Clip	Speaker-Mic	1.6 cm	2.0 cm	2.4	2.44	1.22	-1.10	3.14	1.57
					Belt-Holster	Speaker-Mic	2.0 cm	2.2 cm	2.4	3.92	1.96	-0.922	4.85	2.43
Body	Apr-03	793.0	Low 2	Li-ion	Belt-Clip	Speaker-Mic	1.6 cm	2.0 cm	2.6	1.99	0.995	-0.692	2.33	1.17
					Belt-Holster	Speaker-Mic	2.0 cm	2.2 cm	2.6	2.15	1.08	-0.543	2.44	1.22
Body	Mar-11	799.0	Mid 2	Li-ion	Belt-Clip	Speaker-Mic	1.6 cm	2.0 cm	2.6	3.07	1.54	-0.238	3.24	1.62
					Belt-Holster	Speaker-Mic	2.0 cm	2.2 cm	2.6	2.19	1.10	-0.411	2.41	1.20
Body	Apr-03	805.0	High 2	Li-ion	Belt-Clip	Speaker-Mic	1.6 cm	2.0 cm	2.6	2.19	1.10	-0.431	2.42	1.21
					Belt-Holster	Speaker-Mic	2.0 cm	2.2 cm	2.6	1.56	0.780	-0.158	1.62	0.810
Body	Apr-03	806.0	Low 3	Li-ion	Belt-Clip	Speaker-Mic	1.6 cm	2.0 cm	3.0	2.04	1.02	-0.280	2.18	1.09
					Belt-Holster	Speaker-Mic	2.0 cm	2.2 cm	3.0	2.05	1.03	-0.447	2.27	1.14
Body	Mar-11	815.0	Mid 3	Li-ion	Belt-Clip	Speaker-Mic	1.6 cm	2.0 cm	3.0	3.32	1.66	-0.661	3.87	1.93
					Belt-Holster	Speaker-Mic	2.0 cm	2.2 cm	3.0	3.95	1.98	-0.511	4.44	2.22
Body	Apr-03	824.0	High 3	Li-ion	Belt-Clip	Speaker-Mic	1.6 cm	2.0 cm	3.0	3.20	1.60	-0.534	3.62	1.81
					Belt-Holster	Speaker-Mic	2.0 cm	2.2 cm	3.0	3.31	1.66	-0.569	3.77	1.89
Body	Apr-03	851.0	Low 4	Li-ion	Belt-Clip	Speaker-Mic	1.6 cm	2.0 cm	3.1	1.34	0.670	-1.77	2.01	1.01
					Belt-Holster	Speaker-Mic	2.0 cm	2.2 cm	3.1	1.47	0.735	-1.65	2.15	1.07
Body	Mar-11	860.0	Mid 4	Li-ion	Belt-Clip	Speaker-Mic	1.6 cm	2.0 cm	3.1	1.18	0.590	-2.77	2.23	1.12
					Belt-Holster	Speaker-Mic	2.0 cm	2.2 cm	3.1	1.12	0.560	-0.558	1.27	0.637
Body	Apr-03	869.0	High 4	Li-ion	Belt-Clip	Speaker-Mic	1.6 cm	2.0 cm	3.1	0.666	0.333	-1.22	0.882	0.441
					Belt-Holster	Speaker-Mic	2.0 cm	2.2 cm	3.1	0.688	0.344	-1.33	0.935	0.467
SAR Limit(s)						Head & Body		Spatial Peak			RF Exposure Category			
FCC 47 CFR 2.1093			Health Canada Safety Code 6			8.0 W/kg		averaged over 1 gram			Occupational / Controlled			

Notes

- Detailed measurement data and plots showing the maximum SAR location of the DUT are reported in Appendix A.
- The SAR drift of the DUT was measured by the DASY4 system for the duration of the SAR evaluations. The measured SAR droop was added to the measured SAR level and the scaled SAR results are shown in the above test data table. A SAR-versus-Time droop evaluation was performed in the maximum measured SAR droop configuration.
- The DUT was tested at the maximum power level preset by the manufacturer in unmodulated continuous transmit operation (Continuous Wave mode at 100% duty cycle) with the transmit key constantly depressed. For a push-to-talk device the 50% duty cycle compensation reported assumes a transmit/receive cycle of equal time base.

Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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MEASURED FLUID PARAMETERS																	
Dielectric Constant ϵ_r		Test Date: March 11, 2009			Test Date: March 11, 2009			Test Date: March 11, 2009			Test Date: March 11, 2009						
		835 Head		770 MHz Meas.		835 Head		800 MHz Meas.		835 Head		815 MHz Meas.		835 Head		860 MHz Meas.	
		IEEE Target		Meas.	Dev.	IEEE Target		Meas.	Dev.	IEEE Target		Meas.	Dev.	IEEE Target		Meas.	Dev.
		41.5	±5%	43.6	+5.0%	41.5	±5%	43.5	+4.8%	41.5	±5%	43.3	+4.3%	41.5	±5%	42.7	+2.9%
		835 Body		770 MHz Meas.		835 Body		800 MHz Meas.		835 Body		815 MHz Meas.		835 Body		860 MHz Meas.	
		IEEE Target		Meas.	Dev.	IEEE Target		Meas.	Dev.	IEEE Target		Meas.	Dev.	IEEE Target		Meas.	Dev.
		55.2	±5%	57.8	+4.7%	55.2	±5%	57.5	+4.2%	55.2	±5%	57.3	+3.8%	55.2	±5%	56.8	+2.9%
		Test Date: April 03, 2009			Test Date: April 03, 2009			Test Date: April 03, 2009			Test Date: April 03, 2009						
		835 Body		765 MHz Meas.		835 Body		775 MHz Meas.		835 Body		795 MHz Meas.		835 Body		805 MHz Meas.	
		IEEE Target		Meas.	Dev.	IEEE Target		Meas.	Dev.	IEEE Target		Meas.	Dev.	IEEE Target		Meas.	Dev.
		55.2	±5%	57.2	+3.6%	55.2	±5%	57.3	+3.8%	55.2	±5%	56.9	+3.1%	55.2	±5%	56.7	+2.7%
		835 Body		825 MHz Meas.		835 Body		855 MHz Meas.		835 Body		865 MHz Meas.					
		IEEE Target		Meas.	Dev.	IEEE Target		Meas.	Dev.	IEEE Target		Meas.	Dev.				
		55.2		±5%	56.5	+2.4%	55.2		±5%	56.1	+1.7%	55.2		±5%	56.2	+1.8%	
Conductivity σ (mho/m)		Test Date: March 11, 2009			Test Date: March 11, 2009			Test Date: March 11, 2009			Test Date: March 11, 2009						
		835 Head		770 MHz Meas.		835 Head		800 MHz Meas.		835 Head		815 MHz Meas.		835 Head		860 MHz Meas.	
		IEEE Target		Meas.	Dev.	IEEE Target		Meas.	Dev.	IEEE Target		Meas.	Dev.	IEEE Target		Meas.	Dev.
		0.90	±5%	0.86	-4.5%	0.90	±5%	0.88	-2.2%	0.90	±5%	0.89	-1.1%	0.90	±5%	0.94	+4.4%
		835 Body		770 MHz Meas.		835 Body		800 MHz Meas.		835 Body		815 MHz Meas.		835 Body		860 MHz Meas.	
		IEEE Target		Meas.	Dev.	IEEE Target		Meas.	Dev.	IEEE Target		Meas.	Dev.	IEEE Target		Meas.	Dev.
		0.97	±5%	0.92	-5.0%	0.97	±5%	0.93	-4.1%	0.97	±5%	0.94	-3.1%	0.97	±5%	1.00	+3.1%
		Test Date: April 03, 2009			Test Date: April 03, 2009			Test Date: April 03, 2009			Test Date: April 03, 2009						
		835 Body		765 MHz Meas.		835 Body		775 MHz Meas.		835 Body		795 MHz Meas.		835 Body		805 MHz Meas.	
		IEEE Target		Meas.	Dev.	IEEE Target		Meas.	Dev.	IEEE Target		Meas.	Dev.	IEEE Target		Meas.	Dev.
		0.97	±5%	0.92	-5.0%	0.97	±5%	0.93	-4.2%	0.97	±5%	0.95	-2.0%	0.97	±5%	0.95	-2.0%
		835 Body		825 MHz Meas.		835 Body		855 MHz Meas.		835 Body		865 MHz Meas.					
		IEEE Target		Meas.	Dev.	IEEE Target		Meas.	Dev.	IEEE Target		Meas.	Dev.				
		0.97		±5%	0.96	-1.0%	0.97		±5%	1.01	+4.1%	0.97		±5%	1.02	+5.0%	
Test Date	Fluid Type	Ambient Temp.		Fluid Temp.		Fluid Depth		Atmospheric Pressure			Relative Humidity		ρ (Kg/m ³)				
March 11	Head	24.0°C		22.1°C		≥ 15		101.1 kPa			35%		1000				
March 11	Body	23.5°C		21.5°C		≥ 15		101.1 kPa			35%		1000				
April 03	Body	23.2°C		21.8°C		≥ 15		101.1 kPa			35%		1000				
Notes																	
1. The measured fluid parameters for each test frequency satisfy the dielectric parameter requirements of the probe calibration and routine measurements in accordance with FCC KDB 450824 D01 v01r01 (see reference [8]).																	

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5.0 DETAILS OF SAR EVALUATION

The Thales Communications Inc. Model: Liberty 4102023-501 Portable Analog/Digital Multiband Land Mobile PTT Radio Transceiver (700/800 Band) described in this report was compliant for localized Specific Absorption Rate (Occupational / Controlled Exposure) based on the test provisions and conditions described below. Detailed photographs of the test setup are shown in Appendix D.

1. The DUT was evaluated in a face-held configuration with the front of the radio placed parallel to the outer surface of the planar phantom. A 2.5 cm spacing was maintained between the front side of the DUT and the outer surface of the planar phantom.
2. The DUT was evaluated in a body-worn configuration with the back of the radio facing the outer surface of the planar phantom and the attached belt-clip accessory placed parallel to and touching the planar phantom. The belt-clip accessory provided a 1.6 cm spacing from the back of the DUT to the planar phantom. The DUT was evaluated for body-worn SAR with the customer-supplied speaker-microphone accessory connected to the input connector.
3. The DUT was evaluated in a body-worn configuration with the radio placed inside the belt-holster accessory. The back of the radio was facing the outer surface of the planar phantom and the belt-holster accessory was touching the planar phantom. The belt-holster accessory provided a 2.0 cm spacing from the back of the DUT to the planar phantom. The DUT was evaluated for body-worn SAR with the customer-supplied speaker-microphone accessory connected to the input connector.
4. The conducted output power levels referenced in this report were measured prior to the SAR evaluations at the antenna connector of the DUT using a Gigatronix 8652A Universal Power Meter in accordance with FCC 47 CFR §2.1046 and IC RSS-Gen.
5. The area scan evaluation was performed with a fully charged battery. After the area scan was completed the radio was cooled down and the battery was replaced with a fully charged battery prior to the zoom scan evaluation.
6. The fluid temperature was measured prior to and after the SAR evaluations to ensure the temperature remained within $\pm 2^{\circ}\text{C}$ of the fluid temperature reported during the dielectric parameter measurements.
7. The dielectric parameters of the simulated tissue mixtures were measured prior to the SAR evaluations using a Dielectric Probe Kit and a Network Analyzer (see Appendix C).

6.0 EVALUATION PROCEDURES

- (i) The evaluation was performed in the applicable area of the phantom depending on the type of device being tested. For devices held to the ear during normal operation, both the left and right ear positions were evaluated using the SAM phantom.
- (ii) For body-worn and face-held devices a planar phantom was used.
- The SAR was determined by a pre-defined procedure within the DASY4 software. Upon completion of a reference and optical surface check, the exposed region of the phantom was scanned near the inner surface with a grid spacing of 15mm x 15mm.
An area scan was determined as follows:
 - Based on the defined area scan grid, a more detailed grid is created to increase the points by a factor of 10. The interpolation function then evaluates all field values between corresponding measurement points.
 - A linear search is applied to find all the candidate maxima. Subsequently, all maxima are removed that are >2 dB from the global maximum. The remaining maxima are then used to position the cube scans.
A 1g and 10g spatial peak SAR was determined as follows:
- Extrapolation is used to find the points between the dipole center of the probe and the surface of the phantom. This data cannot be measured, since the center of the dipoles is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.4 mm (see probe calibration document in Appendix E). The extrapolation was based on trivariate quadratics computed from the previously calculated 3D interpolated points nearest the phantom surface.
- Interpolated data is used to calculate the average SAR over 1g and 10g cubes by spatially discretizing the entire measured cube. The volume used to determine the averaged SAR is a 1mm grid (42875 interpolated points).
- A zoom scan volume of 32 mm x 32 mm x 30 mm (5 x 5 x 7 points) centered at the peak SAR location determined from the area scan was used for all zoom scans.

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7.0 SAR PROBE CALIBRATION & MEASUREMENT FREQUENCIES

The following procedures are recommended for measurements at 150 MHz - 3 GHz to minimize probe calibration and tissue dielectric parameter discrepancies. In general, SAR measurements below 300 MHz should be within ± 50 MHz of the probe calibration frequency. At 300 MHz to 3 GHz, measurements should be within ± 100 MHz of the probe calibration frequency. Measurements exceeding 50% of these intervals, ± 25 MHz < 300 MHz and ± 50 MHz ≥ 300 MHz, require additional steps (per FCC KDB 450824 D01 v01r01, SAR Probe Calibration and System Verification Considerations for Measurements at 150 MHz - 3 GHz - see reference [8]).

Probe Calibration Freq.	Device Measurement Freq.	Frequency Interval	± 50 MHz ≥ 300 MHz
835 MHz	763 MHz	72 MHz	$> 50 \text{ MHz}^2$
	769 MHz	66 MHz	$> 50 \text{ MHz}^2$
	775 MHz	60 MHz	$> 50 \text{ MHz}^2$
	793 MHz	42 MHz	$< 50 \text{ MHz}^1$
	799 MHz	36 MHz	$< 50 \text{ MHz}^1$
	805 MHz	30 MHz	$< 50 \text{ MHz}^1$
	806 MHz	29 MHz	$< 50 \text{ MHz}^1$
	815 MHz	20 MHz	$< 50 \text{ MHz}^1$
	824 MHz	11 MHz	$< 50 \text{ MHz}^1$
	851 MHz	16 MHz	$< 50 \text{ MHz}^1$
	860 MHz	25 MHz	$< 50 \text{ MHz}^1$
	869 MHz	34 MHz	$< 50 \text{ MHz}^1$

1. The probe calibration and measurement frequency interval is < 50 MHz; therefore the additional steps were not required.

2. The probe calibration and measurement frequency interval is > 50 MHz; therefore the following additional steps were implemented (per FCC KDB 450824 D01 v01r01): *The measured 1-g SAR may be compensated with respect to +5% tolerances in ϵ_r and -5% tolerances in σ , computed according to valid SAR sensitivity data, to reduce SAR underestimation and maintain conservativeness.* SAR sensitivity data is per SPEAG DASY4 Manual (see reference [9]).

Probe Calibration Frequency = 835 MHz				Target Parameters:		Head 41.5 ϵ_r / 0.9 σ	Body 55.2 ϵ_r / 0.97 σ		
Test Freq.	Tissue	σ	Sensitivity	ϵ_r	Sensitivity	% Change	Compensated Max. SAR Level		
763 MHz	Body	-5%	2.95%	+3.6%	2.05%	+5%	2.31 W/kg	1g	50% ptt d/c
769 MHz	Head	-4.5%	2.66%	+5%	2.85%	+5.51%	0.597 W/kg	1g	50% ptt d/c
	Body	-5%	2.95%	+4.7%	2.68%	+5.63%	2.13 W/kg	1g	50% ptt d/c
775 MHz	Body	-4.2%	2.48%	+3.8%	2.17%	+4.65%	2.54 W/kg	1g	50% ptt d/c

Parameter	ϵ_r	σ	ρ
f=800 MHz, d=15 mm ($\epsilon_r=41.5$, $\sigma=0.90 \text{ S/m}$)			
SAR Peak	- 0.70	+ 0.86	-
SAR 1 g	- 0.57	+ 0.59	0.10
SAR 10 g	- 0.45	+ 0.35	0.18

Note: Per SPEAG, the above sensitivity data (Head) from the DASY4 manual (see reference [9]) can be applied to Body tissue parameters provided the approximation is for $< 5\%$ deviation of liquid parameters.

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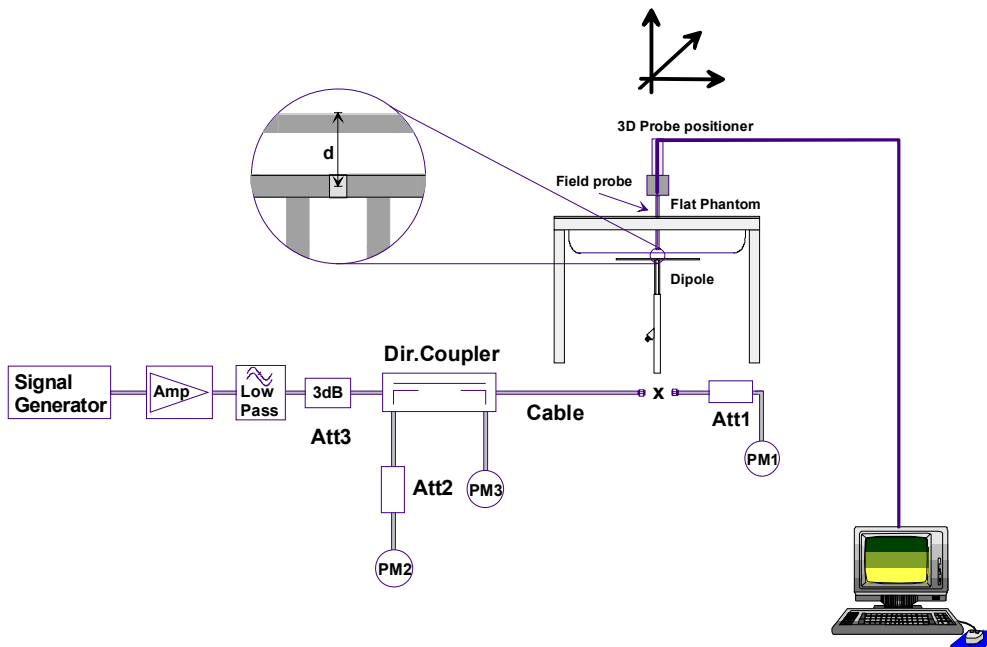
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8.0 SYSTEM PERFORMANCE CHECK

Prior to the SAR evaluations a daily system check was performed using the planar section of the SAM phantom with an 835 MHz dipole (see Appendix B for system performance check test plot) in accordance with the procedures described in IEEE Standard 1528-2003 (see reference [5]) and IEC International Standard 62209-1:2005 (see reference [6]). The dielectric parameters of the simulated tissue mixture were measured prior to the system performance check using a Dielectric Probe Kit and a Network Analyzer (see Appendix C for measured fluid dielectric parameters). A forward power of 250 mW was applied to the dipole and the system was verified to a tolerance of $\pm 10\%$ from the dipole calibration target SAR value.

SYSTEM PERFORMANCE CHECK EVALUATION

Test Date	Equiv. Tissue	SAR 1g (W/kg)			Dielectric Constant ϵ_r			Conductivity σ (mho/m)			ρ (Kg/m ³)	Amb. Temp. (°C)	Fluid Temp. (°C)	Fluid Depth (cm)	Humid. (%)	Barom. Press. (kPa)
	Freq. (MHz)	Sys. Val. Target	Meas.	Dev.	Sys. Val. Target	Meas.	Dev.	Sys. Val. Target	Meas.	Dev.						
Mar 11	Head 835	2.34 ±10%	2.37	+1.2%	42.7 ±5%	42.4	-0.7%	0.90 ±5%	0.91	+1.1%	1000	24.0	22.1	≥ 15	35	101.1
Apr 03	Head 835	2.34 ±10%	2.43	+3.8%	42.7 ±5%	41.5	-2.8%	0.90 ±5%	0.90	0.0%	1000	23.2	22.0	≥ 15	35	101.1
Notes	1.	The target SAR value and target dielectric parameters are referenced from the dipole calibration.														
	2.	The fluid temperature was measured prior to and after the system performance check to ensure the temperature remained within +/-2°C of the fluid temperature reported during the dielectric parameter measurements.														
	3.	The dielectric parameters of the simulated tissue mixture were measured prior to the system performance check using a Dielectric Probe Kit and a Network Analyzer (see Appendix C).														



System Performance Check Measurement Setup Diagram



835 MHz Validation Dipole Setup

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9.0 SIMULATED EQUIVALENT TISSUES

The simulated tissue mixtures consisted of a viscous gel using hydroxethylcellulose (HEC) gelling agent and saline solution. Preservation with a bactericide was added and visual inspection made to ensure air bubbles were not trapped during the mixing process. The fluid was prepared according to standardized procedures and measured for dielectric parameters (permittivity and conductivity).

SIMULATED TISSUE MIXTURES					
INGREDIENT	Water	835 MHz Head Tissue Mixture	40.71 %	835 MHz Body Tissue Mixture	53.79 %
	Sugar		56.63 %		45.13 %
	Salt		1.48 %		0.98 %
	HEC		0.99 %		--
	Bactericide		0.19 %		0.10 %

10.0 SAR LIMITS

SAR RF EXPOSURE LIMITS			
FCC 47 CFR 2.1093	Health Canada Safety Code 6	(General Population / Uncontrolled Exposure)	(Occupational / Controlled Exposure)
Spatial Average (averaged over the whole body)		0.08 W/kg	0.4 W/kg
Spatial Peak (averaged over any 1 g of tissue)		1.6 W/kg	8.0 W/kg
Spatial Peak (hands/wrists/feet/ankles averaged over 10 g)		4.0 W/kg	20.0 W/kg
The Spatial Average value of the SAR averaged over the whole body.			
The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.			
The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.			
Uncontrolled environments are defined as locations where there is potential exposure of individuals who have no knowledge or control of their potential exposure.			
Controlled environments are defined as locations where there is potential exposure of individuals who have knowledge of their potential exposure and can exercise control over their exposure.			

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11.0 ROBOT SYSTEM SPECIFICATIONS

<u>Specifications</u>	
Positioner	Stäubli Unimation Corp. Robot Model: RX60L
Repeatability	0.02 mm
No. of axis	6
<u>Data Acquisition Electronic (DAE) System</u>	
<u>Cell Controller</u>	
Processor	AMD Athlon XP 2400+
Clock Speed	2.0 GHz
Operating System	Windows XP Professional
<u>Data Converter</u>	
Features	Signal Amplifier, multiplexer, A/D converter, and control logic
Software	Measurement Software: DASY4, V4.7 Build 44
	Postprocessing Software: SEMCAD, V1.8 Build 171
Connecting Lines	Optical downlink for data and status info., Optical uplink for commands and clock
<u>DASY4 Measurement Server</u>	
Function	Real-time data evaluation for field measurements and surface detection
Hardware	PC/104 166MHz Pentium CPU; 32 MB chipdisk; 64 MB RAM
Connections	COM1, COM2, DAE, Robot, Ethernet, Service Interface
<u>E-Field Probe</u>	
Model	ET3DV6
Serial No.	1590
Construction	Triangular core fiber optic detection system
Frequency	10 MHz to 6 GHz
Linearity	±0.2 dB (30 MHz to 3 GHz)
<u>Evaluation Phantom</u>	
Type	Side Planar Phantom
Shell Material	Plexiglas
Bottom Thickness	2.0 mm ± 0.1 mm
Inner Dimensions	72.6 cm (L) x 20.3 cm (W) x 20.3 cm (H)
<u>Validation Phantom</u>	
Type	SAM V4.0C
Shell Material	Fiberglass
Thickness	2.0 ±0.1 mm
Volume	Approx. 25 liters

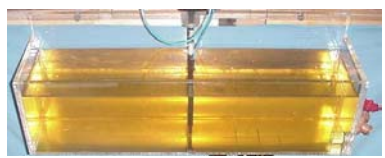
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12.0 PROBE SPECIFICATION (ET3DV6)

Construction: Symmetrical design with triangular core; Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, glycol) Calibration: In air from 10 MHz to 2.5 GHz In head simulating tissue at frequencies of 900 MHz and 1.8 GHz (accuracy $\pm 8\%$) Frequency: 10 MHz to > 6 GHz; Linearity: ± 0.2 dB (30 MHz to 3 GHz) Directivity: ± 0.2 dB in head tissue (rotation around probe axis) ± 0.4 dB in head tissue (rotation normal to probe axis) Dynamic Range: 5 μW/g to > 100 mW/g; Linearity: ± 0.2 dB Surface Detect: ± 0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces Dimensions: Overall length: 330 mm; Tip length: 16 mm; Body diameter: 12 mm; Tip diameter: 6.8 mm Distance from probe tip to dipole centers: 2.7 mm Application: General dosimetry up to 3 GHz; Compliance tests of mobile phone	 ET3DV6 E-Field Probe
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13.0 SIDE PLANAR PHANTOM

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

14.0 VALIDATION PHANTOM

The SAM phantom V4.0C is a fiberglass shell phantom with a 2.0 mm (+/-0.2 mm) shell thickness for left and right head and flat planar area integrated in a wooden table. The shape of the fiberglass shell corresponds to the phantom defined by SCC34-SC2. The device holder positions are adjusted to the standard measurement positions in the three sections (see Appendix G for specifications of the SAM phantom V4.0C).	 SAM Twin Phantom V4.0C
---	--

15.0 DEVICE HOLDER

The DASY4 device holder has two scales for device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear openings). The plane between the ear openings and the mouth tip has a rotation angle of 65°. The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections.	 Device Holder
--	---

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16.0 TEST EQUIPMENT LIST

TEST EQUIPMENT		ASSET NO.	SERIAL NO.	DATE CALIBRATED	CALIBRATION DUE DATE
USED	DESCRIPTION				
x	Schmid & Partner DASY4 System	-	-	-	-
x	-DASY4 Measurement Server	00158	1078	CNR	CNR
x	-Robot	00046	599396-01	CNR	CNR
x	-DAE4	00019	353	22Apr08	22Apr09
x	-ET3DV6 E-Field Probe	00017	1590	21Jul08	21Jul09
x	-835 MHz Validation Dipole	00022	411	10Feb09	10Feb10
x	-Plexiglas Side Planar Phantom	00156	161	CNR	CNR
x	-SAM Phantom V4.0C	00154	1033	CNR	CNR
x	HP 85070C Dielectric Probe Kit	00033	US39240170	CNR	CNR
x	Gigatronics 8652A Power Meter	00007	1835272	23Apr08	23Apr09
x	Gigatronics 80701A Power Sensor	00014	1833699	23Apr08	23Apr09
x	HP 8753ET Network Analyzer	00134	US39170292	28Apr08	28Apr09
x	HP 8648D Signal Generator	00005	3847A00611	CNR	CNR
x	Amplifier Research 5S1G4 Power Amplifier	00106	26235	CNR	CNR
Abbr.	CNR = Calibration Not Required				

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17.0 MEASUREMENT UNCERTAINTIES

UNCERTAINTY BUDGET FOR DEVICE EVALUATION									
Uncertainty Component	IEEE 1528 Section	Uncertainty Value ±%	Probability Distribution	Divisor	ci 1g	ci 10g	Uncertainty Value ±% (1g)	Uncertainty Value ±% (10g)	V _i or V _{eff}
Measurement System									
Probe Calibration (835 MHz)	E.2.1	5.5	Normal	1	1	1	5.5	5.5	∞
Axial Isotropy	E.2.2	4.7	Rectangular	1.732050808	0.7	0.7	1.9	1.9	∞
Hemispherical Isotropy	E.2.2	9.6	Rectangular	1.732050808	0.7	0.7	3.9	3.9	∞
Boundary Effect	E.2.3	1	Rectangular	1.732050808	1	1	0.6	0.6	∞
Linearity	E.2.4	4.7	Rectangular	1.732050808	1	1	2.7	2.7	∞
System Detection Limits	E.2.5	1	Rectangular	1.732050808	1	1	0.6	0.6	∞
Readout Electronics	E.2.6	0.3	Normal	1	1	1	0.3	0.3	∞
Response Time	E.2.7	0.8	Rectangular	1.732050808	1	1	0.5	0.5	∞
Integration Time	E.2.8	2.6	Rectangular	1.732050808	1	1	1.5	1.5	∞
RF Ambient Conditions	E.6.1	3	Rectangular	1.732050808	1	1	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.4	Rectangular	1.732050808	1	1	0.2	0.2	∞
Probe Positioning wrt Phantom Shell	E.6.3	2.9	Rectangular	1.732050808	1	1	1.7	1.7	∞
Extrapolation, interpolation & integration algorithms for max. SAR evaluation	E.5	1	Rectangular	1.732050808	1	1	0.6	0.6	∞
Test Sample Related									
Test Sample Positioning	E.4.2	2.9	Normal	1	1	1	2.9	2.9	12
Device Holder Uncertainty	E.4.1	3.6	Normal	1	1	1	3.6	3.6	8
SAR Drift Measurement	6.6.2	5	Rectangular	1.732050808	1	1	2.9	2.9	∞
Phantom and Tissue Parameters									
Phantom Uncertainty	E.3.1	4	Rectangular	1.732050808	1	1	2.3	2.3	∞
Liquid Conductivity (target)	E.3.2	5	Rectangular	1.732050808	0.64	0.43	1.8	1.2	∞
Liquid Conductivity (measured)	E.3.3	5	Normal	1	0.64	0.43	3.2	2.2	∞
Liquid Permittivity (target)	E.3.2	5	Rectangular	1.732050808	0.6	0.49	1.7	1.4	∞
Liquid Permittivity (measured)	E.3.3	5	Normal	1	0.6	0.49	3.0	2.5	∞
Combined Standard Uncertainty			RSS				11.24	10.72	
Expanded Uncertainty (95% Confidence Interval)			k=2				22.48	21.44	
Measurement Uncertainty Table in accordance with IEEE Standard 1528-2003 and IEC International Standard 62209-1:2005									

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18.0 REFERENCES

- [1] Federal Communications Commission - "Radiofrequency radiation exposure evaluation: portable devices", Rule Part 47 CFR §2.1093.
- [2] Health Canada - "Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz", Safety Code 6: 1999.
- [3] Federal Communications Commission - "Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields", OET Bulletin 65, Supplement C (Edition 01-01), FCC, Washington, D.C.: June 2001.
- [4] Industry Canada - "Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)", Radio Standards Specification RSS-102 Issue 2: November 2005.
- [5] IEEE Standard 1528-2003 - "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques": December 2003.
- [6] IEC International Standard 62209-1:2005 - "Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures."
- [7] Federal Communications Commission, Office of Engineering and Technology - "Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies"; KDB 447498 D01 v03r03: January 2009.
- [8] Federal Communications Commission, Office of Engineering and Technology - "Application Note: SAR Probe Calibration and System Verification Considerations for Measurements at 150 MHz - 3 GHz"; KDB 450824 D01 v01r01: January 2007.
- [9] Schmid & Partner Engineering AG - DASY4 Manual V4.6, Chapter 21 Application Note, SAR Sensitivities: Sept. 2005.

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APPENDIX A - SAR MEASUREMENT DATA

Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Date(s) of Evaluation</u> March 11 & April 03, 2009	<u>Test Report Serial No.</u> 030409OKC-T954-S90P	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Date Tested: 03/11/2009

Face-held SAR - 700 Band - Mid Channel 1 - 769 MHz

DUT: Kenwood Liberty 4102023-501; Type: Portable Multiband Land Mobile PTT Radio Transceiver; Serial: 10007

Ambient Temp: 24.0°C; Fluid Temp: 22.1°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW

Frequency: 769 MHz; Duty Cycle: 1:1

10.8 V Li-ion Battery (P/N: 1600691-2)

Medium: HSL835 Medium parameters used: $f = 769 \text{ MHz}$; $\sigma = 0.86 \text{ mho/m}$; $\epsilon_r = 43.6$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(6.54, 6.54, 6.54); Calibrated: 21/07/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 22/04/2008
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Face-held SAR - 2.5 cm Spacing from Front Side of DUT to Planar Phantom

Area Scan (8x27x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.479 mW/g

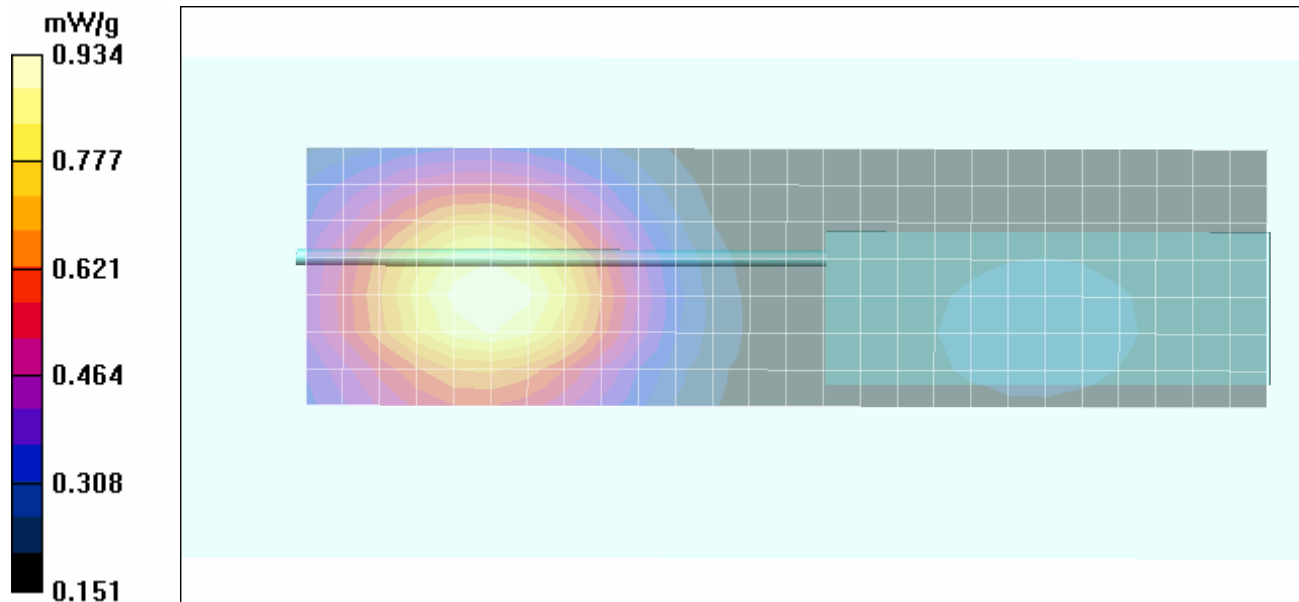
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

Reference Value = 5.23 V/m; Power Drift = -1.09 dB

Peak SAR (extrapolated) = 1.05 W/kg

SAR(1 g) = 0.880 mW/g; SAR(10 g) = 0.664 mW/g

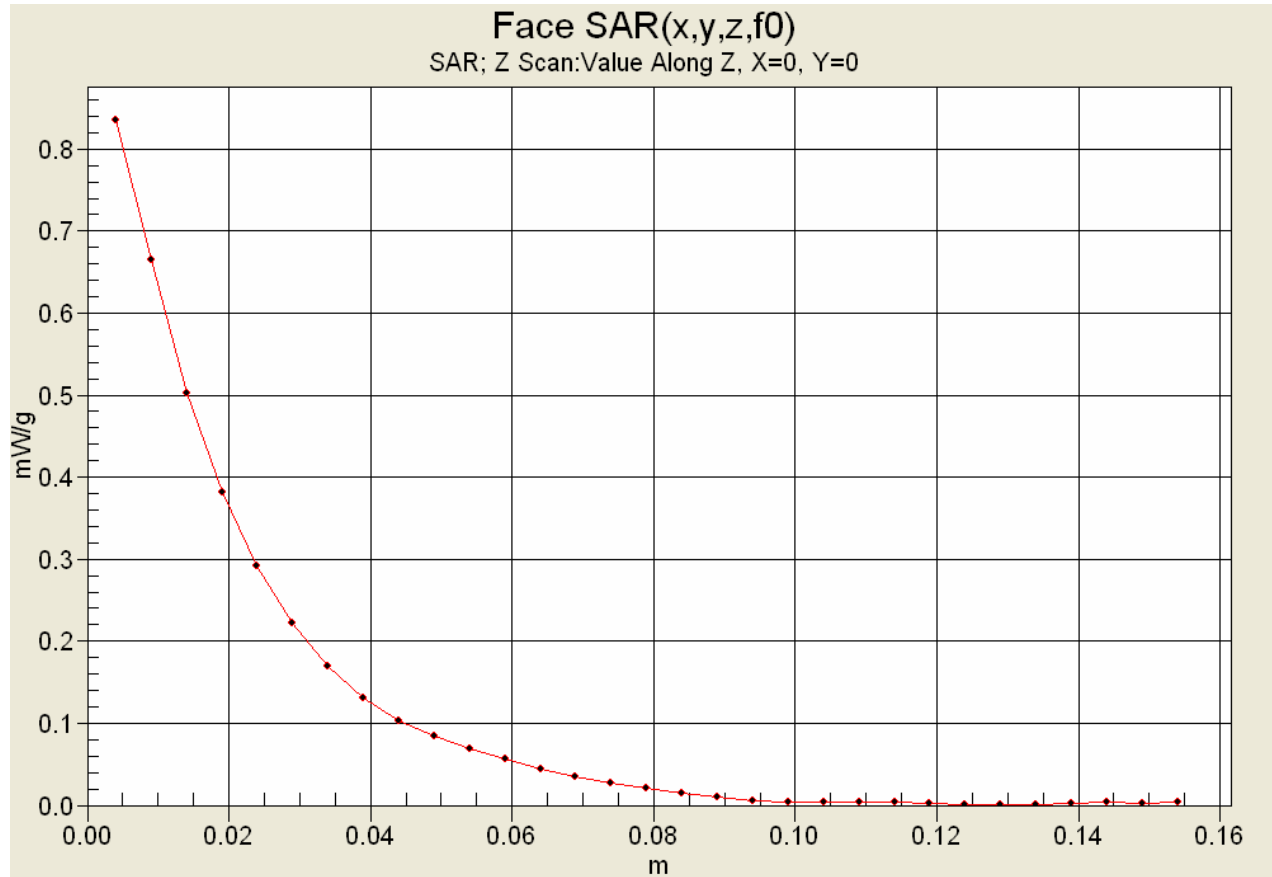
Maximum value of SAR (measured) = 0.934 mW/g



Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Z-Axis Scan



Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Date Tested: 03/11/2009

Face-held SAR - 700 Band - Mid Channel 2 - 799 MHz

DUT: Kenwood Liberty 4102023-501; Type: Portable Multiband Land Mobile PTT Radio Transceiver; Serial: 10007

Ambient Temp: 24.0°C; Fluid Temp: 22.1°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW

Frequency: 799 MHz; Duty Cycle: 1:1

10.8 V Li-ion Battery (P/N: 1600691-2)

Medium: HSL835 Medium parameters used: $f = 799 \text{ MHz}$; $\sigma = 0.88 \text{ mho/m}$; $\epsilon_r = 43.5$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(6.54, 6.54, 6.54); Calibrated: 21/07/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 22/04/2008
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Face-held SAR - 2.5 cm Spacing from Front Side of DUT to Planar Phantom

Area Scan (8x27x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.556 mW/g

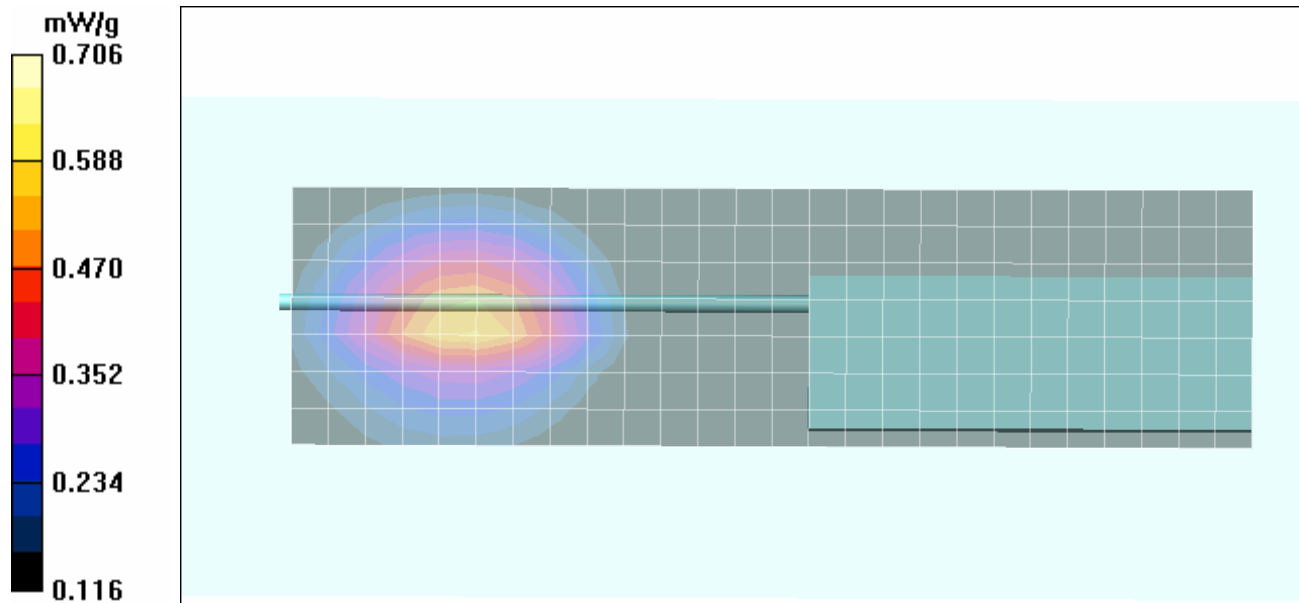
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

Reference Value = 4.63 V/m; Power Drift = -0.133 dB

Peak SAR (extrapolated) = 0.799 W/kg

SAR(1 g) = 0.668 mW/g; SAR(10 g) = 0.506 mW/g

Maximum value of SAR (measured) = 0.706 mW/g



Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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 Testing and Engineering Services Ltd	<u>Date(s) of Evaluation</u> March 11 & April 03, 2009	<u>Test Report Serial No.</u> 030409OKC-T954-S90P	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Date Tested: 03/11/2009

Face-held SAR - 800 Band - Mid Channel 3 - 815 MHz

DUT: Kenwood Liberty 4102023-501; Type: Portable Multiband Land Mobile PTT Radio Transceiver; Serial: 10007

Ambient Temp: 24.0°C; Fluid Temp: 22.1°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW

Frequency: 815 MHz; Duty Cycle: 1:1

10.8 V Li-ion Battery (P/N: 1600691-2)

Medium: HSL835 Medium parameters used: $f = 815 \text{ MHz}$; $\sigma = 0.89 \text{ mho/m}$; $\epsilon_r = 43.3$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(6.54, 6.54, 6.54); Calibrated: 21/07/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 22/04/2008
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Face-held SAR - 2.5 cm Spacing from Front Side of DUT to Planar Phantom

Area Scan (8x27x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.626 mW/g

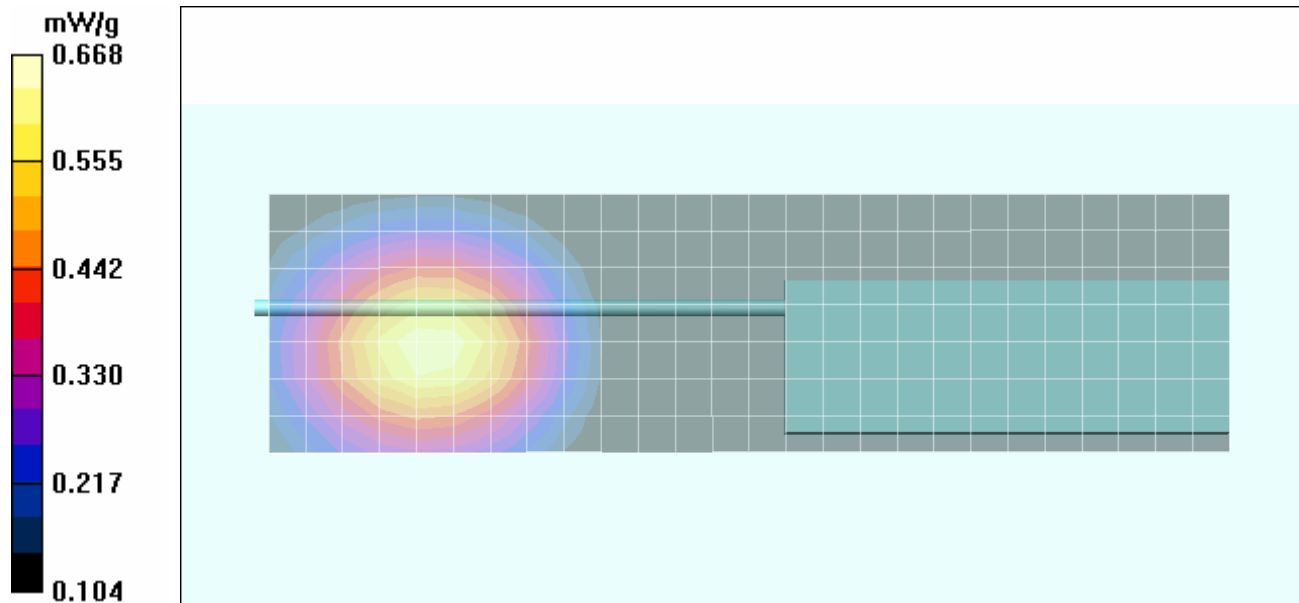
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

Reference Value = 6.98 V/m; Power Drift = -1.77 dB

Peak SAR (extrapolated) = 0.759 W/kg

SAR(1 g) = 0.634 mW/g; SAR(10 g) = 0.477 mW/g

Maximum value of SAR (measured) = 0.668 mW/g



Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Date Tested: 03/11/2009

Face-held SAR - 800 Band - Mid Channel 4 - 860 MHz

DUT: Kenwood Liberty 4102023-501; Type: Portable Multiband Land Mobile PTT Radio Transceiver; Serial: 10007

Ambient Temp: 24.0°C; Fluid Temp: 22.1°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW

Frequency: 860 MHz; Duty Cycle: 1:1

10.8 V Li-ion Battery (P/N: 1600691-2)

Medium: HSL835 Medium parameters used: $f = 860 \text{ MHz}$; $\sigma = 0.94 \text{ mho/m}$; $\epsilon_r = 42.7$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(6.54, 6.54, 6.54); Calibrated: 21/07/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 22/04/2008
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Face-held SAR - 2.5 cm Spacing from Front Side of DUT to Planar Phantom

Area Scan (8x27x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.326 mW/g

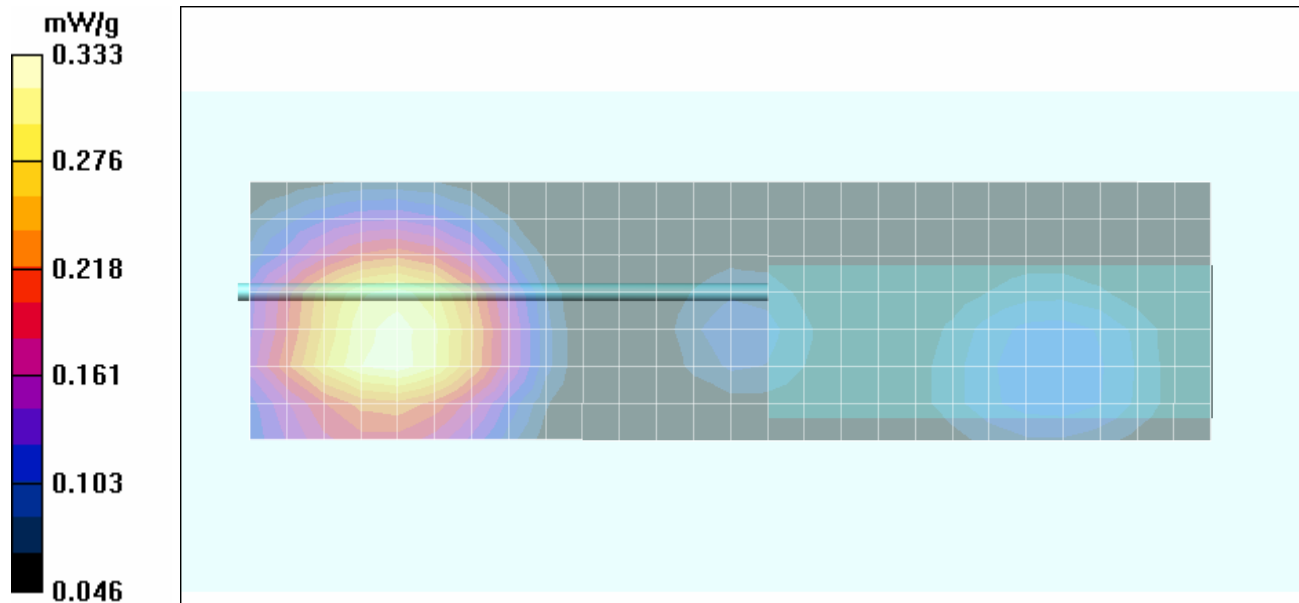
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

Reference Value = 10.8 V/m; Power Drift = -2.51 dB

Peak SAR (extrapolated) = 0.378 W/kg

SAR(1 g) = 0.310 mW/g; SAR(10 g) = 0.233 mW/g

Maximum value of SAR (measured) = 0.333 mW/g



Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Date Tested: 04/03/2009

Body-worn SAR - DUT with Belt-Clip Accessory - 700 Band - Low Channel 1 - 763 MHz

DUT: Kenwood Liberty 4102023-501; Type: Portable Multiband Land Mobile PTT Radio Transceiver; Serial: 10007

Body-worn Accessory: Belt-Clip (P/N: 40508); Audio Accessory: Speaker-Microphone (P/N: 1600696-01)

Ambient Temp: 23.2°C; Fluid Temp: 21.8°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW

Frequency: 763 MHz; Duty Cycle: 1:1

10.8 V Li-ion Battery (P/N: 1600691-2)

Medium: M835 Medium parameters used: $f = 763 \text{ MHz}$; $\sigma = 0.92 \text{ mho/m}$; $\epsilon_r = 57.2$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 – SN1590; ConvF(6.39, 6.39, 6.39); Calibrated: 21/07/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 22/04/2008
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn SAR - 1.6 cm Belt-Clip Spacing from Back Side of DUT to Planar Phantom

Area Scan (8x27x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 1.84 mW/g

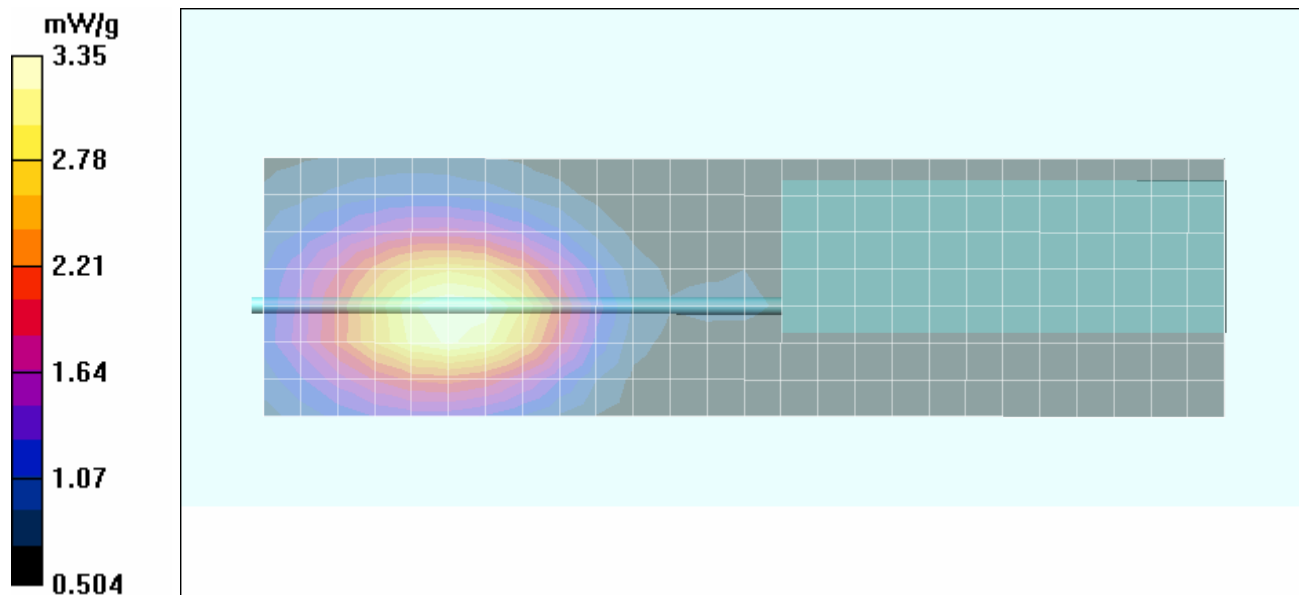
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

Reference Value = 10.2 V/m; Power Drift = -1.45 dB

Peak SAR (extrapolated) = 3.71 W/kg

SAR(1 g) = 3.15 mW/g; SAR(10 g) = 2.38 mW/g

Maximum value of SAR (measured) = 3.35 mW/g



Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Date Tested: 04/03/2009

Body-worn SAR - DUT with Belt-Holster Accessory - 700 Band - Low Channel 1 - 763 MHz

DUT: Kenwood Liberty 4102023-501; Type: Portable Multiband Land Mobile PTT Radio Transceiver; Serial: 10007

Body-worn Accessory: Belt-Holster (P/N: 1600702-1); Audio Accessory: Speaker-Microphone (P/N: 1600696-01)

Ambient Temp: 23.2°C; Fluid Temp: 21.8°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW

Frequency: 763 MHz; Duty Cycle: 1:1

10.8 V Li-ion Battery (P/N: 1600691-2)

Medium: M835 Medium parameters used: $f = 763 \text{ MHz}$; $\sigma = 0.92 \text{ mho/m}$; $\epsilon_r = 57.2$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 – SN1590; ConvF(6.39, 6.39, 6.39); Calibrated: 21/07/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 22/04/2008
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn SAR - 2.0 cm Belt-Holster Spacing from Back Side of DUT to Planar Phantom

Area Scan (8x27x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 2.23 mW/g

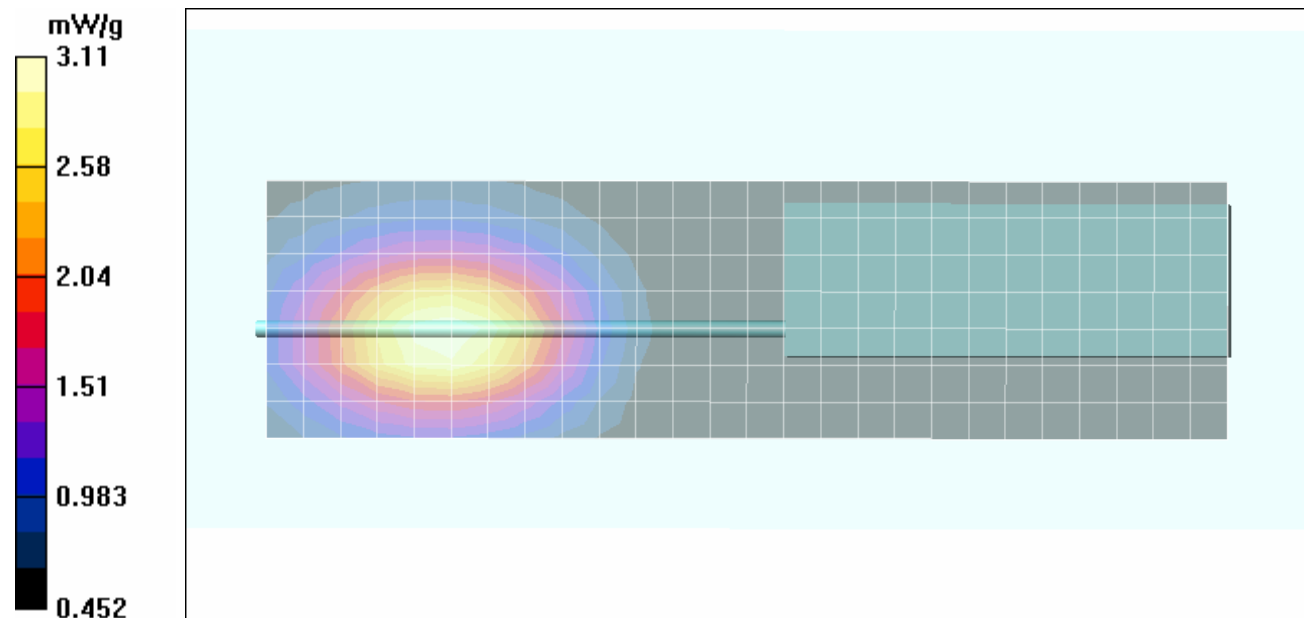
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

Reference Value = 9.72 V/m; Power Drift = -1.01 dB

Peak SAR (extrapolated) = 3.46 W/kg

SAR(1 g) = 2.94 mW/g; SAR(10 g) = 2.2 mW/g

Maximum value of SAR (measured) = 3.11 mW/g



Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Date Tested: 03/11/2009

Body-worn SAR - DUT with Belt-Clip Accessory - 700 Band - Mid Channel 1 - 769 MHz

DUT: Kenwood Liberty 4102023-501; Type: Portable Multiband Land Mobile PTT Radio Transceiver; Serial: 10007

Body-worn Accessory: Belt-Clip (P/N: 40508); Audio Accessory: Speaker-Microphone (P/N: 1600696-01)

Ambient Temp: 23.5°C; Fluid Temp: 21.5°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW

Frequency: 769 MHz; Duty Cycle: 1:1

10.8 V Li-ion Battery (P/N: 1600691-2)

Medium: M835 Medium parameters used: $f = 769 \text{ MHz}$; $\sigma = 0.92 \text{ mho/m}$; $\epsilon_r = 57.8$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 – SN1590; ConvF(6.39, 6.39, 6.39); Calibrated: 21/07/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 22/04/2008
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn SAR - 1.6 cm Belt-Clip Spacing from Back Side of DUT to Planar Phantom

Area Scan (8x27x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 3.20 mW/g

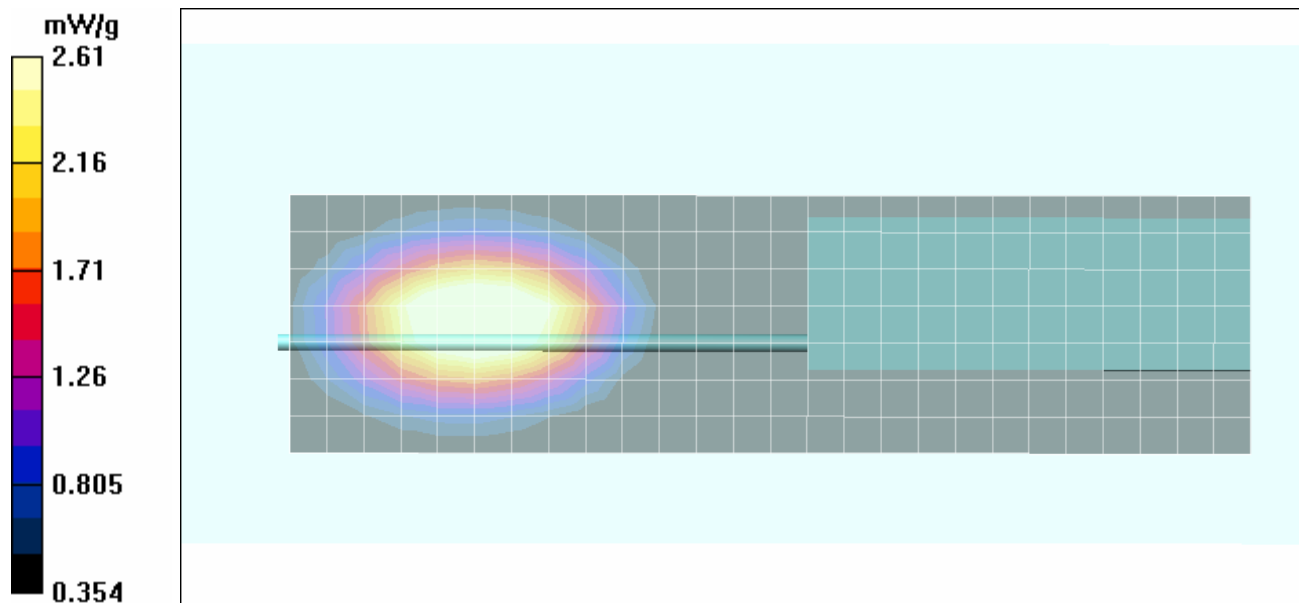
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

Reference Value = 13.3 V/m; Power Drift = -0.764 dB

Peak SAR (extrapolated) = 2.94 W/kg

SAR(1 g) = 2.48 mW/g; SAR(10 g) = 1.83 mW/g

Maximum value of SAR (measured) = 2.61 mW/g



Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Date Tested: 03/11/2009

Body-worn SAR - DUT with Belt-Holster Accessory - 700 Band - Mid Channel 1 - 769 MHz

DUT: Kenwood Liberty 4102023-501; Type: Portable Multiband Land Mobile PTT Radio Transceiver; Serial: 10007

Body-worn Accessory: Belt-Holster (P/N: 1600702-1); Audio Accessory: Speaker-Microphone (P/N: 1600696-01)

Ambient Temp: 23.5°C; Fluid Temp: 21.5°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW

Frequency: 769 MHz; Duty Cycle: 1:1

10.8 V Li-ion Battery (P/N: 1600691-2)

Medium: M835 Medium parameters used: $f = 769 \text{ MHz}$; $\sigma = 0.92 \text{ mho/m}$; $\epsilon_r = 57.8$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 – SN1590; ConvF(6.39, 6.39, 6.39); Calibrated: 21/07/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 22/04/2008
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn SAR - 2.0 cm Belt-Holster Spacing from Back Side of DUT to Planar Phantom

Area Scan (8x27x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 2.34 mW/g

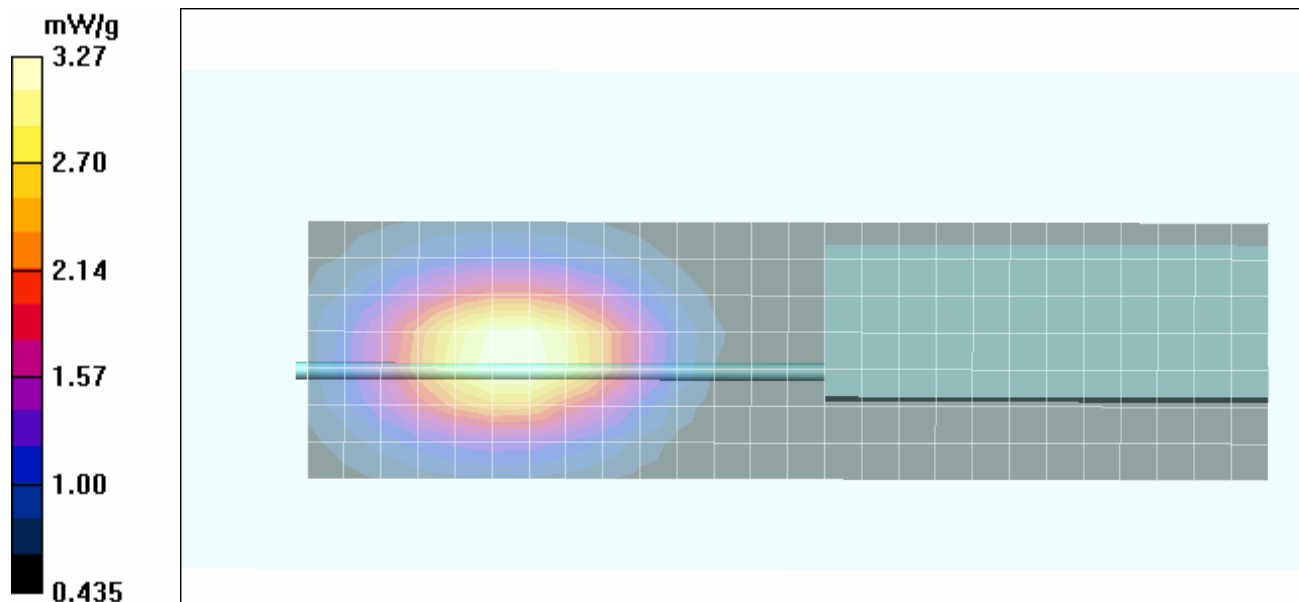
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

Reference Value = 9.74 V/m; Power Drift = -1.13 dB

Peak SAR (extrapolated) = 3.68 W/kg

SAR(1 g) = 3.11 mW/g; SAR(10 g) = 2.33 mW/g

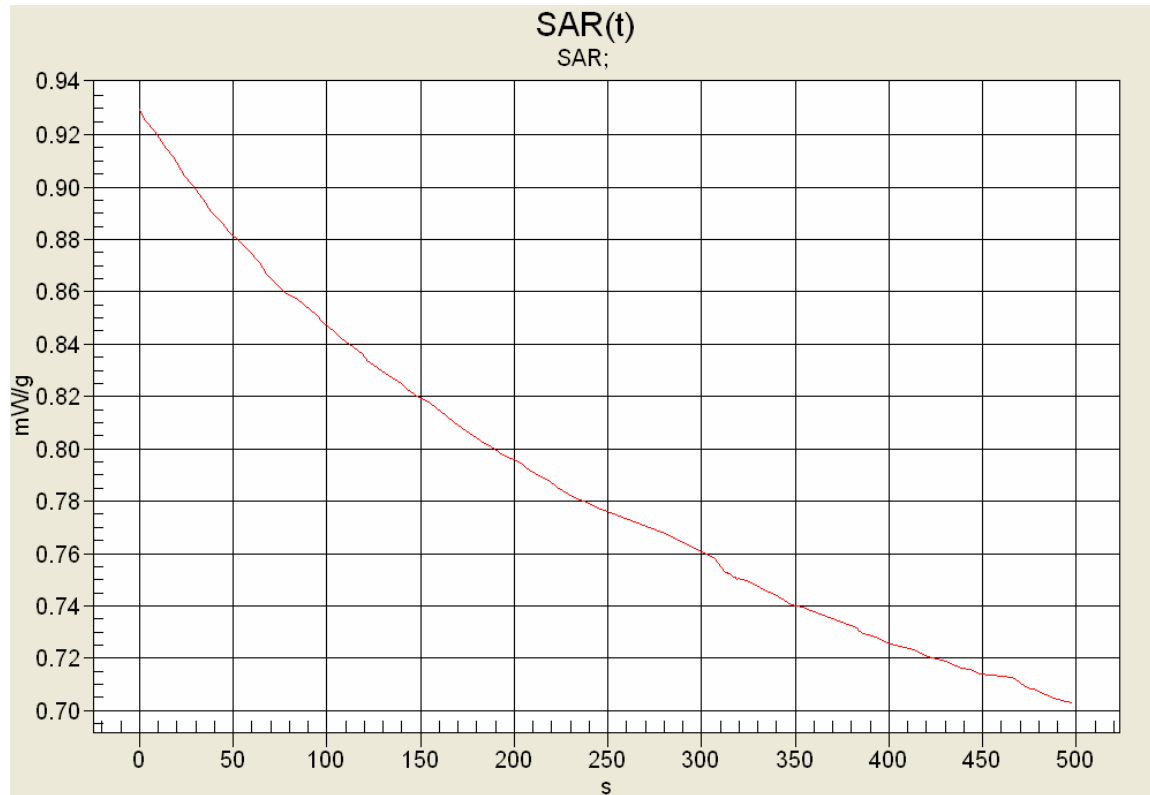
Maximum value of SAR (measured) = 3.27 mW/g



Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

SAR-versus-Time Power Droop Evaluation
Body-worn - Mid Channel 1 - 769 MHz
DUT with Belt-Holster Accessory



SAR 0s: 0.929634 mW/g
SAR 340s: 0.744775 mW/g (-0.963 dB)
(340s = Zoom Scan Duration)
(500s = Area Scan Duration)

Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Date Tested: 04/03/2009

Body-worn SAR - DUT with Belt-Clip Accessory - 700 Band - High Channel 1 - 775 MHz

DUT: Kenwood Liberty 4102023-501; Type: Portable Multiband Land Mobile PTT Radio Transceiver; Serial: 10007

Body-worn Accessory: Belt-Clip (P/N: 40508); Audio Accessory: Speaker-Microphone (P/N: 1600696-01)

Ambient Temp: 23.2°C; Fluid Temp: 21.8°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW

Frequency: 775 MHz; Duty Cycle: 1:1

10.8 V Li-ion Battery (P/N: 1600691-2)

Medium: M835 Medium parameters used: $f = 775 \text{ MHz}$; $\sigma = 0.93 \text{ mho/m}$; $\epsilon_r = 57.3$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 – SN1590; ConvF(6.39, 6.39, 6.39); Calibrated: 21/07/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 22/04/2008
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn SAR - 1.6 cm Belt-Clip Spacing from Back Side of DUT to Planar Phantom

Area Scan (8x27x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 2.55 mW/g

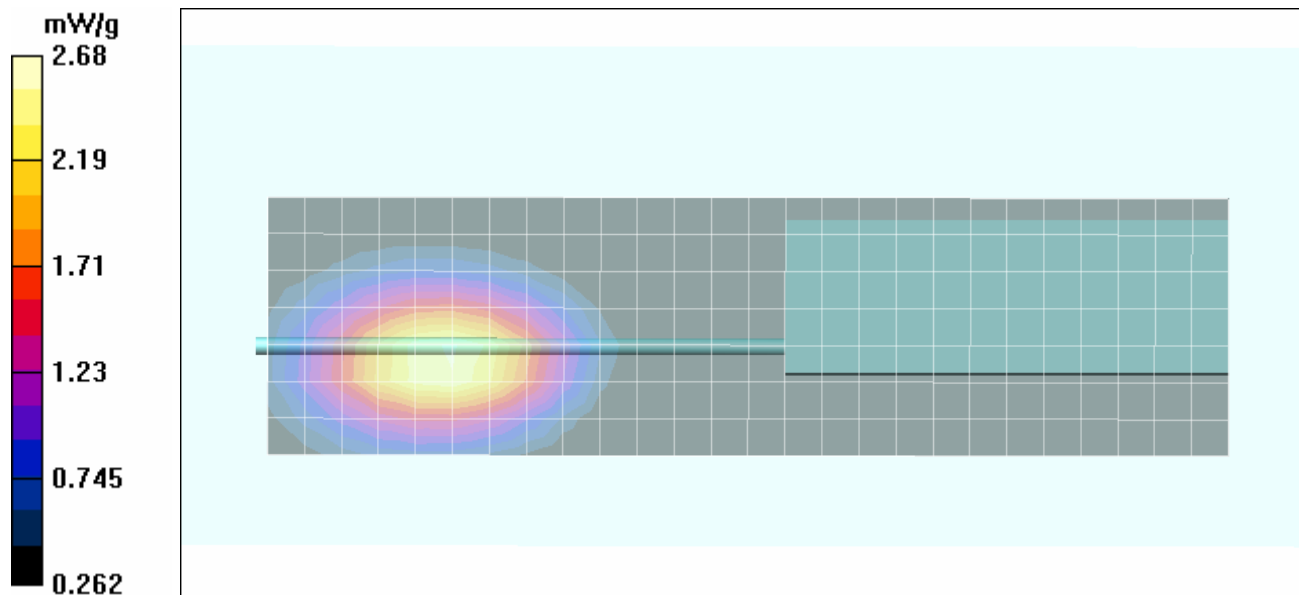
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

Reference Value = 11.5 V/m; Power Drift = -1.10 dB

Peak SAR (extrapolated) = 2.95 W/kg

SAR(1 g) = 2.44 mW/g; SAR(10 g) = 1.78 mW/g

Maximum value of SAR (measured) = 2.68 mW/g



Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Date(s) of Evaluation</u> March 11 & April 03, 2009	<u>Test Report Serial No.</u> 030409OKC-T954-S90P	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Date Tested: 04/03/2009

Body-worn SAR - DUT with Belt-Holster Accessory - 700 Band - High Channel 1 - 775 MHz

DUT: Kenwood Liberty 4102023-501; Type: Portable Multiband Land Mobile PTT Radio Transceiver; Serial: 10007

Body-worn Accessory: Belt-Holster (P/N: 1600702-1); Audio Accessory: Speaker-Microphone (P/N: 1600696-01)

Ambient Temp: 23.2°C; Fluid Temp: 21.8°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW

Frequency: 775 MHz; Duty Cycle: 1:1

10.8 V Li-ion Battery (P/N: 1600691-2)

Medium: M835 Medium parameters used: $f = 775 \text{ MHz}$; $\sigma = 0.93 \text{ mho/m}$; $\epsilon_r = 57.3$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 – SN1590; ConvF(6.39, 6.39, 6.39); Calibrated: 21/07/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 22/04/2008
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn SAR - 2.0 cm Belt-Holster Spacing from Back Side of DUT to Planar Phantom

Area Scan (8x27x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 1.92 mW/g

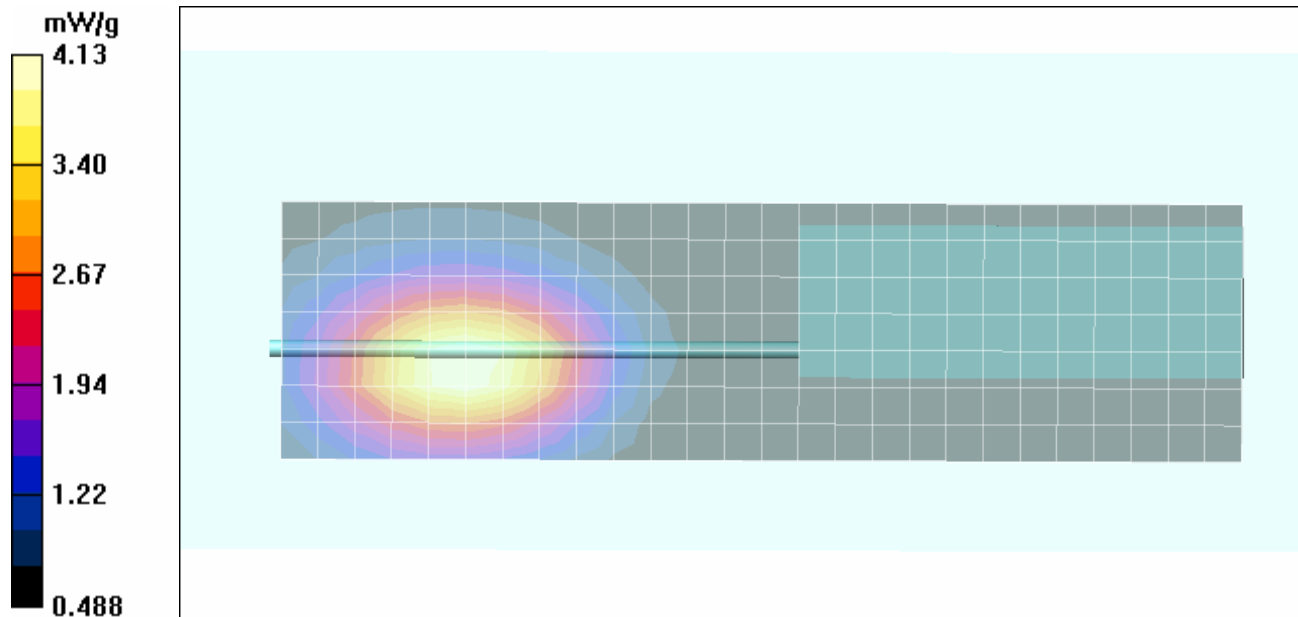
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

Reference Value = 14.2 V/m; Power Drift = -0.922 dB

Peak SAR (extrapolated) = 4.72 W/kg

SAR(1 g) = 3.92 mW/g; SAR(10 g) = 2.8 mW/g

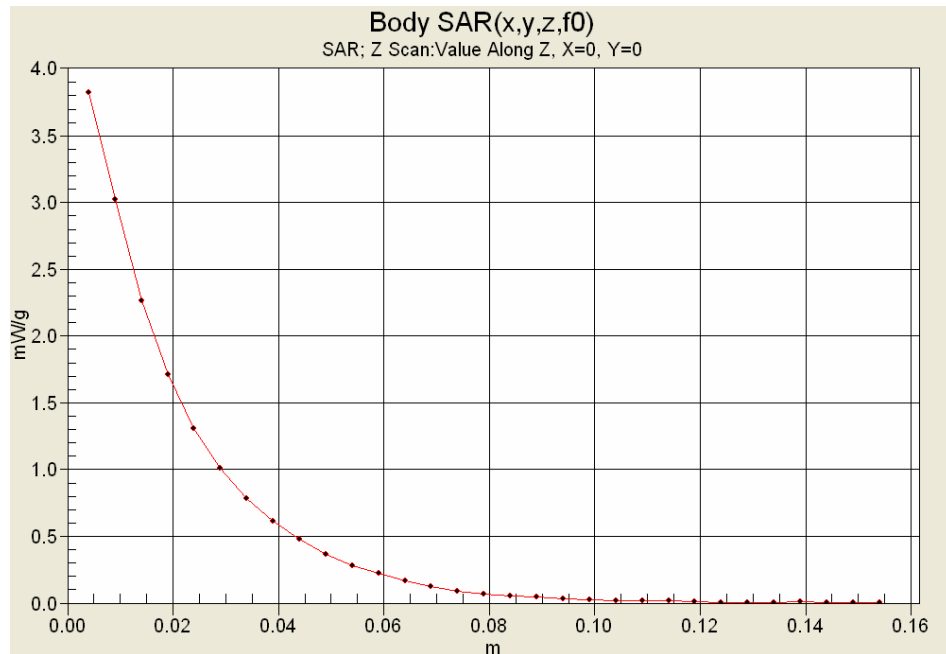
Maximum value of SAR (measured) = 4.13 mW/g



Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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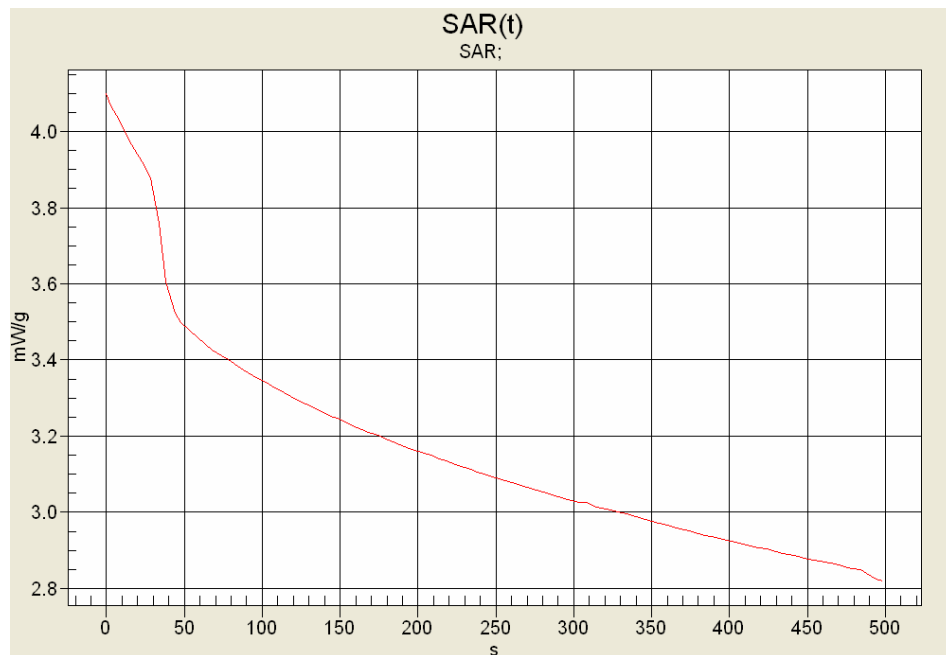
	<u>Date(s) of Evaluation</u> March 11 & April 03, 2009	<u>Test Report Serial No.</u> 030409OKC-T954-S90P	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Z-Axis Scan



SAR-versus-Time Power Droop Evaluation

Body-worn - High Channel - 775 MHz
DUT with Belt-Holster Accessory



SAR 0s: 4.09896 mW/g
SAR 340s: 2.99159 mW/g (-1.37 dB)
(340s = Zoom Scan Duration)
(500s = Area Scan Duration)

Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Date(s) of Evaluation</u> March 11 & April 03, 2009	<u>Test Report Serial No.</u> 030409OKC-T954-S90P	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Date Tested: 04/03/2009

Body-worn SAR - DUT with Belt-Clip Accessory - 700 Band - Low Channel 2 - 793 MHz

DUT: Kenwood Liberty 4102023-501; Type: Portable Multiband Land Mobile PTT Radio Transceiver; Serial: 10007

Body-worn Accessory: Belt-Clip (P/N: 40508); Audio Accessory: Speaker-Microphone (P/N: 1600696-01)

Ambient Temp: 23.2°C; Fluid Temp: 21.8°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW

Frequency: 793 MHz; Duty Cycle: 1:1

10.8 V Li-ion Battery (P/N: 1600691-2)

Medium: M835 Medium parameters used: $f = 793 \text{ MHz}$; $\sigma = 0.95 \text{ mho/m}$; $\epsilon_r = 56.9$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 – SN1590; ConvF(6.39, 6.39, 6.39); Calibrated: 21/07/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 22/04/2008
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn SAR - 1.6 cm Belt-Clip Spacing from Back Side of DUT to Planar Phantom

Area Scan (8x27x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 2.01 mW/g

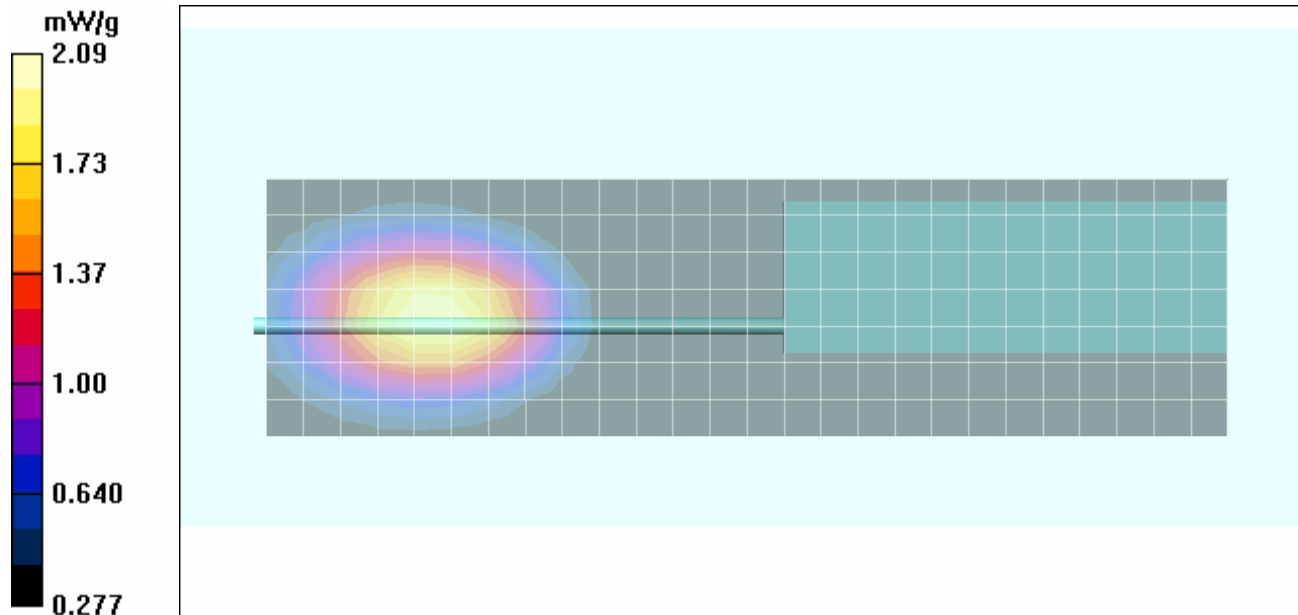
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

Reference Value = 14.7 V/m; Power Drift = -0.692 dB

Peak SAR (extrapolated) = 2.35 W/kg

SAR(1 g) = 1.99 mW/g; SAR(10 g) = 1.47 mW/g

Maximum value of SAR (measured) = 2.09 mW/g



Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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 Testing and Engineering Services Ltd	<u>Date(s) of Evaluation</u> March 11 & April 03, 2009	<u>Test Report Serial No.</u> 030409OKC-T954-S90P	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Date Tested: 04/03/2009

Body-worn SAR - DUT with Belt-Holster Accessory - 700 Band - Low Channel 2 - 793 MHz

DUT: Kenwood Liberty 4102023-501; Type: Portable Multiband Land Mobile PTT Radio Transceiver; Serial: 10007

Body-worn Accessory: Belt-Holster (P/N: 40508); Audio Accessory: Speaker-Microphone (P/N: 1600696-01)

Ambient Temp: 23.2°C; Fluid Temp: 21.8°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW

Frequency: 793 MHz; Duty Cycle: 1:1

10.8 V Li-ion Battery (P/N: 1600691-2)

Medium: M835 Medium parameters used: $f = 793 \text{ MHz}$; $\sigma = 0.95 \text{ mho/m}$; $\epsilon_r = 56.9$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 – SN1590; ConvF(6.39, 6.39, 6.39); Calibrated: 21/07/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 22/04/2008
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn SAR - 2.0 cm Belt-Holster Spacing from Back Side of DUT to Planar Phantom

Area Scan (8x27x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 2.26 mW/g

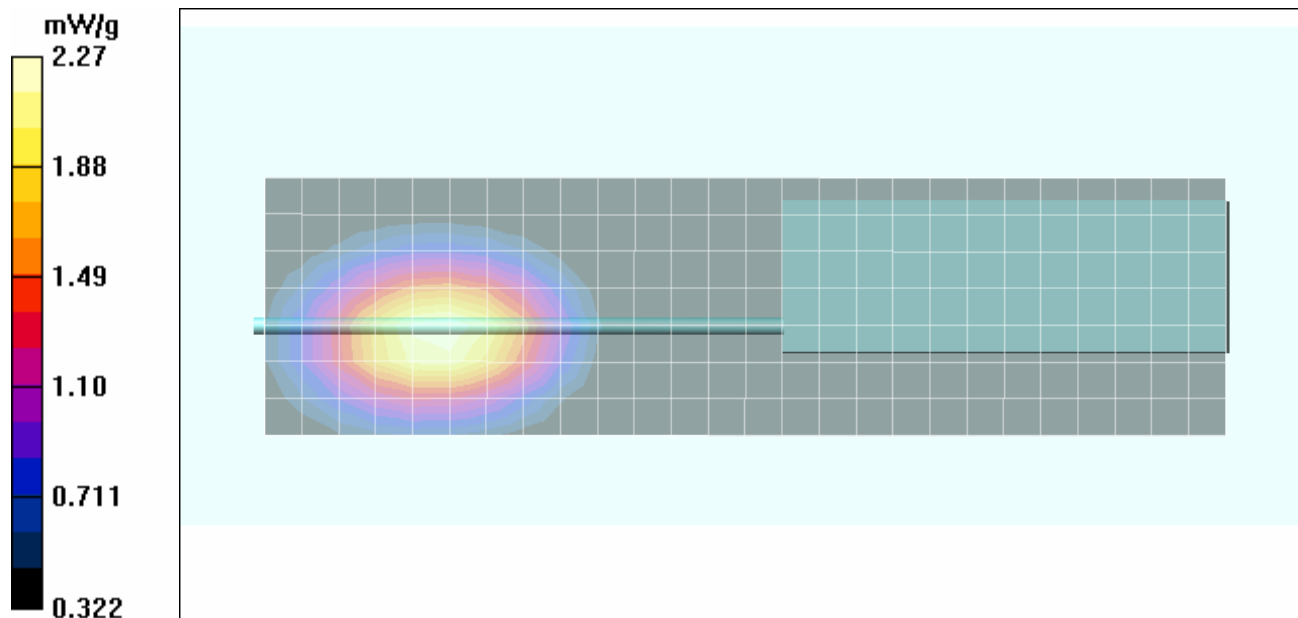
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

Reference Value = 13.4 V/m; Power Drift = -0.543 dB

Peak SAR (extrapolated) = 2.54 W/kg

SAR(1 g) = 2.15 mW/g; SAR(10 g) = 1.59 mW/g

Maximum value of SAR (measured) = 2.27 mW/g



Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Date(s) of Evaluation</u> March 11 & April 03, 2009	<u>Test Report Serial No.</u> 030409OKC-T954-S90P	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Date Tested: 03/11/2009

Body-worn SAR - DUT with Belt-Clip Accessory - 700 Band - Mid Channel 2 - 799 MHz

DUT: Kenwood Liberty 4102023-501; Type: Portable Multiband Land Mobile PTT Radio Transceiver; Serial: 10007

Body-worn Accessory: Belt-Clip (P/N: 40508); Audio Accessory: Speaker-Microphone (P/N: 1600696-01)

Ambient Temp: 23.5°C; Fluid Temp: 21.5°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW

Frequency: 799 MHz; Duty Cycle: 1:1

10.8 V Li-ion Battery (P/N: 1600691-2)

Medium: M835 Medium parameters used: $f = 799 \text{ MHz}$; $\sigma = 0.93 \text{ mho/m}$; $\epsilon_r = 57.5$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 – SN1590; ConvF(6.39, 6.39, 6.39); Calibrated: 21/07/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 22/04/2008
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn SAR - 1.6 cm Belt-Clip Spacing from Back Side of DUT to Planar Phantom

Area Scan (8x27x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 3.10 mW/g

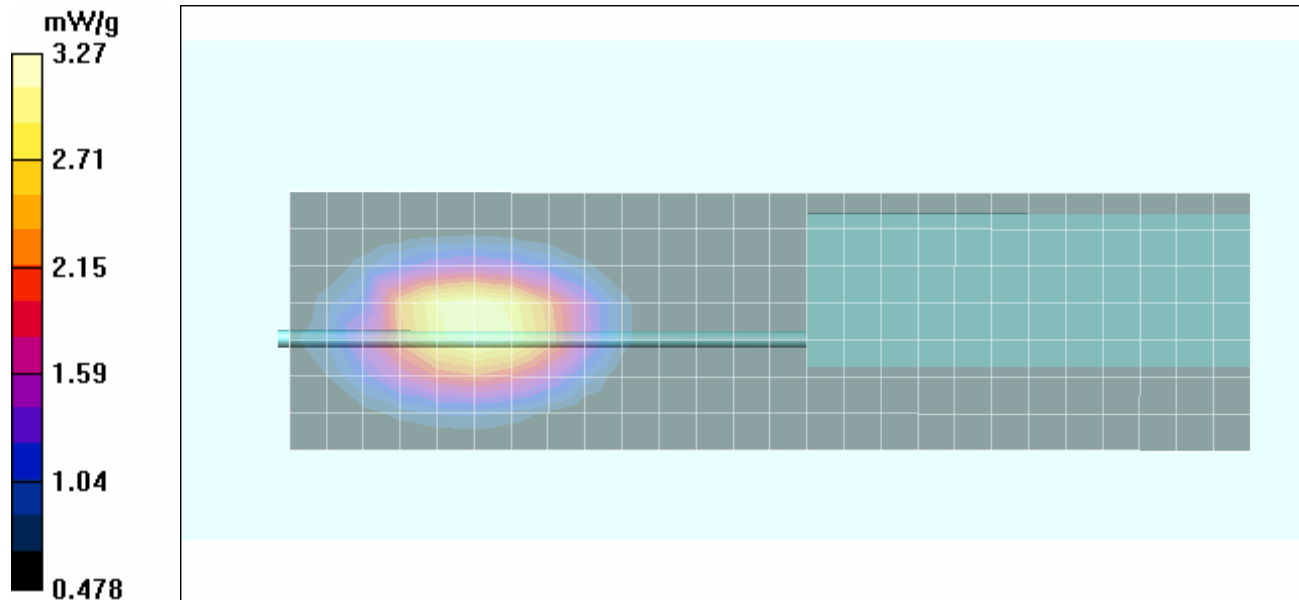
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

Reference Value = 21.3 V/m; Power Drift = -0.238 dB

Peak SAR (extrapolated) = 3.67 W/kg

SAR(1 g) = 3.07 mW/g; SAR(10 g) = 2.27 mW/g

Maximum value of SAR (measured) = 3.27 mW/g



Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Date(s) of Evaluation</u> March 11 & April 03, 2009	<u>Test Report Serial No.</u> 030409OKC-T954-S90P	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Date Tested: 03/11/2009

Body-worn SAR - DUT with Belt-Holster Accessory - 700 Band - Mid Channel 2 - 799 MHz

DUT: Kenwood Liberty 4102023-501; Type: Portable Multiband Land Mobile PTT Radio Transceiver; Serial: 10007

Body-worn Accessory: Belt-Holster (P/N: 1600702-1); Audio Accessory: Speaker-Microphone (P/N: 1600696-01)

Ambient Temp: 23.5°C; Fluid Temp: 21.5°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW

Frequency: 799 MHz; Duty Cycle: 1:1

10.8 V Li-ion Battery (P/N: 1600691-2)

Medium: M835 Medium parameters used: $f = 799 \text{ MHz}$; $\sigma = 0.93 \text{ mho/m}$; $\epsilon_r = 57.5$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 – SN1590; ConvF(6.39, 6.39, 6.39); Calibrated: 21/07/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 22/04/2008
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn SAR - 2.0 cm Belt-Holster Spacing from Back Side of DUT to Planar Phantom

Area Scan (8x27x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 2.82 mW/g

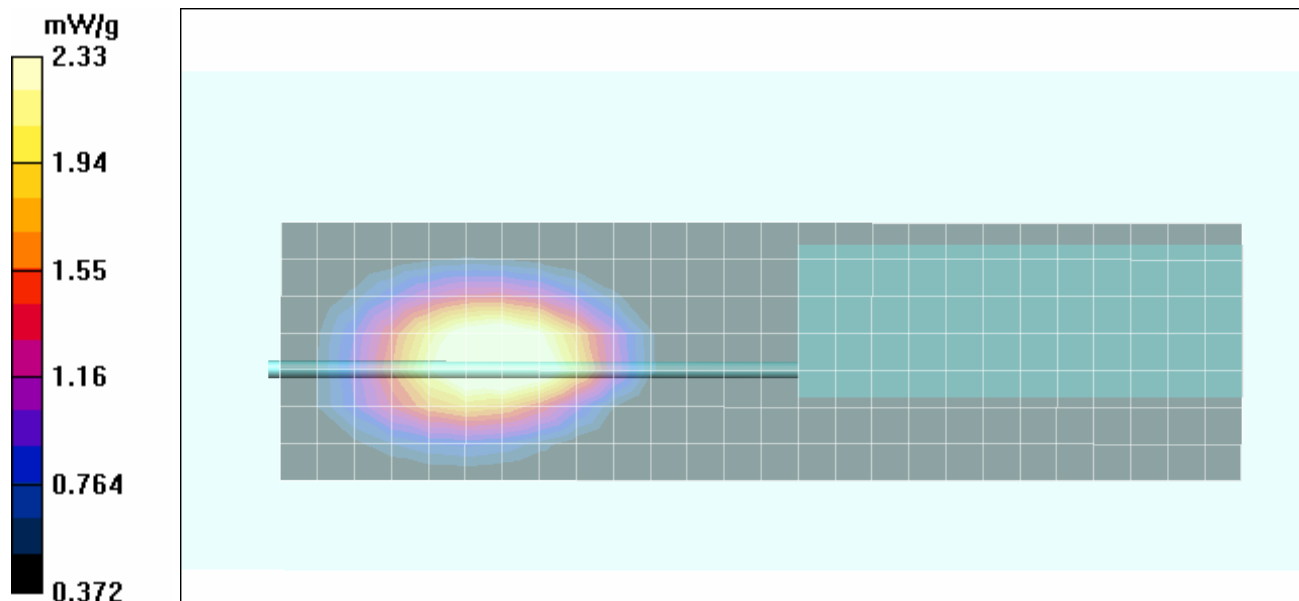
Zoom Scan 2 (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

Reference Value = 16.0 V/m; Power Drift = -0.411 dB

Peak SAR (extrapolated) = 2.60 W/kg

SAR(1 g) = 2.19 mW/g; SAR(10 g) = 1.63 mW/g

Maximum value of SAR (measured) = 2.33 mW/g



Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Date(s) of Evaluation</u> March 11 & April 03, 2009	<u>Test Report Serial No.</u> 030409OKC-T954-S90P	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Date Tested: 04/03/2009

Body-worn SAR - DUT with Belt-Clip Accessory - 700 Band - High Channel 2 - 805 MHz

DUT: Kenwood Liberty 4102023-501; Type: Portable Multiband Land Mobile PTT Radio Transceiver; Serial: 10007

Body-worn Accessory: Belt-Clip (P/N: 40508); Audio Accessory: Speaker-Microphone (P/N: 1600696-01)

Ambient Temp: 23.2°C; Fluid Temp: 21.8°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW

Frequency: 805 MHz; Duty Cycle: 1:1

10.8 V Li-ion Battery (P/N: 1600691-2)

Medium: M835 Medium parameters used: $f = 805 \text{ MHz}$; $\sigma = 0.95 \text{ mho/m}$; $\epsilon_r = 56.7$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(6.39, 6.39, 6.39); Calibrated: 21/07/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 22/04/2008
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn SAR - 1.6 cm Belt-Clip Spacing from Back Side of DUT to Planar Phantom

Area Scan (8x27x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 2.21 mW/g

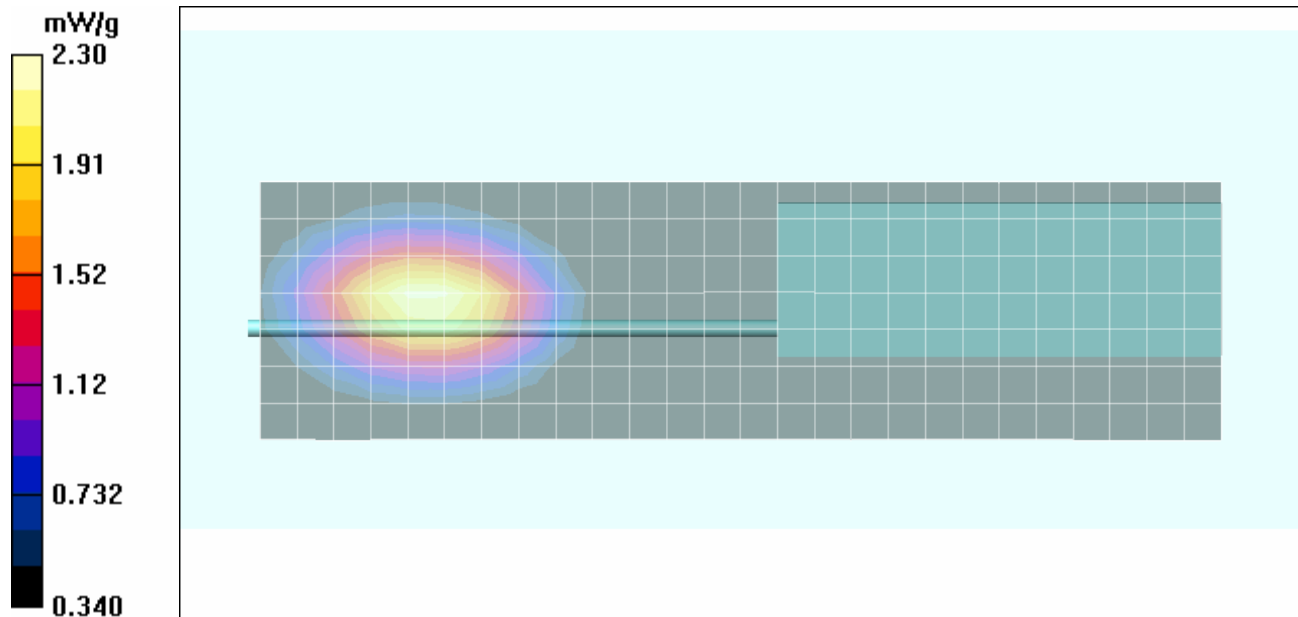
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

Reference Value = 17.3 V/m; Power Drift = -0.431 dB

Peak SAR (extrapolated) = 2.60 W/kg

SAR(1 g) = 2.19 mW/g; SAR(10 g) = 1.63 mW/g

Maximum value of SAR (measured) = 2.30 mW/g



Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Date(s) of Evaluation</u> March 11 & April 03, 2009	<u>Test Report Serial No.</u> 030409OKC-T954-S90P	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Date Tested: 04/03/2009

Body-worn SAR - DUT with Belt-Holster Accessory - 700 Band - High Channel 2 - 805 MHz

DUT: Kenwood Liberty 4102023-501; Type: Portable Multiband Land Mobile PTT Radio Transceiver; Serial: 10007

Body-worn Accessory: Belt-Holster (P/N: 40508); Audio Accessory: Speaker-Microphone (P/N: 1600696-01)

Ambient Temp: 23.2°C; Fluid Temp: 21.8°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW

Frequency: 805 MHz; Duty Cycle: 1:1

10.8 V Li-ion Battery (P/N: 1600691-2)

Medium: M835 Medium parameters used: $f = 805 \text{ MHz}$; $\sigma = 0.95 \text{ mho/m}$; $\epsilon_r = 56.7$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 – SN1590; ConvF(6.39, 6.39, 6.39); Calibrated: 21/07/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 22/04/2008
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn SAR - 2.0 cm Belt-Holster Spacing from Back Side of DUT to Planar Phantom

Area Scan (8x27x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 1.75 mW/g

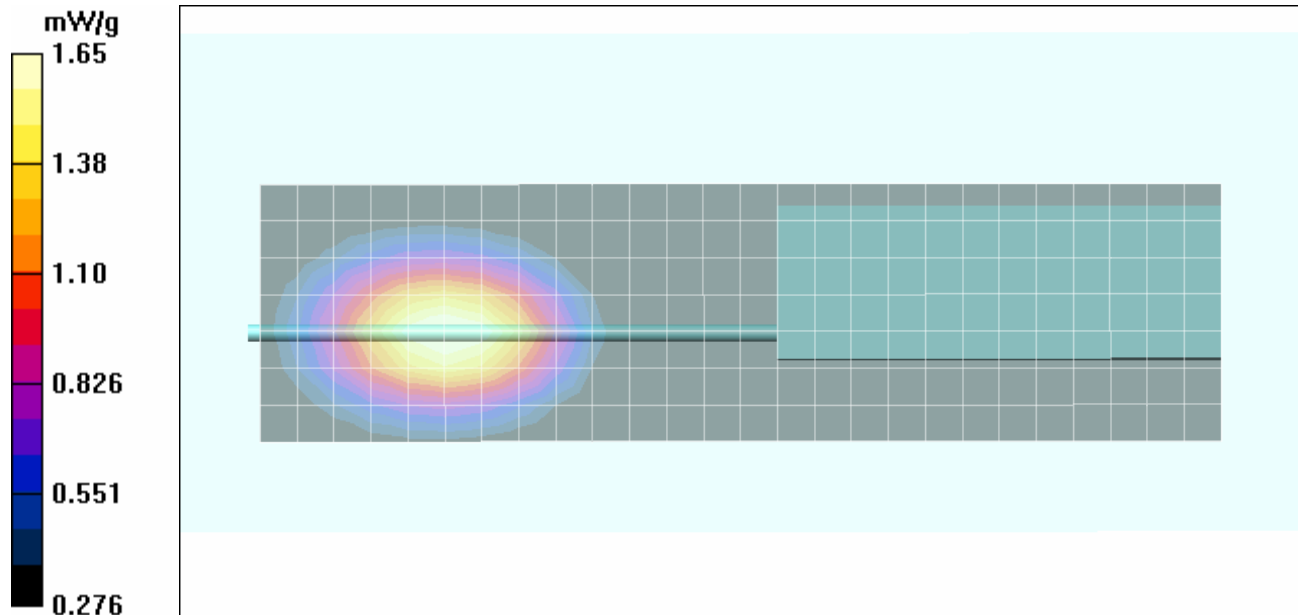
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

Reference Value = 13.4 V/m; Power Drift = -0.158 dB

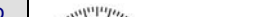
Peak SAR (extrapolated) = 1.83 W/kg

SAR(1 g) = 1.56 mW/g; SAR(10 g) = 1.17 mW/g

Maximum value of SAR (measured) = 1.65 mW/g



Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Date(s) of Evaluation</u> March 11 & April 03, 2009	<u>Test Report Serial No.</u> 030409OKC-T954-S90P	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Date Tested: 04/03/2009

Body-worn SAR - DUT with Belt-Clip Accessory - 800 Band - Low Channel 3 - 806 MHz

DUT: Kenwood Liberty 4102023-501; Type: Portable Multiband Land Mobile PTT Radio Transceiver; Serial: 10007

Body-worn Accessory: Belt-Clip (P/N: 40508); Audio Accessory: Speaker-Microphone (P/N: 1600696-01)

Ambient Temp: 23.2°C; Fluid Temp: 21.8°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW

Frequency: 806 MHz; Duty Cycle: 1:1

10.8 V Li-ion Battery (P/N: 1600691-2)

Medium: M835 Medium parameters used: $f = 806 \text{ MHz}$; $\sigma = 0.95 \text{ mho/m}$; $\epsilon_r = 56.7$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(6.39, 6.39, 6.39); Calibrated: 21/07/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 22/04/2008
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn SAR - 1.6 cm Belt-Clip Spacing from Back Side of DUT to Planar Phantom

Area Scan (8x27x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 2.16 mW/g

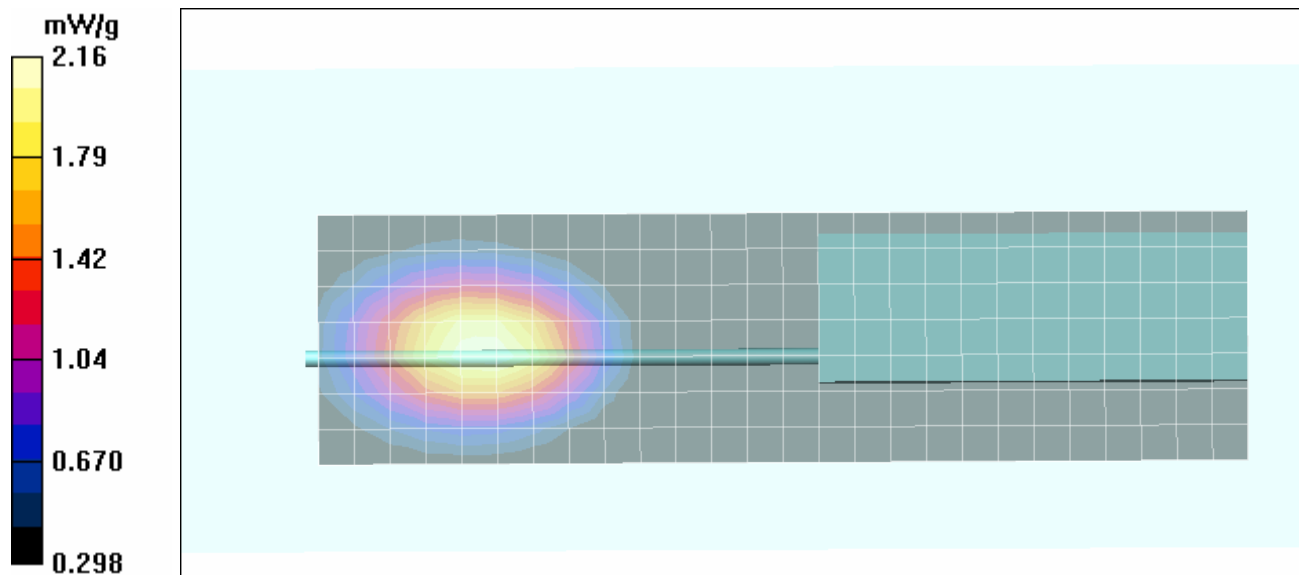
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

Reference Value = 17.5 V/m; Power Drift = -0.280 dB

Peak SAR (extrapolated) = 2.42 W/kg

SAR(1 g) = 2.04 mW/g; SAR(10 g) = 1.53 mW/g

Maximum value of SAR (measured) = 2.16 mW/g



Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Date(s) of Evaluation</u> March 11 & April 03, 2009	<u>Test Report Serial No.</u> 030409OKC-T954-S90P	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Date Tested: 04/03/2009

Body-worn SAR - DUT with Belt-Holster Accessory - 800 Band - Low Channel 3 - 806 MHz

DUT: Kenwood Liberty 4102023-501; Type: Portable Multiband Land Mobile PTT Radio Transceiver; Serial: 10007

Body-worn Accessory: Belt-Holster (P/N: 40508); Audio Accessory: Speaker-Microphone (P/N: 1600696-01)

Ambient Temp: 23.2°C; Fluid Temp: 21.8°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW

Frequency: 806 MHz; Duty Cycle: 1:1

10.8 V Li-ion Battery (P/N: 1600691-2)

Medium: M835 Medium parameters used: $f = 806 \text{ MHz}$; $\sigma = 0.95 \text{ mho/m}$; $\epsilon_r = 56.7$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 – SN1590; ConvF(6.39, 6.39, 6.39); Calibrated: 21/07/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 22/04/2008
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn SAR - 2.0 cm Belt-Holster Spacing from Back Side of DUT to Planar Phantom

Area Scan (8x27x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 1.95 mW/g

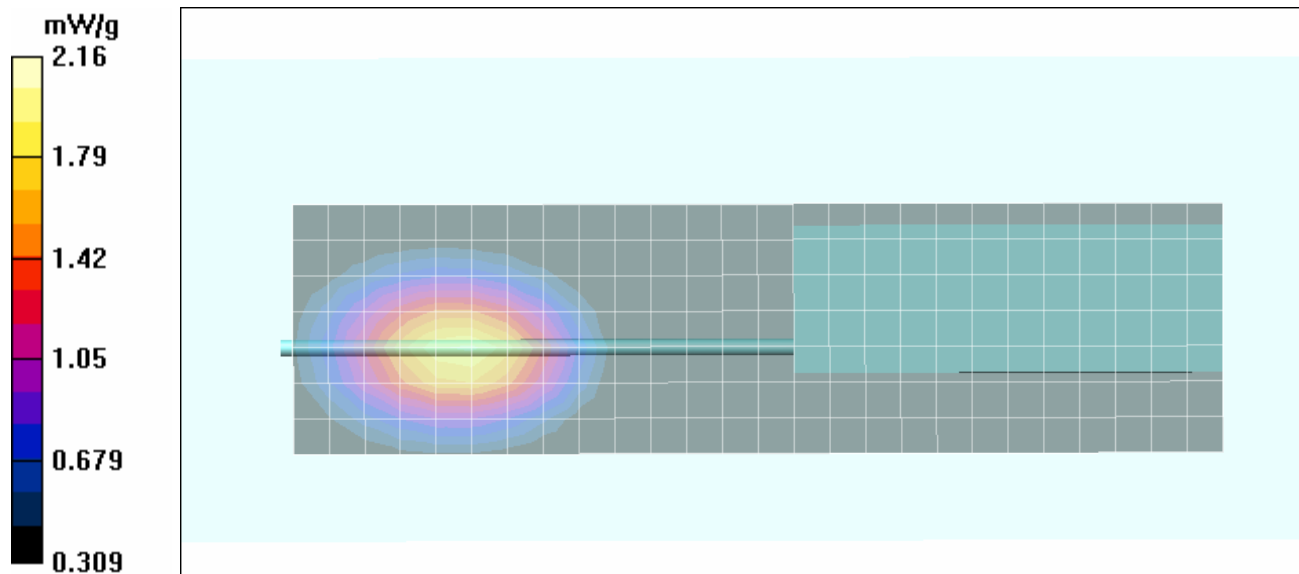
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

Reference Value = 17.1 V/m; Power Drift = -0.447 dB

Peak SAR (extrapolated) = 2.42 W/kg

SAR(1 g) = 2.05 mW/g; SAR(10 g) = 1.52 mW/g

Maximum value of SAR (measured) = 2.16 mW/g



Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Date Tested: 03/11/2009

Body-worn SAR - DUT with Belt-Clip Accessory - 800 Band - Mid Channel 3 - 815 MHz

DUT: Kenwood Liberty 4102023-501; Type: Portable Multiband Land Mobile PTT Radio Transceiver; Serial: 10007

Body-worn Accessory: Belt-Clip (P/N: 40508); Audio Accessory: Speaker-Microphone (P/N: 1600696-01)

Ambient Temp: 23.5°C; Fluid Temp: 21.5°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW

Frequency: 815 MHz; Duty Cycle: 1:1

10.8 V Li-ion Battery (P/N: 1600691-2)

Medium: M835 Medium parameters used: $f = 815 \text{ MHz}$; $\sigma = 0.94 \text{ mho/m}$; $\epsilon_r = 57.3$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 – SN1590; ConvF(6.39, 6.39, 6.39); Calibrated: 21/07/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 22/04/2008
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn SAR - 1.6 cm Belt-Clip Spacing from Back Side of DUT to Planar Phantom

Area Scan (8x27x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 3.96 mW/g

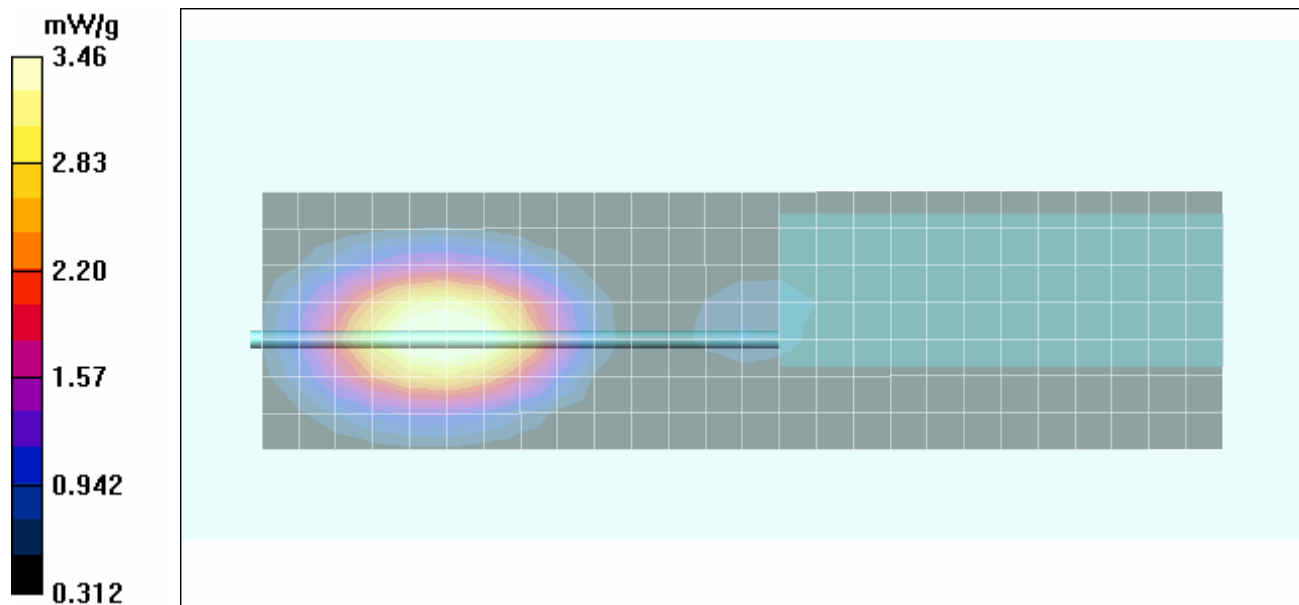
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

Reference Value = 28.4 V/m; Power Drift = -0.661 dB

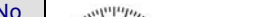
Peak SAR (extrapolated) = 4.13 W/kg

SAR(1 g) = 3.32 mW/g; SAR(10 g) = 2.34 mW/g

Maximum value of SAR (measured) = 3.46 mW/g



Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Date Tested: 03/11/2009

Body-worn SAR - DUT with Belt-Holster Accessory - 800 Band - Mid Channel 3 - 815 MHz

DUT: Kenwood Liberty 4102023-501; Type: Portable Multiband Land Mobile PTT Radio Transceiver; Serial: 10007

Body-worn Accessory: Belt-Holster (P/N: 1600702-1); Audio Accessory: Speaker-Microphone (P/N: 1600696-01)

Ambient Temp: 23.5°C; Fluid Temp: 21.5°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW

Frequency: 815 MHz; Duty Cycle: 1:1

10.8 V Li-ion Battery (P/N: 1600691-2)

Medium: M835 Medium parameters used: $f = 815 \text{ MHz}$; $\sigma = 0.94 \text{ mho/m}$; $\epsilon_r = 57.3$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 – SN1590; ConvF(6.39, 6.39, 6.39); Calibrated: 21/07/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 22/04/2008
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn SAR - 2.0 cm Belt-Holster Spacing from Back Side of DUT to Planar Phantom

Area Scan (8x27x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 4.35 mW/g

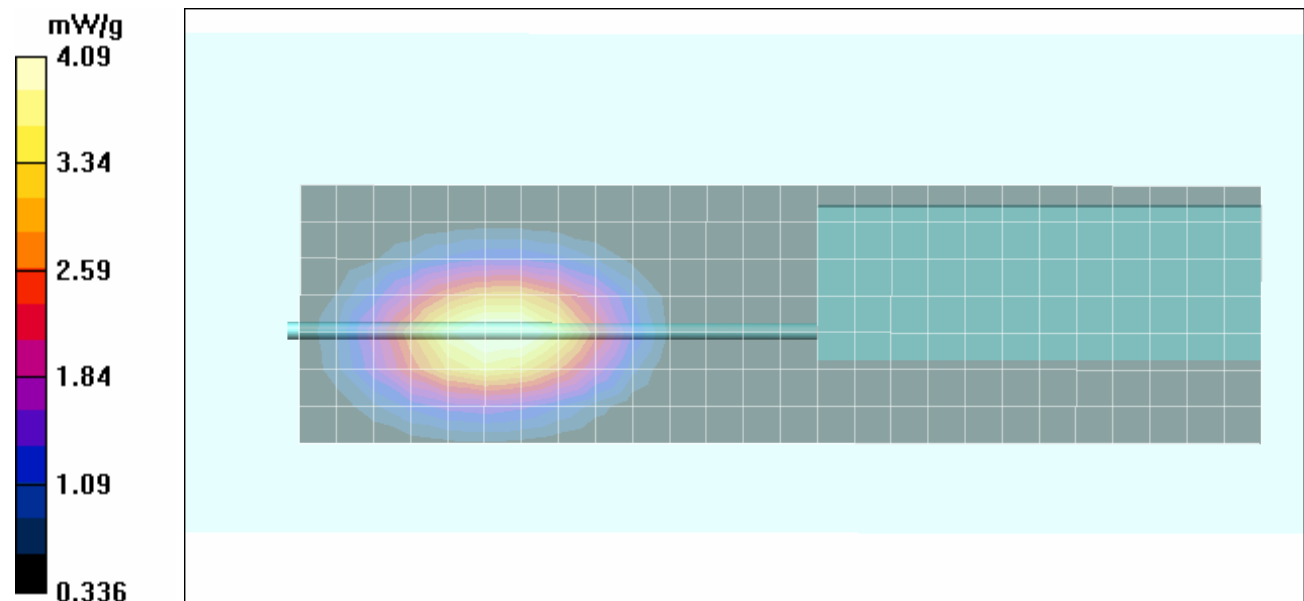
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

Reference Value = 24.3 V/m; Power Drift = -0.511 dB

Peak SAR (extrapolated) = 4.77 W/kg

SAR(1 g) = 3.95 mW/g; SAR(10 g) = 2.8 mW/g

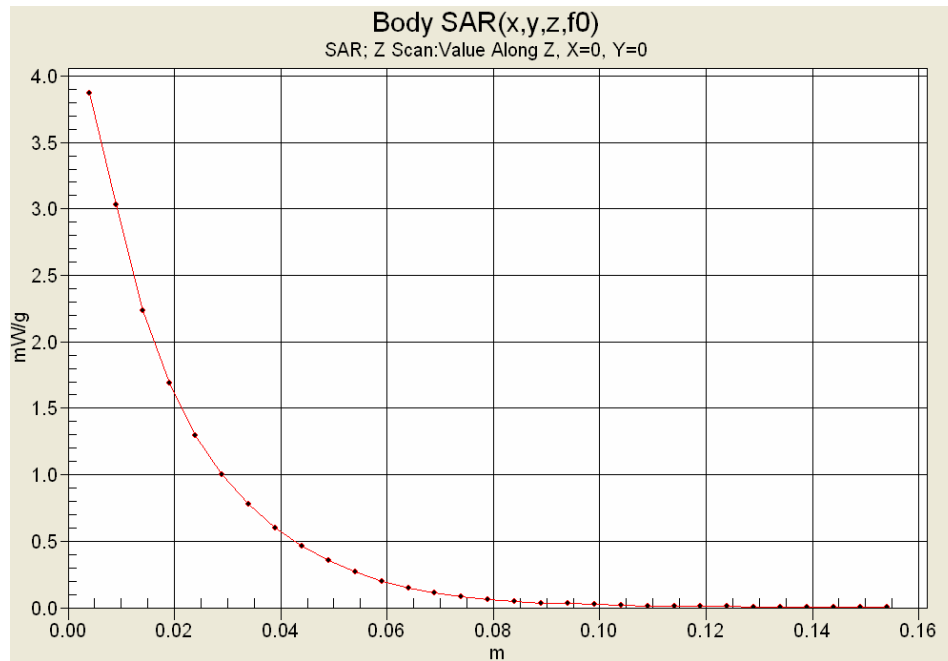
Maximum value of SAR (measured) = 4.09 mW/g



Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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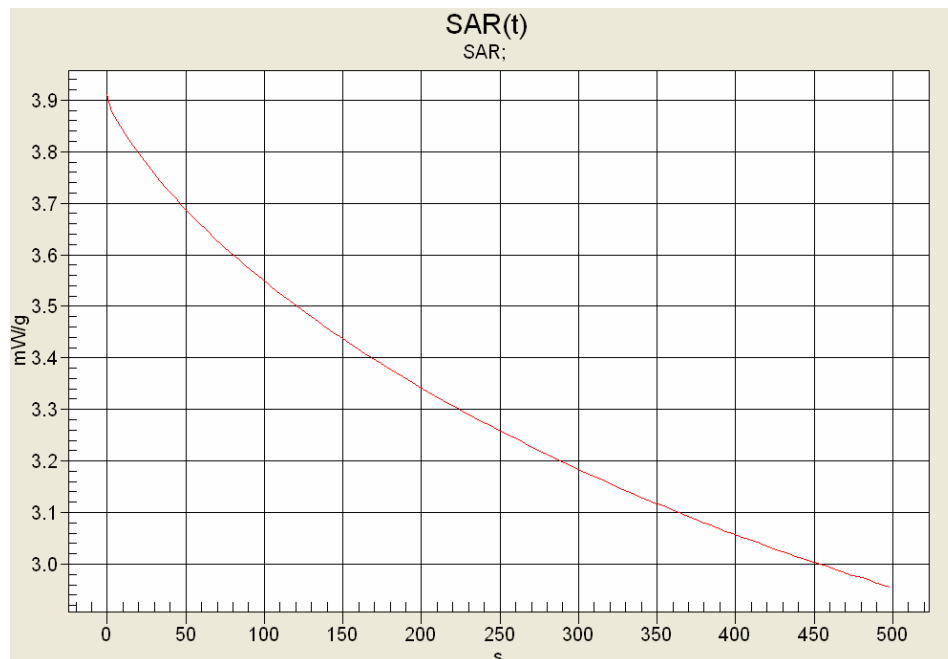
	Date(s) of Evaluation March 11 & April 03, 2009	Test Report Serial No. 030409OKC-T954-S90P	Test Report Revision No. Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	Test Report Issue Date April 09, 2009	Description of Test(s) Specific Absorption Rate	RF Exposure Category Occupational (Controlled)	

Z-Axis Scan



SAR-versus-Time Power Droop Evaluation

Body-worn - Mid Channel 3 - 815 MHz
DUT with Belt-Holster Accessory



SAR 0s: 3.91045 mW/g
SAR 340s: 3.13196 mW/g (-0.964 dB)
(340s = Zoom Scan Duration)
(500s = Area Scan Duration)

Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Date Tested: 04/03/2009

Body-worn SAR - DUT with Belt-Clip Accessory - 800 Band - High Channel 3 - 824 MHz

DUT: Kenwood Liberty 4102023-501; Type: Portable Multiband Land Mobile PTT Radio Transceiver; Serial: 10007

Body-worn Accessory: Belt-Clip (P/N: 40508); Audio Accessory: Speaker-Microphone (P/N: 1600696-01)

Ambient Temp: 23.2°C; Fluid Temp: 21.8°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW

Frequency: 824 MHz; Duty Cycle: 1:1

10.8 V Li-ion Battery (P/N: 1600691-2)

Medium: M835 Medium parameters used: $f = 824 \text{ MHz}$; $\sigma = 0.96 \text{ mho/m}$; $\epsilon_r = 56.5$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(6.39, 6.39, 6.39); Calibrated: 21/07/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 22/04/2008
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn SAR - 1.6 cm Belt-Clip Spacing from Back Side of DUT to Planar Phantom

Area Scan (8x27x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 2.52 mW/g

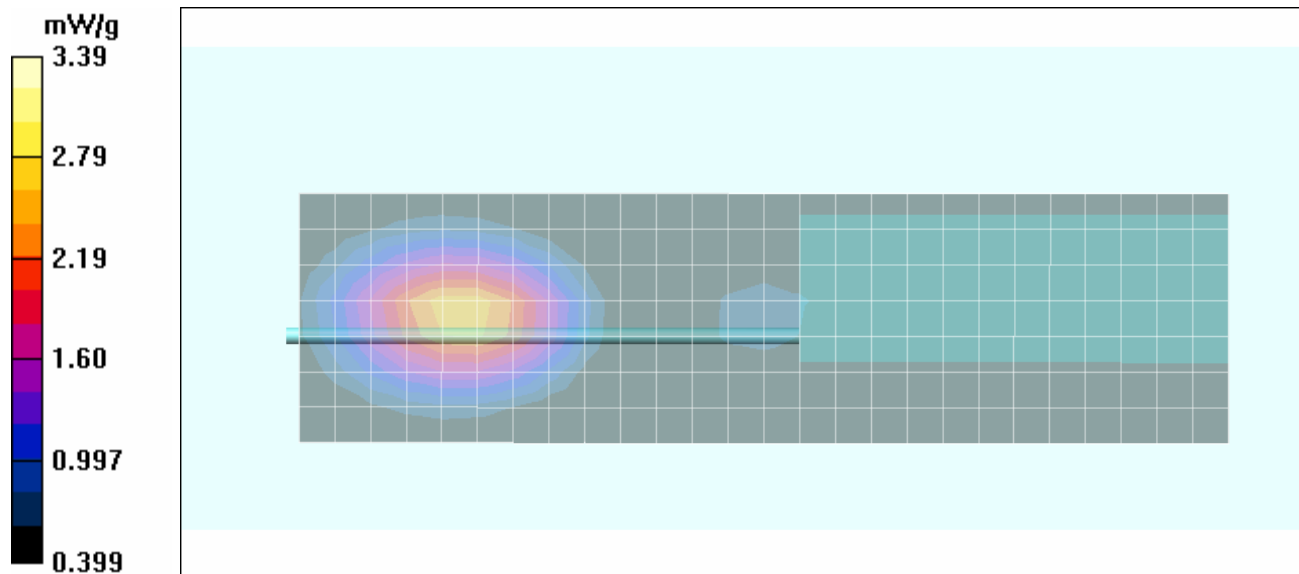
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

Reference Value = 26.1 V/m; Power Drift = -0.534 dB

Peak SAR (extrapolated) = 3.82 W/kg

SAR(1 g) = 3.2 mW/g; SAR(10 g) = 2.35 mW/g

Maximum value of SAR (measured) = 3.39 mW/g



Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Date(s) of Evaluation</u> March 11 & April 03, 2009	<u>Test Report Serial No.</u> 030409OKC-T954-S90P	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Date Tested: 04/03/2009

Body-worn SAR - DUT with Belt-Holster Accessory - 800 Band - High Channel 3 - 824 MHz

DUT: Kenwood Liberty 4102023-501; Type: Portable Multiband Land Mobile PTT Radio Transceiver; Serial: 10007

Body-worn Accessory: Belt-Holster (P/N: 40508); Audio Accessory: Speaker-Microphone (P/N: 1600696-01)

Ambient Temp: 23.2°C; Fluid Temp: 21.8°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW

Frequency: 824 MHz; Duty Cycle: 1:1

10.8 V Li-ion Battery (P/N: 1600691-2)

Medium: M835 Medium parameters used: $f = 824 \text{ MHz}$; $\sigma = 0.96 \text{ mho/m}$; $\epsilon_r = 56.5$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 – SN1590; ConvF(6.39, 6.39, 6.39); Calibrated: 21/07/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 22/04/2008
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn SAR - 2.0 cm Belt-Holster Spacing from Back Side of DUT to Planar Phantom

Area Scan (8x27x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 2.35 mW/g

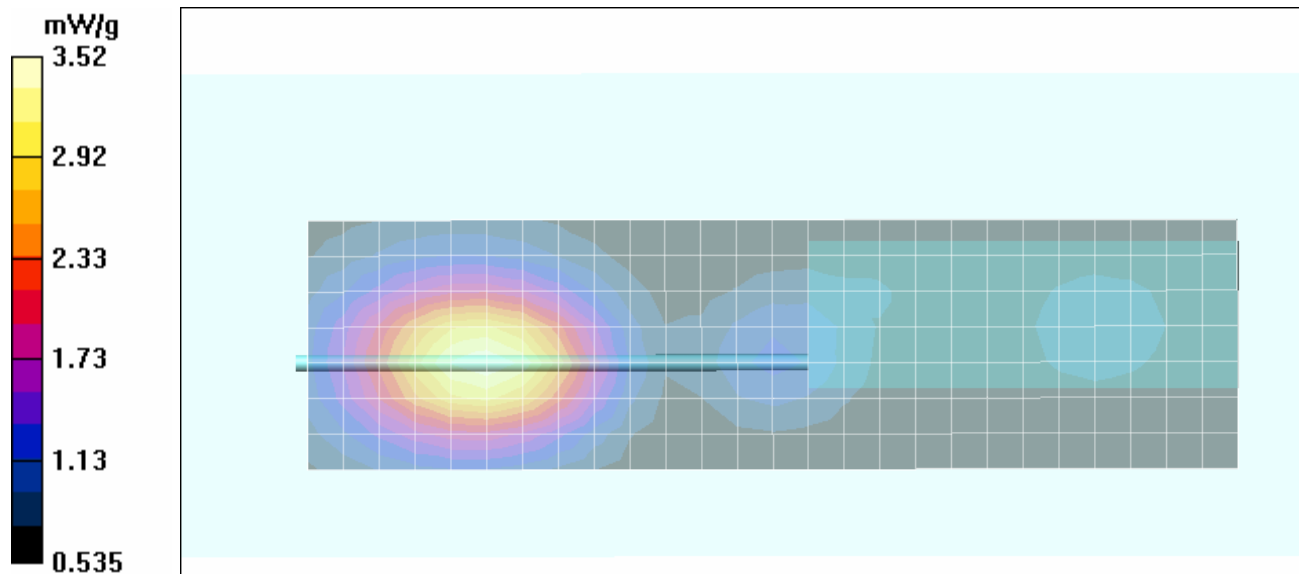
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

Reference Value = 24.4 V/m; Power Drift = -0.569 dB

Peak SAR (extrapolated) = 3.95 W/kg

SAR(1 g) = 3.31 mW/g; SAR(10 g) = 2.44 mW/g

Maximum value of SAR (measured) = 3.52 mW/g



Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Date Tested: 04/03/2009

Body-worn SAR - DUT with Belt-Clip Accessory - 800 Band - Low Channel 4 - 851 MHz

DUT: Kenwood Liberty 4102023-501; Type: Portable Multiband Land Mobile PTT Radio Transceiver; Serial: 10007

Body-worn Accessory: Belt-Clip (P/N: 40508); Audio Accessory: Speaker-Microphone (P/N: 1600696-01)

Ambient Temp: 23.2°C; Fluid Temp: 21.8°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW

Frequency: 851 MHz; Duty Cycle: 1:1

10.8 V Li-ion Battery (P/N: 1600691-2)

Medium: M835 Medium parameters used: $f = 851 \text{ MHz}$; $\sigma = 1.01 \text{ mho/m}$; $\epsilon_r = 56.1$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(6.39, 6.39, 6.39); Calibrated: 21/07/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 22/04/2008
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn SAR - 1.6 cm Belt-Clip Spacing from Back Side of DUT to Planar Phantom

Area Scan (8x27x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 1.39 mW/g

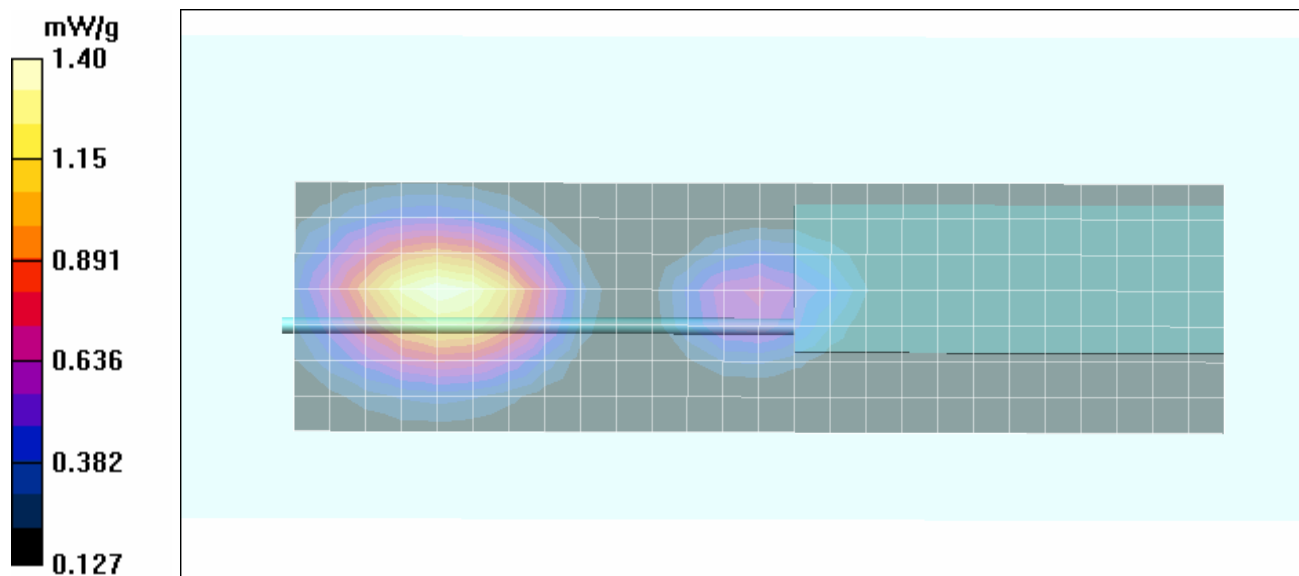
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

Reference Value = 28.9 V/m; Power Drift = -1.77 dB

Peak SAR (extrapolated) = 1.67 W/kg

SAR(1 g) = 1.34 mW/g; SAR(10 g) = 0.893 mW/g

Maximum value of SAR (measured) = 1.40 mW/g



Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Date(s) of Evaluation</u> March 11 & April 03, 2009	<u>Test Report Serial No.</u> 030409OKC-T954-S90P	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Date Tested: 04/03/2009

Body-worn SAR - DUT with Belt-Holster Accessory - 800 Band - Low Channel 4 - 851 MHz

DUT: Kenwood Liberty 4102023-501; Type: Portable Multiband Land Mobile PTT Radio Transceiver; Serial: 10007

Body-worn Accessory: Belt-Holster (P/N: 40508); Audio Accessory: Speaker-Microphone (P/N: 1600696-01)

Ambient Temp: 23.2°C; Fluid Temp: 21.8°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW

Frequency: 851 MHz; Duty Cycle: 1:1

10.8 V Li-ion Battery (P/N: 1600691-2)

Medium: M835 Medium parameters used: $f = 851 \text{ MHz}$; $\sigma = 1.01 \text{ mho/m}$; $\epsilon_r = 56.1$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(6.39, 6.39, 6.39); Calibrated: 21/07/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 22/04/2008
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn SAR - 2.0 cm Belt-Holster Spacing from Back Side of DUT to Planar Phantom

Area Scan (8x27x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 1.51 mW/g

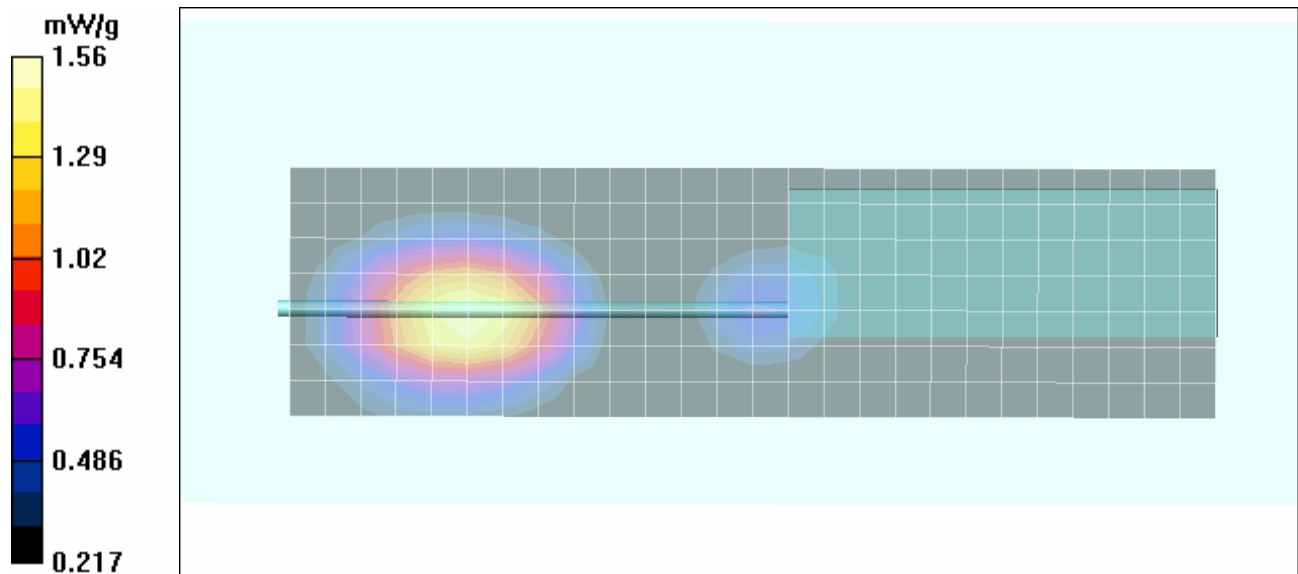
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

Reference Value = 24.5 V/m; Power Drift = -1.65 dB

Peak SAR (extrapolated) = 1.78 W/kg

SAR(1 g) = 1.47 mW/g; SAR(10 g) = 1.08 mW/g

Maximum value of SAR (measured) = 1.56 mW/g



Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Date(s) of Evaluation</u> March 11 & April 03, 2009	<u>Test Report Serial No.</u> 030409OKC-T954-S90P	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Date Tested: 03/11/2009

Body-worn SAR - DUT with Belt-Clip Accessory - 800 Band - Mid Channel 4 - 860 MHz

DUT: Kenwood Liberty 4102023-501; Type: Portable Multiband Land Mobile PTT Radio Transceiver; Serial: 10007

Body-worn Accessory: Belt-Clip (P/N: 40508); Audio Accessory: Speaker-Microphone (P/N: 1600696-01)

Ambient Temp: 23.5°C; Fluid Temp: 21.5°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW

Frequency: 860 MHz; Duty Cycle: 1:1

10.8 V Li-ion Battery (P/N: 1600691-2)

Medium: M835 Medium parameters used: $f = 860 \text{ MHz}$; $\sigma = 1 \text{ mho/m}$; $\epsilon_r = 56.8$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 – SN1590; ConvF(6.39, 6.39, 6.39); Calibrated: 21/07/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 22/04/2008
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn SAR - 1.6 cm Belt-Clip Spacing from Back Side of DUT to Planar Phantom

Area Scan (8x27x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 1.63 mW/g

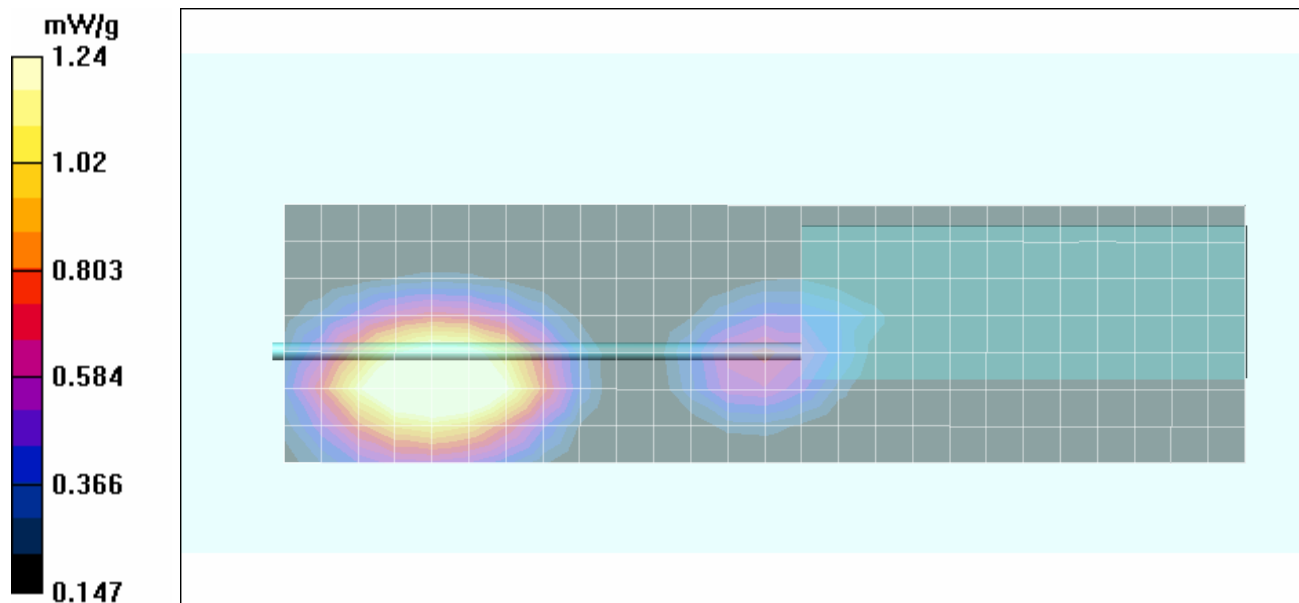
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

Reference Value = 28.7 V/m; Power Drift = -2.77 dB

Peak SAR (extrapolated) = 1.42 W/kg

SAR(1 g) = 1.18 mW/g; SAR(10 g) = 0.833 mW/g

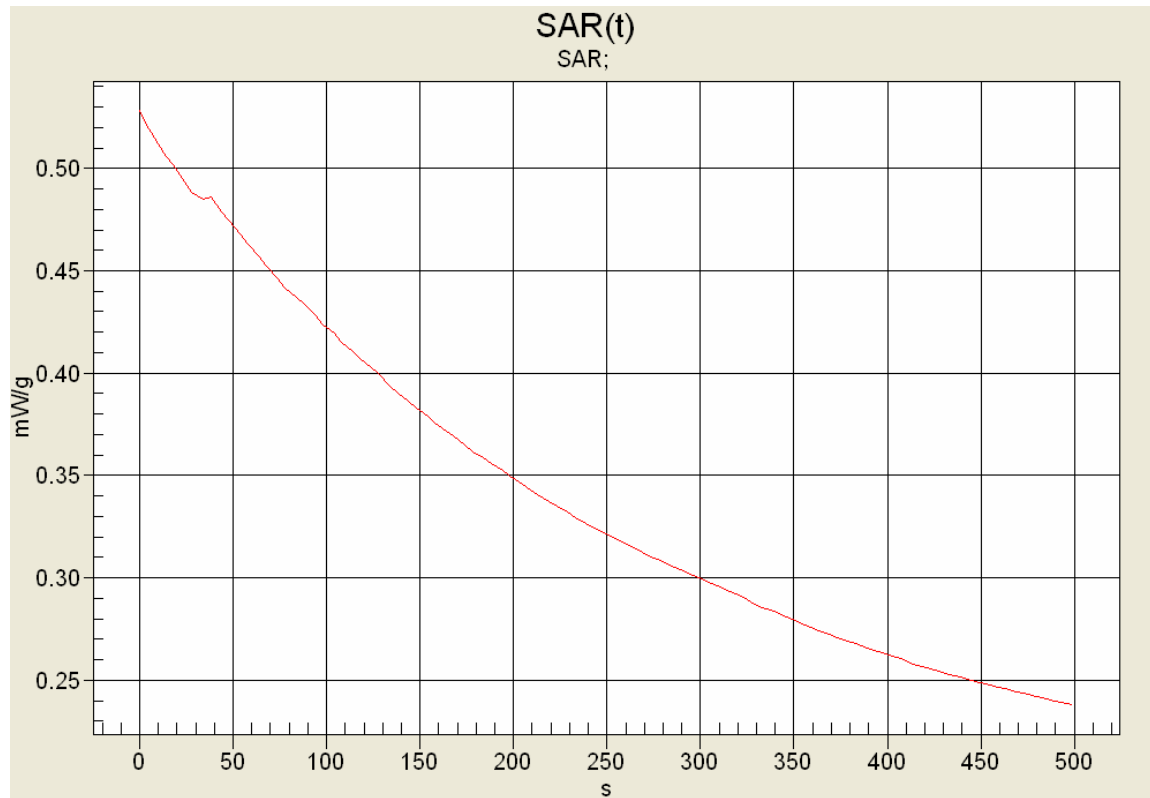
Maximum value of SAR (measured) = 1.24 mW/g



Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Date(s) of Evaluation</u> March 11 & April 03, 2009	<u>Test Report Serial No.</u> 030409OKC-T954-S90P	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

SAR-versus-Time Power Droop Evaluation
Body-worn - Mid Channel 4 - 860 MHz
DUT with Belt-Clip Accessory



SAR 0s: 0.528224 mW/g
SAR 340s: 0.283584 mW/g (-2.70 dB)
(340s = Zoom Scan Duration)
(500s = Area Scan Duration)

Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Date(s) of Evaluation</u> March 11 & April 03, 2009	<u>Test Report Serial No.</u> 030409OKC-T954-S90P	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Date Tested: 03/11/2009

Body-worn SAR - DUT with Belt-Holster Accessory - 800 Band - Mid Channel 4 - 860 MHz

DUT: Kenwood Liberty 4102023-501; Type: Portable Multiband Land Mobile PTT Radio Transceiver; Serial: 10007

Body-worn Accessory: Belt-Holster (P/N: 1600702-1); Audio Accessory: Speaker-Microphone (P/N: 1600696-01)

Ambient Temp: 23.5°C; Fluid Temp: 21.5°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW

Frequency: 860 MHz; Duty Cycle: 1:1

10.8 V Li-ion Battery (P/N: 1600691-2)

Medium: M835 Medium parameters used: $f = 860 \text{ MHz}$; $\sigma = 1 \text{ mho/m}$; $\epsilon_r = 56.8$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 – SN1590; ConvF(6.39, 6.39, 6.39); Calibrated: 21/07/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 22/04/2008
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn SAR - 2.0 cm Belt-Holster Spacing from Back Side of DUT to Planar Phantom

Area Scan (8x27x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 1.29 mW/g

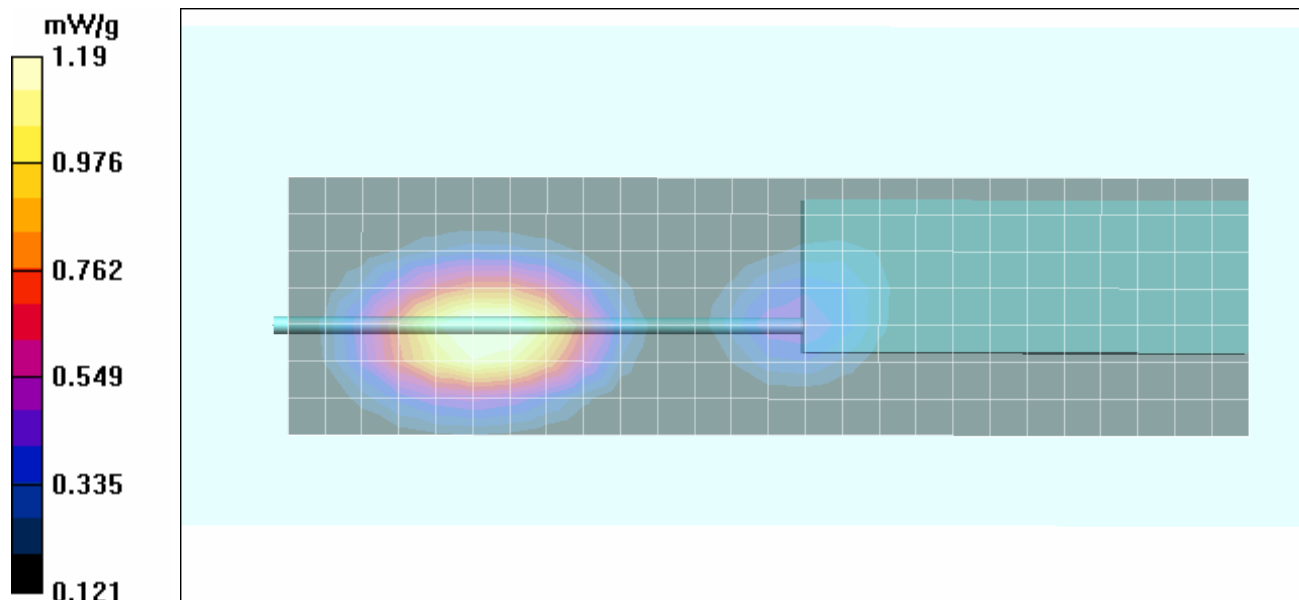
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

Reference Value = 21.6 V/m; Power Drift = -0.558 dB

Peak SAR (extrapolated) = 1.37 W/kg

SAR(1 g) = 1.12 mW/g; SAR(10 g) = 0.797 mW/g

Maximum value of SAR (measured) = 1.19 mW/g



Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Date(s) of Evaluation</u> March 11 & April 03, 2009	<u>Test Report Serial No.</u> 030409OKC-T954-S90P	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Date Tested: 04/03/2009

Body-worn SAR - DUT with Belt-Clip Accessory - 800 Band - High Channel 4 - 869 MHz

DUT: Kenwood Liberty 4102023-501; Type: Portable Multiband Land Mobile PTT Radio Transceiver; Serial: 10007

Body-worn Accessory: Belt-Clip (P/N: 40508); Audio Accessory: Speaker-Microphone (P/N: 1600696-01)

Ambient Temp: 23.2°C; Fluid Temp: 21.8°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW

Frequency: 869 MHz; Duty Cycle: 1:1

10.8 V Li-ion Battery (P/N: 1600691-2)

Medium: M835 Medium parameters used: $f = 869 \text{ MHz}$; $\sigma = 1.02 \text{ mho/m}$; $\epsilon_r = 56.2$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(6.39, 6.39, 6.39); Calibrated: 21/07/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 22/04/2008
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn SAR - 1.6 cm Belt-Clip Spacing from Back Side of DUT to Planar Phantom

Area Scan (8x27x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.444 mW/g

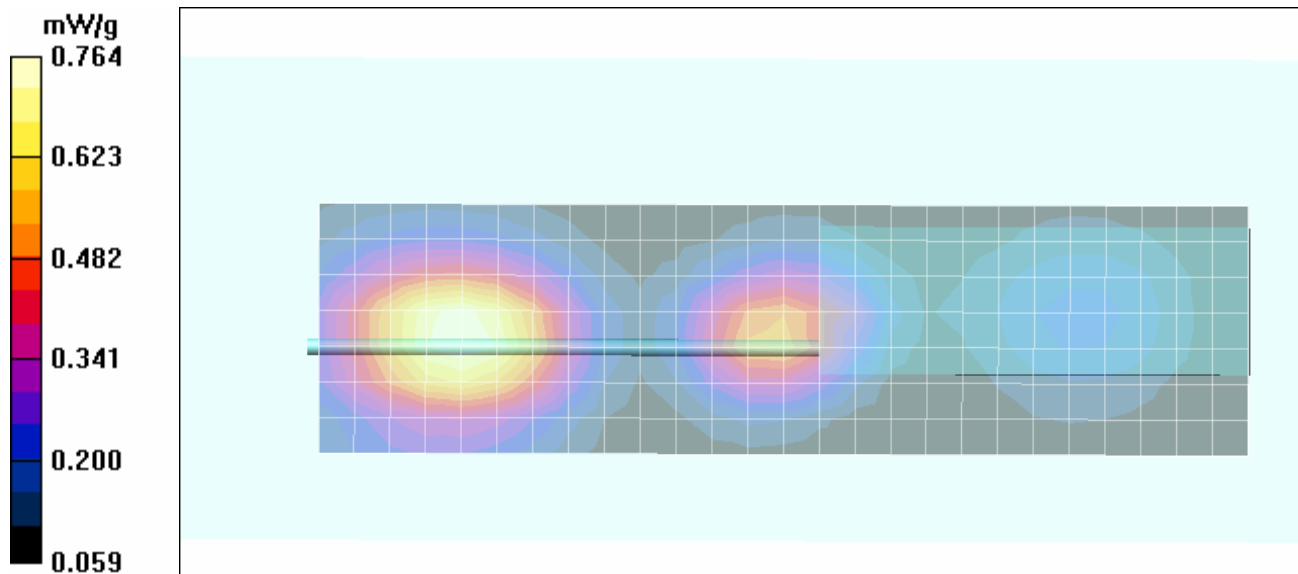
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

Reference Value = 22.3 V/m; Power Drift = -1.22 dB

Peak SAR (extrapolated) = 0.871 W/kg

SAR(1 g) = 0.666 mW/g; SAR(10 g) = 0.449 mW/g

Maximum value of SAR (measured) = 0.764 mW/g



Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Date(s) of Evaluation</u> March 11 & April 03, 2009	<u>Test Report Serial No.</u> 030409OKC-T954-S90P	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Date Tested: 04/03/2009

Body-worn SAR - DUT with Belt-Holster Accessory - 800 Band - High Channel 4 - 869 MHz

DUT: Kenwood Liberty 4102023-501; Type: Portable Multiband Land Mobile PTT Radio Transceiver; Serial: 10007

Body-worn Accessory: Belt-Holster (P/N: 40508); Audio Accessory: Speaker-Microphone (P/N: 1600696-01)

Ambient Temp: 23.2°C; Fluid Temp: 21.8°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW

Frequency: 869 MHz; Duty Cycle: 1:1

10.8 V Li-ion Battery (P/N: 1600691-2)

Medium: M835 Medium parameters used: $f = 869 \text{ MHz}$; $\sigma = 1.02 \text{ mho/m}$; $\epsilon_r = 56.2$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(6.39, 6.39, 6.39); Calibrated: 21/07/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 22/04/2008
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body-worn SAR - 2.0 cm Belt-Holster Spacing from Back Side of DUT to Planar Phantom

Area Scan (8x27x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.376 mW/g

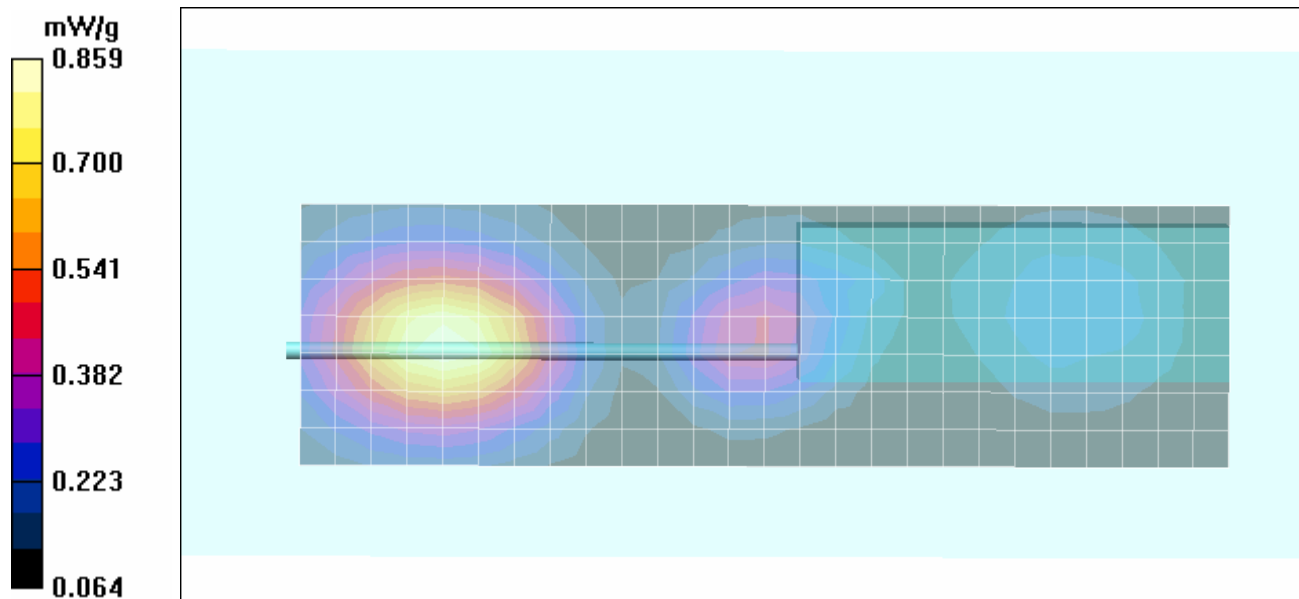
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

Reference Value = 22.9 V/m; Power Drift = -1.33 dB

Peak SAR (extrapolated) = 0.981 W/kg

SAR(1 g) = 0.688 mW/g; SAR(10 g) = 0.468 mW/g

Maximum value of SAR (measured) = 0.859 mW/g



Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Date(s) of Evaluation</u> March 11 & April 03, 2009	<u>Test Report Serial No.</u> 030409OKC-T954-S90P	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

APPENDIX B - SYSTEM PERFORMANCE CHECK DATA

Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Date(s) of Evaluation</u> March 11 & April 03, 2009	<u>Test Report Serial No.</u> 030409OKC-T954-S90P	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Date Tested: 03/11/2009

System Performance Check - 835 MHz Dipole - HSL

DUT: Dipole 835 MHz; Asset: 00022; Serial: 411; Calibrated: 02/10/2009

Ambient Temp: 24.0°C; Fluid Temp: 22.1°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW

Forward Conducted Power: 250 mW

Frequency: 835 MHz; Duty Cycle: 1:1

Medium: 835HSL Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.91 \text{ mho/m}$; $\epsilon_r = 42.4$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(6.54, 6.54, 6.54); Calibrated: 21/07/2008
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 22/04/2008
- Phantom: SAM 4.0; Type: Fiberglass; Serial: 1033
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

System Performance Check - 835 MHz Dipole

Area Scan (6x10x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (measured) = 2.44 mW/g

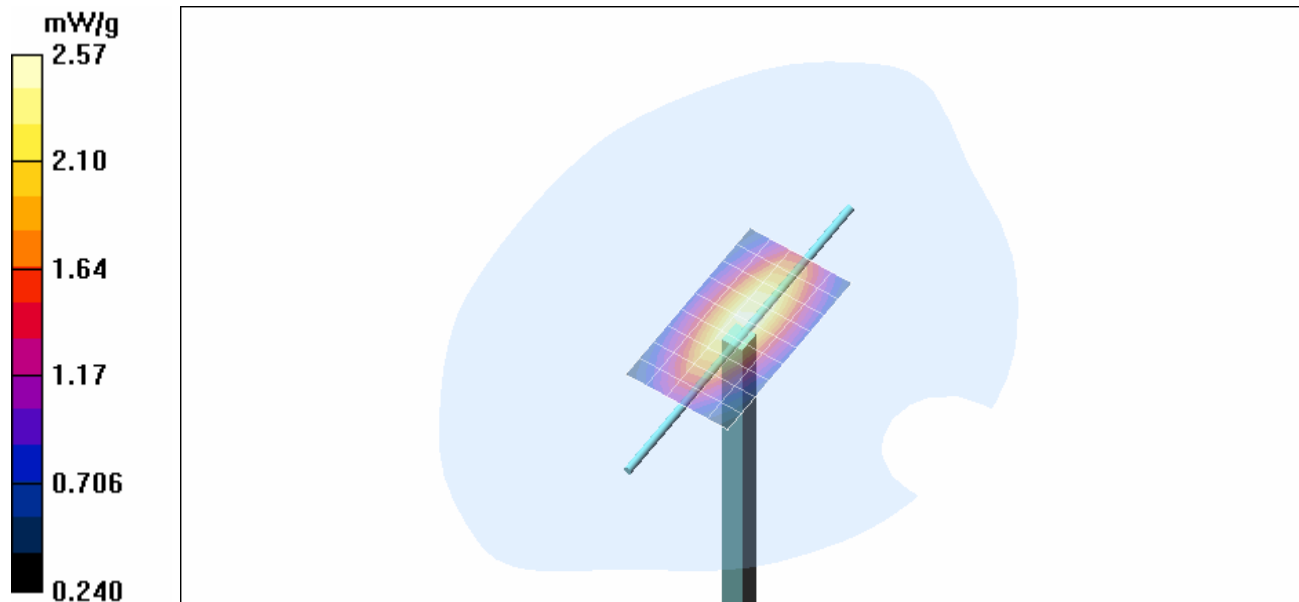
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 56.2 V/m; Power Drift = -0.004 dB

Peak SAR (extrapolated) = 3.23 W/kg

SAR(1 g) = 2.37 mW/g; SAR(10 g) = 1.58 mW/g

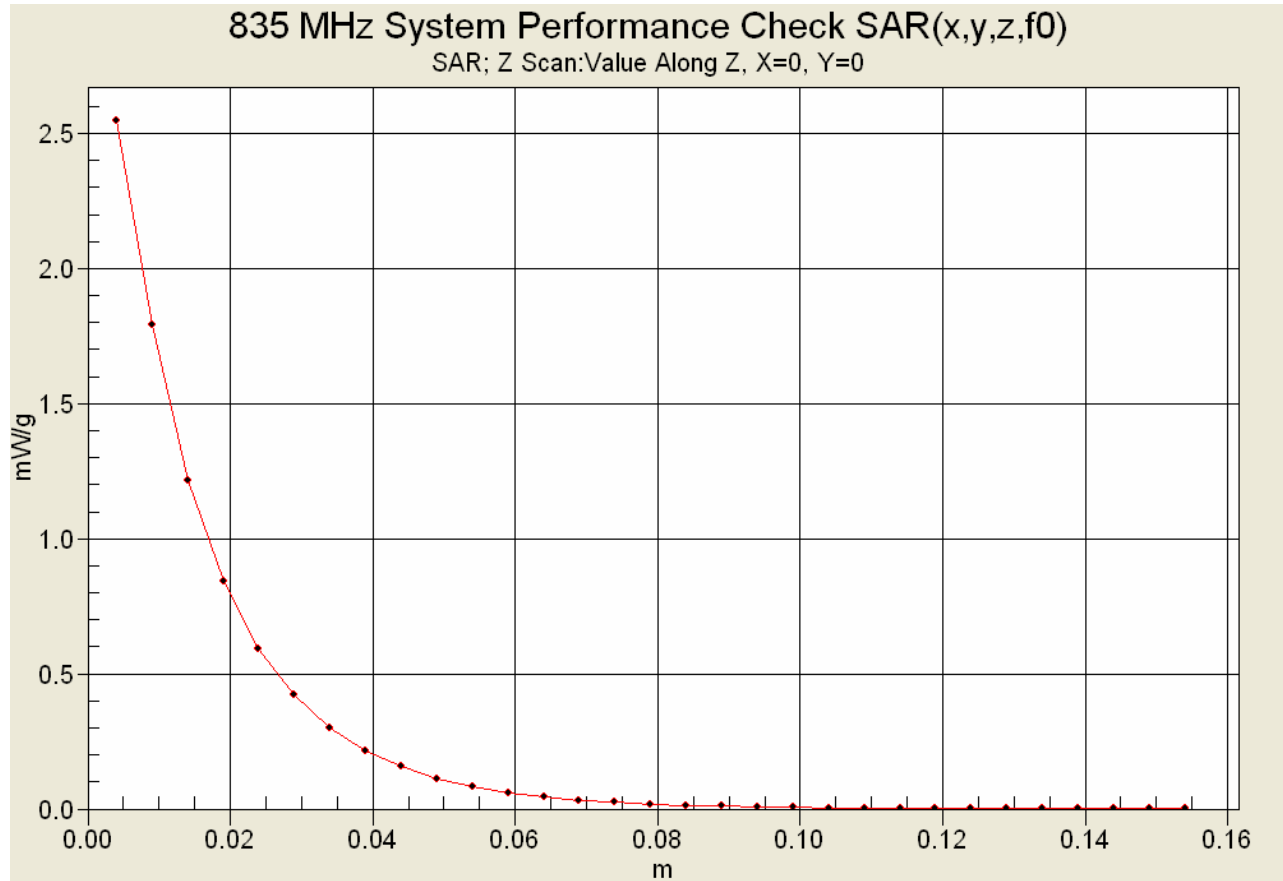
Maximum value of SAR (measured) = 2.57 mW/g



Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Date(s) of Evaluation</u> March 11 & April 03, 2009	<u>Test Report Serial No.</u> 030409OKC-T954-S90P	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Z-Axis Scan



Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Date(s) of Evaluation</u> March 11 & April 03, 2009	<u>Test Report Serial No.</u> 030409OKC-T954-S90P	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Date Tested: 04/03/2009

System Performance Check - 835 MHz Dipole - HSL

DUT: Dipole 835 MHz; Asset: 00022; Serial: 411; Calibrated: 02/10/2009

Ambient Temp: 23.2°C; Fluid Temp: 22.0°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW

Forward Conducted Power: 250 mW

Frequency: 835 MHz; Duty Cycle: 1:1

Medium: 835HSL Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.9 \text{ mho/m}$; $\epsilon_r = 41.5$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(6.54, 6.54, 6.54); Calibrated: 21/07/2008
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 22/04/2008
- Phantom: SAM 4.0; Type: Fiberglass; Serial: 1033
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

System Performance Check - 835 MHz Dipole

Area Scan (6x10x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (measured) = 2.56 mW/g

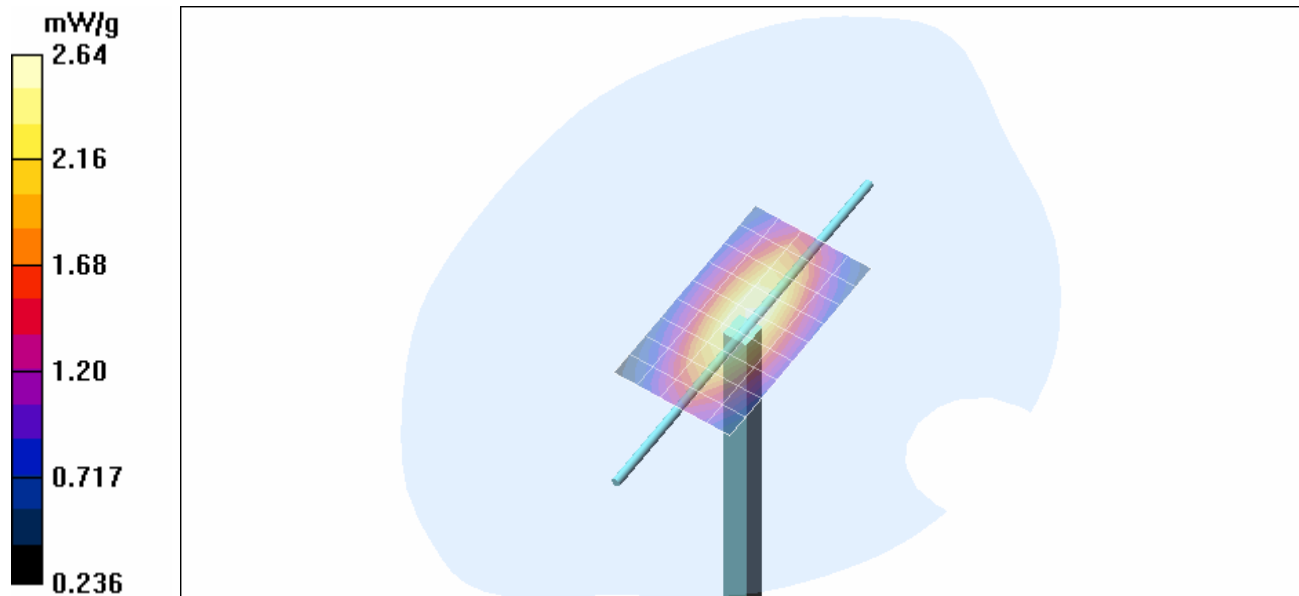
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 57.6 V/m; Power Drift = -0.032 dB

Peak SAR (extrapolated) = 3.33 W/kg

SAR(1 g) = 2.43 mW/g; SAR(10 g) = 1.61 mW/g

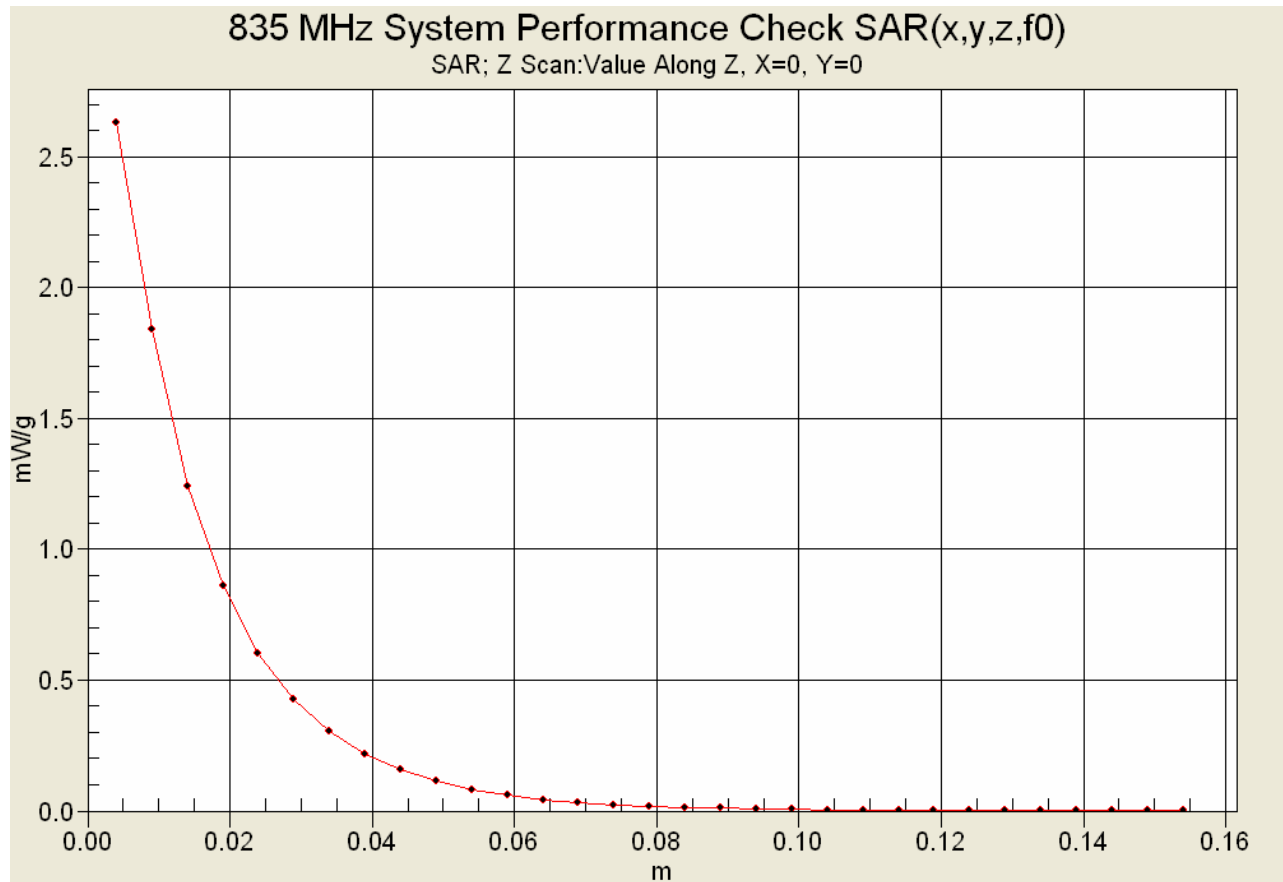
Maximum value of SAR (measured) = 2.64 mW/g



Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Date(s) of Evaluation</u> March 11 & April 03, 2009	<u>Test Report Serial No.</u> 030409OKC-T954-S90P	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Z-Axis Scan



Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Date(s) of Evaluation</u> March 11 & April 03, 2009	<u>Test Report Serial No.</u> 030409OKC-T954-S90P	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

APPENDIX C - MEASURED FLUID DIELECTRIC PARAMETERS

Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Date(s) of Evaluation</u> March 11 & April 03, 2009	<u>Test Report Serial No.</u> 030409OKC-T954-S90P	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

835 MHz System Performance Check & 770/800/815/860 MHz DUT Evaluation (Head)

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
11/Mar/2009
Frequency (GHz)
FCC_eHFCC OET 65 Supplement C (June 2001) Limits for Head Epsilon
FCC_sHFCC OET 65 Supplement C (June 2001) Limits for Head Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM

Freq	FCC_eHFCC_sH	Test_e	Test_s
0.7350	42.02	0.89	44.00
0.7400	41.99	0.89	43.94
0.7450	41.97	0.89	43.89
0.7500	41.94	0.89	44.19
0.7550	41.92	0.89	43.66
0.7600	41.89	0.89	43.81
0.7650	41.86	0.89	43.71
0.7700	41.84	0.89	43.62
0.7750	41.81	0.90	43.54
0.7800	41.79	0.90	43.40
0.7850	41.76	0.90	43.57
0.7900	41.73	0.90	43.49
0.7950	41.71	0.90	43.54
0.8000	41.68	0.90	43.49
0.8050	41.66	0.90	43.11
0.8100	41.63	0.90	43.45
0.8150	41.60	0.90	43.34
0.8200	41.58	0.90	43.04
0.8250	41.55	0.90	43.07
0.8300	41.53	0.90	42.88
0.8350	41.50	0.90	42.40
0.8400	41.50	0.91	42.60
0.8450	41.50	0.91	43.01
0.8500	41.50	0.92	42.67
0.8550	41.50	0.92	42.48
0.8600	41.50	0.93	42.70
0.8650	41.50	0.93	42.35
0.8700	41.50	0.94	42.21
0.8750	41.50	0.94	42.47
0.8800	41.50	0.95	42.49
0.8850	41.50	0.95	42.32
0.8900	41.50	0.96	42.08
0.8950	41.50	0.96	42.46
0.9000	41.50	0.97	42.12
0.9050	41.50	0.97	42.08
0.9100	41.50	0.98	42.09
0.9150	41.50	0.98	42.14
0.9200	41.49	0.98	41.81
0.9250	41.48	0.98	42.11
0.9300	41.47	0.99	41.78
0.9350	41.46	0.99	41.64

Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Date(s) of Evaluation</u> March 11 & April 03, 2009	<u>Test Report Serial No.</u> 030409OKC-T954-S90P	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	
	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Test Lab Certificate No. 2470.01

770/800/815/860 MHz DUT Evaluation (Body)

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
11/Mar/2009
Frequency (GHz)
FCC_eHFCC Bulletin 65 Supplement C (June 2001) Limits for Head Epsilon
FCC_sHFCC Bulletin 65 Supplement C (June 2001) Limits for Head Sigma
FCC_eB FCC Limits for Body Epsilon
FCC_sB FCC Limits for Body Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM

Freq	FCC_eB	FCC_sB	Test_e	Test_s
0.7350	55.59	0.96	57.87	0.88
0.7400	55.57	0.96	58.06	0.90
0.7450	55.55	0.96	58.22	0.89
0.7500	55.53	0.96	57.88	0.88
0.7550	55.51	0.96	57.54	0.91
0.7600	55.49	0.96	57.64	0.90
0.7650	55.47	0.96	57.75	0.91
0.7700	55.45	0.96	57.81	0.92
0.7750	55.43	0.97	57.81	0.91
0.7800	55.41	0.97	57.73	0.91
0.7850	55.39	0.97	57.77	0.95
0.7900	55.38	0.97	57.34	0.92
0.7950	55.36	0.97	57.44	0.94
0.8000	55.34	0.97	57.47	0.93
0.8050	55.32	0.97	57.30	0.95
0.8100	55.30	0.97	57.40	0.95
0.8150	55.28	0.97	57.27	0.94
0.8200	55.26	0.97	57.27	0.96
0.8250	55.24	0.97	57.06	0.97
0.8300	55.22	0.97	56.97	0.96
0.8350	55.20	0.97	57.11	0.98
0.8400	55.18	0.98	56.91	0.97
0.8450	55.17	0.98	56.75	0.99
0.8500	55.15	0.99	57.09	0.98
0.8550	55.14	0.99	56.72	1.00
0.8600	55.12	1.00	56.75	1.00
0.8650	55.11	1.01	56.91	1.00
0.8700	55.09	1.01	56.81	1.01
0.8750	55.08	1.02	56.89	1.02
0.8800	55.06	1.03	56.77	1.03
0.8850	55.05	1.03	56.61	1.02
0.8900	55.03	1.04	56.45	1.04
0.8950	55.02	1.04	56.59	1.04
0.9000	55.00	1.05	56.52	1.04
0.9050	55.00	1.05	56.45	1.04
0.9100	55.00	1.06	56.70	1.05
0.9150	55.00	1.06	56.27	1.05
0.9200	54.99	1.06	56.57	1.05
0.9250	54.98	1.06	56.28	1.07
0.9300	54.97	1.07	56.17	1.06
0.9350	54.96	1.07	56.23	1.08

Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Date(s) of Evaluation</u> March 11 & April 03, 2009	<u>Test Report Serial No.</u> 030409OKC-T954-S90P	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	
	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Test Lab Certificate No. 2470.01

835 MHz System Performance Check (Head)

Celltech Labs Inc.

Test Result for UIM Dielectric Parameter

3/Apr/2009

Frequency (GHz)

FCC_eHFCC OET 65 Supplement C (June 2001) Limits for Head Epsilon

FCC_sHFCC OET 65 Supplement C (June 2001) Limits for Head Sigma

Test_e Epsilon of UIM

Test_s Sigma of UIM

Freq	FCC_eHF	FCC_sH	Test_e	Test_s
0.7350	42.02	0.89	42.49	0.79
0.7450	41.97	0.89	42.46	0.80
0.7550	41.92	0.89	42.48	0.82
0.7650	41.86	0.89	42.09	0.82
0.7750	41.81	0.90	42.07	0.83
0.7850	41.76	0.90	41.57	0.85
0.7950	41.71	0.90	42.19	0.85
0.8050	41.66	0.90	41.76	0.86
0.8150	41.60	0.90	41.52	0.88
0.8250	41.55	0.90	41.44	0.89
0.8350	41.50	0.90	41.50	0.90
0.8450	41.50	0.91	41.12	0.90
0.8550	41.50	0.92	41.09	0.91
0.8650	41.50	0.93	40.97	0.93
0.8750	41.50	0.94	40.66	0.93
0.8850	41.50	0.95	40.36	0.93
0.8950	41.50	0.96	40.65	0.95
0.9050	41.50	0.97	40.56	0.96
0.9150	41.50	0.98	40.32	0.99
0.9250	41.48	0.98	40.12	0.98
0.9350	41.46	0.99	40.04	1.00

Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Date(s) of Evaluation</u> March 11 & April 03, 2009	<u>Test Report Serial No.</u> 030409OKC-T954-S90P	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	
	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Test Lab Certificate No. 2470.01

765/775/795/805/825/855/865 MHz DUT Evaluation (Body)

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
3/Apr/2009
Frequency (GHz)
FCC_eHFCC Bulletin 65 Supplement C (June 2001) Limits for Head Epsilon
FCC_sHFCC Bulletin 65 Supplement C (June 2001) Limits for Head Sigma
FCC_eB FCC Limits for Body Epsilon
FCC_sB FCC Limits for Body Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM

Freq	FCC_eB	FCC_sB	Test_e	Test_s
0.7350	55.59	0.96	57.21	0.89
0.7450	55.55	0.96	57.12	0.89
0.7550	55.51	0.96	56.98	0.92
0.7650	55.47	0.96	57.23	0.92
0.7750	55.43	0.97	57.28	0.93
0.7850	55.39	0.97	56.92	0.94
0.7950	55.36	0.97	56.89	0.95
0.8050	55.32	0.97	56.67	0.95
0.8150	55.28	0.97	56.66	0.96
0.8250	55.24	0.97	56.49	0.96
0.8350	55.20	0.97	56.51	0.98
0.8450	55.17	0.98	55.99	0.99
0.8550	55.14	0.99	56.12	1.01
0.8650	55.11	1.01	56.17	1.02
0.8750	55.08	1.02	55.96	1.03
0.8850	55.05	1.03	56.02	1.04
0.8950	55.02	1.04	56.13	1.05
0.9050	55.00	1.05	55.70	1.05
0.9150	55.00	1.06	55.71	1.07
0.9250	54.98	1.06	55.78	1.08
0.9350	54.96	1.07	55.75	1.09

Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Date(s) of Evaluation</u> March 11 & April 03, 2009	<u>Test Report Serial No.</u> 030409OKC-T954-S90P	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

APPENDIX D - SAR TEST SETUP & DUT PHOTOGRAPHS

Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Date(s) of Evaluation</u> March 11 & April 03, 2009	<u>Test Report Serial No.</u> 030409OKC-T954-S90P	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

FACE-HELD SAR TEST SETUP PHOTOGRAPHS

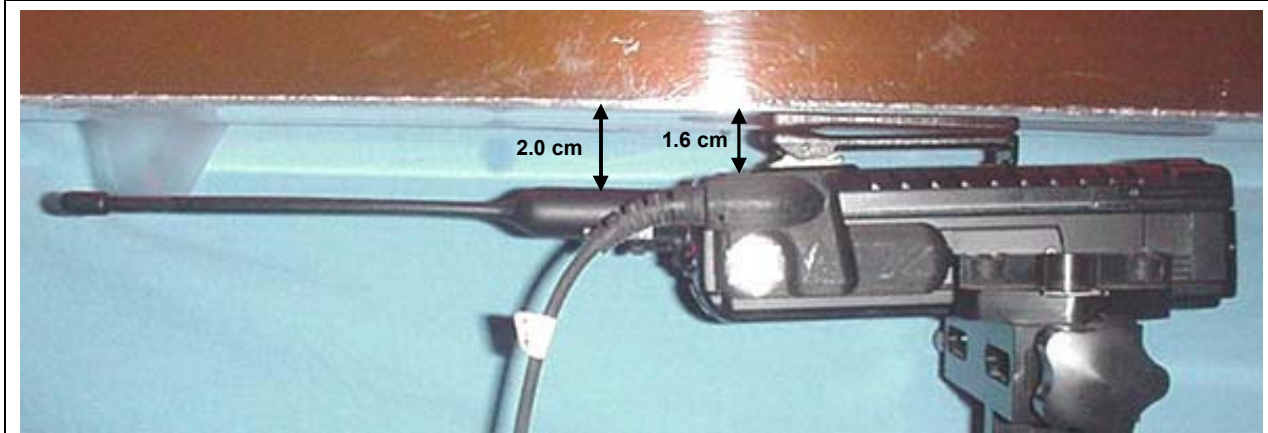
2.5 cm Spacing from Front of DUT to Planar Phantom



Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Date(s) of Evaluation</u> March 11 & April 03, 2009	<u>Test Report Serial No.</u> 030409OKC-T954-S90P	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

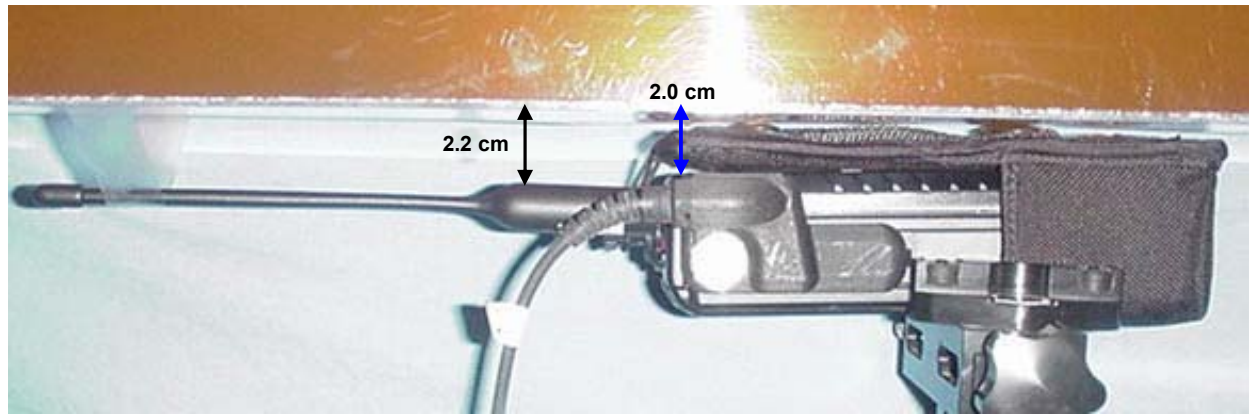
BODY-WORN SAR TEST SETUP PHOTOGRAPHS
1.6 cm Belt-Clip Spacing from Back of DUT to Planar Phantom
DUT with Belt-Clip and Speaker-Microphone Audio Accessory



Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Date(s) of Evaluation</u> March 11 & April 03, 2009	<u>Test Report Serial No.</u> 030409OKC-T954-S90P	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

BODY-WORN SAR TEST SETUP PHOTOGRAPHS
2.0 cm Belt-Holster Spacing from Back of DUT to Planar Phantom
DUT with Belt-Holster and Speaker-Microphone Audio Accessory



Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Date(s) of Evaluation</u> March 11 & April 03, 2009	<u>Test Report Serial No.</u> 030409OKC-T954-S90P	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

DUT PHOTOGRAPHS



Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Date(s) of Evaluation</u> March 11 & April 03, 2009	<u>Test Report Serial No.</u> 030409OKC-T954-S90P	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

DUT PHOTOGRAPHS

			
			
			
Left & Right Sides of DUT with Belt-Clip accessory (P/N: 40508)		Belt-Clip accessory (P/N: 40508)	
Bottom end of DUT with Belt-Clip		Top end of DUT with Belt-Clip	
Bottom end of DUT with Belt-Clip		Belt-Clip accessory (P/N: 40508)	

Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Date(s) of Evaluation</u> March 11 & April 03, 2009	<u>Test Report Serial No.</u> 030409OKC-T954-S90P	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

DUT PHOTOGRAPHS

		
		
Left & Right Sides of DUT with Belt-Holster accessory (P/N: 1600702-1)		Back of Belt-Holster accessory
		
Bottom end of DUT with Belt-Holster	Top end of DUT with Belt-Holster	Front of Belt-Holster accessory

Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Date(s) of Evaluation</u> March 11 & April 03, 2009	<u>Test Report Serial No.</u> 030409OKC-T954-S90P	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

DUT PHOTOGRAPHS

		
DUT Battery Housing	10.8 V 4.8 Ah Lithium-ion Battery (P/N: 1600691-2)	

Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Date(s) of Evaluation</u> March 11 & April 03, 2009	<u>Test Report Serial No.</u> 030409OKC-T954-S90P	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

DUT PHOTOGRAPHS

	
DUT with Belt-Clip & Speaker-Microphone (P/N: 1600696-01)	DUT with Belt-Holster & Speaker-Microphone (P/N: 1600696-01)

Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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	<u>Date(s) of Evaluation</u> March 11 & April 03, 2009	<u>Test Report Serial No.</u> 030409OKC-T954-S90P	<u>Test Report Revision No.</u> Rev. 1.2 (3rd Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> April 09, 2009	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

APPENDIX E - PROBE CALIBRATION

Applicant:	Thales Communications Inc.	FCC ID:	OKC-4102023501	IC:	473C-4102023501	THALES
Model:	Liberty 4102023-501	DUT Type:	Portable Multiband Land Mobile Radio Transceiver			
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Accredited by the Swiss Accreditation Service (SAS)
 The Swiss Accreditation Service is one of the signatories to the EA
 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **Celltech**

Certificate No: **ET3-1590_Jul08**

CALIBRATION CERTIFICATE

Object **ET3DV6 - SN:1590**

Calibration procedure(s) **QA CAL-01.v6, QA CAL-12.v5 and QA CAL-23.v3
 Calibration procedure for dosimetric E-field probes**

Calibration date: **July 21, 2008**

Condition of the calibrated item **In Tolerance**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
 The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-08 (No. 217-00788)	Apr-09
Power sensor E4412A	MY41495277	1-Apr-08 (No. 217-00788)	Apr-09
Power sensor E4412A	MY41498087	1-Apr-08 (No. 217-00788)	Apr-09
Reference 3 dB Attenuator	SN: S5054 (3c)	1-Jul-08 (No. 217-00865)	Jul-09
Reference 20 dB Attenuator	SN: S5086 (20b)	31-Mar-08 (No. 217-00787)	Apr-09
Reference 30 dB Attenuator	SN: S5129 (30b)	1-Jul-08 (No. 217-00866)	Jul-09
Reference Probe ES3DV2	SN: 3013	2-Jan-08 (No. ES3-3013_Jan08)	Jan-09
DAE4	SN: 660	3-Sep-07 (No. DAE4-660_Sep07)	Sep-08
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-07)	In house check: Oct-08

	Name	Function	Signature
Calibrated by:	Katja Pokovic	Technical Manager	
Approved by:	Niels Kuster	Quality Manager	

Issued: July 21, 2008

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.



Accredited by the Swiss Accreditation Service (SAS)
 The Swiss Accreditation Service is one of the signatories to the EA
 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
Polarization ϕ	ϕ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}**: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not effect the E^2 -field uncertainty inside TSL (see below *ConvF*).
- NORM(f)_{x,y,z}** = NORM_{x,y,z} * frequency_response (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- DCP_{x,y,z}**: DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM_{x,y,z} * ConvF whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy)**: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe ET3DV6

SN:1590

Manufactured:	March 19, 2001
Last calibrated:	May 20, 2005
Recalibrated:	July 21, 2008

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ET3DV6 SN:1590**Sensitivity in Free Space^A****Diode Compression^B**

NormX	1.81 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP X	87 mV
NormY	2.00 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP Y	92 mV
NormZ	1.72 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP Z	85 mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect**TSL 835 MHz Typical SAR gradient: 5 % per mm**

Sensor Center to Phantom Surface Distance		3.7 mm	4.7 mm
SAR _{be} [%]	Without Correction Algorithm	10.7	7.2
SAR _{be} [%]	With Correction Algorithm	0.8	0.5

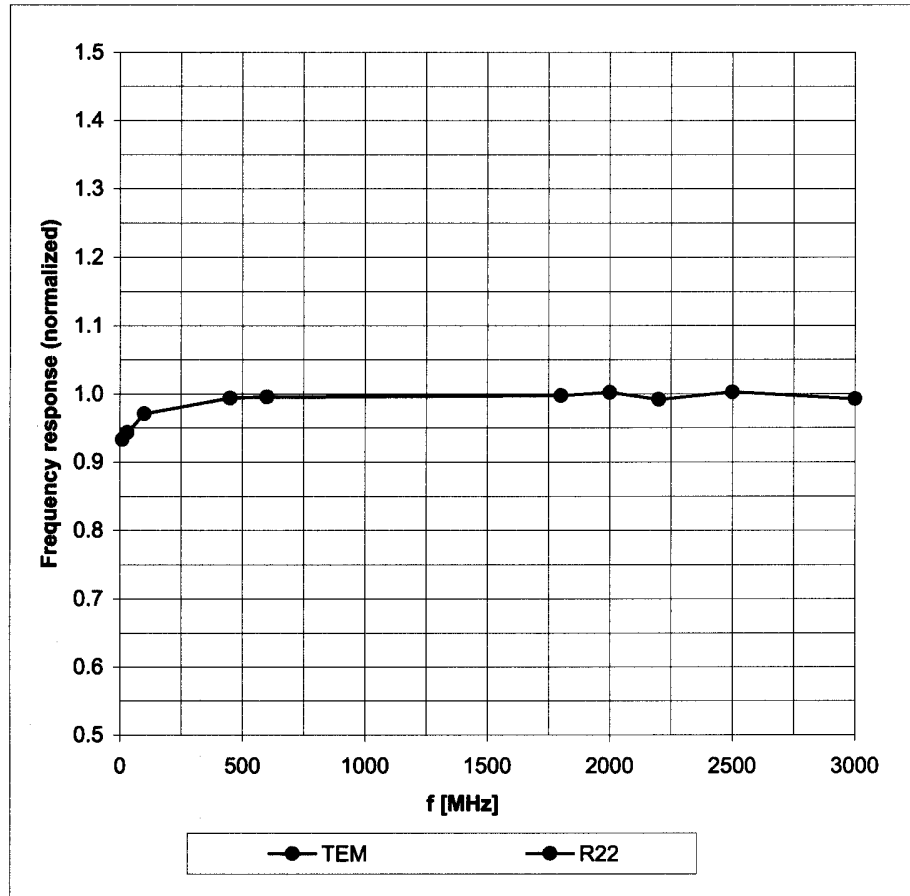
Sensor OffsetProbe Tip to Sensor Center **2.7 mm**

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

^A The uncertainties of NormX,Y,Z do not affect the E²-field uncertainty inside TSL (see Page 8).^B Numerical linearization parameter: uncertainty not required.

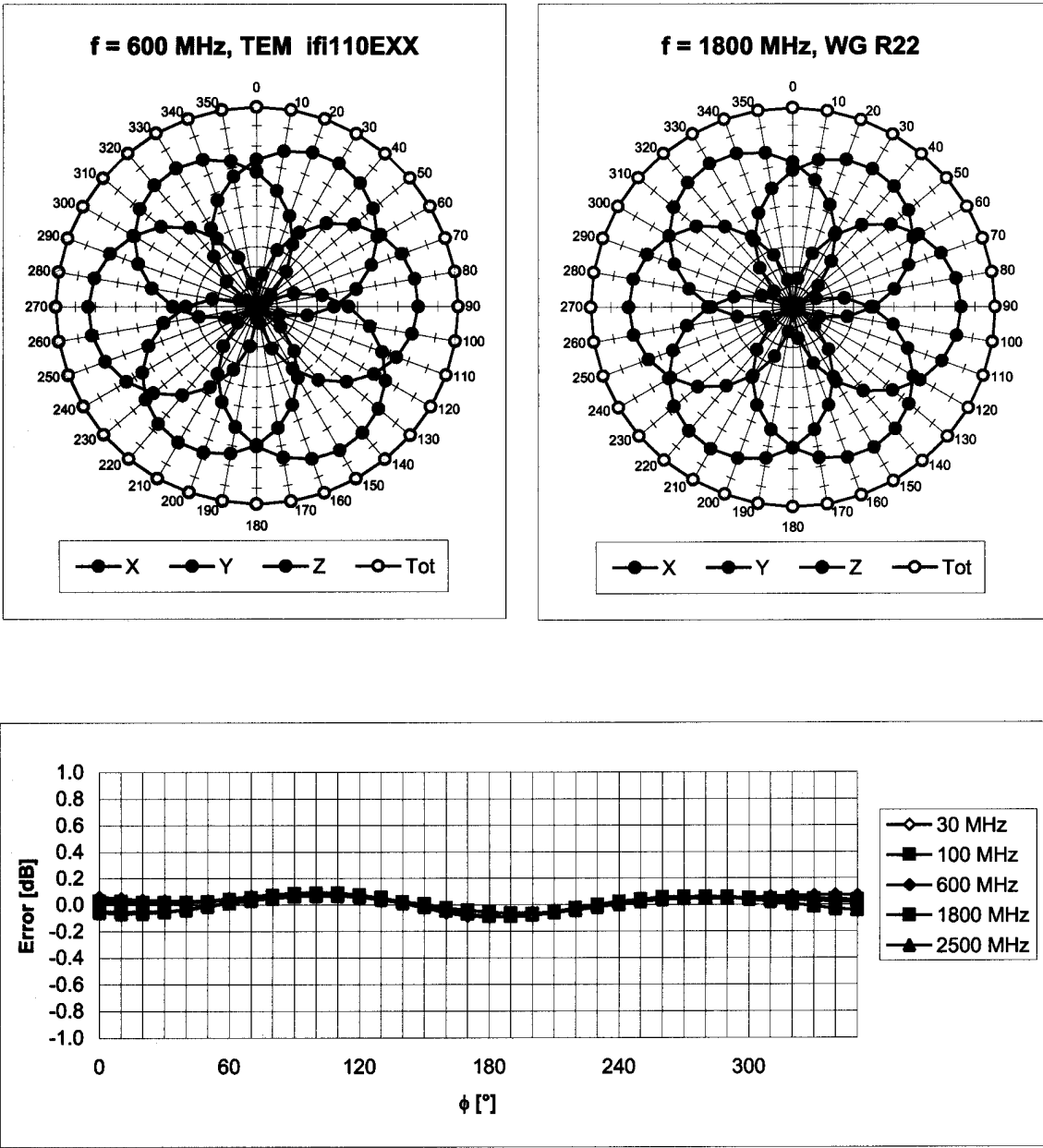
Frequency Response of E-Field

(TEM-Cell:ifi110 EXX, Waveguide: R22)



Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

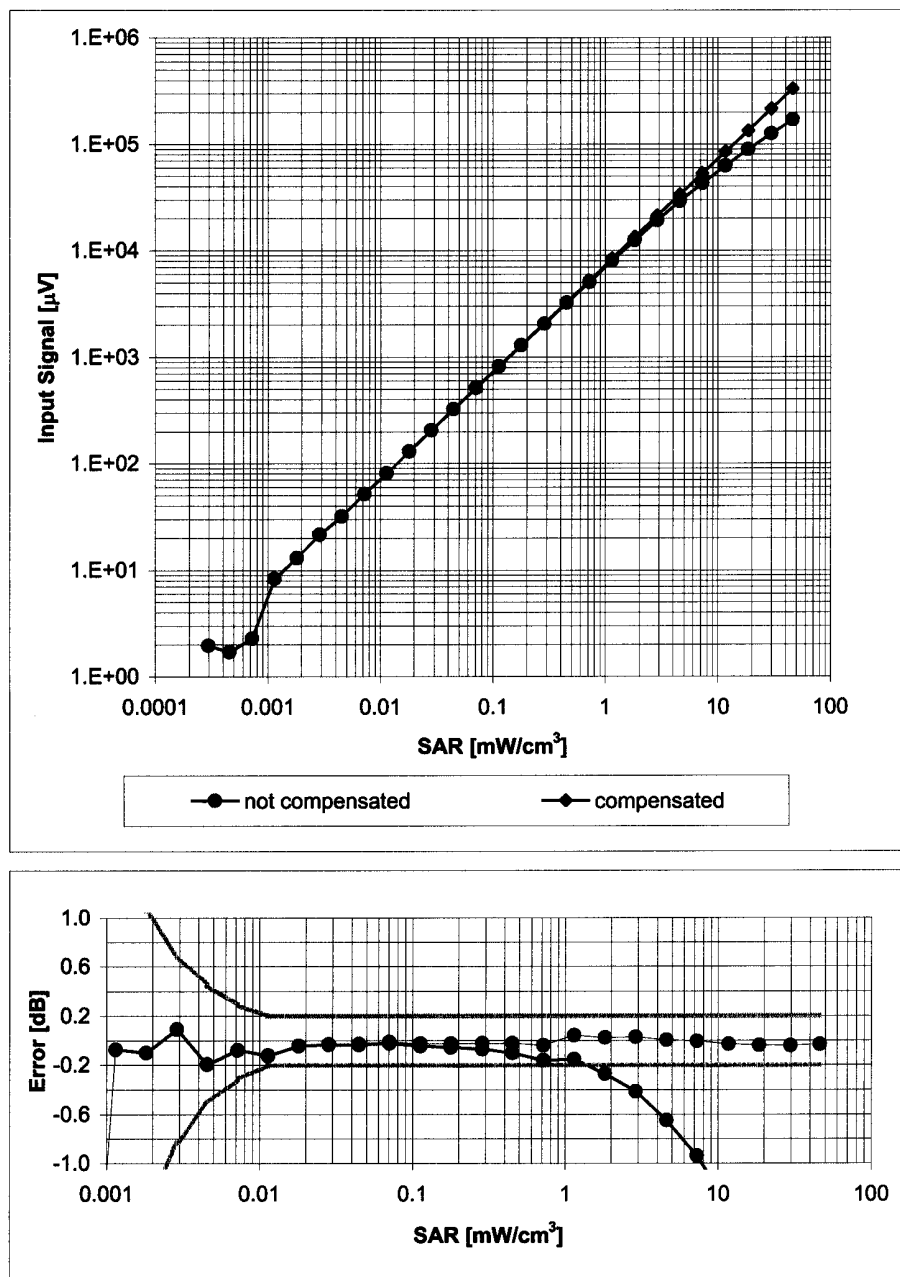
Receiving Pattern (ϕ), $\theta = 0^\circ$



Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

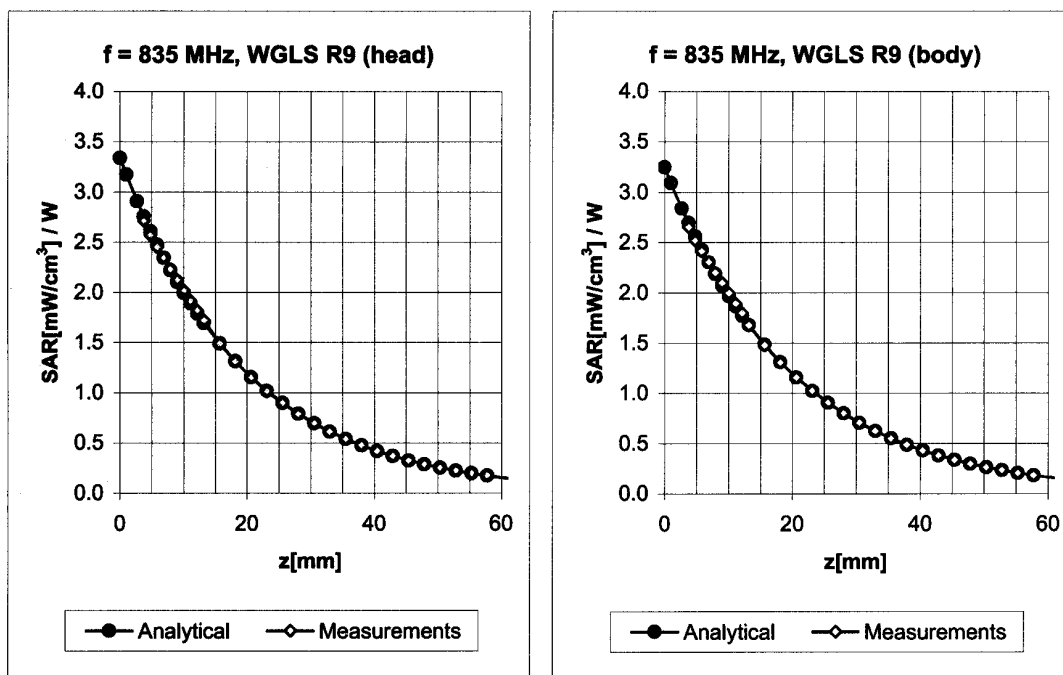
Dynamic Range f(SAR_{head})

(Waveguide R22, f = 1800 MHz)



Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

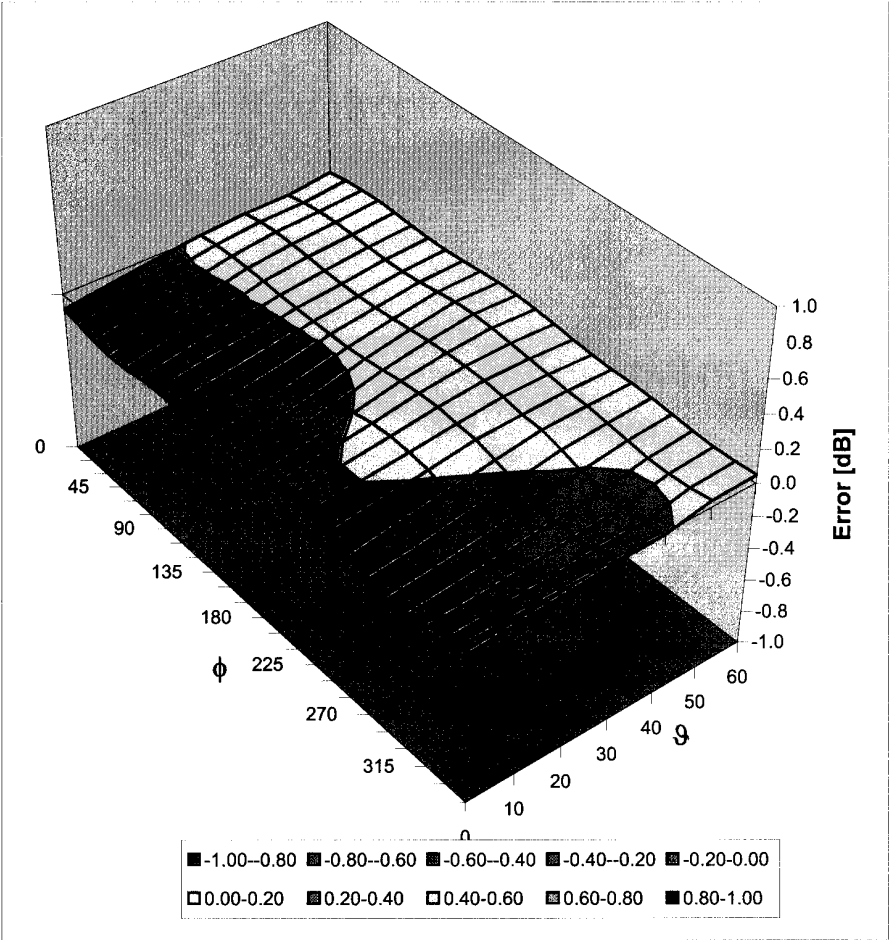
Conversion Factor Assessment



f [MHz]	Validity [MHz] ^c	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF	Uncertainty
450	± 50 / ± 100	Head	43.5 ± 5%	0.87 ± 5%	0.34	1.75	7.66	± 13.3% (k=2)
835	± 50 / ± 100	Head	41.5 ± 5%	0.90 ± 5%	0.32	3.52	6.54	± 11.0% (k=2)
450	± 50 / ± 100	Body	56.7 ± 5%	0.94 ± 5%	0.28	1.77	8.27	± 13.3% (k=2)
835	± 50 / ± 100	Body	55.2 ± 5%	0.97 ± 5%	0.36	3.31	6.39	± 11.0% (k=2)

^c The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

Deviation from Isotropy in HSL
Error (ϕ, ϑ), $f = 900 \text{ MHz}$



Uncertainty of Spherical Isotropy Assessment: $\pm 2.6\%$ ($k=2$)