



Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China Tei: +86-10-62304633-2512 Fax: +86-10-62304633-2504	
E-mail: cttl@chinattl.com Http://www.chinattl.cn	
DASY/EASY – Parameters of Probe: ES3	DV3 - SN: 325
Other Probe Parameters	
Sensor Arrangement	Triangular
Connector Angle (°)	131.6
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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FF-Z11-	Certificate No: Z18 E SN:7401	3-60557				
EX3DV4 FF-Z11-						
FF-Z11-	- SN:7401					
Calibrati	FF-Z11-004-01					
Calibrati	Calibration Procedures for Dosimetric E-field Probes					
January	nuary 15, 2019					
surements and the	aceability to national standards, which rea ne uncertainties with confidence probability	alize the physical units of are given on the following				
incate.						
conducted in th	e closed laboratory facility: environment	temperature(22±3)°C and				
M&TE critical for	calibration)					
ID#	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration				
101919	20-Jun-18 (CTTL, No.J18X05032)					
		Jun-19				
101547	20-Jun-18 (CTTL, No.J18X05032)	Jun-19 Jun-19				
101548	20-Jun-18 (CTTL, No.J18X05032)					
101548 18N50W-10dB	20-Jun-18 (CTTL, No.J18X05032) 09-Feb-18(CTTL, No.J18X01133)	Jun-19				
101548 18N50W-10dB 18N50W-20dB	20-Jun-18 (CTTL, No.J18X05032) 09-Feb-18(CTTL, No.J18X01133) 09-Feb-18(CTTL, No.J18X01132)	Jun-19 Jun-19				
101548 18N50W-10dB 18N50W-20dB SN 7514	20-Jun-18 (CTTL, No.J18X05032) 09-Feb-18(CTTL, No.J18X01133) 09-Feb-18(CTTL, No.J18X01132) 27-Aug-18(SPEAG,No.EX3-7514_Aug18)	Jun-19 Jun-19 Feb-20 Feb-20 Aug-19				
101548 18N50W-10dB 18N50W-20dB	20-Jun-18 (CTTL, No.J18X05032) 09-Feb-18(CTTL, No.J18X01133) 09-Feb-18(CTTL, No.J18X01132)	Jun-19 Jun-19 Feb-20 Feb-20 Aug-19				
101548 18N50W-10dB 18N50W-20dB SN 7514	20-Jun-18 (CTTL, No.J18X05032) 09-Feb-18(CTTL, No.J18X01133) 09-Feb-18(CTTL, No.J18X01132) 27-Aug-18(SPEAG, No.EX3-7514_Aug18) 20-Aug-18(SPEAG, No.DAE4-1555_Aug18)	Jun-19 Jun-19 Feb-20 Feb-20 Aug-19 8) Aug-19				
101548 18N50W-10dB 18N50W-20dB SN 7514 SN 1555	20-Jun-18 (CTTL, No.J18X05032) 09-Feb-18(CTTL, No.J18X01133) 09-Feb-18(CTTL, No.J18X01132) 27-Aug-18(SPEAG, No.EX3-7514_Aug18) 20-Aug-18(SPEAG, No.DAE4-1555_Aug18) Cal Date(Calibrated by, Certificate No.)	Jun-19 Jun-19 Feb-20 Feb-20 Aug-19 8) Aug-19 Scheduled Calibration				
101548 18N50W-10dB 18N50W-20dB SN 7514 SN 1555	20-Jun-18 (CTTL, No.J18X05032) 09-Feb-18(CTTL, No.J18X01133) 09-Feb-18(CTTL, No.J18X01132) 27-Aug-18(SPEAG, No.EX3-7514_Aug18) 20-Aug-18(SPEAG, No.DAE4-1555_Aug18) Cal Date(Calibrated by, Certificate No.) 21-Jun-18 (CTTL, No.J18X05033)	Jun-19 Jun-19 Feb-20 Feb-20 Aug-19 8) Aug-19 Scheduled Calibration Jun-19				
101548 18N50W-10dB 18N50W-20dB SN 7514 SN 1555 ID # 6201052605	20-Jun-18 (CTTL, No.J18X05032) 09-Feb-18(CTTL, No.J18X01133) 09-Feb-18(CTTL, No.J18X01132) 27-Aug-18(SPEAG, No.EX3-7514_Aug18) 20-Aug-18(SPEAG, No.DAE4-1555_Aug18) Cal Date(Calibrated by, Certificate No.)	Jun-19 Jun-19 Feb-20 Feb-20 Aug-19 8) Aug-19 Scheduled Calibration Jun-19 Jan -19				
101548 18N50W-10dB 18N50W-20dB SN 7514 SN 1555 ID # 6201052605 MY46110673	20-Jun-18 (CTTL, No.J18X05032) 09-Feb-18(CTTL, No.J18X01133) 09-Feb-18(CTTL, No.J18X01132) 27-Aug-18(SPEAG,No.EX3-7514_Aug18) 20-Aug-18(SPEAG, No.DAE4-1555_Aug18) Cal Date(Calibrated by, Certificate No.) 21-Jun-18 (CTTL, No.J18X05033) 24-Jan-18 (CTTL, No.J18X00561)	Jun-19 Jun-19 Feb-20 Feb-20 Aug-19 8) Aug-19 Scheduled Calibration Jun-19				
101548 18N50W-10dB 18N50W-20dB SN 7514 SN 1555 ID # 6201052605 MY46110673 ame	20-Jun-18 (CTTL, No.J18X05032) 09-Feb-18(CTTL, No.J18X01133) 09-Feb-18(CTTL, No.J18X01132) 27-Aug-18(SPEAG, No.EX3-7514_Aug18) 20-Aug-18(SPEAG, No.DAE4-1555_Aug18) Cal Date(Calibrated by, Certificate No.) 21-Jun-18 (CTTL, No.J18X05033) 24-Jan-18 (CTTL, No.J18X00561) Function	Jun-19 Jun-19 Feb-20 Feb-20 Aug-19 8) Aug-19 Scheduled Calibration Jun-19 Jan -19				
	Documents the tr surements and th ificate. conducted in th M&TE critical for ID # (	bocuments the traceability to national standards, which reasonates and the uncertainties with confidence probability ifficate. conducted in the closed laboratory facility: environment M&TE critical for calibration) ID # Cal Date(Calibrated by, Certificate No.)				



		In Collaboration	p with
		TLSP	e a g
		CALIBRATION	LABORATORY
		Xueyuan Road, Haidian District, 62304633-2512 Fax: +86-1	Beijing, 100191, China 0-62304633-2504
			w.chinattl.cn
	Glossary:		
	TSL	tissue simulating liquid	I Contraction of the second
	NORMx,y,z	sensitivity in free space	
	ConvF DCP	sensitivity in TSL / NOI diode compression poi	
	CF	crest factor (1/duty_cy	cle) of the RF signal
	A,B,C,D		linearization parameters
	Polarization Φ Polarization θ	Φ rotation around prob	e axis xis that is in the plane normal to probe axis (at measurement center), i
	1 olarization o	$\theta=0$ is normal to probe	axis
	Connector Angle	information used in DA	SY system to align probe sensor X to the robot coordinate system
	a) IEEE Std 152	28-2013 "IFFF Recomm	to the Following Standards: mended Practice for Determining the Peak Spatial-Averaged
	Specific Absor	rption Rate (SAR) in t	the Human Head from Wireless Communications Devices:
		Techniques", June 2013 "Measurement procedur	e 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. "I	Procedure to determine	the Specific Absorption Rate (SAR) for wireless communication
	devices used in	in close proximity to the	human body (frequency range of 30 MHz to 6 GHz)", March
	2010 d) KDB 865664 "	SAP Measurement Pea	uirements for 100 MHz to 6 GHz"
	Methods Applie	ed and Interpretation	of Parameters:
	<ul> <li>NORMx, y, z: A</li> </ul>	Assessed for E-field pola	rization θ=0 (f≤900MHz in TEM-cell; f>1800MHz; waveguide).
	NORMx,y,z a	are only intermediate valu	ues, i.e., the uncertainties of NORMx,y,z does not effect the
	$E^2$ -field unce	ertainty inside TSL (see I	below ConvF).
	<ul> <li>Interview (1)x, y, z</li> </ul>	s implemented in DASY	cy_response (see Frequency Response Chart). This 4 software versions later than 4.2. The uncertainty of the
	frequency res	sponse is included in the	stated uncertainty of ConvF.
	<ul> <li>DCPx, y, z: DC</li> </ul>	CP are numerical lineariz	ation parameters assessed based on the data of power sweep
	<ul> <li>PAR: PAR is t</li> </ul>	the Peak to Average Rat	not depend on frequency nor media. io that is not calibrated but determined based on the signal
	characteristic	S.	
,	data of power	r sweep for specific modu	re numerical linearization parameters assessed based on the ulation signal. The parameters do not depend on frequency nor
	ConvF and B	oundary Effect Parameter	n range expressed in RMS voltage across the diode.
	Transfer Stan	idard for f≤800MHz) and	inside waveguide using analytical field distributions based on
	power measu	rements for f >800MHz.	The same setups are used for assessment of the parameters
	These parame	eters are used in DASY2	lpha, depth) of which typical uncertainty valued are given. software to improve probe accuracy close to the boundary.
	The sensitivity	y in TSL corresponds to	NORMx, y, z* ConvF whereby the uncertainty corresponds to
	that given for	ConvF. A frequency dep	endent ConvF is used in DASY version 4.4 and higher which
	<ul> <li>Spherical isoti</li> </ul>	ling the validity from±50N tropy (3D deviation from	MHz to±100MHz. isotropy): in a field of low gradients realized using a flat
	phantom expo	osed by a patch antenna	
•	<ul> <li>Sensor Offset</li> <li>probe tip (op r</li> </ul>	t: The sensor offset correprobe axis). No tolerance	esponds to the offset of virtual measurement center from the
	Connector An	gle: The angle is assess	e required. ed using the information gained by determining the <i>NORMx</i>
	(no uncertaint	y required).	
1	Certificate No: Z18-6	60557	Deve 0 - 611
C	Continuate INO: 218-0	10557	Page 2 of 11





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

 Tel: +86-10-62304633-2512
 Fax: +86-10-62304633-2504

 E-mail: cttl@chinattl.com
 <u>Http://www.chinattl.cn</u>

# Probe EX3DV4

# SN: 7401

Calibrated: January 15, 2019

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

Certificate No: Z18-60557

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Add: No.51 Xueyuan Road, Ha				
Tel: +86-10-62304633-2512		36-10-62		-2504
E-mail: cttl@chinattl.com	Http://	www.chi	nattl.cn	

# DASY/EASY – Parameters of Probe: EX3DV4 – SN: 7401

# **Basic Calibration Parameters**

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm(µV/(V/m) <sup>2</sup> ) <sup>A</sup>	0.37	0.45	0.33	±10.0%
DCP(mV) <sup>B</sup>	103.9	100.2	102.8	

# **Modulation Calibration Parameters**

UID	Communication System Name		A dB	B dBõV	С	D dB	VR mV	Unc <sup>E</sup> (k=2)
0 CW	0	Х	0.0	0.0	1.0	0.00	141.7	±3.0%
		Y	0.0	0.0	1.0		162.9	
		Z	0.0	0.0	1.0		135.6	

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%.

<sup>A</sup> The uncertainties of Norm X, Y, Z do not affect the E<sup>2</sup>-field uncertainty inside TSL (see Page 5 and Page 6).

 <sup>B</sup> Numerical linearization parameter: uncertainty not required.
 <sup>E</sup> Uncertainly is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

Certificate No: Z18-60557

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# DASY/EASY – Parameters of Probe: EX3DV4 – SN: 7401

#### Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz] <sup>C</sup>	Relative Permittivity <sup>F</sup>	Conductivity (S/m) <sup>F</sup>	ConvF X	ConvF Y	ConvF Z	Alpha <sup>G</sup>	Depth <sup>G</sup> (mm)	Unct. (k=2)
750	41.9	0.89	10.42	10.42	10.42	0.09	1.32	±12.1%
835	41.5	0.90	10.07	10.07	10.07	0.18	1.17	±12.1%
900	41.5	0.97	10.17	10.17	10.17	0.12	1.31	±12.1%
1750	40.1	1.37	8.69	8.69	8.69	0.22	1.11	±12.1%
1900	40.0	1.40	8.21	8.21	8.21	0.34	0.84	±12.1%
2000	40.0	1.40	8.20	8.20	8.20	0.26	0.95	±12.1%
2300	39.5	1.67	8.10	8.10	8.10	0.60	0.71	±12.1%
2450	39.2	1.80	7.69	7.69	7.69	0.58	0.73	±12.1%
2600	39.0	1.96	7.55	7.55	7.55	0.60	0.71	±12.1%
5250	35.9	4.71	5.82	5.82	5.82	0.40	1.20	±13.3%
5600	35.5	5.07	5.20	5.20	5.20	0.40	1.30	±13.3%
5750	35.4	5.22	5.25	5.25	5.25	0.45	1.30	±13.3%

<sup>c</sup> 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  $\pm$  110 MHz.

<sup>F</sup> At frequency below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) 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. <sup>G</sup> 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.

Certificate No: Z18-60557

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Add: No.51 Xueyuan Road, Ha	idian Distr	rict, Beij	ing, 100	191, China
Tel: +86-10-62304633-2512	Fax: +8	36-10-62	304633-	2504
E-mail: cttl@chinattl.com	Http://v	www.chi	nattl.cn	

DASY/EASY – Parameters of Probe: EX3DV4 – SN: 7401

### Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz] <sup>C</sup>	Relative Permittivity <sup>F</sup>	Conductivity (S/m) <sup>F</sup>	ConvF X	ConvF Y	ConvF Z	Alpha <sup>G</sup>	Depth <sup>G</sup> (mm)	Unct. (k=2)
750	55.5	0.96	10.56	10.56	10.56	0.40	0.80	±12.1%
835	55.2	0.97	10.21	10.21	10.21	0.16	1.45	±12.1%
900	55.0	1.05	10.25	10.25	10.25	0.21	1.19	±12.1%
1750	53.4	1.49	8.38	8.38	8.38	0.21	1.13	±12.1%
1900	53.3	1.52	8.06	8.06	8.06	0.22	1.15	±12.1%
2000	53.3	1.52	8.06	8.06	8.06	0.22	1.16	±12.1%
2300	52.9	1.81	7.97	7.97	7.97	0.63	0.76	±12.1%
2450	52.7	1.95	7.67	7.67	7.67	0.36	1.17	±12.1%
2600	52.5	2.16	7.59	7.59	7.59	0.48	0.88	±12.1%
5250	48.9	5.36	5.26	5.26	5.26	0.45	1.90	±13.3%
5600	48.5	5.77	4.66	4.66	4.66	0.50	1.85	±13.3%
5750	48.3	5.94	4.69	4.69	4.69	0.56	1.45	±13.3%

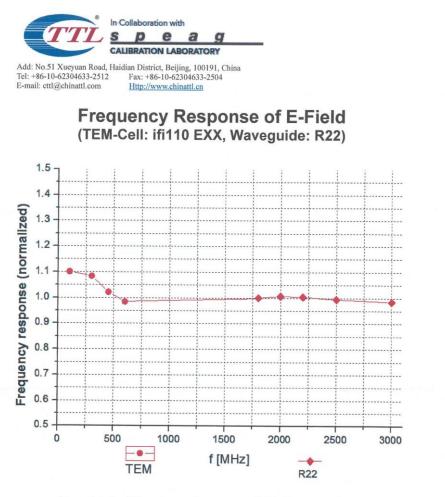
<sup>c</sup> Frequency validity above 300 MHz of ±100MHz only applies for DASY v4.4 and higher (Page 2), else it is restricted to ±50MHz. The uncertainty is the RSS of ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 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.

<sup>F</sup> At frequency below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) 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 ( $\epsilon$  and  $\sigma$ ) is restricted to ±5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters. <sup>G</sup> 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.

Certificate No: Z18-60557

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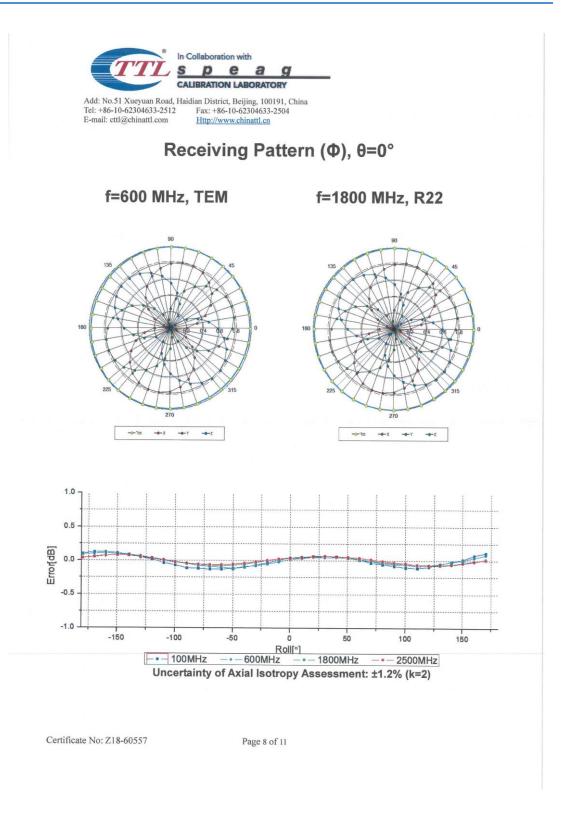




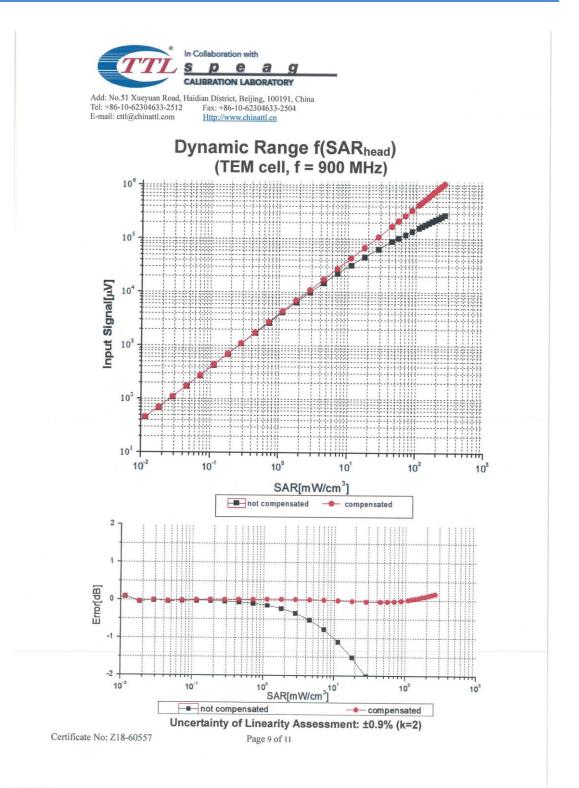


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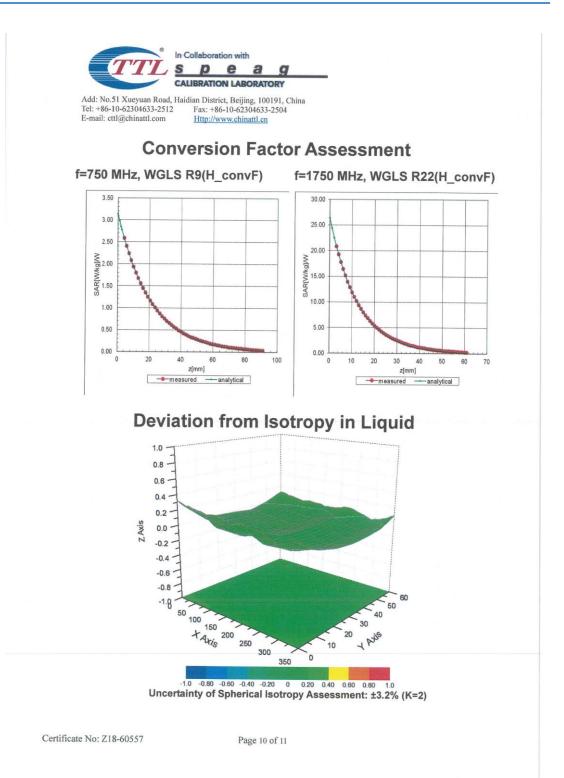








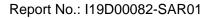






Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China         Tel: +86-10-62304633-2512       Fax: +86-10-62304633-2504         E-mail: cttl@chinattl.com       Http://www.ehinattl.cn	
DASY/EASY – Parameters of Probe: EX3	DV4 – SN: 740
Other Probe Parameters	
Sensor Arrangement	Triangular
Connector Angle (°)	151.2
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disable
Probe Overall Length	337mm
Probe Body Diameter	10mm
Tip Length	9mm
Tip Diameter	2.5mm
Probe Tip to Sensor X Calibration Point	1mm
Probe Tip to Sensor Y Calibration Point	1mm
Probe Tip to Sensor Z Calibration Point	1mm
Recommended Measurement Distance from Surface	1.4mm

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		D C A G ATION LABORATORY	Hac-MRA	CNAS	中国认可 国际互认 校准		
Add: No.51 Xuey Tel: +86-10-62304 E-mail: cttl@china	4633-2079 Fax:	istrict, Beijing, 100191, China +86-10-62304633-2504 //www.chinattl.cn	The Andrews		CALIBRATION CNAS L0570		
Client EC	IT	Ce	ertificate No:	Z18-60424			
CALIBRATION C	ERTIFICA	TE					
Dbject	D750\	/3 - SN: 1144					
Calibration Procedure(s)	and the second						
-(-)		1-003-01					
	Calibra	Calibration Procedures for dipole validation kits					
Calibration date:	Octobe	er 26, 2018					
his calibration Certificate neasurements(SI). The me ages and are part of the c	easurements and	the uncertainties with c	onfidence probabi	lity are given on	the following		
II calibrations have beer umidity<70%.	n conducted in	the closed laboratory	facility: environme	ent temperature	(22±3)℃ and		
alibration Equipment used	d (M&TE critical f	or calibration)					
	I (M&TE critical f		y, Certificate No.)	Scheduled	Calibration		
rimary Standards		or calibration) Cal Date(Calibrated b 01-Nov-17 (CTTL, No.		Scheduled			
rimary Standards Power Meter NRVD	ID #	Cal Date(Calibrated b	J17X08756)	Oct			
rimary Standards Power Meter NRVD Power sensor NRV-Z5	ID # 102083 100542	Cal Date(Calibrated b 01-Nov-17 (CTTL, No.	J17X08756) J17X08756)	Oct	-18		
rimary Standards Power Meter NRVD Power sensor NRV-Z5 Reference Probe EX3DV4	ID # 102083 100542	Cal Date(Calibrated b 01-Nov-17 (CTTL, No. 01-Nov-17 (CTTL, No.	J17X08756) J17X08756) .EX3-7514_Aug18	Oct Oct 3) Aug	-18 -18		
rimary Standards Power Meter NRVD Power sensor NRV-Z5 Reference Probe EX3DV4 DAE4	ID # 102083 100542 SN 7514	Cal Date(Calibrated b 01-Nov-17 (CTTL, No. 01-Nov-17 (CTTL, No. 27-Aug-18(SPEAG,No 20-Aug-18(SPEAG,No	J17X08756) J17X08756) .EX3-7514_Aug18 .DAE4-1555_Aug	Oct Oct 3) Aug 18) Aug	-18 -18 g-19 g-19		
rimary Standards Power Meter NRVD Power sensor NRV-Z5 Reference Probe EX3DV4 DAE4 Secondary Standards	ID # 102083 100542 SN 7514 SN 1555	Cal Date(Calibrated b 01-Nov-17 (CTTL, No. 01-Nov-17 (CTTL, No. 27-Aug-18(SPEAG,No 20-Aug-18(SPEAG,No Cal Date(Calibrated by	J17X08756) J17X08756) .EX3-7514_Aug18 .DAE4-1555_Aug /, Certificate No.)	Oct Oct 3) Aug 18) Aug Scheduled	-18 -18 g-19 g-19 Calibration		
rimary Standards Power Meter NRVD Power sensor NRV-Z5 Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C	ID # 102083 100542 SN 7514 SN 1555 ID #	Cal Date(Calibrated b 01-Nov-17 (CTTL, No. 01-Nov-17 (CTTL, No. 27-Aug-18(SPEAG,No 20-Aug-18(SPEAG,No Cal Date(Calibrated by	J17X08756) J17X08756) .EX3-7514_Aug18 .DAE4-1555_Aug /, Certificate No.) J18X00560)	Oct Oct 3) Aug 18) Aug Scheduled Jan	-18 -18 g-19 g-19		
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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	52.10.2.1495
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	42.1 ± 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	2.11 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	8.50 mW /g ± 18.8 % (k=2)
SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.39 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	5.59 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 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	55.6±6%	0.93 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	2.09 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	8.55 mW /g ± 18.8 % (k=2)
SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	1.40 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	5.70 mW /g ±18.7 % (k=2)

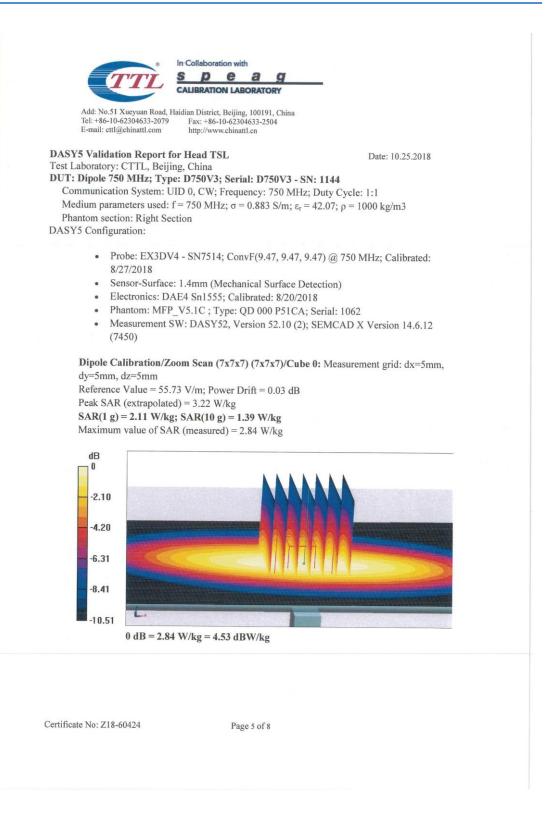
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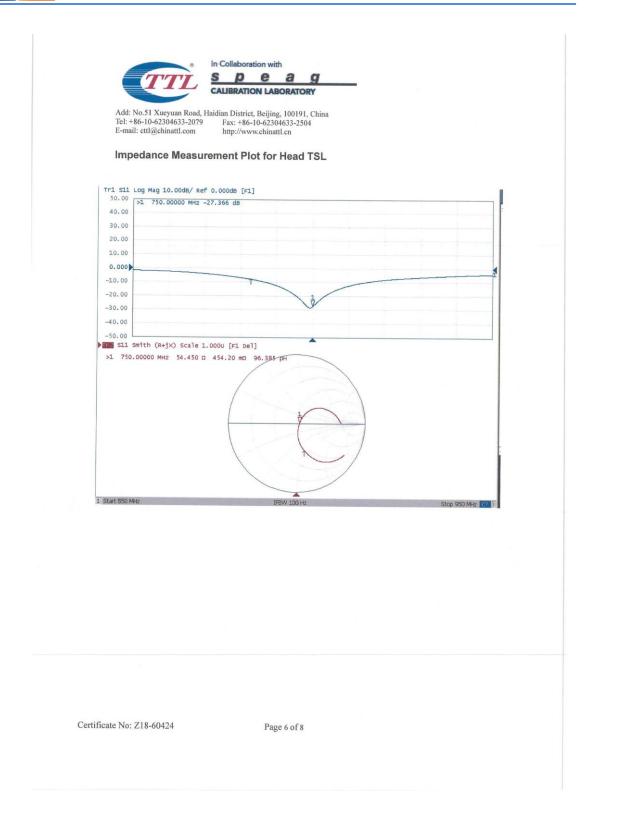


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Appendix (Additional assessments outs Antenna Parameters with Head TSL	ide the scope of CNAS L0570)
Impedance, transformed to feed point	54.5Ω+ 0.45jΩ
Return Loss	- 27.4dB
Antenna Parameters with Body TSL	
Impedance, transformed to feed point	49.7Ω- 2.47jΩ
Return Loss	- 32.1dB
General Antenna Parameters and Desig	1
Electrical Delay (one direction)	0.897 ns
be measured. The dipole is made of standard semirigid coaxial connected to the second arm of the dipole. The a of the dipoles, small end caps are added to the according to the position as explained in the "Mea affected by this change. The overall dipole length	ily a slight warming of the dipole near the feedpoint cable. The center conductor of the feeding line is dir ntenna is therefore short-circuited for DC-signals. Or pole arms in order to improve matching when loader is unement Conditions" paragraph. The SAR data are is still according to the Standard.
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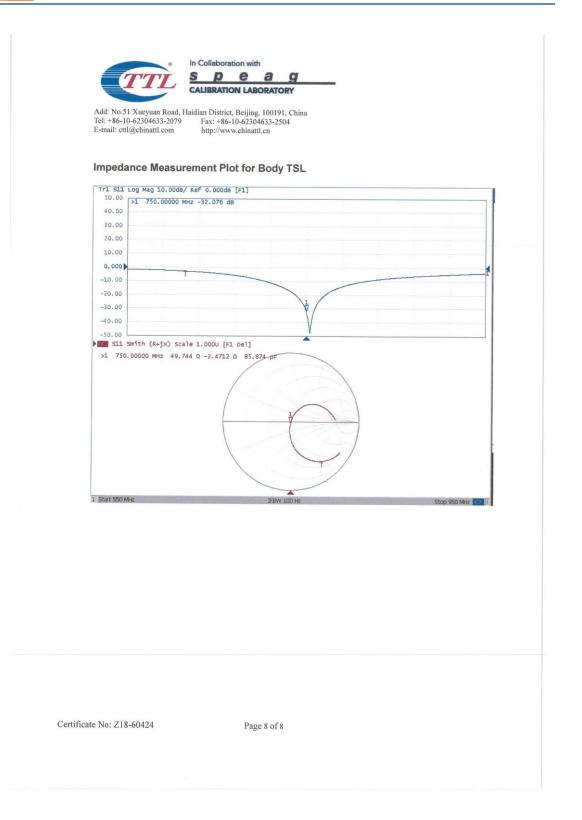






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Test Laborato DUT: Dipole Communic Medium pa	ation System: U nameters used: f ection: Center Se	eg, China <b>:: D750V3; Serial: D750V3 -</b> ID 0, CW; Frequency: 750 MH = 750 MHz; σ = 0.932 S/m; ε	Hz; Duty Cycle: 1:1	
:	8/27/2018 Sensor-Surface: Electronics: DA Phantom: MFP_	1.4mm (Mechanical Surface E4 Sn1555; Calibrated: 8/20// V5.1C ; Type: QD 000 P51C.	2018	
Referen Peak S SAR(1	AR (extrapolated g) = 2.09 W/kg	6 V/m; Power Drift = -0.05 dl l) = 3.16 W/kg ; SAR(10 g) = 1.4 W/kg R (measured) = 2.79 W/kg	В	
-1.9				
-1.9		W/kg = 4.46 dBW/kg		
0 -1.9 -3.9 -5.9 -7.9		W/kg = 4.46 dBW/kg		

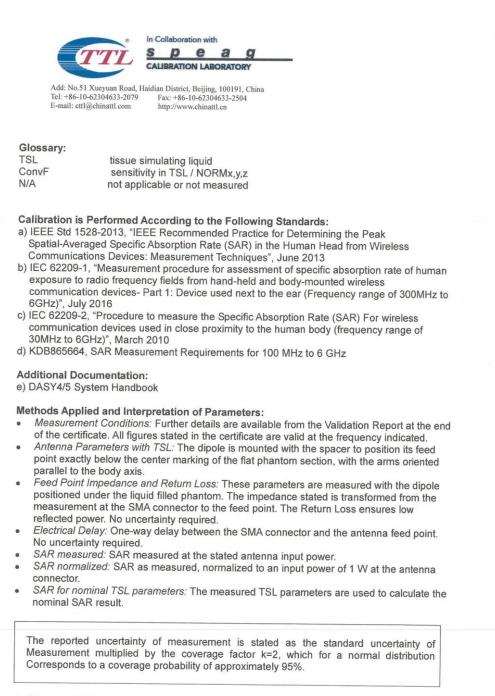






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#### Measurement Conditions DASY system configuration, as far as not given on

DASY Version	DASY52	52.10.2.1495
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	42.4 ± 6 %	0.89 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	2.38 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	9.63 mW /g ± 18.8 % (k=2)
SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.55 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	6.25 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	55.3 ± 6 %	0.96 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	2.42 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	9.75 mW /g ± 18.8 % (k=2)
SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	1.59 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	6.40 mW /g ± 18.7 % (k=2)

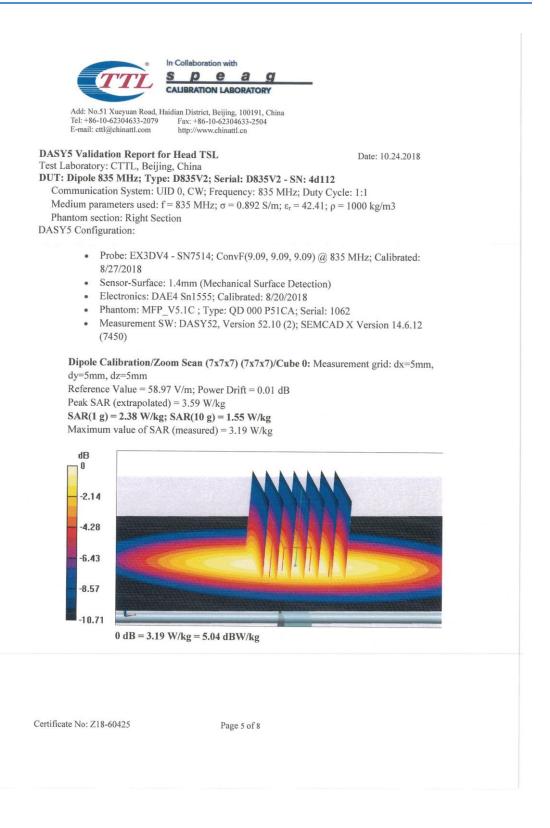
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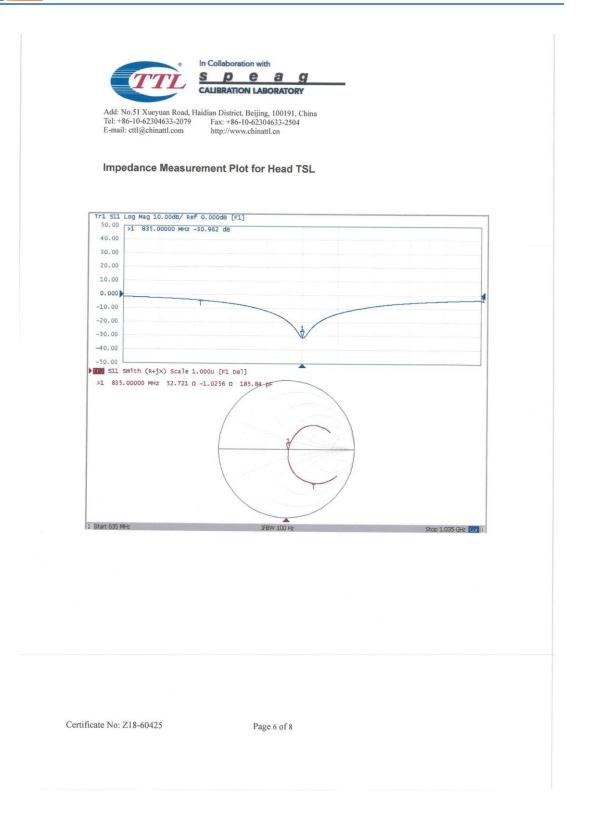


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Appendix (Additional asse		the scope of CNAS L0570)
Antenna Parameters with H		
Impedance, transformed to feed Return Loss	point	52.7Ω- 1.03jΩ - 31.0dB
Antenna Parameters with E	Body TSL	
Impedance, transformed to feed	point	49.2Ω- 6.11jΩ
Return Loss		- 24.1dB
General Antenna Paramete	rs and Design	
Electrical Delay (one direction) After long term use with 100W rate measured. The dipole is made of standard se onnected to the second arm of the f the dipoles, small end caps are coording to the position as expla	emirigid coaxial cable te dipole. The antenr added to the dipole ined in the "Measure	1.265 ns slight warming of the dipole near the feedpoint can the center conductor of the feeding line is directly as is therefore short-circuited for DC-signals. On some arms in order to improve matching when loaded ment Conditions'' narragraph. The SAB data are not
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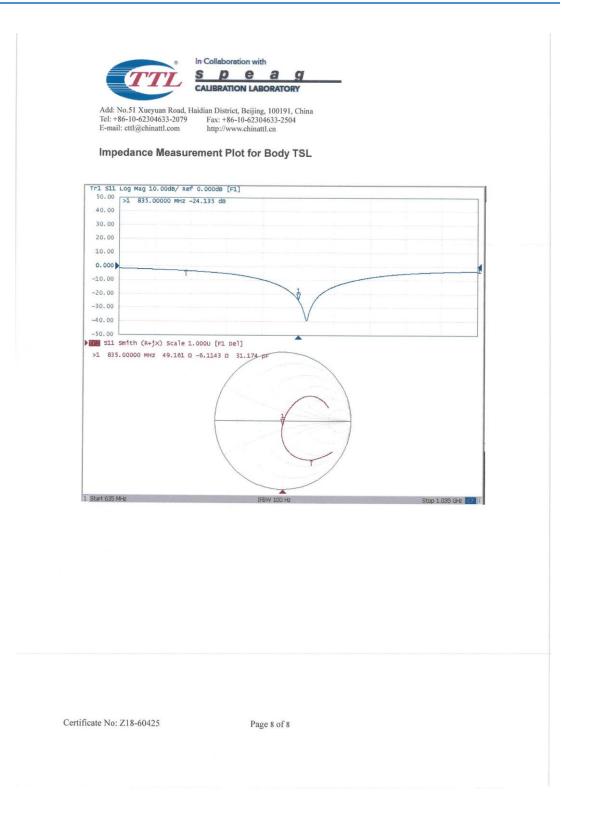






	Collaboration with	
Tel: +86-10-62304633-2079	ian District, Beijing, 100191, China Fax: +86-10-62304633-2504 http://www.chinattl.cn	
<ul> <li>DASY5 Validation Report for I Test Laboratory: CTTL, Beijing,</li> <li>DUT: Dipole 835 MHz; Type: I Communication System: UID Medium parameters used: f = Phantom section: Center Secti DASY5 Configuration:</li> </ul>	China D835V2; Serial: D835V2 - 0, CW; Frequency: 835 MI 835 MHz; σ = 0.961 S/m; ε	Hz; Duty Cycle: 1:1
<ul> <li>8/27/2018</li> <li>Sensor-Surface: 1.</li> <li>Electronics: DAE4</li> <li>Phantom: MFP_V.</li> </ul>	4mm (Mechanical Surface 4 Sn1555; Calibrated: 8/20/ 5.1C ; Type: QD 000 P51C	/2018
dy=5mm, dz=5mm	V/m; Power Drift = -0.06 d = 3.68 W/kg A <b>R(10 g) = 1.59 W/kg</b>	a <b>be 0:</b> Measurement grid: dx=5mm,  B
dB 0 -2.05 -4.10 -6.16		
-8.21 -10.26 0 dB = 3.24 W	V/kg = 5.11 dBW/kg	
Certificate No: Z18-60425	Page 7 of 8	







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Tel: +86-10-62304 E-mail: cttl@china	633-2079 Fax:	strict, Beijing, 100191, China +86-10-62304633-2504 //www.chinattl.cn	CALIBRATION CNAS L0570
Client ECIT	a Stationers	Certificate No: Z18-	-60427
CALIBRATION C	ERTIFICAT	ГЕ	
Object	D1750	V2 - SN: 1044	
Calibration Procedure(s)			
		1-003-01	
	Calibra	ation Procedures for dipole validation kits	
Calibration date:	Octobe	er 31, 2018	
pages and are part of the ce All calibrations have been		the closed laboratory facility: environment	temperature(22+3)°C and
All calibrations have been humidity<70%.	n conducted in	the closed laboratory facility: environment or calibration)	temperature(22±3)°C and
All calibrations have been humidity<70%. Calibration Equipment used Primary Standards	I (M&TE critical f	or calibration) Cal Date(Calibrated by, Certificate No.)	temperature(22±3)°C and Scheduled Calibration
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