

SAR Test Report Annex on ELITE S100T1

Report Reference: MCN_ELITE_1101_FCC SAR

Date: 3, 25, 2011

Test Laboratory:

Beijing 7 layers Huarui Communications Technology Co., Ltd. No.11 Yue Tan Nan Street, Xi Cheng District Beijing 100045 China P.R.



Note:

The following test results relate only to the devices specified in this document. This report shall not be reproduced in parts without the written approval of the test laboratory.

Beijing 7layers Huarui Communications Technology Co., Ltd.No11 Yue Tan Nan Street, Xi Cheng DistrictChairman of the Board:Beijing, China 100045Mr. Yang ZeminPhone: +86 010 68050368Vice Chairman of Board:Fax: +86 010 68050370Dr. Hans-Jürgen Meckelburgwww.7Layers.cnVice Chairman of Board:

Report Reference: MCN_ELITE_1101_FCC SAR



Appendix A: Dipole Certification

chmid & Partner Engineering AG nughausstrasse 43, 8004 Zuric	y of	Hac MRA	Service suisse d'étalonnage Servizio svizzero di taratura
corected by the Swiss Accredita he Swiss Accreditation Service ultilatoral Agreement for the re-	e is one of the signatorie	s to the EA	n No.: SCS 108
Flextronics (Au		TOTAL CONTRACTOR	o: D2450V2-787_Aug10
	D2450V2 - SN: 7		
alibration procedure(s)	QA CAL-05.v7 Calibration proce	dure for dipole validation kits	
Calibration date:	August 26, 2010		
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Calibration Laboratory of Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland



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Schweizerischer Kalibrierdienst Service suisse d'étalonnage Servizio svizzero di taratura Swiss Calibration Service

Accreditation No.: SCS 108

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

Glossary:

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

Certificate No: D2450V2-787_Aug10

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Measurement Conditions

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

DASY5	V52.2
Advanced Extrapolation	
Modular Flat Phantom V5.0	
10 mm	with Spacer
dx, dy, dz = 5 mm	
2450 MHz ± 1 MHz	
	Advanced Extrapolation Modular Flat Phantom V5.0 10 mm dx, dy, dz = 5 mm

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	39.2 ± 6 %	1.77 mho/m ± 6 %
Head TSL temperature during test	(22.0 ± 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	13.5 mW / g
SAR normalized	normalized to 1W	54.0 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	54.4 mW /g ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.34 mW / g
SAR normalized	normalized to 1W	25.4 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	25.4 mW /g ± 16.5 % (k=2)

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Body TSL parameters

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	62.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) "C	52.4 ± 6 %	1.95 mho/m ± 6 %
Body TSL temperature during test	(22.5 ± 0.2) °C	1114	

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	13.7 mW / g
SAR normalized	normalized to 1W	54.8 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	54.8 mW / g ± 17.0 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
	condition 250 mW input power	6.50 mW / g
SAR averaged over 10 cm ³ (10 g) of Body TSL SAR measured SAR normalized		6.50 mW /g 26.0 mW /g

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Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.0 Ω - 0.2 jΩ	
Return Loss	- 30.8 dB	

Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.3 Ω + 2.0 jΩ
Return Loss	- 33.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.151 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	May 06, 2005

Certificate No: D2450V2-787_Aug10

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DASY5 Validation Report for Head TSL

Date/Time: 25.08.2010 11:19:54

Test Laboratory: SPEAG, Zurich, Switzerland

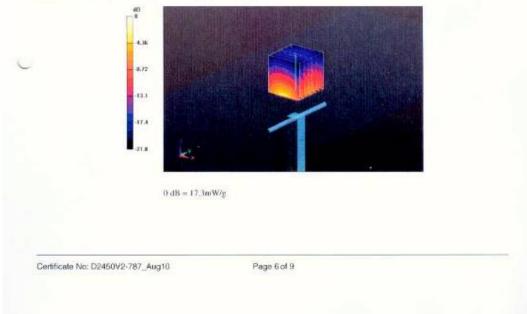
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:787

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1 Medium: HSL U12 BB Medium parameters used: f = 2450 MHz; σ = 1.77 mho/m; v_r = 39.2; ρ = 1000 kg/m³ Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

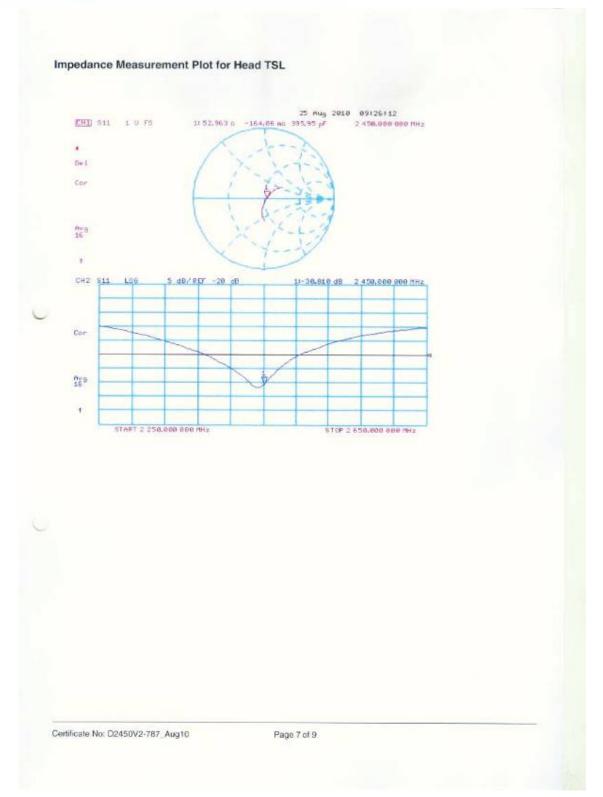
DASY5 Configuration:

- Probe: ES3DV3 SN3205; ConvF(4.53, 4.53, 4.53); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
 - Measurement SW: DASY52, V52.2 Build 0, Version 52.2.0 (163)
 - Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

Head/d=10mm, Pin=250 mW, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 102.6 V/m; Power Drift = 0.044 dB Peak SAR (extrapolated) = 27.4 W/kg SAR(1 g) = 13.5 mW/g; SAR(10 g) = 6.34 mW/g Maximum value of SAR (measured) = 17.3 mW/g









Validation Report for Body

Date/Time: 26.08.2010 14:32:02

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:787

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1 Medium: MSL U11 BB Medium parameters used: f = 2450 MHz; $\sigma = 1.94$ mho/m; $e_r = 52.3$; $\rho = 1000$ kg/m³ 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: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
 - Measurement SW: DASY52, V52.2 Build 0, Version 52.20 (163)
 - Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

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 = 98.3 V/m; Power Drift = 0.00171 dB Pak SAR (extrapolated) = 27.7 W/g; **SAR(1g) = 13.7 mW/g; SAR(10 g) = 6.5 mW/g** Maximum value of SAR (measured) = 17.7 mW/g f_{0}^{0} f_{0}^{0} f_{0}^{0

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Impedance Measurement Plot for Body TSL 26 Aug 2010 11:21:50 CHI 511 1 0 FS 1+49.299 c 2.0410 c 102.59 pH 2 458,888 888 MHz ٠ De 1 Cor five 16 CH2 511 LOG 5 dB/REF -20 dB 1:-33.248 dB 2 450.000 000 MHz Cor Av 9 16 START 2 250.000 800 PHz STOP 2 659,000 000 MHz

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Appendix B: Probe Certification

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



Schweizerischer Kalibrierdienst Service suisse d'étalonnage

C Service suisse d'étaionnage Servizio svizzero di taratura S Swiss Calibration Service

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

S

Flextronics (Auden) Certificate No: ES3-3109_Nov10 Client CALIBRATION CERTIFICATE Object ES3DV3 - SN:3109 QA CAL-01.v6, QA CAL-23.v3 and QA CAL-25.v2 Calibration procedure(s) Calibration procedure for dosimetric E-field probes November 23, 2010 (Additional Conversion Factors) Calibration date: 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-10 (No. 217-01136) Apr-11 Power sensor E4412A MY41495277 1-Apr-10 (No. 217-01136) Apr-11 1-Apr-10 (No. 217-01136) Power sensor E4412A MY41498087 Apr-11 Reference 3 dB Attenuator SN: S5054 (3c) 30-Mar-10 (No. 217-01159) Mar-11 Reference 20 dB Attenuator SN: S5086 (20b) 30-Mar-10 (No. 217-01161) Mar-11 Reference 30 dB Attenuator SN: S5129 (30b) 30-Mar-10 (No. 217-01160) Mar-11 Reference Probe ES3DV2 30-Dec-09 (No. ES3-3013_Dec09) SN: 3013 Dec-10 DAE4 SN: 660 20-Apr-10 (No. DAE4-660_Apr10) Apr-11 Secondary Standards ID# Check Date (in house) Scheduled Check US3642U01700 RF generator HP 8648C 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-10) In house check: Oct-11 Function Name Signature Calibrated by Jeton Kastrati Laboratory Technician Approved by: Katja Pokovic Technical Manager Issued: November 23, 2010 This calibration certificate shall not be reproduced except in full without written approval of the laboratory

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- S Schweizerischer Kalibrierdienst
- Service suisse d'étalonnage
- C Servizio svizzero di taratura
- S Swiss Calibration Service

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 NORMx,y,z ConvF DCP CF A, B, C Polarization φ Polarization 9 tissue simulating liquid sensitivity in free space sensitivity in TSL / NORMx,y,z diode compression point crest factor (1/duty_cycle) of the RF signal modulation dependent linearization parameters φ rotation around probe axis 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 9 = 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 E²-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.



November 23, 2010

Probe ES3DV3

SN:3109 Additional Conversion Factors

Manufactured: Last calibrated: Recalibrated: September 20, 2005 August 25, 2010 November 23, 2010

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

Page 3 of 8



November 23, 2010

DASY/EASY - Parameters of Probe: ES3DV3 SN:3109

Basic Calibration Parameters

5	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm $(\mu V/(V/m)^2)^A$	1.22	1.33	1.30	± 10.1%
DCP (mV) ^B	96.9	95.2	92.5	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dBuV	с	VR mV	Unc ^E (k=2)
10000	CW	0.00	x	0.00	0.00	1.00	300.0	± 1.5%
			Y	0.00	0.00	1.00	300.0	
			Z	0.00	0.00	1.00	300.0	

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%.

 $^{\wedge}$ The uncertainties of NormX,Y,Z do not affect the E²-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.

Certificate No: ES3-3109 Nov10



November 23, 2010

DASY/EASY - Parameters of Probe: ES3DV3 SN:3109

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)
1950	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	4.74	4.74	4.74	0.54	1.41 ± 11.0%

^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.



November 23, 2010

DASY/EASY - Parameters of Probe: ES3DV3 SN:3109

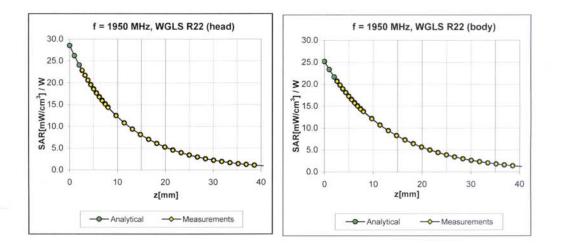
Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz]	Validity [MHz] ^C	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
1950	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	4.69	4.69	4.69	0.33	2.18 ± 11.0%

^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.

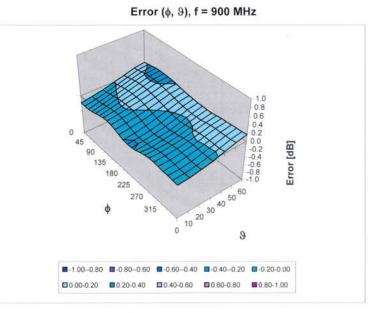


November 23, 2010



Conversion Factor Assessment

Deviation from Isotropy in HSL



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



November 23, 2010

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	10 mm
Tip Diameter	4.0 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm



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

Client



- Schweizerischer Kalibrierdienst S Service suisse d'étalonnage С
- Servizio svizzero di taratura S
- Swiss Calibration Service

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

Flextronics (Auden)

Certificate No: ES3-3109_Aug10

Accreditation No.: SCS 108

Dbject	ES3DV3 - SN:3	109	
Calibration procedure(s)		QA CAL-23.v3 and QA CAL-25.v. edure for dosimetric E-field probe	
Calibration date:	August 25, 2010)	
	~ 같은 것은 것은 사람은 것을 사람이 것을 같은 것을 것을 수 있다.	tional standards, which realize the physical un probability are given on the following pages an	
		ory facility: environment temperature (22 \pm 3)°	C and humidity < 70%.
Calibration Equipment used (M&	&TE critical for calibration)		
Calibration Equipment used (M& Primary Standards	&TE critical for calibration)	Cal Date (Certificate No.)	Scheduled Calibration
Calibration Equipment used (M& rrimary Standards Power meter E4419B	TE critical for calibration)	Cal Date (Certificate No.) 1-Apr-10 (No. 217-01136)	Scheduled Calibration Apr-11
alibration Equipment used (M& rimary Standards lower meter E4419B lower sensor E4412A	&TE critical for calibration) ID # GB41293874 MY41495277	Cal Date (Certificate No.) 1-Apr-10 (No. 217-01136) 1-Apr-10 (No. 217-01136)	Scheduled Calibration Apr-11 Apr-11
alibration Equipment used (M8 rimary Standards ower meter E4419B ower sensor E4412A ower sensor E4412A	&TE critical for calibration) ID # GB41293874 MY41495277 MY41498087	Cal Date (Certificate No.) 1-Apr-10 (No. 217-01136) 1-Apr-10 (No. 217-01136) 1-Apr-10 (No. 217-01136)	Scheduled Calibration Apr-11 Apr-11 Apr-11
rimary Standards ower meter E4419B ower sensor E4412A ower sensor E4412A eference 3 dB Attenuator	&TE critical for calibration) ID # GB41293874 MY41495277 MY41498087 SN: S5054 (3c)	Cal Date (Certificate No.) 1-Apr-10 (No. 217-01136) 1-Apr-10 (No. 217-01136) 1-Apr-10 (No. 217-01136) 30-Mar-10 (No. 217-01159)	Scheduled Calibration Apr-11 Apr-11 Apr-11 Mar-11
Calibration Equipment used (M& Primary Standards Power meter E4419B Power sensor E4412A Power sensor E4412A Reference 3 dB Attenuator Reference 20 dB Attenuator	BTE critical for calibration) ID # GB41293874 MY41495277 MY41498087 SN: S5054 (3c) SN: S5086 (20b)	Cal Date (Certificate No.) 1-Apr-10 (No. 217-01136) 1-Apr-10 (No. 217-01136) 1-Apr-10 (No. 217-01136) 30-Mar-10 (No. 217-01159) 30-Mar-10 (No. 217-01161)	Scheduled Calibration Apr-11 Apr-11 Apr-11
alibration Equipment used (M8 rimary Standards ower meter E4419B ower sensor E4412A ower sensor E4412A terence 3 dB Attenuator teference 20 dB Attenuator teference 30 dB Attenuator	&TE critical for calibration) ID # GB41293874 MY41495277 MY41498087 SN: S5054 (3c)	Cal Date (Certificate No.) 1-Apr-10 (No. 217-01136) 1-Apr-10 (No. 217-01136) 1-Apr-10 (No. 217-01136) 30-Mar-10 (No. 217-01159)	Scheduled Calibration Apr-11 Apr-11 Apr-11 Mar-11 Mar-11
Calibration Equipment used (M&	BTE critical for calibration) ID # GB41293874 MY41495277 MY41498087 SN: S5054 (3c) SN: S5056 (20b) SN: S5129 (30b)	Cal Date (Certificate No.) 1-Apr-10 (No. 217-01136) 1-Apr-10 (No. 217-01136) 1-Apr-10 (No. 217-01136) 30-Mar-10 (No. 217-01159) 30-Mar-10 (No. 217-01161) 30-Mar-10 (No. 217-01160)	Scheduled Calibration Apr-11 Apr-11 Apr-11 Mar-11 Mar-11 Mar-11
Calibration Equipment used (M& Primary Standards Power meter E4419B Power sensor E4412A Power sensor E4412A Reference 3 dB Attenuator Reference 20 dB Attenuator Reference 30 dB Attenuator Reference Probe ES3DV2 DAE4 Secondary Standards	ID # GB41293874 MY41495277 MY41498087 SN: S5054 (3c) SN: S5086 (20b) SN: S5129 (30b) SN: 3013 SN: 660 ID #	Cal Date (Certificate No.) 1-Apr-10 (No. 217-01136) 1-Apr-10 (No. 217-01136) 1-Apr-10 (No. 217-01136) 30-Mar-10 (No. 217-01159) 30-Mar-10 (No. 217-01161) 30-Mar-10 (No. 217-01160) 30-Dec-09 (No. ES3-3013_Dec09) 20-Apr-10 (No. DAE4-660_Apr10) Check Date (in house)	Scheduled Calibration Apr-11 Apr-11 Apr-11 Mar-11 Mar-11 Mar-11 Dec-10
Calibration Equipment used (M& Primary Standards Power meter E4419B Power sensor E4412A Power sensor E4412A Reference 3 dB Attenuator Reference 20 dB Attenuator Reference 20 dB Attenuator Reference Probe ES3DV2 PAE4 Recondary Standards Recondary Standards Reference Pro8648C	ID # ID # GB41293874 MY41495277 MY41498087 SN: S5054 (3c) SN: S5086 (20b) SN: S5129 (30b) SN: 3013 SN: 660 ID # US3642U01700	Cal Date (Certificate No.) 1-Apr-10 (No. 217-01136) 1-Apr-10 (No. 217-01136) 1-Apr-10 (No. 217-01136) 30-Mar-10 (No. 217-01159) 30-Mar-10 (No. 217-01161) 30-Mar-10 (No. 217-01160) 30-Dec-09 (No. ES3-3013_Dec09) 20-Apr-10 (No. DAE4-660_Apr10) Check Date (in house) 4-Aug-99 (in house check Oct-09)	Scheduled Calibration Apr-11 Apr-11 Apr-11 Mar-11 Mar-11 Dec-10 Apr-11 Scheduled Check In house check: Oct-11
alibration Equipment used (M8 rimary Standards lower meter E4419B lower sensor E4412A leference 3 dB Attenuator leference 20 dB Attenuator leference 20 dB Attenuator leference Probe ES3DV2 IAE4 econdary Standards IF generator HP 8648C	ID # GB41293874 MY41495277 MY41498087 SN: S5054 (3c) SN: S5086 (20b) SN: S5129 (30b) SN: 3013 SN: 660 ID #	Cal Date (Certificate No.) 1-Apr-10 (No. 217-01136) 1-Apr-10 (No. 217-01136) 1-Apr-10 (No. 217-01136) 30-Mar-10 (No. 217-01159) 30-Mar-10 (No. 217-01161) 30-Mar-10 (No. 217-01160) 30-Dec-09 (No. ES3-3013_Dec09) 20-Apr-10 (No. DAE4-660_Apr10) Check Date (in house)	Scheduled Calibration Apr-11 Apr-11 Mar-11 Mar-11 Mar-11 Dec-10 Apr-11 Scheduled Check
alibration Equipment used (M8 rimary Standards lower meter E4419B lower sensor E4412A leference 3 dB Attenuator leference 20 dB Attenuator leference 20 dB Attenuator leference Probe ES3DV2 IAE4 econdary Standards IF generator HP 8648C	ID # ID # GB41293874 MY41495277 MY41498087 SN: S5054 (3c) SN: S5086 (20b) SN: S5129 (30b) SN: 3013 SN: 660 ID # US3642U01700	Cal Date (Certificate No.) 1-Apr-10 (No. 217-01136) 1-Apr-10 (No. 217-01136) 1-Apr-10 (No. 217-01136) 30-Mar-10 (No. 217-01159) 30-Mar-10 (No. 217-01161) 30-Mar-10 (No. 217-01160) 30-Dec-09 (No. ES3-3013_Dec09) 20-Apr-10 (No. DAE4-660_Apr10) Check Date (in house) 4-Aug-99 (in house check Oct-09)	Scheduled Calibration Apr-11 Apr-11 Apr-11 Mar-11 Mar-11 Dec-10 Apr-11 Scheduled Check In house check: Oct-11
Calibration Equipment used (M& Primary Standards Power meter E4419B Power sensor E4412A Power sensor E4412A Reference 3 dB Attenuator Reference 20 dB Attenuator Reference 30 dB Attenuator Reference Probe ES3DV2 DAE4	LD # GB41293874 MY41495277 MY41498087 SN: S5054 (3c) SN: S5086 (20b) SN: S5129 (30b) SN: 3013 SN: 660 ID # US3642U01700 US37390585	Cal Date (Certificate No.) 1-Apr-10 (No. 217-01136) 1-Apr-10 (No. 217-01136) 1-Apr-10 (No. 217-01136) 30-Mar-10 (No. 217-01159) 30-Mar-10 (No. 217-01161) 30-Mar-10 (No. 217-01160) 30-Dec-09 (No. ES3-3013_Dec09) 20-Apr-10 (No. DAE4-660_Apr10) Check Date (in house) 4-Aug-99 (in house check Oct-09) 18-Oct-01 (in house check Oct-09)	Scheduled Calibration Apr-11 Apr-11 Mar-11 Mar-11 Mar-11 Dec-10 Apr-11 Scheduled Check In house check: Oct-11 In house check: Oct10



August 25, 2010

Probe ES3DV3

SN:3109

Manufactured: Last calibrated: Recalibrated:

September 20, 2005 February 16, 2009 August 25, 2010

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

Page 3 of 11



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



- S Schweizerischer Kalibrierdienst
- C Service suisse d'étalonnage
- Servizio svizzero di taratura
- Swiss Calibration Service

Accreditation No.: SCS 108

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

Glossary:

TSL NORMx,y,z ConvF DCP CF A, B, C Polarization φ Polarization θ tissue simulating liquid sensitivity in free space sensitivity in TSL / NORMx,y,z diode compression point crest factor (1/duty_cycle) of the RF signal modulation dependent linearization parameters φ rotation around probe axis 9 rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., 9 = 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 9 = 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 E²-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.



August 25, 2010

DASY/EASY - Parameters of Probe: ES3DV3 SN:3109

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm $(\mu V/(V/m)^2)^A$	1.22	1.33	1.30	± 10.1%
DCP (mV) ^B	96.9	95.2	92.5	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dBuV	с	VR mV	Unc ^E (k=2)
10000	cw	0.00	Х	0.00	0.00	1.00	300.0	± 1.5%
			Y	0.00	0.00	1.00	300.0	
			Z	0.00	0.00	1.00	300.0	

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 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.



August 25, 2010

DASY/EASY - Parameters of Probe: ES3DV3 SN:3109

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)
900	± 50 / ± 100	41.5 ± 5%	0.97 ± 5%	5.72	5.72	5.72	0.98	1.05 ± 11.0%
1810	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	4.88	4.88	4.88	0.52	1.42 ± 11.0%
2450	± 50 / ± 100	39.2 ± 5%	1.80 ± 5%	4.24	4.24	4.24	0.43	1.76 ± 11.0%

^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.



August 25, 2010

DASY/EASY - Parameters of Probe: ES3DV3 SN:3109

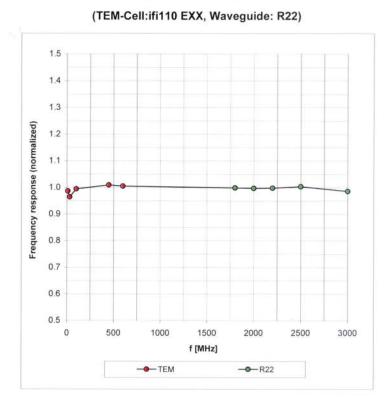
Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz]	Validity [MHz] ^C	Permittivity	Conductivity	ConvF X C	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
900	± 50 / ± 100	55.0 ± 5%	1.05 ± 5%	5.70	5.70	5.70	0.84	1.11 ± 11.0%
1810	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	4.70	4.70	4.70	0.35	2.12 ± 11.0%
2450	± 50 / ± 100	52.7 ± 5%	1.95 ± 5%	4.26	4.26	4.26	0.55	1.47 ± 11.0%

^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.



August 25, 2010



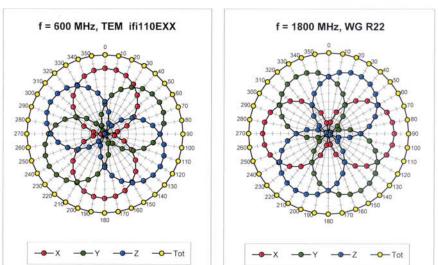
Frequency Response of E-Field

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

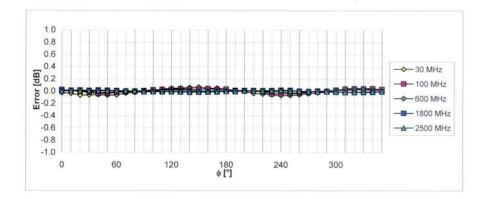
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August 25, 2010



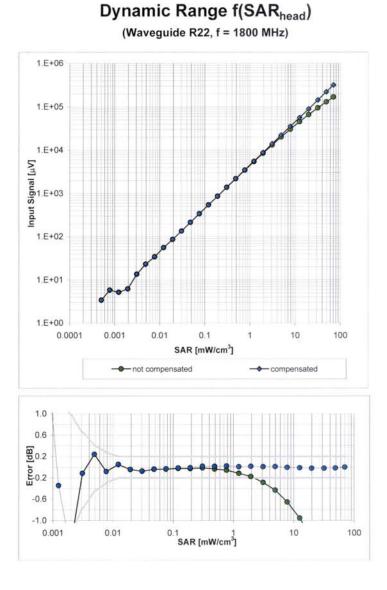
Receiving Pattern (ϕ), ϑ = 0°



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



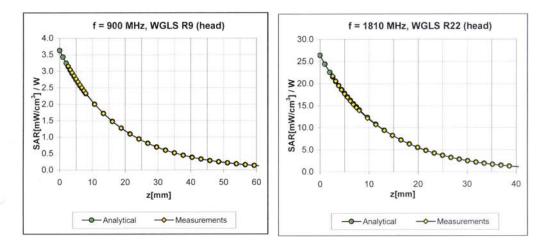
August 25, 2010



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

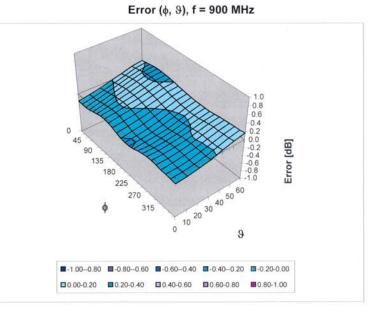


August 25, 2010



Conversion Factor Assessment

Deviation from Isotropy in HSL



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

Page 10 of 11



August 25, 2010

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	10 mm
Tip Diameter	4.0 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm



Appendix C: Phantom Conformity

Schmid & Partner Engineering AG

e а g D

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

Certificate of conformity / First Article Inspection

Item	SAM Twin Phantom V4.0
Type No	QD 000 P40 CA
Series No	TP-1150 and higher
Manufacturer / Origin	Untersee Composites Hauptstr. 69 CH-8559 Fruthwilen Switzerland

S

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; 6mm +/- 0.2mm at ERP	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 if handled and cleaned according to the instructions	DEGMBE based simulating liquids	Pre-series, First article, Samples

Standards

- CENELEC EN 50361 [1]
- IEEE Std 1528-200x Draft CD 1.1 (Dec 02) [2]
- IEC 62209/CD (Nov 02) [3]
- The IT'IS CAD file is derived from [2] and is also within the tolerance requirements of the shapes of (*) [1] and [3].

Conformity

S

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 5.5.2003

Signature / Stamp

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Doc No 881 - OD 000 P40 CA - C

Page 1(1)





Schmid & Partner Engineering AG

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

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	SPEAG Zeughausstrasse 43 CH-8004 Zürich 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.

Requirement	Details	Units tested
Compliant with the standard IEC 62209 – 2 [1] requirements	Dimensions of bottom for 300 MHz – 6 GHz: longitudinal = 600 mm (max. dimension) width= 400 mm (min dimension) depth= 190 mm Shape: ellipse	Prototypes, Samples
Compliant with the standard IEC 62209 – 2 [1] requirements	Bottom plate: 2.0mm +/- 0.2mm	Prototypes, All items
Dielectric parameters for required frequencies	300 MHz – 6 GHz Rel. permittivity = 4 +/-1, Loss tangent ≤ 0.05	Material sample
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.	DEGMBÉ based simulating liquids	Equivalent phantoms, Material sample
Compliant with the requirements according to the standard. 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
	Compliant with the standard IEC 62209 – 2 [1] requirements Compliant with the standard IEC 62209 – 2 [1] requirements Dielectric parameters for required frequencies The material has been lested to be compatible with the liquids defined in the standards if handled and cleaned according to the instructions. Observe Technical Note for material compatibility. Compliant with the requirements according to the standard. Sagging of the flat section when filled	Compliant with the standard IEC Dimensions of bottom 62209 – 2 [1] requirements for 300 MHz – 6 GHz: longitudinal = 600 mm (max. dimension) width= 400 mm (mix. dimension) width= 400 mm (mix. dimension) depth= 190 mm Shape: ellipse Compliant with the standard IEC Bottom plate: 62209 – 2 [1] requirements 2.0mm +/- 0.2mm Dielectric parameters for required 300 MHz – 6 GHz Rel. permittivity = 4 +/-1, Loss tangent ≤ 0.05 The material has been tested to be compatible with the liquids defined in the standards if handled and cleaned according to the instructions. DEGMBE based Observe Technical Note for material compatibility. <1% typical < 0.8% if filed with 155mm of HSL900 and without

Standards

[1] IEC 62209 – 2, Draft Version 0.9, "Evaluation of Human Exposure to Radio Frequency Fields from Handheld and Body-Mounted Wireless Communication Devices in the Frequency Range of 30 MHz to 6 GHz: Human models, Instrumentation and Procedures

Part 2: Procedure to determine the Specific Absorption Rate (SAR) for ... including accessories and multiple transmitters*, December 2004

Conformity

Based on the sample tests above, we certify that this item is in compliance with the standard [1].

Date	07.07.2005	speag
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Schmid & Partner Engineering AG

speag

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

Certificate of conformity / First Article Inspection

ltem	SAM Twin Phantom V4.0
Type No	QD 000 P40 CA
Series No	TP-1150 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; 6mm +/- 0.2mm at ERP	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 if handled and cleaned according to the instructions	DEGMBE based simulating liquids	Pre-series, First article, Samples

Standards

- [1] CENELEC EN 50361
- [2] IEEE Std 1528-200x Draft CD 1.1 (Dec 02)
 [3] IEC 62209/CD (Nov 02)
- (*) 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].

Signature / Stamp 9 Schmid & Partrar Engineering AG		
Zeughautstreue 43, 7004 Zuckh, 5 Phone 41 1 16 9000, Fax <u>411 24</u> Info@epeeg.com/mtp//www.speag	evitemend 5.5779	