



In Collaboration with
s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2512 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com http://www.chinattl.cn

General Antenna Parameters and Design

Electrical Delay (one direction)	1.069 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. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
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
-----------------	-------



Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2512 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com http://www.chinattl.cn

DASY5 Validation Report for Head TSL

Date: 11.05.2018

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1176

Communication System: CW; Frequency: 5250 MHz, Frequency: 5600 MHz,
Frequency: 5750 MHz,

Medium parameters used: $f = 5250$ MHz; $\sigma = 4.848$ S/m; $\epsilon_r = 34.85$; $\rho = 1000$ kg/m³,
Medium parameters used: $f = 5600$ MHz; $\sigma = 4.921$ S/m; $\epsilon_r = 34.47$; $\rho = 1000$ kg/m³,
Medium parameters used: $f = 5750$ MHz; $\sigma = 5.067$ S/m; $\epsilon_r = 34.42$; $\rho = 1000$ kg/m³,

Phantom section: Center Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7514; ConvF(5.02, 5.02, 5.02) @ 5250 MHz; Calibrated: 8/27/2018, ConvF(4.41, 4.41, 4.41) @ 5600 MHz; Calibrated: 8/27/2018, ConvF(4.47, 4.47, 4.47) @ 5750 MHz; Calibrated: 8/27/2018,
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1555; Calibrated: 8/20/2018
- Phantom: MFP_V5.1C ; Type: QD 000 P51CA; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

Dipole Calibration /Pin=100mW, d=10mm, f=5250 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 70.52 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 32.2 W/kg
SAR(1 g) = 7.93 W/kg; SAR(10 g) = 2.26 W/kg
Maximum value of SAR (measured) = 18.5 W/kg

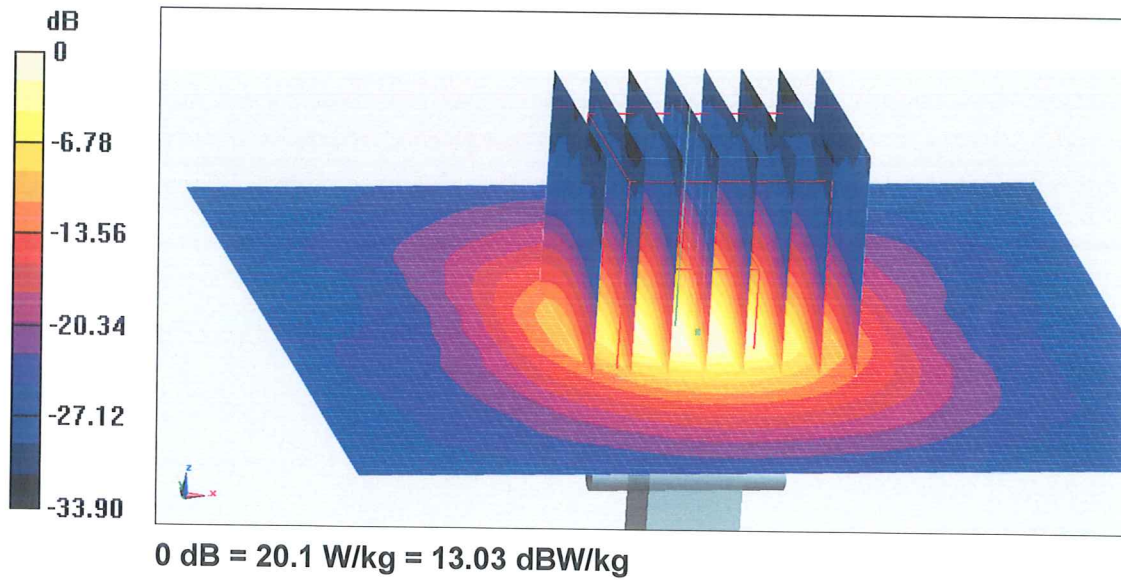
Dipole Calibration /Pin=100mW, d=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 72.65 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 36.4 W/kg
SAR(1 g) = 8.15 W/kg; SAR(10 g) = 2.33 W/kg
Maximum value of SAR (measured) = 19.3 W/kg

Dipole Calibration /Pin=100mW, d=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 71.99 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 37.6 W/kg
SAR(1 g) = 8.05 W/kg; SAR(10 g) = 2.28 W/kg
Maximum value of SAR (measured) = 20.1 W/kg



In Collaboration with
s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2512 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com <http://www.chinattl.cn>

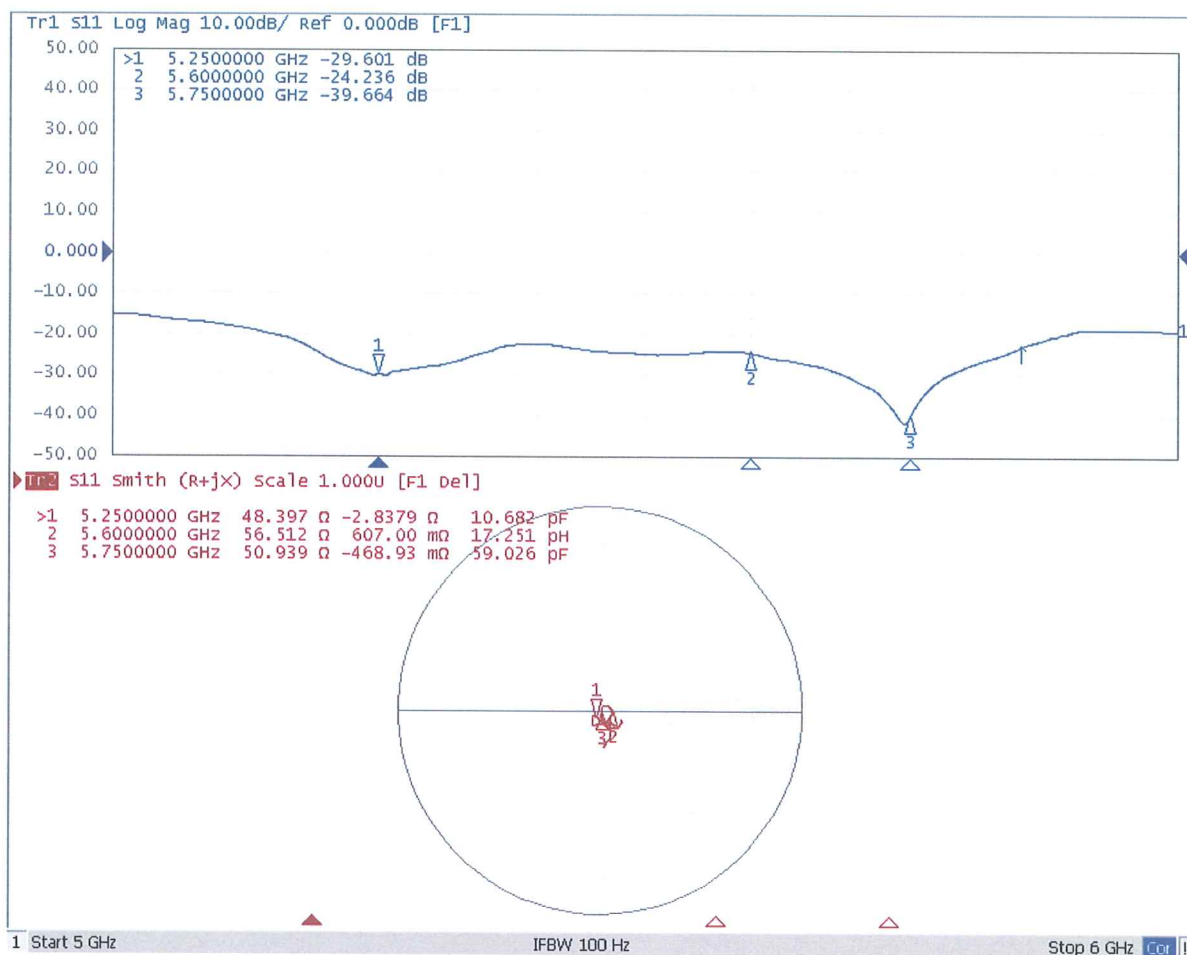




In Collaboration with
s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2512 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com http://www.chinattl.cn

Impedance Measurement Plot for Head TSL





In Collaboration with

s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2512 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com http://www.chinattl.cn

DASY5 Validation Report for Body TSL

Date: 11.06.2018

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1176

Communication System: CW; Frequency: 5250 MHz, Frequency: 5600 MHz,
Frequency: 5750 MHz,

Medium parameters used: $f = 5250$ MHz; $\sigma = 5.269$ S/m; $\epsilon_r = 47.53$; $\rho = 1000$ kg/m³, Medium parameters used: $f = 5600$ MHz; $\sigma = 5.791$ S/m; $\epsilon_r = 47.12$; $\rho = 1000$ kg/m³, Medium parameters used: $f = 5750$ MHz; $\sigma = 6.018$ S/m; $\epsilon_r = 46.88$; $\rho = 1000$ kg/m³,

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7514; ConvF(4.54, 4.54, 4.54) @ 5250 MHz; Calibrated: 8/27/2018, ConvF(4, 4, 4) @ 5600 MHz; Calibrated: 8/27/2018, ConvF(3.98, 3.98, 3.98) @ 5750 MHz; Calibrated: 8/27/2018,
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1555; Calibrated: 8/20/2018
- Phantom: MFP_V5.1C ; Type: QD 000 P51CA; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

Dipole Calibration /Pin=100mW, d=10mm, f=5250 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 66.47 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 29.0 W/kg
SAR(1 g) = 7.32 W/kg; SAR(10 g) = 2.08 W/kg
Maximum value of SAR (measured) = 16.9 W/kg

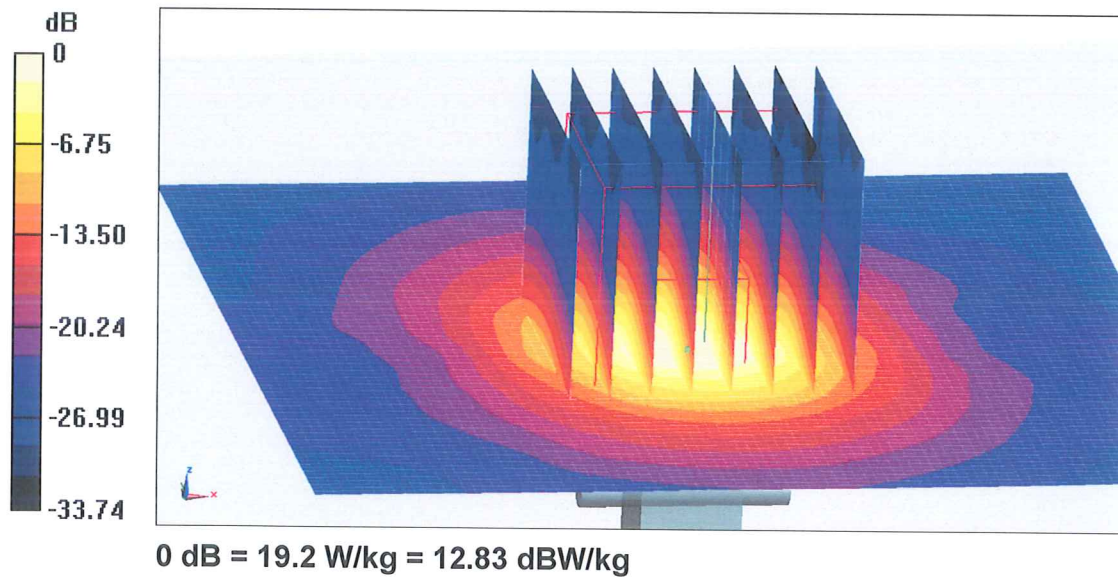
Dipole Calibration /Pin=100mW, d=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 65.94 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 34.6 W/kg
SAR(1 g) = 7.77 W/kg; SAR(10 g) = 2.2 W/kg
Maximum value of SAR (measured) = 19.1 W/kg

Dipole Calibration /Pin=100mW, d=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 61.33 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 35.8 W/kg
SAR(1 g) = 7.57 W/kg; SAR(10 g) = 2.12 W/kg
Maximum value of SAR (measured) = 19.2 W/kg



In Collaboration with
s p e a k
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2512 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com <http://www.chinattl.cn>

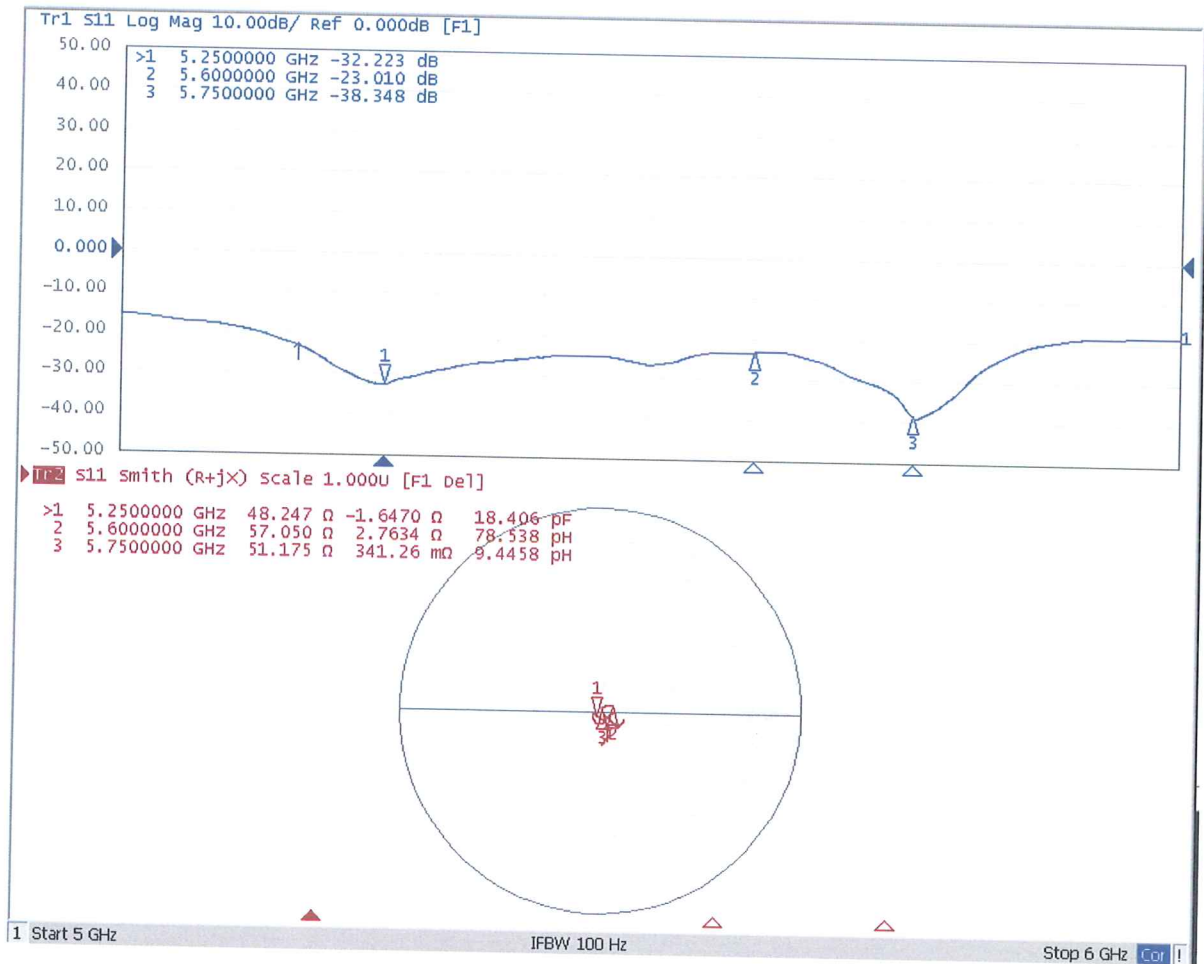




In Collaboration with
s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2512 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com http://www.chinattl.cn

Impedance Measurement Plot for Body TSL



Appendix Annual validation for Test Lab.

General calibration information

Date	2019.10.09
Test Laboratory	ShenZhen Morlab Communications Technology Co., Ltd.
Antenna serial No.	D1750V2-SN:1160

Antenna Parameters with Head TSL at 5250 MHz

Impedance, transformed to feed point	$51.35 \Omega + 3.85j \Omega$
Return Loss	-27.9dB

Antenna Parameters Head TSL at 5600 MHz

Impedance, transformed to feed point	$44.7 \Omega + 2.96j \Omega$
Return Loss	-23.87dB

Antenna Parameters Head TSL at 5750 MHz

Impedance, transformed to feed point	$46.84 \Omega + 0.95j \Omega$
Return Loss	-29.36dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.276 ns
----------------------------------	----------

After long term use with 100W radiated power, only a slight warming of the dipole near the feed point 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. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard No excessive force must be applied to the dipole arm, because they might bend or the soldered connections near the feed point may be damaged.

System Check_5250MHz_Head

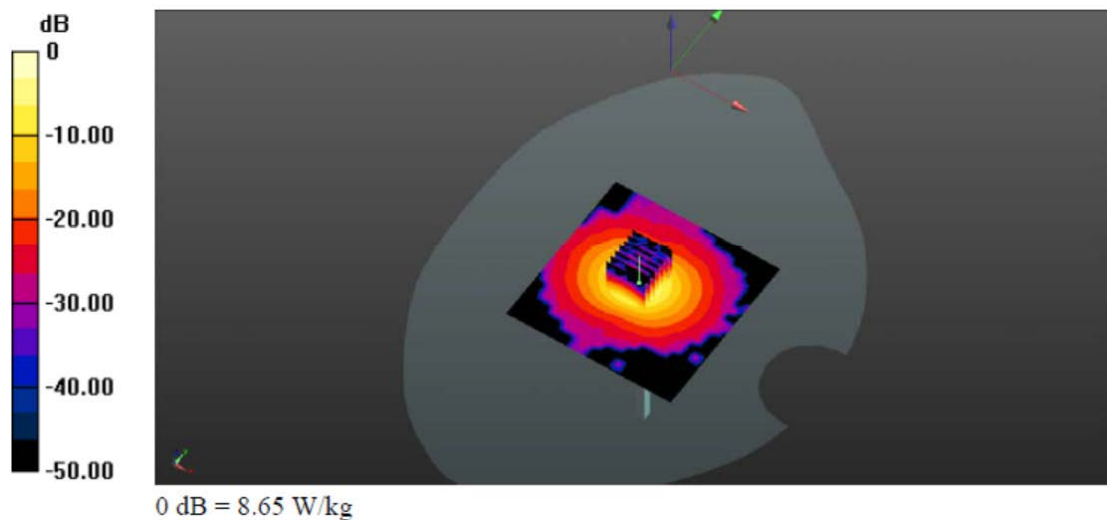
Communication System: UID 0, CW (0); Frequency: 5250 MHz; Duty Cycle: 1:1
Medium: HSL_5250 Medium parameters used: $f = 5250$ MHz; $\sigma = 4.699$ S/m; $\epsilon_r = 36.146$; $\rho = 1000$ kg/m³
Ambient Temperature : 23.4 °C; Liquid Temperature : 22.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3823; ConvF(4.6, 4.6, 4.6); Calibrated: 2018.11.12;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn480; Calibrated: 2019.04.11
- Phantom: SAM 1; Type: QD000P40CC; Serial: TP:1471
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

CW 5250/Area Scan (201x201x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 8.65 W/kg

CW 5250/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 35.37 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 46.7 W/kg
SAR(1 g) = 7.67 W/kg; SAR(10 g) = 2.23 W/kg
Maximum value of SAR (measured) = 8.24 W/kg



Test Laboratory: SAR Lab. of Shenzhen Morlab Communications Technology Co., Ltd.

Date: 2019.10.09

System Check_5600MHz_Head

Communication System: UID 0, CW (0); Frequency: 5600 MHz; Duty Cycle: 1:1
Medium: HSL_5600 Medium parameters used: $f = 5600$ MHz; $\sigma = 5.125$ S/m; $\epsilon_r = 35.435$; $\rho = 1000$

 kg/m^3

Ambient Temperature : 23.4 °C; Liquid Temperature : 22.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3823; ConvF(4.5, 4.5, 4.5); Calibrated: 2018.11.12;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn480; Calibrated: 2019.04.11
- Phantom: SAM 1; Type: QD000P40CC; Serial: TP:1471
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

CW 5600/Area Scan (201x201x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 8.96 W/kg

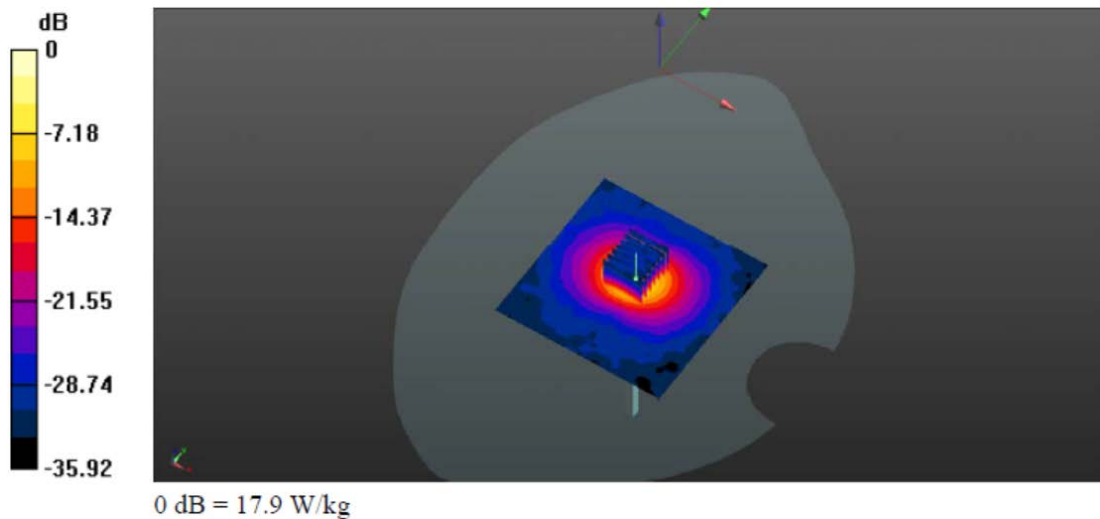
CW 5600/Zoom Scan (7x7x13)/Cube 0: Measurement grid: $dx=4$ mm, $dy=4$ mm, $dz=2$ mm

Reference Value = 33.62 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 40.3 W/kg

SAR(1 g) = 8.31 W/kg; SAR(10 g) = 2.3 W/kg

Maximum value of SAR (measured) = 17.9 W/kg



Test Laboratory: SAR Lab. of Shenzhen Morlab Communications Technology Co., Ltd.

Date: 2019.10.09

System Check_5750MHz_Head

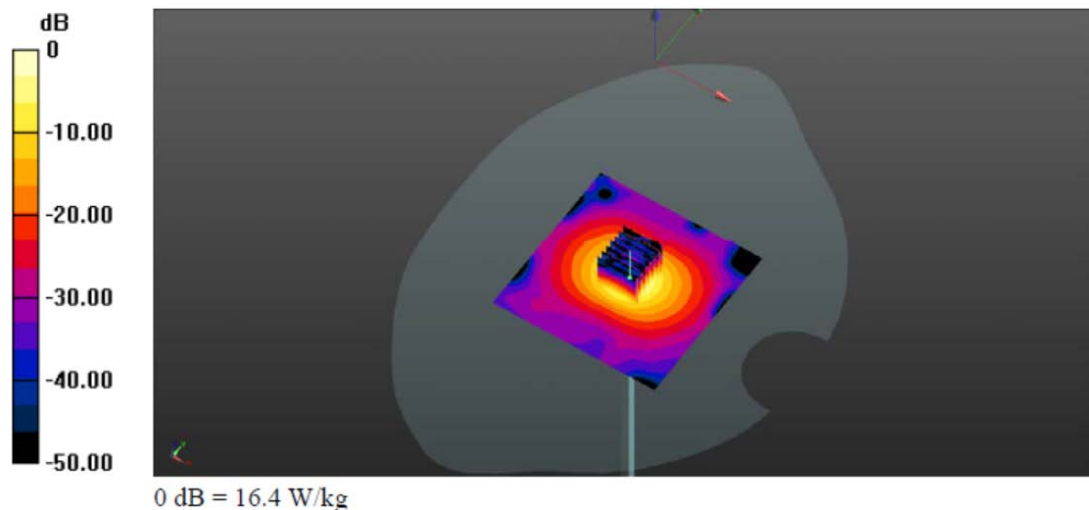
Communication System: UID 0, CW (0); Frequency: 5750 MHz; Duty Cycle: 1:1
Medium: HSL_5750 Medium parameters used: $f = 5750$ MHz; $\sigma = 5.298$ S/m; $\epsilon_r = 35.158$; $\rho = 1000$ kg/m³
Ambient Temperature : 23.4 °C; Liquid Temperature : 22.3 °C

DASY5 Configuration:

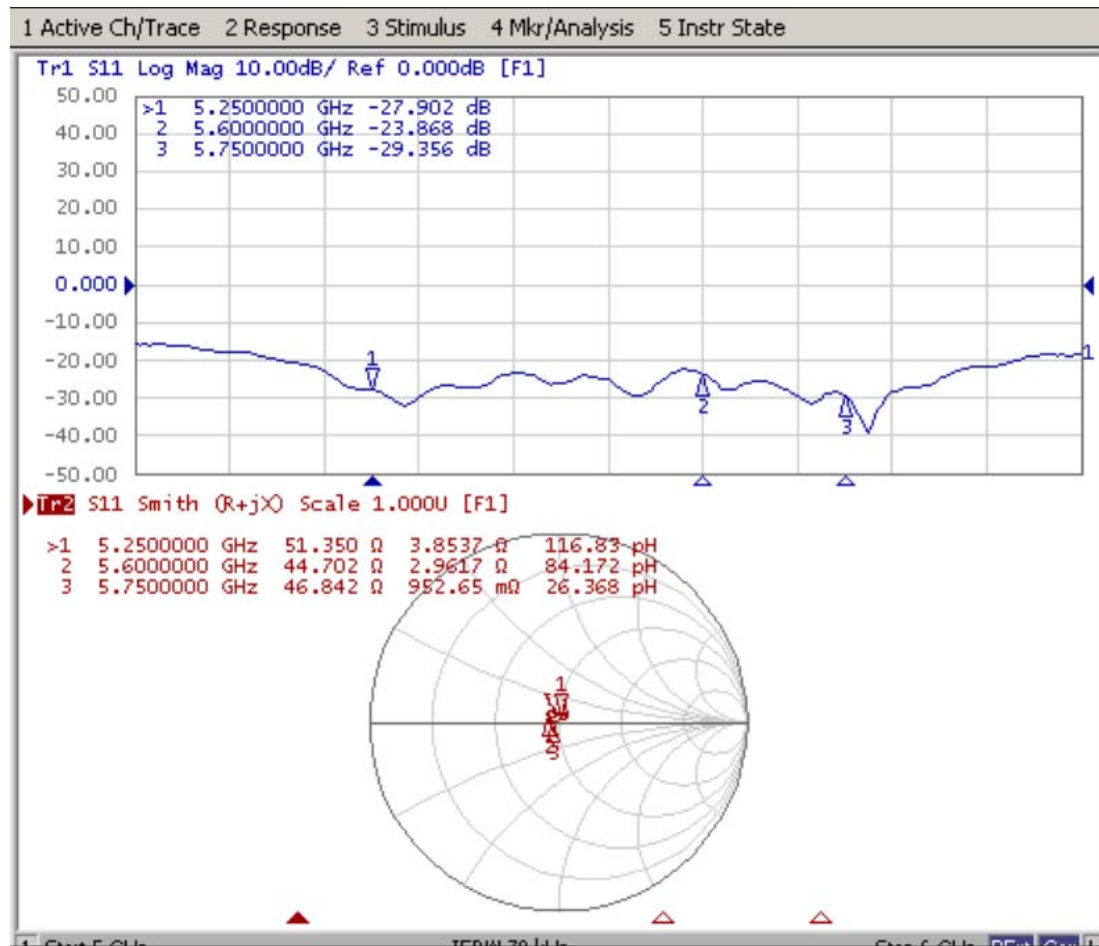
- Probe: EX3DV4 - SN3823; ConvF(4.6, 4.6, 4.6); Calibrated: 2018.11.12;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn480; Calibrated: 2019.04.11
- Phantom: SAM 1; Type: QD000P40CC; Serial: TP:1471
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

CW5750/Area Scan (101x101x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 16.4 W/kg

CW5750/Zoom Scan (7x7x13)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 37.87 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 39.3 W/kg
SAR(1 g) = 7.96 W/kg; SAR(10 g) = 2.31 W/kg
Maximum value of SAR (measured) = 16.4 W/kg



Appendix Impedance Measurement Plot for Head TSL





In Collaboration with
s p e a g
CALIBRATION LABORATORY



中国认可
国际互认
校准
CALIBRATION
CNAS L0570

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2512 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com [Http://www.chinattl.cn](http://www.chinattl.cn)

Client

INNOWAVE

Certificate No: Z19-60174

CALIBRATION CERTIFICATE

Object **EX3DV4 - SN:3748**

Calibration Procedure(s) **FF-Z11-004-01**
Calibration Procedures for Dosimetric E-field Probes

Calibration date: **June 19, 2019**

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(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	101919	20-Jun-18 (CTTL, No.J18X05032)	Jun-19
Power sensor NRP-Z91	101547	20-Jun-18 (CTTL, No.J18X05032)	Jun-19
Power sensor NRP-Z91	101548	20-Jun-18 (CTTL, No.J18X05032)	Jun-19
Reference10dBAttenuator	18N50W-10dB	09-Feb-18(CTTL, No.J18X01133)	Feb-20
Reference20dBAttenuator	18N50W-20dB	09-Feb-18(CTTL, No.J18X01132)	Feb-20
Reference Probe EX3DV4	SN 3617	31-Jan-19(SPEAG,No.EX3-3617_Jan19)	Jan-20
DAE4	SN 1331	06-Feb-19(SPEAG, No.DAE4-1331_Feb19)	Feb -20

Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
SignalGeneratorMG3700A	6201052605	21-Jun-18 (CTTL, No.J18X05033)	Jun-19
Network Analyzer E5071C	MY46110673	24-Jan-19 (CTTL, No.J19X00547)	Jan -20

	Name	Function	Signature
Calibrated by:	Yu Zongying	SAR Test Engineer	
Reviewed by:	Lin Hao	SAR Test Engineer	
Approved by:	Qi Dianyuan	SAR Project Leader	

Issued: June 20, 2019

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



In Collaboration with

s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China

Tel: +86-10-62304633-2512

Fax: +86-10-62304633-2504

E-mail: ctl@chinattl.com

[Http://www.chinattl.cn](http://www.chinattl.cn)

Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A,B,C,D	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 $\theta=0$ is normal to probe axis

Connector Angle information used in DASY system to align probe sensor X to the robot coordinate system

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}:** Assessed for E-field polarization $\theta=0$ ($f \leq 900\text{MHz}$ in TEM-cell; $f > 1800\text{MHz}$: waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not effect the E^2 -field uncertainty inside TSL (see below ConvF).
- NORM(f)_{x,y,z} = NORM_{x,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.
- DCP_{x,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.
- PAR:** PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics.
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; VR_{x,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 $f \leq 800\text{MHz}$) and inside waveguide using analytical field distributions based on power measurements for $f > 800\text{MHz}$. 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 NORM_{x,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 $\pm 50\text{MHz}$ to $\pm 100\text{MHz}$.
- 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.
- Connector Angle:** The angle is assessed using the information gained by determining the NORM_x (no uncertainty required).



In Collaboration with

s p e a g

CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China

Tel: +86-10-62304633-2512

Fax: +86-10-62304633-2504

E-mail: cttl@chinattl.com

[Http://www.chinattl.cn](http://www.chinattl.cn)

Probe EX3DV4

SN: 3748

Calibrated: June 19, 2019

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)



DASY/EASY – Parameters of Probe: EX3DV4 – SN: 3748

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	0.40	0.51	0.45	$\pm 10.0\%$
DCP(mV) ^B	103.7	102.2	102.4	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB $\sqrt{\mu\text{V}}$	C	D dB	VR mV	Unc ^E (k=2)
0	CW	X	0.0	0.0	1.0	0.00	147.8	$\pm 2.2\%$
		Y	0.0	0.0	1.0		168.7	
		Z	0.0	0.0	1.0		162.2	

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 Norm X, Y, Z do not affect the E²-field uncertainty inside TSL (see Page 5 and Page 6).

^B Numerical linearization parameter: uncertainty not required.

^E Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.



DASY/EASY – Parameters of Probe: EX3DV4 – SN: 3748

Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz] ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha ^G	Depth ^G (mm)	Unct. (k=2)
750	41.9	0.89	9.14	9.14	9.14	0.12	1.70	±12.1%
835	41.5	0.90	8.76	8.76	8.76	0.11	1.59	±12.1%
900	41.5	0.97	8.85	8.85	8.85	0.11	1.59	±12.1%
1750	40.1	1.37	7.60	7.60	7.60	0.25	1.02	±12.1%
1900	40.0	1.40	7.31	7.31	7.31	0.25	0.99	±12.1%
2100	39.8	1.49	7.31	7.31	7.31	0.25	1.07	±12.1%
2300	39.5	1.67	7.11	7.11	7.11	0.57	0.71	±12.1%
2450	39.2	1.80	6.98	6.98	6.98	0.65	0.69	±12.1%
2600	39.0	1.96	6.70	6.70	6.70	0.65	0.67	±12.1%
5250	35.9	4.71	5.00	5.00	5.00	0.40	1.50	±13.3%
5600	35.5	5.07	4.59	4.59	4.59	0.40	1.60	±13.3%
5750	35.4	5.22	4.68	4.68	4.68	0.45	1.60	±13.3%

^C Frequency validity above 300 MHz of ±100MHz only applies for DASY v4.4 and higher (Page 2), else it is restricted to ±50MHz. The uncertainty is the RSS of ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

^F At frequency below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ±10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ±5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

^G Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for the frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.



DASY/EASY – Parameters of Probe: EX3DV4 – SN: 3748

Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz] ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha ^G	Depth ^G (mm)	Unct. (k=2)
750	55.5	0.96	9.10	9.10	9.10	0.40	0.80	± 12.1%
835	55.2	0.97	8.78	8.78	8.78	0.18	1.42	± 12.1%
900	55.0	1.05	8.80	8.80	8.80	0.23	1.20	± 12.1%
1750	53.4	1.49	7.28	7.28	7.28	0.24	1.05	± 12.1%
1900	53.3	1.52	7.03	7.03	7.03	0.22	1.20	± 12.1%
2100	53.2	1.62	7.22	7.22	7.22	0.24	1.15	± 12.1%
2300	52.9	1.81	7.22	7.22	7.22	0.54	0.80	± 12.1%
2450	52.7	1.95	7.14	7.14	7.14	0.66	0.71	± 12.1%
2600	52.5	2.16	6.85	6.85	6.85	0.65	0.68	± 12.1%
5250	48.9	5.36	4.35	4.35	4.35	0.45	1.60	± 13.3%
5600	48.5	5.77	3.78	3.78	3.78	0.50	1.55	± 13.3%
5750	48.3	5.94	3.88	3.88	3.88	0.50	1.65	± 13.3%

^C Frequency validity above 300 MHz of ±100MHz only applies for DASY v4.4 and higher (Page 2), else it is restricted to ±50MHz. The uncertainty is the RSS of ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

^F At frequency below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ±10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ±5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

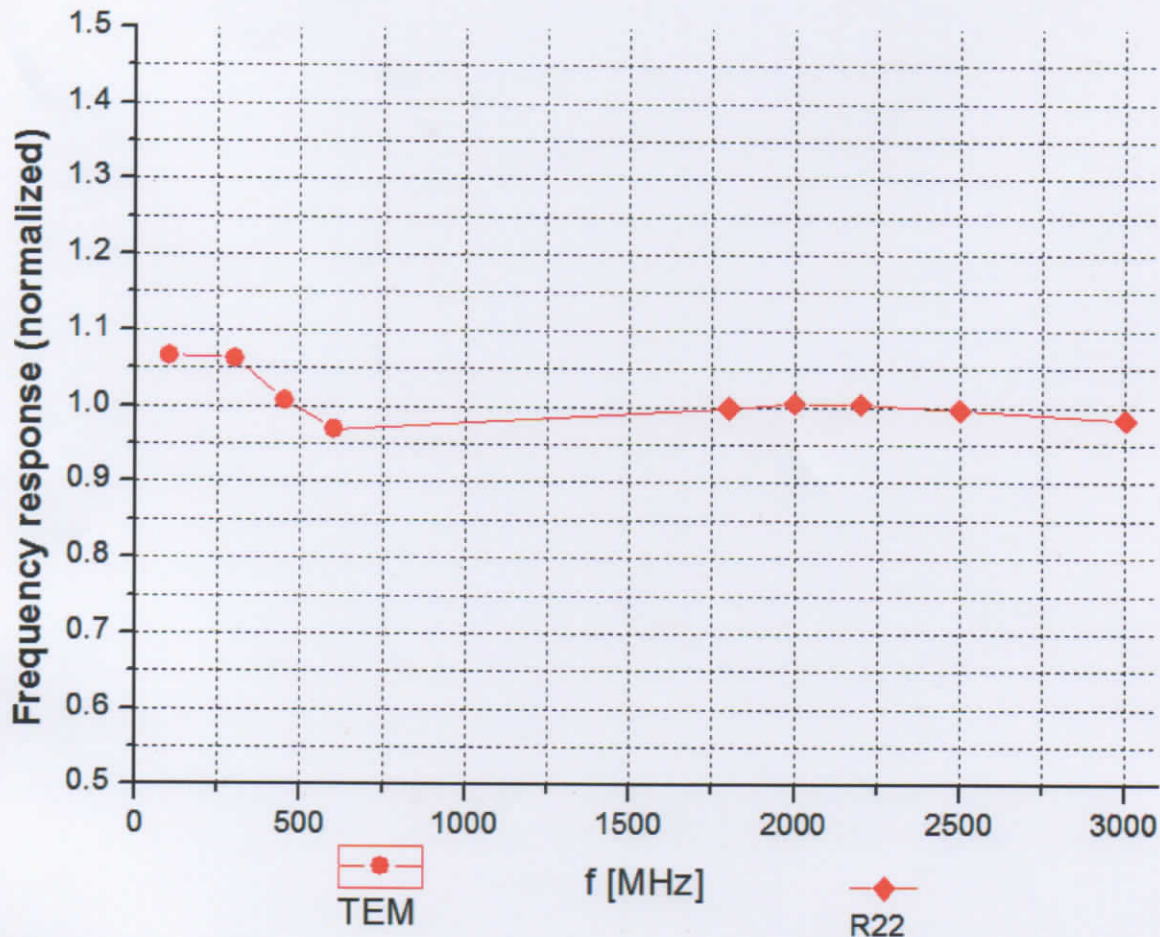
^G Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for the frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.



In Collaboration with
s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2512 Fax: +86-10-62304633-2504
E-mail: ctl@chinattl.com [Http://www.chinattl.cn](http://www.chinattl.cn)

Frequency Response of E-Field (TEM-Cell: ifi110 EXX, Waveguide: R22)



Uncertainty of Frequency Response of E-field: $\pm 7.4\%$ ($k=2$)

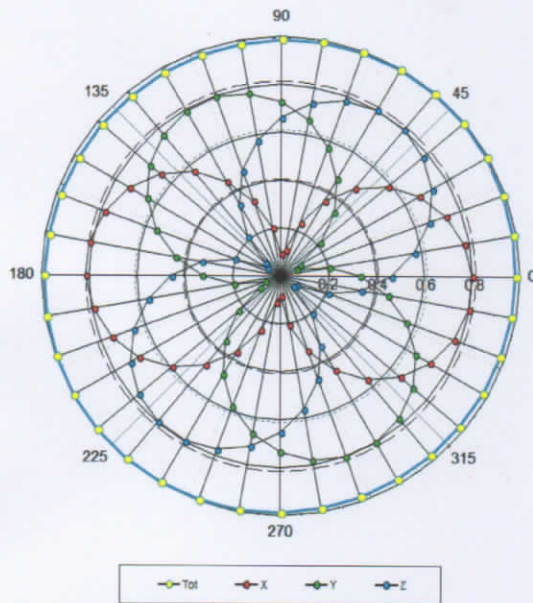


In Collaboration with
s p e a g
CALIBRATION LABORATORY

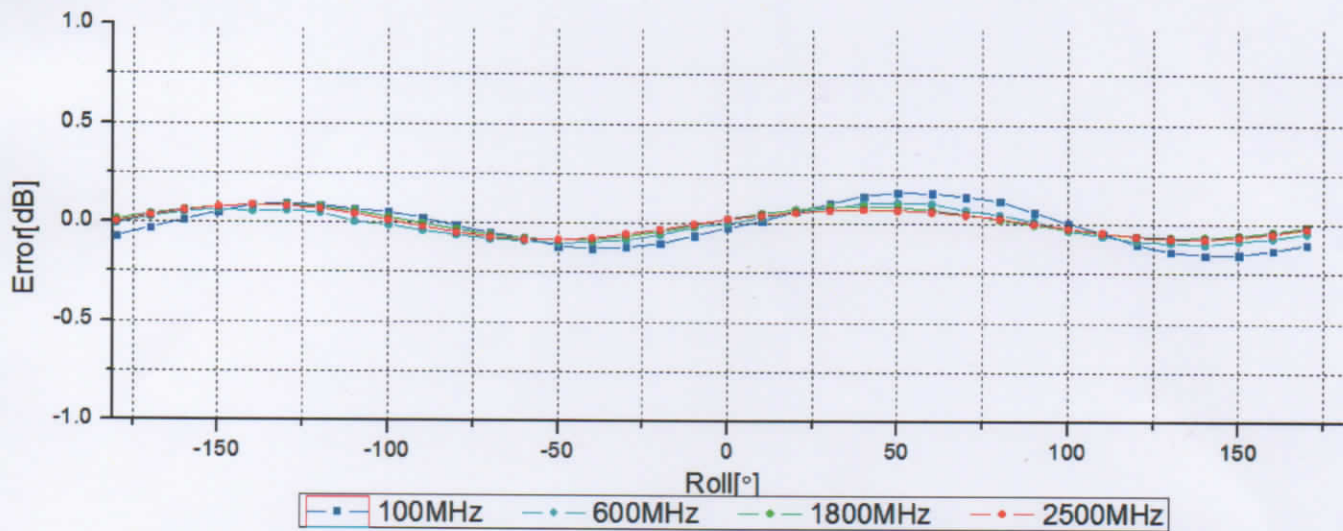
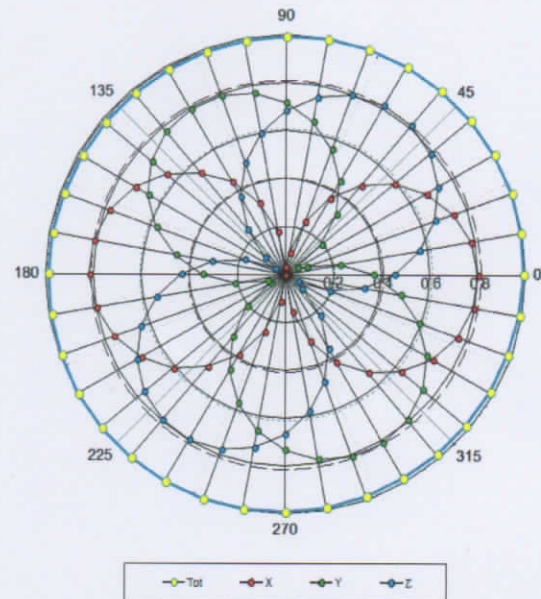
Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2512 Fax: +86-10-62304633-2504
E-mail: ctl@chinattl.com [Http://www.chinattl.cn](http://www.chinattl.cn)

Receiving Pattern (Φ), $\theta=0^\circ$

f=600 MHz, TEM



f=1800 MHz, R22



Uncertainty of Axial Isotropy Assessment: $\pm 1.2\%$ ($k=2$)



In Collaboration with
s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China

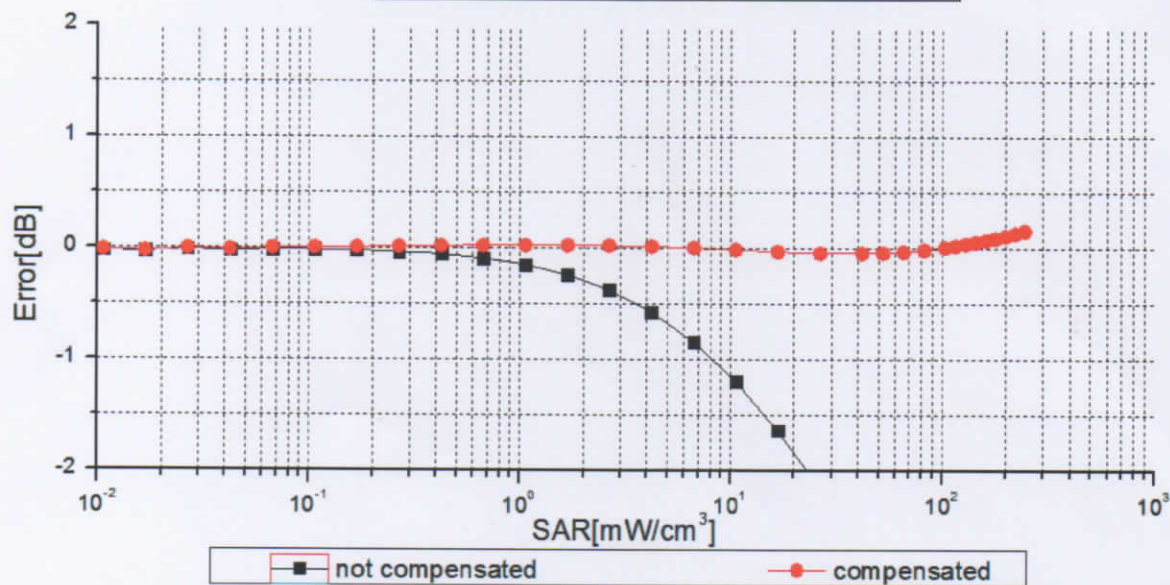
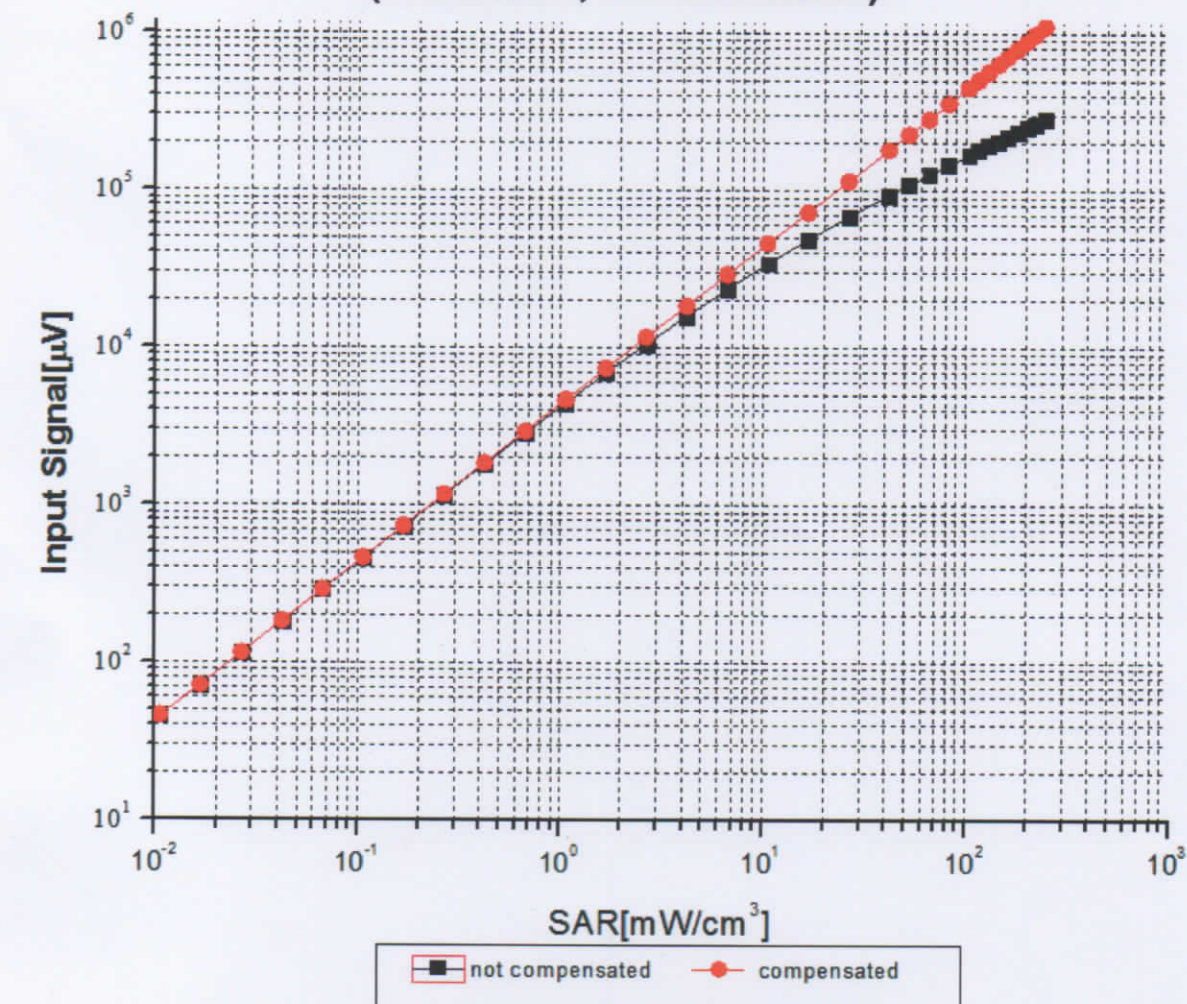
Tel: +86-10-62304633-2512

Fax: +86-10-62304633-2504

E-mail: ctl@chinattl.com

<http://www.chinattl.cn>

Dynamic Range $f(\text{SAR}_{\text{head}})$ (TEM cell, $f = 900 \text{ MHz}$)



Uncertainty of Linearity Assessment: $\pm 0.9\%$ ($k=2$)