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TEST REPORT

Report Number: 100028553LEX-001
Project Number: G100028553

Evaluation of Model Number: 7505 Handheld Computer
FCCID: GM37505BTMW
IC ID: 2739D-7505BTMW

Tested to the SAR Criteria in

FCC OET Bulletin 65, Supplement C (Edition 01-01)

Industry Canada RSS-102 Issue 4

For

Psion Teklogix

Test Performed by:	Test Authorized by:
Intertek 731 Enterprise Drive Lexington, KY 40510	Psion Teklogix 2100 Meadowvale Blvd. Mississuaga, L5N 7J9 Canada

Prepared By:_____ **Date:** 6/11/2010

Jason Centers, Senior Project Engineer

Approved By:_____ **Date:** 6/11/2010

Bryan Taylor, Team Leader – Engineering

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1.0 DOCUMENT HISTORY

Revision/ Project Number	Writer Initials	Date	Change
1.0 /G100028553	JC	6/11/2010	Original document

2.0 REFERENCES

[1] ANSI, *ANSI/IEEE C95.1-1991: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3kHz to 300 GHz*, The Institute of electrical and Electronics Engineers, Inc., New York, NY 10017, 1992

[2] Federal Communications Commission, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields", Supplement C (Edition 01-01) to OET Bulletin 65 (Edition 97-01), FCC, Washington, D.C. 20554, 1997

[3] Thomas Schmid, Oliver Egger, and Niels Kuster, "Automated E-field scanning system for dosimetric assessments", *IEEE Transaction on Microwave Theory and Techniques*, vol. 44, pp. 105-113, Jan. 1996.

[4] Niels Kuster, Ralph Kastle, and Thomas Schmid, "Dosimetic evaluation of mobile communications equipment with know precision", IEICE Transactions on Communications, vol. E80-B, no. 5, pp.645-652, May 1997.

[5] NIS81, NAMAS, "The treatment of uncertainty in EMC measurement", Tech. Rep., NAMAS Executive, National Physical Laboratory, Teddinton, Middlesex, England, 1994.

[6] Barry N. Tayor and Chris E. Kuyatt, "Guidelines for evaluating and expressing the uncertainty of NIST measurement results", Tech. Rep., National Institute of Standards and Technology, 1994.

[7] Federal Communications Commission, "SAR Measurement Procedures for 802.11 a/b/g Transmitters"

[8] Federal Communications Commission, KDB 648474 – "SAR Evaluation Considerations for Handsets with Multiple Transmitters and Antennas".

[9] Federal Communications Commission, KDB 447498 – "Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies".

[10] ANSI, ANSI/IEEE C63.10-2009: American National Standard for Testing Unlicensed Wireless Devices.

3.0 INTRODUCTION

At the request of Psion Teklogix, the Handheld Computer was evaluated for SAR in accordance with the requirements for RF Exposure compliance testing defined in FCC OET Bulletin 65, Supplement C (Edition 01-01). Testing was performed at the Intertek facility in Lexington, Kentucky on 4/29/2010.

For the evaluation, the dosimetric assessment system DASY4 was used. The phantom employed was the "SAM Twin Phantom". The total uncertainty for the evaluation of the spatial peak SAR values averaged over a cube of 1g tissue mass had been assessed for this system to be ±21.9%.

The 7505 was tested at the maximum output power measured by Intertek. Maximum output power measurements are tabulated under **Heading 11.0 - Tabular Test Results**.

The maximum spatial peak SAR value for the sample device averaged over 1g was found to be:

Phantom	Mode	Setup Details	Worst Case Extrapolated SAR_{1g} mW/g
Flat Section (Body Mode)	Ch 6 - 802.11b, 1 Mbps Data Rate	Back of device against phantom	**0.788**
Flat Section (Body Mode)	Ch 39 - Bluetooth	Back of device against phantom	**0.00126**

Table 1: Maximum Measured SAR

Based on the worst-case data presented above, the Handheld Computer was found to be **compliant** with the 1.6 mW/g requirement defined in OET Bulletin 65, Supplement C (Edition 01-01) for general population / uncontrolled exposure.

Modifications made to test sample

Intertek implemented no modifications.

4.0 TEST SITE DESCRIPTION

The SAR test site located at 731 Enterprise Drive, Lexington KY 40510 is comprised of the SPEAG model DASY 4 automated near-field scanning system, which is a package, optimized for dosimetric evaluation of mobile radios [3]. This system is installed in an ambient-free shielded chamber. The ambient temperature is controlled to 22.0 $\pm 2^{O}$C. During the SAR evaluations, the RF ambient conditions are monitored continuously for signals that might interfere with the test results. The tissue simulating liquid is also stored in this area in order to keep it at the same constant ambient temperature as the room.

Figure 1: Intertek SAR Test Site

Measurement Equipment

The following major equipment/components were used for the SAR evaluations:

SAR Measurement System			
Equipment	**Specifications**	**S/N #**	**Cal. Due**
Robot	**Stäubli RX60L**	597412-01	N/A
	Repeatability: ± 0.025mm Accuracy: 0.806x10-3 degree Number of Axes: 6		
E-Field Probe	**EX3DV3**	3516	12/15/2010
	Frequency Range: 10MHz to 6GHz Probe Linearity: ± 0.2 dB (30MHz to 6GHz) Length: 337 mm Distance between the probe tip and the dipole center: 1 mm Tip Diameter: 2.5 mm Calibration: 835, 900, 1750, 1900, 2450, 5200, 5800MHz for head & body tissue simulating liquid		
Data Acquisition	**DAE4**	358	4/14/2011
	Measurement Range: 1µV to >200mV Input offset Voltage: < 1µV (with auto zero) Input Resistance: 200 M		
Phantom	**SAM Twin V4.0**	TP-1243	N/A
Complies with IEEE P1528-2003	Type SAM Twin, Homogenous Shell Material: Fiberglass Thickness: 2 ± 0.2 mm Capacity: 20 liter Size of the flat section: approx. 320 x 230 mm		
Device holder	Non-conductive holder supplied with DASY4, dielectric constant less than 5.0	N/A	N/A
Network Analyzer	**Agilent 8753A**	3018	2/24/2011
	Frequency Range: 30KHz – 3.0 GHz		
Signal Generator	**ESG-D3000A**	2038	10/19/2010
	Frequency Range: 10MHz – 3 GHz		
Spectrum Analyzer	**Rohde & Schwarz FSP 7**	1164.4391.07	8/17/2010
	Frequency Range: 9KHz – 7 GHz		

Table 2: Test Equipment Used for SAR Evaluation

Measurement Traceability

All measurements described in this report are traceable to National Institute of Standards and Technology (NIST) standards or appropriate national standards.

Measurement Uncertainty

The Table below includes the uncertainty budget suggested by the IEEE Std 1528-2003 and determined by SPEAG for the DASY4 measurement System

Error Description	Uncertainty Value	Prob. Dist.	Div.	c_i (1g)	c_i (10g)	Std.Unc. (1g)	Std.Unc. (10g)	(v_i) v_{eff}
Measurement System								
Probe Calibration	±5.9%	N	1	1	1	±5.9%	±5.9%	∞
Axial Isotropy	±4.7%	R	√3	0.7	0.7	±1.9%	±1.9%	∞
Hemispherical Isotropy	±9.6%	R	√3	0.7	0.7	±3.9%	±3.9%	∞
Boundary Effect	±1.0%	R	√3	1	1	±0.6%	±0.6%	∞
Linearity	±4.7%	R	√3	1	1	±2.7%	±2.7%	∞
System Detection Limits	±1.0%	R	√3	1	1	±0.6%	±0.6%	∞
Readout Electronics	±0.3%	N	1	1	1	±0.3%	±0.3%	∞
Response Time	±0.8%	R	√3	1	1	±0.5%	±0.5%	∞
Integration Time	±2.6%	R	√3	1	1	±1.5%	±1.5%	∞
RF Ambient Conditions	±3.0%	R	√3	1	1	±1.7%	±1.7%	∞
Probe Positioner	±0.4%	R	√3	1	1	±0.2%	±0.2%	∞
Probe Positioning	±2.9%	R	√3	1	1	±1.7%	±1.7%	∞
Max. SAR Eval.	±1.0%	R	√3	1	1	±0.6%	±0.6%	∞
Test sample Related								
Device Positioning	±2.9%	N	1	1	1	±2.9%	±2.9%	145
Device Holder	±3.6%	N	1	1	1	±3.6%	±3.6%	5
Power Drift	±5.0%	R	√3	1	1	±2.9%	±2.9%	∞
Phantom and Tissue Parameters								
Phantom Uncertainty	±4.0%	R	√3	1	1	±2.3%	±2.3%	∞
Liquid Conductivity (target)	±5.0%	R	√3	0.64	0.43	±1.8%	±1.2%	∞
Liquid Conductivity (meas.)	±2.5%	N	1	0.64	0.43	±1.6%	±1.1%	∞
Liquid Permittivity (target)	±5.0%	R	√3	0.6	0.49	±1.7%	±1.4%	∞
Liquid Permittivity (meas.)	±2.5%	N	1	0.6	0.49	±1.5%	±1.2%	∞
Combined Standard Uncertainty						±10.9%	±10.7%	387
Expanded STD Uncertainty						**±21.9%**	**±21.4%**	

Notes.

1. Worst Case uncertainty budget for DASY4 assessed according to IEEE 1528. The budget is valid for the frequency range 300 MHz – 3 GHz and represents a worst-case analysis. For specific tests and configurations, the uncertainty could be considerably smaller.

5.0 JOB DESCRIPTION

At the request of Psion Teklogix, the 7505 was evaluated to the requirements defined in OET Bulletin 65, Supplement C.

Test sample	
Manufacturer	Psion Teklogix
Model Number	7505
Serial Number	CHOCU9450480
Receive Date	4/23/2010
Device Received Condition	Good condition production unit
Device Category	Portable
RF Exposure Category	General Population/Uncontrolled Environment
Frequency Band	2.4GHz ISM Band
Mode(s) of Operation	802.11b/g, Bluetooth
Duty Cycle	100% (Test Commands)
Maximum Output Power	802.11: 17.48 dBm (average - conducted) Bluetooth: -3.1 dBm (average – conducted)
Test Channels	802.11b – Ch1 (2412MHz), Ch 6 (2437MHz), Ch 11 (2462MHz) Bluetooth – Ch 39 (2441 MHz)
Antenna Type	Bluetooth – SMD, 1.1dBi peak gain 802.11b/g – PCB, 2.1dBi peak gain
Test sample Accessories	
Battery type	Rechargeable Li-Ion
Belt clip	None
Cables	None
Antennas	Internal
Contact Information	
Contact Name	Sada Dharwarkar
Phone Number	(905) 812-6200
Email Address	Sada.Dharwarkar@psionteklogix.com

Table 3: Product Information

Test Sample Pictures:

Photographs of the test sample and its accessories are shown in Figure 2 through **Error! Reference source not found.**.

Figure 2: Front of Test Sample

Figure 3: Back of Test Sample

6.0 SYSTEM VERIFICATION

System Validation

Prior to the assessment, the system was verified to be within ±10% of the specifications by using the system validation kit. The validation was performed at 2450 MHz using muscle simulating tissue. The results from the daily dipole validation are shown in Table 4.

Figure 4: System Verification Setup

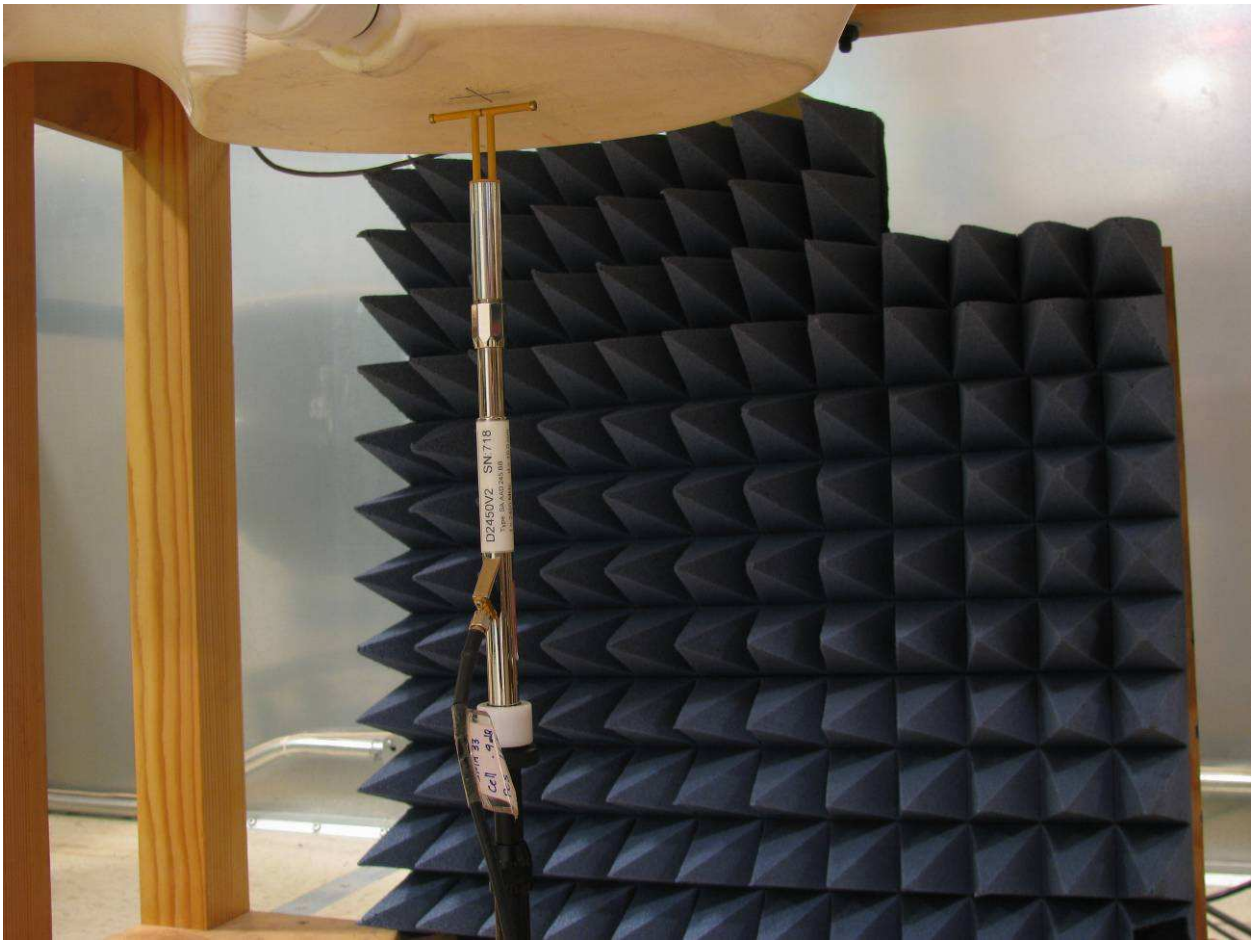


Table 4: Dipole Validation

Reference Dipole Validation								
Frequency Measure (MHz)	**Dipole Type**	**Dipole Serial Number**	**Fluid Type**	**Dipole Power Input**	**Cal. Lab SAR (1g)**	**Measured SAR (1g)**	**% Error SAR (1g)**	**Date**
2450	D2450	718	2450 MSL	1W	50.2	48.00	4.38	4/29/2010

Tissue Simulating Liquid Description and Validation

The dielectric parameters were verified to be within 5% of the target values each day prior to assessment. The dielectric parameters **(ε_r, σ)** and temperature on each day of testing are shown in Table 5 and Table 6. A recipe for the tissue simulating fluid used is shown in Table 7.

Table 5: Dielectric Parameter Validation

Body Tissue Parameters								
Frequency Measure (MHz)	**Dielectric Constant Target**	**Dielectric Constant Measure**	**Dielectric % Deviation**	**Imaginary Part**	**Conductivity Target**	**Conductivity Measure**	**Conductivity % Deviation**	**Date**
2412	52.75	54.2	**2.75**	14.61	1.91	1.96	**2.57**	4/29/2010
2437	52.72	54.1	**2.62**	14.74	1.94	2.00	**2.94**	
2450	52.7	54.07	**2.60**	14.86	1.95	2.02	**3.80**	
2462	52.68	54	**2.51**	14.92	1.97	2.04	**3.66**	
The % deviation should be below 5%.								

Table 6: Temperature Validation

Date	Ambient Temperature(°C)	Muscle Simulating Liquid Temperature (°C) f=2450MHz
4/29/2010	21.4	21.1

Table 7: Tissue Simulating Fluid Recipe

TYPICAL COMPOSITION OF INGREDIENTS FOR LIQUID TISSUE PHANTOMS, Supplement C Edition 01-01 to OET Bulletin 65 Edition 97-01, Page 36. (450MHz to 2450 MHz data only)												
Ingredient (% by weight)	f (MHz)											
	450		835		915		1900		2450		5500	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	41.45	52.4	41.05	56	54.9	70.45	62.7	**68.64**	65.53	78.67
Salt (NaCl)	3.95	1.49	1.45	1.4	1.35	0.76	0.18	0.36	0.5	**0**	0	0
Sugar	56.32	46.78	56	45	56.5	41.76	0	0	0	**0**	0	0
HEC	0.98	0.52	1	1	1	1.21	0	0	0	**0**	0	0
Bactericide	0.19	0.05	0.1	0.1	0.1	0.27	0	0	0	**0**	0	0
Triton X-100	0	0	0	0	0	0	0	0	36.8	**0**	17.235	10.665
DGBE	0	0	0	0	0	0	44.92	29.18	0	**31.37**	0	0
DGHE	0	0	0	0	0	0	0	0	0	**0**	17.235	10.665
Dielectric Constant	43.42	58	42.54	56.1	42	56.8	39.9	53.3	39.8	**52.7**		
Conductivity (S/m)	0.85	0.83	0.91	0.95	1	1.07	1.42	1.52	1.88	**1.95**		

7.0 EVALUATION PROCEDURES

Prior to any testing, the appropriate fluid was used to fill the phantom to a depth of 15 cm ±0.2cm. The fluid parameters were verified and the dipole validation was performed as described in the previous sections.

Test Positions:

The Device was positioned against the SAM and flat phantom using the exact procedure described in Supplement C Edition 01 – 01 of Federal Communications Commission, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields", OET Bulletin 65, FCC, Washington, D.C. 20554, 1997.

Reference Power Measurement:

The measurement probe was positioned at a fixed location above the reference point. A power measurement was made with the probe above this reference position so it could used for the assessing the power drift later in the test procedure.

Coarse Scan:

A coarse area scan with a horizontal grid spacing of 15 x 15 mm was performed in order to find the approximate location of the peak SAR value. This scan was performed with the measurement probe at a constant height in the simulating fluid. A two dimensional spline interpolation algorithm was then used to determine the peaks and gradients within the scanned area.

Zoom Scan:

A zoom scan was performed around the approximate location of the peak SAR as determined from the coarse scan. The zoom scan was comprised of a measurement volume of 30 x 30 x 30 mm based on 7 x 7 x 7 points. On the basis of this data set, the spatial peak SAR value was evaluated with the following procedure:

Data Extrapolation:

Since the center of the dipoles in the measurement probe are 1 mm away from the tip of the probe, and the distance between the surface and the lowest measurement point is 2 mm the data at the surface was extrapolated. The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in the Z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip.

The maximum interpolated value was searched with a straightforward sorting algorithm. Around this maximum, the SAR values averaged over the spatial volumes (1g or 10g) were computed using a 3-D spline interpolation algorithm. The 3-D spline is composed of three one-dimensional splines with the "Not a knot" condition (in x, y and z directions). The volume was integrated with a trapezoidal algorithm. 1000 points (10 x 10 x 10) were interpolated to calculate the average.

All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

Reference Power Measurement:

The probe was positioned at precisely the same reference point and the reference power measurement was repeated. The difference between the initial reference power and the final one is referred to as the power drift

RF Ambient Activity:

During the entire SAR evaluation, the RF ambient activity was monitored using a spectrum analyzer with an antenna connected to it. The spectrum analyzer was tuned to the frequency of measurement and with one trace set to max hold mode. In this way, it was possible to determine if at any point during the SAR measurement there was an interfering ambient signal. If an ambient signal was detected, then the SAR measurement was repeated.

8.0 TEST CONFIGURATION

For the purpose of this evaluation, the 7505 was considered to be a device that could be operated when held against the body. All SAR scans were performed with a freshly charged battery installed.

The test channels and operating modes were selected using software based test commands. The device was positioned against the bottom of the phantom with zero clearance during the evaluation. A photograph of the 7505, as positioned for testing, is shown in Figure 5.

Figure 5: Device Positioning for SAR Scans

9.0 CRITERIA

The following FCC limits for SAR apply to devices operating in the General Population/Uncontrolled Exposure environment:

Exposure **(General Population/Uncontrolled Exposure environment)**	**SAR** **(W/kg)**
Average over the whole body	0.08
Spatial Peak (1g)	1.60
Spatial Peak for hands, wrists, feet and ankles (10g)	4.00

10.0 TABULAR TEST RESULTS

The results on the following page(s) were obtained when the device was transmitting at maximum output power. Detailed measurement data and plots, which reveal information about the location of the maximum SAR with respect to the device, are referenced under Graphical SAR Scan Results on page 24.

Conducted Power Measurements

The conducted power measurements for the 7505 were performed by Krishna Vemuri at the Intertek Menlo Park office. Please see Intertek report number 100028553MPK-001 for details. The same samples were used for EMC and SAR testing.

Table 8: Conducted Output Power – 802.11b/g Mode

Channel	Frequency (MHz)	Standard	Data Rate	Conducted Power (average) dBm
1	2412	802.11 b	11	16.63
1	2412	802.11 g	54	11.96
6	2437	802.11 b	11	17.34
6	2437	802.11 g	54	11.92
11	2462	802.11 b	11	17.48
11	2462	802.11 g	54	11.96

Table 9: Conducted Output Power – Bluetooth Mode

Channel	Frequency (MHz)	Conducted Power (average) dBm
1	2402	-3.6
40	2441	-3.1
79	2480	-3

Body Mode SAR Test Results

During the test, the RF output power of the test sample varied by a small amount due to heat and battery output power variations in the device. The device was scanned on the back side of the device as it would be held against the body. A scan was performed at 1Mbps data rate in b-mode. Since the output power in 802.11g mode was less than the 802.11b mode, no scans were required for that mode. The sum of the worse case 1-g SAR values from the 802.11b and Bluetooth scans were less than the 1.6mW/g limit.

Table 10: Body Mode SAR Results – 802.11b/g Mode

Flat Phantom; 100% Duty Cycle						
Mode/Channel	**Data Rate**	**Freq. (MHz)**	**Position**	**SAR Drift (dB)**	**Measured 1-g SAR (mW/g)**	**Meas. 10g-SAR (mw/g)**
802.11b - Ch. 1	1 Mbps	2412	Back	0.196	0.600	0.291
802.11b - Ch. 6	1 Mbps	2417	Back	-0.027	0.788	0.380
802.11b - Ch. 11	1 Mbps	2462	Back	-0.186	0.787	0.381
FCC Limit = 1.6mW/g (General Population / Uncontrolled Exposure)						

Table 11: Body Mode SAR Results – Bluetooth Mode

Flat Phantom; 100% Duty Cycle						
Mode/Channel	**Data Rate**	**Freq. (MHz)**	**Position**	**SAR Drift (dB)**	**Measured 1-g SAR (mW/g)**	**Meas. 10g-SAR (mw/g)**
Ch39	Continuous	2441	Back	-0.129	0.00126	0.0009
FCC Limit = 1.6mW/g (General Population / Uncontrolled Exposure)						

11.0 DIPOLE VALIDATION SCANS

Date/Time: 4/29/2010 9:34:14 AM

Test Laboratory: Intertek ETL Semko
File Name: Dipole Validation 4_29_2010.da4

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:718
Program Name: System Performance Check at 2450 MHz

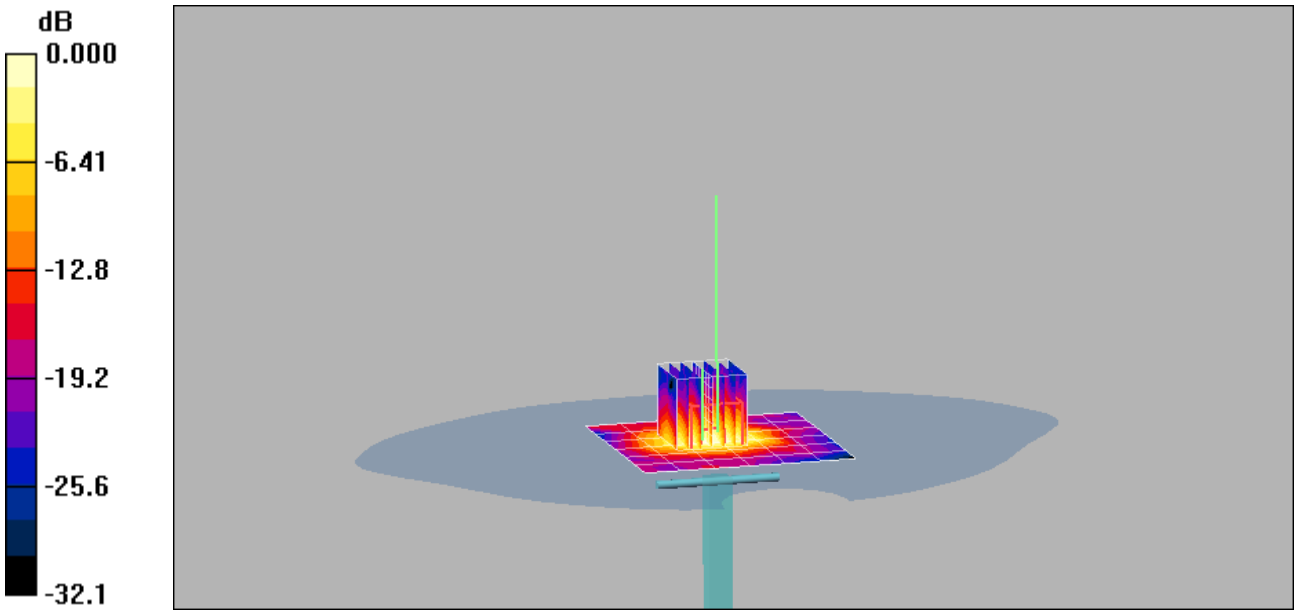
Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 2.02 mho/m; εr = 54.1; ρ = 1000 kg/m3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: EX3DV3 - SN3516; ConvF(8.22, 8.22, 8.22); Calibrated: 12/15/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn358; Calibrated: 4/14/2010
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1243
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

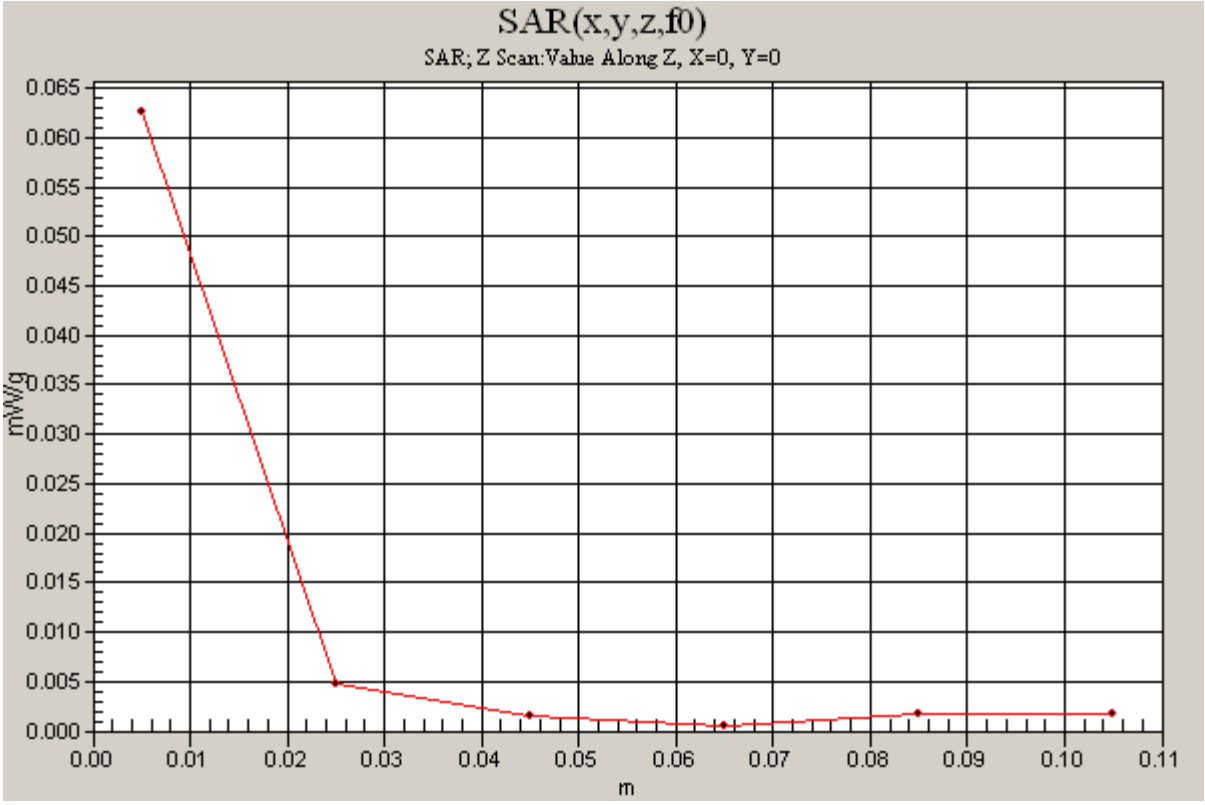
d=10mm, Pin=10mW/Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.042 mW/g

d=10mm, Pin=10mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.13 V/m; Power Drift = 0.042 dB
Peak SAR (extrapolated) = 101.0 W/kg
SAR(1 g) = 48 mW/g; SAR(10 g) = 22 mW/g
Normalized to target power = 1 W and actual power = 0.001 W
Maximum value of SAR (measured) = 54.4 mW/g

d=10mm, Pin=10mW/Z Scan (1x1x6): Measurement grid: dx=20mm, dy=20mm, dz=20mm
Maximum value of SAR (measured) = 0.063 mW/g


dB
0.000
-6.41
-12.8
-19.2
-25.6
-32.1

0 dB = 0.042mW/g


SAR(x,y,z,f0)
SAR; Z Scan:Value Along Z, X=0, Y=0
mW/g
0.065
0.060
0.055
0.050
0.045
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.10
0.11
m

12.0 GRAPHICAL SAR SCAN RESULTS

Date/Time: 4/29/2010 10:47:42 AM

Test Laboratory: Intertek ETL Semko
File Name: CH 1 802.11b Scan.da4

DUT: PSION; Type: 7505; Serial: CHOCU9450480
Program Name: Different Test Procedures (Left-Hand Side)

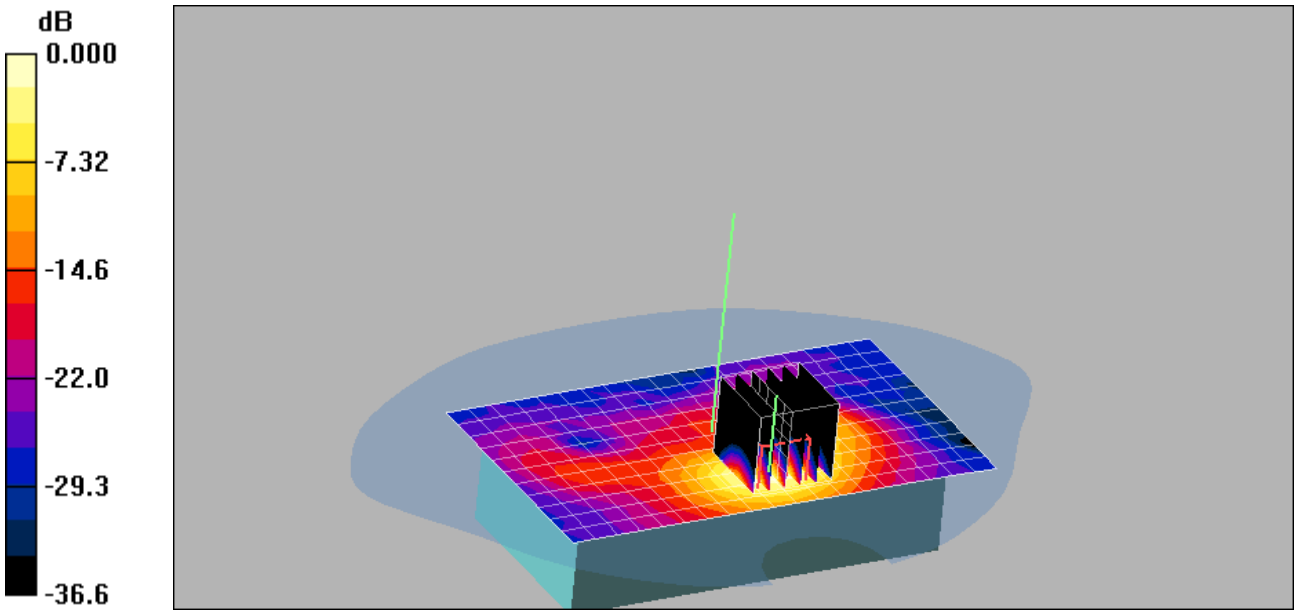
Communication System: 802.11b/g; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2412 MHz; σ = 1.96 mho/m; εr = 54.2; ρ = 1000 kg/m3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: EX3DV3 - SN3516; ConvF(8.22, 8.22, 8.22); Calibrated: 12/15/2009
- Sensor-Surface: 2.7mm (Mechanical Surface Detection)Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn358; Calibrated: 4/14/2010
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1243
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

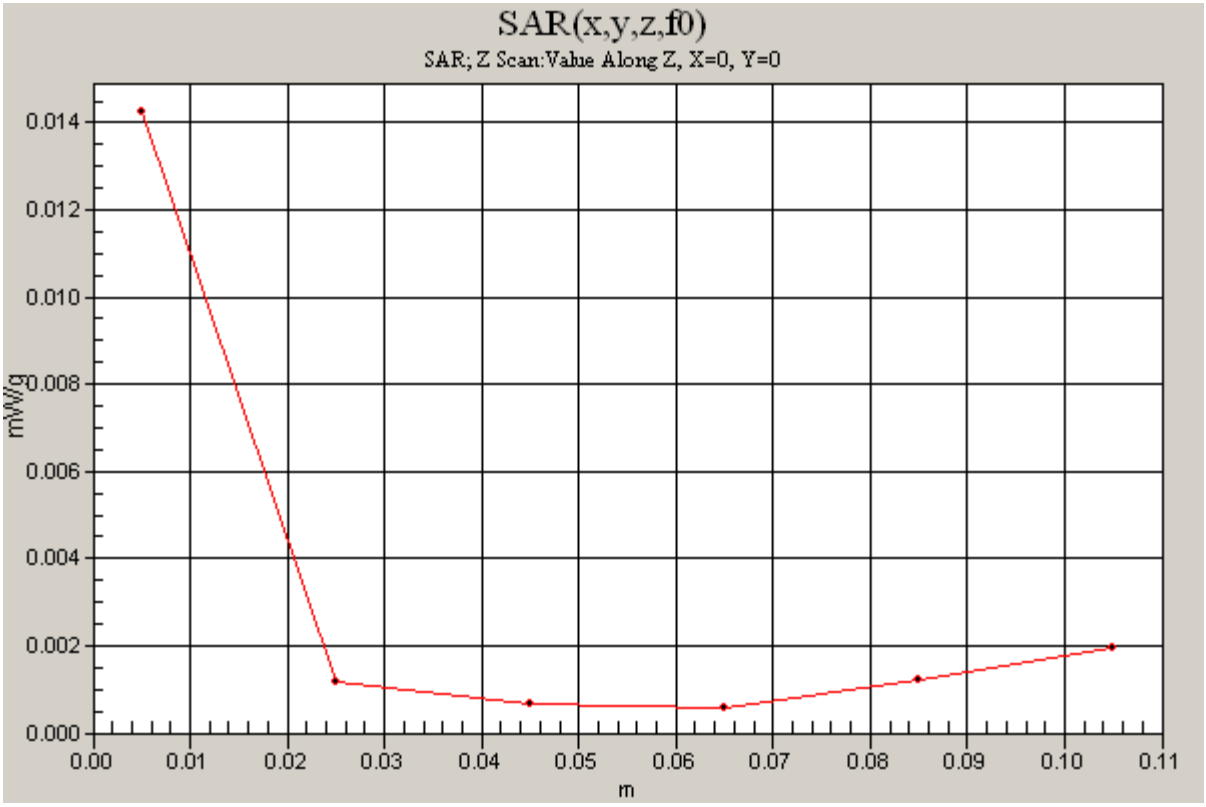
Cube7x7x7 - Flat Phantom/Area Scan (12x20x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.733 mW/g

Cube7x7x7 - Flat Phantom/Zoom Scan (6x6x6)/Cube 0: Measurement grid: dx=7mm, dy=7mm, dz=7mm
Reference Value = 2.52 V/m; Power Drift = 0.196 dB
Peak SAR (extrapolated) = 1.15 W/kg
SAR(1 g) = 0.600 mW/g; SAR(10 g) = 0.291 mW/g
Maximum value of SAR (measured) = 0.800 mW/g

Cube7x7x7 - Flat Phantom/Z Scan (1x1x6): Measurement grid: dx=20mm, dy=20mm, dz=20mm
Maximum value of SAR (measured) = 0.014 mW/g


dB
0.000
-7.32
-14.6
-22.0
-29.3
-36.6

0 dB = 0.733mW/g


SAR(x,y,z,f0)
SAR; Z Scan:Value Along Z, X=0, Y=0
mW/g
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.10
0.11
m

Test Laboratory: Intertek ETL Semko
File Name: CH 6 802.11b Scan.da4

DUT: PSION; Type: 7505; Serial: CHOCU9450480
Program Name: Different Test Procedures (Left-Hand Side)

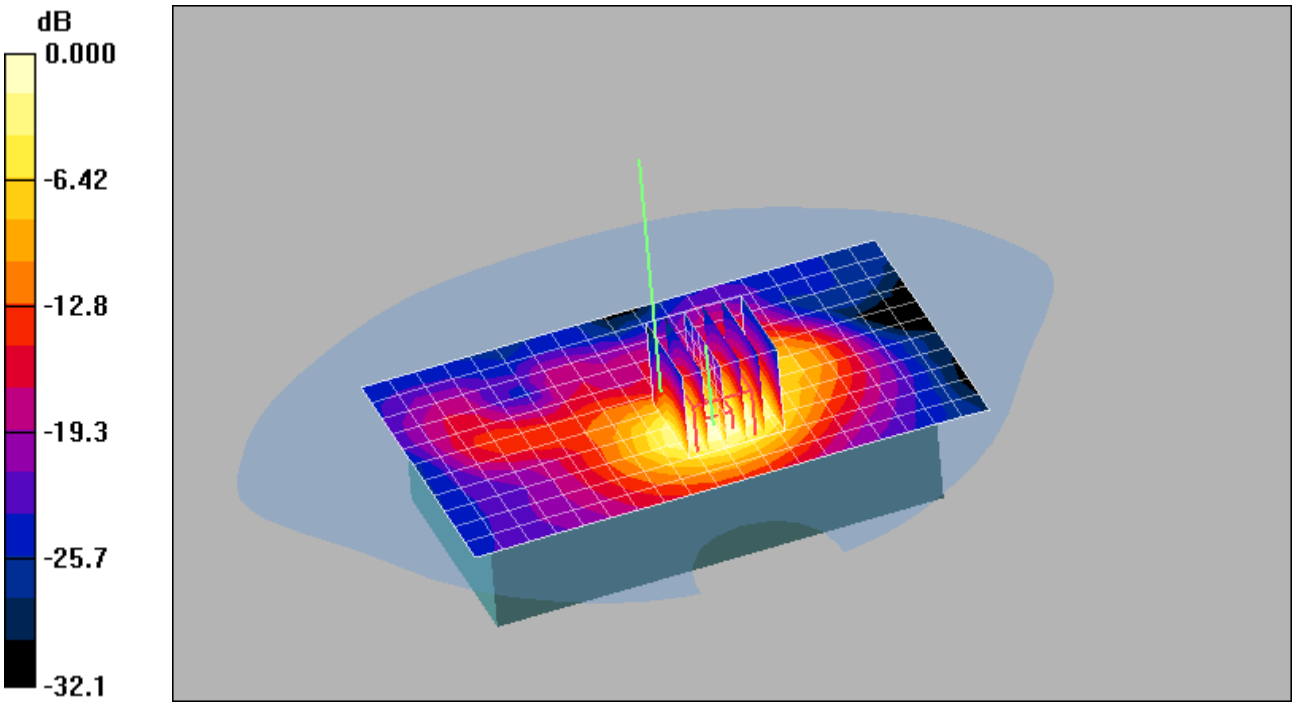
Communication System: 802.11b/g; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2437 MHz; σ = 2 mho/m; εr = 54.1; ρ = 1000 kg/m3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: EX3DV3 - SN3516; ConvF(8.22, 8.22, 8.22); Calibrated: 12/15/2009
- Sensor-Surface: 2.7mm (Mechanical Surface Detection)Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn358; Calibrated: 4/14/2010
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1243
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

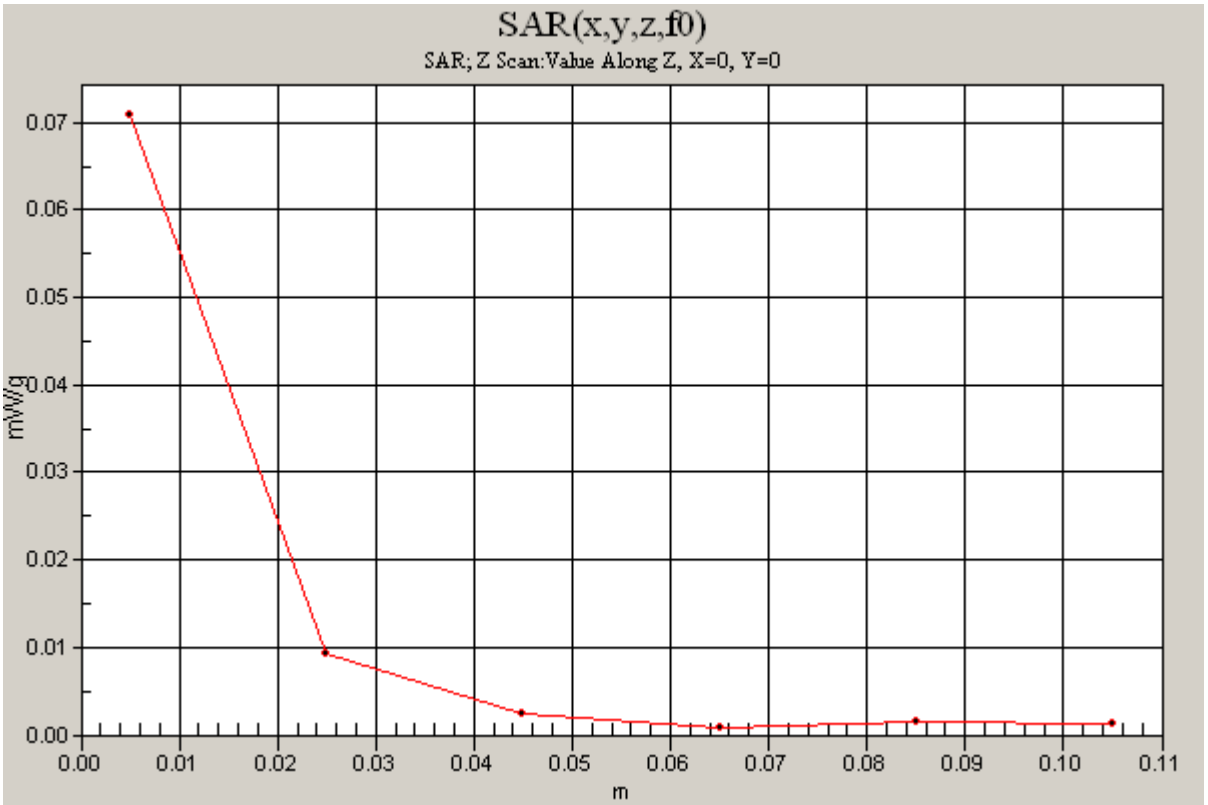
Cube7x7x7 - Flat Phantom/Area Scan (12x20x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.901 mW/g

Cube7x7x7 - Flat Phantom/Z Scan (1x1x6): Measurement grid: dx=20mm, dy=20mm, dz=20mm
Maximum value of SAR (measured) = 0.071 mW/g

Cube7x7x7 - Flat Phantom/Zoom Scan (6x6x6)/Cube 0: Measurement grid: dx=7mm, dy=7mm, dz=7mm
Reference Value = 5.53 V/m; Power Drift = -0.027 dB
Peak SAR (extrapolated) = 1.52 W/kg
SAR(1 g) = 0.788 mW/g; SAR(10 g) = 0.380 mW/g
Maximum value of SAR (measured) = 1.05 mW/g


dB
0.000
-6.42
-12.8
-19.3
-25.7
-32.1

0 dB = 0.901mW/g


SAR(x,y,z,f0)
SAR; Z Scan:Value Along Z, X=0, Y=0
mW/g
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.10
0.11
m

Date/Time: 4/29/2010 1:54:56 PM

Test Laboratory: Intertek ETL Semko
File Name: CH 11 802.11b Scan.da4

DUT: PSION; Type: 7505; Serial: CHOCU9450480
Program Name: Different Test Procedures (Left-Hand Side)

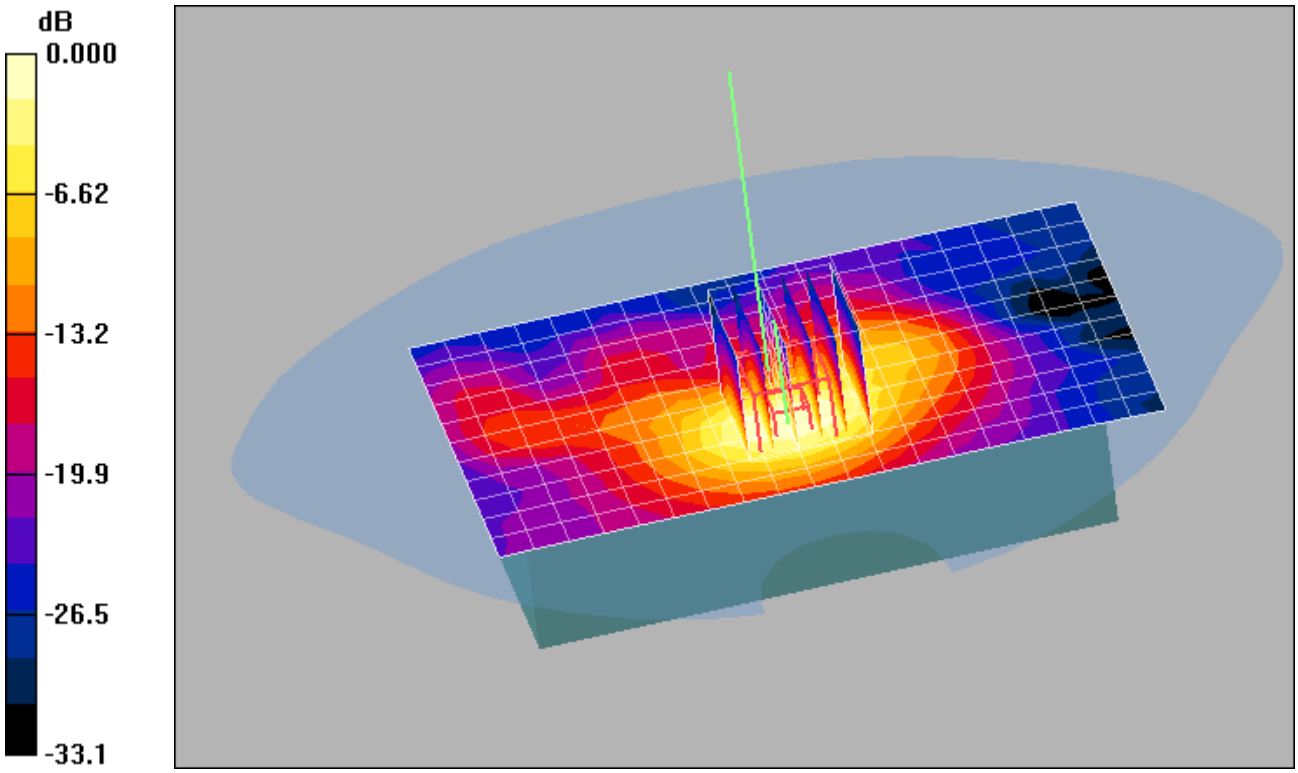
Communication System: 802.11b/g; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2462 MHz; σ = 2.04 mho/m; εr = 54; ρ = 1000 kg/m3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: EX3DV3 - SN3516; ConvF(8.22, 8.22, 8.22); Calibrated: 12/15/2009
- Sensor-Surface: 2.7mm (Mechanical Surface Detection)Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn358; Calibrated: 4/14/2010
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1243
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

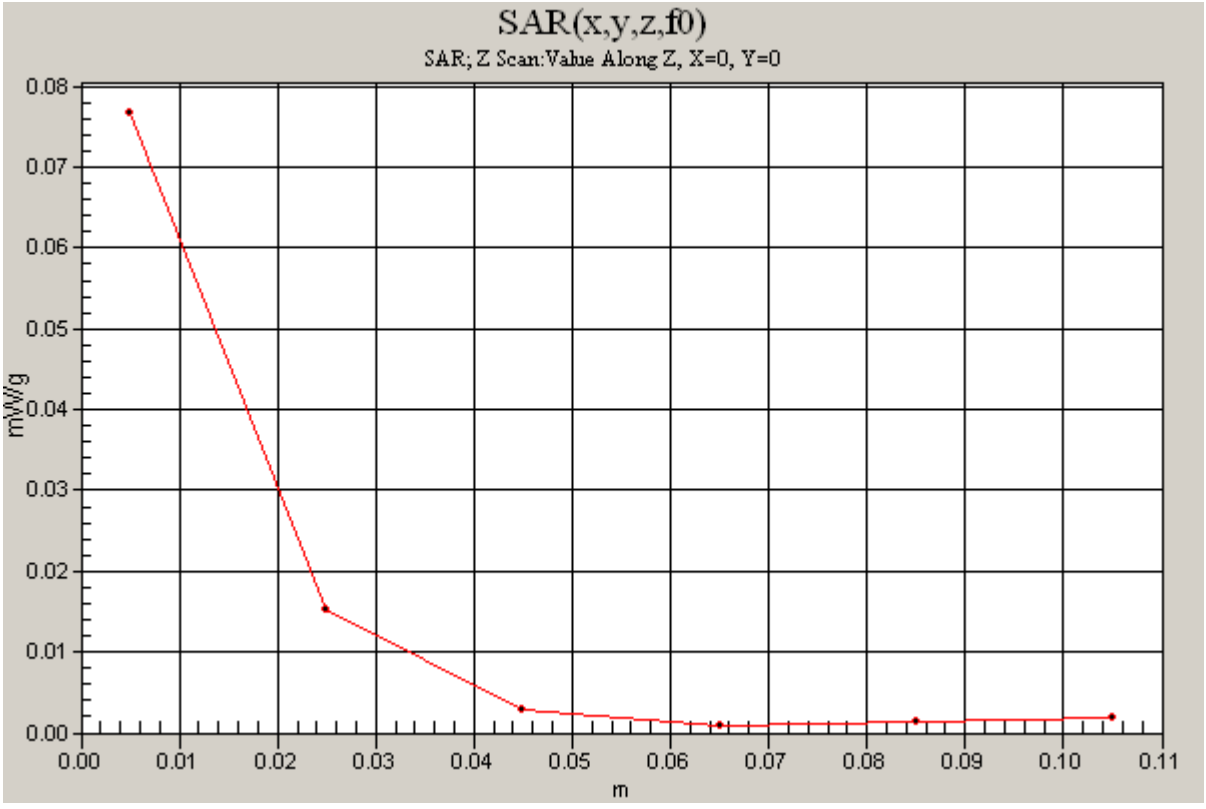
Cube7x7x7 - Flat Phantom/Area Scan (12x20x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.945 mW/g

Cube7x7x7 - Flat Phantom/Zoom Scan (6x6x6)/Cube 0: Measurement grid: dx=7mm, dy=7mm, dz=7mm
Reference Value = 5.87 V/m; Power Drift = -0.186 dB
Peak SAR (extrapolated) = 1.51 W/kg
SAR(1 g) = 0.787 mW/g; SAR(10 g) = 0.381 mW/g
Maximum value of SAR (measured) = 1.05 mW/g

Cube7x7x7 - Flat Phantom/Z Scan (1x1x6): Measurement grid: dx=20mm, dy=20mm, dz=20mm
Maximum value of SAR (measured) = 0.077 mW/g


dB
0.000
-6.62
-13.2
-19.9
-26.5
-33.1

0 dB = 0.945mW/g


SAR(x,y,z,f0)
SAR; Z Scan:Value Along Z, X=0, Y=0
mW/g
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.10
0.11
m

Date/Time: 4/29/2010 3:08:32 PM

Test Laboratory: Intertek ETL Semko
File Name: Bluetooth Mid Channel.da4

DUT: PSION; Type: 7505; Serial: CHOCU9450480

Program Name: Different Test Procedures (Left-Hand Side)

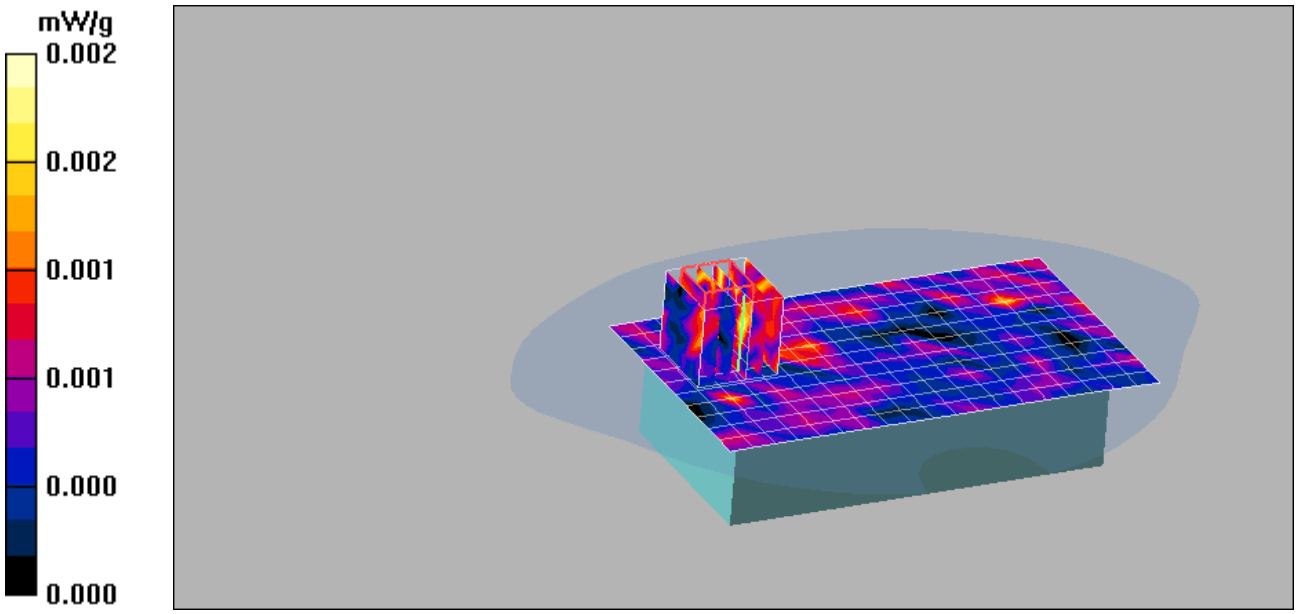
Communication System: Bluetooth; Frequency: 2441 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2441 MHz; σ = 2.01 mho/m; εr = 54.1; ρ = 1000 kg/m3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: EX3DV3 - SN3516; ConvF(8.22, 8.22, 8.22); Calibrated: 12/15/2009
- Sensor-Surface: 2.7mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn358; Calibrated: 4/14/2010
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1243
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Cube7x7x7 - Flat Phantom/Area Scan (12x20x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 0.002 mW/g

Cube7x7x7 - Flat Phantom/Zoom Scan (6x6x6)/Cube 0: Measurement grid: dx=7mm, dy=7mm, dz=7mm
Reference Value = 0.585 V/m; Power Drift = -0.129 dB
Peak SAR (extrapolated) = 0.002 W/kg
SAR(1 g) = 0.00126 mW/g; SAR(10 g) = 0.000876 mW/g


mW/g
0.002
0.002
0.001
0.001
0.000
0.000

13.0 PROBE CERTIFICATE

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

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Swiss Calibration Service

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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 Intertek

Certificate No: EX3-3516_Dec09

CALIBRATION CERTIFICATE

Object	EX3DV3 - SN:3516
Calibration procedure(s)	QA CAL-01.v6, QA CAL-14.v3, QA CAL-23.v3 and QA CAL-25.v2 Calibration procedure for dosimetric E-field probes
Calibration date:	December 15, 2009

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 ± 3)°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-09 (No. 217-01030)	Apr-10
Power sensor E4412A	MY41495277	1-Apr-09 (No. 217-01030)	Apr-10
Power sensor E4412A	MY41498087	1-Apr-09 (No. 217-01030)	Apr-10
Reference 3 dB Attenuator	SN: S5054 (3c)	31-Mar-09 (No. 217-01026)	Mar-10
Reference 20 dB Attenuator	SN: S5086 (20b)	31-Mar-09 (No. 217-01028)	Mar-10
Reference 30 dB Attenuator	SN: S5129 (30b)	31-Mar-09 (No. 217-01027)	Mar-10
Reference Probe ES3DV2	SN: 3013	2-Jan-09 (No. ES3-3013_Jan09)	Jan-10
DAE4	SN: 660	29-Sep-09 (No. DAE4-660_Sep09)	Sep-10

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-09)	In house check: Oct10

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

Issued: December 16, 2009

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

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Accredited by the Swiss Accreditation Service (SAS)
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Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
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., ϑ = 0 is normal to probe axis

Calibration is Performed According to the Following Standards:

a) 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
b) 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:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not effect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,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*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *Ax,y,z; Bx,y,z; Cx,y,z, VRx,y,z*: *A, B, C* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 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 *NORMx,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 EX3DV3

SN:3516

Manufactured:	March 8, 2004
Last calibrated:	November 13, 2008
Recalibrated:	December 15, 2009

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

EX3DV3 SN:3516 **December 15, 2009**

DASY - Parameters of Probe: EX3DV3 SN:3516

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	0.86	0.77	0.62	± 10.1%
DCP (mV)[B]	92.7	94.5	93.6	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dBuV	C	VR mV	Unc[E] (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	300	± 1.5%
			Y	0.00	0.00	1.00	300	
			Z	0.00	0.00	1.00	300	

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 E^2-field uncertainty inside TSL (see Pages 5 and 6).

[B] Numerical linearization parameter: uncertainty not required.

[E] Uncertainty is determined using the maximum deviation from linear response applying recatangular distribution and is expressed for the square of the field value.

EX3DV3 SN:3516

December 15, 2009

DASY - Parameters of Probe: EX3DV3 SN:3516

Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz]	Validity [MHz][C]	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
835	± 50 / ± 100	41.5 ± 5%	0.90 ± 5%	10.65	10.65	10.65	0.67	0.65 ± 11.0%
900	± 50 / ± 100	41.5 ± 5%	0.97 ± 5%	10.35	10.35	10.35	0.63	0.66 ± 11.0%
1750	± 50 / ± 100	40.1 ± 5%	1.37 ± 5%	9.27	9.27	9.27	0.40	0.72 ± 11.0%
1900	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	9.00	9.00	9.00	0.52	0.67 ± 11.0%
2450	± 50 / ± 100	39.2 ± 5%	1.80 ± 5%	8.15	8.15	8.15	0.30	0.88 ± 11.0%
5200	± 50 / ± 100	36.0 ± 5%	4.66 ± 5%	5.32	5.32	5.32	0.40	1.80 ± 13.1%
5800	± 50 / ± 100	35.3 ± 5%	5.27 ± 5%	4.67	4.67	4.67	0.45	1.80 ± 13.1%

[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.

EX3DV3 SN:3516

December 15, 2009

DASY - Parameters of Probe: EX3DV3 SN:3516

Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz]	Validity [MHz][C]	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth	Unc (k=2)
835	± 50 / ± 100	55.2 ± 5%	0.97 ± 5%	10.54	10.54	10.54	0.59	0.70	± 11.0%
900	± 50 / ± 100	55.0 ± 5%	1.05 ± 5%	10.32	10.32	10.32	0.58	0.72	± 11.0%
1750	± 50 / ± 100	53.4 ± 5%	1.49 ± 5%	9.16	9.16	9.16	0.45	0.79	± 11.0%
1900	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	8.71	8.71	8.71	0.34	0.86	± 11.0%
2450	± 50 / ± 100	52.7 ± 5%	1.95 ± 5%	8.22	8.22	8.22	0.30	0.95	± 11.0%
5200	± 50 / ± 100	49.0 ± 5%	5.30 ± 5%	4.18	4.18	4.18	0.60	1.80	± 13.1%
5800	± 50 / ± 100	48.2 ± 5%	6.00 ± 5%	3.84	3.84	3.84	0.60	1.80	± 13.1%

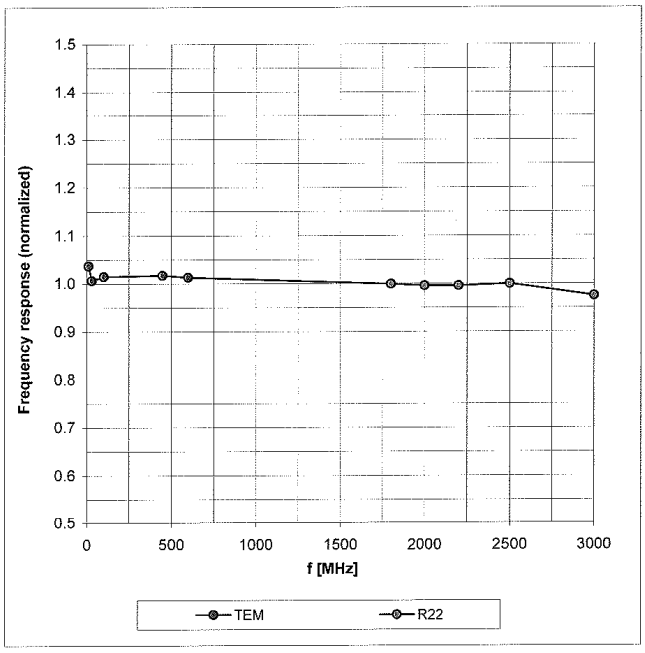
[C] The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

EX3DV3 SN:3516

December 15, 2009

Frequency Response of E-Field

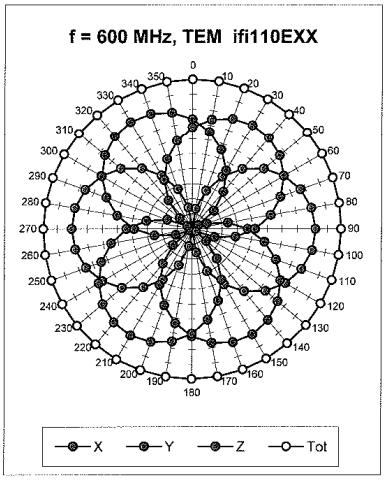
(TEM-Cell:ifi110 EXX, Waveguide: R22)

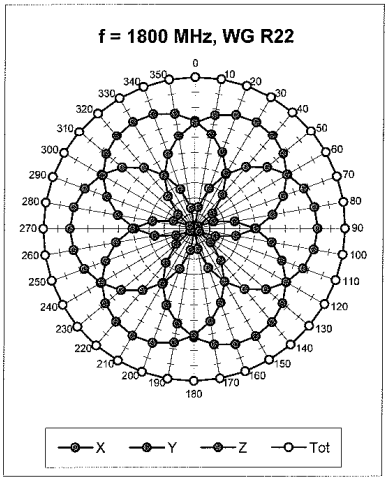


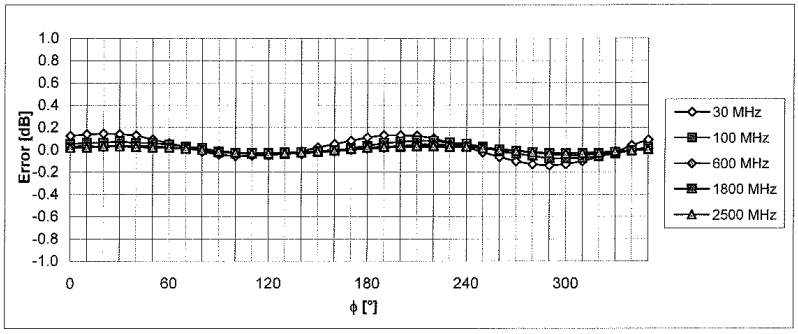
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

EX3DV3 SN:3516 **December 15, 2009**

Receiving Pattern (ϕ), ϑ = 0°





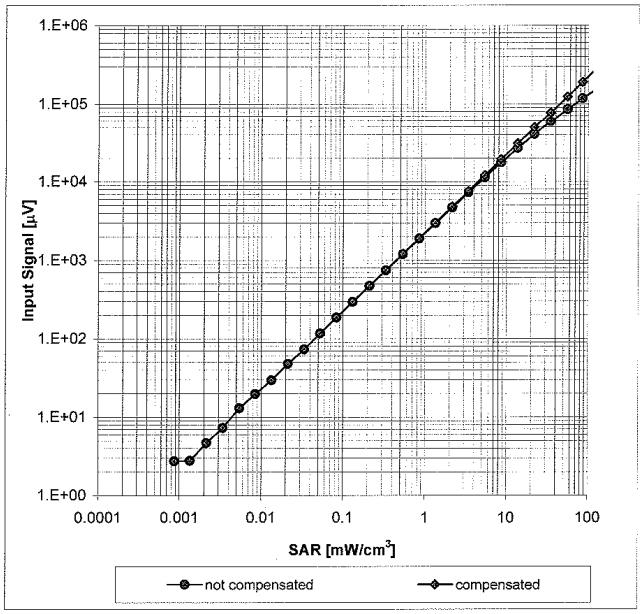


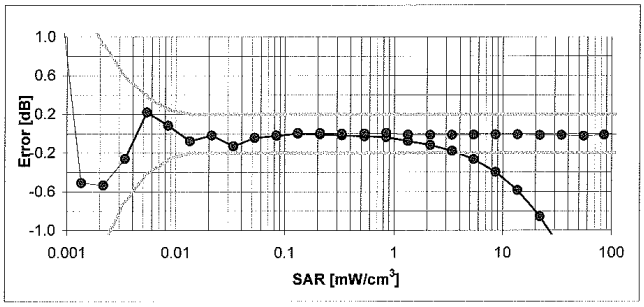
Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

EX3DV3 SN:3516 **December 15, 2009**

Dynamic Range f(SAR_{head})

(Waveguide R22, f = 1800 MHz)

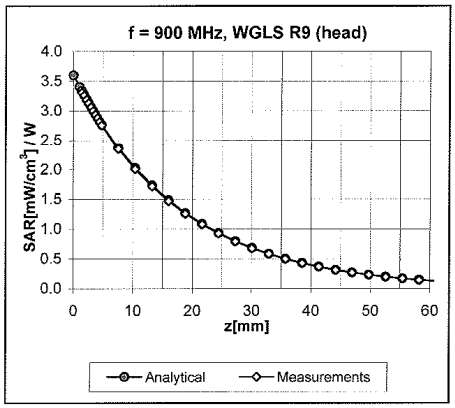


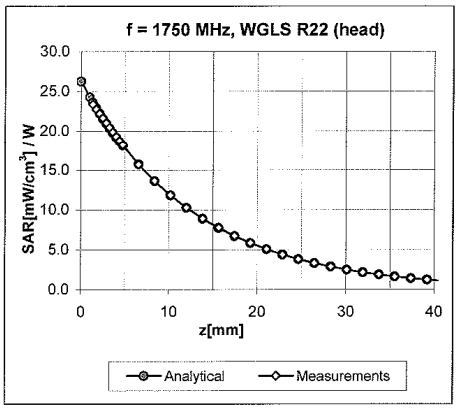


Uncertainty of Linearity Assessment: ± 0.6% (k=2)

EX3DV3 SN:3516 **December 15, 2009**

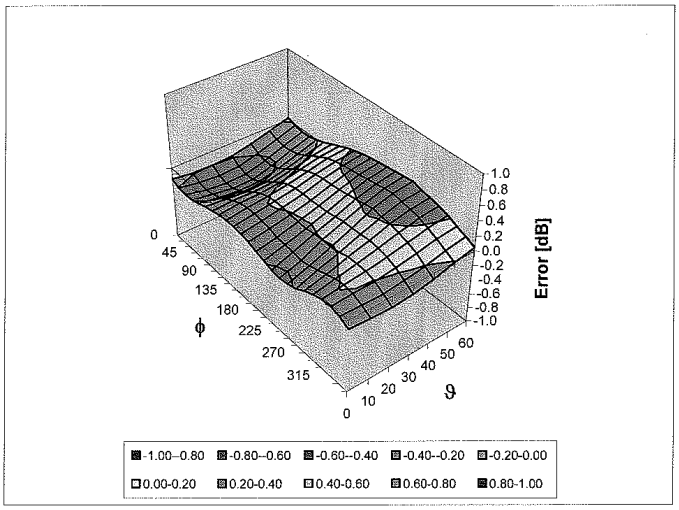
Conversion Factor Assessment





Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

EX3DV3 SN:3516 **December 15, 2009**

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	2 mm

14.0 DIPOLE CERTIFICATE

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

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Accreditation No.: SCS 108

Client Intertek

Certificate No: D2450V2-718_Dec09

CALIBRATION CERTIFICATE

Object	D2450V2 - SN: 718
Calibration procedure(s)	QA CAL-05.v7 Calibration procedure for dipole validation kits
Calibration date:	December 10, 2009

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 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	06-Oct-09 (No. 217-01086)	Oct-10
Power sensor HP 8481A	US37292783	06-Oct-09 (No. 217-01086)	Oct-10
Reference 20 dB Attenuator	SN: 5086 (20g)	31-Mar-09 (No. 217-01025)	Mar-10
Type-N mismatch combination	SN: 5047.2 / 06327	31-Mar-09 (No. 217-01029)	Mar-10
Reference Probe ES3DV3	SN: 3205	26-Jun-09 (No. ES3-3205_Jun09)	Jun-10
DAE4	SN: 601	07-Mar-09 (No. DAE4-601_Mar09)	Mar-10

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-09)	In house check: Oct-10

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: December 16, 2009

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

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Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) 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
b) 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
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V5.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V4.9	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.3 ± 6 %	1.82 mho/m ± 6 %
Head TSL temperature during test	(21.4 ± 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.4 mW / g
SAR normalized	normalized to 1W	53.6 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**53.3 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.31 mW / g
SAR normalized	normalized to 1W	25.2 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**25.2 mW /g ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	53.6 ± 6 %	2.01 mho/m ± 6 %
Body TSL temperature during test	(21.5 ± 0.2) °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	12.7 mW / g
SAR normalized	normalized to 1W	50.8 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**50.2 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.82 mW / g
SAR normalized	normalized to 1W	23.3 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**23.2 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.2 Ω + 2.8 jΩ
Return Loss	- 26.3 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	50.1 Ω + 4.5 jΩ
Return Loss	- 26.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.147 ns

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	September 10, 2002

DASY5 Validation Report for Head TSL

Date/Time: 09.12.2009 12:32:31

Test Laboratory: SPEAG, Zurich, Switzerland

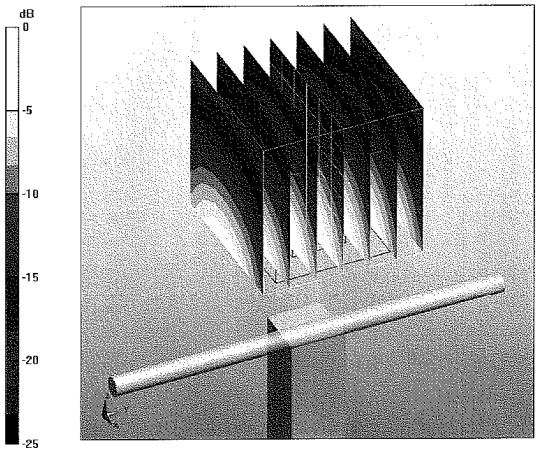
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:718

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: HSL U11 BB
Medium parameters used: f = 2450 MHz; σ = 1.82 mho/m; ε_r = 39.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

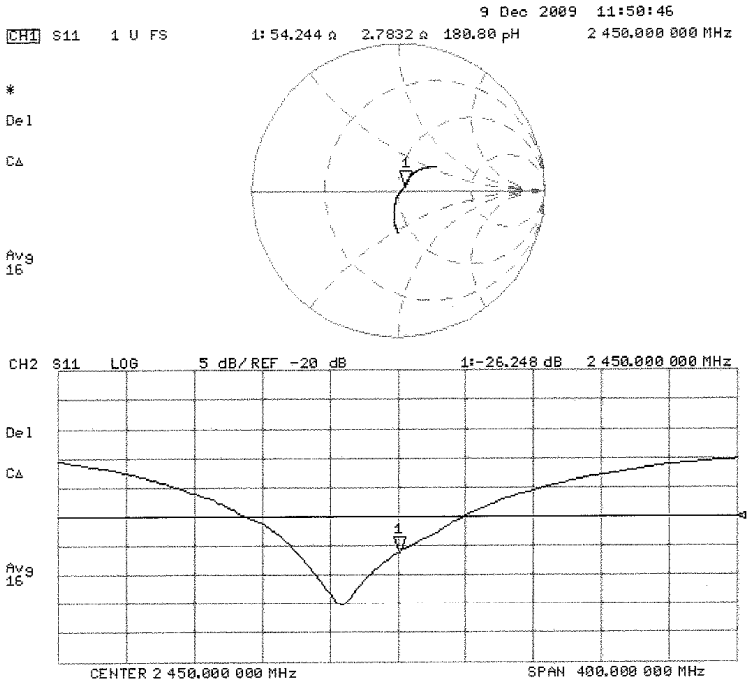
- Probe: ES3DV3 - SN3205; ConvF(4.53, 4.53, 4.53); Calibrated: 26.06.2009
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.03.2009
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 100.3 V/m; Power Drift = 0.052 dB
Peak SAR (extrapolated) = 27.3 W/kg
SAR(1 g) = 13.4 mW/g; SAR(10 g) = 6.31 mW/g
Maximum value of SAR (measured) = 17.1 mW/g



0 dB = 17.1mW/g

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body

Date/Time: 10.12.2009 13:47:28

Test Laboratory: SPEAG, Zurich, Switzerland

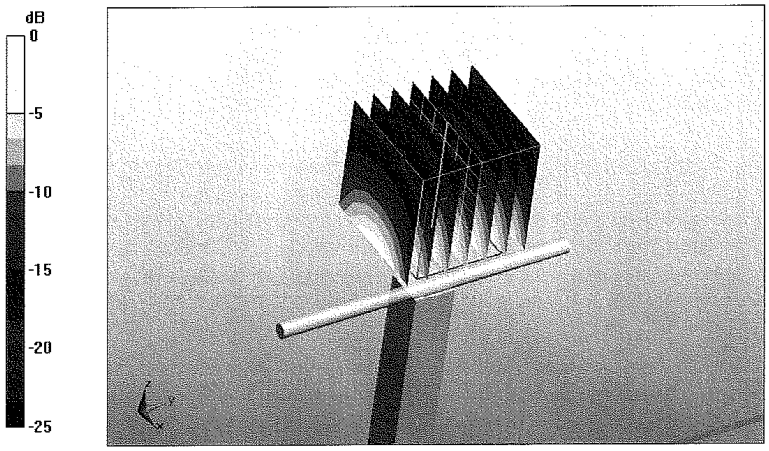
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:718

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: MSL U10 BB
Medium parameters used: f = 2450 MHz; σ = 2.01 mho/m; ε_r = 53.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

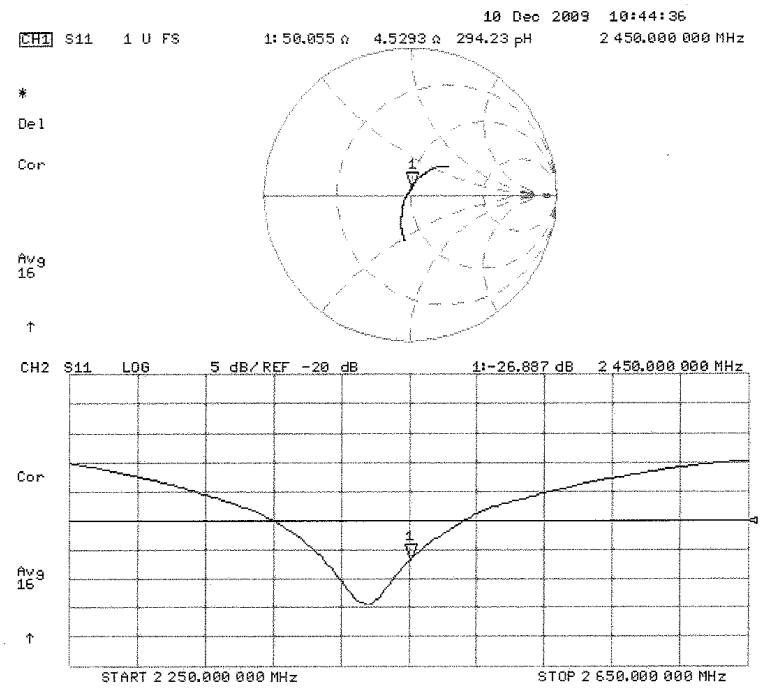
- Probe: ES3DV3 - SN3205; ConvF(4.31, 4.31, 4.31); Calibrated: 26.06.2009
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.03.2009
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Pin250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 94 V/m; Power Drift = 0.051 dB
Peak SAR (extrapolated) = 27.1 W/kg
SAR(1 g) = 12.7 mW/g; SAR(10 g) = 5.82 mW/g
Maximum value of SAR (measured) = 16.8 mW/g



0 dB = 16.8mW/g

Impedance Measurement Plot for Body TSL



15.0 PHANTOM CERTIFICATE

Schmid & Partner
Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland, Phone +41 1 245 97 00, Fax +41 1 245 97 79

Certificate of conformity / First Article Inspection

Item	SAM Twin Phantom V4.0
Type No	QD 000 P40 BA
Series No	TP-1002 and higher
Manufacturer / Origin	Untersee Composites Hauptstr. 69 CH-8559 Fruthwilen Switzerland

Tests

The series production process used allows the limitation to test of first articles.
Complete tests were made on the pre-series Type No. QD 000 P40 AA, Serial No. TP-1001 and on the series first article Type No. QD 000 P40 BA, Serial No. TP-1006. Certain parameters have been retested using further series units (called samples).

Test	Requirement	Details	Units tested
Shape	Compliance with the geometry according to the CAD model.	IT'IS CAD File (*)	First article, Samples
Material thickness	Compliant with the requirements according to the standards	2mm +/- 0.2mm in specific areas	First article, Samples
Material parameters	Dielectric parameters for required frequencies	200 MHz – 3 GHz Relative permittivity < 5 Loss tangent < 0.05.	Material sample TP 104-5
Material resistivity	The material has been tested to be compatible with the liquids defined in the standards	Liquid type HSL 1800 and others according to the standard.	Pre-series, First article

Standards

[1] CENELEC EN 50361
[2] IEEE P1528-200x draft 6.5
[3] IEC PT 62209 draft 0.9
(*) The IT'IS CAD file is derived from [2] and is also within the tolerance requirements of the shapes of [1] and [3].

Conformity

Based on the sample tests above, we certify that this item is in compliance with the uncertainty requirements of SAR measurements specified in standard [1] and draft standards [2] and [3].

Date 18.11.2001

Signature / Stamp