

ANNEX B – RELEVANT PAGES FROM CALIBRATION REPORTS

DAE4 Sn:546

In Collaboration with Calibration Laboratory Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China Tel: +86-10-62204633-2312 Fax: +86-10-62204633-2304 E-mail: cti@ttdi.com.cn Http://www.ttdi.com.cn 中国认可 国家互认 校准 CALIBRATION CNAS L0570 Client: SRTC Certificate No: Z18-60400 CALIBRATION CERTIFICATE Object: DAE4 - SN: 546 Calibration Procedure(s): FF-Z11-002-01 Calibration Procedure for the Data Acquisition Electronics (DAEx) Calibration date: October 15, 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(23±2)°C and humidity<70%. Calibration Equipment used (M&TE critical for calibration) <table border="1" style="width: 100%; border-collapse: collapse; font-size: 0.8em;"> <thead> <tr> <th>Primary Standards</th> <th>ID #</th> <th>Cal Date(Calibrated by, Certificate No.)</th> <th>Scheduled Calibration</th> </tr> </thead> <tbody> <tr> <td>Process Calibrator 753</td> <td>1971018</td> <td>20-Jun-18 (CTTL, No.J180X02034)</td> <td>June-19</td> </tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse; font-size: 0.8em;"> <thead> <tr> <th></th> <th>Name</th> <th>Function</th> <th>Signature</th> </tr> </thead> <tbody> <tr> <td>Calibrated by:</td> <td>Yu Zengying</td> <td>SAR Test Engineer</td> <td></td> </tr> <tr> <td>Reviewed by:</td> <td>Lin Han</td> <td>SAR Test Engineer</td> <td></td> </tr> <tr> <td>Approved by:</td> <td>Qi Dianyuan</td> <td>SAR Project Leader</td> <td></td> </tr> </tbody> </table> Issued: October 17, 2018 This calibration certificate shall not be reproduced except in full without written approval of the laboratory. Certificate No: Z18-60400 Page 1 of 3	Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration	Process Calibrator 753	1971018	20-Jun-18 (CTTL, No.J180X02034)	June-19		Name	Function	Signature	Calibrated by:	Yu Zengying	SAR Test Engineer		Reviewed by:	Lin Han	SAR Test Engineer		Approved by:	Qi Dianyuan	SAR Project Leader		In Collaboration with Calibration Laboratory Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China Tel: +86-10-62204633-2312 Fax: +86-10-62204633-2304 E-mail: cti@ttdi.com.cn Http://www.ttdi.com.cn Glossary: DAE: data acquisition electronics Connector angle: information used in DASY system to align probe sensor X to the robot coordinate system. Methods Applied and Interpretation of Parameters: DC Voltage Measurement: Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range. Connector angle: The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required. - The report provide only calibration results for DAE, it does not contain other performance test results. Certificate No: Z18-60400 Page 2 of 3
Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration																						
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	Name	Function	Signature																						
Calibrated by:	Yu Zengying	SAR Test Engineer																							
Reviewed by:	Lin Han	SAR Test Engineer																							
Approved by:	Qi Dianyuan	SAR Project Leader																							

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DC Voltage Measurement

A/D - Converter Resolution nominal: 1LSB = 5.1μV Full range = -100...+300 mV

High Range: 1LSB = 810V Full range = +1...+3mV

Low Range: 1LSB = 810V Full range = +1...+3mV

DASY measurement parameters: Auto Zero Time: 2 sec. Measuring time: 2 sec.

Calibration Factors	X	Y	Z
High Range	405.306 ± 0.12% (k=2)	404.059 ± 0.13% (k=2)	404.180 ± 0.13% (k=2)
Low Range	3.99893 ± 0.7% (k=2)	3.99878 ± 0.7% (k=2)	3.99821 ± 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	238° ± 1°
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ES3DV3 Sn:3127

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CALIBRATION
CNAS 16070

Client: **SRTC** Certificate No: **Z18-60398**

CALIBRATION CERTIFICATE

Object: **ES3DV3 - SN3127**

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

Calibration date: **November 02, 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(23±0.5)°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-Z31	101547	20-Jun-18 (CTTL No.J18X05032)	Jun-19
Power sensor NRP-Z31	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.J18X01133)	Feb-20
Reference Probe EX3DV4	SN 3846	25-Jan-18(SPEAG No.EK3-3846_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	21-Jun-18 (CTTL No.J18X05033)	Jun-19
Network Analyzer E5071C	MY46110673	14-Jan-18 (CTTL No.J18X00581)	Jan-19

Calibrated by: **Yu Zongying** SAR Test Engineer

Reviewed by: **Lin Hao** SAR Test Engineer

Approved by: **Qi Dianyan** SAR Project Leader

Issued: November 04, 2018

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Glossary:

TS: tissue simulating liquid
NORM_{x,y,z}: sensitivity in free space
ConF: sensitivity in TSL / NORM_{x,y,z}
DCP: diode compression point
OF: level factor (1/duty_cycle) of the RF signal
A,E,C,D: modulation dependent linearization parameters
Polarization θ : θ rotation around probe axis
Polarization ϕ : ϕ 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 K to the root 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 3 GHz)", July 2018
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 2018
d) KDB 865864, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}: Assessed for E-field polarization $\theta=0$ (600MHz in TEM-cell; $F>1800$ 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 ConF).
- NORM_(E₁,E₂) = NORM_{x,y,z} frequency response (see Frequency Response Chart). This linearity is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConF.
- 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_K, B_K, C_K, D_K, E_K, F_K, G_K, H_K, I_K, J_K, K_K 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.
- ConF and Boundary Effect Parameters: Assessed in flat phantom using E-field (or Temperature Transfer Standard for 600MHz) and inside waveguide using analytical field distributions based on power measurements for $F>300$ MHz. The semi-edges 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} ConF whereby the uncertainty corresponds to that given for ConF. A frequency dependent ConF is used in DASY version 4.4 and higher which allows extending the validity from 50MHz to 100MHz.
- Spherical isotropy (SD deviation from isotropy): in a field of low gradients realized using a fix phantom exposed by a patch antenna.
- Sensor Offset: The sensor offset corresponds to the offset of virtual measurement center from the probe to on probe axis. No tolerance required.
- Connector Angle: The angle is assessed using the information gained by determining the NORM_x (no uncertainty required).

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Probe ES3DV3

SN: 3127

Calibrated: November 02, 2018

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)



DASY/EASY – Parameters of Probe: ES3DV3 - SN: 3127

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm($\mu V/(V/m)^2$) ^A	1.27	1.29	1.21	$\pm 10.0\%$
DCP(mV) ^B	103.3	104.4	105.0	

Modulation Calibration Parameters

UID	Communication System Name	A dB	B dB/μV	C	D dB	VR mV	Unc ^C (k=2)
0	CW	X 0.0	0.0	1.0	0.00	285.6	$\pm 2.2\%$
		Y 0.0	0.0	1.0		287.9	
		Z 0.0	0.0	1.0		282.9	

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

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DASY/EASY – Parameters of Probe: ES3DV3 - SN: 3127

Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz] ^B	Relative Permittivity ^C	Conductivity (S/m) ^C	ConvF X	ConvF Y	ConvF Z	Alpha ^D	Depth ^E (mm)	Unc ^F (k=2)
750	41.9	0.89	6.34	6.34	6.34	0.40	1.35	$\pm 12.1\%$
835	41.5	0.90	6.18	6.18	6.18	0.35	1.58	$\pm 12.1\%$
1810	40.0	1.40	5.07	5.07	5.07	0.66	1.24	$\pm 12.1\%$
2000	40.0	1.40	4.98	4.98	4.98	0.70	1.20	$\pm 12.1\%$
2300	39.5	1.07	4.79	4.79	4.79	0.80	1.08	$\pm 12.1\%$
2450	39.2	1.80	4.66	4.66	4.66	0.90	1.08	$\pm 12.1\%$
2600	39.0	1.98	4.40	4.40	4.40	0.80	1.21	$\pm 12.1\%$

^B Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (Page 2), else it is restricted to ± 50 MHz. 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 $\pm 10, 25, 40, 50$ 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.

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

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

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DASY/EASY – Parameters of Probe: ES3DV3 - SN: 3127

Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz] ^B	Relative Permittivity ^C	Conductivity (S/m) ^C	ConvF X	ConvF Y	ConvF Z	Alpha ^D	Depth ^E (mm)	Unc ^F (k=2)
750	55.5	0.96	6.33	6.33	6.33	0.40	1.40	$\pm 12.1\%$
835	55.2	0.97	6.13	6.13	6.13	0.37	1.62	$\pm 12.1\%$
1810	53.3	1.52	4.78	4.78	4.78	0.65	1.27	$\pm 12.1\%$
2000	53.3	1.52	4.80	4.80	4.80	0.67	1.27	$\pm 12.1\%$
2300	52.9	1.81	4.46	4.46	4.46	0.90	1.16	$\pm 12.1\%$
2450	52.7	1.06	4.31	4.31	4.31	0.70	1.28	$\pm 12.1\%$
2600	52.5	2.10	4.14	4.14	4.14	0.90	1.10	$\pm 12.1\%$

^B Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (Page 2), else it is restricted to ± 50 MHz. 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 $\pm 10, 25, 40, 50$ 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.

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

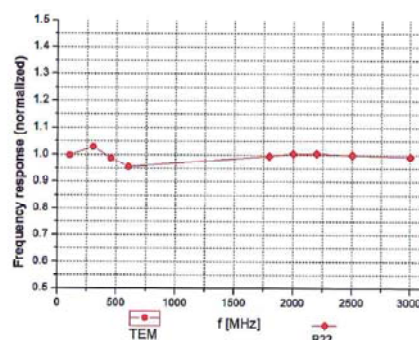
^D Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than $\pm 1\%$ for frequencies below 3 GHz and below $\pm 2\%$ for the frequencies between 3-6 GHz at any distance larger than half the probe tip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

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Frequency Response of E-Field (TEM-Cell: if110 EXX, Waveguide: R22)



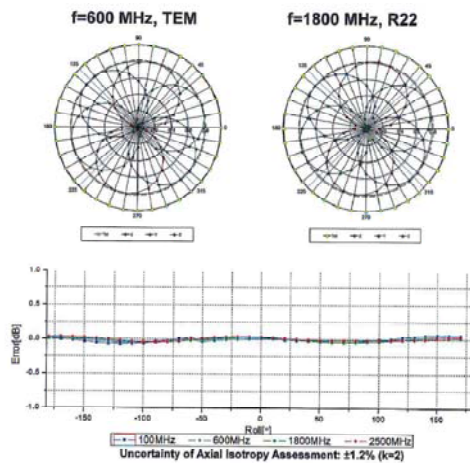
Uncertainty of Frequency Response of E-field: $\pm 7.4\%$ (k=2)

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

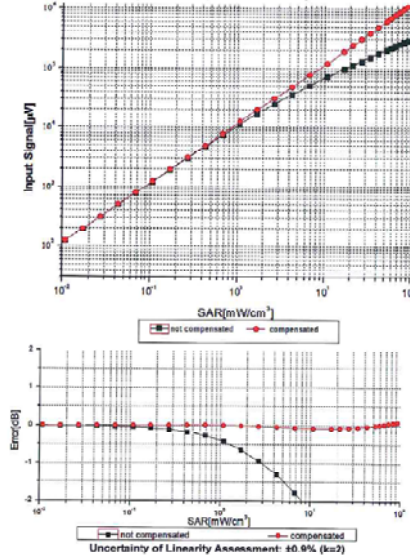


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Dynamic Range f(SAR_{head}) (TEM cell, f = 900 MHz)

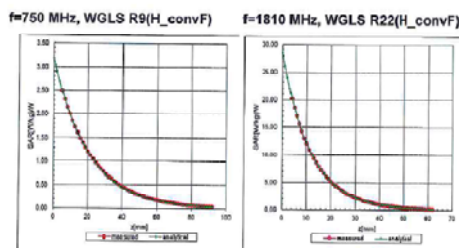


Certificate No: Z18-60398

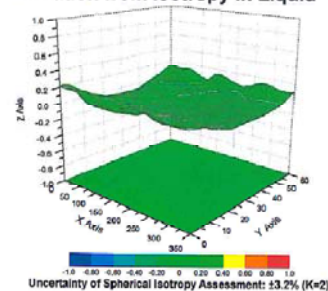
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Conversion Factor Assessment



Deviation from Isotropy in Liquid



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Appendix: Modulation Calibration Parameters

UID	Communication System Name	PAR	A dB	B dB-μV	C	VR mV	Unc ¹ (k=2)
0	CW	0.00	X 0.0	0.0	1.0	282.3	±2.5%
			Y 0.0	0.0	1.0	280.9	
			Z 0.0	0.0	1.0	275.1	
10012	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps)	1.87	X 2.77	68.02	18.46	143.0	±1.8%
			Y 2.75	68.05	18.52	145.0	
			Z 2.71	67.79	18.25	142.3	
10100	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	5.67	X 6.13	66.4	18.97	141.9	±1.9%
			Y 6.15	66.49	19.06	144.2	
			Z 6.09	66.32	18.90	140.9	
10108	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	5.80	X 6.09	66.24	19.07	139.5	±1.9%
			Y 6.10	66.33	19.15	141.5	
			Z 6.05	66.19	19.05	138.0	
10154	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	5.75	X 5.81	65.85	18.93	136.1	±1.9%
			Y 5.82	65.92	19.01	137.8	
			Z 5.79	65.89	18.97	134.7	
10169	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	5.73	X 4.84	65.92	19.20	130.8	±1.9%
			Y 4.82	65.98	19.27	131.3	
			Z 4.80	66.00	19.29	129.1	
10175	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	5.72	X 4.88	66.14	19.40	131.6	±1.9%
			Y 4.83	66.08	19.33	130.9	
			Z 4.79	66.02	19.29	129.3	
10297	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	5.81	X 6.19	66.61	19.42	141.9	±1.9%
			Y 6.13	66.43	19.26	140.7	
			Z 6.14	66.52	19.33	139.6	

Certificate No: Z17-97142

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DAE4 Sn:720

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CNAS L6570

Client: SRTC Certificate No: Z18-60399

CALIBRATION CERTIFICATE

Object: DAE4 - SN: 720

Calibration Procedure(s): FF-Z11-002-01
Calibration Procedure for the Data Acquisition Electronics (DAEx)

Calibration date: October 15, 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(23±3)°C and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Process Calibrator 753	1971018	20-Jun-18 (CTTL, No.J18X05034)	June-19

Calibrated by: Name: Yu Zongying Function: SAR Test Engineer Signature: [Signature]

Reviewed by: Name: Lin Hao Function: SAR Test Engineer Signature: [Signature]

Approved by: Name: Qi Diaryuan Function: SAR Project Leader Signature: [Signature]

Issued: October 17, 2018

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Glossary:
DAE: data acquisition electronics
Connector angle: information used in DASY system to align probe sensor X to the robot coordinate system.

Methods Applied and Interpretation of Parameters:

- **DC Voltage Measurement:** Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- **Connector angle:** The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The report provide only calibration results for DAE, it does not contain other performance test results.

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DC Voltage Measurement
AD - Converter Resolution nominal
High Range: 1LSB = 6.1μV, full range = -100...+300 mV
Low Range: 1LSB = 61nV, full range = -1...+3mV
DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Calibration Factors	X	Y	Z
High Range	403.343 ± 0.15% (k=2)	404.773 ± 0.15% (k=2)	403.205 ± 0.15% (k=2)
Low Range	3.95574 ± 0.7% (k=2)	3.95559 ± 0.7% (k=2)	3.95585 ± 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	29° ± 1°
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Certificate No: Z18-60399

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EX3DV4 Sn:3708 (1/7)

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zugstrasse 43, 8034 Zurich, Switzerland

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Client: **SRTC (Auden)**

Accreditation No.: **SCS 0108**

Certificate No.: **EX3-3708_Oct18**

CALIBRATION CERTIFICATE

Object: **EX3DV4 - SN:3708**

Calibration procedure(s): **QA CAL-01-v9, QA CAL-12-v9, QA CAL-14-v4, QA CAL-25-v5,
QA CAL-25-v6
Calibration procedure for dosimetric E-field probes**

Calibration date: **October 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 ± 0.2°C and humidity < 70%).

Calibration Equipment used (MPE critical for calibration)

Primary Standards	ID	Cal Data (Certificate No.)	Scheduled Calibration
Power meter N992	SN: 104179	06-Apr-18 (No. 217-2087320823)	Apr-19
Power sensor NRP-231	SN: 103244	06-Apr-18 (No. 217-208732)	Apr-19
Reference 50 dB Attenuator	SN: 103245	06-Apr-18 (No. 217-208732)	Apr-19
Reference Probe E8303V	SN: 59877 (270)	06-Apr-18 (No. 217-208831)	Apr-19
Reference Probe E8303V	SN: 3013	30-Dec-17 (No. 203-9113_Cert17)	Dec-18
DASY	SN: 680	21-Jan-17 (No. 044-4905_Cert17)	Dec-18

Secondary Standards	ID	Check Data (in house)	Scheduled Check
Power meter 144188	SN: 10841202074	06-Apr-18 (in house check Jun-18)	In house check Jun-20
Power sensor 14413A	SN: MY11083027	06-Apr-18 (in house check Jun-18)	In house check Jun-20
Power sensor 14413A	SN: 202110212	06-Apr-18 (in house check Jun-18)	In house check Jun-20
RF generator HP 8544C	SN: 10290405102	06-Apr-18 (in house check Jun-18)	In house check Jun-20
Network Analyser F5550A	SN: 1054100077	31-Mar-14 (in house check Oct-18)	In house check Oct-19

Calibrated by: **Gisela LAMAR** (Laboratory Technician)

Approved by: **Kjetil PHILIP** (Technical Manager)

Issued: October 23, 2018

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EX3DV4 - SN:3708

October 22, 2018

Probe EX3DV4

SN:3708

Manufactured: July 21, 2009
Calibrated: October 22, 2018

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

Certificate No: EX3-3708_Oct18 Page 3 of 39

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zugstrasse 43, 8034 Zurich, Switzerland

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Client: **SRTC (Auden)**

Accreditation No.: **SCS 0108**

Certificate No.: **EX3-3708_Oct18**

Calibration Certificate

Object: **EX3DV4 - SN:3708**

Calibration procedure(s): **QA CAL-01-v9, QA CAL-12-v9, QA CAL-14-v4, QA CAL-25-v5,
QA CAL-25-v6
Calibration procedure for dosimetric E-field probes**

Calibration date: **October 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 ± 0.2°C and humidity < 70%).

Calibration Equipment used (MPE critical for calibration)

Primary Standards	ID	Cal Data (Certificate No.)	Scheduled Calibration
Power meter N992	SN: 104179	06-Apr-18 (No. 217-2087320823)	Apr-19
Power sensor NRP-231	SN: 103244	06-Apr-18 (No. 217-208732)	Apr-19
Reference 50 dB Attenuator	SN: 103245	06-Apr-18 (No. 217-208732)	Apr-19
Reference Probe E8303V	SN: 59877 (270)	06-Apr-18 (No. 217-208831)	Apr-19
Reference Probe E8303V	SN: 3013	30-Dec-17 (No. 203-9113_Cert17)	Dec-18
DASY	SN: 680	21-Jan-17 (No. 044-4905_Cert17)	Dec-18

Secondary Standards	ID	Check Data (in house)	Scheduled Check
Power meter 144188	SN: 10841202074	06-Apr-18 (in house check Jun-18)	In house check Jun-20
Power sensor 14413A	SN: MY11083027	06-Apr-18 (in house check Jun-18)	In house check Jun-20
Power sensor 14413A	SN: 202110212	06-Apr-18 (in house check Jun-18)	In house check Jun-20
RF generator HP 8544C	SN: 10290405102	06-Apr-18 (in house check Jun-18)	In house check Jun-20
Network Analyser F5550A	SN: 1054100077	31-Mar-14 (in house check Oct-18)	In house check Oct-19

Calibrated by: **Gisela LAMAR** (Laboratory Technician)

Approved by: **Kjetil PHILIP** (Technical Manager)

Issued: October 23, 2018

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EX3DV4 - SN:3708

October 22, 2018

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3708

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm (μV/m) ¹	0.20	0.35	0.42	± 10.1 %
DCP (mV)	95.4	103.6	100.4	

Modulation Calibration Parameters

URD	Communication System Name	A	B	C	D	VR	Unc ² (k=2)
0	CW	X	0.0	0.0	1.0	0.00	134.7
		Y	0.0	0.0	1.0	0.00	130.0
		Z	0.0	0.0	1.0	0.00	146.0

Note: For details on URD parameters see Appendix.

Sensor Model Parameters

	C1	C2	σ	T1	T2	T3	T4	T5	T6
X	33.84	270.1	40.07	9.383	1.302	0.022	0.006	0.762	1.008
Y	40.04	291.1	34.06	11.47	0.801	0.012	1.758	0.156	1.005
Z	38.84	282.2	35.97	11.65	0.890	0.001	0.000	0.009	1.008

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%.

¹ The uncertainties of Norm X,Y,Z do not affect the E²-field uncertainty inside TSL (see Pages 5 and 6).
² Numerical interpolation parameter: uncertainty not required.
³ Uncertainty is determined using the rms deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

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EX3DV4 Sn:3708 (2/7)

EX3DV4- SN:3708

October 22, 2018

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3708

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz)	Relative Permittivity ^a	Conductivity (S/m) ^b	Conc ^c X	Conc ^c Y	Conc ^c Z	Alpha ^d	Depth ^e (mm)	Unc (k=2)
450	43.5	0.87	9.79	9.79	9.79	0.14	1.20	± 13.3 %
750	41.8	0.89	9.59	9.59	9.59	0.54	0.90	± 12.0 %
835	41.5	0.90	9.16	9.16	9.16	0.51	0.82	± 12.0 %
1450	40.5	1.20	8.50	8.50	8.50	0.33	0.80	± 12.0 %
1750	40.1	1.37	8.20	8.20	8.20	0.28	0.94	± 12.0 %
1900	40.0	1.40	7.89	7.89	7.89	0.35	0.85	± 12.0 %
2000	40.0	1.40	7.86	7.86	7.86	0.34	0.80	± 12.0 %
2300	39.5	1.87	7.51	7.51	7.51	0.29	0.86	± 12.0 %
2450	39.2	1.80	7.13	7.13	7.13	0.38	0.86	± 12.0 %
2600	39.0	1.96	7.01	7.01	7.01	0.38	0.87	± 12.0 %
5200	35.0	4.68	5.48	5.48	5.48	0.40	1.80	± 13.1 %
5300	35.9	4.78	5.25	5.25	5.25	0.40	1.80	± 13.1 %
5600	35.5	5.07	4.84	4.84	4.84	0.40	1.80	± 13.1 %
5800	35.3	5.27	5.04	5.04	5.04	0.40	1.80	± 13.1 %

^a Frequency validity above 300 MHz of a 100 MHz only applies for DASY v4.4 and higher (see Page 2), when it is restricted to ± 10 MHz. The uncertainty is the RSS of the Conc^c uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 20, 40, 50 and 70 MHz for Conc^c assessments at 30, 60, 120, 150 and 220 MHz respectively. Above 3 GHz frequency validity can be extended to ± 100 MHz.
^b At frequencies below 3 GHz, the validity of tissue parameters (u and v) can be relaxed to ± 10% if liquid compensation formula is applied to measured S₂₁ values. At frequencies above 3 GHz, the validity of tissue parameters (u and v) is restricted to ± 5%. The uncertainty is the RSS of the Conc^c uncertainty for indicated target tissue parameters.
^c Accuracy is determined during calibration. SPTAC 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.

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October 22, 2018

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3708

Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz)	Relative Permittivity ^a	Conductivity (S/m) ^b	Conc ^c X	Conc ^c Y	Conc ^c Z	Alpha ^d	Depth ^e (mm)	Unc (k=2)
450	56.7	0.94	10.35	10.35	10.35	0.08	1.20	± 13.3 %
750	55.9	0.96	9.51	9.51	9.51	0.50	0.85	± 12.0 %
835	55.2	0.97	9.33	9.33	9.33	0.47	0.84	± 12.0 %
1450	54.0	1.30	7.84	7.84	7.84	0.38	0.80	± 12.0 %
1750	53.4	1.49	7.69	7.69	7.69	0.37	0.85	± 12.0 %
1900	53.3	1.52	7.56	7.56	7.56	0.42	0.84	± 12.0 %
2000	53.3	1.52	7.53	7.53	7.53	0.41	0.85	± 12.0 %
2300	52.9	1.81	7.34	7.34	7.34	0.39	0.88	± 12.0 %
2450	52.7	1.95	7.19	7.19	7.19	0.32	0.95	± 12.0 %
2600	52.5	2.16	7.14	7.14	7.14	0.32	0.95	± 12.0 %
5200	49.0	5.30	4.53	4.53	4.53	0.50	1.80	± 13.1 %
5300	49.9	5.42	4.41	4.41	4.41	0.50	1.80	± 13.1 %
5600	48.5	5.77	3.99	3.99	3.99	0.50	1.80	± 13.1 %
5800	48.2	6.00	4.21	4.21	4.21	0.50	1.80	± 13.1 %

^a Frequency validity above 300 MHz of a 100 MHz only applies for DASY v4.4 and higher (see Page 2), when it is restricted to ± 10 MHz. The uncertainty is the RSS of the Conc^c uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 20, 40, 50 and 70 MHz for Conc^c assessments at 30, 60, 120, 150 and 220 MHz respectively. Above 3 GHz frequency validity can be extended to ± 100 MHz.
^b At frequencies below 3 GHz, the validity of tissue parameters (u and v) can be relaxed to ± 10% if liquid compensation formula is applied to measured S₂₁ values. At frequencies above 3 GHz, the validity of tissue parameters (u and v) is restricted to ± 5%. The uncertainty is the RSS of the Conc^c uncertainty for indicated target tissue parameters.
^c Accuracy is determined during calibration. SPTAC 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.

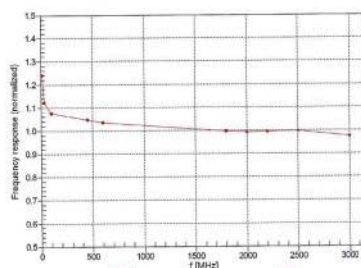
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Frequency Response of E-Field (TEM-Cell:R110 EXX, Waveguide: R22)



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

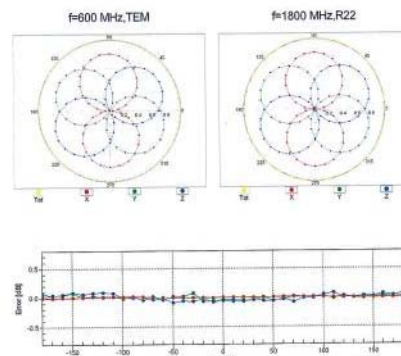
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October 22, 2018

Receiving Pattern (φ), θ = 0°



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

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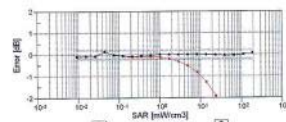
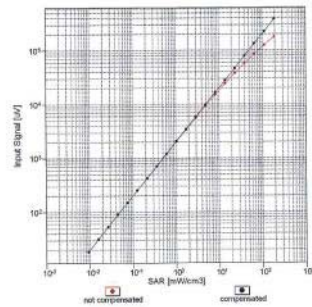
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Dynamic Range f(SAR_{head}) (TEM cell, f_{test}=1900 MHz)



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

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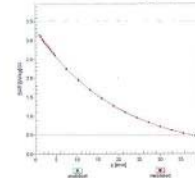
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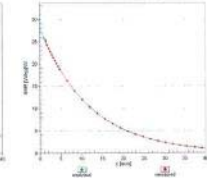
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Conversion Factor Assessment

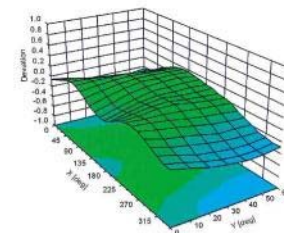
f = 835 MHz, WGLS R9 (H₁ conf)



f = 1900 MHz, WGLS R22 (H₁ conf)



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



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

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DASY/EASY - Parameters of Probe: EX3DV4 - SN:3708

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	0.5
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

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Appendix: Modulation Calibration Parameters

Communication System Name		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ	BA	BB	BC	BD	BE	BF	BG	BH	BI	BJ	BK	BL	BM	BN	BO	BP	BQ	BR	BS	BT	BU	BV	BW	BX	BY	BZ	CA	CB	CC	CD	CE	CF	CG	CH	CI	CJ	CK	CL	CM	CN	CO	CP	CQ	CR	CS	CT	CU	CV	CW	CX	CY	CZ	DA	DB	DC	DD	DE	DF	DG	DH	DI	DJ	DK	DL	DM	DN	DO	DP	DQ	DR	DS	DT	DU	DV	DW	DX	DY	DZ	EA	EB	EC	ED	EE	EF	EG	EH	EI	EJ	EK	EL	EM	EN	EO	EP	EQ	ER	ES	ET	EU	EV	EW	EX	EY	EZ	FA	FB	FC	FD	FE	FF	FG	FH	FI	FJ	FK	FL	FM	FN	FO	FP	FQ	FR	FS	FT	FU	FV	FW	FX	FY	FZ	GA	GB	GC	GD	GE	GF	GG	GH	GI	GJ	GK	GL	GM	GN	GO	GP	GQ	GR	GS	GT	GU	GV	GW	GX	GY	GZ	HA	HB	HC	HD	HE	HF	HG	HH	HI	HJ	HK	HL	HM	HN	HO	HP	HQ	HR	HS	HT	HU	HV	HW	HX	HY	HZ	IA	IB	IC	ID	IE	IF	IG	IH	II	IJ	IK	IL	IM	IN	IO	IP	IQ	IR	IS	IT	IU	IV	IW	IX	IY	IZ	JA	JB	JC	JD	JE	JF	JG	JH	JI	IJ	JK	KL	KM	KN	KO	KP	KQ	KR	KS	KT	KU	KV	KW	KX	KY	KZ	LA	LB	LC	LD	LE	LF	LG	LH	LI	LJ	LK	LL	LM	LN	LO	LP	LQ	LR	LS	LT	LU	LV	LW	LX	LY	LZ	MA	MB	MC	MD	ME	MF	MG	MH	MI	MJ	MK	ML	MM	MN	MO	MP	MQ	MR	MS	MT	MU	MV	MW	MX	MY	MZ	NA	NB	NC	ND	NE	NF	NG	NH	NI	NJ	NK	NL	NM	NN	NO	NP	NQ	NR	NS	NT	NU	NV	NW	NX	NY	NZ	OA	OB	OC	OD	OE	OF	OG	OH	OI	OJ	OK	OL	OM	ON	OO	OP	OQ	OR	OS	OT	OU	OV	OW	OX	OY	OZ	PA	PB	PC	PD	PE	PF	PG	PH	PI	PJ	PK	PL	PM	PN	PO	PP	PQ	PR	PS	PT	PU	PV	PW	PX	PY	PZ	QA	QB	QC	QD	QE	QF	QG	QH	QI	QJ	QK	QL	QM	QN	QO	QP	QQ	QR	QS	QT	QU	QV	QW	QX	QY	QZ	RA	RB	RC	RD	RE	RF	RG	RH	RI	RJ	RK	RL	RM	RN	RO	RP	RQ	RR	RS	RT	RU	RV	RW	RX	RY	RZ	SA	SB	SC	SD	SE	SF	SG	SH	SI	SJ	SK	SL	SM	SN	SO	SP	SQ	SR	SS	ST	SU	SV	SW	SX	SY	SZ	TA	TB	TC	TD	TE	TF	TG	TH	TI	TJ	TK	TL	TM	TN	TO	TP	TQ	TR	TS	TT	TU	TV	TW	TX	TY	TZ	UA	UB	UC	UD	UE	UF	UG	UH	UI	UJ	UK	UL	UM	UN	UO	UP	UQ	UR	US	UT	UU	UV	UW	UX	UY	UZ	VA	VB	VC	VD	VE	VF	VG	VH	VI	VJ	VK	VL	VM	VN	VO	VP	VQ	VR	VS	VT	VU	VV	VW	VX	VY	VZ	WA	WB	WC	WD	WE	WF	WG	WH	WI	WJ	WK	WL	WM	WN	WO	WP	WQ	WR	WS	WT	WU	WV	WW	WX	WY	WZ	XA	XB	XC	XD	XE	XF	YG	YH	YI	YJ	YK	YL	YM	YN	YO	YP	YQ	YR	YS	YT	YU	YV	YW	YX	YY	YZ	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZZ
0	OW	X	0.00	0.05	1.00	0.00	134.7	3.33	N/A																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		

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1001- CAB	IEEE 802.11b WFI 2.4 GHz (DSSS, 11 Mbps)	X	2.70	84.53	21.19	2.04	110.0	9.9 %
		Y	3.80	10.22	23.08	110.0		
		Z	2.76	85.79	21.19	110.0		
1002- CAB	IEEE 802.11b WFI 5 GHz (OFDM, 6 Mbps)	X	4.36	69.56	16.60	0.68	100.0	2.6 %
		Y	4.56	56.88	16.50	100.0		
		Z	4.46	69.43	16.19	100.0		
1003- CAB	IEEE 802.11a WFI 5 GHz (OFDM, 9 Mbps)	X	4.36	69.56	16.60	0.72	100.0	2.6 %
		Y	4.56	56.88	16.50	100.0		
1004- CAB	IEEE 802.11a WFI 5 GHz (OFDM, 12 Mbps)	X	4.41	69.56	16.75	0.66	100.0	2.6 %
		Y	4.62	67.17	16.77	100.0		
		Z	4.73	68.79	16.77	100.0		
1005- CAB	IEEE 802.11b WFI 5 GHz (OFDM, 18 Mbps)	X	4.49	69.74	16.82	1.21	100.0	3.0 %
		Y	4.69	67.04	16.86	100.0		
		Z	4.61	69.63	16.86	100.0		
1006- CAB	IEEE 802.11b WFI 5 GHz (OFDM, 24 Mbps)	X	4.61	69.74	16.87	1.46	100.0	3.0 %
		Y	4.69	67.04	16.99	100.0		
		Z	4.63	69.65	16.74	100.0		
1007- CAB	IEEE 802.11b WFI 5 GHz (OFDM, 36 Mbps)	X	4.61	69.74	17.46	2.04	100.0	3.0 %
		Y	4.69	67.34	17.43	100.0		
		Z	4.93	69.92	17.32	100.0		
1008- CAB	IEEE 802.11b WFI 5 GHz (OFDM, 48 Mbps)	X	4.83	67.62	17.63	2.35	100.0	3.0 %
		Y	5.03	67.20	17.58	100.0		
		Z	4.97	69.82	17.58	100.0		
1009- CAB	IEEE 802.11b WFI 5 GHz (OFDM, 54 Mbps)	X	4.82	67.67	17.82	2.67	100.0	3.0 %
		Y	5.10	67.21	17.77	100.0		
		Z	5.03	69.86	17.78	100.0		
1001- CAB	IEEE 802.11g WFI 2.4 GHz (DSSS/OFDM, 2 Mbps)	X	4.68	67.26	17.34	1.99	100.0	3.0 %
		Y	4.83	66.92	17.28	100.0		
		Z	4.78	69.60	17.57	100.0		
1002- CAB	IEEE 802.11g WFI 2.4 GHz (DSSS/OFDM, 3 Mbps)	X	4.61	67.04	17.53	2.30	100.0	3.0 %
		Y	4.81	67.21	17.47	100.0		
		Z	4.75	69.87	17.26	100.0		
1003- CAB	IEEE 802.11g WFI 2.4 GHz (DSSS/OFDM, 6 Mbps)	X	4.74	67.26	17.87	2.83	100.0	3.0 %
		Y	4.88	67.39	17.79	100.0		
		Z	4.78	69.89	17.66	100.0		
1004- CAB	IEEE 802.11g WFI 2.4 GHz (DSSS/OFDM, 9 Mbps)	X	4.77	67.38	18.03	3.30	100.0	3.0 %
		Y	4.88	67.32	17.93	100.0		
		Z	4.83	67.63	17.76	100.0		
1005- CAB	IEEE 802.11g WFI 2.4 GHz (DSSS/OFDM, 12 Mbps)	X	4.73	67.33	18.38	3.82	100.0	3.0 %
		Y	4.81	67.40	18.20	90.0		
		Z	4.87	67.11	18.03	90.0		
1006- CAB	IEEE 802.11g WFI 2.4 GHz (DSSS/OFDM, 18 Mbps)	X	4.84	67.25	18.40	4.15	90.0	3.0 %
		Y	4.95	67.25	18.34	80.0		
		Z	4.91	67.50	18.32	80.0		
1007- CAB	IEEE 802.11g WFI 2.4 GHz (DSSS/OFDM, 24 Mbps)	X	4.80	67.36	18.58	4.30	90.0	3.0 %
		Y	4.96	67.34	18.45	80.0		
		Z	4.96	67.50	18.45	80.0		

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1013A-CAZ	LTE-FDD (3G-PDMA, 100% RB, 10 MHz, 84-QAM)	X	2.71	67.18	18.85	0.00	150.0	9.86 %
		Y	2.87	68.02	19.17	0.00	150.0	
		Z	2.77	68.04	19.23	0.00	150.0	
1013A-CAG	LTE-FDD (3G-PDMA, 100% RB, 3 MHz, 64-QAM)	X	2.88	67.88	19.15	0.00	150.0	9.86 %
		Y	2.45	69.72	19.75	0.00	150.0	
		Z	2.48	67.56	19.38	0.00	150.0	
1014A-CAG	IEEE 802.11n (HT Greenfield, 13.5 Mbps, BPSK)	X	5.00	67.35	18.48	0.00	150.0	9.86 %
		Y	6.01	66.96	18.16	0.00	150.0	
1015A-CAG	IEEE 802.11n (HT Greenfield, 81 Mbps, 16-QAM)	X	9.11	67.12	18.58	0.00	150.0	9.86 %
		Y	3.25	67.37	18.90	0.00	150.0	
		Z	3.62	66.86	18.62	0.00	150.0	
1016A-CAG	IEEE 802.11n (HT Greenfield, 130 Mbps, 64-QAM)	X	6.02	67.00	18.50	0.00	150.0	9.86 %
		Y	5.00	67.63	19.49	0.00	150.0	
		Z	4.99	67.56	19.18	0.00	150.0	
1017A-CAG	IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK)	X	5.00	67.07	18.48	0.00	150.0	9.86 %
		Y	4.98	67.38	18.45	0.00	150.0	
		Z	4.90	66.60	18.10	0.00	150.0	
1018A-CAG	IEEE 802.11n (HT Mixed, 81 Mbps, 16-QAM)	X	5.21	67.43	18.74	0.00	150.0	9.86 %
		Y	3.31	67.56	18.68	0.00	150.0	
		Z	3.23	67.13	18.31	0.00	150.0	
1019A-CAG	IEEE 802.11n (HT Mixed, 135 Mbps, 64-QAM)	X	5.04	67.23	18.67	0.00	150.0	9.86 %
		Y	4.97	67.50	19.49	0.00	150.0	
		Z	4.98	66.63	18.10	0.00	150.0	
1020A-CAE	LTE-FDD (3G-PDMA, 100% RB, 5 MHz, 16-QAM)	X	3.56	67.10	19.77	0.00	150.0	9.86 %
		Y	3.31	67.96	18.16	0.00	150.0	
		Z	3.36	67.57	18.37	0.00	150.0	
1021A-CAE	LTE-FDD (3G-PDMA, 100% RB, 5 MHz, 16-QAM)	X	3.44	68.01	18.35	0.00	150.0	9.86 %
		Y	3.38	68.38	19.39	0.00	150.0	
		Z	1.58	67.83	14.30	0.00	150.0	9.86 %
1023A-CAE	LTE-FDD (3G-PDMA, 100% RB, 3 MHz, 16-QAM)	X	2.82	70.37	16.43	0.00	150.0	9.86 %
		Y	1.69	69.19	14.18	0.00	150.0	
		Z	1.65	67.47	13.73	0.00	150.0	
1024A-CAE	LTE-FDD (3G-PDMA, 100% RB, 3 MHz, 64-QAM)	X	2.89	70.86	16.42	0.00	150.0	9.86 %
		Y	2.08	67.38	14.26	0.00	150.0	
		Z	1.65	64.41	11.60	0.00	150.0	9.86 %
1025A-CAF	LTE-FDD (3G-PDMA, 100% RB, 1.4 MHz, QPSK)	X	2.15	67.38	14.13	0.00	150.0	9.86 %
		Y	2.87	68.03	13.93	0.00	150.0	
		Z	0.87	60.60	6.97	0.00	150.0	9.86 %
1026A-CAF	LTE-FDD (3G-PDMA, 100% RB, 1.4 MHz, 16-QAM)	X	1.62	64.21	10.44	0.00	150.0	9.86 %
		Y	0.77	61.08	7.85	0.00	150.0	
		Z	0.83	60.60	6.97	0.00	150.0	9.86 %
1027A-CAF	LTE-FDD (3G-PDMA, 100% RB, 1.4 MHz, 16-QAM)	X	1.46	63.85	8.28	0.00	150.0	9.86 %
		Y	1.17	61.09	7.99	0.00	150.0	
		Z	0.94	60.00	6.95	0.00	150.0	
1028A-CAF	LTE-FDD (3G-PDMA, 100% RB, 1.4 MHz, 64-QAM)	X	1.94	64.86	8.75	0.00	150.0	9.86 %
		Y	1.24	62.17	8.36	0.00	150.0	

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10223-CAE	IEEE 802.11n (HT Mixed, 90 Mbps, 16-QAM)	X	5.00	67.07	18.58	0.00	100.0	±0.6 %	
		Y	5.23	67.44	18.54		100.0		
		Z	5.15	67.00	18.58		100.0		
10224-CAE	IEEE 802.11n (HT Mixed, 150 Mbps, 64-QAM)	X	4.84	67.01	18.49	0.00	100.0	±0.6 %	
		Y	4.59	67.37	18.42		100.0		
		Z	4.50	66.88	18.11		100.0		
10225-CAB	UMTS-FDD (HSPA+)	X	2.44	65.81	14.45	0.00	100.0	±0.6 %	
		Y	2.73	66.77	14.43		100.0		
		Z	2.58	65.53	14.45		100.0		
10226-CAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	X	8.96	67.92	24.97	0.02	65.0	±0.6 %	
		Y	31.18	109.58	31.14		65.0		
		Z	8.89	68.89	25.48		65.0		
10227-CAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	X	8.31	68.60	23.59	0.02	65.0	±0.6 %	
		Y	25.63	104.26	28.94		65.0		
		Z	8.57	67.84	24.30		65.0		
10228-CAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	X	6.80	67.47	26.62	0.02	65.0	±0.6 %	
		Y	11.48	27.68	32.08		65.0		
		Z	6.33	66.07	26.42		65.0		
10229-CAE	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	X	0.00	60.01	34.44	0.04	60.0	±0.6 %	
		Y	27.05	106.96	35.33		65.0		
		Z	8.38	67.97	25.02		65.0		
10330-CAE	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	X	7.76	64.41	23.10	0.02	65.0	±0.6 %	
		Y	22.43	101.87	28.22		65.0		
		Z	8.06	65.94	24.27		65.0		
10331-CAE	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	X	5.41	66.43	26.29	0.02	65.0	±0.6 %	
		Y	10.71	66.21	29.53		65.0		
		Z	6.58	65.18	26.01		65.0		
10332-CAF	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	X	8.37	66.60	24.43	0.02	65.0	±0.6 %	
		Y	27.05	106.96	35.33		65.0		
		Z	8.38	67.97	25.02		65.0		
10333-CAE	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	X	7.75	64.38	23.10	0.02	65.0	±0.6 %	
		Y	22.36	101.83	28.21		65.0		
		Z	8.04	65.91	24.26		65.0		
10334-CAF	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	X	6.12	65.18	25.79	0.02	65.0	±0.6 %	
		Y	10.08	64.88	28.87		65.0		
		Z	8.85	64.35	25.03		65.0		
10335-CAF	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	X	8.39	66.63	24.43	0.02	65.0	±0.6 %	
		Y	27.08	107.02	35.34		65.0		
		Z	8.35	67.87	25.02		65.0		
10336-CAF	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	X	7.81	64.48	23.12	0.02	65.0	±0.6 %	
		Y	22.71	102.14	28.26		65.0		
		Z	8.11	66.03	23.90		65.0		
10337-CAF	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	X	6.42	66.27	26.30	0.02	65.0	±0.6 %	
		Y	15.73	66.29	29.36		65.0		
		Z	6.06	65.19	25.02		65.0		
10338-CAF	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	X	8.38	66.67	24.43	0.02	65.0	±0.6 %	
		Y	26.94	106.92	35.31		65.0		
		Z	8.33	67.82	25.00		65.0		

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10225-CAF	LTE-TDD (SC-FDMA, 10% RB, 15 MHz, QPSK)	X	6.62	76.10	20.55	3.98	65.0	±0.6 %	
		Y	6.54	78.25	21.42		65.0		
		Z	5.16	78.07	20.53		65.0		
10226-CAA	LTE-TDD (SC-FDMA, 10% RB, 1.4 MHz, 16-QAM)	X	2.45	63.21	18.47	3.98	65.0	±0.6 %	
		Y	3.51	67.93	12.58		65.0		
		Z	3.12	66.29	12.00		65.0		
10227-CAA	LTE-TDD (SC-FDMA, 10% RB, 1.4 MHz, 64-QAM)	X	2.44	62.90	18.21	3.98	65.0	±0.6 %	
		Y	3.41	66.86	12.18		65.0		
		Z	3.56	65.78	17.83		65.0		
10228-CAA	LTE-TDD (SC-FDMA, 10% RB, 1.4 MHz, QPSK)	X	1.85	63.35	18.82	3.98	65.0	±0.6 %	
		Y	3.32	69.86	14.27		65.0		
		Z	2.73	67.24	12.82		65.0		
10229-CAE	LTE-TDD (SC-FDMA, 10% RB, 3 MHz, 16-QAM)	X	4.04	70.43	18.24	3.98	65.0	±0.6 %	
		Y	9.28	75.31	18.83		65.0		
		Z	4.62	72.23	17.50		65.0		
10230-CAE	LTE-TDD (SC-FDMA, 10% RB, 3 MHz, 64-QAM)	X	4.07	70.21	18.13	3.98	65.0	±0.6 %	
		Y	9.28	75.31	18.83		65.0		
		Z	4.65	71.89	17.63		65.0		
10231-CAE	LTE-TDD (SC-FDMA, 10% RB, 3 MHz, QPSK)	X	4.07	70.21	18.13	3.98	65.0	±0.6 %	
		Y	9.28	75.31	18.83		65.0		
		Z	4.65	71.89	17.63		65.0		
10232-CAF	LTE-TDD (SC-FDMA, 10% RB, 5 MHz, 16-QAM)	X	5.01	74.07	19.48	3.98	65.0	±0.6 %	
		Y	9.99	76.46	20.76		65.0		
		Z	5.53	74.90	19.86		65.0		
10233-CAF	LTE-TDD (SC-FDMA, 10% RB, 5 MHz, 64-QAM)	X	5.01	74.07	19.48	3.98	65.0	±0.6 %	
		Y	9.99	76.46	20.76		65.0		
		Z	5.53	74.90	19.86		65.0		
10234-CAF	LTE-TDD (SC-FDMA, 10% RB, 5 MHz, QPSK)	X	5.01	74.07	19.48	3.98	65.0	±0.6 %	
		Y	9.99	76.46	20.76		65.0		
		Z	5.53	74.90	19.86		65.0		
10235-CAF	LTE-TDD (SC-FDMA, 10% RB, 10 MHz, 16-QAM)	X	5.01	74.07	19.48	3.98	65.0	±0.6 %	
		Y	9.99	76.46	20.76		65.0		
		Z	5.53	74.90	19.86		65.0		
10236-CAF	LTE-TDD (SC-FDMA, 10% RB, 10 MHz, 64-QAM)	X	5.01	74.07	19.48	3.98	65.0	±0.6 %	
		Y	9.99	76.46	20.76		65.0		
		Z	5.53	74.90	19.86		65.0		
10237-CAF	LTE-TDD (SC-FDMA, 10% RB, 15 MHz, 16-QAM)	X	5.01	74.07	19.48	3.98	65.0	±0.6 %	
		Y	9.99	76.46	20.76		65.0		
		Z	5.53	74.90	19.86		65.0		
10238-CAF	LTE-TDD (SC-FDMA, 10% RB, 15 MHz, QPSK)	X	5.01	74.07	19.48	3.98	65.0	±0.6 %	
		Y	9.99	76.46	20.76		65.0		
		Z	5.53	74.90	19.86		65.0		

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10303-AAA	IEEE 802.11b WMAX (31.5, 5mls, 10MHz, 8QAM, PUSC)	X	4.86	67.09	18.50	4.98	65.0	±0.6 %	
		Y	4.83	66.81	17.92		65.0		
		Z	4.77	66.64	17.56		65.0		
10304-AAA	IEEE 802.11b WMAX (31.5, 5mls, 10MHz, 8QAM, PUSC)	X	4.86	66.87	17.82	4.17	50.0	±0.6 %	
		Y	4.84	65.92	17.45		50.0		
		Z	4.87	65.48	17.17		50.0		
10305-AAA	IEEE 802.11b WMAX (31.5, 10mls, 10MHz, 8QAM, PUSC, 18 symbols)	X	4.86	67.09	18.50	4.98	65.0	±0.6 %	
		Y	4.83	66.82	17.79		65.0		
		Z	4.82	66.49	17.48		65.0		
10306-AAA	IEEE 802.11b WMAX (31.5, 10mls, 10MHz, 8QAM, PUSC, 18 symbols)	X	4.86	67.09	18.50	4.98	65.0	±0.6 %	
		Y	4.83	66.82	17.79		65.0		
		Z	4.82	66.49	17.48		65.0		
10307-AAA	IEEE 802.11b WMAX (31.5, 10mls, 10MHz, QPSK, PUSC, 18 symbols)	X	4.86	67.09	18.50	4.98	65.0	±0.6 %	
		Y	4.83	67.30	19.20		65.0		
		Z	4.78	66.94	18.82		65.0		
10308-AAA	IEEE 802.11b WMAX (31.5, 10mls, 10MHz, 16QAM, PUSC)	X	4.84	66.40	16.59	5.02	50.0	±0.6 %	
		Y	4.80	67.31	18.18		50.0		
		Z	4.82	67.00	18.34		50.0		
10309-AAA	IEEE 802.11b WMAX (31.5, 10mls, 10MHz, 16QAM, AMC 2x3, 18 symbols)	X	4.86	67.77	19.31		65.0	±0.6 %	
		Y	4.88	66.89	18.91	6.02	30.0	±0.6 %	
		Z	4.73	67.44	19.31		30.0		
10310-AAA	IEEE 802.11b WMAX (31.5, 10mls, 10MHz, QPSK, AMC 2x3, 18 symbols)	X	4.74	67.44	19.30		30.0	±0.6 %	
		Y	4.74	67.44	19.30		30.0		
		Z	4.68	67.43	18.90		30.0		
10311-AAD	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	X	2.77	66.48	16.05	0.00	150.0	±0.6 %	
		Y	3.14	70.00	16.79		150.0		
		Z	2.75	67.64	15.39		150.0		
10313-AAA	IDEN 1.3	X	3.50	74.44	18.42	0.99	10.0	±0.6 %	
		Y	3.64	72.55	15.49		70.0		
		Z	2.87	69.89	14.72		70.0		
10314-AAA	IDEN 1.8	X	3.50	74.44	18.42	10.00	30.0	±0.6 %	
		Y	3.64	72.55	15.49		70.0		
		Z	2.87	69.89	14.72		70.0		
10315-AAB	IEEE 802.11b WFI 2.4 GHz (5555, 1 Mbps, 8Qps duty cycle)	X	5.12	82.13	21.83		60.0	±0.6 %	
		Y	5.18	79.04	19.55		60.0		
		Z	5.10	78.04	19.55		60.0		
10316-AAB	IEEE 802.11b WFI 2.4 GHz (5555, 1 Mbps, 8Qps duty cycle)	X	5.12	82.13	21.83	0.17	150.0	±0.6 %	
		Y	5.18	79.04	19.55		150.0		
		Z	5.10	78.04	19.55		150.0		
10317-AAC	IEEE 802.11a WFI 5 GHz (OFDM, 6 Mbps, 8Qps duty cycle)	X	4.45	66.89	18.25	0.17	150.0	±0.6 %	
		Y	4.45	66.89	18.25		150.0		
		Z	4.45	66.89	18.25		150.0		
10400-AAD	IEEE 802.11ac WFI (80MHz, 64-QAM, 8Qps duty cycle)	X	4.30	66.79	18.52	0.00	150.0	±0.6 %	
		Y	4.30	66.79	18.52		150.0		
		Z	4.30	66.79	18.52		150.0		
10401-AAD	IEEE 802.11ac WFI (80MHz, 64-QAM, 8Qps duty cycle)	X	4.30	66.79	18.52	0.00	150.0	±0.6 %	
		Y	4.30	66.79	18.52		150.0		
		Z	4.30	66.79	18.52		150.0		

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10427- AAE	IEEE 802.11n (HT Greenfield, 150 Mbps, 64-QAM, UL, Subframe=2,3,4,7,8,9)	X	5.02	67.00	18.51	0.00	150.0	± 9.8 %	
		Y	5.19	67.39	18.49		150.0		
		Z	5.11	66.94	18.20		150.0		
10430- AAD	LTE-FDD (FDDMA, 5 MHz, E-TM 3.1)	X	4.38	73.73	18.68	0.00	150.0	± 9.8 %	
		Y	4.49	73.15	18.04		150.0		
		Z	4.10	71.38	17.94		150.0		
10431- AAD	LTE-FDD (FDDMA, 10 MHz, E-TM 3.1)	X	3.70	67.15	18.98	0.00	150.0	± 9.8 %	
		Y	4.07	67.63	18.28		150.0		
		Z	3.92	66.88	18.14		150.0		
10432- AAC	LTE-FDD (FDDMA, 15 MHz, E-TM 3.1)	X	4.13	66.99	18.21	0.00	150.0	± 9.8 %	
		Y	4.37	67.41	18.38		150.0		
		Z	4.28	66.79	18.20		150.0		
10433- AAC	LTE-FDD (FDDMA, 20 MHz, E-TM 3.1)	X	4.39	66.91	18.54	0.00	150.0	± 9.8 %	
		Y	4.62	67.33	18.42		150.0		
		Z	4.51	66.77	18.04		150.0		
10434- AAA	W-CDMA (BS Test Model 1, 64 DPCH)	X	4.42	74.13	18.28	0.00	150.0	± 9.8 %	
		Y	4.73	74.54	18.12		150.0		
		Z	4.17	72.09	17.89		150.0		
10438- AAF	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL, Subframe=2,3,4,7,8,9)	X	5.40	80.51	20.00	0.00	150.0	± 9.8 %	
		Y	100.00	117.25	27.58		80.0		
		Z	11.09	92.89	22.28		80.0		
10447- AAD	LTE-FDD (FDDMA, 5 MHz, E-TM 3.1, Clipping 44%)	X	3.96	66.95	18.33	0.00	150.0	± 9.8 %	
		Y	3.37	67.75	18.49		150.0		
		Z	3.10	66.53	18.49		150.0		
10448- AAD	LTE-FDD (FDDMA, 10 MHz, E-TM 3.1, Clipping 44%)	X	3.96	66.96	18.33	0.00	150.0	± 9.8 %	
		Y	3.93	67.43	18.16		150.0		
		Z	3.78	66.86	18.00		150.0		
10449- AAC	LTE-FDD (FDDMA, 15 MHz, E-TM 3.1, Clipping 44%)	X	3.97	66.81	18.10	0.00	150.0	± 9.8 %	
		Y	4.20	67.26	18.28		150.0		
		Z	4.08	66.61	18.21		150.0		
10450- AAC	LTE-FDD (FDDMA, 20 MHz, E-TM 3.1, Clipping 44%)	X	4.18	66.60	18.18	0.00	150.0	± 9.8 %	
		Y	4.46	67.13	18.25		150.0		
		Z	4.28	66.94	18.09		150.0		
10451- AAA	W-CDMA (BS Test Model 1, 64 DPCH, Clipping 44%)	X	2.70	65.89	19.23	0.00	150.0	± 9.8 %	
		Y	3.22	67.79	18.95		150.0		
		Z	2.96	66.32	18.88		150.0		
10456- AAB	IEEE 802.11ac WFI (160MHz, 64-QAM, 80% duty cycle)	X	4.09	67.79	18.82	0.00	150.0	± 9.8 %	
		Y	6.10	68.03	18.68		150.0		
		Z	6.09	67.70	18.49		150.0		
10457- AAA	UMTS-FDD (DC-HSPA)	X	3.57	65.33	18.93	0.00	150.0	± 9.8 %	
		Y	3.72	65.64	18.01		150.0		
		Z	3.64	65.12	18.61		150.0		
10458- AAA	CDMA2000 (1xEV-DO, Rev. B, 2.4MHz)	X	3.31	69.88	18.53	0.00	150.0	± 9.8 %	
		Y	4.24	73.24	18.12		150.0		
		Z	3.83	70.98	18.45		150.0		
10459- AAA	CDMA2000 (1xEV-DO, Rev. B, 3.1MHz)	X	3.26	71.27	18.70	0.00	150.0	± 9.8 %	
		Y	3.12	69.87	18.55		150.0		
		Z	4.91	69.06	17.98		150.0		

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10477- AAF	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM, UL, Subframe=2,3,4,7,8,9)	X	0.86	60.00	7.77	3.23	80.0	± 9.8 %	
		Y	0.86	60.00	7.37		80.0		
		Z	0.85	60.75	8.50		80.0		
10478- AAF	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM, UL, Subframe=2,3,4,7,8,9)	X	0.86	60.00	7.29	3.23	80.0	± 9.8 %	
		Y	0.86	60.00	6.95		80.0		
		Z	0.89	60.00	7.80		80.0		
10479- AAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK, UL, Subframe=2,3,4,7,8,9)	X	45.10	109.19	27.60	3.23	80.0	± 9.8 %	
		Y	10.72	98.20	25.00		80.0		
		Z	6.80	84.41	21.78		80.0		
10485- AAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM, UL, Subframe=2,3,4,7,8,9)	X	9.04	88.21	13.43	3.23	80.0	± 9.8 %	
		Y	7.14	79.40	17.60		80.0		
		Z	3.88	72.88	18.52		80.0		
10481- AAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM, UL, Subframe=2,3,4,7,8,9)	X	2.10	68.01	11.77	3.23	80.0	± 9.8 %	
		Y	4.29	72.85	14.53		80.0		
		Z	2.95	68.94	13.69		80.0		
10482- AAB	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK, UL, Subframe=2,3,4,7,8,9)	X	1.17	61.31	9.58	2.23	80.0	± 9.8 %	
		Y	2.63	70.02	15.29		80.0		
		Z	1.70	64.80	12.42		80.0		
10483- AAB	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM, UL, Subframe=2,3,4,7,8,9)	X	1.90	60.97	8.89	2.23	80.0	± 9.8 %	
		Y	3.07	68.75	13.78		80.0		
		Z	2.34	65.50	12.29		80.0		
10484- AAB	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM, UL, Subframe=2,3,4,7,8,9)	X	1.49	60.41	8.72	2.23	80.0	± 9.8 %	
		Y	2.87	67.74	13.34		80.0		
		Z	2.25	64.87	11.98		80.0		
10485- AAC	LTE-TDD (SC-FDMA, 50% RB, 6 MHz, QPSK, UL, Subframe=2,3,4,7,8,9)	X	2.10	68.29	14.58	2.23	80.0	± 9.8 %	
		Y	3.39	74.14	18.00		80.0		
		Z	2.30	68.88	13.38		80.0		
10486- AAB	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM, UL, Subframe=2,3,4,7,8,9)	X	1.89	62.30	11.43	2.23	80.0	± 9.8 %	
		Y	2.87	68.86	15.17		80.0		
		Z	2.31	65.30	13.27		80.0		
10487- AAB	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM, UL, Subframe=2,3,4,7,8,9)	X	1.88	62.92	11.27	2.23	80.0	± 9.8 %	
		Y	2.84	68.37	14.93		80.0		
		Z	2.33	68.19	13.13		80.0		
10488- AAB	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK, UL, Subframe=2,3,4,7,8,9)	X	2.83	71.00	17.45	2.23	80.0	± 9.8 %	
		Y	3.88	73.22	18.66		80.0		
		Z	2.85	69.54	16.89		80.0		
10489- AAC	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM, UL, Subframe=2,3,4,7,8,9)	X	2.80	67.87	18.87	2.23	80.0	± 9.8 %	
		Y	3.42	69.49	17.05		80.0		
		Z	2.88	67.24	15.84		80.0		
10490- AAB	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM, UL, Subframe=2,3,4,7,8,9)	X	2.87	67.51	18.00	2.23	80.0	± 9.8 %	
		Y	3.60	69.29	16.97		80.0		
		Z	3.07	67.17	15.82		80.0		
10491- AAB	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK, UL, Subframe=2,3,4,7,8,9)	X	3.19	68.71	17.35	2.23	80.0	± 9.8 %	
		Y	3.74	71.43	18.14		80.0		
		Z	3.30	67.45	16.40		80.0		
10492- AAB	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM, UL, Subframe=2,3,4,7,8,9)	X	3.70	68.80	17.98	2.23	80.0	± 9.8 %	
		Y	3.40	68.98	16.20		80.0		

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10508- AAE	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM, UL, Subframe=2,3,4,7,8,9)	X	3.41	67.37	18.58	2.23	80.0	± 9.8 %	
		Y	3.62	68.59	17.18		80.0		
		Z	3.82	67.03	18.39		80.0		
10509- AAB	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK, UL, Subframe=2,3,4,7,8,9)	X	3.78	68.64	17.37	2.23	80.0	± 9.8 %	
		Y	4.18	71.43	18.03		80.0		
		Z	3.81	69.14	18.94		80.0		
10510- AAE	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM, UL, Subframe=2,3,4,7,8,9)	X	3.60	67.28	18.80	2.23	80.0	± 9.8 %	
		Y	4.71	69.40	17.24		80.0		
		Z	3.91	67.15	18.53		80.0		
10511- AAE	LTE-TDD (SC-FDMA, 100% RB, 18 MHz, 64-QAM, UL, Subframe=2,3,4,7,8,9)	X	3.87	67.15	18.77	2.23	80.0	± 9.8 %	
		Y	4.36	69.20	17.18		80.0		
		Z	3.88	68.69	18.50		80.0		
10512- AAF	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK, UL, Subframe=2,3,4,7,8,9)	X	3.83	70.67	17.64	2.23	80.0	± 9.8 %	
		Y	4.57	72.98	18.50		80.0		
		Z	3.88	70.11	17.19		80.0		
10513- AAF	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM, UL, Subframe=2,3,4,7,8,9)	X	3.89	67.29	18.85	2.23	80.0	± 9.8 %	
		Y	4.10	68.72	17.33		80.0		
		Z	3.70	67.28	18.57		80.0		
10514- AAF	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM, UL, Subframe=2,3,4,7,8,9)	X	3.74	67.09	18.78	2.23	80.0	± 9.8 %	
		Y	4.12	69.32	17.20		80.0		
		Z	3.84	68.97	18.51		80.0		
10515- AAA	IEEE 802.11b WFI 2.4 GHz (DSSS, 2 Mbps, 80% duty cycle)	X	0.81	83.02	14.44	0.00	150.0	± 9.8 %	
		Y	0.98	84.09	15.32		150.0		
		Z	0.87	82.57	13.59		150.0		
10516- AAA	IEEE 802.11b WFI 2.4 GHz (DSSS, 3.5 Mbps, 80% duty cycle)	X	0.89	78.74	18.87	0.00	150.0	± 9.8 %	
		Y	0.80	77.81	20.56		150.0		
		Z	0.82	80.83	13.72		150.0		
10517- AAA	IEEE 802.11b WFI 2.4 GHz (DSSS, 11 Mbps, 80% duty cycle)	X	0.86	85.37	15.03	0.00	150.0	± 9.8 %	
		Y	0.83	86.70	16.38		150.0		
		Z	0.88	83.32	13.89		150.0		
10518- AAB	IEEE 802.11ah WFI 5 GHz (OFDM, 9 Mbps, 80% duty cycle)	X	4.19	68.67	18.18	0.00	150.0	± 9.8 %	
		Y	4.43	67.06	18.26		150.0		
		Z	4.30	68.42	18.88		150.0		
10519- AAB	IEEE 802.11ah WFI 5 GHz (OFDM, 12 Mbps, 80% duty cycle)	X	4.33	69.54	16.27	0.00	150.0	± 9.8 %	
		Y	4.46	67.23	16.37		150.0		
		Z	4.30	68.86	16.98		150.0		
10520- AAB	IEEE 802.11ah WFI 5 GHz (OFDM, 18 Mbps, 80% duty cycle)	X	4.19	68.67	18.18	0.00	150.0	± 9.8 %	
		Y	4.42	67.19	16.38		150.0		
		Z	4.30	68.95	15.89		150.0		
10521- AAB	IEEE 802.11ah WFI 5 GHz (OFDM, 24 Mbps, 80% duty cycle)	X	4.19	68.67	18.18	0.00	150.0	± 9.8 %	
		Y	4.38	67.18	16.39		150.0		
		Z	4.24	68.57	15.80		150.0		
10522- AAB	IEEE 802.11ah WFI 5 GHz (OFDM, 36 Mbps, 80% duty cycle)	X	4.17	68.64	18.05	0.00	150.0	± 9.8 %	
		Y	4.43	67.37	16.38		150.0		
		Z	4.30	68.26	15.87		150.0		

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10007-AAB	IEEE 802.11ac WFI (20MHz, MCS0, 90ps duty cycle)	X	4.30	68.68	16.10	0.46	130.0	±9.6 %	
		Y	4.50	69.24	16.15		130.0		
		Z	4.40	69.72	16.80		130.0		
10008-AAB	IEEE 802.11ac WFI (20MHz, MCS1, 90ps duty cycle)	X	4.43	69.20	16.24	0.46	130.0	±9.6 %	
		Y	4.65	69.50	16.30		130.0		
		Z	4.54	69.56	15.90		130.0		
10009-AAB	IEEE 802.11ac WFI (20MHz, MCS2, 90ps duty cycle)	X	4.33	69.00	16.03	0.46	130.0	±9.6 %	
		Y	4.54	69.42	16.12		130.0		
		Z	4.44	69.87	15.76		130.0		
10010-AAB	IEEE 802.11ac WFI (20MHz, MCS3, 90ps duty cycle)	X	4.38	68.21	16.23	0.46	130.0	±9.6 %	
		Y	4.60	69.00	16.30		130.0		
		Z	4.48	69.10	15.59		130.0		
10011-AAB	IEEE 802.11ac WFI (20MHz, MCS4, 90ps duty cycle)	X	4.39	68.97	16.05	0.46	130.0	±9.6 %	
		Y	4.51	69.39	16.13		130.0		
		Z	4.40	69.84	15.77		130.0		
10012-AAB	IEEE 802.11ac WFI (20MHz, MCS5, 90ps duty cycle)	X	4.35	68.08	16.08	0.46	130.0	±9.6 %	
		Y	4.51	69.50	16.17		130.0		
		Z	4.39	69.98	15.80		130.0		
10013-AAB	IEEE 802.11ac WFI (20MHz, MCS6, 90ps duty cycle)	X	4.27	68.69	15.85	0.46	130.0	±9.6 %	
		Y	4.50	69.34	16.02		130.0		
		Z	4.38	69.79	15.65		130.0		
10014-AAB	IEEE 802.11ac WFI (20MHz, MCS7, 90ps duty cycle)	X	4.35	68.17	16.21	0.46	130.0	±9.6 %	
		Y	4.47	68.82	16.30		130.0		
		Z	4.36	69.03	15.92		130.0		
10015-AAB	IEEE 802.11ac WFI (20MHz, MCS8, 90ps duty cycle)	X	4.23	68.76	16.76	0.46	130.0	±9.6 %	
		Y	4.60	69.18	16.86		130.0		
		Z	4.38	69.85	15.52		130.0		
10016-AAB	IEEE 802.11ac WFI (40MHz, MCS0, 90ps duty cycle)	X	4.90	66.50	16.34	0.46	130.0	±9.6 %	
		Y	5.12	66.50	16.29		130.0		
		Z	5.05	66.10	16.02		130.0		
10017-AAB	IEEE 802.11ac WFI (40MHz, MCS1, 90ps duty cycle)	X	5.02	66.34	16.39	0.46	130.0	±9.6 %	
		Y	5.17	66.39	16.34		130.0		
		Z	5.10	66.39	16.07		130.0		
10018-AAB	IEEE 802.11ac WFI (40MHz, MCS2, 90ps duty cycle)	X	4.91	66.35	16.40	0.46	130.0	±9.6 %	
		Y	5.08	66.77	16.40		130.0		
		Z	5.00	66.31	16.11		130.0		
10019-AAB	IEEE 802.11ac WFI (40MHz, MCS3, 90ps duty cycle)	X	4.96	66.33	16.32	0.46	130.0	±9.6 %	
		Y	5.08	66.52	16.30		130.0		
		Z	5.01	66.09	15.80		130.0		
10020-AAB	IEEE 802.11ac WFI (40MHz, MCS4, 90ps duty cycle)	X	5.01	66.21	16.31	0.46	130.0	±9.6 %	
		Y	5.18	66.53	16.25		130.0		
		Z	5.09	66.11	15.89		130.0		
10021-AAB	IEEE 802.11ac WFI (40MHz, MCS5, 90ps duty cycle)	X	5.01	66.30	16.50	0.46	130.0	±9.6 %	
		Y	5.18	66.72	16.48		130.0		
		Z	5.10	66.27	16.20		130.0		
10022-AAB	IEEE 802.11ac WFI (40MHz, MCS6, 90ps duty cycle)	X	5.01	66.42	16.43	0.46	130.0	±9.6 %	
		Y	5.18	66.83	16.52		130.0		
		Z	5.09	66.37	16.24		130.0		

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10030-AAC	IEEE 802.11ac WFI (160MHz, MCS0, 90ps duty cycle)	X	5.68	66.78	16.50	0.46	130.0	±9.6 %	
		Y	5.96	67.16	16.45		130.0		
		Z	5.80	66.78	16.22		130.0		
10040-AAC	IEEE 802.11ac WFI (160MHz, MCS4, 90ps duty cycle)	X	5.19	66.53	16.33	0.46	130.0	±9.6 %	
		Y	5.85	67.13	16.30		130.0		
		Z	5.88	66.72	16.13		130.0		
10041-AAC	IEEE 802.11ac WFI (160MHz, MCS5, 90ps duty cycle)	X	5.97	66.66	16.51	0.46	130.0	±9.6 %	
		Y	6.01	67.09	16.38		130.0		
		Z	5.98	66.74	16.16		130.0		
10042-AAC	IEEE 802.11ac WFI (160MHz, MCS6, 90ps duty cycle)	X	5.94	66.62	16.72	0.46	130.0	±9.6 %	
		Y	6.08	67.38	16.68		130.0		
		Z	5.92	66.88	16.48		130.0		
10043-AAC	IEEE 802.11ac WFI (160MHz, MCS7, 90ps duty cycle)	X	5.76	66.59	16.43	0.46	130.0	±9.6 %	
		Y	6.29	67.02	16.36		130.0		
		Z	6.03	66.65	16.18		130.0		
10044-AAC	IEEE 802.11ac WFI (160MHz, MCS8, 90ps duty cycle)	X	5.93	66.71	16.32	0.46	130.0	±9.6 %	
		Y	6.36	67.32	16.36		130.0		
		Z	6.07	66.89	16.31		130.0		
10046-AAC	IEEE 802.11ac WFI (160MHz, MCS9, 90ps duty cycle)	X	6.16	67.41	16.53	0.46	130.0	±9.6 %	
		Y	6.27	67.25	16.48		130.0		
		Z	6.04	66.85	16.31		130.0		
10046-AAF	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL, Subframe=2.7)	X	9.04	62.83	31.00	0.30	60.0	±9.6 %	
		Y	16.22	106.06	36.65		60.0		
		Z	10.43	96.01	32.53		60.0		
10047-AAF	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL, Subframe=2.7)	X	9.34	91.27	30.60	0.30	60.0	±9.6 %	
		Y	13.94	103.45	34.79		60.0		
		Z	9.34	94.22	31.85		60.0		
10048-AAA	CDMA2000 (1X Advanced)	X	0.32	90.00	5.03	0.00	150.0	±9.6 %	
		Y	0.59	93.51	9.94		150.0		
		Z	0.44	90.36	7.17		150.0		
10052-AAD	LTE-TDD (OFDMA, 5 MHz, E-TM 3.1, CQI=9, 44%)	X	3.20	66.29	16.67	2.23	60.0	±9.6 %	
		Y	3.56	67.36	16.44		60.0		
		Z	3.26	66.84	15.56		60.0		
10053-AAD	LTE-TDD (OFDMA, 10 MHz, E-TM 44%, CQI=9, 44%)	X	3.78	66.70	16.24	2.23	60.0	±9.6 %	
		Y	4.08	68.63	16.60		60.0		
		Z	3.87	65.57	16.04		60.0		
10054-AAD	LTE-TDD (OFDMA, 15 MHz, E-TM 3.1, CQI=9, 44%)	X	3.81	66.39	16.33	2.23	60.0	±9.6 %	
		Y	4.08	68.15	16.62		60.0		
		Z	3.89	65.26	16.10		60.0		
10055-AAD	LTE-TDD (OFDMA, 20 MHz, E-TM 3.1, CQI=9, 44%)	X	3.89	65.27	16.38	2.23	60.0	±9.6 %	
		Y	4.12	68.08	16.65		60.0		
		Z	3.95	67.32	16.15		60.0		
10065-AAA	Pulse Waveform (200Hz, 10%)	X	3.95	69.00	12.97	10.00	50.0	±9.6 %	
		Y	4.12	68.08	16.65		50.0		
		Z	3.92	70.15	16.90		50.0		
10069-AAA	Pulse Waveform (200Hz, 20%)	X	4.20	68.91	13.74	6.69	50.0	±9.6 %	
		Y	40.68	53.57	15.50		50.0		
		Z	4.18	81.85	16.51		50.0		

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Client: **SRTC** Certificate No: **Z17-97134**

CALIBRATION CERTIFICATE

Object: **D750V3 - SN: 1101**

Calibration Procedure(s): **FF-Z11-003-01**
Calibration Procedures for dipole validation kits

Calibration date: **September 13, 2017**

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 (MATE critical for calibration)

Primary Standards	ID #	Cal Date/Calibrated by: Certificate No.)	Scheduled Calibration
Power Meter NRVD	102196	02-Mar-17 (CTTL, No.J17X01254)	Mar-18
Power sensor NRV-Z5	100596	02-Mar-17 (CTTL, No.J17X01254)	Mar-18
Reference Probe EX30V4	SN 7433	26-Sep-16(SPEAG, No EX3-7433_Sep16)	Sep-17
DAE4	SN 1331	19-Jan-17(CTTL-SPEAG, No Z17-97015)	Jan-18

Secondary Standards	ID #	Cal Date/Calibrated by: Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY46071430	13-Jan-17 (CTTL, No.J17X00286)	Jan-18
Network Analyzer E5071C	MY46111013	13-Jan-17 (CTTL, No.J17X00285)	Jan-18

Calibrated by: **Zhao Jing** SAR Test Engineer Signature: *[Signature]*

Reviewed by: **Yu Zongying** SAR Test Engineer Signature: *[Signature]*

Approved by: **Qi Dianyuan** SAR Project Leader Signature: *[Signature]*

Issued: September 16, 2017

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

Certificate No: Z17-97134

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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) KDB85664, 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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In Collaboration with
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Measurement Conditions
DASY system configuration, as far as not given on page 1

DASY Version	DASY52	52.10.0.1448
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	0.88 mS/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.5 ± 6 %	0.88 mS/m ± 6 %
Head TSL temperature change during test	<1.0 °C	---	---

SAR result with Head TSL

	Condition	
SAR averaged over 1 cm ³ (1 g) of Head TSL	250 mW input power	2.05 mW / g
SAR measured	normalized to 1W	8.26 mW / g ± 18.6 % (k=2)
SAR for nominal Head TSL parameters	Condition	
SAR averaged over 10 cm ³ (10 g) of Head TSL	250 mW input power	1.34 mW / g
SAR measured	normalized to 1W	6.39 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	55.5	0.96 mS/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	55.4 ± 6 %	0.95 mS/m ± 6 %
Body TSL temperature change during test	<1.0 °C	---	---

SAR result with Body TSL

	Condition	
SAR averaged over 1 cm ³ (1 g) of Body TSL	250 mW input power	2.15 mW / g
SAR measured	normalized to 1W	8.69 mW / g ± 18.8 % (k=2)
SAR for nominal Body TSL parameters	Condition	
SAR averaged over 10 cm ³ (10 g) of Body TSL	250 mW input power	1.42 mW / g
SAR measured	normalized to 1W	6.73 mW / g ± 18.7 % (k=2)

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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.90 ± 0.24jΩ
Return Loss	- 28.4dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	52.0Q; 2.22jΩ
Return Loss	- 30.9dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.136 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

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