Table 15.1-9: SAR Values for LTE B41

Test Position	Power Reduction	Mode				Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
		Modulation	BW(MHz)	RB Allocation	RB Offset						Measured SAR1g	Scaling Factor	Report SAR1g	
Head SAR														
Left Touch	Normal power	QPSK	20	1	mid	40620	2593	23.89	24.50	0.08	**0.163**	1.15	**0.188**	**A.17**
Left Tilt 15°	Normal power	QPSK	20	1	mid	40620	2593	23.89	24.50	0.17	0.100	1.15	0.115	/
Right Touch	Normal power	QPSK	20	1	mid	40620	2593	23.89	24.50	-0.08	0.087	1.15	0.100	/
Right Tilt 15°	Normal power	QPSK	20	1	mid	40620	2593	23.89	24.50	-0.05	0.078	1.15	0.090	/
Left Touch	Normal power	QPSK	20	50%	high	40620	2593	22.71	23.50	0.18	0.116	1.20	0.139	/
Left Tilt 15°	Normal power	QPSK	20	50%	high	40620	2593	22.71	23.50	-0.04	0.078	1.20	0.093	/
Right Touch	Normal power	QPSK	20	50%	high	40620	2593	22.71	23.50	-0.04	0.062	1.20	0.074	/
Right Tilt 15°	Normal power	QPSK	20	50%	high	40620	2593	22.71	23.50	0.14	0.036	1.20	0.044	/
Hotspot SAR (10mm)														
Front Side	Normal power	QPSK	20	1	mid	40620	2593	23.89	24.50	-0.09	0.232	1.15	0.267	/
Back Side	Normal power	QPSK	20	1	mid	40620	2593	23.89	24.50	-0.03	0.693	1.15	0.798	/
Left Side	Normal power	QPSK	20	1	mid	40620	2593	23.89	24.50	-0.03	0.179	1.15	0.206	/
Right Side	Normal power	QPSK	20	1	mid	40620	2593	23.89	24.50	0.04	0.073	1.15	0.084	/
Bottom Side	Normal power	QPSK	20	1	mid	40620	2593	23.89	24.50	0.17	0.720	1.15	0.829	/
Front Side	Normal power	QPSK	20	50%	high	40620	2593	22.71	23.50	-0.16	0.172	1.20	0.206	/
Back Side	Normal power	QPSK	20	50%	high	40620	2593	22.71	23.50	0.07	0.493	1.20	0.591	/
Left Side	Normal power	QPSK	20	50%	high	40620	2593	22.71	23.50	-0.04	0.119	1.20	0.143	/
Right Side	Normal power	QPSK	20	50%	high	40620	2593	22.71	23.50	-0.08	0.073	1.20	0.087	/
Bottom Side	Normal power	QPSK	20	50%	high	40620	2593	22.71	23.50	-0.04	0.545	1.20	0.654	/
Bottom Side	Normal power	QPSK	20	1	mid	39750	2506	23.72	24.50	-0.13	**0.762**	1.20	**0.912**	**A.18**
Bottom Side	Normal power	QPSK	20	1	mid	41490	2680	23.78	24.50	0.14	0.697	1.18	0.823	/
Body-worn SAR (10mm)														
Front Side	Normal power	QPSK	20	1	mid	40620	2593	23.89	24.50	-0.09	0.232	1.15	0.267	/
Back Side	Normal power	QPSK	20	1	mid	40620	2593	23.89	24.50	-0.03	0.693	1.15	0.798	/
Front Side	Normal power	QPSK	20	50%	high	40620	2593	22.71	23.50	-0.16	0.172	1.20	0.206	/
Back Side	Normal power	QPSK	20	50%	high	40620	2593	22.71	23.50	0.07	0.493	1.20	0.591	/

According to the product change description, for Wi-Fi/BT mode, only the worst mode was tested in this project.

Table 15.1-10: SAR Values for Wi-Fi 2.4G (original: I23W00020-SAR)

Test Position	Power Reduction	Mode	BW(MHz)	Duty Cycle	Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
										Measured SAR1g	Scaling Factor	Report SAR1g	
Head SAR													
Left Touch	Normal power	802.11b	20	1:1	11	2462	14.94	15.50	-0.11	**0.493**	1.14	**0.561**	/
Left Tilt 15°	Normal power	802.11b	20	1:1	11	2462	14.94	15.50	0.04	0.264	1.14	0.300	/
Right Touch	Normal power	802.11b	20	1:1	11	2462	14.94	15.50	-0.03	0.176	1.14	0.200	/
Right Tilt 15°	Normal power	802.11b	20	1:1	11	2462	14.94	15.50	0.09	0.116	1.14	0.132	/
Head SAR-Secondary Supply													
Left Touch	Normal power	802.11b	20	1:1	11	2462	14.94	15.50	0.04	0.490	1.14	0.557	/
Hotspot SAR (10mm)													
Front Side	Normal power	802.11b	20	1:1	11	2462	14.94	15.50	0.08	0.094	1.14	0.107	/
Back Side	Normal power	802.11b	20	1:1	11	2462	14.94	15.50	0.05	0.105	1.14	0.119	/
Left Side	Normal power	802.11b	20	1:1	11	2462	14.94	15.50	-0.03	0.029	1.14	0.033	/
Right Side	Normal power	802.11b	20	1:1	11	2462	14.94	15.50	-0.04	**0.107**	1.14	**0.122**	/
Top Side	Normal power	802.11b	20	1:1	11	2462	14.94	15.50	0.01	0.039	1.14	0.044	/
Body-worn SAR (10mm)													
Front Side	Normal power	802.11b	20	1:1	11	2462	14.94	15.50	0.08	0.094	1.14	0.107	/
Back Side	Normal power	802.11b	20	1:1	11	2462	14.94	15.50	0.05	0.105	1.14	0.119	/

Table 15.1-11: SAR Values for Wi-Fi 2.4G (variant: I23W00045-SAR)

Test Position	Power Reduction	Mode	BW(MHz)	Duty Cycle	Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
										Measured SAR1g	Scaling Factor	Report SAR1g	
Head SAR													
Left Touch	Normal power	802.11b	20	1:1	11	2462	14.94	15.50	-0.12	**0.465**	1.14	**0.529**	**A.19**
Head SAR-Secondary Supply													
Left Touch	Normal power	802.11b	20	1:1	11	2462	14.94	15.50	-0.08	0.463	1.14	0.527	/

Table 15.1-12: SAR Values for Wi-Fi 5G U-NII-2A (original: I23W00020-SAR)

Test Position	Power Reduction	Mode	BW(MHz)	Duty Cycle	Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
										Measured SAR1g	Scaling Factor	Report SAR1g	
Head SAR													
Left Touch	Normal power	802.11a	20	1:1	52	5260	10.48	11.50	0.15	**0.364**	1.26	**0.460**	/
Left Tilt 15°	Normal power	802.11a	20	1:1	52	5260	10.48	11.50	-0.08	0.289	1.26	0.366	/
Right Touch	Normal power	802.11a	20	1:1	52	5260	10.48	11.50	-0.04	0.293	1.26	0.371	/
Right Tilt 15°	Normal power	802.11a	20	1:1	52	5260	10.48	11.50	-0.09	0.269	1.26	0.340	/
Hotspot SAR (10mm)													
Front Side	Normal power	802.11a	20	1:1	52	5260	10.48	11.50	-0.10	0.052	1.26	0.066	/
Back Side	Normal power	802.11a	20	1:1	52	5260	10.48	11.50	0.00	0.073	1.26	0.092	/
Left Side	Normal power	802.11a	20	1:1	52	5260	10.48	11.50	0.00	0.044	1.26	0.055	/
Right Side	Normal power	802.11a	20	1:1	52	5260	10.48	11.50	0.10	0.052	1.26	0.066	/
Top Side	Normal power	802.11a	20	1:1	52	5260	10.48	11.50	0.11	**0.106**	1.26	**0.134**	/
Hotspot SAR (10mm)-Secondary Supply													
Top Side	Normal power	802.11a	20	1:1	52	5260	10.48	11.50	0.11	0.101	1.26	0.128	/
Body-worn SAR (10mm)													
Front Side	Normal power	802.11a	20	1:1	52	5260	10.48	11.50	-0.10	0.052	1.26	0.066	/
Back Side	Normal power	802.11a	20	1:1	52	5260	10.48	11.50	0.00	0.073	1.26	0.092	/

Table 15.1-13: SAR Values for Wi-Fi 5G U-NII-2A (variant: I23W00045-SAR)

Test Position	Power Reduction	Mode	BW(MHz)	Duty Cycle	Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
										Measured SAR1g	Scaling Factor	Report SAR1g	
Hotspot SAR (10mm)													
Top Side	Normal power	802.11a	20	1:1	52	5260	10.48	11.50	-0.02	**0.085**	1.26	**0.108**	**A.20**
Hotspot SAR (10mm)-Secondary Supply													
Top Side	Normal power	802.11a	20	1:1	52	5260	10.48	11.50	-0.05	0.084	1.26	0.107	/

Table 15.1-14: SAR Values for Wi-Fi 5G U-NII-2C (original: I23W00020-SAR)

Test Position	Power Reduction	Mode	BW(MHz)	Duty Cycle	Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
										Measured SAR1g	Scaling Factor	Report SAR1g	
Head SAR													
Left Touch	Normal power	802.11a	20	1:1	120	5600	10.40	11.50	-0.06	0.251	1.29	**0.323**	/
Left Tilt 15°	Normal power	802.11a	20	1:1	120	5600	10.40	11.50	-0.05	0.167	1.29	0.215	/
Right Touch	Normal power	802.11a	20	1:1	120	5600	10.40	11.50	-0.08	0.191	1.29	0.246	/
Right Tilt 15°	Normal power	802.11a	20	1:1	120	5600	10.40	11.50	-0.08	0.139	1.29	0.179	/
Hotspot SAR (10mm)													
Front Side	Normal power	802.11a	20	1:1	120	5600	10.40	11.50	0.00	0.033	1.29	0.043	/
Back Side	Normal power	802.11a	20	1:1	120	5600	10.40	11.50	0.00	0.073	1.29	0.094	/
Left Side	Normal power	802.11a	20	1:1	120	5600	10.40	11.50	0.11	0.048	1.29	0.062	/
Right Side	Normal power	802.11a	20	1:1	120	5600	10.40	11.50	-0.05	0.061	1.29	0.079	/
Top Side	Normal power	802.11a	20	1:1	120	5600	10.40	11.50	-0.10	0.095	1.29	**0.122**	/
Body-worn SAR (10mm)													
Front Side	Normal power	802.11a	20	1:1	120	5600	10.40	11.50	0.00	0.033	1.29	0.043	/
Back Side	Normal power	802.11a	20	1:1	120	5600	10.40	11.50	0.00	0.073	1.29	0.094	/

Table 15.1-15: SAR Values for Wi-Fi 5G U-NII-3 (original: I23W00020-SAR)

Test Position	Power Reduction	Mode	BW(MHz)	Duty Cycle	Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
										Measured SAR1g	Scaling Factor	Report SAR1g	
Head SAR													
Left Touch	Normal power	802.11a	20	1:1	149	5745	11.78	13.00	0.08	0.323	1.32	**0.428**	/
Left Tilt 15°	Normal power	802.11a	20	1:1	149	5745	11.78	13.00	-0.10	0.252	1.32	0.334	/
Right Touch	Normal power	802.11a	20	1:1	149	5745	11.78	13.00	-0.10	0.243	1.32	0.322	/
Right Tilt 15°	Normal power	802.11a	20	1:1	149	5745	11.78	13.00	-0.12	0.181	1.32	0.240	/
Hotspot SAR (10mm)													
Front Side	Normal power	802.11a	20	1:1	149	5745	11.78	13.00	0.00	0.076	1.32	0.101	/
Back Side	Normal power	802.11a	20	1:1	149	5745	11.78	13.00	0.00	0.098	1.32	**0.129**	/
Left Side	Normal power	802.11a	20	1:1	149	5745	11.78	13.00	0.10	0.043	1.32	0.057	/
Right Side	Normal power	802.11a	20	1:1	149	5745	11.78	13.00	-0.04	0.071	1.32	0.094	/
Top Side	Normal power	802.11a	20	1:1	149	5745	11.78	13.00	0.05	0.066	1.32	0.087	/
Body-worn SAR (10mm)													
Front Side	Normal power	802.11a	20	1:1	149	5745	11.78	13.00	0.00	0.076	1.32	0.101	/
Back Side	Normal power	802.11a	20	1:1	149	5745	11.78	13.00	0.00	0.098	1.32	0.129	/

Table 15.1-16: SAR Values for BT (original: I23W00020-SAR)

Test Position	Power Reduction	Mode	Duty Cycle	Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
									Measured SAR1g	Scaling Factor	Report SAR1g	
Head SAR												
Left Touch	Normal power	BT	1:1	39	2441	10.69	11.00	-0.06	0.094	1.07	**0.101**	/
Left Tilt 15°	Normal power	BT	1:1	39	2441	10.69	11.00	-0.03	0.063	1.07	0.068	/
Right Touch	Normal power	BT	1:1	39	2441	10.69	11.00	0.05	0.033	1.07	0.035	/
Right Tilt 15°	Normal power	BT	1:1	39	2441	10.69	11.00	0.03	0.027	1.07	0.029	/
Hotspot SAR (10mm)												
Front Side	Normal power	BT	1:1	39	2441	10.69	11.00	0.05	0.018	1.07	0.019	/
Back Side	Normal power	BT	1:1	39	2441	10.69	11.00	0.14	0.023	1.07	0.025	/
Left Side	Normal power	BT	1:1	39	2441	10.69	11.00	0.00	0.000	1.07	0.000	/
Right Side	Normal power	BT	1:1	39	2441	10.69	11.00	0.02	0.025	1.07	**0.027**	/
Top Side	Normal power	BT	1:1	39	2441	10.69	11.00	-0.08	0.011	1.07	0.012	/
Body-worn SAR (10mm)												
Front Side	Normal power	BT	1:1	39	2441	10.69	11.00	0.05	0.018	1.07	0.019	/
Back Side	Normal power	BT	1:1	39	2441	10.69	11.00	0.14	0.023	1.07	0.025	/

15.2. SAR Measurement Variability

SAR measurement variability must be assessed for each frequency band, which is determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media are required for SAR measurements in a frequency band, the variability measurement procedures should be applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium.

The following procedures are applied to determine if repeated measurements are required.

1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps2) through 4) do not apply.

2) When the original highest measured SAR is ≥0.80 W/kg, repeat that measurement once.

3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥1.45W/kg (~ 10% from the 1-g SAR limit).

4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

Table15.2-1 SAR Measurement Variability (1g)

Band	Frequency		Mode	Test Position	Distance (mm)	Original Measured SAR (W/kg)	First Repeated measured SAR (W/kg)	The Ratio
	Ch.	MHz						
GSM850	251	848.8	GSM	Right Cheek	0	0.892	0.891	1.001
WCDMA Band Ⅱ	9538	1907.6	RMC 12.2k	Bottom Side	10	0.872	0.842	1.036
WCDMA Band Ⅴ	4132	826.4	RMC 12.2k	Right Cheek	0	0.877	0.876	1.001
LTE Band 4	20175	1732.5	QPSK 1RB 50offset	Back Side	10	0.904	0.900	1.004
LTE Band 5	20450	829	QPSK 1RB 50offset	Right Cheek	0	0.945	0.893	1.058
LTE Band 7	20850	2510	QPSK 1RB 50offset	Bottom Side	10	0.846	0.829	1.021

16. Measurement Uncertainty

Measurement Uncertainty for Normal SAR Tests (below 3GHz)

Error Description	Uncert. Value	Prob. Dist.	Div.	(Ci) 1g	(Ci) 10g	Std. Unc.[%] (1g)	Std. Unc.[%] (10g)	(Ui) ueff
Measurement System								
Probe Calibration	12.1	N	2	1	1	6.05	6.05	∞
Axial Isotropy	4.7	R	√3	0.7	0.7	1.90	1.90	∞
Hemispherical Isotropy	9.6	R	√3	0.7	0.7	3.88	3.88	∞
Boundary effects	1.0	R	√3	1	1	0.58	0.58	∞
Linearity	4.7	R	√3	1	1	2.71	2.71	∞
System Detection Limits	1.0	R	√3	1	1	0.58	0.58	∞
Readout Electronics	0.3	N	1	1	1	0.30	0.30	∞
Response Time	0.8	R	√3	1	1	0.50	0.50	∞
Integration Time	2.6	R	√3	1	1	1.50	1.50	∞
RF ambient conditions-noise	0	R	√3	1	1	0.00	0.00	∞
RF ambient conditions-re ection	0	R	√3	1	1	0.00	0.00	∞
Probe Positioned mech.retrictions	0.2	R	√3	1	1	0.12	0.12	∞
Probe Positioning with respect to phantom shell	2.9	R	√3	1	1	1.67	1.67	∞
Post-processing	4.0	R	√3	1	1	2.31	2.31	∞
Test Sample Related								
Device Holder	2.54	N	1	1	1	2.54	2.54	3
Test dample Positioning	0.5	N	1	1	1	0.50	0.50	63
Power Drift	5.0	R	√3	1	1	2.89	2.89	∞
Phantom and Setup								
Phantom Uncertainty	7.5	R	√3	1	1	4.33	4.33	∞
Liquid Conductivity (target)	5.0	R	√3	0.64	0.43	1.85	1.24	∞
Liquid Conductivity (meas..)	2.5	N	1	0.64	0.43	1.60	1.08	∞
Liquid Permittivity (target)	5.00	R	√3	0.6	0.49	1.73	1.41	∞
Liquid Permittivity (meas..)	0.4	N	1	0.6	0.49	0.24	0.20	∞
Combined Std. Uncertainty	$U_c' = \sqrt{\sum_{i=1}^{23} Ci^2 Ui^2}$	RSS				10.09	9.96	
Expanded STD Uncertainty	$U_c = 2U_c'$					20.18	19.93	

Measurement Uncertainty for Fast SAR Tests (below 3GHz)

Error Description	Uncert. Value	Prob. Dist.	Div.	(Ci) 1g	(Ci) 10g	Std. Unc.[%] (1g)	Std. Unc.[%] (10g)	(Ui) ueff
Measurement System								
Probe Calibration	12.1	N	2	1	1	6.05	6.05	∞
Axial Isotropy	4.7	R	√3	0.7	0.7	1.90	1.90	∞
Hemispherical Isotropy	9.6	R	√3	0.7	0.7	3.88	3.88	∞
Boundary effects	1.0	R	√3	1	1	0.58	0.58	∞
Linearity	4.7	R	√3	1	1	2.71	2.71	∞
System Detection Limits	1.0	R	√3	1	1	0.58	0.58	∞
Readout Electronics	0.3	N	1	1	1	0.30	0.30	∞
Response Time	0.8	R	√3	1	1	0.50	0.50	∞
Integration Time	2.6	R	√3	1	1	1.50	1.50	∞
RF ambient conditions-noise	0	R	√3	1	1	0.00	0.00	∞
RF ambient conditions-re ection	0	R	√3	1	1	0.00	0.00	∞
Probe Positioned mech.retrictions	0.2	R	√3	1	1	0.12	0.12	∞
Probe Positioning with respect to phantom shell	2.9	R	√3	1	1	1.67	1.67	∞
Post-processing	4.0	R	√3	1	1	2.31	2.31	∞
Fast SAR-Z-Approximation	7.0	R	√3	1	1	4.0	4.0	∞
Test Sample Related								
Device Holder	2.54	N	1	1	1	2.54	2.54	3
Test dample Positioning	0.5	N	1	1	1	0.50	0.50	63
Power Drift	5.0	R	√3	1	1	2.89	2.89	∞
Phantom and Setup								
Phantom Uncertainty	7.5	R	√3	1	1	4.33	4.33	∞
Liquid Conductivity (target)	5.0	R	√3	0.64	0.43	1.85	1.24	∞
Liquid Conductivity (meas..)	2.5	N	1	0.64	0.43	1.60	1.08	∞
Liquid Permittivity (target)	5.00	R	√3	0.6	0.49	1.73	1.41	∞
Liquid Permittivity (meas..)	0.4	N	1	0.6	0.49	0.24	0.20	∞
Combined Std. Uncertainty	$U_c' = \sqrt{\sum_{i=1}^{23} Ci^2 Ui^2}$	RSS				10.85	10.73	
Expanded STD Uncertainty	$U_c = 2U_c'$					21.70	21.46	

Measurement Uncertainty for Normal SAR Tests (3GHz-6GHz)

Error Description	Uncert. Value	Prob. Dist.	Div.	(Ci)	(Ci)	Std. Unc.[%]	Std. Unc.[%]	(Ui) ueff
				1g	10g	(1g)	(10g)	
Measurement System								
Probe Calibration	13.3	N	2	1	1	6.65	6.65	∞
Axial Isotropy	4.7	R	√3	0.7	0.7	1.90	1.90	∞
Hemispherical Isotropy	9.6	R	√3	0.7	0.7	3.88	3.88	∞
Boundary effects	2.0	R	√3	1	1	1.15	1.15	∞
Linearity	4.7	R	√3	1	1	2.71	2.71	∞
System Detection Limits	1.0	R	√3	1	1	0.58	0.58	∞
Readout Electronics	0.3	N	1	1	1	0.30	0.30	∞
Response Time	0.8	R	√3	1	1	0.50	0.50	∞
Integration Time	2.6	R	√3	1	1	1.50	1.50	∞
RF ambient conditions-noise	0	R	√3	1	1	0.00	0.00	∞
RF ambient conditions-re ection	0	R	√3	1	1	0.00	0.00	∞
Probe Positioned mech.retrictions	0.4	R	√3	1	1	0.23	0.23	∞
Probe Positioning with respect to phantom shell	6.7	R	√3	1	1	3.87	3.87	∞
Post-processing	4.0	R	√3	1	1	2.31	2.31	∞
Test Sample Related								
Device Holder	2.54	N	1	1	1	2.54	2.54	3
Test dample Positioning	0.5	N	1	1	1	0.50	0.50	63
Power Drift	5.0	R	√3	1	1	2.89	2.89	∞
Phantom and Setup								
Phantom Uncertainty	7.9	R	√3	1	1	4.56	4.56	∞
Liquid Conductivity (target)	5.0	R	√3	0.64	0.43	1.85	1.24	∞
Liquid Conductivity (meas..)	2.5	N	1	0.64	0.43	1.60	1.08	∞
Liquid Permittivity (target)	5.00	R	√3	0.6	0.49	1.73	1.41	∞
Liquid Permittivity (meas..)	0.4	N	1	0.6	0.49	0.24	0.20	∞
Combined Std. Uncertainty	$U_c' = \sqrt{\sum_{i=1}^{23} C_i^2 U_i^2}$	RSS				11.17	11.05	
Expanded STD Uncertainty	$U_c = 2U_c'$					22.34	22.11	

Measurement Uncertainty for Fast SAR Tests (3GHz-6GHz)

Error Description	Uncert. Value	Prob. Dist.	Div.	(Ci) 1g	(Ci) 10g	Std. Unc.[%] (1g)	Std. Unc.[%] (10g)	(Ui) ueff
Measurement System								
Probe Calibration	13.3	N	2	1	1	6.65	6.65	∞
Axial Isotropy	4.7	R	√3	0.7	0.7	1.90	1.90	∞
Hemispherical Isotropy	9.6	R	√3	0.7	0.7	3.88	3.88	∞
Boundary effects	2.0	R	√3	1	1	1.15	1.15	∞
Linearity	4.7	R	√3	1	1	2.71	2.71	∞
System Detection Limits	1.0	R	√3	1	1	0.58	0.58	∞
Readout Electronics	0.3	N	1	1	1	0.30	0.30	∞
Response Time	0.8	R	√3	1	1	0.50	0.50	∞
Integration Time	2.6	R	√3	1	1	1.50	1.50	∞
RF ambient conditions-noise	0	R	√3	1	1	0.00	0.00	∞
RF ambient conditions-re ection	0	R	√3	1	1	0.00	0.00	∞
Probe Positioned mech.retrictions	0.4	R	√3	1	1	0.23	0.23	∞
Probe Positioning with respect to phantom shell	6.7	R	√3	1	1	3.87	3.87	∞
Post-processing	4.0	R	√3	1	1	2.31	2.31	∞
Fast SAR-Z-Approximation	14.0	R	√3	1	1	8.10	8.10	∞
Test Sample Related								
Device Holder	2.54	N	1	1	1	2.54	2.54	3
Test dample Positioning	0.5	N	1	1	1	0.50	0.50	63
Power Drift	5.0	R	√3	1	1	2.89	2.89	∞
Phantom and Setup								
Phantom Uncertainty	7.9	R	√3	1	1	4.56	4.56	∞
Liquid Conductivity (target)	5.0	R	√3	0.64	0.43	1.85	1.24	∞
Liquid Conductivity (meas..)	2.5	N	1	0.64	0.43	1.60	1.08	∞
Liquid Permittivity (target)	5.00	R	√3	0.6	0.49	1.73	1.41	∞
Liquid Permittivity (meas..)	0.4	N	1	0.6	0.49	0.24	0.20	∞
Combined Std. Uncertainty	$U_c' = \sqrt{\sum_{i=1}^{23} Ci^2 Ui^2}$	RSS				13.80	13.70	
Expanded STD Uncertainty	$U_c = 2U_c'$					27.60	27.40	

17. MAIN TEST INSTRUMENTS

Table 17-1: List of Main Instruments

No.	Name	Type	Serial Number	Software version	Hardware version	Calibration Date	Valid Period
01	DAE	DAE4	1329	--	--	2023-07-25	2024-07-24
02	Probe	EX3DV4	7633	--	--	2023-04-28	2024-04-27
03	Power Meter	N1914A	MY50001660	--	--	2023-05-29	2024-06-28
04	Radio Communication Analyzer	CMW500	109616	--	--	2023-05-29	2024-06-28
05	Signal Generator	N5181A	MY50143363	--	--	2023-05-29	2024-06-28
06	Power Sensor	E8481H	MY51020011	--	--	2023-05-29	2024-06-28
07	Power Amplifier	ZHL	QA1202003	--	--	2023-05-29	2024-06-28
08	Network Analyzer	E5071C	MY46212462	A.10.0x	8.0	2023-05-29	2024-06-28
09	D835V2	Dipole	4d135	--	--	2020-10-16	2023-10-15
10	D1750V2	Dipole	1063	--	--	2020-10-15	2023-10-14
11	D1900V2	Dipole	5d153	--	--	2020-10-14	2023-10-13
12	D2450V2	Dipole	886	--	--	2020-10-13	2023-10-12
13	D2600V2	Dipole	1045	--	--	2020-10-13	2023-10-12
14	D5GHz	Dipole	1172	--	--	2022-03-15	2025-03-14

*****END OF REPORT BODY*****

ANNEX A. GRAPH RESULTS

GSM 850 Right Cheek Mode High

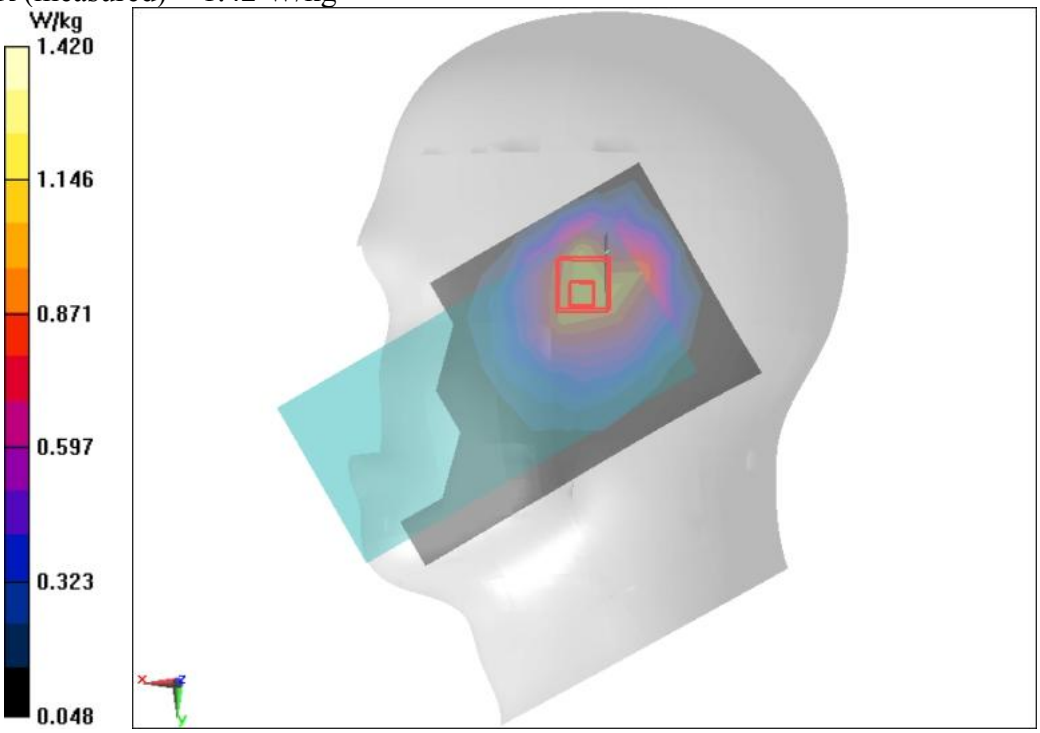
Date/Time: 2023/9/14
Electronics: DAE4 Sn1329
Medium parameters used: f = 849 MHz; σ = 0.922 S/m; ε_r = 40.492; ρ = 1000 kg/m^3
Ambient Temperature:21.4°C Liquid Temperature:20.3°C
Communication System: Generic GSM 900MHz; Frequency: 848.8 MHz; Duty Cycle: 1:8.3
Probe: EX3DV4 - SN7633ConvF(10.66, 10.66, 10.66) @ 848.8 MHz

GSM 850 Right Cheek Mode High/Area Scan (11x6x1):

Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.05 W/kg

GSM 850 Right Cheek Mode High/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 34.31 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 1.81 W/kg
SAR(1 g) = 0.892 W/kg; SAR(10 g) = 0.611 W/kg
Maximum of SAR (measured) = 1.42 W/kg



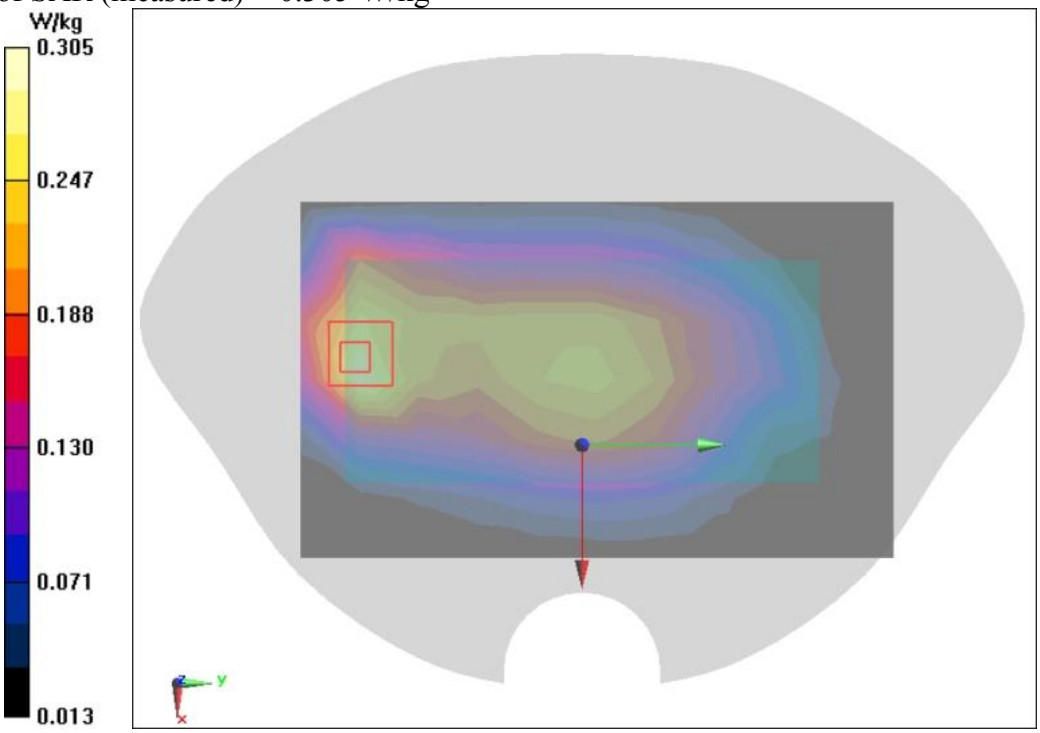
A.1

GSM 850 GPRS 2TS Back Mode Middle 10mm

Date/Time: 2023/9/14
Electronics: DAE4 Sn1329
Medium parameters used: f = 837 MHz; σ = 0.923 S/m; ε_r = 40.532; ρ = 1000 kg/m^3
Ambient Temperature:21.4°C Liquid Temperature:20.3°C
Communication System: GSM 900MHz GPRS 2TS (0); Frequency: 836.6 MHz; Duty Cycle: 1:4
Probe: EX3DV4 - SN7633ConvF(10.66, 10.66, 10.66) @ 836.6 MHz

GSM 850 GPRS 2TS Back Mode Middle 10mm/Area Scan (7x11x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.288 W/kg

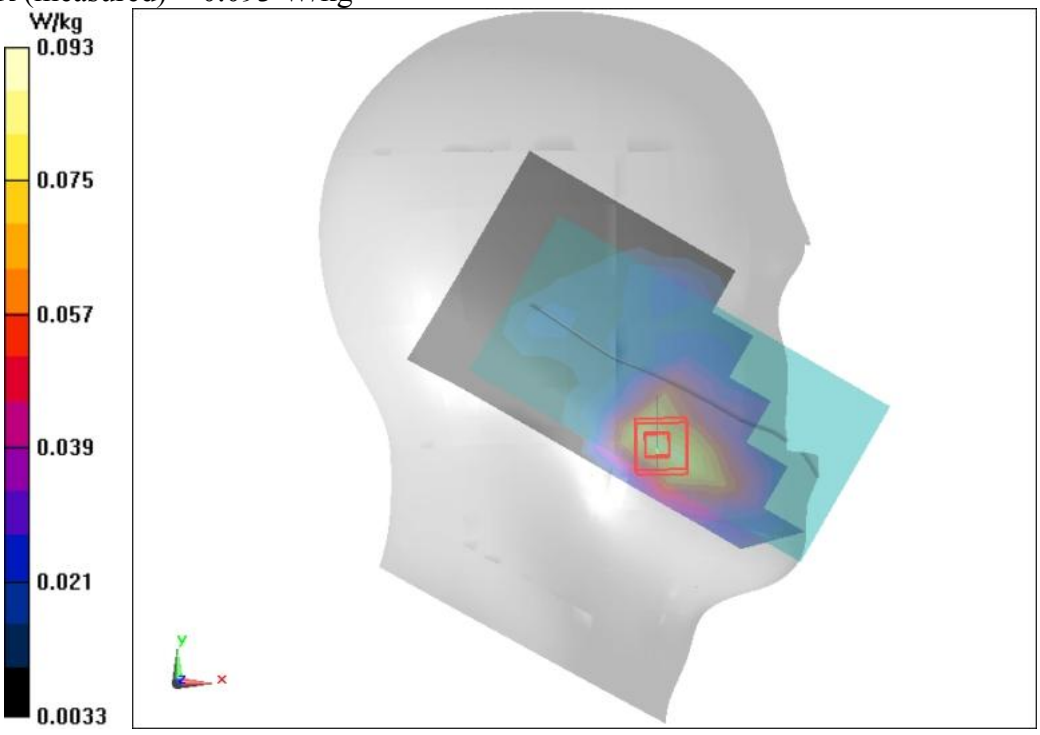
GSM 850 GPRS 2TS Back Mode Middle 10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.40 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.377 W/kg
SAR(1 g) = 0.210 W/kg; SAR(10 g) = 0.130 W/kg
Maximum value of SAR (measured) = 0.305 W/kg



A.2

GSM 1900 Left Cheek Mode Middle

Date/Time: 2023/9/8
Electronics: DAE4 Sn1329
Medium parameters used: f = 1880 MHz; σ = 1.404 S/m; ε_r = 38.594; ρ = 1000 kg/m^3
Ambient Temperature:21.4°C Liquid Temperature:20.2°C
Communication System: GSM Professional 1900MHz; Frequency: 1880 MHz; Duty Cycle: 1:8.3
Probe: EX3DV4 - SN7633ConvF(8.67, 8.67, 8.67) @ 1880 MHz
GSM 1900 Left Cheek Mode Middle/Area Scan (11x6x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.0839 W/kg
GSM 1900 Left Cheek Mode Middle/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.033 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.108 W/kg
SAR(1 g) = 0.068 W/kg; SAR(10 g) = 0.043 W/kg
Maximum of SAR (measured) = 0.093 W/kg



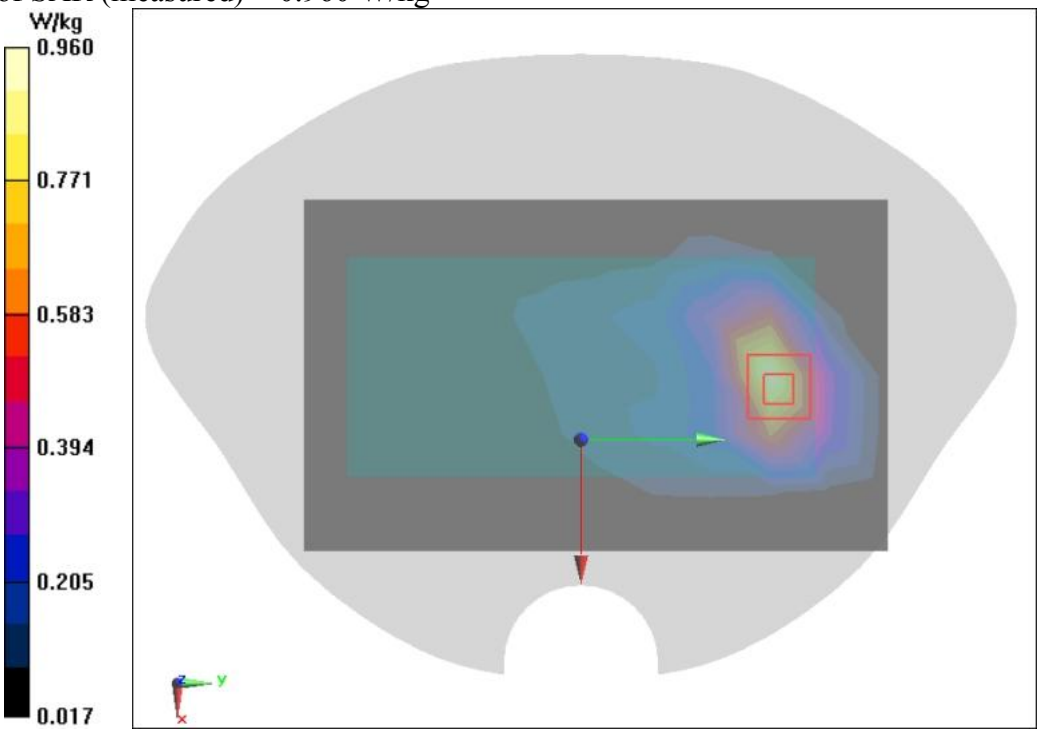
A.3

GSM 1900 GPRS 4TS Back Mode High 10mm

Date/Time: 2023/9/8
Electronics: DAE4 Sn1329
Medium parameters used: f = 1910 MHz; σ = 1.422 S/m; ε_r = 38.542; ρ = 1000 kg/m^3
Ambient Temperature:21.4°C Liquid Temperature:20.2°C
Communication System: GSM 1900MHz GPRS 4TS (0); Frequency: 1909.8 MHz; Duty Cycle: 1:2
Probe: EX3DV4 - SN7633ConvF(8.67, 8.67, 8.67) @ 1909.8 MHz

GSM 1900 GPRS 4TS Back Mode High 10mm/Area Scan (7x11x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.934 W/kg

GSM 1900 GPRS 4TS Back Mode High 10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.554 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 1.21 W/kg
SAR(1 g) = 0.678 W/kg; SAR(10 g) = 0.377 W/kg
Maximum value of SAR (measured) = 0.960 W/kg



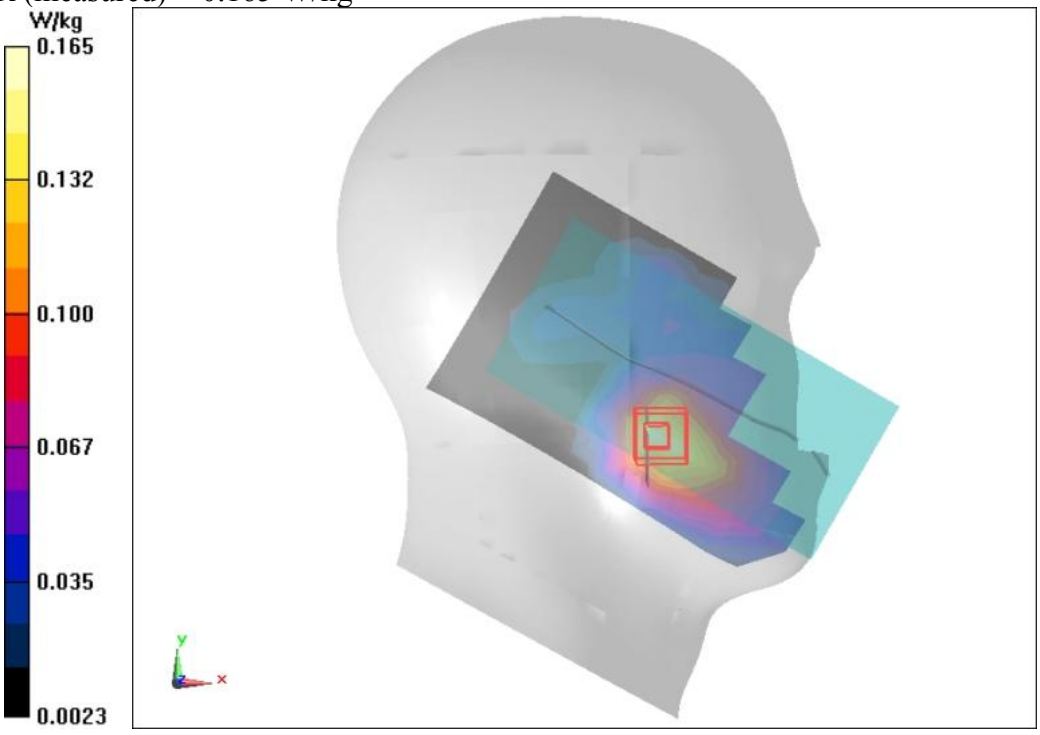
A.4

WCDMA Band Ⅱ Left Cheek Mode Middle

Date/Time: 2023/9/8
Electronics: DAE4 Sn1329
Medium parameters used: f = 1880 MHz; σ = 1.404 S/m; ε_r = 38.594; ρ = 1000 kg/m^3
Ambient Temperature:21.4°C Liquid Temperature:20.2°C
Communication System: WCDMA Band Ⅱ; Frequency: 1880 MHz; Duty Cycle: 1:1
Probe: EX3DV4 - SN7633ConvF(8.67, 8.67, 8.67) @ 1880 MHz

WCDMA Band Ⅱ Left Cheek Mode Middle/Area Scan (14x8x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.161 W/kg

WCDMA Band Ⅱ Left Cheek Mode Middle/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.827 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.195 W/kg
SAR(1 g) = 0.122 W/kg; SAR(10 g) = 0.077 W/kg
Maximum of SAR (measured) = 0.165 W/kg



A.5

WCDMA Band Ⅱ Botton Mode High 10mm

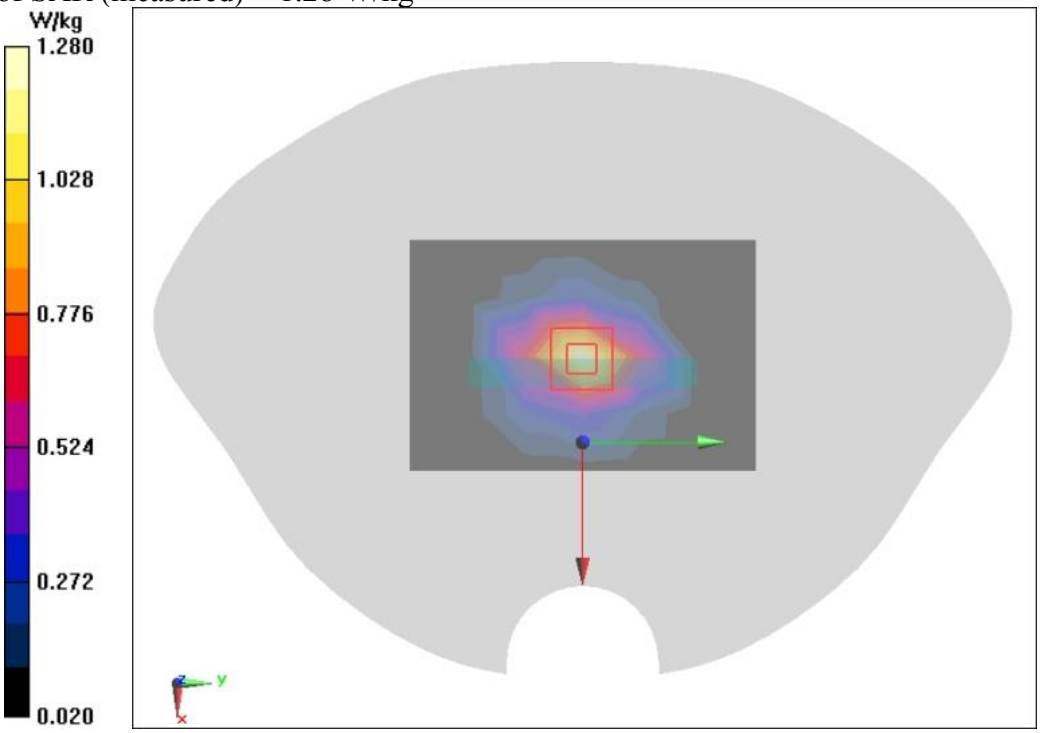
Date/Time: 2023/9/8
Electronics: DAE4 Sn1329
Medium parameters used: f = 1908 MHz; σ = 1.421 S/m; ε_r = 38.546; ρ = 1000 kg/m^3
Ambient Temperature:21.4°C Liquid Temperature:20.2°C
Communication System: WCDMA Band Ⅱ; Frequency: 1907.6 MHz; Duty Cycle: 1:1
Probe: EX3DV4 - SN7633ConvF(8.67, 8.67, 8.67) @ 1907.6 MHz

WCDMA Band Ⅱ Botton Mode High 10mm/Area Scan (5x7x1):

Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.30 W/kg

WCDMA Band Ⅱ Botton Mode High 10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 30.39 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 1.56 W/kg
SAR(1 g) = 0.872 W/kg; SAR(10 g) = 0.478 W/kg
Maximum value of SAR (measured) = 1.28 W/kg



A.6

WCDMA Band Ⅴ Right Cheek Mode Low

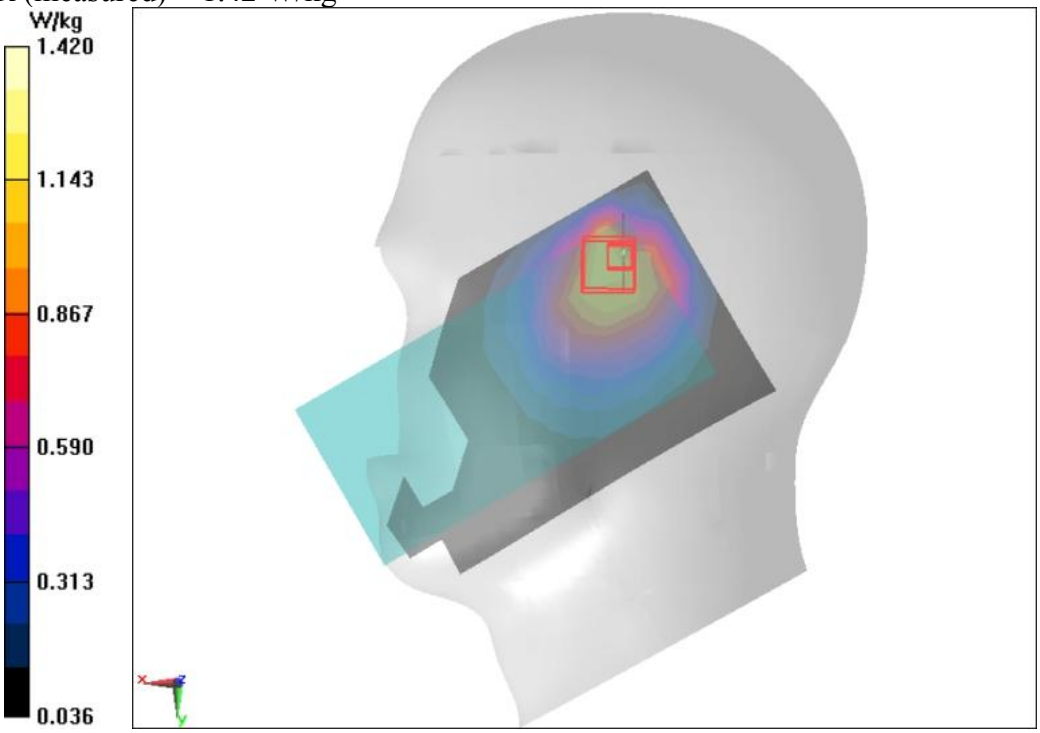
Date/Time: 2023/9/8
Electronics: DAE4 Sn1329
Medium parameters used (interpolated): f = 826.4 MHz; σ = 0.908 S/m; ε_r = 40.777; ρ = 1000 kg/m^3
Ambient Temperature:21.5°C Liquid Temperature:20.3°C
Communication System: WCDMA Band Ⅷ; Frequency: 826.4 MHz; Duty Cycle: 1:1
Probe: EX3DV4 - SN7633ConvF(10.66, 10.66, 10.66) @ 826.4 MHz

WCDMA Band Ⅴ Right Cheek Mode Low/Area Scan (14x8x1):

Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.11 W/kg

WCDMA Band Ⅴ Right Cheek Mode Low/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 33.94 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 1.79 W/kg
SAR(1 g) = 0.877 W/kg; SAR(10 g) = 0.565 W/kg
Maximum of SAR (measured) = 1.42 W/kg



A.7

WCDMA Band Ⅴ Left Mode Middle 10mm

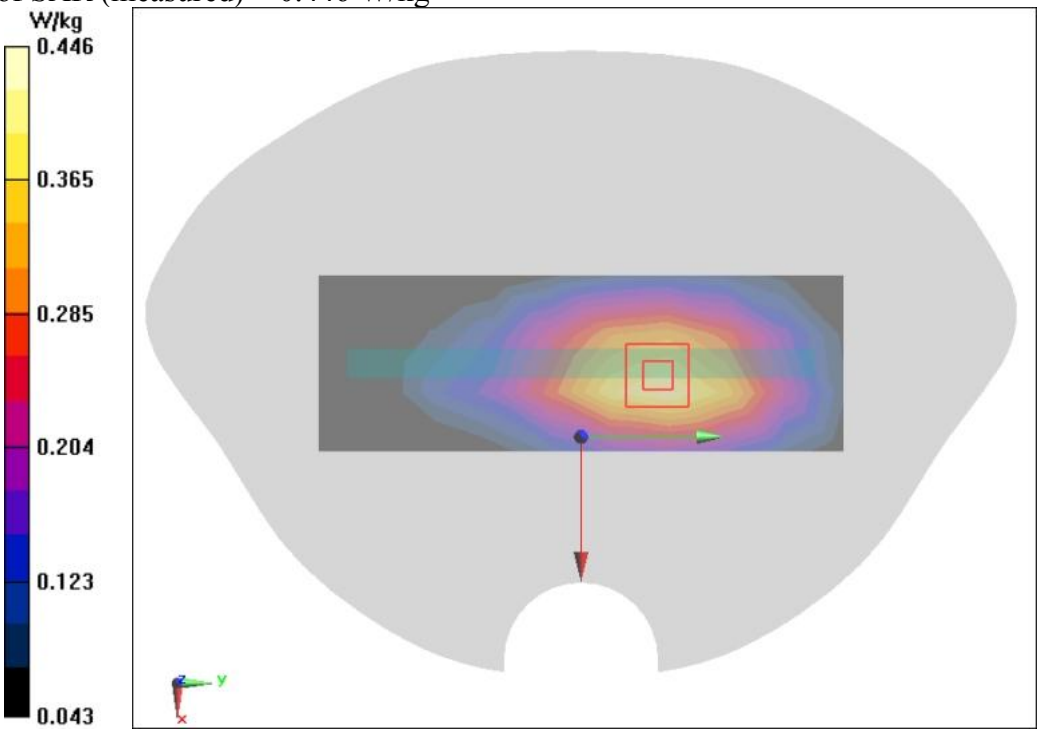
Date/Time: 2023/9/8
Electronics: DAE4 Sn1329
Medium parameters used: f = 837 MHz; σ = 0.912 S/m; ε_r = 40.742; ρ = 1000 kg/m^3
Ambient Temperature:21.5°C Liquid Temperature:20.3°C
Communication System: WCDMA Band Ⅷ; Frequency: 836.6 MHz; Duty Cycle: 1:1
Probe: EX3DV4 - SN7633ConvF(10.66, 10.66, 10.66) @ 836.6 MHz

WCDMA Band Ⅴ Left Mode Middle 10mm/Area Scan (4x10x1):

Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.426 W/kg

WCDMA Band Ⅴ Left Mode Middle 10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.65 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.511 W/kg
SAR(1 g) = 0.336 W/kg; SAR(10 g) = 0.229 W/kg
Maximum value of SAR (measured) = 0.446 W/kg



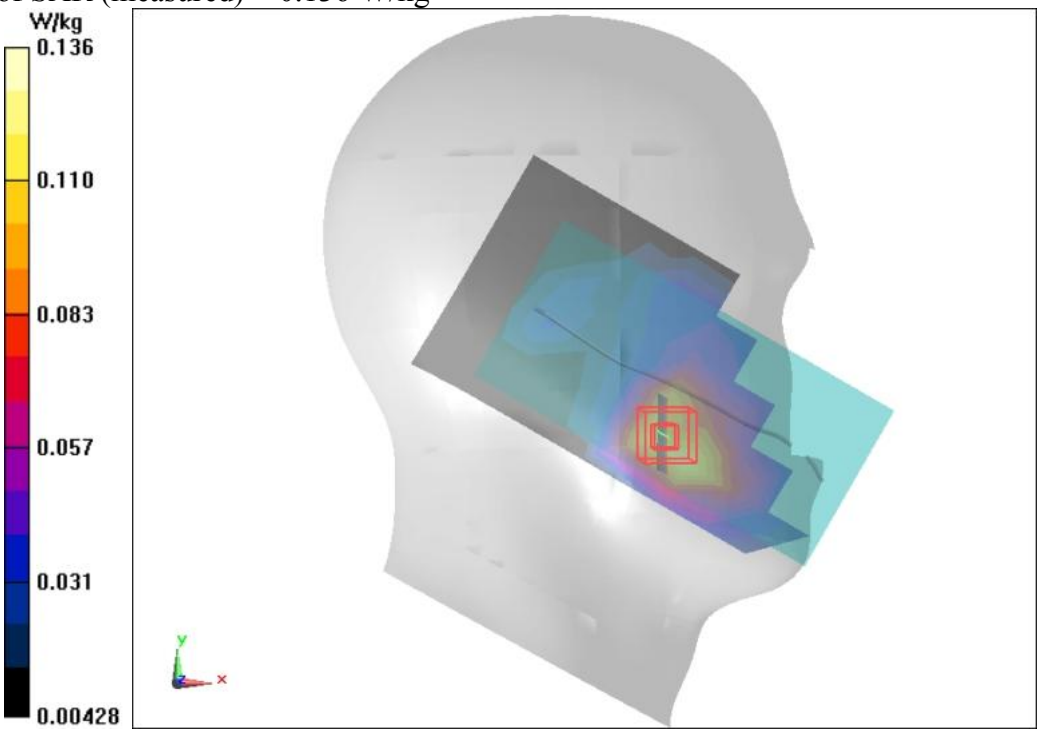
A.8

LTE B2 20MHz 50RB 50offset Left Cheek Mode Middle

Date/Time: 2023/8/25
Electronics: DAE4 Sn1329
Medium parameters used: f = 1880 MHz; σ = 1.392 S/m; ε_r = 38.695; ρ = 1000 kg/m^3
Ambient Temperature:21.6°C Liquid Temperature:20.4°C
Communication System: LTE Band 2 Professional 1900MHz; Duty Cycle: 1:1
Probe: EX3DV4 - SN7633ConvF(8.67, 8.67, 8.67) @ 1880 MHz

LTE B2 20MHz 50RB 50offset Left Cheek Mode Middle/Area Scan (11x6x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.124 W/kg

LTE B2 20MHz 50RB 50offset Left Cheek Mode Middle/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.602 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 0.163 W/kg
SAR(1 g) = 0.100 W/kg; SAR(10 g) = 0.063 W/kg
Maximum value of SAR (measured) = 0.136 W/kg



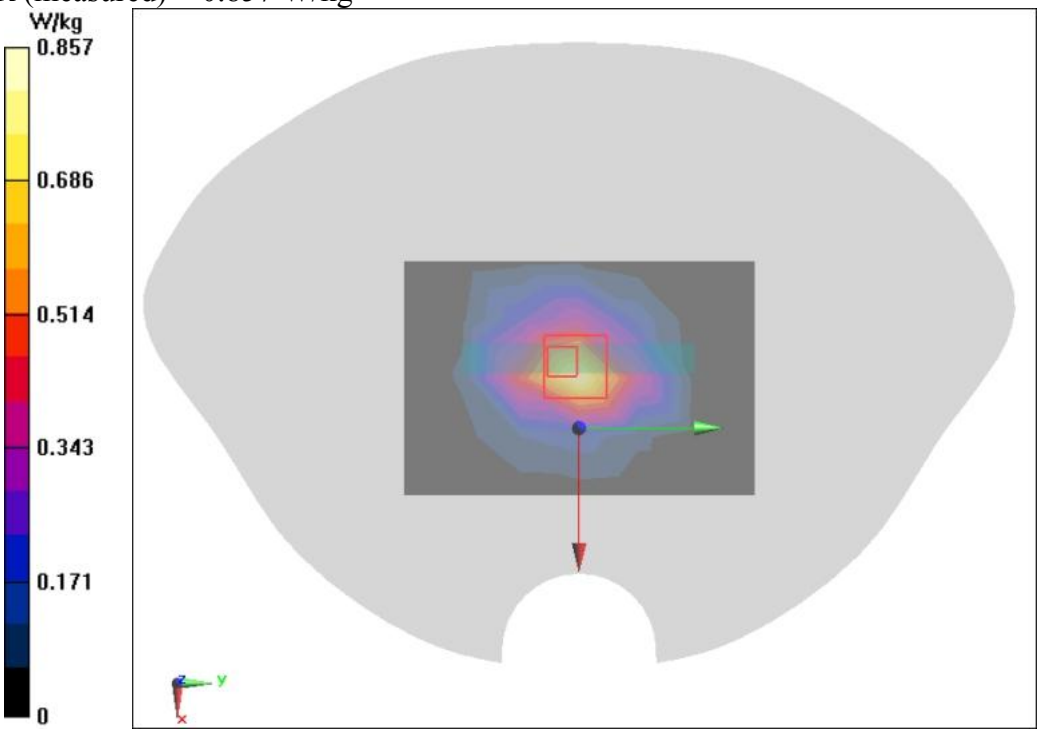
A.9

LTE B2 20MHz 1RB 50offset Bottom Mode Middle 10mm

Date/Time: 2023/8/25
Electronics: DAE4 Sn1329
Medium parameters used: f = 1880 MHz; σ = 1.392 S/m; ε_r = 38.695; ρ = 1000 kg/m^3
Ambient Temperature:21.6°C Liquid Temperature:20.4°C
Communication System: LTE Band 2 Professional 1900MHz; Duty Cycle: 1:1
Probe: EX3DV4 - SN7633ConvF(8.67, 8.67, 8.67) @ 1880 MHz

LTE B2 20MHz 1RB 50offset Bottom Mode Middle 10mm/Area Scan (5x7x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.824 W/kg

LTE B2 20MHz 1RB 50offset Bottom Mode Middle 10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 25.92 V/m; Power Drift = -0.17 dB
Peak SAR (extrapolated) = 1.36 W/kg
SAR(1 g) = 0.647 W/kg; SAR(10 g) = 0.338 W/kg
Maximum of SAR (measured) = 0.857 W/kg



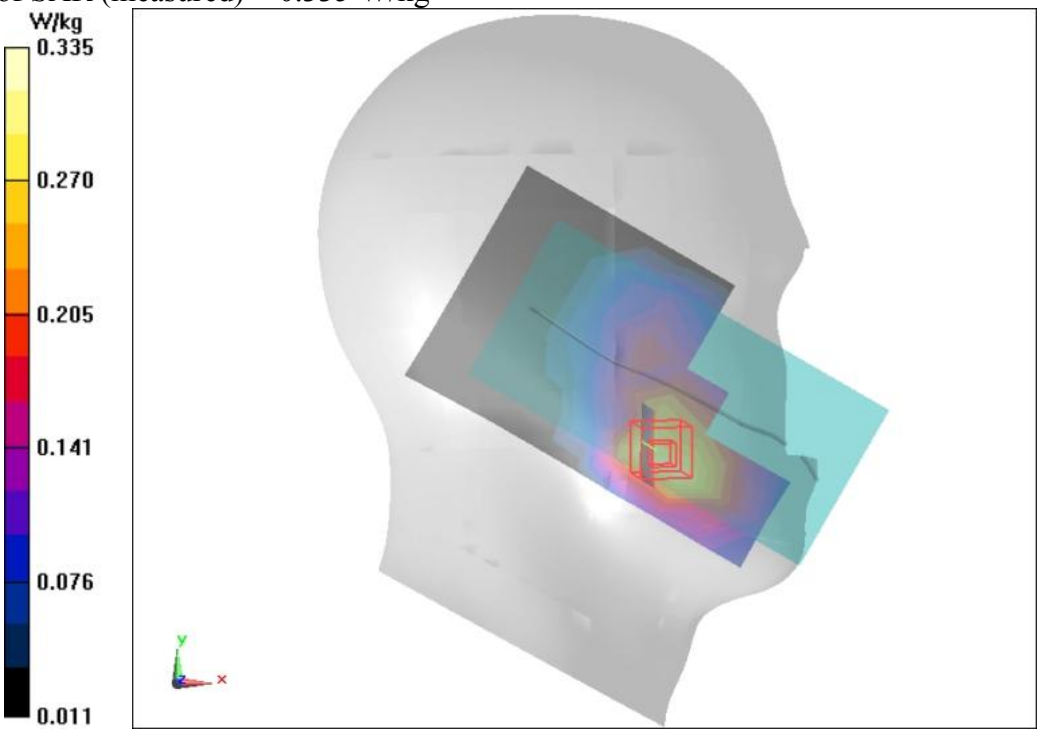
A.10

LTE B4 20MHz 1RB 50offset Left Cheek Mode Middle

Date/Time: 2023/9/11
Electronics: DAE4 Sn1329
Medium parameters used (interpolated): f = 1732.5 MHz; σ = 1.314 S/m; ε_r = 38.84; ρ = 1000 kg/m^3
Ambient Temperature:21.5°C Liquid Temperature:20.5°C
Communication System: LTE B4 1900MHz; Frequency: 1732.5 MHz; Duty Cycle: 1:1
Probe: EX3DV4 - SN7633ConvF(8.96, 8.96, 8.96) @ 1732.5 MHz

LTE B4 20MHz 1RB 50offset Left Cheek Mode Middle/Area Scan (11x6x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.310 W/kg

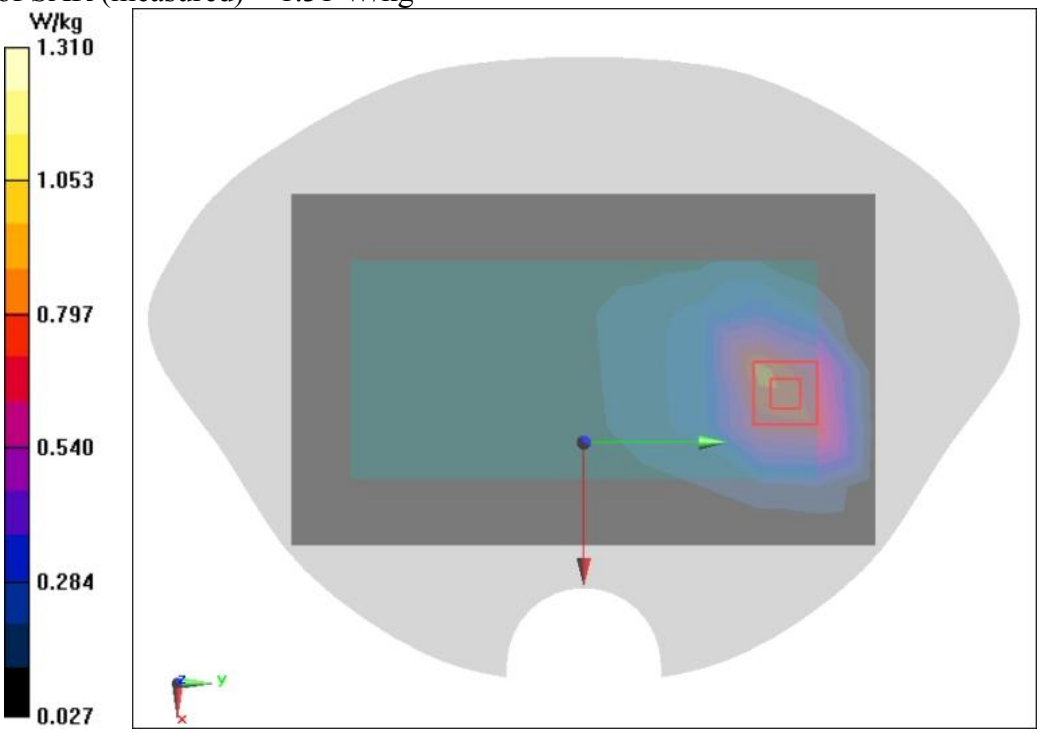
LTE B4 20MHz 1RB 50offset Left Cheek Mode Middle/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.387 W/kg
SAR(1 g) = 0.251 W/kg; SAR(10 g) = 0.164 W/kg
Maximum value of SAR (measured) = 0.335 W/kg



A.11

LTE B4 20MHz 1RB 50offset Back Mode Middle 10mm

Date/Time: 2023/9/11
Electronics: DAE4 Sn1329
Medium parameters used (interpolated): f = 1732.5 MHz; σ = 1.314 S/m; ε_r = 38.84; ρ = 1000 kg/m^3
Ambient Temperature:21.5°C Liquid Temperature:20.5°C
Communication System: LTE B4 1900MHz; Frequency: 1732.5 MHz; Duty Cycle: 1:1
Probe: EX3DV4 - SN7633ConvF(8.96, 8.96, 8.96) @ 1732.5 MHz
LTE B4 20MHz 1RB 50offset Back Mode Middle 10mm/Area Scan (7x11x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.848 W/kg
LTE B4 20MHz 1RB 50offset Back Mode Middle 10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.136 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 1.53 W/kg
SAR(1 g) = 0.904 W/kg; SAR(10 g) = 0.508 W/kg
Maximum value of SAR (measured) = 1.31 W/kg



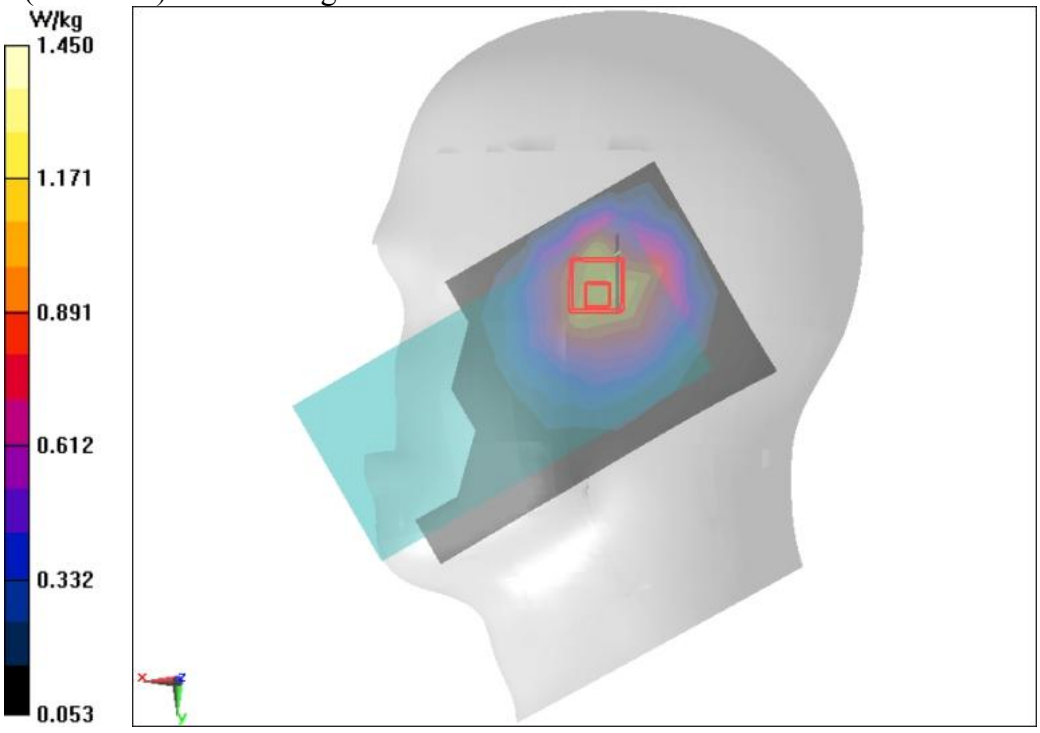
A.12

LTE B5 10MHz 1RB 25offset Right Cheek Mode Low

Date/Time: 2023/8/25
Electronics: DAE4 Sn1329
Medium parameters used: f = 829 MHz; σ = 0.914 S/m; ε_r = 40.659; ρ = 1000 kg/m^3
Ambient Temperature:21.5°C Liquid Temperature:20.4°C
Communication System: LTE B5 900MHz; Frequency: 829 MHz; Duty Cycle: 1:1
Probe: EX3DV4 - SN7633ConvF(10.66, 10.66, 10.66) @ 829 MHz

LTE B5 10MHz 1RB 25offset Right Cheek Mode Low/Area Scan (11x6x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.12 W/kg

LTE B5 10MHz 1RB 25offset Right Cheek Mode Low/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 35.30 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 1.83 W/kg
SAR(1 g) = 0.945 W/kg; SAR(10 g) = 0.649 W/kg
Maximum of SAR (measured) = 1.45 W/kg



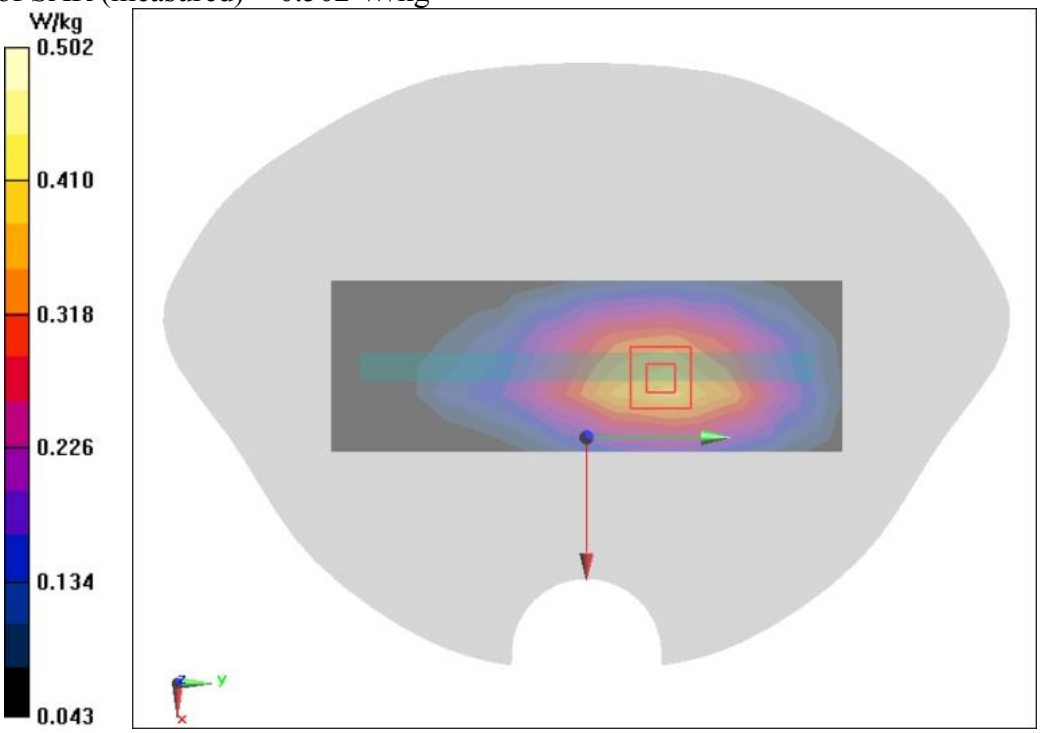
A.13

LTE B5 10MHz 1RB 25offset Left Mode Middle 10mm

Date/Time: 2023/8/25
Electronics: DAE4 Sn1329
Medium parameters used: f = 837 MHz; σ = 0.917 S/m; ε_r = 40.633; ρ = 1000 kg/m^3
Ambient Temperature:21.5°C Liquid Temperature:20.4°C
Communication System: LTE B5 900MHz; Frequency: 836.5 MHz; Duty Cycle: 1:1
Probe: EX3DV4 - SN7633ConvF(10.66, 10.66, 10.66) @ 836.5 MHz

LTE B5 10MHz 1RB 25offset Left Mode Middle 10mm/Area Scan (4x10x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.522 W/kg

LTE B5 10MHz 1RB 25offset Left Mode Middle 10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.32 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.613 W/kg
SAR(1 g) = 0.409 W/kg; SAR(10 g) = 0.287 W/kg
Maximum value of SAR (measured) = 0.502 W/kg



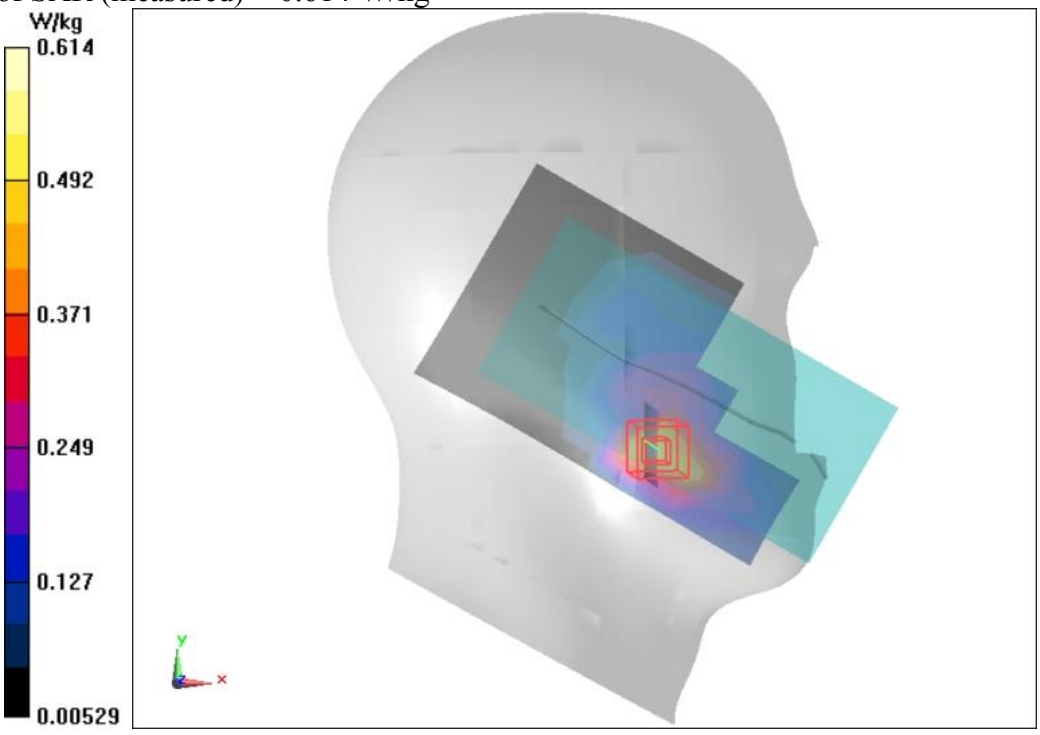
A.14

LTE B7 20MHz 1RB 50offset Left Cheek Mode Middle

Date/Time: 2023/8/28
Electronics: DAE4 Sn1329
Medium parameters used (interpolated): f = 2535 MHz; σ = 1.917 S/m; ε_r = 37.653; ρ = 1000 kg/m^3
Ambient Temperature:21.4°C Liquid Temperature:20.2°C
Communication System: LTE B7 2500MHz; Frequency: 2535 MHz; Duty Cycle: 1:1
Probe: EX3DV4 - SN7633ConvF(8.07, 8.07, 8.07) @ 2535 MHz

LTE B7 20MHz 1RB 50offset Left Cheek Mode Middle/Area Scan (11x6x1):
Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 0.582 W/kg

LTE B7 20MHz 1RB 50offset Left Cheek Mode Middle/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.051 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.735 W/kg
SAR(1 g) = 0.409 W/kg; SAR(10 g) = 0.220 W/kg
Maximum value of SAR (measured) = 0.614 W/kg



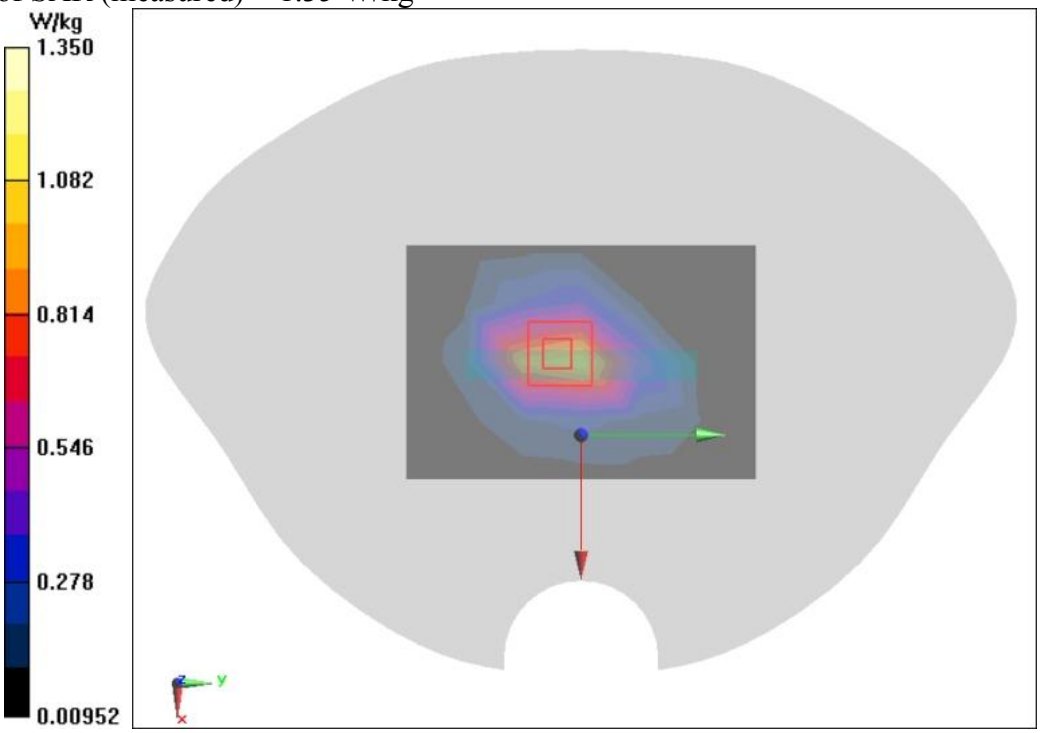
A.15

LTE B7 20MHz 1RB 50offset Bottom Mode Low 10mm

Date/Time: 2023/8/28
Electronics: DAE4 Sn1329
Medium parameters used: f = 2510 MHz; σ = 1.899 S/m; ε_r = 37.668; ρ = 1000 kg/m^3
Ambient Temperature:21.4°C Liquid Temperature:20.2°C
Communication System: LTE B7 2500MHz; Frequency: 2510 MHz; Duty Cycle: 1:1
Probe: EX3DV4 - SN7633ConvF(8.07, 8.07, 8.07) @ 2510 MHz

LTE B7 20MHz 1RB 50offset Bottom Mode Low 10mm/Area Scan (5x7x1):
Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 1.09 W/kg

LTE B7 20MHz 1RB 50offset Bottom Mode Low 10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 24.96 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 1.67 W/kg
SAR(1 g) = 0.846 W/kg; SAR(10 g) = 0.424 W/kg
Maximum value of SAR (measured) = 1.35 W/kg



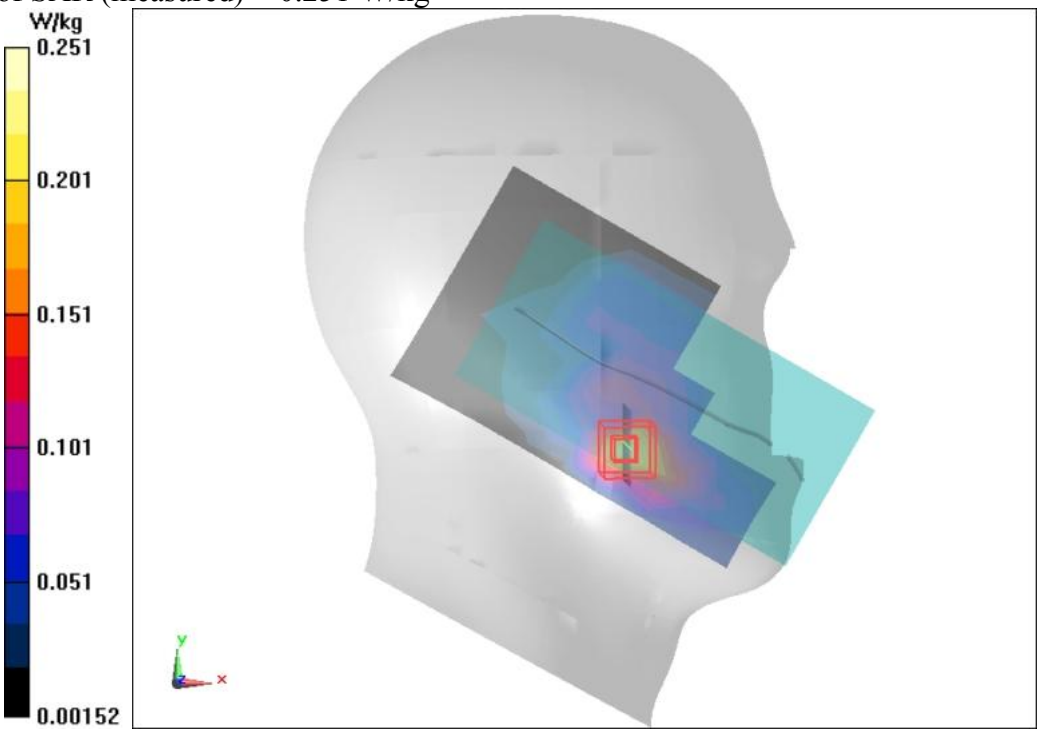
A.16

LTE B41 20MHz 1RB 50offset Left Cheek Mode Middle

Date/Time: 2023/8/28
Electronics: DAE4 Sn1329
Medium parameters used (interpolated): f = 2593 MHz; σ = 1.96 S/m; ε_r = 37.487; ρ = 1000 kg/m^3
Ambient Temperature:21.4°C Liquid Temperature:20.2°C
Communication System: LTE B41 2500MHz; Frequency: 2593 MHz; Duty Cycle: 1:1
Probe: EX3DV4 - SN7633ConvF(7.86, 7.86, 7.86) @ 2593 MHz

LTE B41 20MHz 1RB 50offset Left Cheek Mode Middle/Area Scan (11x6x1):
Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 0.239 W/kg

LTE B41 20MHz 1RB 50offset Left Cheek Mode Middle/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.456 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 0.308 W/kg
SAR(1 g) = 0.163 W/kg; SAR(10 g) = 0.084 W/kg
Maximum value of SAR (measured) = 0.251 W/kg



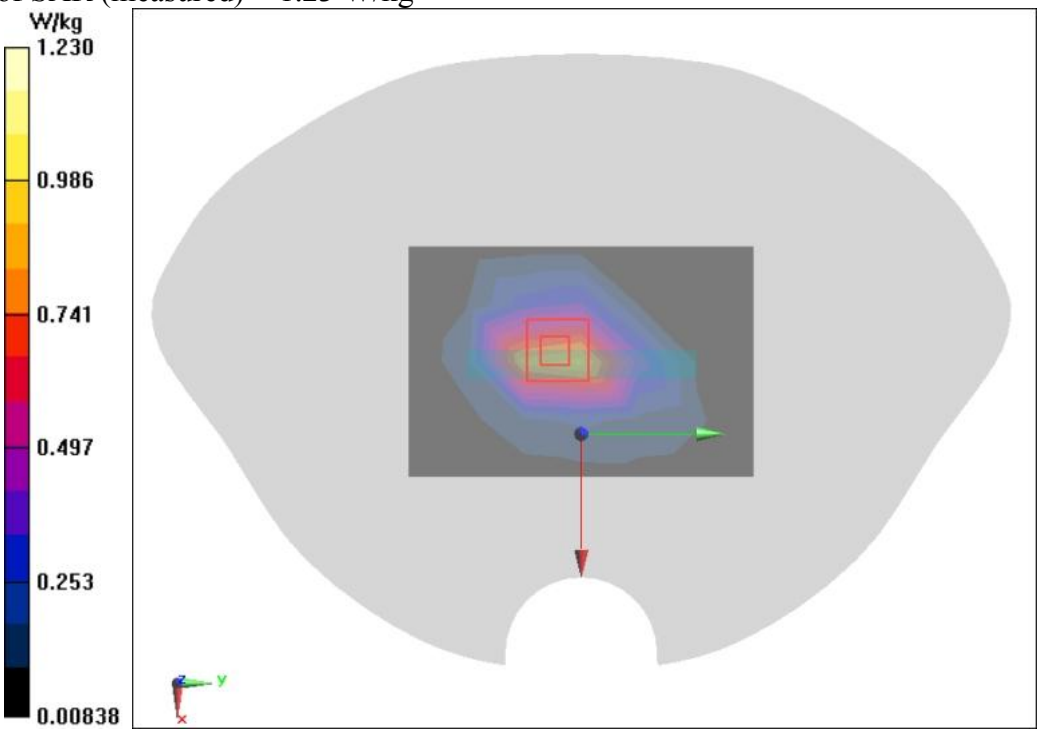
A.17

LTE B41 20MHz 1RB 50offset Bottom Mode Low 10mm

Date/Time: 2023/8/28
Electronics: DAE4 Sn1329
Medium parameters used: f = 2506 MHz; σ = 1.897 S/m; ε_r = 37.672; ρ = 1000 kg/m^3
Ambient Temperature:21.4°C Liquid Temperature:20.2°C
Communication System: LTE B41 2500MHz; Frequency: 2506 MHz; Duty Cycle: 1:1
Probe: EX3DV4 - SN7633ConvF(8.07, 8.07, 8.07) @ 2506 MHz

LTE B41 20MHz 1RB 50offset Bottom Mode Low 10mm/Area Scan (5x7x1):
Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 0.946 W/kg

LTE B41 20MHz 1RB 50offset Bottom Mode Low 10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 23.97 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 1.50 W/kg
SAR(1 g) = 0.762 W/kg; SAR(10 g) = 0.381 W/kg
Maximum value of SAR (measured) = 1.23 W/kg



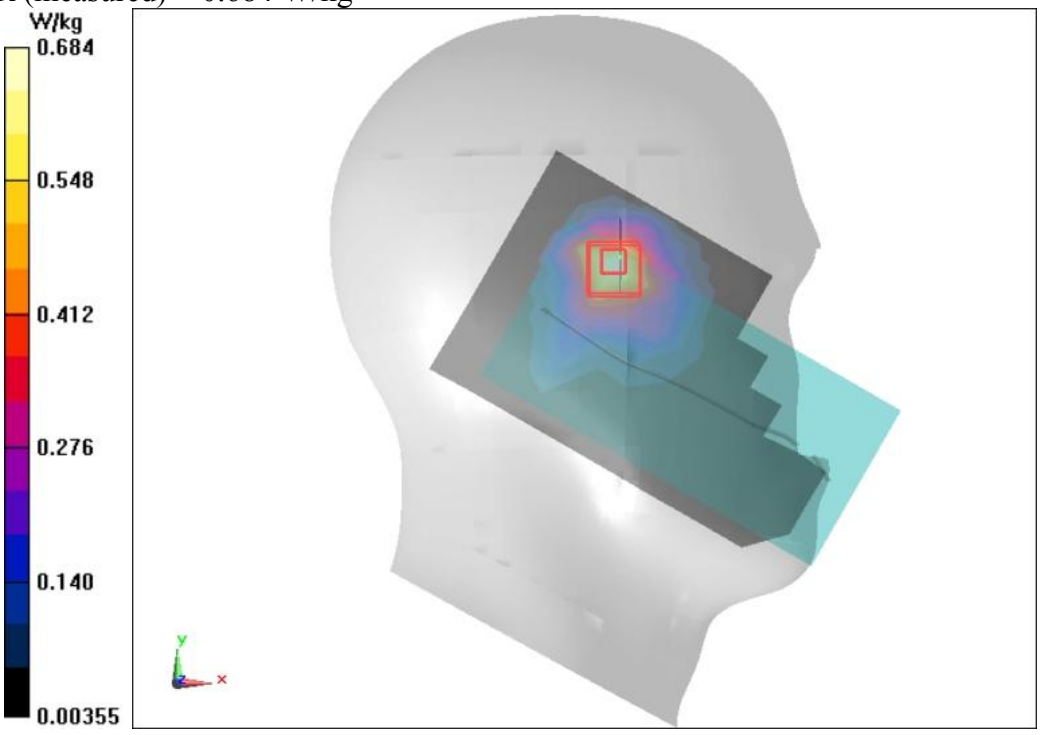
A.18

Wi-Fi 2.4G 802.11b Left Cheek Mode Middle

Date/Time: 2023/8/25
Electronics: DAE4 Sn1329
Medium parameters used: f = 2462 MHz; σ = 1.869 S/m; ε_r = 37.781; ρ = 1000 kg/m^3
Ambient Temperature:21.5°C Liquid Temperature:20.4°C
Communication System: Wifi 2450 2450MHz; Frequency: 2462 MHz; Duty Cycle: 1:1
Probe: EX3DV4 - SN7633ConvF(8.07, 8.07, 8.07) @ 2462 MHz

Wi-Fi 2.4G 802.11b Left Cheek Mode Middle/Area Scan (14x8x1):
Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 0.756 W/kg

Wi-Fi 2.4G 802.11b Left Cheek Mode Middle/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.28 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 0.926 W/kg
SAR(1 g) = 0.465 W/kg; SAR(10 g) = 0.238 W/kg
Maximum of SAR (measured) = 0.684 W/kg



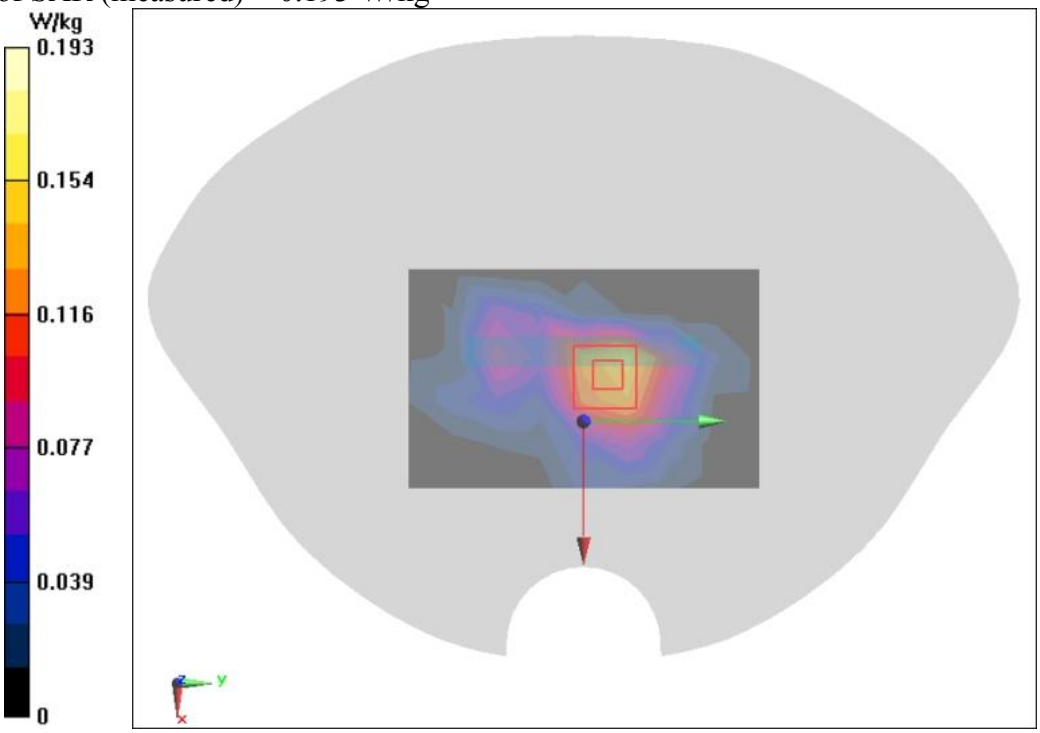
A.19

Wi-Fi 5G 802.11a Top Mode Middle 10mm

Date/Time: 2023/8/28
Electronics: DAE4 Sn1329
Medium parameters used: f = 5260 MHz; σ = 4.57 S/m; ε_r = 34.943; ρ = 1000 kg/m^3
Ambient Temperature:21.3°C Liquid Temperature:20.2°C
Communication System: 5GHz U-NII-2A 5GHz; Frequency: 5260 MHz; Duty Cycle: 1:1
Probe: EX3DV4 - SN7633ConvF(5.72, 5.72, 5.72) @ 5260 MHz

Wi-Fi 5G 802.11a Top Mode Middle 10mm/Area Scan (6x9x1):
Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.163 W/kg

Wi-Fi 5G 802.11a Top Mode Middle 10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 7.564 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.467 W/kg
SAR(1 g) = 0.085 W/kg; SAR(10 g) = 0.033 W/kg
Maximum value of SAR (measured) = 0.193 W/kg

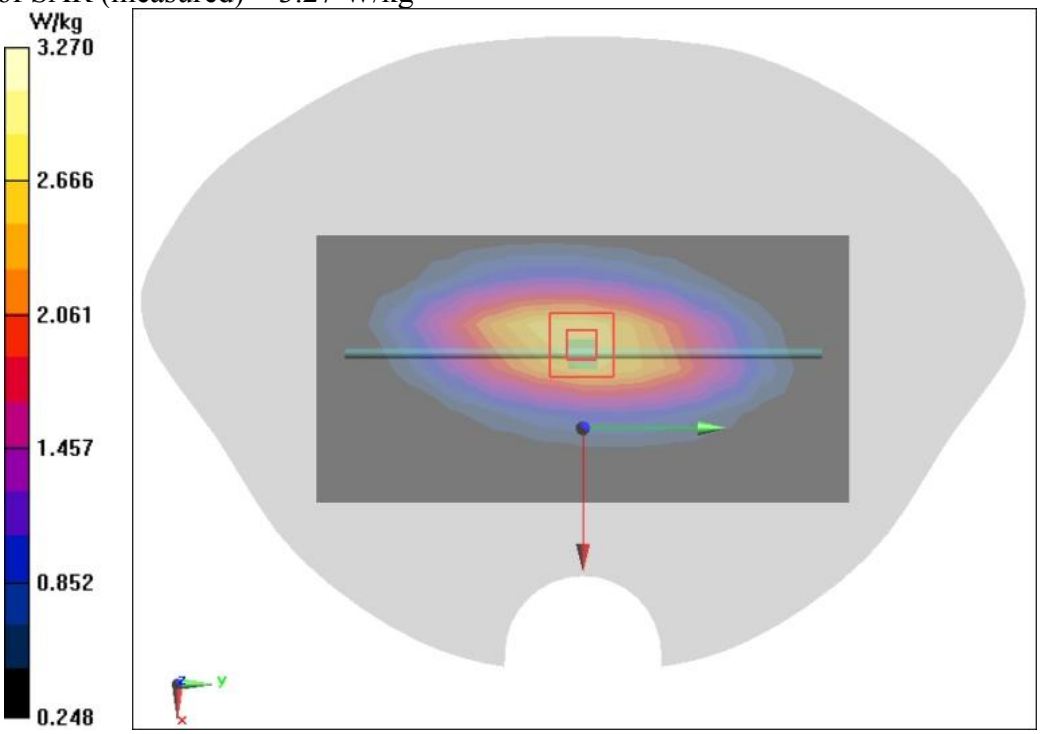


A.20

ANNEX B. SYSTEM VALIDATION RESULTS

System Check Head 835MHz

Date/Time: 2023/8/25
Electronics: DAE4 Sn1329
Medium parameters used: f = 835 MHz; σ = 0.916 S/m; ε_r = 40.64; ρ = 1000 kg/m^3
Ambient Temperature:21.5°C Liquid Temperature:20.4°C
Communication System: CW 900MHz; Frequency: 835 MHz; Duty Cycle: 1:1
Probe: EX3DV4 - SN7633ConvF(10.66, 10.66, 10.66) @ 835 MHz
System Check Head 835MHz/Area Scan (7x13x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.72 W/kg
System Check Head 835MHz/Zoom Scan (7x7x7) (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 61.04 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 3.76 W/kg
SAR(1 g) = 2.39 W/kg; SAR(10 g) = 1.55 W/kg
Maximum value of SAR (measured) = 3.27 W/kg



B.1

System Check Head 835MHz

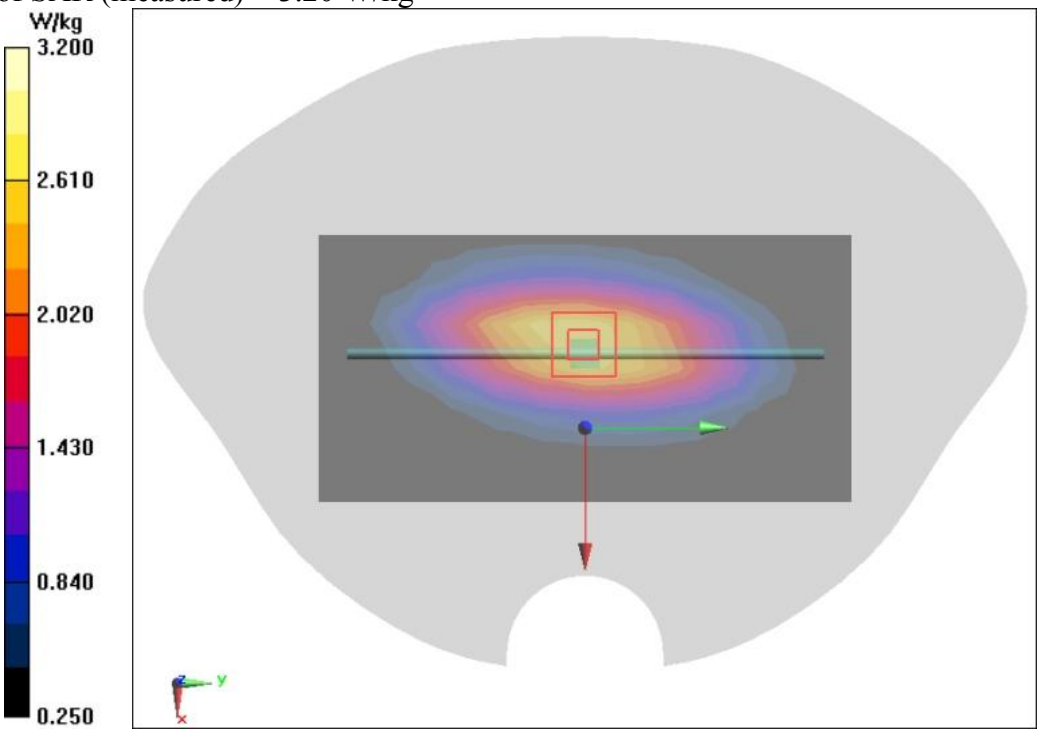
Date/Time: 2023/9/8
Electronics: DAE4 Sn1329
Medium parameters used: f = 835 MHz; σ = 0.911 S/m; ε_r = 40.749; ρ = 1000 kg/m^3
Ambient Temperature:21.3°C Liquid Temperature:20.2°C
Communication System: CW 700-1000MHz; Frequency: 835 MHz; Duty Cycle: 1:1
Probe: EX3DV4 - SN7633ConvF(10.66, 10.66, 10.66) @ 835 MHz

System Check Head 835MHz/Area Scan (7x13x1):

Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.67 W/kg

System Check Head 835MHz/Zoom Scan (7x7x7) (5x5x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 58.85 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 3.69 W/kg
SAR(1 g) = 2.33 W/kg; SAR(10 g) = 1.52 W/kg
Maximum value of SAR (measured) = 3.20 W/kg



B.2

System Check Head 835MHz

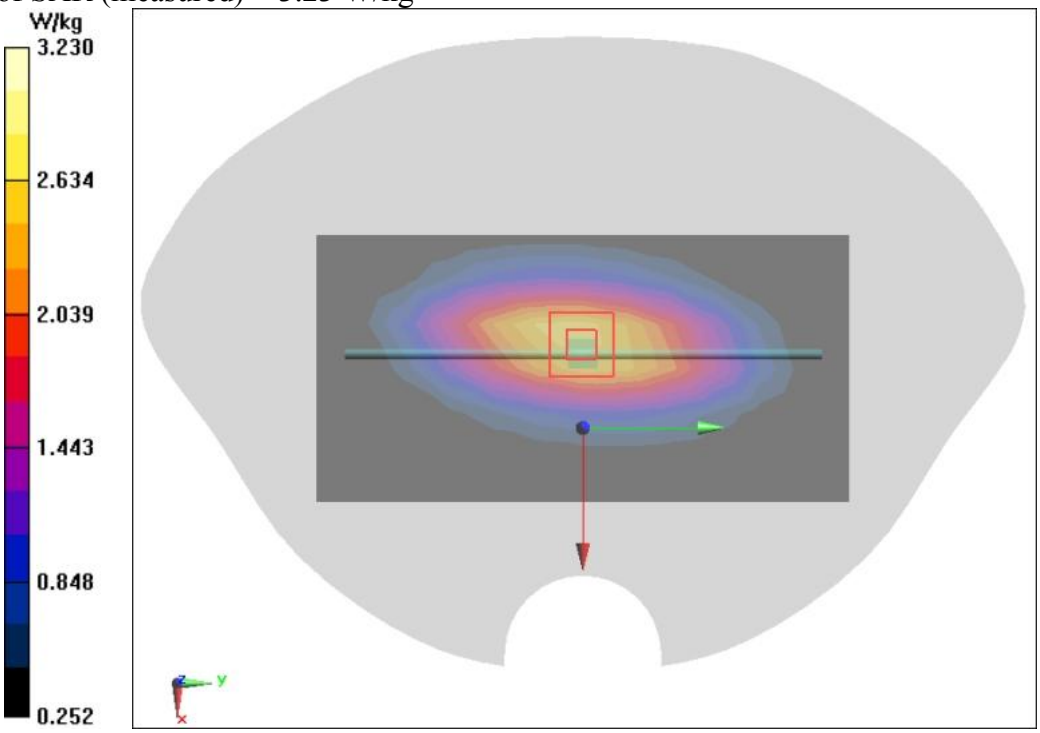
Date/Time: 2023/9/14
Electronics: DAE4 Sn1329
Medium parameters used: f = 835 MHz; σ = 0.922 S/m; ε_r = 40.539; ρ = 1000 kg/m^3
Ambient Temperature:21.3°C Liquid Temperature:20.2°C
Communication System: CW 700-1000MHz; Frequency: 835 MHz; Duty Cycle: 1:1
Probe: EX3DV4 - SN7633ConvF(10.66, 10.66, 10.66) @ 835 MHz

System Check Head 835MHz/Area Scan (7x13x1):

Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.69 W/kg

System Check Head 835MHz/Zoom Scan (7x7x7) (5x5x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 59.01 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 3.72 W/kg
SAR(1 g) = 2.36 W/kg; SAR(10 g) = 1.53 W/kg
Maximum value of SAR (measured) = 3.23 W/kg



B.3

System Check Head 1750MHz

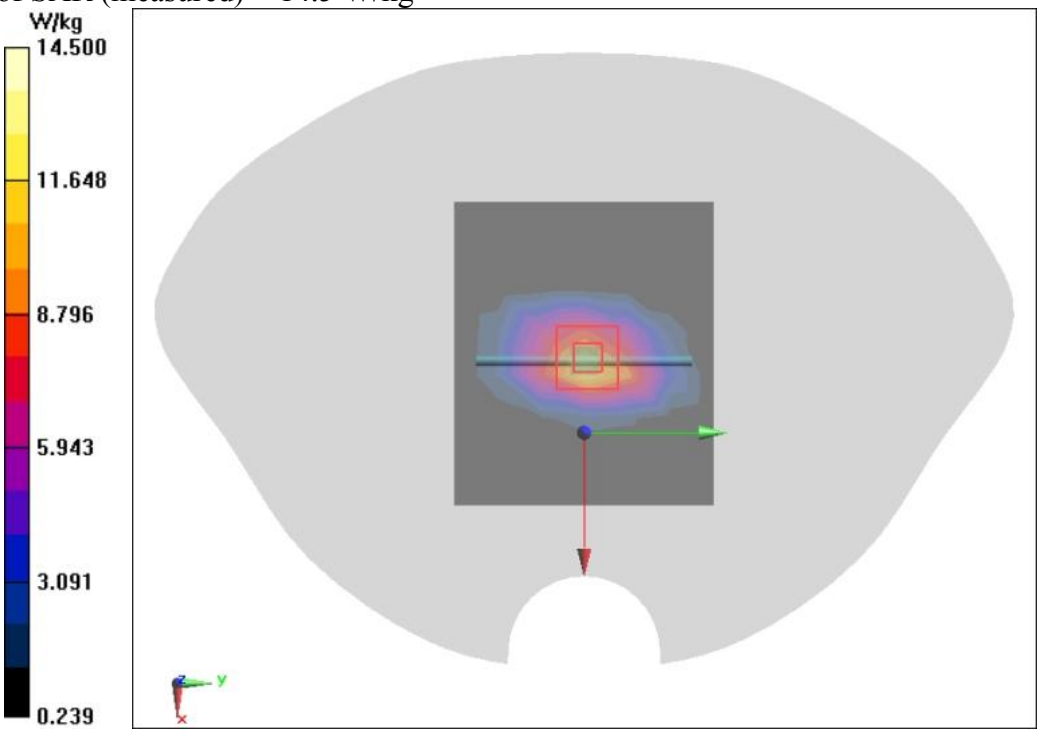
Date/Time: 2023/9/11
Electronics: DAE4 Sn1329
Medium parameters used: f = 1750 MHz; σ = 1.324 S/m; ε_r = 38.81; ρ = 1000 kg/m^3
Ambient Temperature:21.6°C Liquid Temperature:20.5°C
Communication System: CW 1750MHz; Frequency: 1750 MHz; Duty Cycle: 1:1
Probe: EX3DV4 - SN7633ConvF(8.96, 8.96, 8.96) @ 1750 MHz

System Check Head 1750MHz/Area Scan (8x7x1):

Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 11.9 W/kg

System Check Head 1750MHz/Zoom Scan (7x7x7) (5x5x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 112.9 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 17.3 W/kg
SAR(1 g) = 9.34 W/kg; SAR(10 g) = 4.91 W/kg
Maximum value of SAR (measured) = 14.5 W/kg



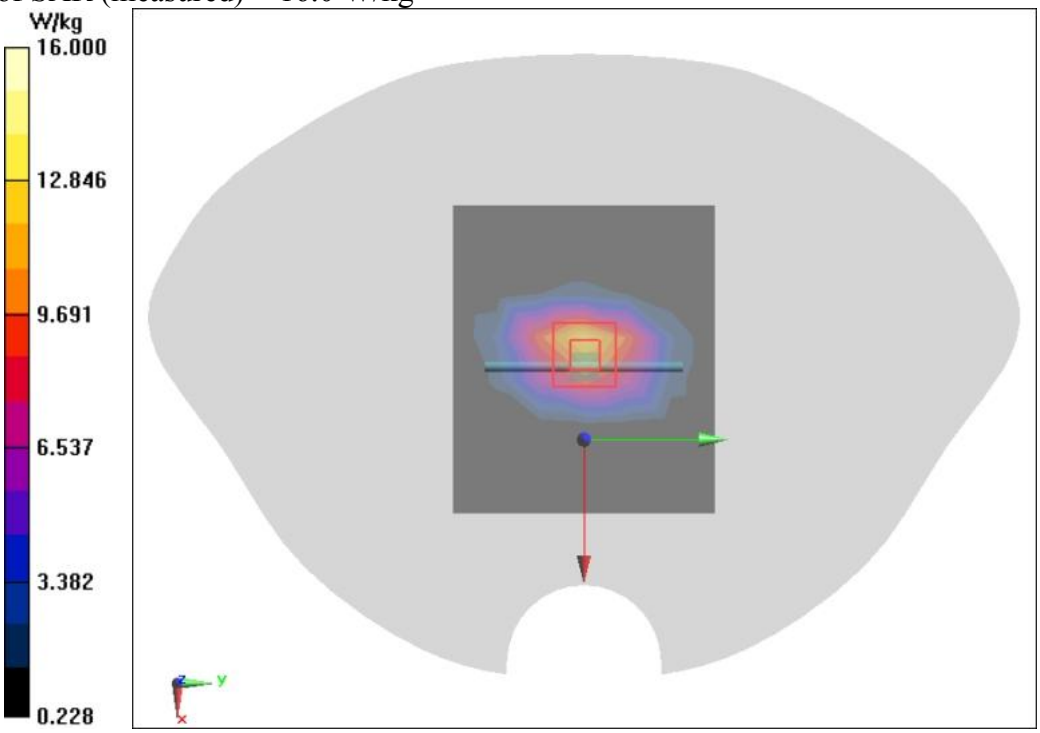
B.4

System Check Head 1900MHz

Date/Time: 2023/8/25
Electronics: DAE4 Sn1329
Medium parameters used: f = 1900 MHz; σ = 1.405 S/m; ε_r = 38.658; ρ = 1000 kg/m^3
Ambient Temperature:21.5°C Liquid Temperature:20.4°C
Communication System: CW 1900MHz; Frequency: 1900 MHz; Duty Cycle: 1:1
Probe: EX3DV4 - SN7633ConvF(8.67, 8.67, 8.67) @ 1900 MHz

System Check Head 1900MHz/Area Scan (8x7x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 13.5 W/kg

System Check Head 1900MHz/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 104.6 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 19.5 W/kg
SAR(1 g) = 10.2 W/kg; SAR(10 g) = 5.25 W/kg
Maximum value of SAR (measured) = 16.0 W/kg



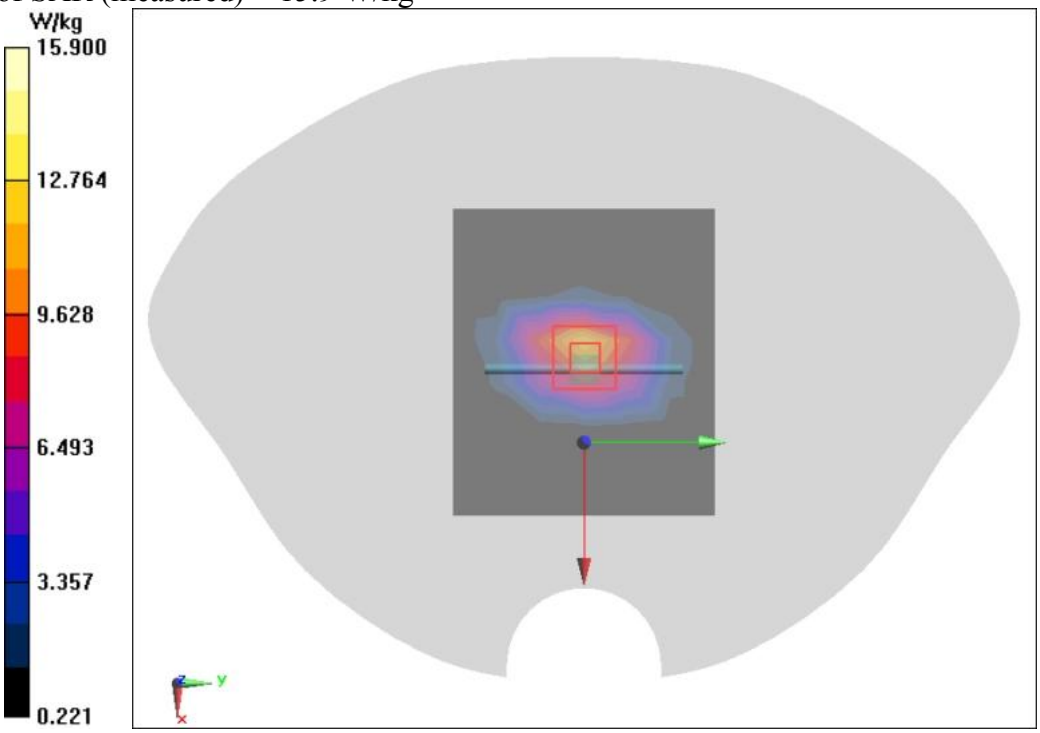
B.5

System Check Head 1900MHz

Date/Time: 2023/9/8
Electronics: DAE4 Sn1329
Medium parameters used: f = 1900 MHz; σ = 1.417 S/m; ε_r = 38.557; ρ = 1000 kg/m^3
Ambient Temperature:21.5°C Liquid Temperature:20.3°C
Communication System: CW 1900MHz; Frequency: 1900 MHz; Duty Cycle: 1:1
Probe: EX3DV4 - SN7633ConvF(8.67, 8.67, 8.67) @ 1900 MHz

System Check Head 1900MHz/Area Scan (8x7x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 12.7 W/kg

System Check Head 1900MHz/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 104.2 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 19.4 W/kg
SAR(1 g) = 10.1 W/kg; SAR(10 g) = 5.19 W/kg
Maximum value of SAR (measured) = 15.9 W/kg



B.6

System Check Head 2450MHz

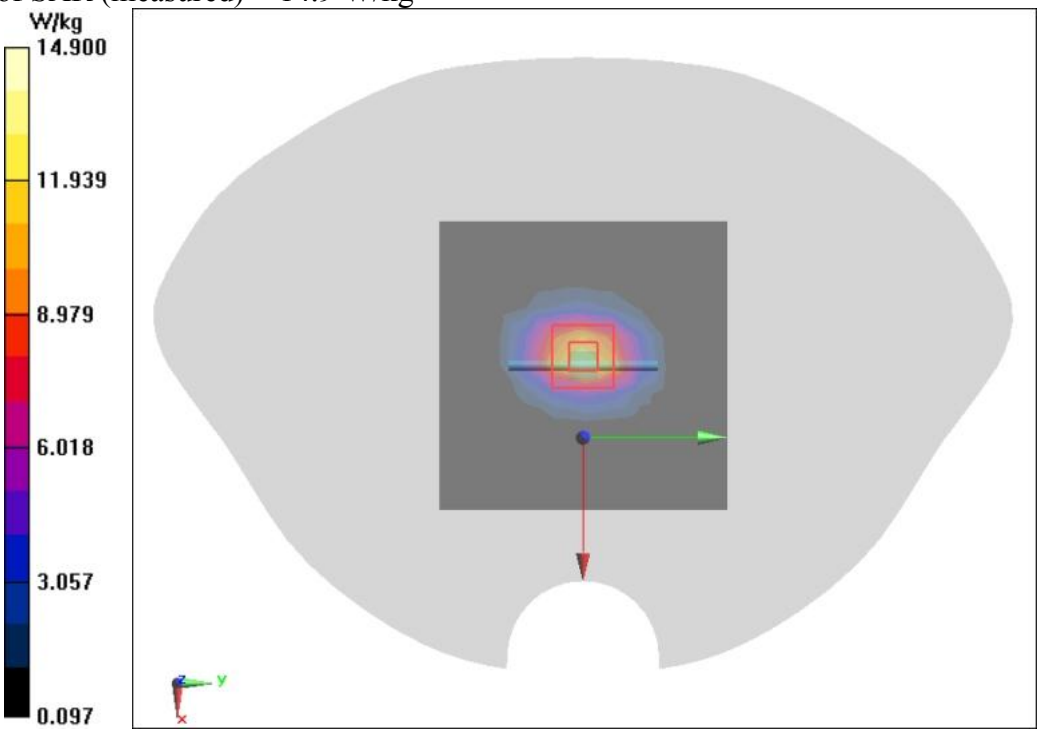
Date/Time: 2023/8/25
Electronics: DAE4 Sn1329
Medium parameters used: f = 2450 MHz; σ = 1.858 S/m; ε_r = 37.807; ρ = 1000 kg/m^3
Ambient Temperature:21.5°C Liquid Temperature:20.4°C
Communication System: CW 2450HMz; Frequency: 2450 MHz; Duty Cycle: 1:1
Probe: EX3DV4 - SN7633ConvF(8.07, 8.07, 8.07) @ 2450 MHz

System Check Head 2450MHz/Area Scan (11x11x1):

Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 13.8 W/kg

System Check Head 2450MHz/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 86.45 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 27.8 W/kg
SAR(1 g) = 13.1 W/kg; SAR(10 g) = 6.04 W/kg
Maximum value of SAR (measured) = 14.9 W/kg



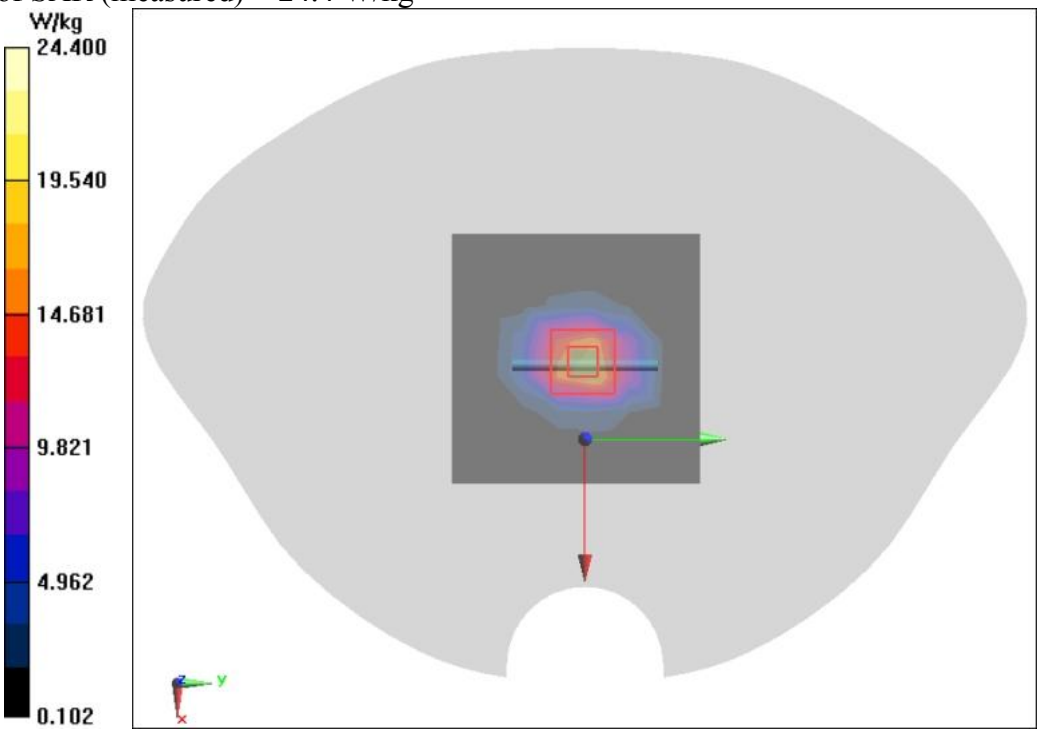
B.7

System Check Head 2600MHz

Date/Time: 2023/8/28
Electronics: DAE4 Sn1329
Medium parameters used: f = 2600 MHz; σ = 1.964 S/m; ε_r = 37.478; ρ = 1000 kg/m^3
Ambient Temperature:21.4°C Liquid Temperature:20.2°C
Communication System: CW 2500MHz; Frequency: 2600 MHz; Duty Cycle: 1:1
Probe: EX3DV4 - SN7633ConvF(7.86, 7.86, 7.86) @ 2600 MHz

System Check Head 2600MHz/Area Scan (8x8x1):
Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 18.2 W/kg

System Check Head 2600MHz/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 123.4 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 30.9 W/kg
SAR(1 g) = 14.1 W/kg; SAR(10 g) = 6.32 W/kg
Maximum value of SAR (measured) = 24.4 W/kg



B.8

System Check 5300MHz

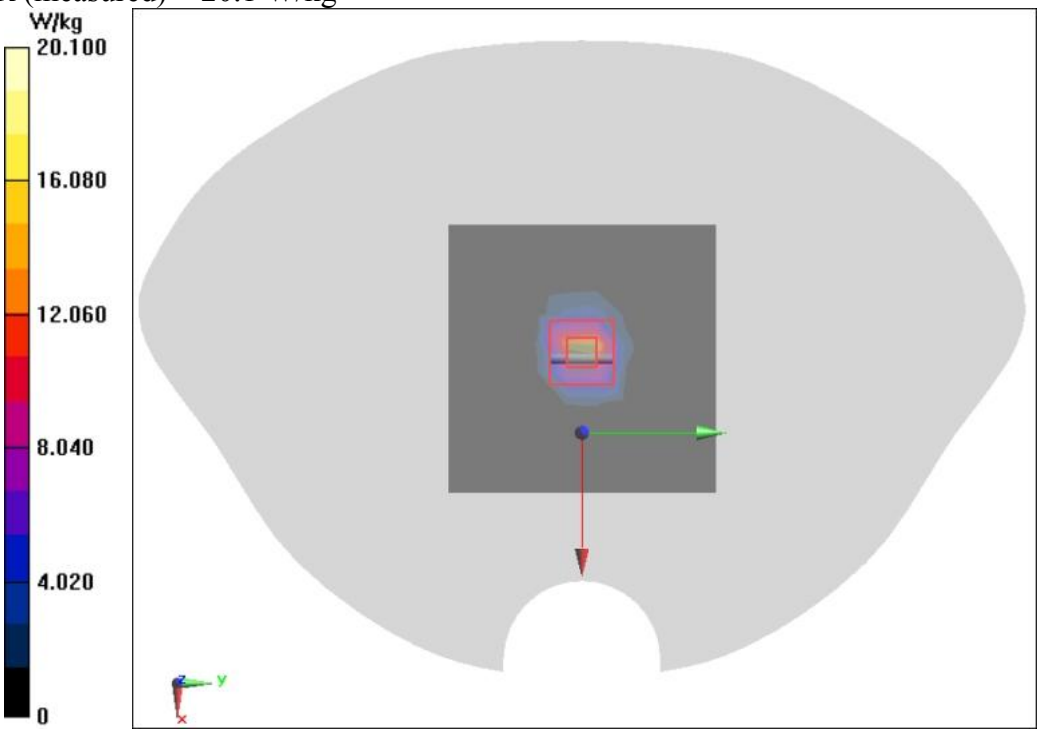
Date/Time: 2023/8/28
Electronics: DAE4 Sn1329
Medium parameters used: f = 5300 MHz; σ = 4.612 S/m; ε_r = 34.868; ρ = 1000 kg/m^3
Ambient Temperature:21.4°C Liquid Temperature:20.2°C
Communication System: CW 5GHz; Frequency: 5300 MHz; Duty Cycle: 1:1
Probe: EX3DV4 - SN7633ConvF(5.72, 5.72, 5.72) @ 5300 MHz

System Check 5300MHz/Area Scan (10x10x1):

Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 14.2 W/kg

System Check 5300MHz/Zoom Scan (4x4x1.4mm, graded), dist=1.4mm (7x7x7)/Cube 0:

Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 68.92 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 31.9 W/kg
SAR(1 g) = 7.95 W/kg; SAR(10 g) = 2.29 W/kg
Maximum of SAR (measured) = 20.1 W/kg



B.9

ANNEX C. CALIBRATION REPORT

In Collaboration with
CALIBRATION LABORATORY
Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2117
E-mail: emf@caict.ac.cn http://www.caict.ac.cn

Client : CATR(Chongqing) Certificate No: J23Z60331

CALIBRATION CERTIFICATE

Object	DAE4 - SN: 1329
Calibration Procedure(s)	FF-Z11-002-01 Calibration Procedure for the Data Acquisition Electronics (DAEx)
Calibration date:	July 25, 2023

This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)℃ and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Process Calibrator 753	1971018	12-Jun-23 (CTTL, No.J23X05436)	Jun-24

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

Issued: July 31, 2023

In Collaboration with
speag
CALIBRATION LABORATORY

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Glossary:

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

Methods Applied and Interpretation of Parameters:

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

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DC Voltage Measurement

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

Calibration Factors	X	Y	Z
High Range	404.385 ± 0.15% (k=2)	404.516 ± 0.15% (k=2)	404.110 ± 0.15% (k=2)
Low Range	3.99857 ± 0.7% (k=2)	3.99517 ± 0.7% (k=2)	4.00130 ± 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	103.5° ± 1 °

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CALIBRATION CNAS L0570

Client 3in Certificate No: J23Z60208

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN : 7633
Calibration Procedure(s)	FF-Z11-004-02 Calibration Procedures for Dosimetric E-field Probes
Calibration date:	April 28, 2023

This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)℃ and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	101919	14-Jun-22(CTTL, No.J22X04181)	Jun-23
Power sensor NRP-Z91	101547	14-Jun-22(CTTL, No.J22X04181)	Jun-23
Power sensor NRP-Z91	101548	14-Jun-22(CTTL, No.J22X04181)	Jun-23
Reference 10dBAttenuator	18N50W-10dB	19-Jan-23(CTTL, No.J23X00212)	Jan-25
Reference 20dBAttenuator	18N50W-20dB	19-Jan-23(CTTL, No.J23X00211)	Jan-25
OCP DAK-3.5	SN 1040	18-Jan-23(SPEAG, No.OCP-DAK3.5-1040_Jan23)	Jan-24
Reference Probe EX3DV4	SN 3846	20-May-22(SPEAG, No.EX3-3846_May22)	May-23
DAE4	SN 1555	25-Aug-22(SPEAG, No.DAE4-1555_Aug22)	Aug-23

Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
SignalGenerator MG3700A	6201052605	14-Jun-22(CTTL, No.J22X04182)	Jun-23
Network Analyzer E5071C	MY46110673	10-Jan-23(CTTL, No.J23X00104)	Jan-24

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

Issued: May 01, 2023

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Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A,B,C,D	modulation dependent linearization parameters
Polarization Φ	Φ rotation around probe axis
Polarization θ	θ rotation around an axis that is in the plane normal to probe axis (at measurement center), i θ=0 is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013

b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016

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

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

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization θ=0 (f≤900MHz in TEM-cell; f>1800MHz: waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not effect the E^2-field uncertainty inside TSL (see below ConvF).
- *NORM(f)x,y,z = NORMx,y,z* frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- PAR: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics.
- *Ax,y,z; Bx,y,z; Cx,y,z;VRx,y,z:*A,B,C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f≤800MHz) and inside waveguide using analytical field distributions based on power measurements for f >800MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty valued are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORMx,y,z* ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from±50MHz to±100MHz.
- *Spherical isotropy (3D deviation from isotropy):* in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset:* The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- *Connector Angle:* The angle is assessed using the information gained by determining the *NORMx* (no uncertainty required).

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DASY/EASY – Parameters of Probe: EX3DV4 – SN:7633

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (*k*=2)
Norm(μV/(V/m)²)[A]	0.66	0.64	0.68	±10.0%
DCP(mV)[B]	109.8	112.6	114.4	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Unc[E] (*k*=2)
0	CW	X	0.0	0.0	1.0	0.00	210.8	±2.2%
		Y	0.0	0.0	1.0		210.6	
		Z	0.0	0.0	1.0		218.3	

The reported uncertainty of measurement is stated as the standard uncertainty of Measurement multiplied by the coverage factor *k*=2, which for a normal distribution Corresponds to a coverage probability of approximately 95%.

[A] The uncertainties of Norm X, Y, Z do not affect the E²-field uncertainty inside TSL (see Page 4).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainly is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

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DASY/EASY – Parameters of Probe: EX3DV4 – SN:7633

Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz][C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha[G]	Depth[G] (mm)	Unct. (k=2)
750	41.9	0.89	11.03	11.03	11.03	0.13	1.45	±12.7%
835	41.5	0.90	10.66	10.66	10.66	0.16	1.41	±12.7%
900	41.5	0.97	10.62	10.62	10.62	0.19	1.29	±12.7%
1750	40.1	1.37	8.96	8.96	8.96	0.21	1.17	±12.7%
1900	40.0	1.40	8.67	8.67	8.67	0.26	0.99	±12.7%
2000	40.0	1.40	8.72	8.72	8.72	0.27	0.99	±12.7%
2300	39.5	1.67	8.32	8.32	8.32	0.64	0.66	±12.7%
2450	39.2	1.80	8.07	8.07	8.07	0.64	0.66	±12.7%
2600	39.0	1.96	7.86	7.86	7.86	0.48	0.78	±12.7%
3300	38.2	2.71	7.45	7.45	7.45	0.41	1.03	±13.9%
3500	37.9	2.91	7.21	7.21	7.21	0.40	1.04	±13.9%
3700	37.7	3.12	7.00	7.00	7.00	0.43	1.03	±13.9%
3900	37.5	3.32	6.91	6.91	6.91	0.40	1.25	±13.9%
4100	37.2	3.53	6.85	6.85	6.85	0.40	1.15	±13.9%
4200	37.1	3.63	6.75	6.75	6.75	0.35	1.35	±13.9%
4400	36.9	3.84	6.65	6.65	6.65	0.35	1.35	±13.9%
4600	36.7	4.04	6.55	6.55	6.55	0.40	1.30	±13.9%
4800	36.4	4.25	6.50	6.50	6.50	0.40	1.35	±13.9%
4950	36.3	4.40	6.22	6.22	6.22	0.40	1.35	±13.9%
5250	35.9	4.71	5.72	5.72	5.72	0.40	1.50	±13.9%
5600	35.5	5.07	5.17	5.17	5.17	0.55	1.20	±13.9%
5750	35.4	5.22	5.22	5.22	5.22	0.50	1.30	±13.9%

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

[F] At frequency up to 6 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ±10% if liquid compensation formula is applied to measured SAR values. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

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

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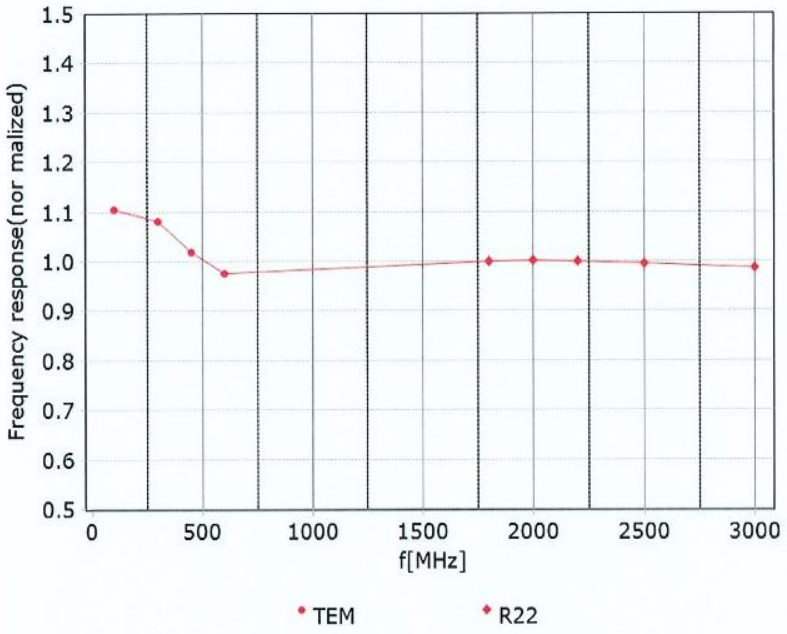
Frequency Response of E-Field
(TEM-Cell: ifi110 EXX, Waveguide: R22)



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

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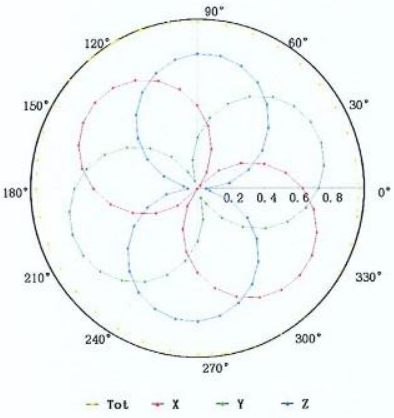
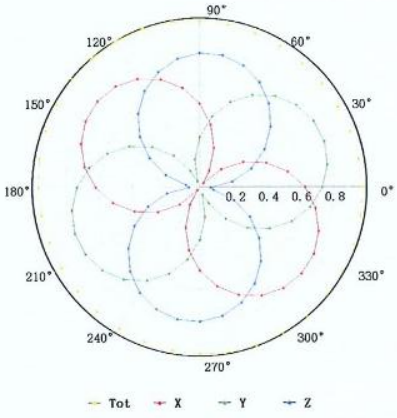
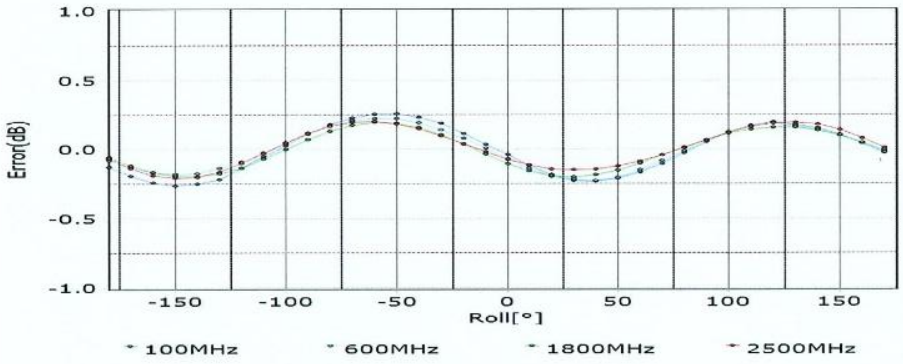
Receiving Pattern (Φ), θ=0°

f=600 MHz, TEM **f=1800 MHz, R22**







Uncertainty of Axial Isotropy Assessment: ±1.2% (*k*=2)

Certificate No:J23Z60208 Page 6 of 9

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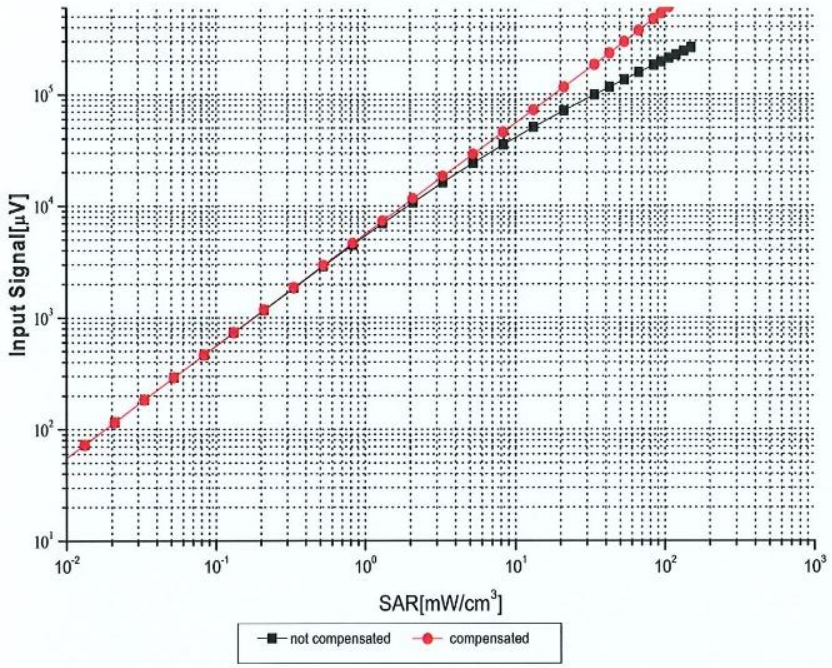
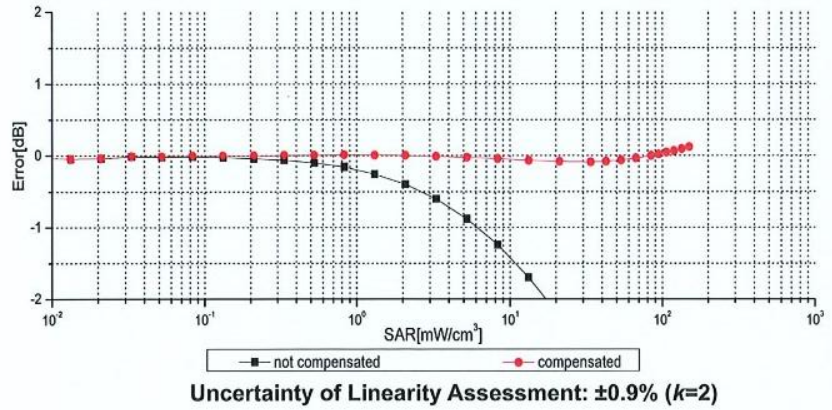
Dynamic Range f(SAR_{head})
(TEM cell, f = 900 MHz)





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

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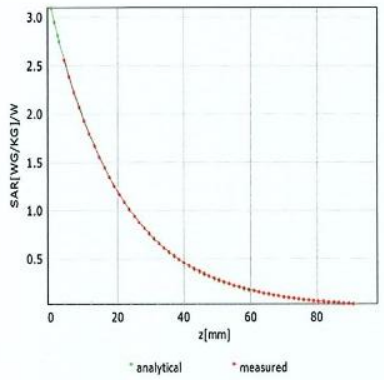
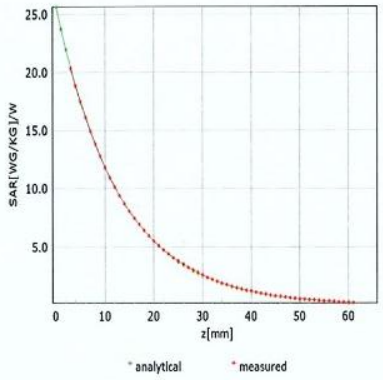
Conversion Factor Assessment

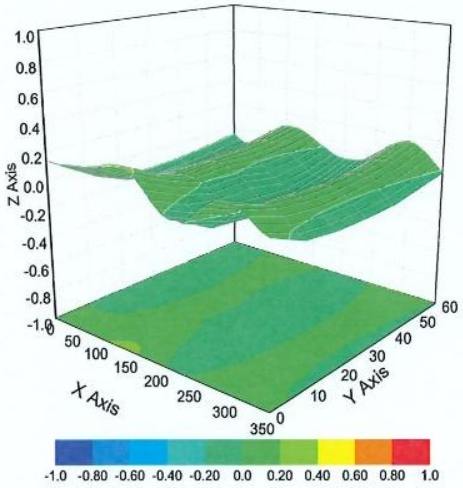
f=750 MHz,WGLS R9(H_convF)



f=1750 MHz,WGLS R22(H_convF)



Deviation from Isotropy in Liquid



Uncertainty of Spherical Isotropy Assessment: ±3.2% (*k*=2)

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DASY/EASY – Parameters of Probe: EX3DV4 – SN:7633

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	24.2
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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CALIBRATION
CNAS L0570

Client CATR(Chongqing) Certificate No: Z20-60400

CALIBRATION CERTIFICATE

Object	D835V2 - SN: 4d135
Calibration Procedure(s)	FF-Z11-003-01 Calibration Procedures for dipole validation kits
Calibration date:	October 16, 2020

This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)℃ and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	106276	12-May-20 (CTTL, No.J20X02965)	May-21
Power sensor NRP6A	101369	12-May-20 (CTTL, No.J20X02965)	May-21
ReferenceProbe EX3DV4	SN 3617	30-Jan-20(SPEAG,No.EX3-3617_Jan20)	Jan-21
DAE4	SN 771	10-Feb-20(CTTL-SPEAG,No.Z20-60017)	Feb-21
Secondary Standards	**ID #**	**Cal Date(Calibrated by, Certificate No.)**	**Scheduled Calibration**
Signal Generator E4438C	MY49071430	25-Feb-20 (CTTL, No.J20X00516)	Feb-21
NetworkAnalyzer E5071C	MY46110673	10-Feb-20 (CTTL, No.J20X00515)	Feb-21

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

Issued: October 22, 2020

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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	V52.10.4
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	41.7 ± 6 %	0.91 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.40 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**9.54 W/kg ± 18.8 % (*k*=2)**
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.60 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**6.37 W/kg ± 18.7 % (*k*=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.9 ± 6 %	0.94 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	2.40 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**9.79 W/kg ± 18.8 % (*k*=2)**
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	1.59 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**6.46 W/kg ± 18.7 % (*k*=2)**

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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.1Ω- 4.05jΩ
Return Loss	- 27.9dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.2Ω- 5.04jΩ
Return Loss	- 23.7dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.265 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG

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DASY5 Validation Report for Head TSL Date: 10.16.2020

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d135

Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium parameters used: f = 835 MHz; σ = 0.909 S/m; ε_r = 41.68; ρ = 1000 kg/m^3

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(9.66, 9.66, 9.66) @ 835 MHz; Calibrated: 2020-01-30
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2020-02-10
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

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

Reference Value = 57.52 V/m; Power Drift = -0.03 dB

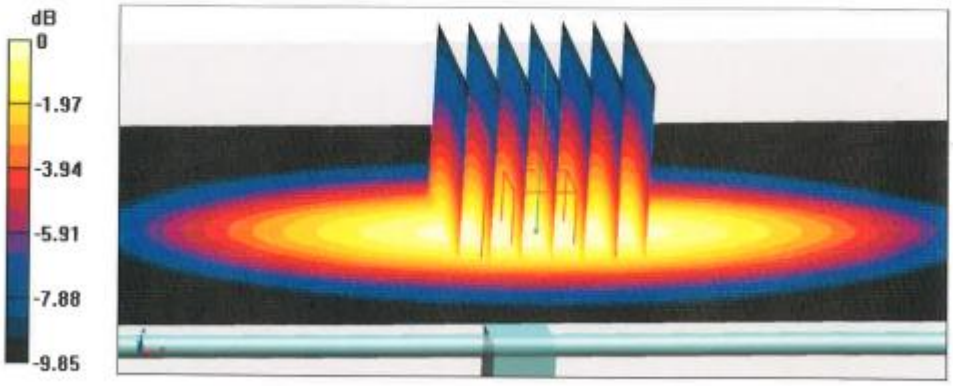
Peak SAR (extrapolated) = 3.47 W/kg

SAR(1 g) = 2.4 W/kg; SAR(10 g) = 1.6 W/kg

Smallest distance from peaks to all points 3 dB below = 16.3 mm

Ratio of SAR at M2 to SAR at M1 = 69.4%

Maximum value of SAR (measured) = 3.13 W/kg



0 dB = 3.13 W/kg = 4.96 dBW/kg

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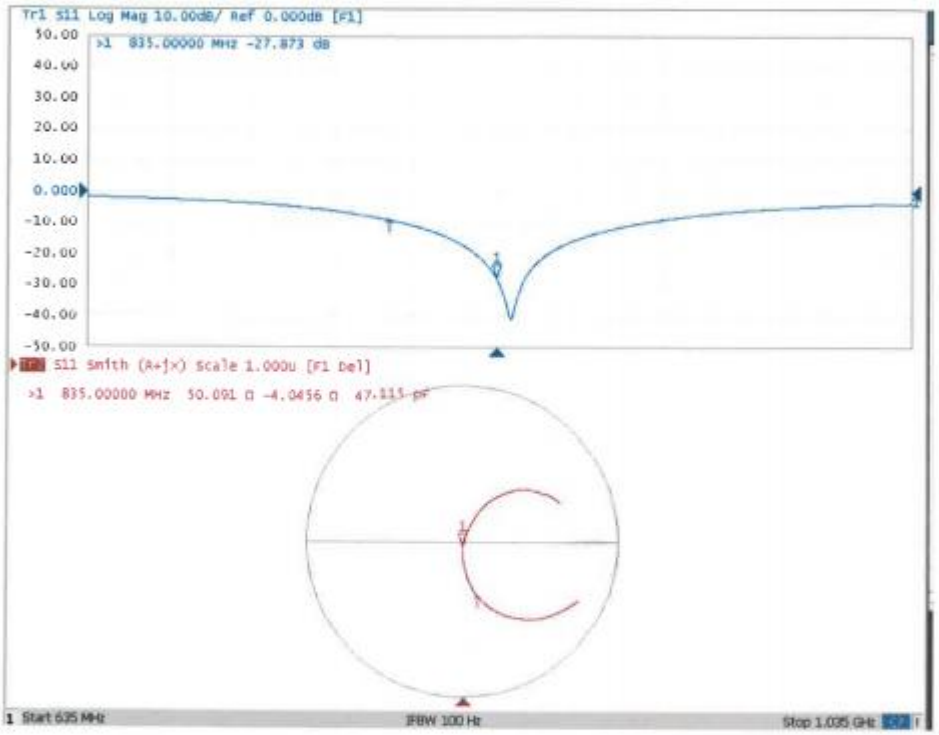
Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL Date: 10.16.2020

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d135

Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium parameters used: f = 835 MHz; σ = 0.944 S/m; ε_r = 54.91; ρ = 1000 kg/m^3

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(9.53, 9.53, 9.53) @ 835 MHz; Calibrated: 2020-01-30
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2020-02-10
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

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

Reference Value = 55.41 V/m; Power Drift = 0.00 dB

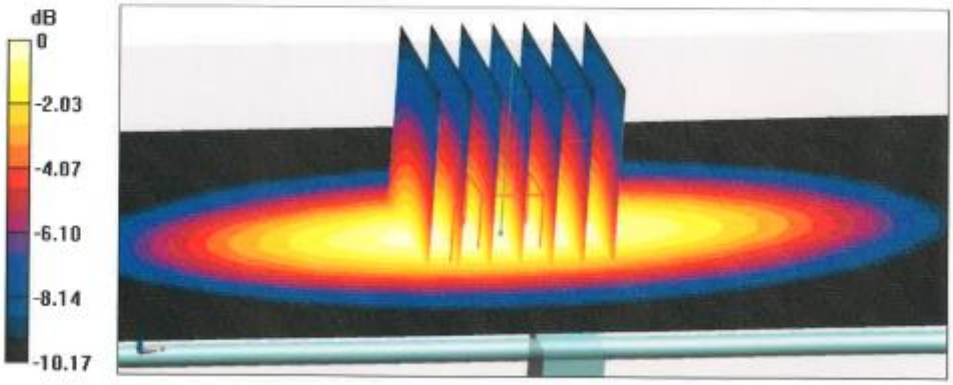
Peak SAR (extrapolated) = 3.60 W/kg

SAR(1 g) = 2.4 W/kg; SAR(10 g) = 1.59 W/kg

Smallest distance from peaks to all points 3 dB below = 16 mm

Ratio of SAR at M2 to SAR at M1 = 67.1%

Maximum value of SAR (measured) = 3.20 W/kg



0 dB = 3.20 W/kg = 5.05 dBW/kg

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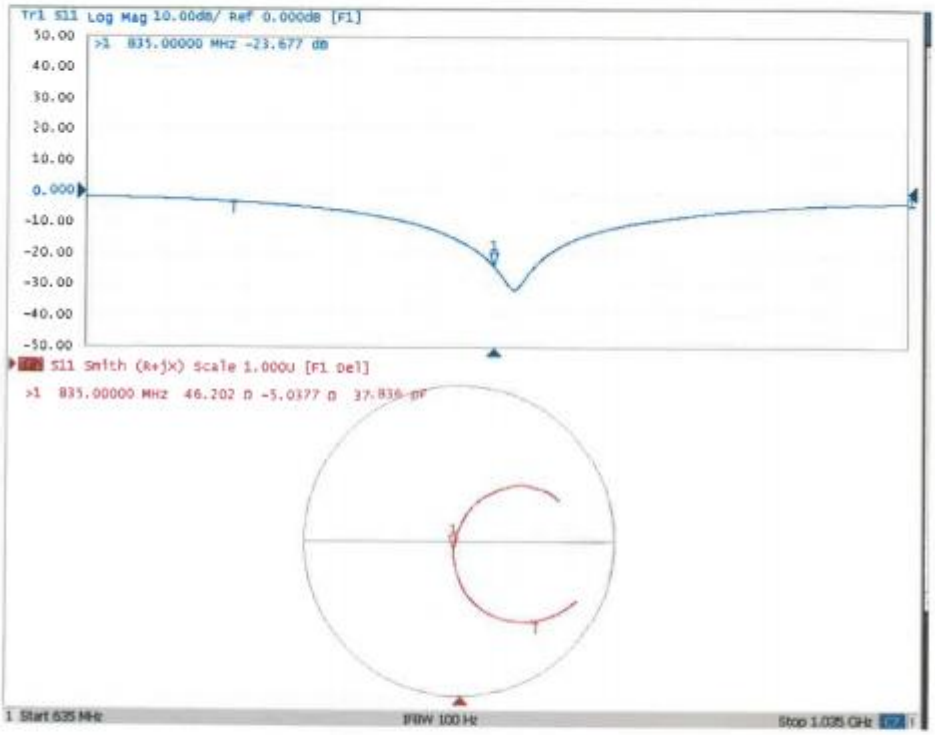
Impedance Measurement Plot for Body TSL



Certificate No: Z20-60400 Page 8 of 8

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Client CATR(Chongqing) Certificate No: Z20-60402

CALIBRATION CERTIFICATE

Object	D1750V2 - SN: 1063
Calibration Procedure(s)	FF-Z11-003-01 Calibration Procedures for dipole validation kits
Calibration date:	October 15, 2020

This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)℃ and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	106276	12-May-20 (CTTL, No.J20X02965)	May-21
Power sensor NRP6A	101369	12-May-20 (CTTL, No.J20X02965)	May-21
ReferenceProbe EX3DV4	SN 3617	30-Jan-20(SPEAG,No.EX3-3617_Jan20)	Jan-21
DAE4	SN 771	10-Feb-20(CTTL-SPEAG,No.Z20-60017)	Feb-21
Secondary Standards	**ID #**	**Cal Date(Calibrated by, Certificate No.)**	**Scheduled Calibration**
Signal Generator E4438C	MY49071430	25-Feb-20 (CTTL, No.J20X00516)	Feb-21
NetworkAnalyzer E5071C	MY46110673	10-Feb-20 (CTTL, No.J20X00515)	Feb-21

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

Issued: October 22, 2020

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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	V52.10.4
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	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	39.6 ± 6 %	1.37 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	8.96 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**35.8 W/kg ± 18.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	4.73 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**18.9 W/kg ± 18.7 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	53.4	1.49 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	53.0 ± 6 %	1.51 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	9.42 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**37.3 W/kg ± 18.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	5.05 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**20.1 W/kg ± 18.7 % (k=2)**

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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.4Ω- 0.99 jΩ
Return Loss	- 38.5 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.0Ω- 0.80 jΩ
Return Loss	- 27.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.087 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG

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DASY5 Validation Report for Head TSL Date: 10.15.2020

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1063

Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium parameters used: f = 1750 MHz; σ = 1.365 S/m; ε_r = 39.61; ρ = 1000 kg/m^3

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(8.41, 8.41, 8.41) @ 1750 MHz; Calibrated: 2020-01-30
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2020-02-10
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 97.18 V/m; Power Drift = -0.03 dB

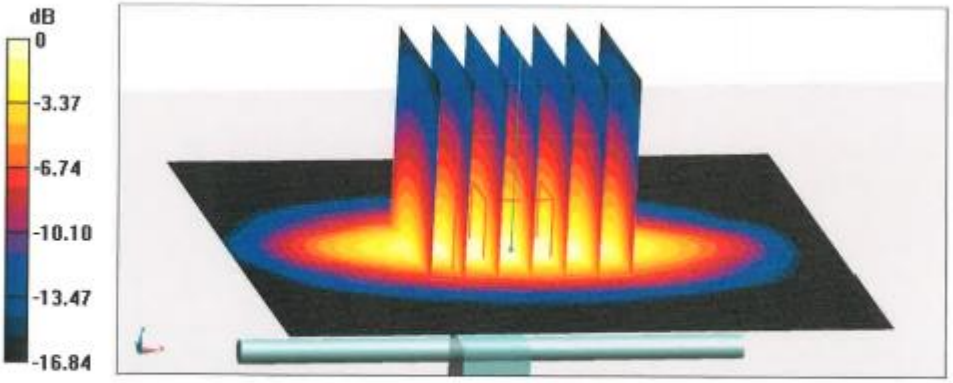
Peak SAR (extrapolated) = 16.8 W/kg

SAR(1 g) = 8.96 W/kg; SAR(10 g) = 4.73 W/kg

Smallest distance from peaks to all points 3 dB below = 10 mm

Ratio of SAR at M2 to SAR at M1 = 53.8%

Maximum value of SAR (measured) = 14.0 W/kg



0 dB = 14.0 W/kg = 11.46 dBW/kg

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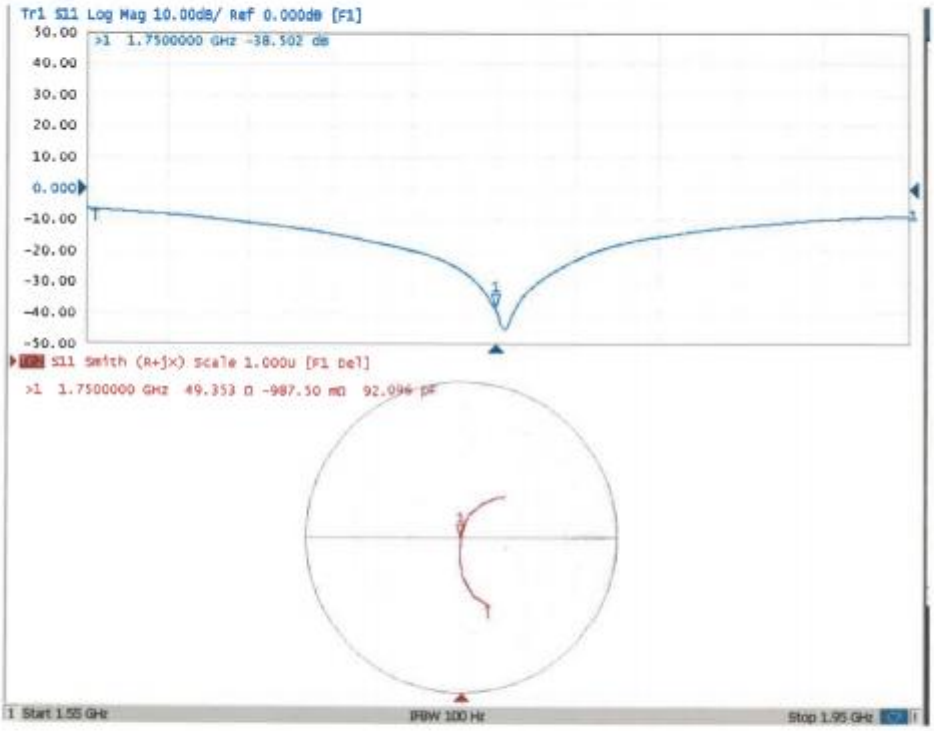
Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL Date: 10.15.2020

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1063

Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium parameters used: f = 1750 MHz; σ = 1.51 S/m; ε_r = 53; ρ = 1000 kg/m^3

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(8.09, 8.09, 8.09) @ 1750 MHz; Calibrated: 2020-01-30
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2020-02-10
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 95.36 V/m; Power Drift = -0.01 dB

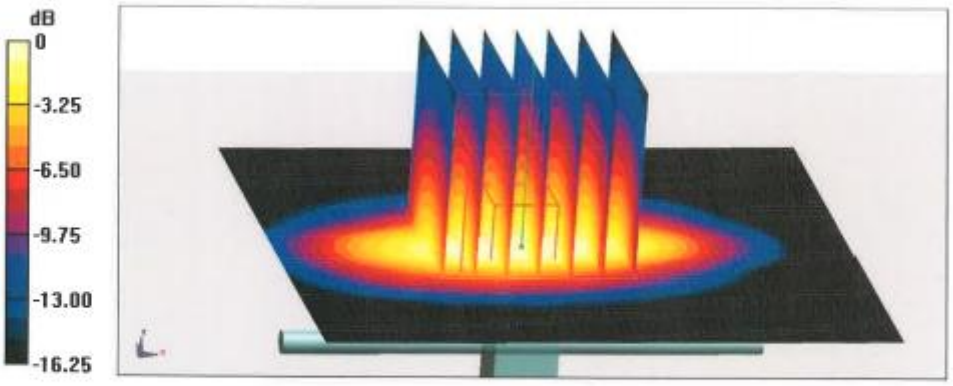
Peak SAR (extrapolated) = 16.5 W/kg

SAR(1 g) = 9.42 W/kg; SAR(10 g) = 5.05 W/kg

Smallest distance from peaks to all points 3 dB below = 9.2 mm

Ratio of SAR at M2 to SAR at M1 = 58.1%

Maximum value of SAR (measured) = 14.1 W/kg



0 dB = 14.1 W/kg = 11.49 dBW/kg

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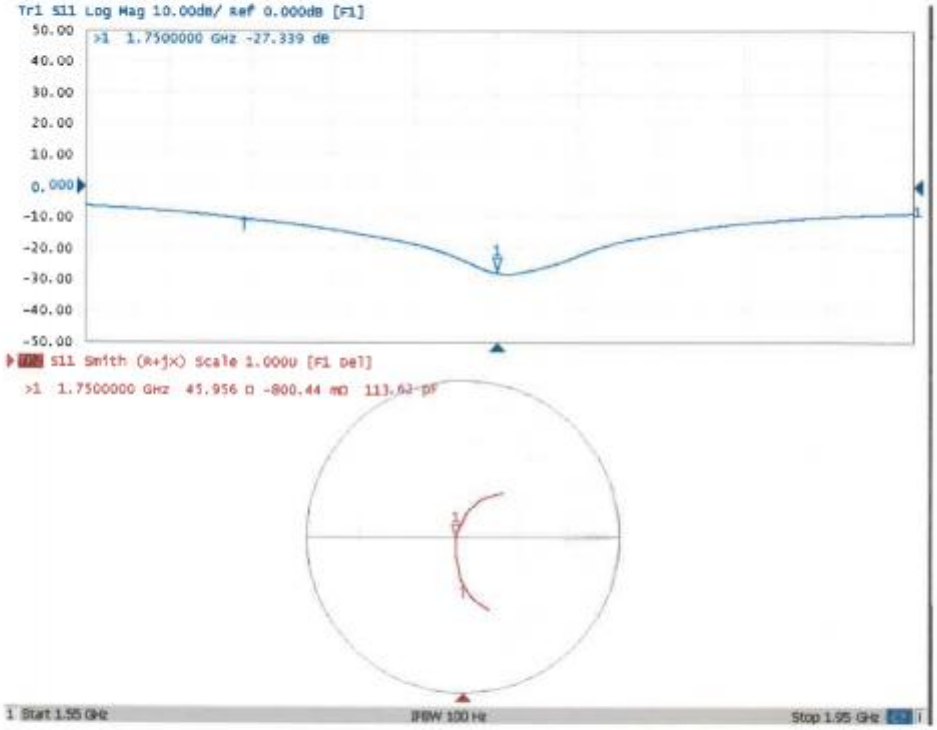
Impedance Measurement Plot for Body TSL



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Client CATR(Chongqing) Certificate No: Z20-60403

CALIBRATION CERTIFICATE

Object	D1900V2 - SN: 5d153
Calibration Procedure(s)	FF-Z11-003-01 Calibration Procedures for dipole validation kits
Calibration date:	October 14, 2020

This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)℃ and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	106276	12-May-20 (CTTL, No.J20X02965)	May-21
Power sensor NRP6A	101369	12-May-20 (CTTL, No.J20X02965)	May-21
ReferenceProbe EX3DV4	SN 3617	30-Jan-20(SPEAG,No.EX3-3617_Jan20)	Jan-21
DAE4	SN 771	10-Feb-20(CTTL-SPEAG,No.Z20-60017)	Feb-21
Secondary Standards	**ID #**	**Cal Date(Calibrated by, Certificate No.)**	**Scheduled Calibration**
Signal Generator E4438C	MY49071430	25-Feb-20 (CTTL, No.J20X00516)	Feb-21
NetworkAnalyzer E5071C	MY46110673	10-Feb-20 (CTTL, No.J20X00515)	Feb-21

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

Issued: October 22, 2020

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lossary:

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	V52.10.4
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	39.0 ± 6 %	1.38 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	9.78 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**39.2 W/kg ± 18.8 % (*k*=2)**
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	5.04 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**20.2 W/kg ± 18.7 % (*k*=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	53.1 ± 6 %	1.51 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	9.89 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**39.7 W/kg ± 18.8 % (*k*=2)**
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	5.15 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**20.6 W/kg ± 18.7 % (*k*=2)**

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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.7Ω+ 5.15jΩ
Return Loss	- 25.5dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.8Ω+ 5.42jΩ
Return Loss	- 25.0dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.065 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG

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DASY5 Validation Report for Head TSL Date: 10.14.2020

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d153

Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium parameters used: f = 1900 MHz; σ = 1.383 S/m; ε_r = 38.95; ρ = 1000 kg/m^3

Phantom section: Center Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(8.14, 8.14, 8.14) @ 1900 MHz; Calibrated: 2020-01-30
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2020-02-10
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 102.3 V/m; Power Drift = -0.02 dB

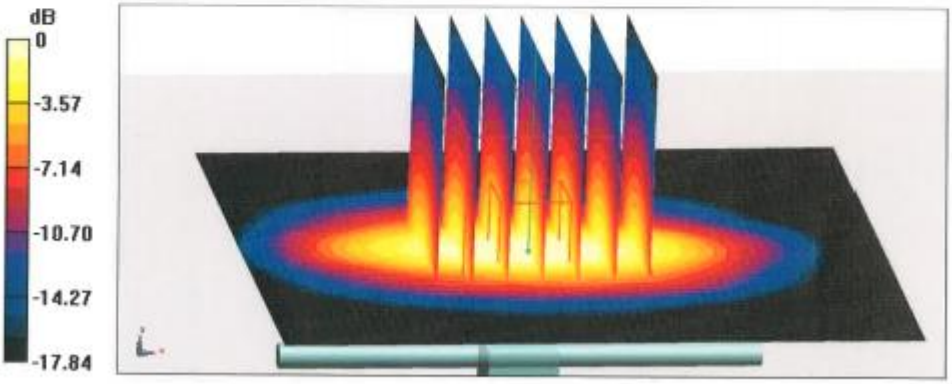
Peak SAR (extrapolated) = 18.7 W/kg

SAR(1 g) = 9.78 W/kg; SAR(10 g) = 5.04 W/kg

Smallest distance from peaks to all points 3 dB below = 9.5 mm

Ratio of SAR at M2 to SAR at M1 = 52.7%

Maximum value of SAR (measured) = 15.5 W/kg



0 dB = 15.5 W/kg = 11.90 dBW/kg

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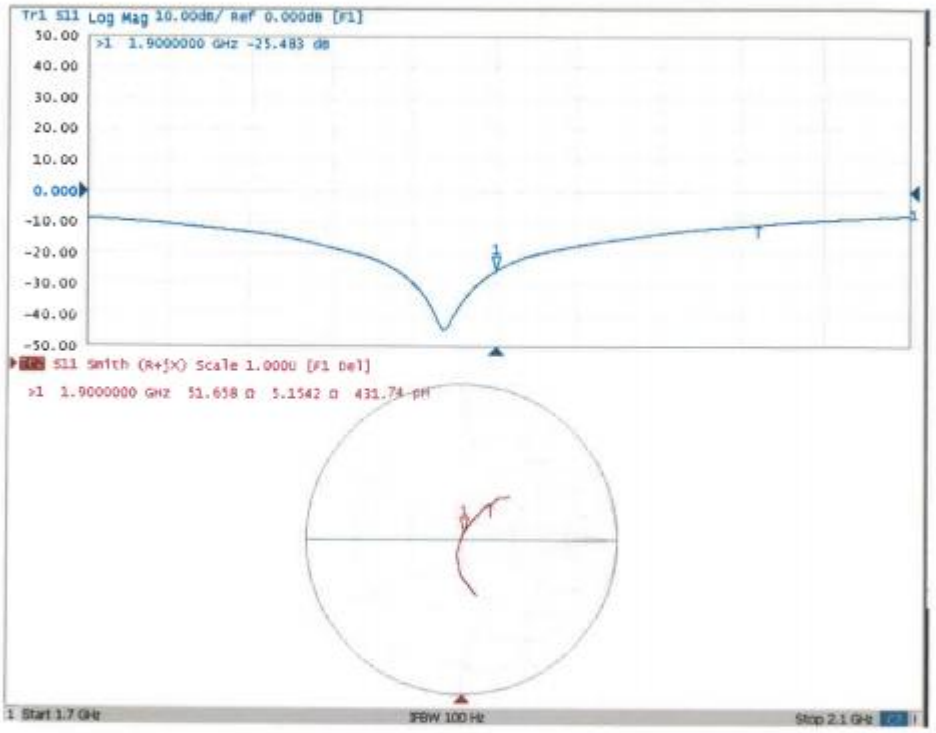
Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL Date: 10.14.2020

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d153

Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium parameters used: f = 1900 MHz; σ = 1.511 S/m; ε_r = 53.06; ρ = 1000 kg/m^3

Phantom section: Center Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(7.94, 7.94, 7.94) @ 1900 MHz; Calibrated: 2020-01-30
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2020-02-10
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 97.93 V/m; Power Drift = -0.02 dB

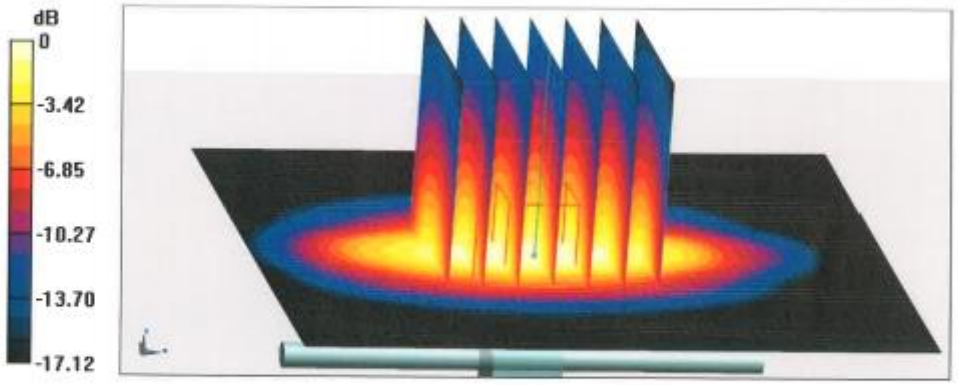
Peak SAR (extrapolated) = 18.2 W/kg

SAR(1 g) = 9.89 W/kg; SAR(10 g) = 5.15 W/kg

Smallest distance from peaks to all points 3 dB below = 9 mm

Ratio of SAR at M2 to SAR at M1 = 55.4%

Maximum value of SAR (measured) = 15.3 W/kg



0 dB = 15.3 W/kg = 11.85 dBW/kg

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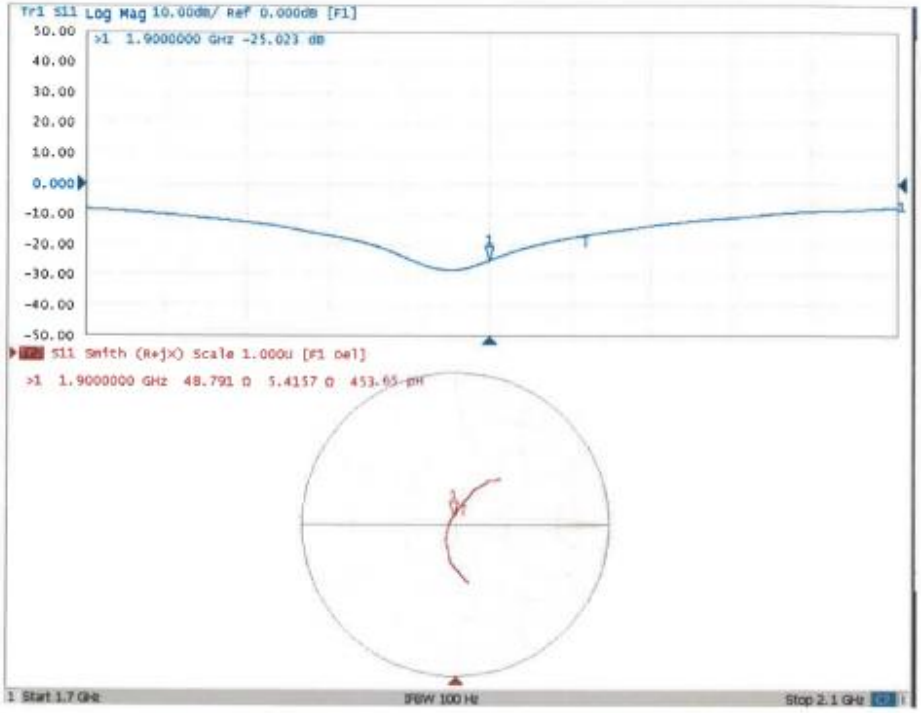
Impedance Measurement Plot for Body TSL



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Client CATR(Chongqing) Certificate No: Z20-60405

CALIBRATION CERTIFICATE

Object	D2450V2 - SN: 886
Calibration Procedure(s)	FF-Z11-003-01 Calibration Procedures for dipole validation kits
Calibration date:	October 13, 2020

This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)℃ and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	106276	12-May-20 (CTTL, No.J20X02965)	May-21
Power sensor NRP6A	101369	12-May-20 (CTTL, No.J20X02965)	May-21
ReferenceProbe EX3DV4	SN 3617	30-Jan-20(SPEAG,No.EX3-3617_Jan20)	Jan-21
DAE4	SN 771	10-Feb-20(CTTL-SPEAG,No.Z20-60017)	Feb-21
Secondary Standards	**ID #**	**Cal Date(Calibrated by, Certificate No.)**	**Scheduled Calibration**
Signal Generator E4438C	MY49071430	25-Feb-20 (CTTL, No.J20X00516)	Feb-21
NetworkAnalyzer E5071C	MY46110673	10-Feb-20 (CTTL, No.J20X00515)	Feb-21

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

Issued: October 22, 2020