





Page 7 of 11

















DASY/EASY – Parameters of Probe: EX3DV4 – SN: 3754

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	47.9
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

Certificate No: Z17-97010

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CALIBRATION C	ERTIFICAT	Certificate No. 21	0-9/100
	LININGAI	E	
Object			
Object	D835V	2 - SN: 4d112	
Calibration Procedure(s)	ED.711	2.003.01	THE REAL PROPERTY AND INCOME.
	Calibrat	ion Procedures for dipole validation kits	
Calibration date:	Octobe	22 2015	
ACTIVITY AND ADDRESS AND ADDRESS AND ADDRESS			
This calibration Certificate	documents the t	raceability to national standards, which rea	alize the physical units of
measurements(SI). The me pages and are part of the or	asurements and	the uncertainties with confidence probability	are given on the following
hades and are barr or the co	anuncate.		
All calibrations have been	conducted in t	he closed laboratory facility: environment	temperature(22+3)(C and
humidity<70%.			in the second second second
0-11- F			
Calibration Equipment used	(M&TE critical fo	r calibration)	
Primary Standards	ID#	Cal Data/Calibrated by: CastiSecte No.1	-
		Val Date Valuation by Valuation and	Scheduled Calibration
Power Meter NRP2	101919	01-Jul-15 (CTTL, No.J15X04256)	Scheduled Calibration Jun-16
Power Meter NRP2 Power sensor NRP-Z91	101919 101547	01-Jul-15 (CTTL, No.J15X04256) 01-Jul-15 (CTTL, No.J15X04256)	Jun-16 Jun-16
Power Meter NRP2 Power sensor NRP-Z91 Reference Probe EX3DV4	101919 101547 SN 3617	01-Jul-15 (CTTL, No.J15X04256) 01-Jul-15 (CTTL, No.J15X04256) 26-Aug-15(SPEAG,No.EX3-3617_Aug15)	Scheduled Calibration Jun-16 Jun-16 Aug -16
Power Meter NRP2 Power sensor NRP-Z91 Reference Probe EX3DV4 DAE4	101919 101547 SN 3617 SN 777	Car Date(Canorated by, Certificate No.) 01-Jul-15 (CTTL, No.J15X04256) 01-Jul-15 (CTTL, No.J15X04256) 26-Aug-15(SPEAG,No.EX3-3617_Aug15) 28-Aug-15(SPEAG,No.DAE4-777_Aug15)	Scheduled Calibration Jun-16 Jun-16 Aug -16 Aug -16
Power Meter NRP2 Power sensor NRP-Z91 Reference Probe EX3DV4 DAE4 Secondary Standards	101919 101547 SN 3617 SN 777	Cal Date(Calibrated by, Certificate No.) 01-Jul-15 (CTTL, No.J15X04256) 01-Jul-15 (CTTL, No.J15X04256) 26-Aug-15(SPEAG,No.EX3-3617_Aug15) 26-Aug-15(SPEAG,No.DAE4-777_Aug15) Cal Date(Calibrated by Certificate No.)	Scheduled Calibration Jun-16 Jun-16 Aug -16 Aug -16 Scheduled Calibration
Power Meter NRP2 Power sensor NRP-Z91 Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C	101919 101547 SN 3617 SN 777 ID #	Cal Date(Calibrated by, Certificate No.) 01-Jul-15 (CTTL, No.J15X04256) 01-Jul-15 (CTTL, No.J15X04256) 26-Aug-15(SPEAG,No.EX3-3617_Aug15) 26-Aug-15(SPEAG,No.DAE4-777_Aug15) Cal Date(Calibrated by, Certificate No.) 02-Feb-15 (CTTL, No.J15X00729)	Scheduled Calibration Jun-16 Jun-16 Aug -16 Aug -16 Scheduled Calibration Eeb-16
Power Meter NRP2 Power sensor NRP-Z91 Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C Network Analyzer E5071C	101919 101547 SN 3617 SN 777 ID # MY49071430 MY46110673	Cal Date(Calibrated by, Certificate No.) 01-Jul-15 (CTTL, No.J15X04256) 26-Aug-15(SPEAG,No.EX3-3617_Aug15) 26-Aug-15(SPEAG,No.DAE4-777_Aug15) Cal Date(Calibrated by, Certificate No.) 02-Feb-15 (CTTL, No.J15X00729) 03-Feb-15 (CTTL, No.J15X00728)	Scheduled Calibration Jun-16 Jun-16 Aug -16 Aug -16 Scheduled Calibration Feb-16 Feb-16
Power Meter NRP2 Power sensor NRP-Z91 Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C Network Analyzer E5071C	101919 101547 SN 3617 SN 777 ID # MY49071430 MY46110673	Cal Date(Calibrated by, Certificate No.) 01-Jul-15 (CTTL, No.J15X04256) 01-Jul-15 (CTTL, No.J15X04256) 26-Aug-15(SPEAG,No.EX3-3617_Aug15) 26-Aug-15(SPEAG,No.DAE4-777_Aug15) Cal Date(Calibrated by, Certificate No.) 02-Feb-15 (CTTL, No.J15X00728) 03-Feb-15 (CTTL, No.J15X00728)	Scheduled Calibration Jun-16 Jun-16 Aug -16 Aug -16 Scheduled Calibration Feb-16 Feb-16
Power Meter NRP2 Power sensor NRP-Z91 Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C Network Analyzer E5071C	101919 101547 SN 3617 SN 777 ID # MY49071430 MY46110673 Name	Cal Date(Calibrated by, Certificate No.) 01-Jul-15 (CTTL, No.J15X04256) 01-Jul-15 (CTTL, No.J15X04256) 26-Aug-15(SPEAG,No.EX3-3617_Aug15) 26-Aug-15(SPEAG,No.DAE4-777_Aug15) Cal Date(Calibrated by, Certificate No.) 02-Feb-15 (CTTL, No.J15X00729) 03-Feb-15 (CTTL, No.J15X00728) Function	Scheduled Calibration Jun-16 Jun-16 Aug -16 Aug -16 Scheduled Calibration Feb-16 Feb-16 Signature
Power Meter NRP2 Power sensor NRP-Z91 Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C Network Analyzer E5071C	101919 101547 SN 3617 SN 777 ID # MY49071430 MY46110673 Name Zhao Jing	Cal Date(Calibrated by, Certificate No.) 01-Jul-15 (CTTL, No.J15X04256) 01-Jul-15 (CTTL, No.J15X04256) 26-Aug-15(SPEAG,No.EX3-3617_Aug15) 26-Aug-15(SPEAG,No.DAE4-777_Aug15) Cal Date(Calibrated by, Certificate No.) 02-Feb-15 (CTTL, No.J15X00729) 03-Feb-15 (CTTL, No.J15X00728) Function SAR Test Engineer	Scheduled Calibration Jun-16 Jun-16 Aug -16 Aug -16 Scheduled Calibration Feb-16 Feb-16 Signature
Power Meter NRP2 Power sensor NRP-Z91 Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C Network Analyzer E5071C Calibrated by:	101919 101547 SN 3617 SN 777 ID # MY49071430 MY46110673 Name Zhao Jing Qi Dianyuan	Cal Date(Calibrated by, Certificate No.) 01-Jul-15 (CTTL, No.J15X04256) 01-Jul-15 (CTTL, No.J15X04256) 26-Aug-15(SPEAG,No.EX3-3617_Aug15) 26-Aug-15(SPEAG,No.DAE4-777_Aug15) Cal Date(Calibrated by, Certificate No.) 02-Feb-15 (CTTL, No.J15X00729) 03-Feb-15 (CTTL, No.J15X00728) Function SAR Test Engineer SAR Project Leader	Scheduled Calibration Jun-16 Jun-16 Aug -16 Aug -16 Scheduled Calibration Feb-16 Feb-16 Signature
Power Meter NRP2 Power sensor NRP-Z91 Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C Network Analyzer E5071C Calibrated by: Reviewed by:	101919 101547 SN 3617 SN 777 ID # MY49071430 MY46110673 Name Zhao Jing Qi Dianyuan	Cal Date(Calibrated by, Certificate No.) 01-Jul-15 (CTTL, No.J15X04256) 01-Jul-15 (CTTL, No.J15X04256) 26-Aug-15(SPEAG,No.EX3-3617_Aug15) 26-Aug-15(SPEAG,No.DAE4-777_Aug15) Cal Date(Calibrated by, Certificate No.) 02-Feb-15 (CTTL, No.J15X00729) 03-Feb-15 (CTTL, No.J15X00728) Function SAR Test Engineer SAR Project Leader	Scheduled Calibration Jun-16 Jun-16 Aug -16 Aug -16 Scheduled Calibration Feb-16 Feb-16 Signature
Power Meter NRP2 Power sensor NRP-Z91 Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C Network Analyzer E5071C Calibrated by: Reviewed by:	101919 101547 SN 3617 SN 777 ID # MY49071430 MY46110673 Name Zhao Jing Qi Dianyuan Lu Bingsong	Cal Date(Calibrated by, Certificate No.) 01-Jul-15 (CTTL, No.J15X04256) 01-Jul-15 (CTTL, No.J15X04256) 26-Aug-15(SPEAG,No.EX3-3617_Aug15) 26-Aug-15(SPEAG,No.DAE4-777_Aug15) Cal Date(Calibrated by, Certificate No.) 02-Feb-15 (CTTL, No.J15X00729) 03-Feb-15 (CTTL, No.J15X00728) Function SAR Test Engineer SAR Project Leader	Scheduled Calibration Jun-16 Jun-16 Aug -16 Aug -16 Scheduled Calibration Feb-16 Feb-16 Signature
Power Meter NRP2 Power sensor NRP-Z91 Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C Network Analyzer E5071C Calibrated by: Reviewed by:	101919 101547 SN 3617 SN 777 ID # MY49071430 MY46110673 Name Zhao Jing Qi Dianyuan Lu Bingsong	Cal Date(Calibrated by, Certificate No.) 01-Jul-15 (CTTL, No.J15X04256) 01-Jul-15 (CTTL, No.J15X04256) 26-Aug-15(SPEAG,No.EX3-3617_Aug15) 26-Aug-15(SPEAG,No.DAE4-777_Aug15) Cal Date(Calibrated by, Certificate No.) 02-Feb-15 (CTTL, No.J15X00729) 03-Feb-15 (CTTL, No.J15X00728) Function SAR Test Engineer SAR Project Leader Deputy Director of the laboratory Issued: Octob	Scheduled Calibration Jun-16 Jun-16 Aug -16 Aug -16 Scheduled Calibration Feb-16 Feb-16 Signature



ЕСП

Add: No.5 Tel: +86-1	1 Xueyuan Road, Haidian District, Beijing, 100191, China 0-62304633-2079 Fix:+86-10-62304633-2504
to-mail: cti	agennanceon impowww.eninati.en
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 15 Spatial Aver	i28-2013, "IEEE Recommended Practice for Determining the Peak
Communica	tions Devices: Measurement Techniques", June 2013
b) IEC 62209-	1, "Procedure to measure the Specific Absorption Rate (SAR) For hand-held
2005	a in close proximity to the ear (frequency range of 300MHz to 3GHz)", February
c) KDB865664	, SAR Measurement Requirements for 100 MHz to 6 GHz
Additional Do	cumentation:
d) DASY4/5 S	/stem Handbook
Methods App	lied and Interpretation of Parameters
Measurem	ent Conditions: Further details are available from the Validation Report at the end
of the certi	ficate. All figures stated in the certificate are valid at the frequency indicated.
point exact	ly below the center marking of the flat phantom section, with the arms oriented
parallel to	the body axis.
positioned measurem	under the liquid filled phantom. The impedance stated is transformed from the ent at the SMA connector to the feed point. The Return Loss ensures low
Electrical L	ower. No uncertainty required. Jelay: One-way delay between the SMA connector and the antenna feed point.
SAR meas	inty required. ured: SAR measured at the stated antenna input nower
SAR norm	alized: SAR as measured, normalized to an input power of 1 W at the antenna
connector.	minal TSI naramatore. The measured TSI parameters are used to seleculate the
nominal SA	R result.
The reporte	uncertainty of measurement is stated as the standard uncertainty of
Measureme Corresponde	nt multiplied by the coverage factor k=2, which for a normal distribution s to a coverage probability of approximately 95%.
Sector No. 214	5-97165 Page 7 of 8
AND THE REPORT OF A DESCRIPTION OF A DESCRIPANTO OF A DESCRIPTION OF A DESCRIPTION OF A DESCRIPTION OF A DES	rage 2 of 8





-	In Collaboration with					
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Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504 E-mail: ettl@chinatt.com Http://www.chinattl.cn

Measurement Conditions

DASY Version	DASY52	52.8.8.1222	
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	42.2 ± 6 %	0.91 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C		1

SAR result with Head TSL

SAR averaged over 1 cm3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.31 mW/g
SAR for nominal Head TSL parameters	normalized to 1W	9.22 mW /g ± 20.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.51 mW/g
SAR for nominal Head TSL parameters	normalized to 1W	6.03 mW /g ± 20.4 % (k=2)

Body TSL parameters

	Temperat	ure	Permitti	vity	Conductivity
Nominal Body TSL parameters	22.0 °C	§ 11	55.2	8	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2	°C	55.1 ± 1	8 %	0.96 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C	ŝ			
result with Body TSL					1
SAR averaged over 1 cm ³ (1g) of Body TSL		Condit	ion		
SAR measured	250	mW in	put power		2.37 mW / g
SAR for nominal Body TSL parameters	no	malize	d to 1W	9.57	mW /g ± 20.8 % (k=2
SAR averaged over 10 cm ³ (10 g) of Body T	SL	Condit	ion		
SAR measured	250	m/W inp	put power		1.56 mW / g
SAR for nominal Body TSL parameters	no	malize	Wt of b	6.29	mW /a ± 20.4 % (k=2

Certificate No: Z15-97165

Page 3 of 8



An	tenna Parameters with Head TSL		
[Impedance, transformed to feed point	49.1Ω- 4.20jΩ	1
	Return Loss	- 27.3dB	1
Ant	tenna Parameters with Body TSL		
Ľ	Impedance, transformed to feed point	46.2Ω- 4.79jΩ	Ē
	Return Loss	- 23.9dB	
Ger	neral Antenna Parameters and Desi	gn	
Afte be n The conr of th acco	Electrical Delay (one direction) er long term use with 100W radiated power, measured. In dipole is made of standard semirigid coaxis nected to the second arm of the dipole. The be dipoles, small end caps are added to the ording to the position as explained in the "M ording to this change. The overall dipole leng	1.502 ns only a slight warming of the dipole near the feedpoint car al cable. The center conductor of the feeding line is direct antenna is therefore short-circuited for DC-signals. On s dipole arms in order to improve matching when loaded easurement Conditions" paragraph. The SAR data are n th is still according to the Stardard] n tiy iome iot
Afte be n The conr of th acco affec No e conr	Electrical Delay (one direction) ar long term use with 100W radiated power, measured. In dipole is made of standard semirigid coaxia nected to the second arm of the dipole. The he dipoles, small end caps are added to the ording to the position as explained in the "M cted by this change. The overall dipole leng excessive force must be applied to the dipol nections near the feedpoint may be damage	1.502 ns only a slight warming of the dipole near the feedpoint car al cable. The center conductor of the feeding line is direct antenna is therefore short-circuited for DC-signals. On s dipole arms in order to improve matching when loaded easurement Conditions" paragraph. The SAR data are n th is still according to the Standard. e arms, because they might bend or the soldered id.	n tły kome kot
Afte be n The conr of th acco affec conr Addo	Electrical Delay (one direction) ar long term use with 100W radiated power, measured. In dipole is made of standard semirigid coaxis nected to the second arm of the dipole. The he dipoles, small end caps are added to the ording to the position as explained in the "M cted by this change. The overall dipole leng excessive force must be applied to the dipol nections near the feedpoint may be damage ditional EUT Data	1.502 ns only a slight warming of the dipole near the feedpoint car al cable. The center conductor of the feeding line is direct antenna is therefore short-circuited for DC-signals. On s dipole arms in order to improve matching when loaded easurement Conditions" paragraph. The SAR data are n th is still according to the Standard. e arms, because they might bend or the soldered id.	n tiy kome kot
After be n The contr accor affec contr Addo	Electrical Delay (one direction) ar long term use with 100W radiated power, measured. a dipole is made of standard semirigid coaxis nected to the second arm of the dipole. The he dipoles, small end caps are added to the ording to the position as explained in the "M cted by this change. The overall dipole leng excessive force must be applied to the dipol nections near the feedpoint may be damage ditional EUT Data Manufactured by	1.502 ns only a slight warming of the dipole near the feedpoint car al cable. The center conductor of the feeding line is direct antenna is therefore short-circuited for DC-signals. On s dipole arms in order to improve matching when loaded easurement Conditions" paragraph. The SAR data are n th is still according to the Standard. e arms, because they might bend or the soldered ad. SPEAG	n tiy iome







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1 Stat 6253	#2 New 100% Stor Loss de Kal











D835V2, Serial No.4d112 Extended Dipole Calibrations

Per IEEE Std 1528-2013, the dipole should have a return loss better than -20dB at the test frequency to reduce uncertainty in the power measurement.

Per KDB 865664 D01, if dipoles are verified in return loss(<-20dB, within 20% of prior calibration), and in impedance (within 5 ohm of prior calibration), the annual calibration is not necessary and the calibration interval can be extended.

Justification of the extended calibration

		D835	V2 Serial No.4	ld112				
	835 Head							
Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)		
10.22.2015	-27.27		49.108		-4.2018			
10.21.2016	-29.019	6.41	50.108	1	-2.1757	2.0261		

		D835	V2 Serial No.4	ld112				
	835 Body							
Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)		
10.22.2015	-23.036		46.184		-4.7866			
10.21.2016	-23.131	0.56	47.003	0.819	-2.9072	1.8794		

The return loss is < -20dB, within 20% of prior calibration; the impedance is within 5 ohm of prior calibration. Therefore the verification result should support extended calibration.



Dipole Verification Data D835V2 Serial No.4d112 835MHz-Head



835MHz - Body





		TION LABORATORY	IC-MRA CNAS
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Client EC	IT	Certificate No: Z	15-97167
CALIBRATION C	ERTIFICAT	ГЕ	
Object	D1750	V2 - SN: 1044	
Calibration Procedure(s)			
	FD-Z1 Calibra	1-2-003-01 ation Procedures for dipole validation kits	
Calibration date:	Novem	iber 3, 2015	A LOS MANY
All collibrations have been	a conducted in	the closed laboration for the second	
All calibrations have been humidity<70%	n conducted in I (M&TE critical f	the closed laboratory facility; environment or calibration)	temperature(22±3)℃ and
All calibrations have beer humidity<70%. Calibration Equipment used Primary Standards	f (M&TE critical f	the closed laboratory facility: environment or calibration) Cal Date(Calibrated by, Certificate No.)	temperature(22±3)°C and Scheduled Calibration
All calibrations have been humidity<70%. Calibration Equipment used Primary Standards Power Meter NRP2	ID # 101919	the closed laboratory facility; environment or calibration) Cal Date(Calibrated by, Certificate No.) 01-Jul-15 (CTTL, No.J15X04256)	temperature(22±3)℃ and Scheduled Calibration Jun-16
All calibrations have been humidity<70%. Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP-Z91	I conducted in (M&TE critical f ID # 101919 101547	the closed laboratory facility; environment or calibration) Cal Date(Calibrated by, Certificate No.) 01-Jul-15 (CTTL, No.J15X04256) 01-Jul-15 (CTTL, No.J15X04256)	Scheduled Calibration Jun-16 Jun-16
All calibrations have been humidity<70%. Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP-Z91 Reference Probe EX3DV4	ID # 101919 101547 SN 3617	the closed laboratory facility: environment or calibration) Cal Date(Calibrated by, Certificate No.) 01-Jul-15 (CTTL, No.J15X04256) 01-Jul-15 (CTTL, No.J15X04256) 28-Aug-15(SPEAG,No.EX3-3617_Aug15)	Scheduled Calibration Jun-16 Jun-16 Aug-16
All calibrations have been humidity<70%. Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP-Z91 Reference Probe EX3DV4 DAE4	ID# 101919 101547 SN 3617 SN 777	the closed laboratory facility: environment or calibration) Cal Date(Calibrated by, Certificate No.) 01-Jul-15 (CTTL, No.J15X04256) 01-Jul-15 (CTTL, No.J15X04256) 26-Aug-15 (SPEAG,No.EX3-3617_Aug15) 26-Aug-15 (SPEAG,No.DAE4-777_Aug15)	Scheduled Calibration Jun-16 Jun-16 Aug -16 Aug -16 Aug -16
All calibrations have been humidity<70%. Calibration Equipment used Primary Standards Power Meter NRP2 Power Sensor NRP-Z91 Reference Probe EX3DV4 DAE4 Secondary Standards	ID # 101919 101547 SN 3617 SN 777 ID #	the closed laboratory facility: environment or calibration) Cal Date(Calibrated by, Certificate No.) 01-Jul-15 (CTTL, No.J15X04256) 01-Jul-15 (CTTL, No.J15X04256) 28-Aug-15(SPEAG,No.DAE4-777_Aug15) 28-Aug-15(SPEAG,No.DAE4-777_Aug15) Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration Jun-16 Aug -16 Aug -16 Scheduled Calibration
All calibrations have been humidity<70%. Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP-Z91 Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C	ID # 101919 101547 SN 3617 SN 777 ID # MY49071430	the closed laboratory facility: environment or calibration) Cal Date(Calibrated by, Certificate No.) 01-Jul-15 (CTTL, No.J15X04256) 01-Jul-15 (CTTL, No.J15X04256) 26-Aug-15(SPEAG,No.EX3-3617_Aug15) 26-Aug-15(SPEAG,No.DAE4-777_Aug15) Cal Date(Calibrated by, Certificate No.) 02-Feb-15 (CTTL, No.J15X00729)	Scheduled Calibration Jun-16 Jun-16 Aug -16 Aug -16 Scheduled Calibration Feb-16
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All calibrations have been humidity<70%. Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP-Z91 Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C Network Analyzer E5071C	ID # 101919 101547 SN 3617 SN 777 ID # MY49071430 MY46110673 Name	the closed laboratory facility: environment or calibration) Cal Date(Calibrated by, Certificate No.) 01-Jul-15 (CTTL, No.J15X04256) 01-Jul-15 (CTTL, No.J15X04256) 26-Aug-15(SPEAG,No.EX3-3617_Aug15) 26-Aug-15(SPEAG,No.DAE4-777_Aug15) 26-Aug-15(SPEAG,No.DAE4-777_Aug15) Cal Date(Calibrated by, Certificate No.) 02-Feb-15 (CTTL, No.J15X00729) 03-Feb-15 (CTTL, No.J15X00728) Function	temperature(22±3)℃ and Scheduled Calibration Jun-16 Jun-16 Aug -16 Aug -16 Scheduled Calibration Feb-16 Feb-16
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Certificate No: Z15-97167

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Measurement Conditions

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

DASY52	52.8.8.1222
Advanced Extrapolation	
Triple Flat Phantom 5.1C	
10 mm	with Spacer
dx, dy, dz = 5 mm	
1750 MHz ± 1 MHz	
	DASY52 Advanced Extrapolation Triple Flat Phantom 5.1C 10 mm dx, dy, dz = 5 mm 1750 MHz ± 1 MHz

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.1	1.37 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.7 ± 6 %	1.40 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	0
SAR measured	250 mW input power	9.48 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	37.3 mW /g ± 20.8 % (k=2)
SAR averaged over 10 cm3 (10 g) of Head TSL	Condition	0
SAR measured	250 mW input power	5.09 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	20.1 mW /g ± 20.4 % (k=2)

Body TSL parameters

S.

The following parameters and calculations were applied.

	Temperature	Permitti	vity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.4		1.49 mha/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.4 ± (8 %	1.47 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C	1	2	
R result with Body TSL				
SAR averaged over 1 cm3 (1 g) of Body TSL	Condi	tion		
SAR measured	250 mW in	put power		9.30 mW / g
SAR for nominal Body TSL parameters	normalize	d to 1W	37.6	mW /g ± 20.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Body TS	SL Condit	tion		
SAR measured	250 mW in	put power		5.02 mW / g
SAR for nominal Body TSL parameters	normalize	d to 1W	20.2 1	mW /g ± 20.4 % (k=2)

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Appendix Antenna Parameters with Head TSL Impedance, transformed to feed point 48.90+1.17j0 Return Loss -35.8dB Antenna Parameters with Body TSL Impedance, transformed to feed point 45.50+0.58j0 Return Loss -26.5dB Seneral Antenna Parameters and Design Electrical Delay (one direction) 1.319 ns After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint of the dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is dire onnected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On the dipole arms in order to improve matching when loaded coording to the position as explained in the "Measurement Conditions" paragraph. The SAR data are flected by this change. The overall dipole length is still according to the Standard. Lo excessive force must be applied to the dipole arms, because they might bend or the soldered onnections near the feedpoint may be damaged. udditional EUT Data SPEAG	Tel: +86-10-62304633-2079 Fax: +86-10-6230463 E-mail: cttl/gchinattl.com Http://www.chinattl.c	3-2504 A
Antenna Parameters with Head TSL Impedance, transformed to feed point 48.90+1.17/0 Return Loss -36.8dB Antenna Parameters with Body TSL Impedance, transformed to feed point 45.50+0.69/0 Return Loss -26.5dB Seneral Antenna Parameters and Design Electrical Delay (one direction) 1.319 ns Wher long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint or is made of standard semirgid coaxial cable. The center conductor of the feeding line is dire onnected to the second arm of the dipole arms in order to improve matching when loaded coording to the position as explained in the "Measurement Conditions" paragraph. The SAR data are fifeted by this change. The overall dipole length is still according to the Standard. Io excessive force must be applied to the dipole arms, because they might bend or the soldered onnections near the feedpoint may be damaged. wdditional EUT Data Manufactured by	Appendix	
Impedance, transformed to feed point 48.9Ω+ 1.17jΩ Return Loss -35.8dB Antenna Parameters with Body TSL Impedance, transformed to feed point 45.5Ω+ 0.58jΩ Return Loss -26.5dB General Antenna Parameters and Design Electrical Delay (one direction) 1.319 ns After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint of the dipole is made of standard semingid coaxial cable. The center conductor of the feeding line is dire onnected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On fibe dipoles, small end caps are added to the "Measurement Conditions" paragraph. The SAR data are fifected by this change. The overall dipole length is still according to the Standard. Jo excessive force must be applied to the dipole arms, because they might bend or the soldered onnections near the feedpoint may be damaged. vadditional EUT Data Manufactured by	Antenna Parameters with Head TSL	
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Antenna Parameters with Body TSL Impedance, transformed to feed point 45.50+ 0.58j0 Return Loss -26.5dB General Antenna Parameters and Design 1.319 ns Electrical Delay (one direction) 1.319 ns Where long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint of the measured. "he dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directoring to the position as explained in the "Measurement Conditions" paragraph. The SAR data are flected by this change. The overall dipole length is still according to the Standard. Io excessive force must be applied to the dipole arms, because they might bend or the soldered onnections near the feedpoint may be damaged. Mdditional EUT Data SPEAG	Return Loss	- 35.8dB
Impedance, transformed to feed point 45.50+0.58j0 Return Loss - 26.5dB General Antenna Parameters and Design Electrical Delay (one direction) Electrical Delay (one direction) 1.319 ns	Antenna Parameters with Body TSL	
Return Loss -26.5dB General Antenna Parameters and Design Image: Comparison of the display (one direction) Electrical Delay (one direction) 1,319 ns Atter long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint of the measured. The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is direction on ected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On f the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded coording to the position as explained in the "Measurement Conditions" paragraph. The SAR data are fleated by this change. The overall dipole length is still according to the Standard. Io excessive force must be applied to the dipole arms, because they might bend or the soldered onnections near the feedpoint may be damaged. Vdditional EUT Data SPEAG	Impedance, transformed to feed point	45.5Ω+ 0.58jΩ
General Antenna Parameters and Design Electrical Delay (one direction) 1.319 ns After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint of the measured. The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is dire onnected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On f the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded ccording to the position as explained in the "Measurement Conditions" paragraph. The SAR data are freeded by this change. The overall dipole length is still according to the Standard. Io excessive force must be applied to the dipole arms, because they might bend or the soldered onnections near the feedpoint may be damaged. Vadditional EUT Data Manufactured by SPEAG	Return Loss	- 26.5dB
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Manufactured by SPEAG	After long term use with 100W radiated power, only be measured. The dipole is made of standard semirigid coaxial ca connected to the second arm of the dipole. The ant of the dipoles, small end caps are added to the dip according to the position as explained in the "Meas affected by this change. The overall dipole length is No excessive force must be applied to the dipole an connections near the feedpoint may be damaged.	a slight warming of the dipole near the feedpoin ble. The center conductor of the feeding line is enna is therefore short-circuited for DC-signals. Is arms in order to improve matching when loa urement Conditions" paragraph. The SAR data still according to the Standard. ms, because they might bend or the soldered
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Client EC	IT	Certificate No: Z1	15-97168
CALIBRATION C	ERTIFICAT	ſE	
Object	D1900	V2 - SN: 5d134	
Calibration Procedure(s)			
	FD-Z1	1-2-003-01	
	Calibra	tion Procedures for dipole validation kits	1 9 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
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Certificate No: Z15-97168

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Glossary:	
TSL	tissue simulating liquid
N/A	not applicable or not measured
Calibration i a) IEEE Std 1 Spatial-Ave Communic b) IEC 62209 devices us 2005	 Performed According to the Following Standards: 528-2013, "IEEE Recommended Practice for Determining the Peak raged Specific Absorption Rate (SAR) in the Human Head from Wireless ations Devices: Measurement Techniques", June 2013 -1, "Procedure to measure the Specific Absorption Rate (SAR) For hand-held ed in close proximity to the ear (frequency range of 300MHz to 3GHz)", February
c) KDB86566	4, SAR Measurement Requirements for 100 MHz to 6 GHz
Additional D d) DASY4/5 S	ocumentation: Jystem Handbook
Methods App Measurer of the cer Antenna I point exar parallel to Feed Poil positioned measurer reflected Electrical No uncert SAR mea SAR nom connector SAR for n nominal S	Alled and Interpretation of Parameters: nent Conditions: Further details are available from the Validation Report at the end ificate. All figures stated in the certificate are valid at the frequency indicated. Parameters with TSL: The dipole is mounted with the spacer to position its feed titly below the center marking of the flat phantom section, with the arms oriented the body axis. Int Impedance and Return Loss: These parameters are measured with the dipole i under the liquid filled phantom. The impedance stated is transformed from the ment at the SMA connector to the feed point. The Return Loss ensures low power. No uncertainty required. Delay: One-way delay between the SMA connector and the antenna feed point. ainty required. sured: SAR measured at the stated antenna input power. halized: SAR as measured, normalized to an input power of 1 W at the antenna cominal TSL parameters: The measured TSL parameters are used to calculate the AR result.
The report Measurem Correspond	ed uncertainty of measurement is stated as the standard uncertainty of ant multiplied by the coverage factor k=2, which for a normal distribution is 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	52.8.8.1222	
Extrapolation	Advanced Extrapolation		
Phantom	Triple Flat Phantom 5.1C		
Distance Dipole Center - TSL	10 mm	with Spacer	
Zoom Scan Resolution	dx, dy, dz = 5 mm		
Frequency	1900 MHz ± 1 MHz		

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.6 ± 6 %	1.39 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	10.1 mW/g
SAR for nominal Head TSL parameters	normalized to 1W	40.8 mW /g ± 20.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	5.22 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	21.0 mW /g ± 20.4 % (k=2)

Body TSL parameters

	Temperature	Permitti	ivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3		1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.1 ±	6 %	1.54 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C		2	and a
R result with Body TSL				1
SAR averaged over 1 cm ³ (1 g) of Body TSL	Condi	tion		
SAR measured	250 mW in	put power		10.3 mW / g
SAR for nominal Body TSL parameters	normalize	d to 1W	41.1	mW /g ± 20.8 % (k=2
SAR averaged over 10 cm3 (10 g) of Body TS	SL Condi	tion		
SAR measured	250 mW in	put power		5.33 mW / g
SAR for nominal Body TSL parameters	normalize	d to 1W	21.3	mW /g ± 20.4 % (k=2

Certificate No: Z15-97168

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Appendix	
Antenna Parameters with Head TSL	
Impedance, transformed to feed point	51.8Ω+ 6.01jΩ
Return Loss	- 24.2dB
Antenna Parameters with Body TSL	
Impedance, transformed to feed point	47.1Ω+ 5.41]Ω
Return Loss	- 24.0dB
After long term use with 100W radiated power be measured.	r, only a slight warming of the dipole near the feedpoint can
After long term use with 100W radiated power be measured. The dipole is made of standard semirigid coax connected to the second arm of the dipole. Th of the dipoles, small end caps are added to th according to the position as explained in the "1 affected by this change. The overall dipole len No excessive force must be applied to the dip connections near the feedpoint may be damag	r, only a slight warming of the dipole near the feedpoint can oal cable. The center conductor of the feeding line is directly the antenna is therefore short-circuited for DC-signals. On some e dipole arms in order to improve matching when loaded Measurement Conditions" paragraph. The SAR data are not gigth is still according to the Standard. ole arms, because they might bend or the soldered ged.
After long term use with 100W radiated power be measured. The dipole is made of standard semirigid coax connected to the second arm of the dipole. Th of the dipoles, small end caps are added to th according to the position as explained in the " affected by this change. The overall dipole len No excessive force must be applied to the dip connections near the feedpoint may be damag Additional EUT Data Manufactured by	r, only a slight warming of the dipole near the feedpoint can oal cable. The center conductor of the feeding line is directly the antenna is therefore short-circuited for DC-signals. On some e dipole arms in order to improve matching when loaded Measurement Conditions" paragraph. The SAR data are not ogth is still according to the Standard. ole arms, because they might bend or the soldered ged.

Page 4 of 8









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Add: No.51 Xueyuan Road, Haddan District, Beijing, 100191, China Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504 Http://www.chinatl.cn Impedance Measurement Plot for Body TSL 775, 511 (Jog Hag 30,0068/ Nef 0.00006 [F1] 50.00 92.1,9000000 Griz -24,028 GB 40.00 10.00 10.00 -00.00		CALIBRATION LABORATORY
Impedance Measurement Plot for Body TSL	Add: No. Tel: +86- E-mail: ct	11 Xueyuan Road, Haidian District, Beijing, 100191, China. 10-62304633-2079 Fax: +86-10-62304633-2504 ti@chinattl.com Http://www.chinattl.cn
Tr1 S11 Log Mag 10.00d6/ Kef 0.000d6 [91] S0.00 A0.00 30.00 20.00 20.00 -20.00 -30.00 -40.00 -50.00 -50.00 -511 Smith (R+jx) Scale 1.0000 [FL Sel] S1 1.9000000 GHz 47,147 D 5.4122 D 453.44 pm	Imped	ance Measurement Plot for Body TSL
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	si 1.9000	000 GHz 47,147 D 5,4132 D 453,44-pm

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D1750V2, Serial No.1044 Extended Dipole Calibrations

Per IEEE Std 1528-2013, the dipole should have a return loss better than -20dB at the test frequency to reduce uncertainty in the power measurement.

Per KDB 865664 D01, if dipoles are verified in return loss(<-20dB, within 20% of prior calibration), and in impedance (within 5 ohm of prior calibration), the annual calibration is not necessary and the calibration interval can be extended.

Justification of the extended calibration

		D175	0V2 Serial No.	.1044		
			1750 Head			
Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)
11.03.2015	-36.76		48.891		1.1688	
11.02.2016	-36.675	0.23	49.732	0.841	0.738	0.431

		D175	0V2 Serial No	.1044		
			1750Body			
Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)
11.03.2015	-26.523		45.53		0.583	
11.02.2016	-25.909	2.31	47.294	1.764	0.219	0.364

The return loss is < -20dB, within 20% of prior calibration; the impedance is within 5 ohm of prior calibration. Therefore the verification result should support extended calibration.



Dipole Verification Data D1750V2 Serial No.1044 1750MHz-Head



1750MHz - Body





		TION LABORATORY	CNAS
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Client EC	IT	Certificate No: Z1	15-97168
CALIBRATION C	ERTIFICAT	ſE	
Object	D1900	V2 - SN: 5d134	
Calibration Procedure(s)			
19-03-047-047-047-047-047-047-047-047-047-047	FD-Z1	1-2-003-01	
	Calibra	nton Procedures for dipole validation kits	
Calibration date:	Novem	ber 4, 2015	
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Pages and are part of the contract of the cont	I conducted in dimensional (M&TE critical find)	the closed laboratory facility: environment or calibration) Cal Date(Calibrated by, Certificate No.)	temperature(22±3) © and Scheduled Calibration
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Gloss TSL ConvF N/A Calibr	a ry: tissue simu sensitivity not applicat	lating liquid n TSL / NORMx,y,z
TSL ConvF N/A Calibr	tissue simu sensitivity i not applicat	lating liquid n TSL / NORMx,y,z
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Metho Me of 1 An poi poi poi poi poi poi poi poi	ds Applied and Interpre- asurement Conditions: F the certificate. All figures tenna Parameters with 7 int exactly below the cen allel to the body axis. ad Point Impedance and sitioned under the liquid asurement at the SMA c lected power. No uncerta tectrical Delay: One-way of uncertainty required. R measured: SAR meas R normalized: SAR as m inector. R for nominal TSL param minal SAR result.	etation of Parameters: Further details are available from the Validation Report at the end stated in the certificate are valid at the frequency indicated. <i>SL</i> : The dipole is mounted with the spacer to position its feed ter marking of the flat phantom section, with the arms oriented <i>Return Loss</i> : These parameters are measured with the dipole filled phantom. The impedance stated is transformed from the onnector to the feed point. The Return Loss ensures low inty required. leasy between the SMA connector and the antenna feed point. ured at the stated antenna input power. leasured, normalized to an input power of 1 W at the antenna meters: The measured TSL parameters are used to calculate the
The Mea Corr	reported uncertainty o surement multiplied by esponds to a coverage p	f measurement is stated as the standard uncertainty of the coverage factor k=2, which for a normal distribution robability of approximately 95%.

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Measurement Conditions

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

DASY Version	DASY52	52.8.8.1222	
Extrapolation	Advanced Extrapolation		
Phantom	Triple Flat Phantom 5.1C		
Distance Dipole Center - TSL	10 mm	with Spacer	
Zoom Scan Resolution	dx, dy, dz = 5 mm		
Frequency	1900 MHz ± 1 MHz		

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.6 ± 6 %	1.39 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	10.1 mW/g
SAR for nominal Head TSL parameters	normalized to 1W	40.8 mW /g ± 20.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	5.22 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	21.0 mW /g ± 20.4 % (k=2)

Body TSL parameters

	Temperature	Permitti	ivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3		1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.1 ±	6 %	1.54 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C		2	and a
R result with Body TSL				1
SAR averaged over 1 cm ³ (1 g) of Body TSL	Condi	tion		
SAR measured	250 mW in	put power		10.3 mW / g
SAR for nominal Body TSL parameters	normalize	d to 1W	41.1	mW /g ± 20.8 % (k=2
SAR averaged over 10 cm3 (10 g) of Body TS	SL Condi	tion		
SAR measured	250 mW in	put power		5.33 mW / g
SAR for nominal Body TSL parameters	normalize	d to 1W	21.3	mW /g ± 20.4 % (k=2

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Appendix	
Antenna Parameters with Head T	rsL
Impedance, transformed to feed point	51.8Ω+ 6.01jΩ
Return Loss	- 24.2dB
Antenna Parameters with Body T	FSL
Impedance, transformed to feed point	47.1Ω+ 5.41jΩ
Return Loss	- 24.0dB
Electrical Delay (one direction) After long term use with 100W radiated p be measured.	1.305 ns
Electrical Delay (one direction) After long term use with 100W radiated p be measured. The dipole is made of standard semirigid connected to the second arm of the dipol of the dipoles, small end caps are added according to the position as explained in affected by this change. The overall dipo No excessive force must be applied to th connections near the feedpoint may be d Additional EUT Data	1.305 ns power, only a slight warming of the dipole near the feedpoint can d coaxial cable. The center conductor of the feeding line is directly le. The antenna is therefore short-circuited for DC-signals. On some d to the dipole arms in order to improve matching when loaded the "Measurement Conditions" paragraph. The SAR data are not ble length is still according to the Standard. ne dipole arms, because they might bend or the soldered famaged.
Electrical Delay (one direction) After long term use with 100W radiated g be measured. The dipole is made of standard semirigid connected to the second arm of the dipol of the dipoles, small end caps are added according to the position as explained in affected by this change. The overall dipo No excessive force must be applied to th connections near the feedpoint may be d Additional EUT Data Manufactured by	1.305 ns power, only a slight warming of the dipole near the feedpoint can d coaxial cable. The center conductor of the feeding line is directly te. The antenna is therefore short-circuited for DC-signals. On some d to the dipole arms in order to improve matching when loaded the "Measurement Conditions" paragraph. The SAR data are not ble length is still according to the Standard. ne dipole arms, because they might bend or the soldered damaged. SPEAG

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	CALIBRATION L	ABORATORY		
Add: No.51 Xueyuan Roa Tel: +86-10-62304633-20 E-mail: cttl@chinattl.com	d, Haidian District, Bei 79 Fax: +86-10-6, Http://www.ch	iing, 100191, China 2304633-2504 inattl.cn		
Impedance Meas	urement Plot f	or Body TSL		
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Page 8 of 8



D1900V2, Serial No.5d134 Extended Dipole Calibrations

Per IEEE Std 1528-2013, the dipole should have a return loss better than -20dB at the test frequency to reduce uncertainty in the power measurement.

Per KDB 865664 D01, if dipoles are verified in return loss(<-20dB, within 20% of prior calibration), and in impedance (within 5 ohm of prior calibration), the annual calibration is not necessary and the calibration interval can be extended.

Justification of the extended calibration

	D1900V2 Serial No.5d134								
1900 Head									
Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)			
11.04.2015	-24.201		51.842		6.0142				
11.03.2016	-23.684	2.13	52.246	0.404	6.4699	0.456			

	D1900V2 Serial No.5d134							
1900 Body								
Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)		
11.04.2015	-24.028		47.147		5.4132			
11.03.2016	-23.250	3.24	48.572	1.425	6.1951	0.782		

The return loss is < -20dB, within 20% of prior calibration; the impedance is within 5 ohm of prior calibration. Therefore the verification result should support extended calibration.



Dipole Verification Data D1900V2 Serial No.5d134 1900MHz-Head



1900MHz - Body





Add: No.51 Xueyu Tel: +86-10-62304	an Road, Haidian Di 633-2079 Fax:	strict, Beijing, 100191, China +86-10-62304633-2504	CALIBRATION No. 1.0570
E-mail: cttl@china	uttl.com <u>Http:</u>	://www.chinattl.cn	NO. 20570
CALIBRATION C	ERTIFICA	TE	15-9/1/1
Object	D2450	IV2 - SN: 858	
Calibration Procedure(s)	FD-Z1	1-2-003-01	
	Calibra	ation Procedures for dipole validation kits	
Calibration date:	Octobe	er 30, 2015	
All calibrations have been humidity<70%.	conducted in	the closed laboratory facility: environment	t temperature(22±3)°C and
Calibration Equipment used	I (M&TE critical f	or calibration)	
Calibration Equipment used Primary Standards	I (M&TE critical fo	or calibration) Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Calibration Equipment used Primary Standards Power Meter NRP2	I (M&TE critical for ID # 101919	Cal Date(Calibrated by, Certificate No.) 01-Jul-15 (CTTL, No.J15X04256)	Scheduled Calibration Jun-16
Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP-Z91	I (M&TE critical for ID # 101919 101547	Cal Date(Calibrated by, Certificate No.) 01-Jul-15 (CTTL, No.J15X04256) 01-Jul-15 (CTTL, No.J15X04256)	Scheduled Calibration Jun-16 Jun-16
Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP-Z91 Reference Probe EX3DV4	I (M&TE critical fr ID # 101919 101547 SN 3617 SN 377	Cal Date(Calibrated by, Certificate No.) 01-Jul-15 (CTTL, No.J15X04256) 01-Jul-15 (CTTL, No.J15X04256) 26-Aug-15(SPEAG,No.EX3-3617_Aug15)	Scheduled Calibration Jun-16 Jun-16 Aug-16
Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP-Z91 Reference Probe EX3DV4 DAE4	I (M&TE critical fr ID # 101919 101547 SN 3617 SN 777	Cal Date(Calibrated by, Certificate No.) 01-Jul-15 (CTTL, No.J15X04256) 01-Jul-15 (CTTL, No.J15X04256) 26-Aug-15(SPEAG,No.EX3-3617_Aug15) 26-Aug-15(SPEAG,No.DAE4-777_Aug15)	Scheduled Calibration Jun-16 Jun-16 Aug-16 Aug-16
Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP-Z91 Reference Probe EX3DV4 DAE4 Secondary Standards	I (M&TE critical fo ID # 101919 101547 SN 3617 SN 777 ID #	Cal Date(Calibrated by, Certificate No.) 01-Jul-15 (CTTL, No.J15X04256) 01-Jul-15 (CTTL, No.J15X04256) 26-Aug-15(SPEAG,No.EX3-3617_Aug15) 26-Aug-15(SPEAG,No.DAE4-777_Aug15) Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration Jun-16 Jun-16 Aug-16 Aug-16 Scheduled Calibration
Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP-Z91 Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C	I (M&TE critical for ID # 101919 101547 SN 3617 SN 777 ID # MY49071430	Cal Date(Calibrated by, Certificate No.) 01-Jul-15 (CTTL, No.J15X04256) 01-Jul-15 (CTTL, No.J15X04256) 26-Aug-15(SPEAG,No.EX3-3617_Aug15) 26-Aug-15(SPEAG,No.DAE4-777_Aug15) Cal Date(Calibrated by, Certificate No.) 02-Feb-15 (CTTL, No.J15X00729)	Scheduled Calibration Jun-16 Jun-16 Aug-16 Aug-16 Scheduled Calibration Feb-16
Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP-Z91 Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C Network Analyzer E5071C	I (M&TE critical fi 101919 101547 SN 3617 SN 777 ID # MY49071430 MY46110673	Cal Date(Calibrated by, Certificate No.) 01-Jul-15 (CTTL, No.J15X04256) 01-Jul-15 (CTTL, No.J15X04256) 26-Aug-15(SPEAG,No.EX3-3617_Aug15) 26-Aug-15(SPEAG,No.DAE4-777_Aug15) Cal Date(Calibrated by, Certificate No.) 02-Feb-15 (CTTL, No.J15X00729) 03-Feb-15 (CTTL, No.J15X00728)	Scheduled Calibration Jun-16 Jun-16 Aug-16 Aug-16 Scheduled Calibration Feb-16 Feb-16
Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP-Z91 Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C Network Analyzer E5071C	I (M&TE critical fi ID # 101919 101547 SN 3617 SN 777 ID # MY49071430 MY46110673 Name	Cal Date(Calibrated by, Certificate No.) 01-Jul-15 (CTTL, No.J15X04256) 01-Jul-15 (CTTL, No.J15X04256) 26-Aug-15(SPEAG,No.EX3-3617_Aug15) 26-Aug-15(SPEAG,No.DAE4-777_Aug15) Cal Date(Calibrated by, Certificate No.) 02-Feb-15 (CTTL, No.J15X00729) 03-Feb-15 (CTTL, No.J15X00728)	Scheduled Calibration Jun-16 Jun-16 Aug-16 Aug-16 Scheduled Calibration Feb-16 Feb-16
Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP-Z91 Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C Network Analyzer E5071C	I (M&TE critical fi ID # 101919 101547 SN 3617 SN 777 ID # MY49071430 MY46110673 Name Zhao Jing	Cal Date(Calibrated by, Certificate No.) 01-Jul-15 (CTTL, No.J15X04256) 01-Jul-15 (CTTL, No.J15X04256) 26-Aug-15(SPEAG,No.EX3-3617_Aug15) 26-Aug-15(SPEAG,No.DAE4-777_Aug15) Cal Date(Calibrated by, Certificate No.) 02-Feb-15 (CTTL, No.J15X00729) 03-Feb-15 (CTTL, No.J15X00728) Function SAR Test Engineer	Scheduled Calibration Jun-16 Jun-16 Aug-16 Aug-16 Scheduled Calibration Feb-16 Feb-16 Signature
Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP-Z91 Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C Network Analyzer E5071C Calibrated by: Reviewed by:	(M&TE critical fi 101919 101547 SN 3617 SN 777 ID # MY49071430 MY46110673 Name Zhao Jing Qi Dianyuan	Cal Date(Calibrated by, Certificate No.) Cal Date(Calibrated by, Certificate No.) O1-Jul-15 (CTTL, No.J15X04256) C6-Aug-15(SPEAG,No.EX3-3617_Aug15) C6-Aug-15(SPEAG,No.DAE4-777_Aug15) Cal Date(Calibrated by, Certificate No.) O2-Feb-15 (CTTL, No.J15X00729) O3-Feb-15 (CTTL, No.J15X00728) Function SAR Test Engineer SAR Project Leader	Scheduled Calibration Jun-16 Jun-16 Aug-16 Aug-16 Scheduled Calibration Feb-16 Feb-16 Signature
Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP-Z91 Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C Network Analyzer E5071C Calibrated by: Reviewed by: Approved by:	I (M&TE critical for ID # 101919 101547 SN 3617 SN 777 ID # MY49071430 MY46110673 Name Zhao Jing Qi Dianyuan Lu Bingsong	Cal Date(Calibrated by, Certificate No.) Cal Date(Calibrated by, Certificate No.) 01-Jul-15 (CTTL, No.J15X04256) 26-Aug-15(SPEAG,No.EX3-3617_Aug15) 26-Aug-15(SPEAG,No.DAE4-777_Aug15) Cal Date(Calibrated by, Certificate No.) 02-Feb-15 (CTTL, No.J15X00729) 03-Feb-15 (CTTL, No.J15X00728) Function SAR Test Engineer SAR Project Leader Deputy Director of the laboratory	Scheduled Calibration Jun-16 Jun-16 Aug-16 Aug-16 Scheduled Calibration Feb-16 Feb-16 Signature
Calibration Equipment used Primary Standards Power Meter NRP2 Power sensor NRP-Z91 Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C Network Analyzer E5071C Calibrated by: Reviewed by: Approved by:	I (M&TE critical fi 101919 101547 SN 3617 SN 777 ID # MY49071430 MY46110673 Name Zhao Jing Qi Dianyuan Lu Bingsong	Cal Date(Calibrated by, Certificate No.) 01-Jul-15 (CTTL, No.J15X04256) 01-Jul-15 (CTTL, No.J15X04256) 26-Aug-15(SPEAG,No.EX3-3617_Aug15) 26-Aug-15(SPEAG,No.DAE4-777_Aug15) Cal Date(Calibrated by, Certificate No.) 02-Feb-15 (CTTL, No.J15X00729) 03-Feb-15 (CTTL, No.J15X00728) Function SAR Test Engineer SAR Project Leader Deputy Director of the laboratory Issued: Nove	Scheduled Calibration Jun-16 Jun-16 Aug-16 Aug-16 Scheduled Calibration Feb-16 Feb-16 Signature

ΕΟΙΤ

	Add: No.51 Xuey Tel: +86-10-62304 E-mail: cttl@chin	uan Road, Haidian 4633-2079 Fa attl.com Ht	District, Beijing, 1001 ax: +86-10-62304633-2 ttp://www.chinattl.cn	91, China 2504		
Gloss TSL Convi N/A	sary: F	tissue simula sensitivity in not applicabl	ating liquid h TSL / NORMx le or not measu	,y,z red		
Calibu a) IEE Spa Corr b) IEC dev 200 c) KDI	ration is Perf EE Std 1528-2 atial-Averaged mmunications C 62209-1, "Pr vices used in o 55 B865664, SAI	formed Acco 013, "IEEE R I Specific Abs Devices: Me rocedure to m close proximit R Measureme	ording to the For Recommended sorption Rate (S assurement Tec neasure the Sport ty to the ear (fre ent Requirement	ollowing Stan Practice for De AR) in the Hur hniques", June ecific Absorptic equency range hts for 100 MH:	dards: termining the Peak nan Head from Wirele 2013 n Rate (SAR) For han of 300MHz to 3GHz)" z to 6 GHz	ss d-held , February
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The Mea Corr	e reported ur asurement m responds to a	ncertainty of ultiplied by t coverage pr	measurement the coverage f obability of app	is stated as actor k=2, wh roximately 95%	the standard uncer ich for a normal dis 5.	ainty of tribution
Certifica	tte No: Z15-9717	1	Page 2 of a	8		





8	In Collaboration with					
TTL	S	p	е	а	g	
	CALIBRATION LABORATORY					

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

 Tel: +86-10-62304633-2079
 Fax: +86-10-62304633-2504

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

Measurement Conditions

DASY Version	DASY52	52.8.8.1222
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.1 ± 6 %	1.82 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	13.2 mW / g	
SAR for nominal Head TSL parameters	normalized to 1W	52.9 mW /g ± 20.8 % (k=2	
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition		
SAR measured	250 mW input power	6.06 mW / g	
SAR for nominal Head TSL parameters	normalized to 1W	24.3 mW /g ± 20.4 % (k=2)	

Body TSL parameters

	Temperature	Permitti	vity	Conductivity	
Nominal Body TSL parameters	22.0 °C 52.7			1.95 mho/m	
Measured Body TSL parameters	(22.0 ± 0.2) °C	53.1 ± 6	6 %	1.94 mho/m ± 6 %	
Body TSL temperature change during test	<1.0 °C				
R result with Body TSL					
SAR averaged over 1 cm^3 (1 g) of Body TSL	Condit	tion			
SAR measured	250 mW in	put power		13.2 mW / g	
SAR for nominal Body TSL parameters	normalize	d to 1W	53.1	mW /g ± 20.8 % (k=2)	
SAR averaged over 10 cm ³ (10 g) of Body TS	L Condit	ion			
SAR measured	250 mW in	250 mW input power		6.16 mW / g	
SAR for nominal Body TSL parameters	normalized to 1W 24.7 mW /g ± 20.		mW /a + 20.4 % (k=2)		

Cer ficate No: Z15-97171 Page 3 of 8



Appendix		
Antenna Parameters wi	th Head TSL	
Impedance, transformed to	feed point	53.2Ω+ 6.03jΩ
Return Loss		- 23.6dB
Antenna Parameters wi	th Body TSL	
Impedance, transformed to	feed point	49.9Ω+ 7.39jΩ
Return Loss		- 22.6dB
After long term use with 100	V radiated power, only a	slight warming of the dipole near the feedpoint can
After long term use with 100V be measured. The dipole is made of standa connected to the second arm of the dipoles, small end caps according to the position as e affected by this change. The No excessive force must be a connections near the feedpoi	V radiated power, only a rd semirigid coaxial cabl of the dipole. The anter s are added to the dipole xplained in the "Measur overall dipole length is s ipplied to the dipole arm nt may be damaged.	slight warming of the dipole near the feedpoint can e. The center conductor of the feeding line is directly na is therefore short-circuited for DC-signals. On some arms in order to improve matching when loaded ement Conditions'' paragraph. The SAR data are not ill according to the Standard. s, because they might bend or the soldered
After long term use with 100V be measured. The dipole is made of standa connected to the second arm of the dipoles, small end caps according to the position as e affected by this change. The No excessive force must be a connections near the feedpoi	V radiated power, only a rd semirigid coaxial cabl of the dipole. The anter s are added to the dipole xplained in the "Measur overall dipole length is s piplied to the dipole arm nt may be damaged.	slight warming of the dipole near the feedpoint can e. The center conductor of the feeding line is directly na is therefore short-circuited for DC-signals. On some arms in order to improve matching when loaded ment Conditions" paragraph. The SAR data are not till according to the Standard. s, because they might bend or the soldered
After long term use with 100V be measured. The dipole is made of standa connected to the second arm of the dipoles, small end caps according to the position as e affected by this change. The No excessive force must be a connections near the feedpoi	V radiated power, only a rd semirigid coaxial cabl of the dipole. The anter s are added to the dipole xplained in the "Measur overall dipole length is s upplied to the dipole arm nt may be damaged.	e. The center conductor of the feeding line is directly na is therefore short-circuited for DC-signals. On some arms in order to improve matching when loaded ement Conditions" paragraph. The SAR data are not till according to the Standard. s, because they might bend or the soldered SPEAG



















D2450V2, Serial No.858 Extended Dipole Calibrations

Per IEEE Std 1528-2013, the dipole should have a return loss better than -20dB at the test frequency to reduce uncertainty in the power measurement.

Per KDB 865664 D01, if dipoles are verified in return loss(<-20dB, within 20% of prior calibration), and in impedance (within 5 ohm of prior calibration), the annual calibration is not necessary and the calibration interval can be extended.

Justification of the extended calibration

	D2450V2 Serial No.858							
2450 Head								
Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)		
10.30.2015	-23.589		53.231		6.0299			
10.29.2016	-23.466	0.52	50.672	2.559	6.4162	0.386		

D2450V2 Serial No.858								
2450 Body								
Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)		
10.30.2015	-22.642		49.935		7.3927			
10.29.2016	-23.075	1.91	46.903	3.032	5.6814	1.711		

The return loss is < -20dB, within 20% of prior calibration; the impedance is within 5 ohm of prior calibration. Therefore the verification result should support extended calibration.



Dipole Verification Data D2450V2 Serial No.858 2450MHz-Head



2450MHz - Body





Client ECI			
CALIBRATION C	EDTIEICAT	Certificate No: 21	15-9/1/2
CALIBITATION O	LITITICA		
Object	D2600	V2 - SN 1031	
Calibration Procedure(s)			
	Calibra	tion Procedures for dipole validation kits	
Calibration date:	Octobe	or 30, 2015	
This calibration Certificate measurements/SI). The me	documents the asurements and	traceability to national standards, which rea	alize the physical units of
pages and are part of the ce	ertificate.	and another mer connuclice probability	are given on the following
All calibrations have been humidity<70%.	conducted in	the closed laboratory facility: environment	temperature(22±3)℃ and
Calibration Equipment used	(M&TE critical f	or calibration)	
Primary Standards	ID #		
	and the second	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	101919	01-Jul-15 (CTTL, No.J15X04256)	Scheduled Calibration Jun-16
Power Meter NRP2 Power sensor NRP-Z91	101919 101547	Cal Darte(Calibrated by, Centricate No.) 01-Jul-15 (CTTL, No.J15X04256) 01-Jul-15 (CTTL, No.J15X04256)	Scheduled Calibration Jun-16 Jun-16
Power Meter NRP2 Power sensor NRP-Z91 Reference Probe EX3DV4 DAE4	101919 101547 SN 3617 SN 777	Cai Date(Calibrated by, Centricate No.) 01-Jul-15 (CTTL, No.J15X04256) 01-Jul-15 (CTTL, No.J15X04256) 26-Aug-15(SPEAG,No.EX3-3617_Aug15) 26-Aug-15(SPEAG,No.DAE4-777_Aug15)	Scheduled Calibration Jun-16 Jun-16 Aug-16 Aug-16
Power Meter NRP2 Power sensor NRP-Z91 Reference Probe EX3DV4 DAE4	101919 101547 SN 3617 SN 777	Cal Date(Calibrated by, Certificate No.) 01-Jul-15 (CTTL, No.J15X04256) 01-Jul-15 (CTTL, No.J15X04256) 28-Aug-15(SPEAG,No.EX3-3617_Aug15) 26-Aug-15(SPEAG,No.DAE4-777_Aug15)	Scheduled Calibration Jun-16 Jun-16 Aug-16 Aug-16
Power Meter NRP2 Power sensor NRP-Z91 Reference Probe EX3DV4 DAE4 Secondary Standards	101919 101547 SN 3617 SN 777 ID#	Cal Date(Calibrated by, Certificate No.) 01-Jul-15 (CTTL, No.J15X04256) 01-Jul-15 (CTTL, No.J15X04256) 26-Aug-15(SPEAG,No.EX3-3617_Aug15) 26-Aug-15(SPEAG,No.DAE4-777_Aug15) Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration Jun-16 Jun-16 Aug-16 Aug-16 Scheduled Calibration
Power Meter NRP2 Power sensor NRP-Z91 Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C	101919 101547 SN 3617 SN 777 ID # MY 49071430	Cal Date(Calibrated by, Certificate No.) 01-Jul-15 (CTTL, No.J15X04256) 01-Jul-15 (CTTL, No.J15X04256) 26-Aug-15(SPEAG,No.EX3-3617_Aug15) 26-Aug-15(SPEAG,No.DAE4-777_Aug15) Cal Date(Calibrated by, Certificate No.) 02-Feb-15 (CTTL, No.J15X00729) 02-5eb-15 (CTTL, No.J15X00729)	Scheduled Calibration Jun-16 Jun-16 Aug-16 Aug-16 Scheduled Calibration Feb-16
Power Meter NRP2 Power sensor NRP-Z91 Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C Network Analyzer E5071C	101919 101547 SN 3617 SN 777 ID # MY49071430 MY46110673	Cal Date(Calibrated by, Certificate No.) 01-Jul-15 (CTTL, No.J15X04256) 01-Jul-15 (CTTL, No.J15X04256) 26-Aug-15(SPEAG,No.EX3-3617_Aug15) 26-Aug-15(SPEAG,No.DAE4-777_Aug15) Cal Date(Calibrated by, Certificate No.) 02-Feb-15 (CTTL, No.J15X00729) 03-Feb-15 (CTTL, No.J15X00728)	Scheduled Calibration Jun-16 Jun-16 Aug-16 Aug-16 Scheduled Calibration Feb-16 Feb-16
Power Meter NRP2 Power sensor NRP-Z91 Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C Network Analyzer E5071C	101919 101547 SN 3617 SN 777 ID # MY49071430 MY46110673 Name	Cal Date(Calibrated by, Certificate No.) 01-Jul-15 (CTTL, No.J15X04256) 01-Jul-15 (CTTL, No.J15X04256) 28-Aug-15(SPEAG,No.EX3-3617_Aug15) 26-Aug-15(SPEAG,No.DAE4-777_Aug15) Cal Date(Calibrated by, Certificate No.) 02-Feb-15 (CTTL, No.J15X00729) 03-Feb-15 (CTTL, No.J15X00728) Function	Scheduled Calibration Jun-16 Jun-16 Aug-16 Aug-16 Scheduled Calibration Feb-16 Feb-16 Signature
Power Meter NRP2 Power sensor NRP-Z91 Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C Network Analyzer E5071C	101919 101547 SN 3617 SN 777 ID # MY49071430 MY46110673 Name Zhao Jing	Cal Date(Calibrated by, Certificate No.) 01-Jul-15 (CTTL, No.J15X04256) 01-Jul-15 (CTTL, No.J15X04256) 26-Aug-15(SPEAG,No.EX3-3617_Aug15) 26-Aug-15(SPEAG,No.DAE4-777_Aug15) Cal Date(Calibrated by, Certificate No.) 02-Feb-15 (CTTL, No.J15X00729) 03-Feb-15 (CTTL, No.J15X00728) Function SAR Test Engineer	Scheduled Calibration Jun-16 Jun-16 Aug-16 Aug-16 Scheduled Calibration Feb-16 Feb-16 Signature
Power Meter NRP2 Power sensor NRP-Z91 Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C Network Analyzer E5071C	101919 101547 SN 3617 SN 777 ID # MY49071430 MY46110673 Name Zhao Jing Qi Dianyuan	Cal Date(Calibrated by, Certificate No.) 01-Jul-15 (CTTL, No.J15X04256) 01-Jul-15 (CTTL, No.J15X04256) 26-Aug-15(SPEAG,No.EX3-3617_Aug15) 26-Aug-15(SPEAG,No.DAE4-777_Aug15) Cal Date(Calibrated by, Certificate No.) 02-Feb-15 (CTTL, No.J15X00729) 03-Feb-15 (CTTL, No.J15X00728) Function SAR Test Engineer SAR Project Leader	Scheduled Calibration Jun-16 Jun-16 Aug-16 Aug-16 Scheduled Calibration Feb-16 Feb-16 Signature
Power Meter NRP2 Power sensor NRP-Z91 Reference Probe EX3DV4 DAE4 Secondary Standards Signal Generator E4438C Network Analyzer E5071C Calibrated by: Reviewed by:	101919 101547 SN 3617 SN 777 ID # MY49071430 MY46110673 Name Zhao Jing Qi Dianyuan	Cal Date(Calibrated by, Certificate No.) 01-Jul-15 (CTTL, No.J15X04256) 01-Jul-15 (CTTL, No.J15X04256) 28-Aug-15(SPEAG,No.EX3-3617_Aug15) 26-Aug-15(SPEAG,No.DAE4-777_Aug15) Cal Date(Calibrated by, Certificate No.) 02-Feb-15 (CTTL, No.J15X00729) 03-Feb-15 (CTTL, No.J15X00728) Function SAR Test Engineer SAR Project Leader	Scheduled Calibration Jun-16 Jun-16 Aug-16 Aug-16 Scheduled Calibration Feb-16 Feb-16 Signature
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TTL	S	p	е	a	g
	CAL	IBRATI	ON LAS	ORAT	ORY
Add: No.51 Xueyuan Road, I	Haidian	District,	Beijing.	100191	, China

Tel: +86-10-62304633-2079 E-mail: cttl@chinattl.com

в Fax: +86-10-62304633-2504 Http://www.chinattl.en

Measurement Conditions

DASY Version	DASY52	52.8.8.1222
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2600 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.0	1.96 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.9±6%	2.01 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C		

SAR result with Head TSL

SAR averaged over 1 cm3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	14.6 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	58.0 mW /g ± 20.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	6.40 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	25.5 mW /g ± 20.4 % (k=2)

Body TSL parameters

	Temperature	Permitti	ivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.5	5	2.16 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.7 ±	6 %	2.14 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C			
R result with Body TSL		-	_	
SAR averaged over 1 cm3 (1 g) of Body TSL	Condi	tion		
SAR measured	250 mW in	put power		14.2 mW / g
SAR for nominal Body TSL parameters	normalize	d to 1W	57.1	mW /g ± 20.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Body TS	L Condit	lion		
SAR measured	250 mW in	put power		6.33 mW / g
CAD for any local Post Tot	normalized to 1W		25.4 mW /g ± 20.4 % (k=2	

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Add; No.51 Xueyuan Road, Haidia Tel: +86-10-62304633-2079	n District, Beijing, 100191, China ax: +86-10-62304633-2504		
Appendix	suporwww.chinam.ch		
Antone Bronnin III II	1.001		
Antenna Parameters with He	ead TSL		
Impedance, transformed to feed p	oint	48.5Ω- 3.48jΩ	
Return Loss		- 28.3dB	
Antenna Parameters with Bo	ody TSL		
Impedance, transformed to feed p	oint	45.9Ω- 3.13jΩ	
Return Loss		- 25.4dB	
General Antenna Parameters	s and Design		
)	
Electrical Delay (one direction) After long term use with 100W radio be measured. The dipole is made of standard ser- connected to the second arm of the of the dipoles, small end caps are a seconding to the position as explain iffected by this change. The overal	ated power, only a slight wa nirigid coaxial cable. The ce a dipole. The antenna is ther added to the dipole arms in o red in the "Measurement Co II dipole length is still accord	1.253 ns ming of the dipole near the feedpoint can her conductor of the feeding line is directly efore short-circuited for DC-signals. On so rofer to improve matching when loaded nditions" paragraph. The SAR data are not ng to the Standard.	y me t
Electrical Delay (one direction) After long term use with 100W radio be measured. The dipole is made of standard ser connected to the second arm of the of the dipoles, small end caps are a according to the position as explain affected by this change. The overal No excessive force must be applied connections near the feedpoint matching Additional EUT Data	ated power, only a slight wa nirigid coaxial cable. The ce e dipole. The antenna is ther added to the dipole arms in c red in the "Measurement Co II dipole length is still accord d to the dipole arms, becaus y be damaged.	1.253 ns ming of the dipole near the feedpoint can ther conductor of the feeding line is directly afore short-circuited for DC-signals. On so rider to improve matching when loaded ditions" paragraph. The SAR data are not ng to the Standard. a they might bend or the soldered	y me t
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ECIT

50.00 >1 2.6000000 GHz -	0.0008 [F1] 25.441 dB	
40.00		
30.00		
20,00		
10.00		
0.000		4
-20,00		
-30,00	2	
-40.00	~	
-50.00		
First Sil Swith (8+jx) Scale 1.	.000u [F1 nel]	
1 Start 2.4 GHz	PEW 100 HP Plat	3844 23



D2600V2, Serial No.1031 Extended Dipole Calibrations

Per IEEE Std 1528-2013,the dipole should have a return loss better than -20dB at the test frequency to reduce uncertainty in the power measurement.

Per KDB 865664 D01, if dipoles are verified in return loss(<-20dB, within 20% of prior calibration), and in impedance (within 5 ohm of prior calibration), the annual calibration is not necessary and the calibration interval can be extended.

Justification of the extended calibration

D2600V2 Serial No.1031								
2600 Head								
Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)		
10.30.2015	-28.261		48.452		-3.4766			
10.29.2016	-26.029	7.89	44.630	3.822	-4.4265	0.950		

D2600V2 Serial No.1031								
2600 Body								
Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)		
10.30.2015	-25.441		45.931		-3.125			
10.29.2016	-25.582	0.54	48.845	2.914	-2.163	0.962		

The return loss is < -20dB, within 20% of prior calibration; the impedance is within 5 ohm of prior calibration. Therefore the verification result should support extended calibration.



Dipole Verification Data D2600V2 Serial No.1031 2600MHz-Head



2600MHz - Body











- 3) The SPEAG-TMC agreement includes specific protocols identified in the following to ensure the quality of calibration services provided by TMC under this SPEAG-TMC Dual-Logo calibration agreement are equivalent to the calibration services provided by SPEAG. TMC shall, upon request, provide copies of documentation to the FCC to substantiate program implementation.
 - the FCC to substantiate program implementation.
 a) The Inter-laboratory Calibration Evaluation (ILCE) stated in the TMC QA protocol shall be performed between SPEAG and TMC at least once every 12 months. The ILCE acceptance criteria defined in the TMC QA protocol shall be satisfied for the TMC, SPEAG and FCC agreements to remain valid.
 - b) Check of Calibration Certificate (CCC) shall be performed by SPEAG for all calibrations performed by TMC. Written confirmation from SPEAG for all calibrations performed by TMC. Written confirmation from SPEAG is required for TMC to issue calibration certificates under the SPEAG-TMC Dual-Logo calibration program. Quarterly reports for all calibrations performed by TMC under the program are also issued by SPEAG.
 - c) The calibration equipment and measurement system used by TMC shall be verified before each calibration service according to the specific reference SAR probes, dipoles, and DAE calibrated by SPEAG. The results shall be reproducible and within the defined acceptance criteria specified in the TMC QA protocol before each actual calibration can commence. TMC shall maintain records of the measurement and calibration system verification results for all calibrations.
 - d) Quality Check of Calibration (QCC) certificates shall be performed by SPEAG at least once every 12 months. SPEAG shall visit TMC facilities to verify the laboratory, equipment, applied procedures and plausibility of randomly selected certificates.
- 4) A copy of this document, to be updated annually, shall be provided to TMC clients that accept calibration services according to the SPEAG-TMC Dual-Logo calibration program, which should be presented to a TCB (*Telecommunication Certification Body*), to facilitate FCC equipment approval.
- TMC shall address any questions raised by its clients or TCBs relating to the SPEAG-TMC Dual-Logo calibration program and inform the FCC and SPEAG of any critical issues.

Change Note: Revised on June 26 to clarify the applicability of PMR and Bundled probe calibrations according to the requirements of KDB 865664.

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ANNEX H. Accreditation Certificate





Accredited Laboratory

A2LA has accredited

EAST CHINA INSTITUTE OF TELECOMMUNICATIONS

Shanghai, People's Republic of China

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 General requirements for the competence of testing and calibration laboratories. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009).



Presented this 15th day of March 2017.

President and CEO For the Accreditation Council Certificate Number 3682.01 Valid to February 28, 2019

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

**********End The Report********