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CALIBRATION
CNAS L0570

Client	**Hydsoft Testing Co., Ltd**	Certificate No:	Z18-60058

CALIBRATION CERTIFICATE

Object	ES3DV3 - SN:3090
Calibration Procedure(s)	FF-Z11-004-01 Calibration Procedures for Dosimetric E-field Probes
Calibration date:	April 03, 2018

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	NRP2	101919	27-Jun-17 (CTTL, No.J17X05857)	Jun-18
Power sensor	NRP-Z91	101547	27-Jun-17 (CTTL, No.J17X05857)	Jun-18
Power sensor	NRP-Z91	101548	27-Jun-17 (CTTL, No.J17X05857)	Jun-18
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 3846	25-Jan-18(SPEAG,No.EX3-3846_Jan18)	Jan-19
DAE4		SN 777	15-Dec-17(SPEAG, No.DAE4-777_Dec17)	Dec -18

Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
SignalGeneratorMG3700A	6201052605	27-Jun-17 (CTTL, No.J17X05858)	Jun-18
Network Analyzer E5071C	MY46110673	14-Jan-18 (CTTL, No.J18X00561)	Jan -19

	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: April 04, 2018

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

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,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), θ=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:

a) 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

b) 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

c) 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

d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

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.

- PAR: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics.

- *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≤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.

- *Connector Angle:* The angle is assessed using the information gained by determining the *NORMx* (no uncertainty required).

Probe ES3DV3

SN: 3090

Calibrated: April 03, 2018

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

DASY/EASY – Parameters of Probe: ES3DV3 - SN: 3090

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm(μV/(V/m)^2) [A]	1.25	1.36	1.33	±10.0%
DCP(mV) [B]	102.4	104.0	104.8	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB$\sqrt{\mu}$V	C	D dB	VR mV	Unc [E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	261.7	±2.5%
		Y	0.0	0.0	1.0		275.7	
		Z	0.0	0.0	1.0		274.7	

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 E^2-field uncertainty inside TSL (see Page 5 and Page 6).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainly is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

In Collaboration with

speag

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DASY/EASY – Parameters of Probe: ES3DV3 - SN: 3090

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	6.34	6.34	6.34	0.40	1.30	±12.1%
900	41.5	0.97	6.14	6.14	6.14	0.32	1.76	±12.1%
1750	40.1	1.37	5.30	5.30	5.30	0.65	1.25	±12.1%
1950	40.0	1.40	4.92	4.92	4.92	0.69	1.24	±12.1%
2300	39.5	1.67	4.75	4.75	4.75	0.90	1.15	±12.1%
2450	39.2	1.80	4.54	4.54	4.54	0.90	1.12	±12.1%
2600	39.0	1.96	4.47	4.47	4.47	0.90	1.10	±12.1%

^{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: ES3DV3 - SN: 3090

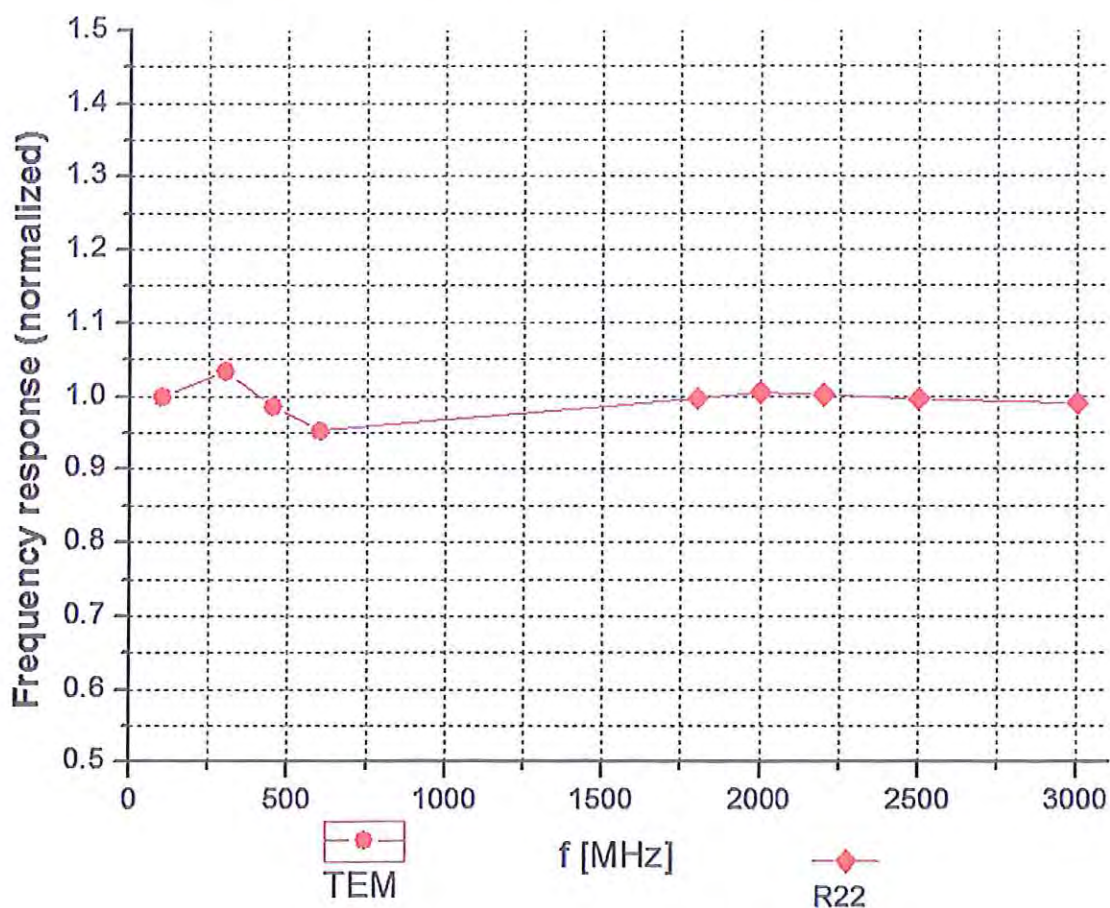## Calibration Parameter Determined in Body Tissue Simulating Media

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	6.41	6.41	6.41	0.40	1.30	±12.1%
900	55.0	1.05	6.20	6.20	6.20	0.48	1.46	±12.1%
1750	53.4	1.49	4.95	4.95	4.95	0.64	1.29	±12.1%
1950	53.3	1.52	4.48	4.48	4.48	0.66	1.30	±12.1%
2300	52.9	1.81	4.52	4.52	4.52	0.90	1.15	±12.1%
2450	52.7	1.95	4.43	4.43	4.43	0.90	1.12	±12.1%
2600	52.5	2.16	4.20	4.20	4.20	0.90	1.07	±12.1%

[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.

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

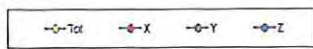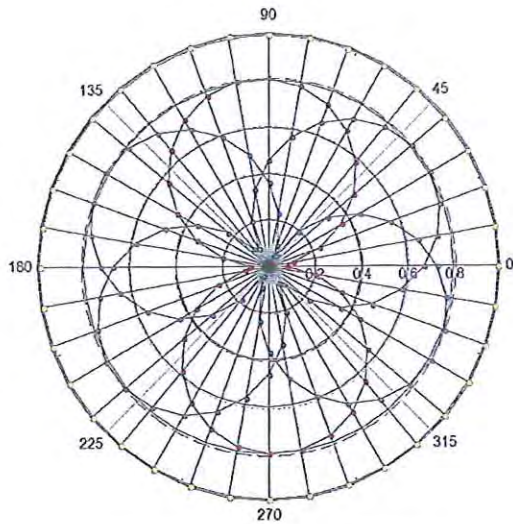**Uncertainty of Frequency Response of E-field: ±7.4% (k=2)**

Receiving Pattern (Φ), θ=0°

f=600 MHz, TEM

f=1800 MHz, R22
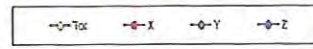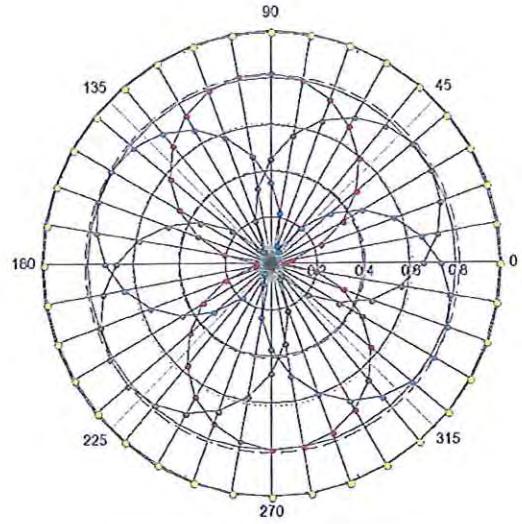
Uncertainty of Axial Isotropy Assessment: ±1.2% (k=2)

In Collaboration with
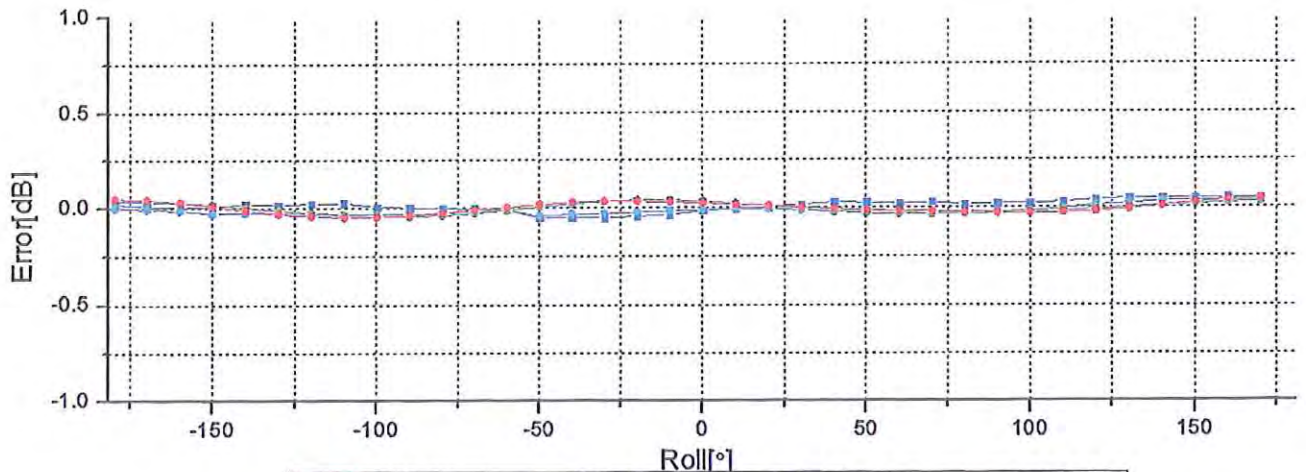**s p e a g**
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Dynamic Range f(SAR$_{head}$)
(TEM cell, f = 900 MHz)

Uncertainty of Linearity Assessment: ±0.9% (k=2)
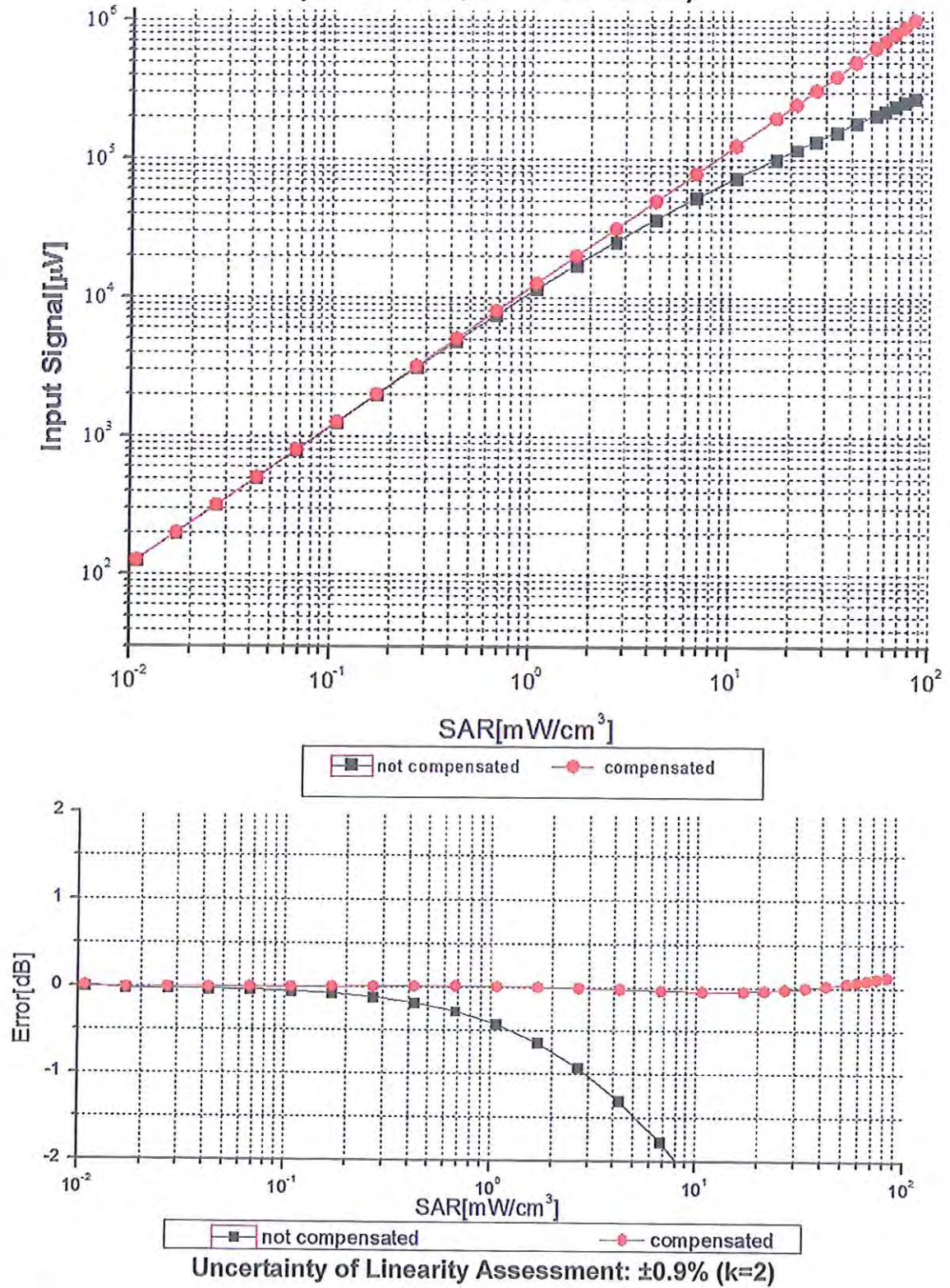
Conversion Factor Assessment

f=750 MHz, WGLS R9(H_convF)

f=1750 MHz, WGLS R22(H_convF)

Deviation from Isotropy in Liquid

Uncertainty of Spherical Isotropy Assessment: ±3.2% (K=2)
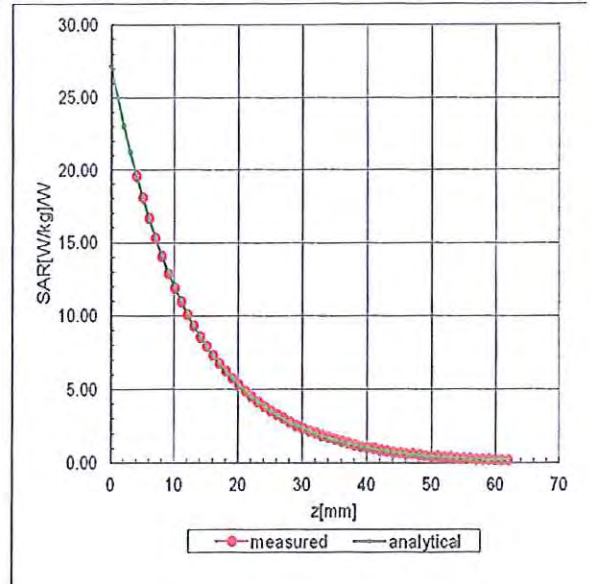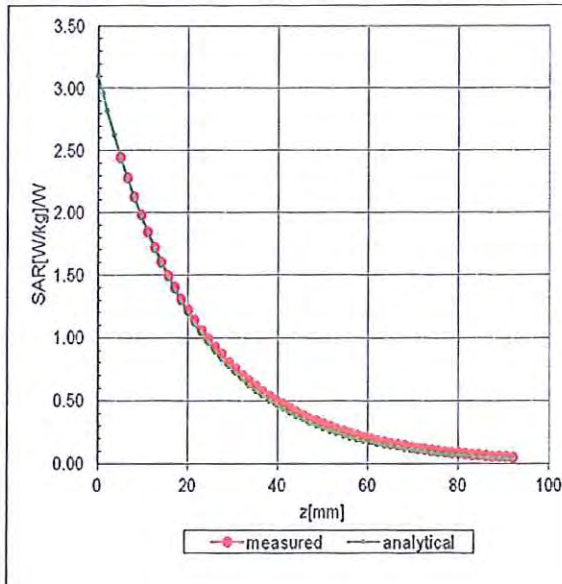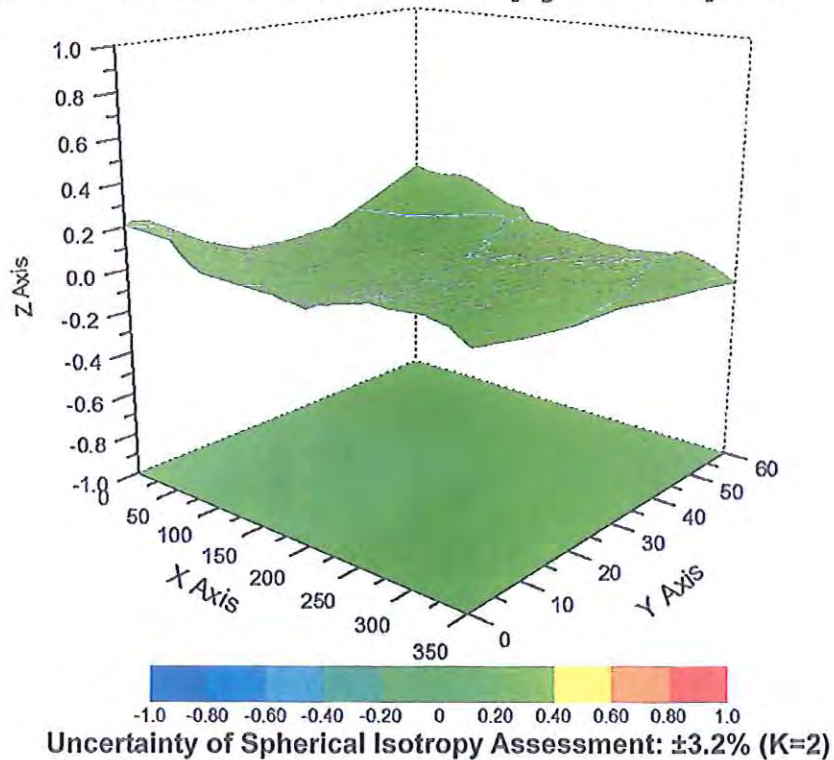
DASY/EASY – Parameters of Probe: ES3DV3 - SN: 3090

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	179.7
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disable
Probe Overall Length	337mm
Probe Body Diameter	10mm
Tip Length	10mm
Tip Diameter	4mm
Probe Tip to Sensor X Calibration Point	2mm
Probe Tip to Sensor Y Calibration Point	2mm
Probe Tip to Sensor Z Calibration Point	2mm
Recommended Measurement Distance from Surface	3mm

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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client   **TüV China (Auden)**

Certificate No: **EX3-7506_Jun18**

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN:7506
Calibration procedure(s)	QA CAL-01.v9, QA CAL-14.v4, QA CAL-23.v5, QA CAL-25.v6 Calibration procedure for dosimetric E-field probes
Calibration date:	June 22, 2018

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 NRP	SN: 104778	04-Apr-18 (No. 217-02672/02673)	Apr-19
Power sensor NRP-Z91	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: S5277 (20x)	04-Apr-18 (No. 217-02682)	Apr-19
Reference Probe ES3DV2	SN: 3013	30-Dec-17 (No. ES3-3013_Dec17)	Dec-18
DAE4	SN: 660	21-Dec-17 (No. DAE4-660_Dec17)	Dec-18
Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-18)	In house check: Jun-20
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-17)	In house check: Oct-18

	Name	Function	Signature
Calibrated by:	Leif Klysner	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: June 23, 2018

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

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,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.e., ϑ = 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:

a) 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

b) 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

c) 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

d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z*: Assessed for E-field polarization ϑ = 0 (f $\leq$ 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 affect 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 with CW signal (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

- *Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z*: A, B, C, D 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 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 $\pm$ 50 MHz to $\pm$ 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.

- *Connector Angle:* The angle is assessed using the information gained by determining the *NORMx* (no uncertainty required).

Probe EX3DV4

SN:7506

Manufactured: November 13, 2017
Calibrated: June 22, 2018

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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:7506

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm (μV/(V/m)^2)^A	0.55	0.42	0.52	± 10.1 %
DCP (mV)^B	103.5	92.7	101.0	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB$\sqrt{\mu}$V	C	D dB	VR mV	Unc^E (k=2)
0	CW	X	0.0	0.0	1.0	0.00	145.2	±3.0 %
		Y	0.0	0.0	1.0		148.7	
		Z	0.0	0.0	1.0		144.1	

Note: For details on UID parameters see Appendix.

Sensor Model Parameters

	C1 fF	C2 fF	α V^{-1}	T1 ms.V^{-2}	T2 ms.V^{-1}	T3 ms	T4 V^{-2}	T5 V^{-1}	T6
X	37.72	279.8	35.17	7.945	0.000	5.035	1.979	0.082	1.007
Y	31.70	240.9	36.60	3.393	0.204	5.01	0.000	0.274	1.007
Z	35.25	262.5	35.38	7.701	0.000	5.041	2.000	0.055	1.007

> 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 E^2-field uncertainty inside TSL (see Pages 5 and 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:7506

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)	Unc (k=2)
750	41.9	0.89	10.49	10.49	10.49	0.43	0.91	± 12.0 %
835	41.5	0.90	10.07	10.07	10.07	0.46	0.85	± 12.0 %
900	41.5	0.97	9.83	9.83	9.83	0.53	0.80	± 12.0 %
1750	40.1	1.37	9.10	9.10	9.10	0.41	0.87	± 12.0 %
1810	40.0	1.40	8.66	8.66	8.66	0.37	0.85	± 12.0 %
1900	40.0	1.40	8.58	8.58	8.58	0.43	0.80	± 12.0 %
2000	40.0	1.40	8.61	8.61	8.61	0.40	0.80	± 12.0 %
2300	39.5	1.67	8.22	8.22	8.22	0.47	0.80	± 12.0 %
2450	39.2	1.80	7.86	7.86	7.86	0.37	0.85	± 12.0 %
2600	39.0	1.96	7.65	7.65	7.65	0.36	0.88	± 12.0 %
3500	37.9	2.91	7.09	7.09	7.09	0.22	1.20	± 13.1 %
3700	37.7	3.12	7.00	7.00	7.00	0.25	1.20	± 13.1 %
5200	36.0	4.66	5.65	5.65	5.65	0.35	1.80	± 13.1 %
5300	35.9	4.76	5.46	5.46	5.46	0.35	1.80	± 13.1 %
5500	35.6	4.96	5.17	5.17	5.17	0.40	1.80	± 13.1 %
5600	35.5	5.07	4.96	4.96	4.96	0.40	1.80	± 13.1 %
5800	35.3	5.27	5.10	5.10	5.10	0.40	1.80	± 13.1 %

[C] Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the 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 frequencies 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 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:7506

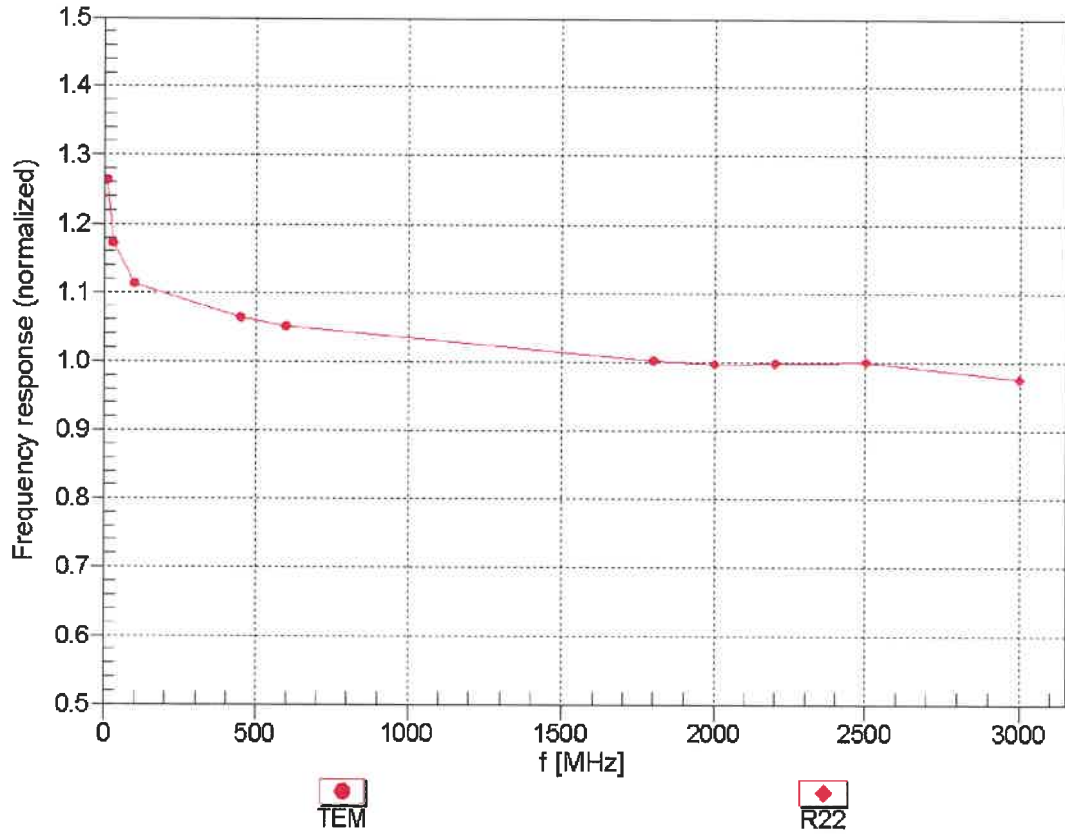## Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unc (k=2)
750	55.5	0.96	10.45	10.45	10.45	0.53	0.83	± 12.0 %
835	55.2	0.97	10.16	10.16	10.16	0.48	0.85	± 12.0 %
900	55.0	1.05	10.04	10.04	10.04	0.51	0.80	± 12.0 %
1750	53.4	1.49	8.43	8.43	8.43	0.43	0.80	± 12.0 %
1810	53.3	1.52	8.21	8.21	8.21	0.35	0.98	± 12.0 %
1900	53.3	1.52	8.08	8.08	8.08	0.41	0.80	± 12.0 %
2000	53.3	1.52	8.15	8.15	8.15	0.47	0.80	± 12.0 %
2300	52.9	1.81	7.73	7.73	7.73	0.37	0.92	± 12.0 %
2450	52.7	1.95	7.65	7.65	7.65	0.37	0.85	± 12.0 %
2600	52.5	2.16	7.56	7.56	7.56	0.34	0.92	± 12.0 %
3500	51.3	3.31	7.02	7.02	7.02	0.23	1.25	± 13.1 %
3700	51.0	3.55	6.98	6.98	6.98	0.24	1.25	± 13.1 %
5200	49.0	5.30	5.09	5.09	5.09	0.55	1.90	± 13.1 %
5300	48.9	5.42	4.91	4.91	4.91	0.55	1.90	± 13.1 %
5500	48.6	5.65	4.32	4.32	4.32	0.55	1.90	± 13.1 %
5600	48.5	5.77	4.25	4.25	4.25	0.55	1.90	± 13.1 %
5800	48.2	6.00	4.31	4.31	4.31	0.55	1.90	± 13.1 %

[C] Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the 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 frequencies 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 frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

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

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

Receiving Pattern (φ), ϑ = 0°

f=600 MHz,TEM

| Tot | X | Y | Z |

f=1800 MHz,R22

| Tot | X | Y | Z |

| 100 MHz | 600 MHz | 1800 MHz | 2500 MHz |
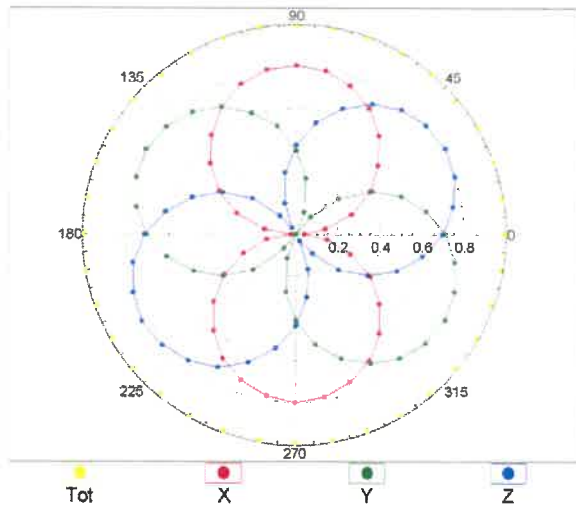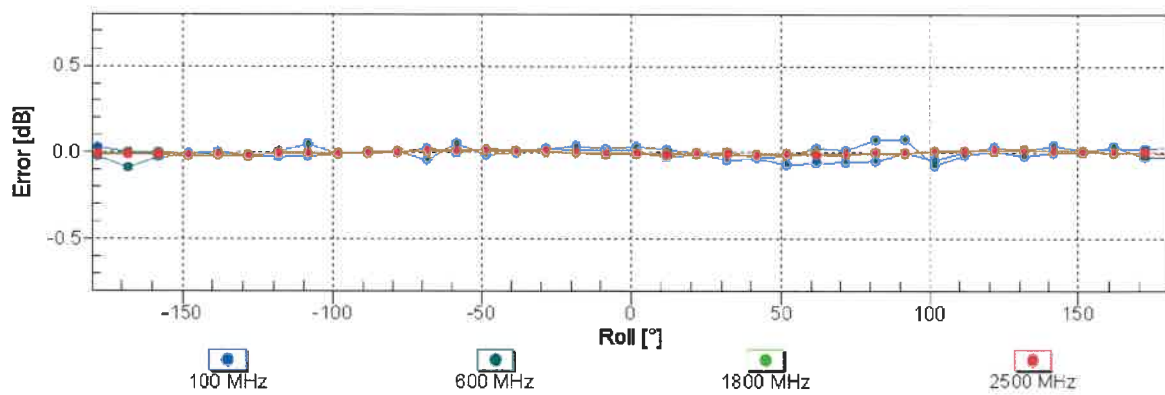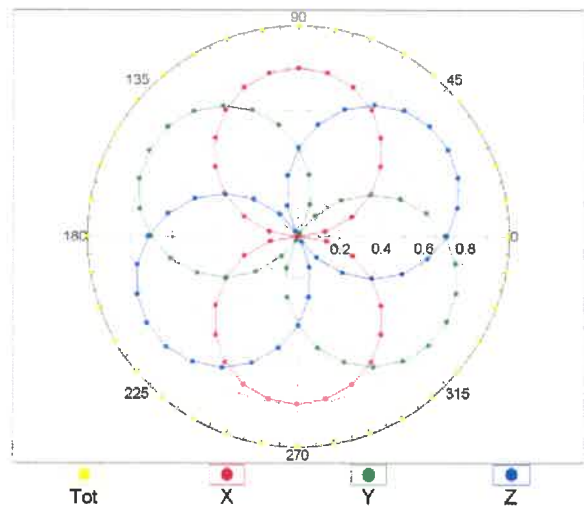
Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR$_{head}$)
(TEM cell , f$_{eval}$= 1900 MHz)
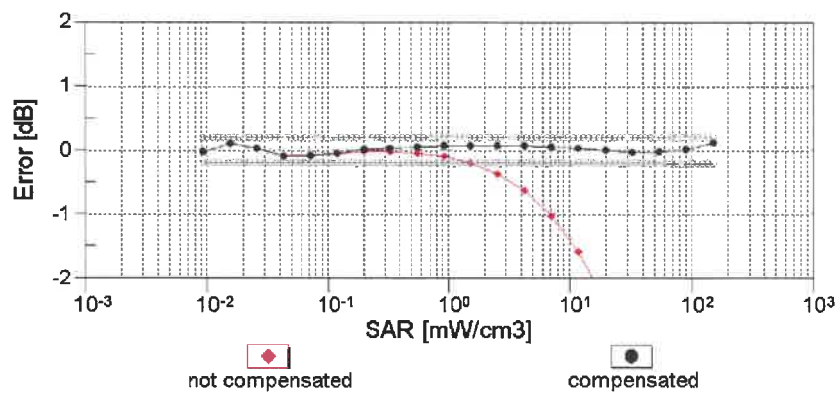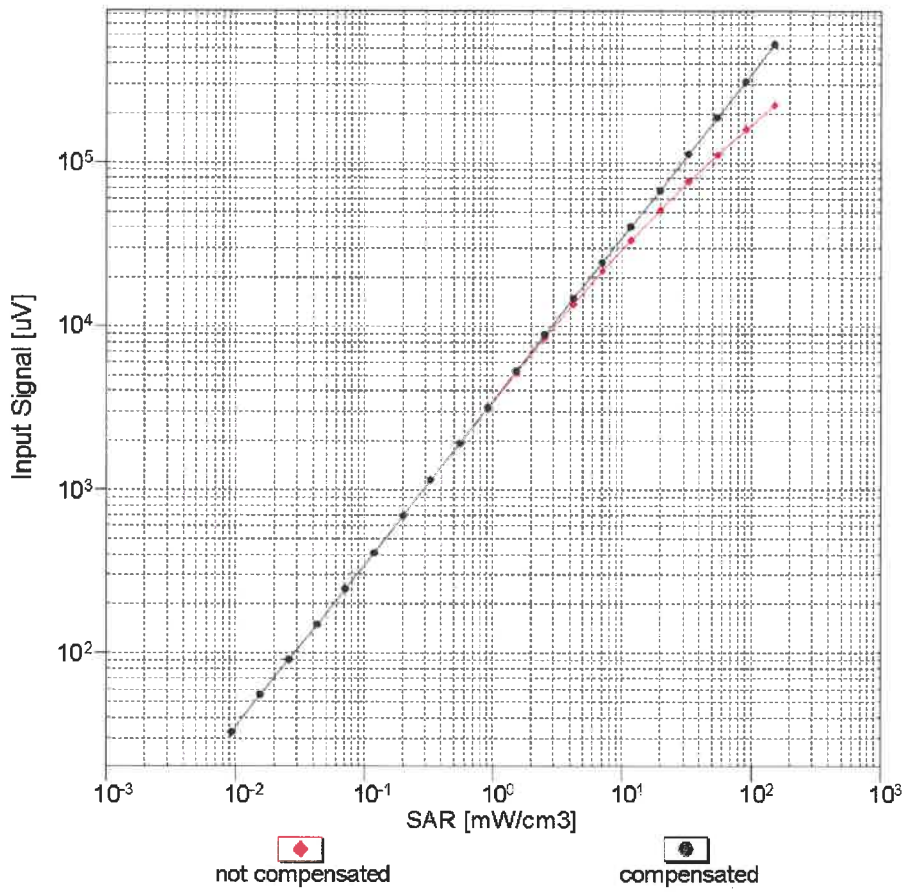
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment
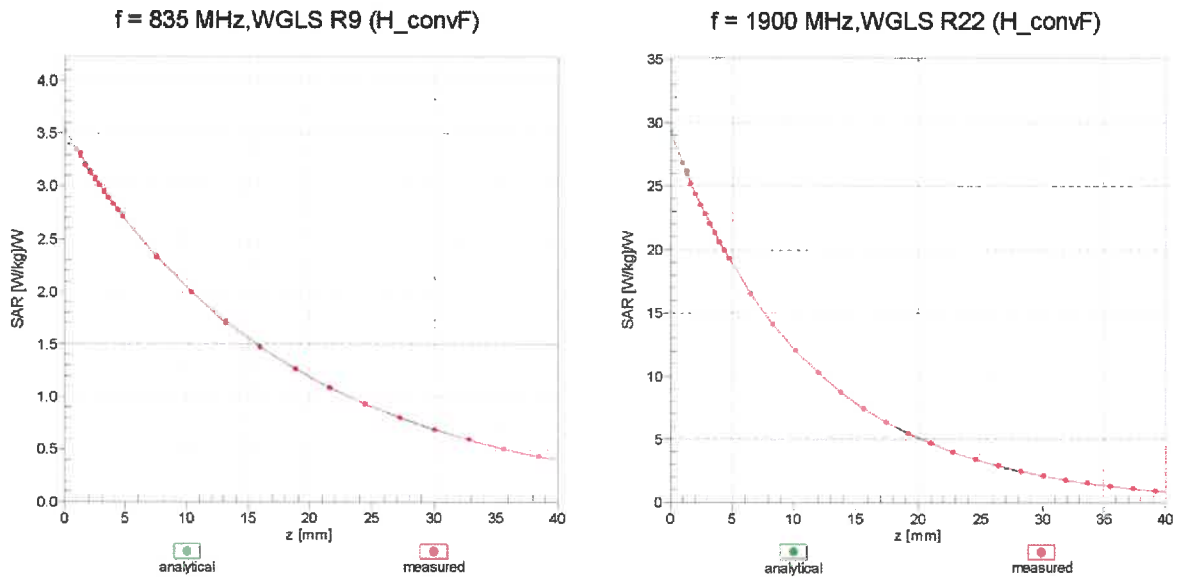
f = 835 MHz,WGLS R9 (H_convF)   f = 1900 MHz,WGLS R22 (H_convF)

Deviation from Isotropy in Liquid
Error (φ, ϑ), f = 900 MHz

Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)
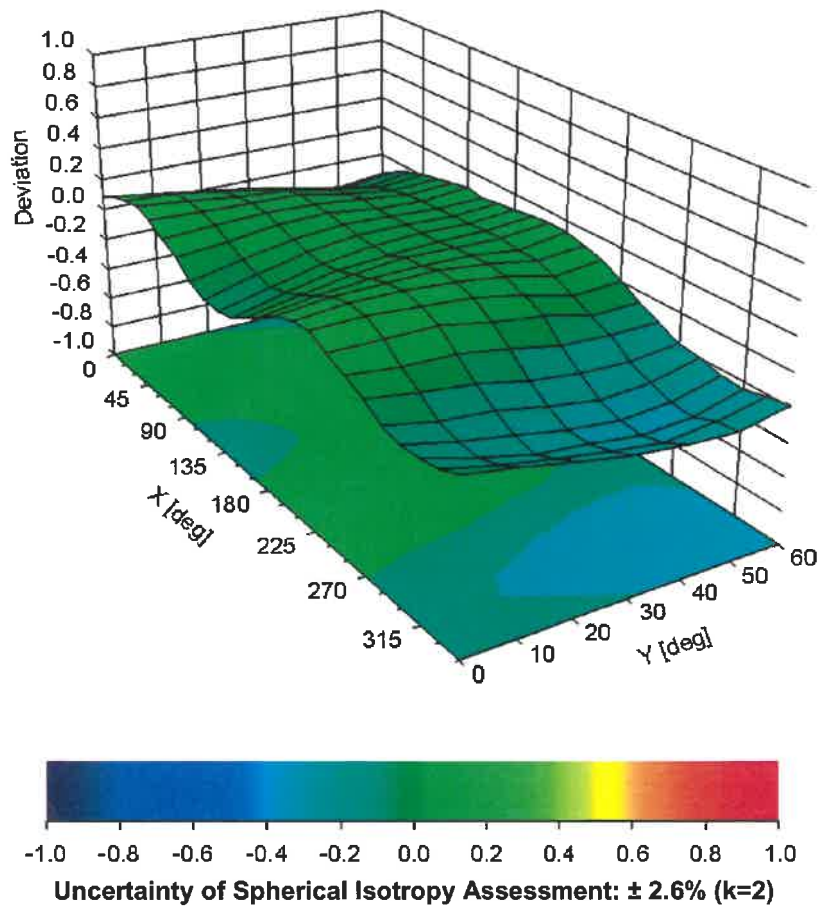
DASY/EASY - Parameters of Probe: EX3DV4 - SN:7506

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	61.9
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

Appendix: Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Max Unc[E] (k=2)
0	CW	X	0.00	0.00	1.00	0.00	145.2	± 3.0 %
		Y	0.00	0.00	1.00		148.7	
		Z	0.00	0.00	1.00		144.1	
10010-CAA	SAR Validation (Square, 100ms, 10ms)	X	1.50	62.85	7.85	10.00	20.0	± 9.6 %
		Y	1.42	61.44	6.91		20.0	
		Z	1.56	63.25	8.14		20.0	
10011-CAB	UMTS-FDD (WCDMA)	X	0.96	66.62	14.65	0.00	150.0	± 9.6 %
		Y	0.81	64.97	13.16		150.0	
		Z	0.92	65.94	14.14		150.0	
10012-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps)	X	1.12	63.35	14.80	0.41	150.0	± 9.6 %
		Y	1.02	62.46	13.98		150.0	
		Z	1.11	63.15	14.59		150.0	
10013-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps)	X	4.69	66.61	16.91	1.46	150.0	± 9.6 %
		Y	4.50	66.38	16.66		150.0	
		Z	4.65	66.62	16.89		150.0	
10021-DAC	GSM-FDD (TDMA, GMSK)	X	100.00	106.44	22.97	9.39	50.0	± 9.6 %
		Y	4.60	72.97	13.10		50.0	
		Z	100.00	107.51	23.48		50.0	
10023-DAC	GPRS-FDD (TDMA, GMSK, TN 0)	X	100.00	105.84	22.75	9.57	50.0	± 9.6 %
		Y	3.76	70.66	12.22		50.0	
		Z	100.00	106.80	23.21		50.0	
10024-DAC	GPRS-FDD (TDMA, GMSK, TN 0-1)	X	100.00	107.31	22.34	6.56	60.0	± 9.6 %
		Y	2.31	69.64	10.73		60.0	
		Z	100.00	108.80	23.00		60.0	
10025-DAC	EDGE-FDD (TDMA, 8PSK, TN 0)	X	5.89	85.48	35.06	12.57	50.0	± 9.6 %
		Y	3.25	64.58	22.69		50.0	
		Z	5.89	85.52	35.19		50.0	
10026-DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1)	X	6.57	87.74	32.01	9.56	60.0	± 9.6 %
		Y	4.72	78.55	27.43		60.0	
		Z	6.22	86.51	31.63		60.0	
10027-DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2)	X	100.00	110.01	22.79	4.80	80.0	± 9.6 %
		Y	1.48	68.20	9.44		80.0	
		Z	100.00	111.93	23.62		80.0	
10028-DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)	X	100.00	114.27	23.95	3.55	100.0	± 9.6 %
		Y	0.63	64.19	7.22		100.0	
		Z	100.00	116.53	24.89		100.0	
10029-DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2)	X	4.17	76.48	25.88	7.80	80.0	± 9.6 %
		Y	3.33	71.26	23.03		80.0	
		Z	4.04	75.80	25.65		80.0	
10030-CAA	IEEE 802.15.1 Bluetooth (GFSK, DH1)	X	100.00	105.85	21.28	5.30	70.0	± 9.6 %
		Y	0.92	63.64	7.63		70.0	
		Z	100.00	107.19	21.86		70.0	
10031-CAA	IEEE 802.15.1 Bluetooth (GFSK, DH3)	X	100.00	109.32	20.72	1.88	100.0	± 9.6 %
		Y	0.20	60.00	3.15		100.0	
		Z	100.00	110.21	21.07		100.0	

10061-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps)	X	1.82	74.80	20.25	2.04	110.0	± 9.6 %
		Y	1.24	68.97	17.06		110.0	
		Z	1.74	73.92	19.83		110.0	
10062-CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)	X	4.50	66.63	16.36	0.49	100.0	± 9.6 %
		Y	4.32	66.38	16.11		100.0	
		Z	4.46	66.59	16.31		100.0	
10063-CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps)	X	4.51	66.70	16.45	0.72	100.0	± 9.6 %
		Y	4.33	66.45	16.19		100.0	
		Z	4.47	66.68	16.40		100.0	
10064-CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps)	X	4.76	66.92	16.65	0.86	100.0	± 9.6 %
		Y	4.55	66.65	16.39		100.0	
		Z	4.71	66.89	16.61		100.0	
10065-CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps)	X	4.62	66.75	16.72	1.21	100.0	± 9.6 %
		Y	4.42	66.43	16.43		100.0	
		Z	4.58	66.72	16.68		100.0	
10066-CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps)	X	4.63	66.74	16.87	1.46	100.0	± 9.6 %
		Y	4.41	66.38	16.55		100.0	
		Z	4.58	66.70	16.83		100.0	
10067-CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps)	X	4.91	66.98	17.34	2.04	100.0	± 9.6 %
		Y	4.69	66.66	17.02		100.0	
		Z	4.87	66.99	17.33		100.0	
10068-CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps)	X	4.93	66.89	17.50	2.55	100.0	± 9.6 %
		Y	4.71	66.55	17.17		100.0	
		Z	4.89	66.88	17.48		100.0	
10069-CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps)	X	5.00	66.91	17.70	2.67	100.0	± 9.6 %
		Y	4.77	66.56	17.34		100.0	
		Z	4.95	66.91	17.68		100.0	
10071-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 9 Mbps)	X	4.77	66.66	17.20	1.99	100.0	± 9.6 %
		Y	4.59	66.41	16.93		100.0	
		Z	4.74	66.67	17.18		100.0	
10072-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 12 Mbps)	X	4.72	66.88	17.38	2.30	100.0	± 9.6 %
		Y	4.52	66.55	17.06		100.0	
		Z	4.68	66.88	17.36		100.0	
10073-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 18 Mbps)	X	4.76	67.00	17.69	2.83	100.0	± 9.6 %
		Y	4.57	66.69	17.36		100.0	
		Z	4.73	67.03	17.69		100.0	
10074-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 24 Mbps)	X	4.75	66.90	17.83	3.30	100.0	± 9.6 %
		Y	4.57	66.63	17.51		100.0	
		Z	4.73	66.95	17.84		100.0	
10075-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 36 Mbps)	X	4.75	66.89	18.08	3.82	90.0	± 9.6 %
		Y	4.58	66.59	17.72		90.0	
		Z	4.73	66.94	18.09		90.0	
10076-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 48 Mbps)	X	4.78	66.73	18.23	4.15	90.0	± 9.6 %
		Y	4.62	66.47	17.89		90.0	
		Z	4.77	66.80	18.26		90.0	
10077-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 54 Mbps)	X	4.81	66.80	18.33	4.30	90.0	± 9.6 %
		Y	4.65	66.55	18.00		90.0	
		Z	4.79	66.88	18.37		90.0	

10112-CAE	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	X	2.87	67.18	15.65	0.00	150.0	± 9.6 %
		Y	2.68	66.64	15.17		150.0	
		Z	2.81	66.98	15.48		150.0	
10113-CAE	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	X	2.61	68.28	15.89	0.00	150.0	± 9.6 %
		Y	2.38	67.60	15.12		150.0	
		Z	2.54	67.99	15.61		150.0	
10114-CAC	IEEE 802.11n (HT Greenfield, 13.5 Mbps, BPSK)	X	4.97	67.07	16.33	0.00	150.0	± 9.6 %
		Y	4.83	66.88	16.22		150.0	
		Z	4.92	67.00	16.28		150.0	
10115-CAC	IEEE 802.11n (HT Greenfield, 81 Mbps, 16-QAM)	X	5.22	67.15	16.37	0.00	150.0	± 9.6 %
		Y	5.06	66.94	16.25		150.0	
		Z	5.17	67.07	16.32		150.0	
10116-CAC	IEEE 802.11n (HT Greenfield, 135 Mbps, 64-QAM)	X	5.05	67.26	16.35	0.00	150.0	± 9.6 %
		Y	4.89	67.02	16.22		150.0	
		Z	5.00	67.18	16.30		150.0	
10117-CAC	IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK)	X	4.96	67.02	16.32	0.00	150.0	± 9.6 %
		Y	4.80	66.76	16.18		150.0	
		Z	4.92	66.95	16.27		150.0	
10118-CAC	IEEE 802.11n (HT Mixed, 81 Mbps, 16-QAM)	X	5.28	67.31	16.46	0.00	150.0	± 9.6 %
		Y	5.13	67.13	16.35		150.0	
		Z	5.24	67.26	16.42		150.0	
10119-CAC	IEEE 802.11n (HT Mixed, 135 Mbps, 64-QAM)	X	5.05	67.25	16.35	0.00	150.0	± 9.6 %
		Y	4.90	67.05	16.24		150.0	
		Z	5.00	67.18	16.30		150.0	
10140-CAD	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	X	3.23	67.25	15.75	0.00	150.0	± 9.6 %
		Y	3.04	66.70	15.36		150.0	
		Z	3.18	67.06	15.61		150.0	
10141-CAD	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	X	3.36	67.40	15.93	0.00	150.0	± 9.6 %
		Y	3.17	66.92	15.59		150.0	
		Z	3.30	67.23	15.81		150.0	
10142-CAD	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	X	1.79	68.06	15.11	0.00	150.0	± 9.6 %
		Y	1.50	66.39	13.62		150.0	
		Z	1.70	67.45	14.62		150.0	
10143-CAD	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	X	2.27	68.52	15.03	0.00	150.0	± 9.6 %
		Y	1.89	66.68	13.33		150.0	
		Z	2.15	67.90	14.49		150.0	
10144-CAD	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	X	1.99	65.90	13.20	0.00	150.0	± 9.6 %
		Y	1.65	64.20	11.50		150.0	
		Z	1.89	65.35	12.68		150.0	
10145-CAE	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	X	0.88	62.25	9.02	0.00	150.0	± 9.6 %
		Y	0.60	60.00	6.19		150.0	
		Z	0.77	61.26	8.01		150.0	
10146-CAE	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	X	1.28	62.33	8.17	0.00	150.0	± 9.6 %
		Y	0.80	60.00	5.76		150.0	
		Z	1.11	61.23	7.16		150.0	
10147-CAE	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	X	1.38	63.03	8.64	0.00	150.0	± 9.6 %
		Y	0.81	60.00	5.82		150.0	
		Z	1.17	61.68	7.49		150.0	

10168-CAE	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	X	5.19	77.75	22.14	3.01	150.0	± 9.6 %
		Y	3.52	72.25	20.07		150.0	
		Z	4.97	77.39	22.02		150.0	
10169-CAD	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	X	2.89	69.70	19.27	3.01	150.0	± 9.6 %
		Y	2.26	65.50	17.29		150.0	
		Z	2.81	69.24	19.06		150.0	
10170-CAD	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	X	4.59	78.92	22.86	3.01	150.0	± 9.6 %
		Y	2.59	69.39	19.12		150.0	
		Z	4.31	78.05	22.54		150.0	
10171-AAD	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	X	3.48	73.12	19.40	3.01	150.0	± 9.6 %
		Y	2.20	66.07	16.41		150.0	
		Z	3.31	72.53	19.17		150.0	
10172-CAD	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	X	4.25	82.41	26.10	6.02	65.0	± 9.6 %
		Y	2.64	73.12	21.93		65.0	
		Z	3.88	80.95	25.68		65.0	
10173-CAD	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	X	19.29	107.38	31.82	6.02	65.0	± 9.6 %
		Y	3.34	76.88	21.72		65.0	
		Z	15.68	104.61	31.25		65.0	
10174-CAD	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	X	16.57	102.91	29.80	6.02	65.0	± 9.6 %
		Y	2.58	72.15	19.23		65.0	
		Z	14.37	101.42	29.58		65.0	
10175-CAE	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	X	2.86	69.38	19.01	3.01	150.0	± 9.6 %
		Y	2.24	65.25	17.06		150.0	
		Z	2.77	68.94	18.81		150.0	
10176-CAE	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	X	4.60	78.95	22.87	3.01	150.0	± 9.6 %
		Y	2.60	69.41	19.13		150.0	
		Z	4.32	78.08	22.55		150.0	
10177-CAG	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	X	2.88	69.52	19.09	3.01	150.0	± 9.6 %
		Y	2.25	65.36	17.13		150.0	
		Z	2.79	69.07	18.89		150.0	
10178-CAE	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	X	4.55	78.72	22.76	3.01	150.0	± 9.6 %
		Y	2.58	69.30	19.06		150.0	
		Z	4.28	77.88	22.45		150.0	
10179-CAE	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	X	3.97	75.84	20.97	3.01	150.0	± 9.6 %
		Y	2.37	67.62	17.63		150.0	
		Z	3.76	75.12	20.70		150.0	
10180-CAE	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	X	3.47	73.06	19.36	3.01	150.0	± 9.6 %
		Y	2.20	66.05	16.38		150.0	
		Z	3.31	72.48	19.13		150.0	
10181-CAD	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	X	2.87	69.51	19.09	3.01	150.0	± 9.6 %
		Y	2.25	65.34	17.12		150.0	
		Z	2.79	69.05	18.88		150.0	
10182-CAD	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	X	4.54	78.69	22.74	3.01	150.0	± 9.6 %
		Y	2.58	69.27	19.05		150.0	
		Z	4.27	77.84	22.44		150.0	
10183-AAC	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	X	3.47	73.03	19.35	3.01	150.0	± 9.6 %
		Y	2.20	66.03	16.37		150.0	
		Z	3.30	72.45	19.12		150.0	

10223-CAC	IEEE 802.11n (HT Mixed, 90 Mbps, 16-QAM)	X	5.20	67.20	16.42	0.00	150.0	± 9.6 %
		Y	5.02	66.91	16.25		150.0	
		Z	5.15	67.13	16.37		150.0	
10224-CAC	IEEE 802.11n (HT Mixed, 150 Mbps, 64-QAM)	X	4.97	67.11	16.28	0.00	150.0	± 9.6 %
		Y	4.82	66.89	16.16		150.0	
		Z	4.93	67.04	16.24		150.0	
10225-CAB	UMTS-FDD (HSPA+)	X	2.65	66.05	14.87	0.00	150.0	± 9.6 %
		Y	2.44	65.46	14.07		150.0	
		Z	2.59	65.87	14.61		150.0	
10226-CAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	X	22.08	110.03	32.67	6.02	65.0	± 9.6 %
		Y	3.49	77.77	22.17		65.0	
		Z	17.77	107.09	32.07		65.0	
10227-CAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	X	21.78	107.42	31.06	6.02	65.0	± 9.6 %
		Y	3.49	77.13	21.24		65.0	
		Z	17.94	105.08	30.62		65.0	
10228-CAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	X	5.89	89.13	28.61	6.02	65.0	± 9.6 %
		Y	2.76	74.18	22.46		65.0	
		Z	5.16	86.90	27.96		65.0	
10229-CAB	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	X	19.51	107.55	31.87	6.02	65.0	± 9.6 %
		Y	3.36	76.97	21.76		65.0	
		Z	15.85	104.77	31.30		65.0	
10230-CAB	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	X	18.95	104.89	30.27	6.02	65.0	± 9.6 %
		Y	3.33	76.26	20.83		65.0	
		Z	15.70	102.64	29.84		65.0	
10231-CAB	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	X	5.63	88.15	28.17	6.02	65.0	± 9.6 %
		Y	2.69	73.62	22.13		65.0	
		Z	4.95	85.99	27.54		65.0	
10232-CAD	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	X	19.47	107.53	31.87	6.02	65.0	± 9.6 %
		Y	3.35	76.95	21.75		65.0	
		Z	15.81	104.75	31.29		65.0	
10233-CAD	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	X	18.85	104.82	30.26	6.02	65.0	± 9.6 %
		Y	3.32	76.23	20.82		65.0	
		Z	15.61	102.57	29.83		65.0	
10234-CAD	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	X	5.45	87.36	27.76	6.02	65.0	± 9.6 %
		Y	2.64	73.18	21.82		65.0	
		Z	4.80	85.28	27.16		65.0	
10235-CAD	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	X	19.53	107.61	31.89	6.02	65.0	± 9.6 %
		Y	3.35	76.96	21.76		65.0	
		Z	15.86	104.82	31.32		65.0	
10236-CAD	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	X	19.32	105.19	30.35	6.02	65.0	± 9.6 %
		Y	3.35	76.35	20.86		65.0	
		Z	15.99	102.93	29.92		65.0	
10237-CAD	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	X	5.63	88.20	28.20	6.02	65.0	± 9.6 %
		Y	2.69	73.61	22.13		65.0	
		Z	4.95	86.02	27.56		65.0	
10238-CAD	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	X	19.41	107.50	31.86	6.02	65.0	± 9.6 %
		Y	3.34	76.93	21.74		65.0	
		Z	15.76	104.71	31.28		65.0	

10255-CAD	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	X	5.17	76.03	21.01	3.98	65.0	± 9.6 %
		Y	4.15	72.78	19.31		65.0	
		Z	5.07	75.91	20.96		65.0	
10256-CAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	X	2.73	66.15	11.81	3.98	65.0	± 9.6 %
		Y	1.74	61.79	8.43		65.0	
		Z	2.48	65.11	10.98		65.0	
10257-CAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	X	2.65	65.49	11.37	3.98	65.0	± 9.6 %
		Y	1.74	61.53	8.17		65.0	
		Z	2.42	64.52	10.57		65.0	
10258-CAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	X	2.42	67.72	13.32	3.98	65.0	± 9.6 %
		Y	1.51	62.43	9.30		65.0	
		Z	2.19	66.50	12.43		65.0	
10259-CAB	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	X	4.15	72.23	17.99	3.98	65.0	± 9.6 %
		Y	3.17	68.42	15.39		65.0	
		Z	4.01	71.79	17.61		65.0	
10260-CAB	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	X	4.17	71.94	17.84	3.98	65.0	± 9.6 %
		Y	3.21	68.24	15.29		65.0	
		Z	4.03	71.50	17.46		65.0	
10261-CAB	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	X	4.90	78.24	20.83	3.98	65.0	± 9.6 %
		Y	3.34	72.46	17.68		65.0	
		Z	4.72	77.76	20.53		65.0	
10262-CAD	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	X	4.69	73.94	20.07	3.98	65.0	± 9.6 %
		Y	3.83	70.99	18.23		65.0	
		Z	4.58	73.71	19.88		65.0	
10263-CAD	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	X	4.49	71.96	18.80	3.98	65.0	± 9.6 %
		Y	3.66	69.08	16.90		65.0	
		Z	4.37	71.69	18.58		65.0	
10264-CAD	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	X	5.34	79.07	21.92	3.98	65.0	± 9.6 %
		Y	3.91	74.33	19.52		65.0	
		Z	5.19	78.81	21.79		65.0	
10265-CAD	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	X	4.76	71.82	19.32	3.98	65.0	± 9.6 %
		Y	4.04	69.39	17.87		65.0	
		Z	4.67	71.65	19.22		65.0	
10266-CAD	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	X	5.10	72.82	20.12	3.98	65.0	± 9.6 %
		Y	4.36	70.51	18.78		65.0	
		Z	5.02	72.67	20.04		65.0	
10267-CAD	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	X	5.44	76.75	21.13	3.98	65.0	± 9.6 %
		Y	4.31	73.31	19.44		65.0	
		Z	5.32	76.60	21.10		65.0	
10268-CAD	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	X	5.41	71.89	19.80	3.98	65.0	± 9.6 %
		Y	4.72	69.84	18.66		65.0	
		Z	5.32	71.75	19.75		65.0	
10269-CAD	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	X	5.42	71.53	19.67	3.98	65.0	± 9.6 %
		Y	4.76	69.60	18.57		65.0	
		Z	5.34	71.42	19.63		65.0	
10270-CAD	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	X	5.45	74.16	20.18	3.98	65.0	± 9.6 %
		Y	4.61	71.72	18.96		65.0	
		Z	5.37	74.07	20.18		65.0	

10303-AAA	IEEE 802.16e WiMAX (31:15, 5ms, 10MHz, 64QAM, PUSC)	X	4.59	65.15	17.50	4.96	50.0	± 9.6 %
		Y	4.35	64.95	17.15		50.0	
		Z	4.55	65.21	17.44		50.0	
10304-AAA	IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, 64QAM, PUSC)	X	4.43	65.14	17.06	4.17	50.0	± 9.6 %
		Y	4.17	64.73	16.57		50.0	
		Z	4.39	65.19	16.99		50.0	
10305-AAA	IEEE 802.16e WiMAX (31:15, 10ms, 10MHz, 64QAM, PUSC, 15 symbols)	X	3.81	65.65	18.15	6.02	35.0	± 9.6 %
		Y	3.61	65.33	17.29		35.0	
		Z	3.79	65.81	18.03		35.0	
10306-AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 64QAM, PUSC, 18 symbols)	X	4.24	65.34	18.17	6.02	35.0	± 9.6 %
		Y	4.02	65.08	17.54		35.0	
		Z	4.21	65.48	18.11		35.0	
10307-AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, QPSK, PUSC, 18 symbols)	X	4.10	65.28	18.03	6.02	35.0	± 9.6 %
		Y	3.89	64.99	17.37		35.0	
		Z	4.08	65.41	17.95		35.0	
10308-AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 16QAM, PUSC)	X	4.07	65.43	18.16	6.02	35.0	± 9.6 %
		Y	3.86	65.13	17.49		35.0	
		Z	4.05	65.56	18.08		35.0	
10309-AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 16QAM, AMC 2x3, 18 symbols)	X	4.26	65.44	18.28	6.02	35.0	± 9.6 %
		Y	4.03	65.11	17.61		35.0	
		Z	4.23	65.56	18.20		35.0	
10310-AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, QPSK, AMC 2x3, 18 symbols)	X	4.18	65.34	18.13	6.02	35.0	± 9.6 %
		Y	3.97	65.10	17.51		35.0	
		Z	4.16	65.49	18.07		35.0	
10311-AAC	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	X	2.91	68.44	15.99	0.00	150.0	± 9.6 %
		Y	2.65	67.41	15.41		150.0	
		Z	2.83	68.04	15.78		150.0	
10313-AAA	iDEN 1:3	X	2.65	72.33	15.95	6.99	70.0	± 9.6 %
		Y	1.60	66.26	12.84		70.0	
		Z	2.64	72.46	16.12		70.0	
10314-AAA	iDEN 1:6	X	4.23	81.41	22.53	10.00	30.0	± 9.6 %
		Y	2.80	73.62	18.77		30.0	
		Z	4.15	81.28	22.61		30.0	
10315-AAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 96pc duty cycle)	X	1.04	63.35	14.75	0.17	150.0	± 9.6 %
		Y	0.95	62.52	13.96		150.0	
		Z	1.03	63.13	14.51		150.0	
10316-AAB	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 96pc duty cycle)	X	4.41	66.63	16.13	0.17	150.0	± 9.6 %
		Y	4.22	66.36	15.88		150.0	
		Z	4.36	66.58	16.07		150.0	
10317-AAC	IEEE 802.11a WiFi 5 GHz (OFDM, 6 Mbps, 96pc duty cycle)	X	4.41	66.63	16.13	0.17	150.0	± 9.6 %
		Y	4.22	66.36	15.88		150.0	
		Z	4.36	66.58	16.07		150.0	
10400-AAD	IEEE 802.11ac WiFi (20MHz, 64-QAM, 99pc duty cycle)	X	4.49	66.95	16.15	0.00	150.0	± 9.6 %
		Y	4.29	66.67	15.92		150.0	
		Z	4.43	66.87	16.07		150.0	
10401-AAD	IEEE 802.11ac WiFi (40MHz, 64-QAM, 99pc duty cycle)	X	5.16	66.86	16.21	0.00	150.0	± 9.6 %
		Y	4.97	66.49	16.00		150.0	
		Z	5.10	66.73	16.13		150.0	

10427-AAB	IEEE 802.11n (HT Greenfield, 150 Mbps, 64-QAM)	X	5.16	67.13	16.35	0.00	150.0	± 9.6 %
		Y	4.99	66.88	16.21		150.0	
		Z	5.10	67.03	16.28		150.0	
10430-AAB	LTE-FDD (OFDMA, 5 MHz, E-TM 3.1)	X	4.11	71.32	17.94	0.00	150.0	± 9.6 %
		Y	4.01	71.85	17.74		150.0	
		Z	4.02	71.19	17.71		150.0	
10431-AAB	LTE-FDD (OFDMA, 10 MHz, E-TM 3.1)	X	4.00	67.22	15.98	0.00	150.0	± 9.6 %
		Y	3.77	66.93	15.61		150.0	
		Z	3.93	67.13	15.86		150.0	
10432-AAB	LTE-FDD (OFDMA, 15 MHz, E-TM 3.1)	X	4.32	67.08	16.14	0.00	150.0	± 9.6 %
		Y	4.11	66.84	15.89		150.0	
		Z	4.26	67.01	16.05		150.0	
10433-AAB	LTE-FDD (OFDMA, 20 MHz, E-TM 3.1)	X	4.57	67.04	16.24	0.00	150.0	± 9.6 %
		Y	4.38	66.81	16.04		150.0	
		Z	4.52	66.97	16.17		150.0	
10434-AAA	W-CDMA (BS Test Model 1, 64 DPCH)	X	4.18	72.10	17.75	0.00	150.0	± 9.6 %
		Y	3.97	72.08	17.14		150.0	
		Z	4.06	71.81	17.41		150.0	
10435-AAC	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	100.00	124.04	30.30	3.23	80.0	± 9.6 %
		Y	2.07	76.37	17.41		80.0	
		Z	100.00	125.10	30.68		80.0	
10447-AAB	LTE-FDD (OFDMA, 5 MHz, E-TM 3.1, Clipping 44%)	X	3.24	67.02	14.93	0.00	150.0	± 9.6 %
		Y	2.93	66.23	13.99		150.0	
		Z	3.15	66.78	14.63		150.0	
10448-AAB	LTE-FDD (OFDMA, 10 MHz, E-TM 3.1, Clippin 44%)	X	3.86	67.01	15.86	0.00	150.0	± 9.6 %
		Y	3.65	66.73	15.49		150.0	
		Z	3.80	66.93	15.73		150.0	
10449-AAB	LTE-FDD (OFDMA, 15 MHz, E-TM 3.1, Cliping 44%)	X	4.15	66.91	16.04	0.00	150.0	± 9.6 %
		Y	3.96	66.67	15.79		150.0	
		Z	4.10	66.84	15.95		150.0	
10450-AAB	LTE-FDD (OFDMA, 20 MHz, E-TM 3.1, Clipping 44%)	X	4.37	66.82	16.09	0.00	150.0	± 9.6 %
		Y	4.19	66.58	15.89		150.0	
		Z	4.32	66.75	16.02		150.0	
10451-AAA	W-CDMA (BS Test Model 1, 64 DPCH, Clipping 44%)	X	3.06	66.87	14.27	0.00	150.0	± 9.6 %
		Y	2.66	65.61	12.96		150.0	
		Z	2.93	66.48	13.86		150.0	
10456-AAB	IEEE 802.11ac WiFi (160MHz, 64-QAM, 99pc duty cycle)	X	6.09	67.84	16.61	0.00	150.0	± 9.6 %
		Y	5.97	67.59	16.50		150.0	
		Z	6.04	67.69	16.52		150.0	
10457-AAA	UMTS-FDD (DC-HSDPA)	X	3.72	65.40	15.82	0.00	150.0	± 9.6 %
		Y	3.60	65.30	15.64		150.0	
		Z	3.69	65.39	15.75		150.0	
10458-AAA	CDMA2000 (1xEV-DO, Rev. B, 2 carriers)	X	3.70	70.76	16.66	0.00	150.0	± 9.6 %
		Y	3.11	68.73	14.83		150.0	
		Z	3.50	70.06	16.04		150.0	
10459-AAA	CDMA2000 (1xEV-DO, Rev. B, 3 carriers)	X	4.83	68.67	17.73	0.00	150.0	± 9.6 %
		Y	4.63	68.83	17.30		150.0	
		Z	4.71	68.47	17.43		150.0	

10477-AAC	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	0.69	60.00	7.35	3.23	80.0	± 9.6 %
		Y	0.58	60.00	6.88		80.0	
		Z	0.66	60.00	7.28		80.0	
10478-AAC	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	0.72	60.00	6.67	3.23	80.0	± 9.6 %
		Y	0.30	55.57	3.78		80.0	
		Z	0.69	60.00	6.57		80.0	
10479-AAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	9.47	91.75	24.35	3.23	80.0	± 9.6 %
		Y	3.48	78.35	19.37		80.0	
		Z	10.05	93.01	24.66		80.0	
10480-AAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	6.49	79.97	17.95	3.23	80.0	± 9.6 %
		Y	1.63	65.31	11.76		80.0	
		Z	5.95	79.11	17.46		80.0	
10481-AAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	3.78	72.96	15.07	3.23	80.0	± 9.6 %
		Y	1.27	62.37	9.92		80.0	
		Z	3.30	71.67	14.39		80.0	
10482-AAA	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	1.78	66.74	13.70	2.23	80.0	± 9.6 %
		Y	0.97	60.41	9.27		80.0	
		Z	1.58	65.34	12.77		80.0	
10483-AAA	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	2.35	66.64	12.84	2.23	80.0	± 9.6 %
		Y	1.19	60.00	8.40		80.0	
		Z	1.98	64.76	11.67		80.0	
10484-AAA	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	2.23	65.75	12.43	2.23	80.0	± 9.6 %
		Y	1.22	60.00	8.38		80.0	
		Z	1.90	64.02	11.31		80.0	
10485-AAC	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	2.34	70.06	16.50	2.23	80.0	± 9.6 %
		Y	1.50	64.66	13.11		80.0	
		Z	2.20	69.28	15.99		80.0	
10486-AAC	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	2.32	66.39	14.06	2.23	80.0	± 9.6 %
		Y	1.55	61.94	10.84		80.0	
		Z	2.15	65.55	13.42		80.0	
10487-AAC	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	2.32	66.02	13.86	2.23	80.0	± 9.6 %
		Y	1.57	61.75	10.71		80.0	
		Z	2.16	65.20	13.22		80.0	
10488-AAC	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	2.75	70.05	17.57	2.23	80.0	± 9.6 %
		Y	2.11	66.76	15.63		80.0	
		Z	2.64	69.65	17.34		80.0	
10489-AAC	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	2.87	67.47	16.26	2.23	80.0	± 9.6 %
		Y	2.37	65.27	14.70		80.0	
		Z	2.80	67.24	16.06		80.0	
10490-AAC	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	2.96	67.37	16.21	2.23	80.0	± 9.6 %
		Y	2.45	65.23	14.68		80.0	
		Z	2.88	67.15	16.01		80.0	
10491-AAC	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	3.07	69.06	17.34	2.23	80.0	± 9.6 %
		Y	2.51	66.58	15.92		80.0	
		Z	2.98	68.76	17.19		80.0	
10492-AAC	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	3.25	66.97	16.47	2.23	80.0	± 9.6 %
		Y	2.82	65.36	15.37		80.0	
		Z	3.19	66.82	16.34		80.0	

10508-AAC	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	3.35	66.98	16.57	2.23	80.0	± 9.6 %
		Y	2.93	65.43	15.56		80.0	
		Z	3.28	66.82	16.46		80.0	
10509-AAC	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	3.68	69.39	17.37	2.23	80.0	± 9.6 %
		Y	3.11	67.18	16.22		80.0	
		Z	3.59	69.10	17.26		80.0	
10510-AAC	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	3.74	67.04	16.73	2.23	80.0	± 9.6 %
		Y	3.34	65.61	15.89		80.0	
		Z	3.68	66.87	16.64		80.0	
10511-AAC	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	3.82	66.88	16.69	2.23	80.0	± 9.6 %
		Y	3.42	65.54	15.89		80.0	
		Z	3.76	66.73	16.61		80.0	
10512-AAC	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	3.75	70.55	17.73	2.23	80.0	± 9.6 %
		Y	3.07	67.83	16.37		80.0	
		Z	3.63	70.15	17.58		80.0	
10513-AAC	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	3.62	67.15	16.79	2.23	80.0	± 9.6 %
		Y	3.22	65.61	15.90		80.0	
		Z	3.56	66.95	16.69		80.0	
10514-AAC	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	3.67	66.85	16.70	2.23	80.0	± 9.6 %
		Y	3.29	65.43	15.86		80.0	
		Z	3.62	66.67	16.61		80.0	
10515-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps, 99pc duty cycle)	X	0.95	63.00	14.38	0.00	150.0	± 9.6 %
		Y	0.88	62.29	13.63		150.0	
		Z	0.95	62.77	14.12		150.0	
10516-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps, 99pc duty cycle)	X	0.54	68.56	16.16	0.00	150.0	± 9.6 %
		Y	0.43	66.08	13.93		150.0	
		Z	0.51	67.20	15.26		150.0	
10517-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 99pc duty cycle)	X	0.79	64.56	14.82	0.00	150.0	± 9.6 %
		Y	0.70	63.40	13.72		150.0	
		Z	0.77	64.10	14.42		150.0	
10518-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps, 99pc duty cycle)	X	4.37	66.77	16.09	0.00	150.0	± 9.6 %
		Y	4.19	66.58	15.89		150.0	
		Z	4.32	66.72	16.02		150.0	
10519-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps, 99pc duty cycle)	X	4.52	66.95	16.18	0.00	150.0	± 9.6 %
		Y	4.32	66.73	15.98		150.0	
		Z	4.46	66.89	16.11		150.0	
10520-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps, 99pc duty cycle)	X	4.37	66.88	16.09	0.00	150.0	± 9.6 %
		Y	4.18	66.64	15.88		150.0	
		Z	4.32	66.81	16.02		150.0	
10521-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps, 99pc duty cycle)	X	4.31	66.85	16.08	0.00	150.0	± 9.6 %
		Y	4.12	66.59	15.85		150.0	
		Z	4.25	66.77	16.00		150.0	
10522-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps, 99pc duty cycle)	X	4.36	66.98	16.17	0.00	150.0	± 9.6 %
		Y	4.15	66.67	15.92		150.0	
		Z	4.30	66.88	16.08		150.0	

10541-AAB	IEEE 802.11ac WiFi (40MHz, MCS7, 99pc duty cycle)	X	4.94	66.30	15.94	0.00	150.0	± 9.6 %
		Y	4.78	66.03	15.79		150.0	
		Z	4.89	66.21	15.88		150.0	
10542-AAB	IEEE 802.11ac WiFi (40MHz, MCS8, 99pc duty cycle)	X	5.09	66.39	16.01	0.00	150.0	± 9.6 %
		Y	4.92	66.14	15.87		150.0	
		Z	5.04	66.32	15.95		150.0	
10543-AAB	IEEE 802.11ac WiFi (40MHz, MCS9, 99pc duty cycle)	X	5.16	66.44	16.06	0.00	150.0	± 9.6 %
		Y	5.01	66.27	15.97		150.0	
		Z	5.12	66.40	16.02		150.0	
10544-AAB	IEEE 802.11ac WiFi (80MHz, MCS0, 99pc duty cycle)	X	5.30	66.43	15.94	0.00	150.0	± 9.6 %
		Y	5.16	66.14	15.80		150.0	
		Z	5.26	66.34	15.89		150.0	
10545-AAB	IEEE 802.11ac WiFi (80MHz, MCS1, 99pc duty cycle)	X	5.47	66.83	16.10	0.00	150.0	± 9.6 %
		Y	5.33	66.60	16.00		150.0	
		Z	5.43	66.75	16.06		150.0	
10546-AAB	IEEE 802.11ac WiFi (80MHz, MCS2, 99pc duty cycle)	X	5.33	66.55	15.97	0.00	150.0	± 9.6 %
		Y	5.19	66.24	15.82		150.0	
		Z	5.29	66.45	15.92		150.0	
10547-AAB	IEEE 802.11ac WiFi (80MHz, MCS3, 99pc duty cycle)	X	5.41	66.64	16.01	0.00	150.0	± 9.6 %
		Y	5.29	66.46	15.93		150.0	
		Z	5.37	66.57	15.97		150.0	
10548-AAB	IEEE 802.11ac WiFi (80MHz, MCS4, 99pc duty cycle)	X	5.55	67.25	16.30	0.00	150.0	± 9.6 %
		Y	5.38	66.91	16.14		150.0	
		Z	5.49	67.13	16.23		150.0	
10550-AAB	IEEE 802.11ac WiFi (80MHz, MCS6, 99pc duty cycle)	X	5.38	66.69	16.05	0.00	150.0	± 9.6 %
		Y	5.28	66.55	16.00		150.0	
		Z	5.35	66.64	16.02		150.0	
10551-AAB	IEEE 802.11ac WiFi (80MHz, MCS7, 99pc duty cycle)	X	5.33	66.53	15.94	0.00	150.0	± 9.6 %
		Y	5.17	66.18	15.77		150.0	
		Z	5.28	66.42	15.88		150.0	
10552-AAB	IEEE 802.11ac WiFi (80MHz, MCS8, 99pc duty cycle)	X	5.31	66.53	15.94	0.00	150.0	± 9.6 %
		Y	5.17	66.27	15.81		150.0	
		Z	5.27	66.46	15.89		150.0	
10553-AAB	IEEE 802.11ac WiFi (80MHz, MCS9, 99pc duty cycle)	X	5.37	66.50	15.95	0.00	150.0	± 9.6 %
		Y	5.21	66.19	15.81		150.0	
		Z	5.32	66.41	15.90		150.0	
10554-AAC	IEEE 802.11ac WiFi (160MHz, MCS0, 99pc duty cycle)	X	5.72	66.76	16.02	0.00	150.0	± 9.6 %
		Y	5.60	66.48	15.90		150.0	
		Z	5.68	66.68	15.97		150.0	
10555-AAC	IEEE 802.11ac WiFi (160MHz, MCS1, 99pc duty cycle)	X	5.81	66.99	16.12	0.00	150.0	± 9.6 %
		Y	5.67	66.67	15.98		150.0	
		Z	5.77	66.89	16.07		150.0	
10556-AAC	IEEE 802.11ac WiFi (160MHz, MCS2, 99pc duty cycle)	X	5.84	67.08	16.16	0.00	150.0	± 9.6 %
		Y	5.73	66.84	16.05		150.0	
		Z	5.81	67.00	16.11		150.0	
10557-AAC	IEEE 802.11ac WiFi (160MHz, MCS3, 99pc duty cycle)	X	5.81	66.97	16.12	0.00	150.0	± 9.6 %
		Y	5.67	66.67	15.99		150.0	
		Z	5.77	66.88	16.07		150.0	

10575-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 90pc duty cycle)	X	4.45	66.54	16.23	0.46	130.0	± 9.6 %
		Y	4.27	66.28	15.98		130.0	
		Z	4.41	66.50	16.17		130.0	
10576-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 9 Mbps, 90pc duty cycle)	X	4.48	66.73	16.31	0.46	130.0	± 9.6 %
		Y	4.30	66.51	16.08		130.0	
		Z	4.43	66.70	16.26		130.0	
10577-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 12 Mbps, 90pc duty cycle)	X	4.65	66.97	16.46	0.46	130.0	± 9.6 %
		Y	4.45	66.73	16.23		130.0	
		Z	4.59	66.92	16.40		130.0	
10578-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 18 Mbps, 90pc duty cycle)	X	4.55	67.10	16.55	0.46	130.0	± 9.6 %
		Y	4.36	66.87	16.34		130.0	
		Z	4.50	67.05	16.49		130.0	
10579-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 24 Mbps, 90pc duty cycle)	X	4.31	66.33	15.83	0.46	130.0	± 9.6 %
		Y	4.10	65.95	15.51		130.0	
		Z	4.25	66.26	15.76		130.0	
10580-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 36 Mbps, 90pc duty cycle)	X	4.35	66.39	15.86	0.46	130.0	± 9.6 %
		Y	4.12	65.96	15.50		130.0	
		Z	4.29	66.31	15.78		130.0	
10581-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 48 Mbps, 90pc duty cycle)	X	4.46	67.16	16.51	0.46	130.0	± 9.6 %
		Y	4.27	66.96	16.32		130.0	
		Z	4.41	67.12	16.46		130.0	
10582-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 54 Mbps, 90pc duty cycle)	X	4.24	66.10	15.62	0.46	130.0	± 9.6 %
		Y	4.02	65.70	15.27		130.0	
		Z	4.18	66.04	15.55		130.0	
10583-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps, 90pc duty cycle)	X	4.45	66.54	16.23	0.46	130.0	± 9.6 %
		Y	4.27	66.28	15.98		130.0	
		Z	4.41	66.50	16.17		130.0	
10584-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps, 90pc duty cycle)	X	4.48	66.73	16.31	0.46	130.0	± 9.6 %
		Y	4.30	66.51	16.08		130.0	
		Z	4.43	66.70	16.26		130.0	
10585-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps, 90pc duty cycle)	X	4.65	66.97	16.46	0.46	130.0	± 9.6 %
		Y	4.45	66.73	16.23		130.0	
		Z	4.59	66.92	16.40		130.0	
10586-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps, 90pc duty cycle)	X	4.55	67.10	16.55	0.46	130.0	± 9.6 %
		Y	4.36	66.87	16.34		130.0	
		Z	4.50	67.05	16.49		130.0	
10587-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps, 90pc duty cycle)	X	4.31	66.33	15.83	0.46	130.0	± 9.6 %
		Y	4.10	65.95	15.51		130.0	
		Z	4.25	66.26	15.76		130.0	
10588-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps, 90pc duty cycle)	X	4.35	66.39	15.86	0.46	130.0	± 9.6 %
		Y	4.12	65.96	15.50		130.0	
		Z	4.29	66.31	15.78		130.0	
10589-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps, 90pc duty cycle)	X	4.46	67.16	16.51	0.46	130.0	± 9.6 %
		Y	4.27	66.96	16.32		130.0	
		Z	4.41	67.12	16.46		130.0	
10590-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps, 90pc duty cycle)	X	4.24	66.10	15.62	0.46	130.0	± 9.6 %
		Y	4.02	65.70	15.27		130.0	
		Z	4.18	66.04	15.55		130.0	

10607-AAB	IEEE 802.11ac WiFi (20MHz, MCS0, 90pc duty cycle)	X	4.46	65.97	15.99	0.46	130.0	± 9.6 %
		Y	4.28	65.74	15.77		130.0	
		Z	4.41	65.94	15.94		130.0	
10608-AAB	IEEE 802.11ac WiFi (20MHz, MCS1, 90pc duty cycle)	X	4.60	66.30	16.14	0.46	130.0	± 9.6 %
		Y	4.39	66.02	15.91		130.0	
		Z	4.54	66.25	16.08		130.0	
10609-AAB	IEEE 802.11ac WiFi (20MHz, MCS2, 90pc duty cycle)	X	4.49	66.14	15.96	0.46	130.0	± 9.6 %
		Y	4.29	65.83	15.71		130.0	
		Z	4.44	66.08	15.90		130.0	
10610-AAB	IEEE 802.11ac WiFi (20MHz, MCS3, 90pc duty cycle)	X	4.54	66.30	16.13	0.46	130.0	± 9.6 %
		Y	4.34	66.02	15.89		130.0	
		Z	4.49	66.25	16.07		130.0	
10611-AAB	IEEE 802.11ac WiFi (20MHz, MCS4, 90pc duty cycle)	X	4.46	66.10	15.97	0.46	130.0	± 9.6 %
		Y	4.25	65.79	15.72		130.0	
		Z	4.40	66.04	15.91		130.0	
10612-AAB	IEEE 802.11ac WiFi (20MHz, MCS5, 90pc duty cycle)	X	4.45	66.23	16.01	0.46	130.0	± 9.6 %
		Y	4.23	65.87	15.73		130.0	
		Z	4.39	66.16	15.95		130.0	
10613-AAB	IEEE 802.11ac WiFi (20MHz, MCS6, 90pc duty cycle)	X	4.45	66.06	15.86	0.46	130.0	± 9.6 %
		Y	4.23	65.69	15.57		130.0	
		Z	4.39	65.98	15.79		130.0	
10614-AAB	IEEE 802.11ac WiFi (20MHz, MCS7, 90pc duty cycle)	X	4.41	66.27	16.11	0.46	130.0	± 9.6 %
		Y	4.21	65.95	15.85		130.0	
		Z	4.36	66.20	16.04		130.0	
10615-AAB	IEEE 802.11ac WiFi (20MHz, MCS8, 90pc duty cycle)	X	4.45	65.95	15.75	0.46	130.0	± 9.6 %
		Y	4.24	65.61	15.46		130.0	
		Z	4.40	65.89	15.69		130.0	
10616-AAB	IEEE 802.11ac WiFi (40MHz, MCS0, 90pc duty cycle)	X	5.09	66.31	16.18	0.46	130.0	± 9.6 %
		Y	4.93	66.04	16.02		130.0	
		Z	5.05	66.25	16.14		130.0	
10617-AAB	IEEE 802.11ac WiFi (40MHz, MCS1, 90pc duty cycle)	X	5.14	66.45	16.23	0.46	130.0	± 9.6 %
		Y	4.95	66.12	16.04		130.0	
		Z	5.09	66.36	16.17		130.0	
10618-AAB	IEEE 802.11ac WiFi (40MHz, MCS2, 90pc duty cycle)	X	5.05	66.51	16.27	0.46	130.0	± 9.6 %
		Y	4.86	66.17	16.07		130.0	
		Z	5.00	66.43	16.22		130.0	
10619-AAB	IEEE 802.11ac WiFi (40MHz, MCS3, 90pc duty cycle)	X	5.06	66.31	16.11	0.46	130.0	± 9.6 %
		Y	4.91	66.10	15.97		130.0	
		Z	5.02	66.27	16.08		130.0	
10620-AAB	IEEE 802.11ac WiFi (40MHz, MCS4, 90pc duty cycle)	X	5.14	66.32	16.16	0.46	130.0	± 9.6 %
		Y	4.96	66.02	15.98		130.0	
		Z	5.09	66.26	16.12		130.0	
10621-AAB	IEEE 802.11ac WiFi (40MHz, MCS5, 90pc duty cycle)	X	5.15	66.45	16.34	0.46	130.0	± 9.6 %
		Y	4.98	66.16	16.18		130.0	
		Z	5.10	66.37	16.29		130.0	
10622-AAB	IEEE 802.11ac WiFi (40MHz, MCS6, 90pc duty cycle)	X	5.14	66.54	16.39	0.46	130.0	± 9.6 %
		Y	4.96	66.24	16.21		130.0	
		Z	5.08	66.45	16.33		130.0	

Code	Description	Axis						
10639-AAC	IEEE 802.11ac WiFi (160MHz, MCS3, 90pc duty cycle)	X	5.95	66.97	16.37	0.46	130.0	± 9.6 %
		Y	5.81	66.65	16.21		130.0	
		Z	5.92	66.89	16.33		130.0	
10640-AAC	IEEE 802.11ac WiFi (160MHz, MCS4, 90pc duty cycle)	X	5.93	66.91	16.28	0.46	130.0	± 9.6 %
		Y	5.74	66.45	16.05		130.0	
		Z	5.87	66.78	16.22		130.0	
10641-AAC	IEEE 802.11ac WiFi (160MHz, MCS5, 90pc duty cycle)	X	6.01	66.93	16.32	0.46	130.0	± 9.6 %
		Y	5.88	66.65	16.18		130.0	
		Z	5.97	66.86	16.28		130.0	
10642-AAC	IEEE 802.11ac WiFi (160MHz, MCS6, 90pc duty cycle)	X	6.04	67.14	16.58	0.46	130.0	± 9.6 %
		Y	5.88	66.80	16.43		130.0	
		Z	5.99	67.05	16.54		130.0	
10643-AAC	IEEE 802.11ac WiFi (160MHz, MCS7, 90pc duty cycle)	X	5.88	66.84	16.33	0.46	130.0	± 9.6 %
		Y	5.73	66.47	16.14		130.0	
		Z	5.84	66.75	16.28		130.0	
10644-AAC	IEEE 802.11ac WiFi (160MHz, MCS8, 90pc duty cycle)	X	5.95	67.07	16.46	0.46	130.0	± 9.6 %
		Y	5.77	66.62	16.23		130.0	
		Z	5.90	66.93	16.39		130.0	
10645-AAC	IEEE 802.11ac WiFi (160MHz, MCS9, 90pc duty cycle)	X	6.07	67.08	16.43	0.46	130.0	± 9.6 %
		Y	5.92	66.75	16.27		130.0	
		Z	6.02	66.97	16.38		130.0	
10646-AAD	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Subframe=2,7)	X	9.77	101.08	35.81	9.30	60.0	± 9.6 %
		Y	4.48	81.78	27.93		60.0	
		Z	8.20	97.48	34.82		60.0	
10647-AAC	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Subframe=2,7)	X	8.10	97.02	34.55	9.30	60.0	± 9.6 %
		Y	4.04	79.86	27.26		60.0	
		Z	6.89	93.69	33.59		60.0	
10648-AAA	CDMA2000 (1x Advanced)	X	0.53	61.84	8.75	0.00	150.0	± 9.6 %
		Y	0.37	60.00	6.01		150.0	
		Z	0.48	61.10	7.93		150.0	
10652-AAB	LTE-TDD (OFDMA, 5 MHz, E-TM 3.1, Clipping 44%)	X	3.21	66.07	15.87	2.23	80.0	± 9.6 %
		Y	2.85	64.87	14.87		80.0	
		Z	3.15	65.96	15.72		80.0	
10653-AAB	LTE-TDD (OFDMA, 10 MHz, E-TM 3.1, Clipping 44%)	X	3.77	65.52	16.19	2.23	80.0	± 9.6 %
		Y	3.48	64.70	15.55		80.0	
		Z	3.72	65.45	16.10		80.0	
10654-AAB	LTE-TDD (OFDMA, 15 MHz, E-TM 3.1, Clipping 44%)	X	3.79	65.17	16.22	2.23	80.0	± 9.6 %
		Y	3.54	64.39	15.66		80.0	
		Z	3.75	65.10	16.15		80.0	
10655-AAB	LTE-TDD (OFDMA, 20 MHz, E-TM 3.1, Clipping 44%)	X	3.86	65.11	16.26	2.23	80.0	± 9.6 %
		Y	3.63	64.32	15.73		80.0	
		Z	3.83	65.03	16.20		80.0	
10658-AAA	Pulse Waveform (200Hz, 10%)	X	7.30	77.44	14.98	10.00	50.0	± 9.6 %
		Y	2.77	66.20	10.30		50.0	
		Z	10.17	81.09	16.28		50.0	
10659-AAA	Pulse Waveform (200Hz, 20%)	X	100.00	102.21	20.33	6.99	60.0	± 9.6 %
		Y	1.32	63.44	7.96		60.0	
		Z	100.00	103.16	20.77		60.0	

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Client   **TA(Beijing)**   **Certificate No: Z16-97112**

CALIBRATION CERTIFICATE

Object   D750V3 - SN: 1048

Calibration Procedure(s)   FD-Z11-2-003-01
                            Calibration Procedures for dipole validation kits

Calibration date: July 6, 2016

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 NRP2	101919	27-Jun-16 (CTTL, No.J16X04777)	Jun-17
Power sensor NRP-Z91	101547	27-Jun-16 (CTTL, No.J16X04777)	Jun-17
Reference Probe EX3DV4	SN 7307	19-Feb-16(SPEAG,No.EX3-7307_Feb16)	Feb-17
DAE4	SN 771	02-Feb-16(CTTL-SPEAG,No.Z16-97011)	Feb-17
Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	01-Feb-16 (CTTL, No.J16X00893)	Jan-17
Network Analyzer E5071C	MY46110673	26-Jan-16 (CTTL, No.J16X00894)	Jan-17

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

Issued: July 7, 2016

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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 1528-2013, "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

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) IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010

d) KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

e) 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.

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%.

Measurement Conditions

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

DASY Version	DASY52	52.8.8.1258
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.6 ± 6 %	0.91 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.12 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	8.34 mW /g ± 20.8 % (k=2)
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.41 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	5.56 mW /g ± 20.4 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.5	0.96 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.9 ± 6 %	0.97 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.20 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	8.72 mW /g ± 20.8 % (k=2)
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	1.49 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	5.92 mW /g ± 20.4 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.3Ω- 0.96jΩ
Return Loss	- 29.6dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	51.2Ω- 1.58jΩ
Return Loss	- 34.0dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.140 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

DASY5 Validation Report for Head TSL   Date: 07.06.2016

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1048

Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1

Medium parameters used: f = 750 MHz; σ = 0.908 S/m; ε_r = 41.58; ρ = 1000 kg/m^3

Phantom section: Right Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7307; ConvF(10.47, 10.47,10.47); Calibrated: 2/19/2016;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2016-02-02
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
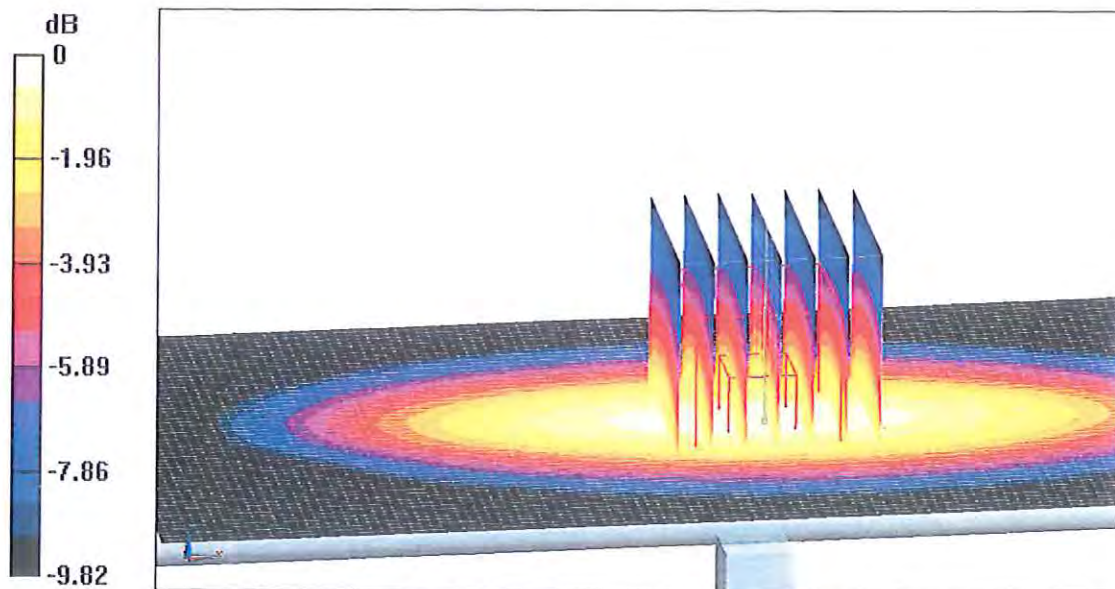- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 55.20 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 3.10 W/kg

SAR(1 g) = 2.12 W/kg; SAR(10 g) = 1.41 W/kg

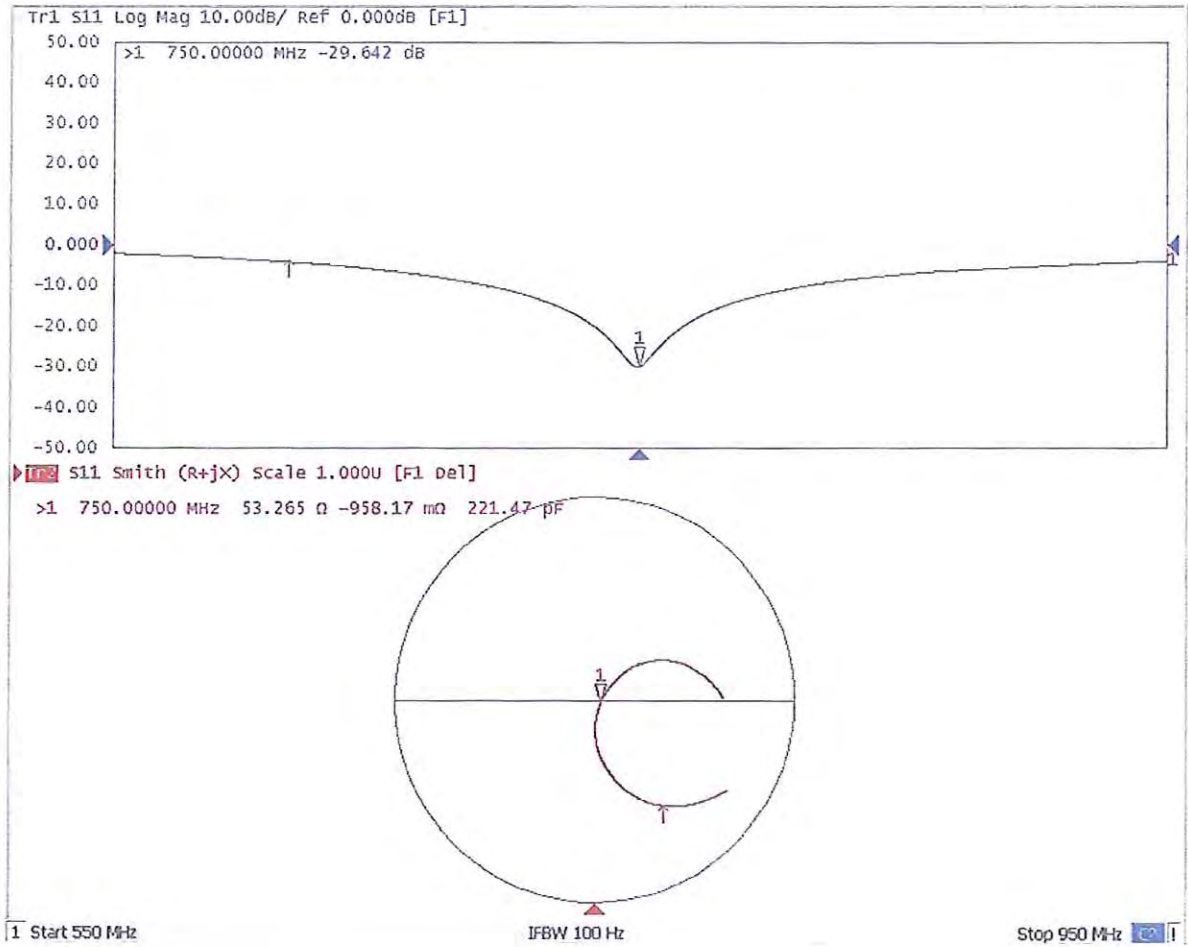Maximum value of SAR (measured) = 2.65 W/kg

0 dB = 2.65 W/kg = 4.23 dBW/kg

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Impedance Measurement Plot for Head TSL

Tr1 S11 Log Mag 10.00dB/ Ref 0.000dB [F1]

>1 750.00000 MHz -29.642 dB

S11 Smith (R+jX) Scale 1.000U [F1 Del]

>1 750.00000 MHz 53.265 Ω -958.17 mΩ 221.47 pF

1 Start 550 MHz   IFBW 100 Hz   Stop 950 MHz

DASY5 Validation Report for Body TSL   Date: 07.06.2016

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1048

Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1

Medium parameters used: f = 750 MHz; σ = 0.968 S/m; ε_r = 54.92; ρ = 1000 kg/m^3

Phantom section: Center Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7307; ConvF(9.93,9.93, 9.93); Calibrated: 2/19/2016;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2016-02-02
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
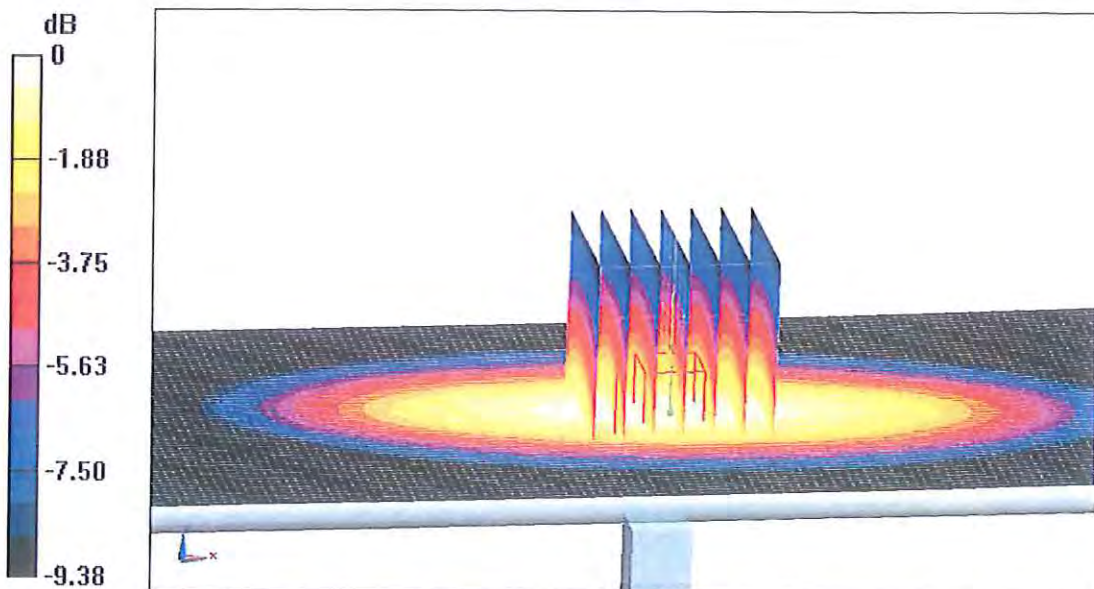- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 54.43 V/m; Power Drift = -0.01 dB
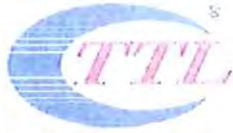
Peak SAR (extrapolated) = 3.16 W/kg

SAR(1 g) = 2.2 W/kg; SAR(10 g) = 1.49 W/kg

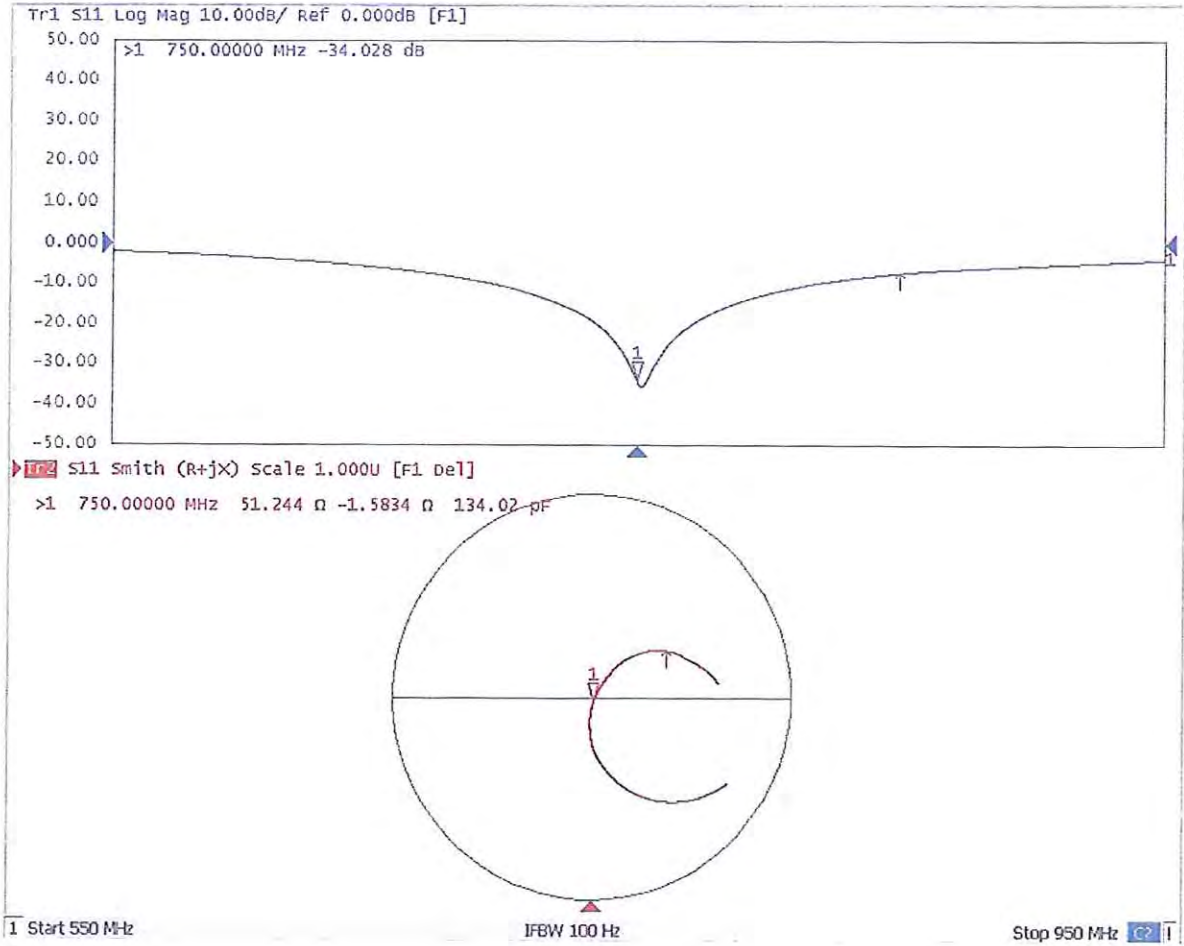Maximum value of SAR (measured) = 2.73 W/kg

0 dB = 2.73 W/kg = 4.36 dBW/kg

Certificate No: Z16-97112   Page 7 of 8

Impedance Measurement Plot for Body TSL

Tr1 S11 Log Mag 10.00dB/ Ref 0.000dB [F1]
>1   750.00000 MHz -34.028 dB

Tr2 S11 Smith (R+jX) Scale 1.000U [F1 Del]
>1   750.00000 MHz   51.244 Ω -1.5834 Ω   134.02 pF

1 Start 550 MHz   IFBW 100 Hz   Stop 950 MHz

Justification for Extended SAR Dipole Calibrations

Dipole	Date of Measurement	Return Loss (dB)	Delta (%)	Impedance	Delta(ohm)
Head 750 MHz	July. 06, 2016	-29.6	-	53.3	-
	July. 01, 2018	-26.8	9.5	54.2	0.9

Note: The return loss is <-20dB, within 20% of prior calibration; the impedance is within 5 ohm of prior calibration. Therefore the verification results meet the requirement of extended calibration.
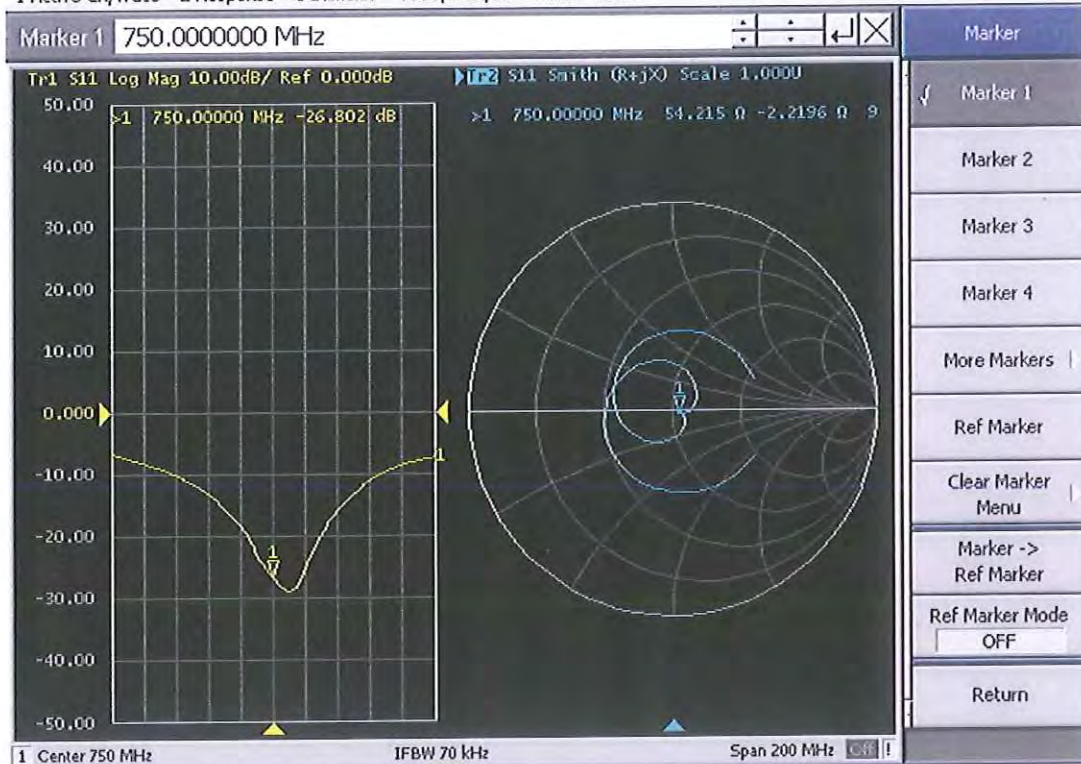
Justification for Extended SAR Dipole Calibrations

Dipole	Date of Measurement	Return Loss (dB)	Delta (%)	Impedance	Delta(ohm)
Body 750 MHz	July. 06, 2016	-34	-	51.2	-
	July. 01, 2018	-30.5	10.3	49.5	-1.7

Note: The return loss is <-20dB, within 20% of prior calibration; the impedance is within 5 ohm of prior calibration. Therefore the verification results meet the requirement of extended calibration.
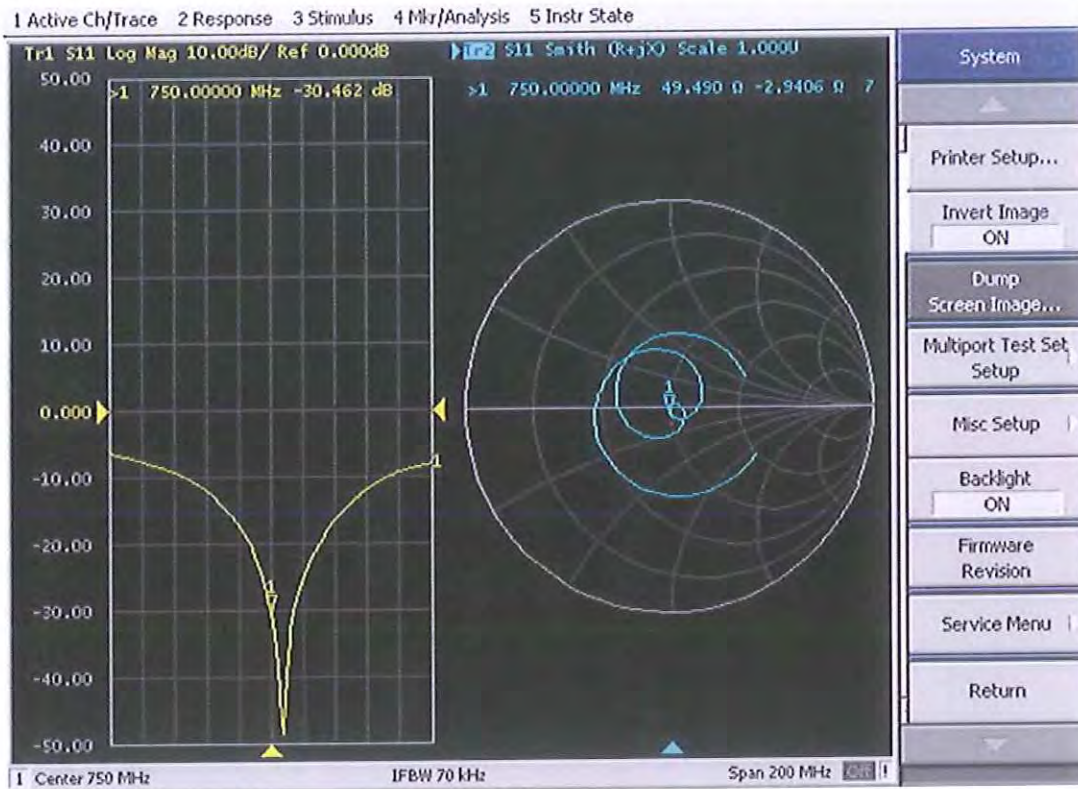
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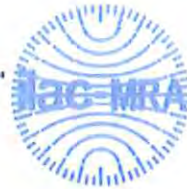
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Client   **Hydsoft Testing Co., Ltd**   **Certificate No:**   **Z18-60116**

CALIBRATION CERTIFICATE

Object	D835V2 - SN: 4d005
Calibration Procedure(s)	FF-Z11-003-01 Calibration Procedures for dipole validation kits
Calibration date:	May 18, 2018

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	102083	01-Nov-17 (CTTL, No.J17X08756)	Oct-18
Power sensor NRV-Z5	100542	01-Nov-17 (CTTL, No.J17X08756)	Oct-18
Reference Probe EX3DV4	SN 7464	12-Sep-17(SPEAG,No.EX3-7464_Sep17)	Sep-18
DAE4	SN 1525	02-Oct-17(SPEAG,No.DAE4-1525_Oct17)	Oct-18
Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	23-Jan-18 (CTTL, No.J18X00560)	Jan-19
NetworkAnalyzer E5071C	MY46110673	24-Jan-18 (CTTL, No.J18X00561)	Jan-19

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	
Reviewed by:	Lin Hao .	SAR Test Engineer	
Approved by:	Qi Dianyuan	SAR Project Leader	

Issued: May 20, 2018

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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 1528-2013, "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

b) IEC 62209-1, "Measurement procedure for assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices- Part 1: Device used next to the ear (Frequency range of 300MHz to 6GHz)", July 2016

c) IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010

d) KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

e) 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.

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%.

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Measurement Conditions

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

DASY Version	DASY52	52.10.0.1446
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
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	42.7 ± 6 %	0.88 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.31 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	9.45 mW /g ± 18.8 % (k=2)
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.47 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	5.98 mW /g ± 18.7 % (k=2)

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	54.3 ± 6 %	0.95 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °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 for nominal Body TSL parameters	normalized to 1W	9.74 mW /g ± 18.8 % (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 for nominal Body TSL parameters	normalized to 1W	6.34 mW /g ± 18.7 % (k=2)