DASY5 Validation Report for Body TSL

Date: 10.08.2015

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 881

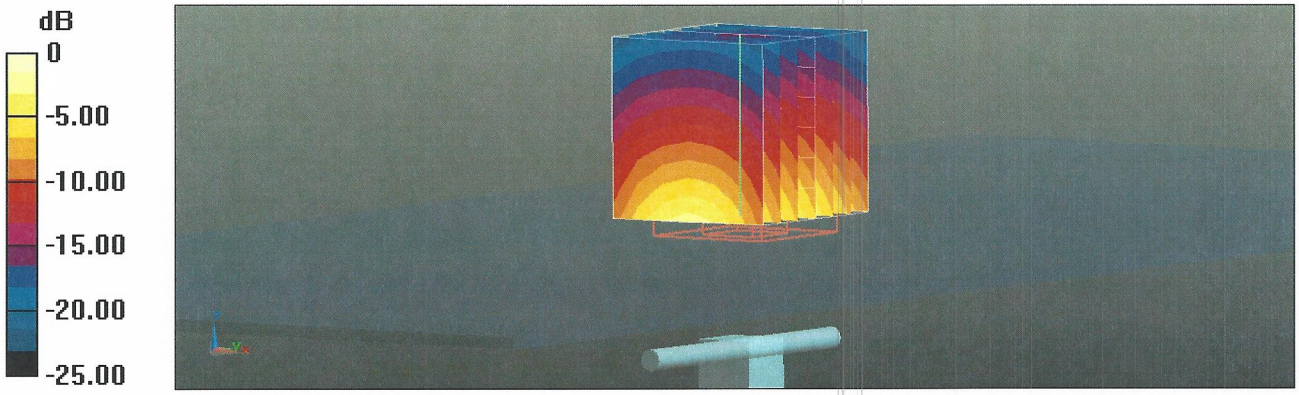
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 2.03 S/m; ε_r = 50.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.32, 4.32, 4.32); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

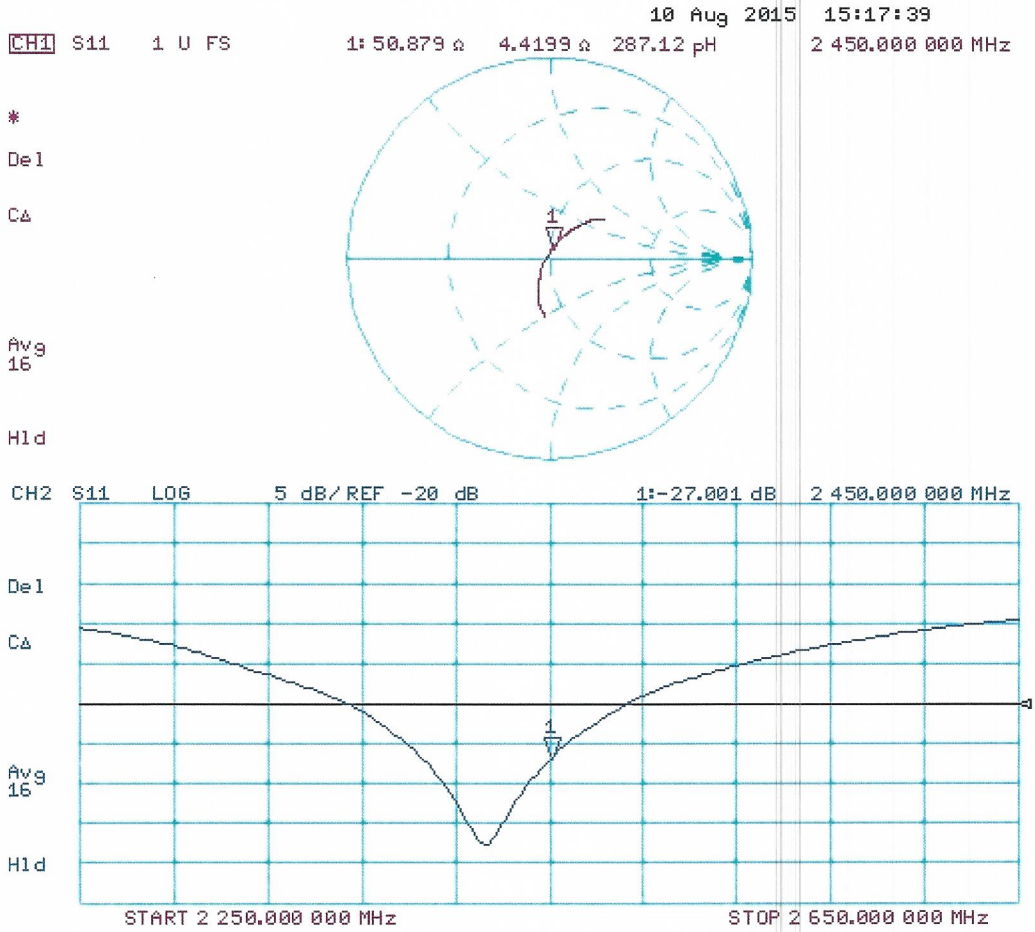
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.26 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 27.7 W/kg
SAR(1 g) = 13.4 W/kg; SAR(10 g) = 6.27 W/kg
Maximum value of SAR (measured) = 17.7 W/kg



0 dB = 17.7 W/kg = 12.48 dBW/kg

Impedance Measurement Plot for Body TSL



Appendix F – Phantom Calibration Data Sheets

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Certificate of Conformity / First Article Inspection

Item	SAM Twin Phantom V4.0
Type No	QD 000 P40 C
Series No	TP-1150 and higher
Manufacturer	SPEAG Zeughausstrasse 43 CH-8004 Zürich 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 items (called samples) or are tested at each item.

Test	Requirement	Details	Units tested
Dimensions	Compliant with the geometry according to the CAD model.	IT'IS CAD File (*)	First article, Samples
Material thickness of shell	Compliant with the requirements according to the standards	2mm +/- 0.2mm in flat and specific areas of head section	First article, Samples, TP-1314 ff.
Material thickness at ERP	Compliant with the requirements according to the standards	6mm +/- 0.2mm at ERP	First article, All items
Material parameters	Dielectric parameters for required frequencies	300 MHz – 6 GHz: Relative permittivity < 5, Loss tangent < 0.05	Material samples
Material resistivity	The material has been tested to be compatible with the liquids defined in the standards if handled and cleaned according to the instructions. Observe technical Note for material compatibility.	DEGMBE based simulating liquids	Pre-series, First article, Material samples
Sagging	Compliant with the requirements according to the standards. Sagging of the flat section when filled with tissue simulating liquid.	< 1% typical < 0.8% if filled with 155mm of HSL900 and without DUT below	Prototypes, Sample testing

Standards

[1] CENELEC EN 50361
[2] IEEE Std 1528-2003
[3] IEC 62209 Part I
[4] FCC OET Bulletin 65, Supplement C, Edition 01-01
(*) The IT'IS CAD file is derived from [2] and is also within the tolerance requirements of the shapes of the other documents.

Conformity

Based on the sample tests above, we certify that this item is in compliance with the uncertainty requirements of SAR measurements specified in standards [1] to [4].

Date 07.07.2005

Signature / Stamp

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Certificate of Conformity / First Article Inspection

Item	Oval Flat Phantom ELI 4.0
Type No	QD OVA 001 B
Series No	1003 and higher
Manufacturer	Untersee Composites Knebelstrasse 8 CH-8268 Mannenbach, Switzerland

Tests

Complete tests were made on the prototype units QD OVA 001 AA 1001, QD OVA 001 AB 1002, pre-series units QD OVA 001 BA 1003-1005 as well as on the series units QD OVA 001 BB, 1006 ff.

Test	Requirement	Details	Units tested
Material thickness	Compliant with the standard requirements	Bottom plate: 2.0mm +/- 0.2mm	all
Material parameters	Dielectric parameters for required frequencies	< 6 GHz: Rel. permittivity = 4 +/-1, Loss tangent ≤ 0.05	Material sample
Material resistivity	The material has been tested to be compatible with the liquids defined in the standards if handled and cleaned according to the instructions.	DGBE based simulating liquids. Observe Technical Note for material compatibility.	Equivalent phantoms, Material sample
Shape	Thickness of bottom material, Internal dimensions, Sagging compatible with standards from minimum frequency	Bottom elliptical 600 x 400 mm Depth 190 mm, Shape is within tolerance for filling height up to 155 mm, Eventual sagging is reduced or eliminated by support via DUT	Prototypes, Sample testing

Standards

[1] CENELEC EN 50361-2001, « Basic standard for the measurement of the Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz – 3 GHz) », July 2001

[2] IEEE 1528-2003, "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques, December 2003

[3] IEC 62209 – 1, "Specific Absorption Rate (SAR) in the frequency range of 300 MHz to 3 GHz – Measurement Procedure, Part 1: Hand-held mobile wireless communication devices", February 2005

[4] IEC 62209 – 2, Draft, "Human Exposure to Radio Frequency Fields from Handheld and Body-Mounted Wireless Communication Devices – Human models, Instrumentation and Procedures – Part 2: Procedure to determine the Specific Absorption Rate (SAR) in the head and body for 30 MHz to 6 GHz Handheld and Body-Mounted Devices used in close proximity to the Body.", February 2005

[5] OET Bulletin 65, Supplement C, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields", Edition January 2001

Based on the tests above, we certify that this item is in compliance with the standards [1] to [5] if operated according to the specific requirements and considering the thickness. The dimensions are fully compliant with [4] from 30 MHz to 6 GHz. For the other standards, the minimum lower frequency limit is limited due to the dimensional requirements ([1]: 450 MHz, [2]: 300 MHz, [3]: 800 MHz, [5]: 375 MHz) and possibly further by the dimensions of the DUT.

Date 28.4.2008 **Signature / Stamp**

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Appendix G – Validation Summary

Per FCC KDB 865664 D02 v01r02, SAR system validation status should be documented to confirm measurement accuracy. The SAR systems (including SAR probes, system components and software versions) used for this device were validated against its performance specifications prior to the SAR measurements. Reference dipoles were used with the required tissue equivalent media for system validation according to the procedures outlined in FCC KDB 865664 D01 v01r04 and IEEE 1528-2013. Since SAR probe calibrations are frequency dependent, each probe calibration point was validated at a frequency within the valid frequency range of the probe calibration point using the system that normally operates with the probe for routine SAR measurements and according to the required tissue equivalent media.

A tabulated summary of the system validation status including the validation date(s), measurement frequencies, SAR probes and tissue dielectric parameters has been included.

Table G-1
SAR System Validation Summary

SAR System #	Freq. (MHz)	Date	Probe S/N	Probe Type	Probe Cal. Point		Cond. (σ)	Perm. (ε_r)	CW Validation			Modulation Validdation		
									Sens-itivity	Probe Linearity	Probe Isotropy	Modulation Type	Duty Factor	PAR
1	750	5/10/2018	3662	EX3DV4	750	Head	0.91	41.29	Pass	Pass	Pass	QPSK	Pass	Pass
1	750	5/11/2018	3662	EX3DV4	750	Body	0.99	55.57	Pass	Pass	Pass	QPSK	Pass	Pass
1	835	5/10/2018	3662	EX3DV4	900	Head	0.92	41.42	Pass	Pass	Pass	GMSK	Pass	Pass
1	835	5/10/2018	3662	EX3DV4	900	Head	0.92	41.42	Pass	Pass	Pass	CDMA	Pass	Pass
1	835	5/10/2018	3662	EX3DV4	900	Head	0.92	41.42	Pass	Pass	Pass	WCDMA	Pass	Pass
1	835	5/10/2018	3662	EX3DV4	900	Body	0.99	55.91	Pass	Pass	Pass	GMSK	Pass	Pass
1	835	5/10/2018	3662	EX3DV4	900	Body	0.99	55.91	Pass	Pass	Pass	CDMA	Pass	Pass
1	835	5/10/2018	3662	EX3DV4	900	Body	0.99	55.91	Pass	Pass	Pass	WCDMA	Pass	Pass
1	1750	5/10/2018	3662	EX3DV4	1750	Head	1.39	39.94	Pass	Pass	Pass	QPSK	Pass	Pass
1	1750	5/11/2018	3662	EX3DV4	1750	Body	1.52	53.32	Pass	Pass	Pass	QPSK	Pass	Pass
1	1900	5/8/2018	3662	EX3DV4	1900	Head	1.41	39.87	Pass	Pass	Pass	GMSK	Pass	Pass
1	1900	5/8/2018	3662	EX3DV4	1900	Head	1.41	39.87	Pass	Pass	Pass	CDMA	Pass	Pass
1	1900	5/8/2018	3662	EX3DV4	1900	Head	1.41	39.87	Pass	Pass	Pass	WCDMA	Pass	Pass
1	1900	5/8/2018	3662	EX3DV4	1900	Head	1.41	39.87	Pass	Pass	Pass	QPSK	Pass	Pass
1	1900	5/9/2018	3662	EX3DV4	1900	Body	1.47	52.07	Pass	Pass	Pass	GMSK	Pass	Pass
1	1900	5/9/2018	3662	EX3DV4	1900	Body	1.47	52.07	Pass	Pass	Pass	CDMA	Pass	Pass
1	1900	5/9/2018	3662	EX3DV4	1900	Body	1.47	52.07	Pass	Pass	Pass	WCDMA	Pass	Pass
1	1900	5/9/2018	3662	EX3DV4	1900	Body	1.47	52.07	Pass	Pass	Pass	QPSK	Pass	Pass
1	2450	5/05/2018	3662	EX3DV4	2450	Head	1.83	39.05	Pass	Pass	Pass	OFDM/TDD	Pass	Pass
1	2450	5/05/2018	3662	EX3DV4	2450	Body	1.94	52.66	Pass	Pass	Pass	OFDM/TDD	Pass	Pass

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