Huawei Technologies Co.,Ltd.
Huawei Base, Bantian, Longgang District, Shenzhen, P.R.China Phone: +86-755-28785278
SAR-Laboratory Fax: +86-755-36834474 .

Accredited testing laboratory

CNAS Registration number: L0310

Appendix to test report no. SYBH(Z-SAR) 095082009
Calibration data, Phantom certificate
and detail information of the DASY5 System

Table of Content

1 Calibration report “Probe EX3DV4”

信息产业部通信计量中心
Telecommunication Metrology Center of MII

Add: No.52 Huayuanbei Road, Haidian District, Beijing, 100083, China
Tel: +86-10-62303288-2082 Fax: +86-10-62304793
E-mail: Info@emcite.com Http://www.emcite.com

CNAS L0442

Client **Huawei** **Certificate No: EX3-3641_May09**

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN: 3641
Calibration Procedure(s)	TMC-XZ-01-028 Calibration procedure for dosimetric E-field probes
Calibration date:	May 14, 2009
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	SN.	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRVD	101253	19-Jun-08 (TMC, No.JZ08-248)	Jun-09
Power sensor NRV-Z5	100333	19-Jun-08 (TMC, No. JZ08-248)	Jun-09
Reference Probe EX3DV4	SN 3631	13-Dec-08(SPEAG, No.ES3-3631_Dec08)	Dec-09
DAE4	SN 771	21-Nov-08(SPEAG, No.DAE4-771_Nov08)	Nov-09
RF generator E4438C	MY45092879	18-Jun-08(TMC, No.JZ08-302)	Jun-09
Network Analyzer 8753E	US38433212	03-Aug-08(TMC, No.JZ08-056)	Aug-09

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

Issued: May 15, 2009

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

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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)YD/T 1644.1-2007, Human exposure to radio frequency fileds from handhled and body-mounted wireless communication devices——human models, instrumentation, and procedures part 1: procedure to determine the specific absorbtion rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300MHz to 3GHz)

b) IEEE 1528-2003, IEEE Recommended Practice for Determining the Peak Spatial- Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques Annex A

c) IEC 62209-1-2005, Evaluation of Human Exposure to Radio Frequency Fields from Handheld and Body-Mounted Wireless Communication Devices in the Frequency Range of 300 MHz to 6 GHz. Annex B

Methods Applied and Interpretation of Parameters:

- NORMx,y,z: Assessed for E-field polarization θ =0 (f≤900MHz in TEM-cell; f>1800MHz: 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≤800MHz) and inside waveguide using analytical field distributions based on power measurements for f >800MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha,depth) of which typical uncertainty valued 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 ±50MHz to ±100MHz.
- 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.

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DASY – Parameters of Probe: EX3DV4 SN:3641

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

NormX	0.36±10.1%	μ V/(V/m)^2	DCP X	83mV
NormY	0.36±10.1%	μ V/(V/m)^2	DCP Y	89mV
NormZ	0.41±10.1%	μ V/(V/m)^2	DCP Z	89mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)
Please see Page 7

Boundary Effect

TSL 900MHz Typical SAR gradient: 5% per mm

Sensor Center to Phantom Surface Distance		2.0 mm	3.0 mm
SARbe[%]	Without Correction Algorithm	8.5	4.2
SARbe[%]	With Correction Algorithm	0.4	0.1

TSL 1810MHz Typical SAR gradient: 10% per mm

Sensor Center to Phantom Surface Distance		2.0 mm	3.0 mm
SARbe[%]	Without Correction Algorithm	7.6	3.8
SARbe[%]	With Correction Algorithm	0.2	0.1

Sensor Offset

Probe Tip to Sensor Center	1.0 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 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 Page 8).
[B] Numerical linearization parameter: uncertainty not required.

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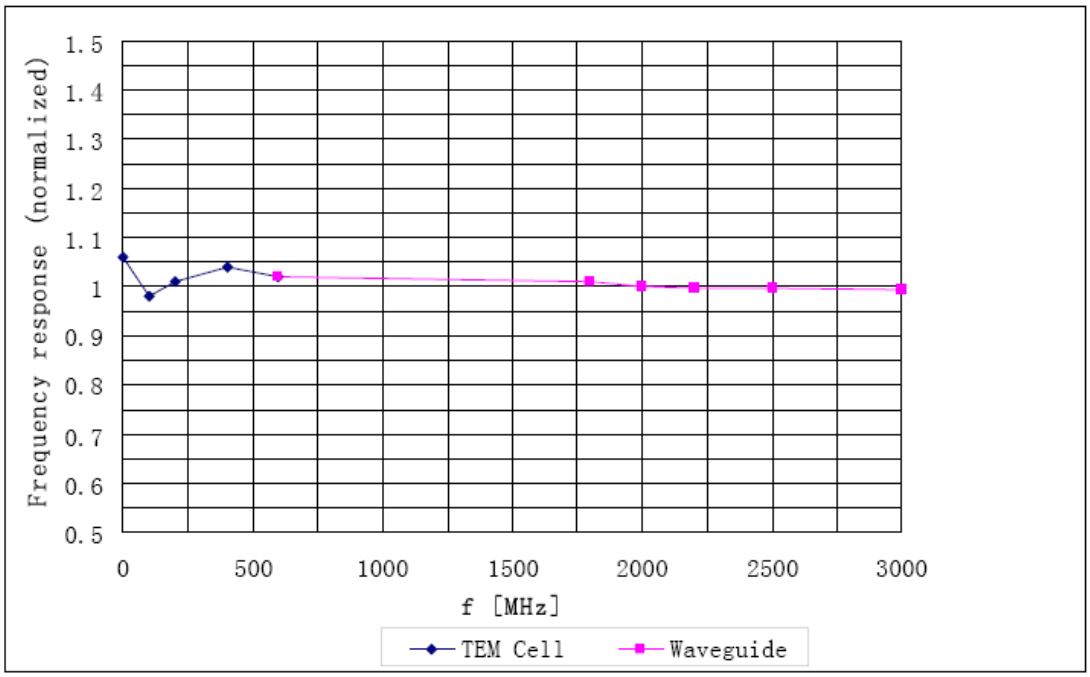
Frequency Response of E-Field



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

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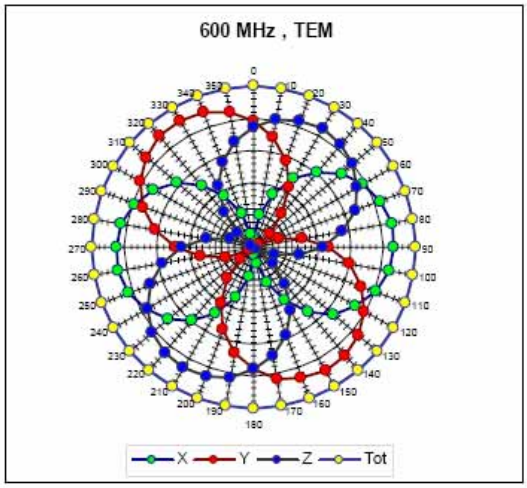
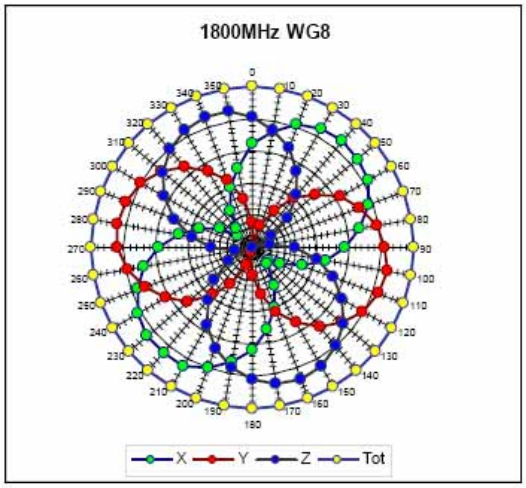
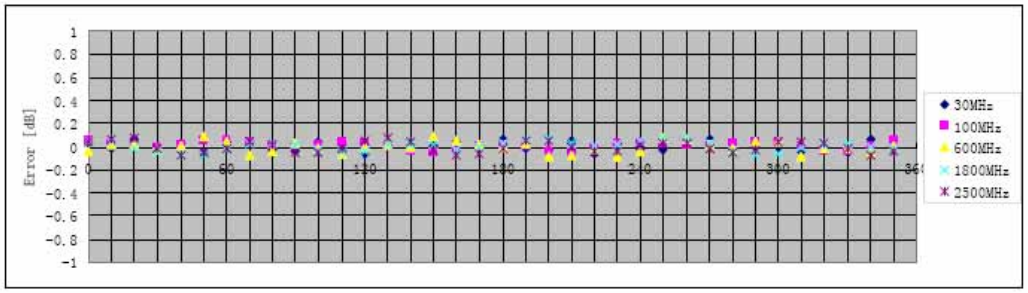
Receiving Pattern (ϕ), θ =0°







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

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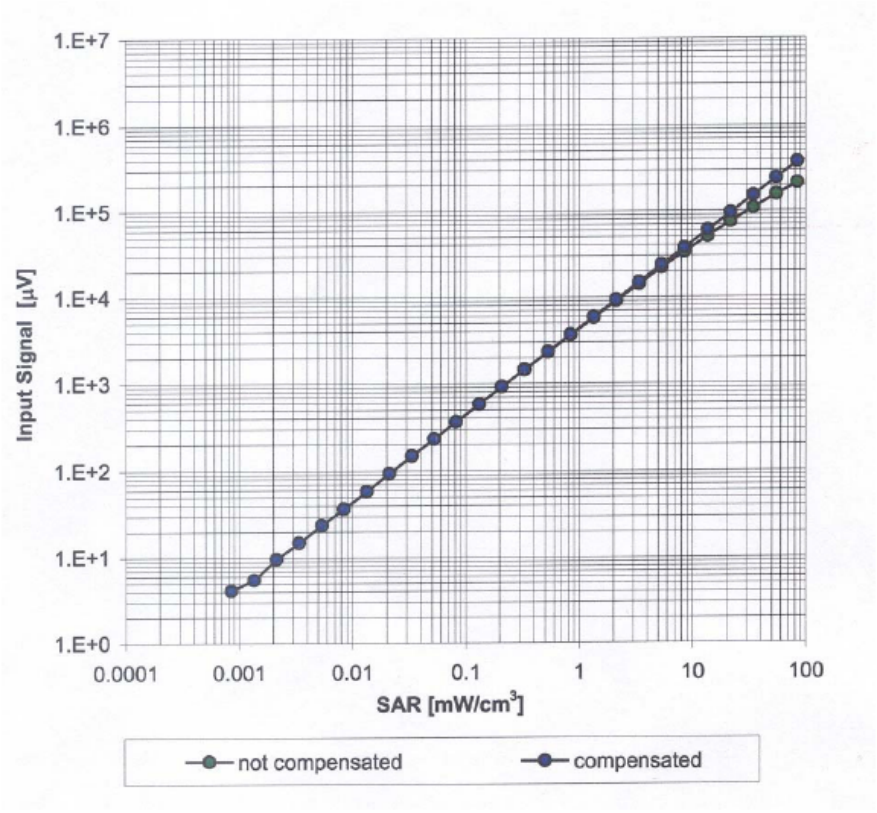
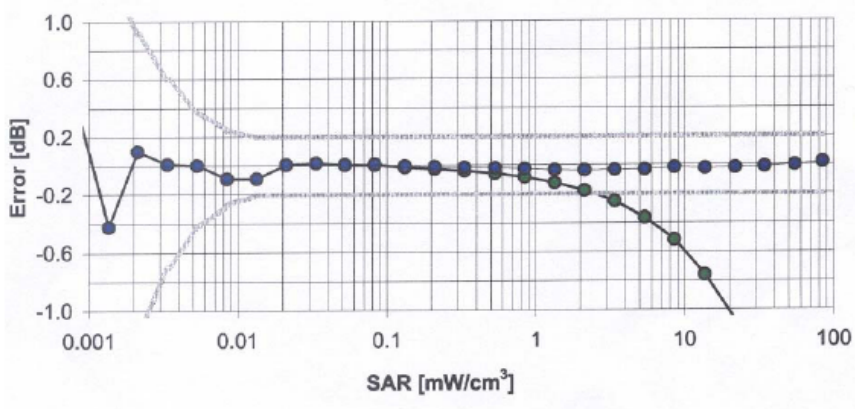
Dynamic Range f(SAR_{head})

(Waveguide: WG8, f = 1800 MHz)





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