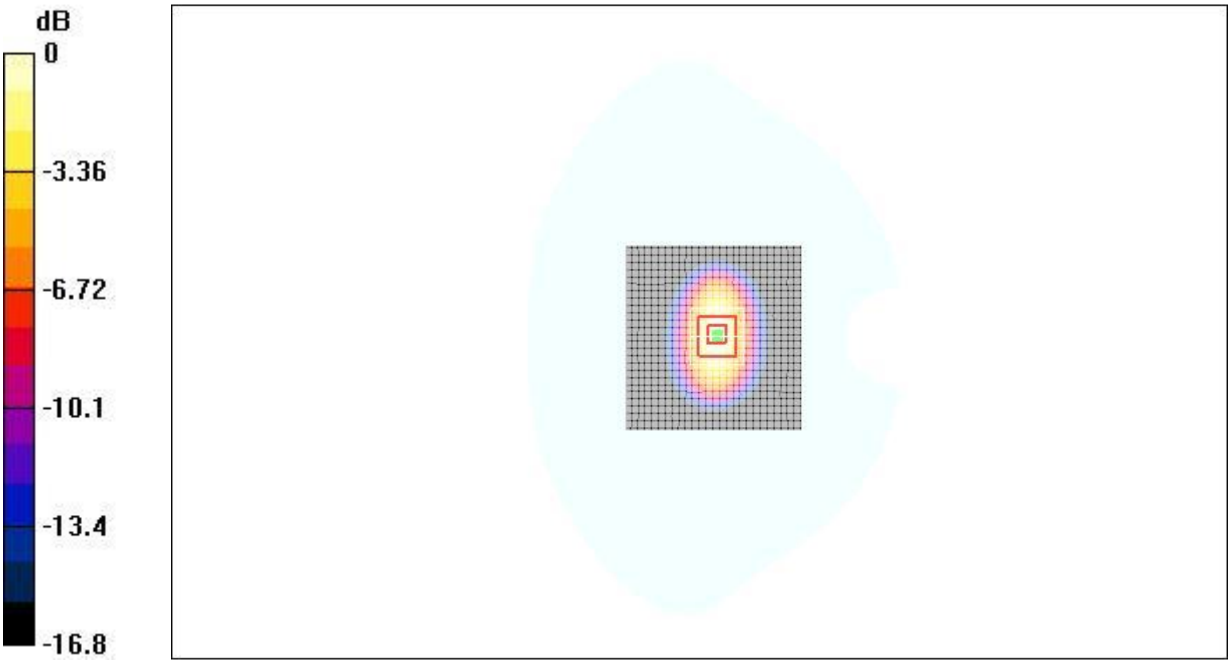
1900MHz

Date/Time: 2010-7-8 7:29:34
Electronics: DAE4 Sn771
Medium: Head 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.39 mho/m; ε_r = 39.2; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: CW Frequency: 1900 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(5.03, 5.03, 5.03)

System Validation/Area Scan (101x101x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 11.3 mW/g

System Validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 88.2 V/m; Power Drift = 0.082 dB
Peak SAR (extrapolated) = 14.8 W/kg
SAR(1 g) = 9.64 mW/g; SAR(10 g) = 4.85 mW/g
Maximum value of SAR (measured) = 10.3 mW/g



0 dB = 10.3mW/g

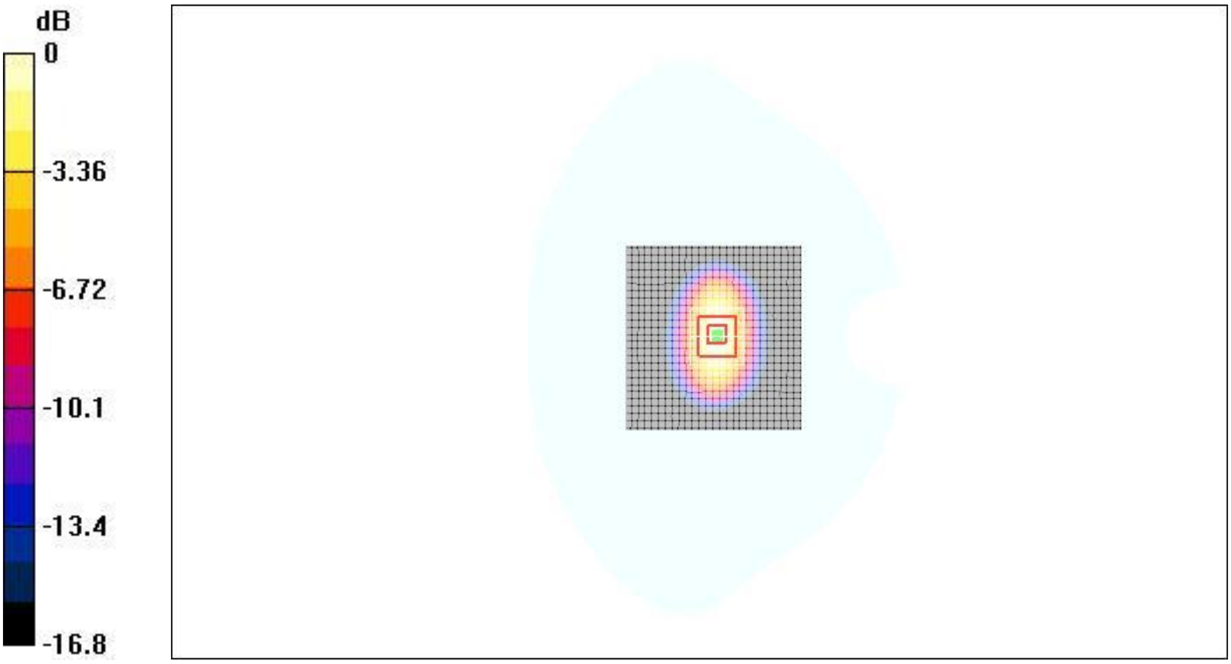
Fig.43 validation 1900MHz 250mW

1900MHz

Date/Time: 2010-7-8 13:16:28
Electronics: DAE4 Sn771
Medium: Body 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.53 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3
Ambient Temperature:23.0^{o}C   Liquid Temperature: 22.5^{o}C
Communication System: CW Frequency: 1900 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(4.68, 4.68, 4.68)

System Validation/Area Scan (101x101x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 11.2 mW/g

System Validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 90.1 V/m; Power Drift = 0.035 dB
Peak SAR (extrapolated) = 15.8 W/kg
SAR(1 g) = 10.0 mW/g; SAR(10 g) = 5.09 mW/g
Maximum value of SAR (measured) = 10.6 mW/g



0 dB = 10.6mW/g

Fig.44 validation 1900MHz 250mW

ANNEX E PROBE CALIBRATION CERTIFICATE

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

S Schweizerischer Kalibrierdienst
C 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**

Client TMC China | Certificate No: ES3DV3-3149_Sep09

CALIBRATION CERTIFICATE

Object	**ES3DV3-SN: 3149**
Calibration procedure(s)	**QA CAL-01.v6** **Calibration procedure for dosimetric E-field probes**
Calibration date:	**September 25, 2009**
Condition of the calibrated item	**In Tolerance**

This calibration certify 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 at an environment temperature (22±3)^{0}C and humidity<70%

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID#	Cal Data (Calibrated by, Certification NO.)	Scheduled Calibration
Power meter E4419B	GB41293874	5-May-09 (METAS, NO. 251-00388)	May-10
Power sensor E4412A	MY41495277	5-May-09 (METAS, NO. 251-00388)	May-10
Reference 3 dB Attenuator	SN:S5054 (3c)	10-Aug-09 (METAS, NO. 251-00403)	Aug-10
Reference 20 dB Attenuator	SN:S5086 (20b)	3-May-09 (METAS, NO. 251-00389)	May-10
Reference 30 dB Attenuator	SN:S5129 (30b)	10-Aug-09 (METAS, NO. 251-00404)	Aug-10
DAE4	SN:617	10-Jun-09 (SPEAG, NO.DAE4-907_Jun09)	Jun-10
Reference Probe ES3DV2	SN: 3013	12-Jan-09 (SPEAG, NO. ES3-3013_Jan09)	Jan-10

Secondary Standards	ID#	Check Data (in house)	Scheduled Calibration
RF generator HP8648C	US3642U01700	4-Aug-99(SPEAG, in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585	18-Oct-01(SPEAG, in house check Nov-07)	In house check: Nov-09

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

Issued: September 25, 2009

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

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

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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	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., 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 (no uncertainty required). DCP does not depend on frequency nor media.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 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 ES3DV3

SN: 3149

Manufactured: June 12, 2007

Calibrated: September 25, 2009

Calibrated for DASY4 System

DASY – Parameters of Probe: ES3DV3 SN:3149

Sensitivity in Free Space[A] Diode Compression[B]

NormX	1.14±10.1%	$\mu V/(V/m)^2$	DCP X	94mV
NormY	1.23±10.1%	$\mu V/(V/m)^2$	DCP Y	95mV
NormZ	1.29±10.1%	$\mu V/(V/m)^2$	DCP Z	91mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)
Please see Page 8

Boundary Effect

TSL 900MHz Typical SAR gradient: 5% per mm

Sensor Center to Phantom Surface Distance		3.0 mm	4.0 mm
SARbe[%]	Without Correction Algorithm	3.8	1.6
SARbe[%]	With Correction Algorithm	0.8	0.7

TSL 1810MHz Typical SAR gradient: 10% per mm

Sensor Center to Phantom Surface Distance		3.0 mm	4.0 mm
SARbe[%]	Without Correction Algorithm	6.8	3.6
SARbe[%]	With Correction Algorithm	0.4	0.2

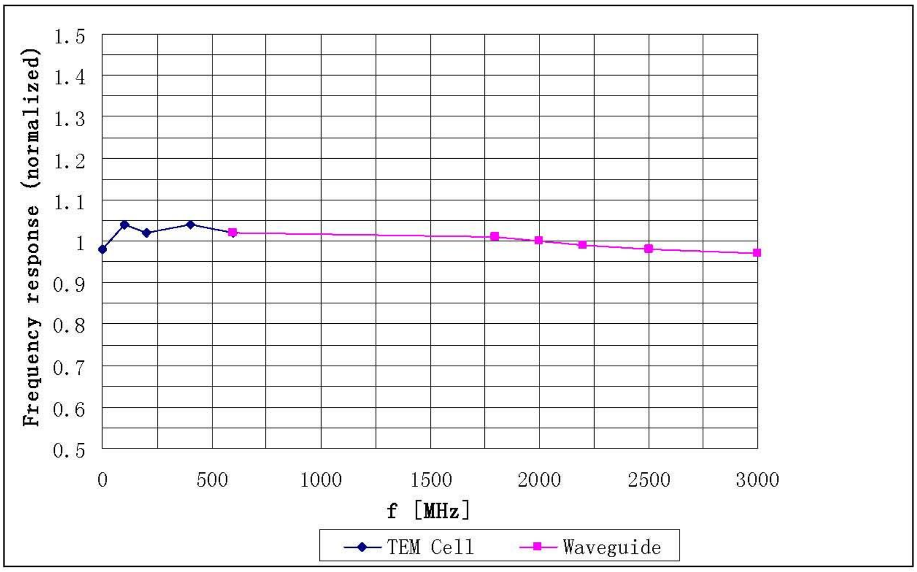
Sensor Offset

Probe Tip to Sensor Center 2.0 mm

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

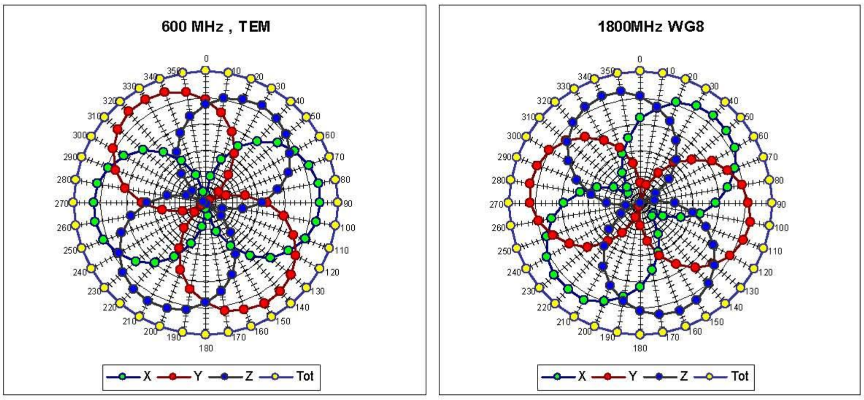
[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Page 8).
[B] Numerical linearization parameter: uncertainty not required.

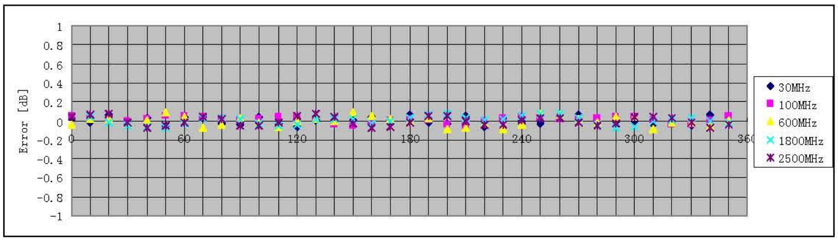
Frequency Response of E-Field



Uncertainty of Frequency Response of E-field: ±5.0% (k=2)

Receiving Pattern (ϕ), θ =0°

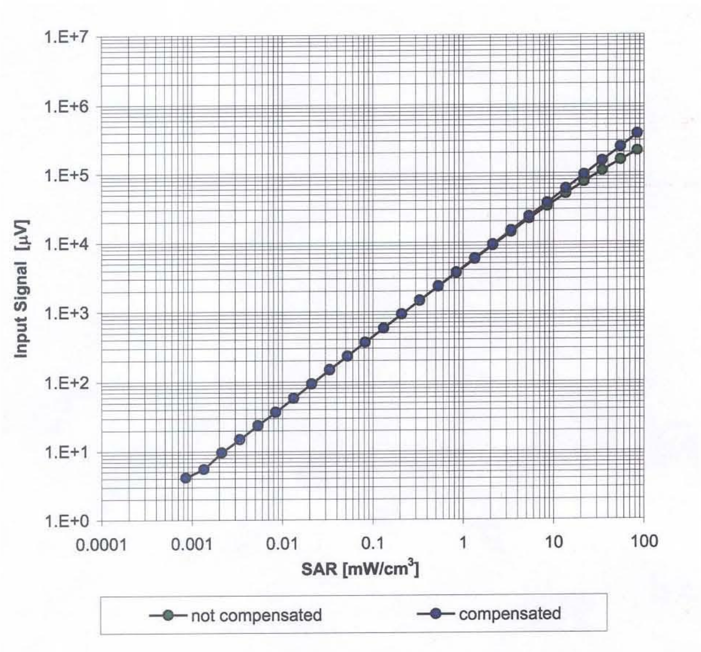


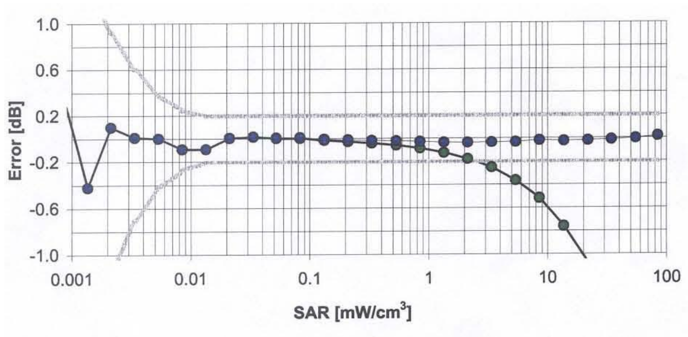


Uncertainty of Axial Isotropy Assessment: ±0.5% (k=2)

Dynamic Range f(SAR_{head})

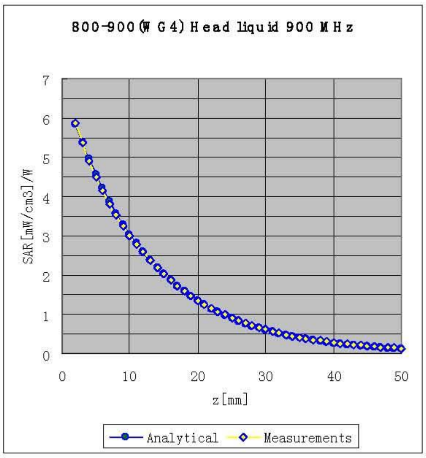
(Waveguide: WG8, f = 1800 MHz)

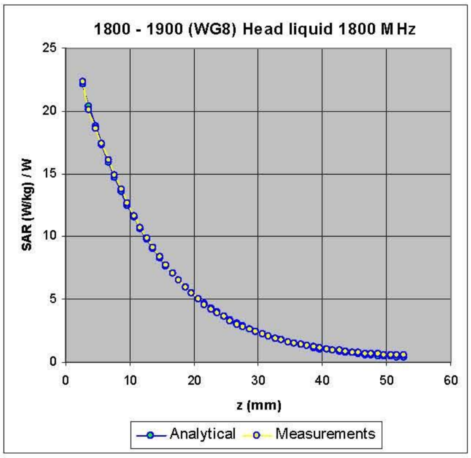




Uncertainty of Linearity Assessment: ±0.5% (k=2)

Conversion Factor Assessment



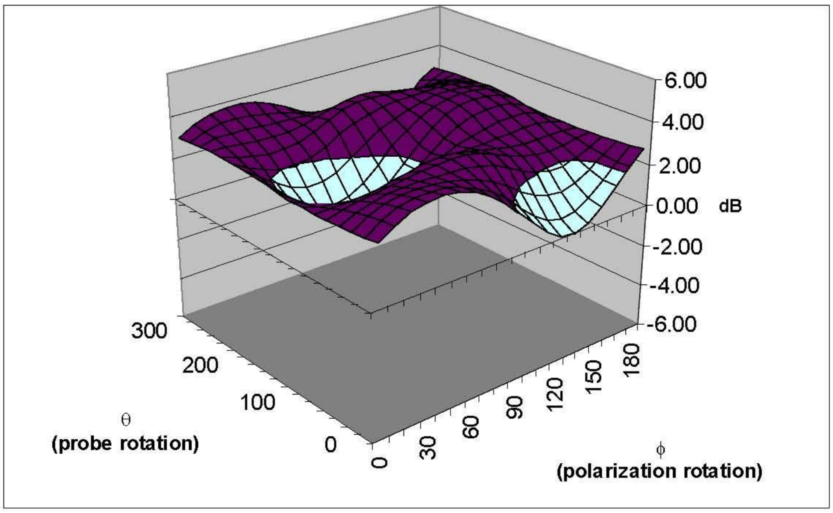


f[MHz]	Validity[MHz][C]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF	Uncertainty
850	±50 /±100	Head	41.5±5%	0.90±5%	0.91	1.13	6.56	±11.0% (k=2)
900	±50 /±100	Head	41.5±5%	0.97±5%	0.83	1.26	6.34	±11.0% (k=2)
1800	±50 /±100	Head	40.0±5%	1.40±5%	0.69	1.47	5.18	±11.0% (k=2)
1900	±50 /±100	Head	40.0±5%	1.40±5%	0.72	1.38	5.03	±11.0% (k=2)
2100	±50 /±100	Head	39.8±5%	1.49±5%	0.66	1.34	4.58	±11.0% (k=2)
850	±50 /±100	Body	55.2±5%	0.97±5%	0.76	1.26	6.22	±11.0% (k=2)
900	±50 /±100	Body	55.0±5%	1.05±5%	0.99	1.06	6.02	±11.0% (k=2)
1800	±50 /±100	Body	53.3±5%	1.52±5%	0.75	1.34	4.97	±11.0% (k=2)
1900	±50 /±100	Body	53.3±5%	1.52±5%	0.62	1.33	4.68	±11.0% (k=2)
2100	±50 /±100	Body	53.5±5%	1.57±5%	0.68	1.34	4.35	±11.0% (k=2)

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

Deviation from Isotropy

Error (Φ , θ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ±2.5% (k=2)

ANNEX F DIPOLE CALIBRATION CERTIFICATE

835 MHz Dipole Calibration Certificate

工业和信息化部通信计量中心
Telecommunication Metrology Center of MIIT

TMC

ilac-MRA CNAS 校准 CNAS L0442

Client TMC

Certificate No: D835V2-443_Feb10

CALIBRATION CERTIFICATE

Object	D835V2 - SN: 443
Calibration Procedure(s)	TMC-XZ-01-027 Calibration procedure for dipole validation kits
Calibration date:	February 26, 2010
Condition of the calibrated item	In Tolerance

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

All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)℃ and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRVD	101253	04-Sep-09 (TMC, No.JZ09-248)	Jun-10
Power sensor NRV-Z5	100333	04-Sep-09 (TMC, No. JZ09-248)	Jun-10
Reference Probe ES3DV3	SN 3149	25-Sep-09(SPEAG, No.ES3-3149_Sep09)	Sep-10
DAE4	SN 771	19-Nov-09(SPEAG, No.DAE4-771_Nov09)	Nov-10
RF generator E4438C	MY45092879	18-Jun-09(TMC, No.JZ09-302)	Jun-10
Network Analyzer 8753E	US38433212	29-Aug-09(TMC, No.JZ09-056)	Aug-10

	Name	Function	Signature
Calibrated by:	Lin Hao	SAR Test Engineer	林浩
Reviewed by:	Qi Dianyuan	SAR Project Leader	
Approved by:	Lu Bingsong	Deputy Director of the laboratory	

Issued: February 26, 2010

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

Certificate No: D835V2-443_Feb10 Page 1 of 9

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORMx,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 300MHz to 3GHz)", 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) DASY 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.

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Telecommunication Metrology Center of MIIT

Measurement Conditions

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

DASY Version	DASY5	V5.0
Extrapolation	Advanced Extrapolation	
Phantom	2mm Oval Phantom ELI4	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.6 ± 6 %	0.92mho/m ± 6 %
Head TSL temperature during test	(21.7 ± 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	2.38 mW / g
SAR normalized	normalized to 1W	9.52 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**9.41 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.54 mW / g
SAR normalized	normalized to 1W	6.16 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**6.12 mW /g ± 16.5 % (k=2)**

[1] Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

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Telecommunication Metrology Center of MIIT

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.5 ± 6%	0.97mho/m ± 6 %
Body TSL temperature during test	(21.9 ± 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	2.41 mW / g
SAR normalized	normalized to 1W	9.64 mW / g
SAR for nominal Body TSL parameters [2]	normalized to 1W	**9.57 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	1.57 mW / g
SAR normalized	normalized to 1W	6.28 mW / g
SAR for nominal Body TSL parameters [2]	normalized to 1W	**6.24 mW /g ± 16.5 % (k=2)**

[2] Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"