

Plot No.	Band	BW (MHz)	Modulation	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	2.45 GHz Ant W1	20M	CCK	Back	15mm	6	2437	17.12	18.0	0.00156	<0.01
14	2.45 GHz Ant W2	20M	CCK		15mm	6	2437	17.18	18.0	0.0370	0.05
	5.25 GHz Ant W1	20M	OFDM		15mm	60	5300	14.28	15.0	0.00268	<0.01
15	5.25 GHz Ant W2	20M	OFDM		15mm	60	5300	14.31	15.0	0.140	0.16
	5.60 GHz Ant W1	20M	OFDM		15mm	124	5620	14.42	15.0	0.00329	<0.01
16	5.60 GHz Ant W2	20M	OFDM		15mm	124	5620	14.49	15.0	0.150	0.17
	5.75 GHz Ant W1	20M	OFDM		15mm	157	5785	14.36	15.0	0.00441	0.01
17	5.75 GHz Ant W2	20M	OFDM		15mm	157	5785	14.39	15.0	0.271	0.31

# 11. Simultaneous Transmission Analysis

The FR1 data is located in report number SAR.20230906. The data listed in the tables below was extracted from the report filed with this report.

## Sim-Tx configuration

No.	Simultaneous Transmission Configuration	Exposure Positions
		Body
1	UMTS + 2.4 GHz Wifi W1 + 2.4 GHz WiFi W2	Yes
2	UMTS + 5 GHz Wifi W1 + 5 GHz WiFi W2	Yes
3	LTE + 2.4 GHz Wifi W1 + 2.4 GHz WiFi W2	Yes
4	LTE + 5 GHz Wifi W1 + 5 GHz WiFi W2	Yes
5	FR1 + 2.4 GHz Wifi W1 + 2.4 GHz WiFi W2	Yes
6	FR1 + 5 GHz Wifi W1 + 5 GHz WiFi W2	Yes

### General Note:

1. The following summations represent the absolute worst cases for simultaneous transmission with WWAN and WLAN.
2. The Scaled SAR summation is calculated based on the same configuration and test position.

Body Exposure Conditions

WWAN Band	Antenna	Exposure Position	1	2	3	4	5	1+2+3 Summed 1g SAR (W/kg)	1+4+5 Summed 1g SAR (W/kg)
			WWAN	2.4GHz Wi-Fi W1	2.4GHz Wi-Fi W2	5GHz Wi-Fi W1	5GHz Wi-Fi W2		
			1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)		
WCDMA Band 2	M1	Back	0.12	0.01	0.05	0.01	0.31	0.18	0.44
	M2		0.90	0.01	0.05	0.01	0.31	0.96	1.22
	M3		0.13	0.01	0.05	0.01	0.31	0.19	0.45
	M4		0.87	0.01	0.05	0.01	0.31	0.93	1.19
	M5		0.88	0.01	0.05	0.01	0.31	0.94	1.20
	M6		0.17	0.01	0.05	0.01	0.31	0.23	0.49
WCDMA Band 4	M1		0.06	0.01	0.05	0.01	0.31	0.12	0.38
	M2		0.58	0.01	0.05	0.01	0.31	0.64	0.90
	M3		0.07	0.01	0.05	0.01	0.31	0.13	0.39
	M4		0.55	0.01	0.05	0.01	0.31	0.61	0.87
	M5		0.57	0.01	0.05	0.01	0.31	0.63	0.89
	M6		0.08	0.01	0.05	0.01	0.31	0.14	0.40
WCDMA Band 5	M1		0.09	0.01	0.05	0.01	0.31	0.15	0.41
	M2		0.32	0.01	0.05	0.01	0.31	0.38	0.64
	M3		0.09	0.01	0.05	0.01	0.31	0.15	0.41
	M4		0.30	0.01	0.05	0.01	0.31	0.36	0.62
	M5		0.29	0.01	0.05	0.01	0.31	0.35	0.61
	M6		0.09	0.01	0.05	0.01	0.31	0.15	0.41
LTE Band 2	M1		0.13	0.01	0.05	0.01	0.31	0.19	0.45
	M2		0.51	0.01	0.05	0.01	0.31	0.57	0.83
	M3		0.13	0.01	0.05	0.01	0.31	0.19	0.45
	M4		0.50	0.01	0.05	0.01	0.31	0.56	0.82
	M5		0.51	0.01	0.05	0.01	0.31	0.57	0.83
	M6		0.13	0.01	0.05	0.01	0.31	0.19	0.45
LTE Band 4	M1		0.05	0.01	0.05	0.01	0.31	0.11	0.37
	M2		0.54	0.01	0.05	0.01	0.31	0.60	0.86
	M3		0.05	0.01	0.05	0.01	0.31	0.11	0.37
	M4		0.51	0.01	0.05	0.01	0.31	0.57	0.83
	M5		0.52	0.01	0.05	0.01	0.31	0.58	0.84
	M6		0.05	0.01	0.05	0.01	0.31	0.11	0.37
LTE Band 5	M1	0.06	0.01	0.05	0.01	0.31	0.12	0.38	
	M2	0.37	0.01	0.05	0.01	0.31	0.43	0.69	
	M3	0.07	0.01	0.05	0.01	0.31	0.13	0.39	
	M4	0.37	0.01	0.05	0.01	0.31	0.43	0.69	
	M5	0.39	0.01	0.05	0.01	0.31	0.45	0.71	
	M6	0.07	0.01	0.05	0.01	0.31	0.13	0.39	
LTE Band 7	M1	0.18	0.01	0.05	0.01	0.31	0.24	0.50	
	M2	0.80	0.01	0.05	0.01	0.31	0.86	1.12	
	M3	0.17	0.01	0.05	0.01	0.31	0.23	0.49	
	M4	0.69	0.01	0.05	0.01	0.31	0.75	1.01	
	M5	0.68	0.01	0.05	0.01	0.31	0.74	1.00	
	M6	0.20	0.01	0.05	0.01	0.31	0.26	0.52	
LTE Band 12	M1	0.21	0.01	0.05	0.01	0.31	0.27	0.53	
	M2	0.30	0.01	0.05	0.01	0.31	0.36	0.62	
	M3	0.20	0.01	0.05	0.01	0.31	0.26	0.52	
	M4	0.26	0.01	0.05	0.01	0.31	0.32	0.58	
	M5	0.27	0.01	0.05	0.01	0.31	0.33	0.59	
	M6	0.22	0.01	0.05	0.01	0.31	0.28	0.54	

WWAN Band	Antenna	Exposure Position	1	2	3	4	5	1+2+3 Summed 1g SAR (W/kg)	1+4+5 Summed 1g SAR (W/kg)
			WWAN	2.4GHz Wi-Fi W1	2.4GHz Wi-Fi W2	5GHz Wi-Fi W1	5GHz Wi-Fi W2		
			1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)		
LTE Band 13	M1	Back	0.06	0.01	0.05	0.01	0.31	0.12	0.38
	M2		0.28	0.01	0.05	0.01	0.31	0.34	0.60
	M3		0.06	0.01	0.05	0.01	0.31	0.12	0.38
	M4		0.26	0.01	0.05	0.01	0.31	0.32	0.58
	M5		0.25	0.01	0.05	0.01	0.31	0.31	0.57
	M6		0.06	0.01	0.05	0.01	0.31	0.12	0.38
LTE Band 14	M1		0.07	0.01	0.05	0.01	0.31	0.13	0.39
	M2		0.28	0.01	0.05	0.01	0.31	0.34	0.60
	M3		0.07	0.01	0.05	0.01	0.31	0.13	0.39
	M4		0.27	0.01	0.05	0.01	0.31	0.33	0.59
	M5		0.28	0.01	0.05	0.01	0.31	0.34	0.60
	M6		0.08	0.01	0.05	0.01	0.31	0.14	0.40
LTE Band 25	M1		0.14	0.01	0.05	0.01	0.31	0.20	0.46
	M2		0.55	0.01	0.05	0.01	0.31	0.61	0.87
	M3		0.13	0.01	0.05	0.01	0.31	0.19	0.45
	M4		0.53	0.01	0.05	0.01	0.31	0.59	0.85
	M5		0.54	0.01	0.05	0.01	0.31	0.60	0.86
	M6		0.14	0.01	0.05	0.01	0.31	0.20	0.46
LTE Band 26	M1		0.07	0.01	0.05	0.01	0.31	0.13	0.39
	M2		0.44	0.01	0.05	0.01	0.31	0.50	0.76
	M3		0.07	0.01	0.05	0.01	0.31	0.13	0.39
	M4		0.42	0.01	0.05	0.01	0.31	0.48	0.74
	M5		0.43	0.01	0.05	0.01	0.31	0.49	0.75
	M6		0.07	0.01	0.05	0.01	0.31	0.13	0.39
LTE Band 38	M1		0.02	0.01	0.05	0.01	0.31	0.08	0.34
	M2		0.46	0.01	0.05	0.01	0.31	0.52	0.78
	M3		0.02	0.01	0.05	0.01	0.31	0.08	0.34
	M4		0.45	0.01	0.05	0.01	0.31	0.51	0.77
	M5		0.46	0.01	0.05	0.01	0.31	0.52	0.78
	M6		0.02	0.01	0.05	0.01	0.31	0.08	0.34
LTE Band 41	M1		0.04	0.01	0.05	0.01	0.31	0.10	0.36
	M2		0.78	0.01	0.05	0.01	0.31	0.84	1.10
	M3		0.04	0.01	0.05	0.01	0.31	0.10	0.36
	M4		0.75	0.01	0.05	0.01	0.31	0.81	1.07
	M5		0.77	0.01	0.05	0.01	0.31	0.83	1.09
	M6		0.04	0.01	0.05	0.01	0.31	0.10	0.36
LTE Band 48	M1		0.16	0.01	0.05	0.01	0.31	0.22	0.48
	M2		0.71	0.01	0.05	0.01	0.31	0.77	1.03
	M3		0.17	0.01	0.05	0.01	0.31	0.23	0.49
	M4		0.69	0.01	0.05	0.01	0.31	0.75	1.01
	M5		0.69	0.01	0.05	0.01	0.31	0.75	1.01
	M6		0.18	0.01	0.05	0.01	0.31	0.24	0.50
LTE Band 66	M1		0.06	0.01	0.05	0.01	0.31	0.12	0.38
	M2		0.62	0.01	0.05	0.01	0.31	0.68	0.94
	M3		0.06	0.01	0.05	0.01	0.31	0.12	0.38
	M4		0.60	0.01	0.05	0.01	0.31	0.66	0.92
	M5		0.61	0.01	0.05	0.01	0.31	0.67	0.93
	M6		0.06	0.01	0.05	0.01	0.31	0.12	0.38

WWAN Band	Antenna	Exposure Position	1	2	3	4	5	1+2+3 Summed 1g SAR (W/kg)	1+4+5 Summed 1g SAR (W/kg)
			WWAN	2.4GHz Wi-Fi W1	2.4GHz Wi-Fi W2	5GHz Wi-Fi W1	5GHz Wi-Fi W2		
			1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)		
LTE Band 71	M1	Back	0.26	0.01	0.05	0.01	0.31	0.32	0.58
	M2		0.42	0.01	0.05	0.01	0.31	0.48	0.74
	M3		0.28	0.01	0.05	0.01	0.31	0.34	0.60
	M4		0.41	0.01	0.05	0.01	0.31	0.47	0.73
	M5		0.41	0.01	0.05	0.01	0.31	0.47	0.73
	M6		0.30	0.01	0.05	0.01	0.31	0.36	0.62
FR1 Band n2	M1		0.11	0.01	0.05	0.01	0.31	0.17	0.43
	M2		0.35	0.01	0.05	0.01	0.31	0.41	0.67
	M3		0.11	0.01	0.05	0.01	0.31	0.17	0.43
	M4		0.33	0.01	0.05	0.01	0.31	0.39	0.65
	M5		0.34	0.01	0.05	0.01	0.31	0.40	0.66
	M6		0.11	0.01	0.05	0.01	0.31	0.17	0.43
FR1 Band n5	M1		0.10	0.01	0.05	0.01	0.31	0.16	0.42
	M2		0.27	0.01	0.05	0.01	0.31	0.33	0.59
	M3		0.10	0.01	0.05	0.01	0.31	0.16	0.42
	M4		0.26	0.01	0.05	0.01	0.31	0.32	0.58
	M5		0.27	0.01	0.05	0.01	0.31	0.33	0.59
	M6		0.10	0.01	0.05	0.01	0.31	0.16	0.42
FR1 Band n7	M1		0.13	0.01	0.05	0.01	0.31	0.19	0.45
	M2		0.63	0.01	0.05	0.01	0.31	0.69	0.95
	M3		0.13	0.01	0.05	0.01	0.31	0.19	0.45
	M4		0.62	0.01	0.05	0.01	0.31	0.68	0.94
	M5		0.63	0.01	0.05	0.01	0.31	0.69	0.95
	M6		0.14	0.01	0.05	0.01	0.31	0.20	0.46
FR1 Band n12	M1		0.18	0.01	0.05	0.01	0.31	0.24	0.50
	M2		0.39	0.01	0.05	0.01	0.31	0.45	0.71
	M3		0.18	0.01	0.05	0.01	0.31	0.24	0.50
	M4		0.38	0.01	0.05	0.01	0.31	0.44	0.70
	M5		0.37	0.01	0.05	0.01	0.31	0.43	0.69
	M6		0.19	0.01	0.05	0.01	0.31	0.25	0.51
FR1 Band n25	M1		0.11	0.01	0.05	0.01	0.31	0.17	0.43
	M2		0.36	0.01	0.05	0.01	0.31	0.42	0.68
	M3		0.12	0.01	0.05	0.01	0.31	0.18	0.44
	M4		0.35	0.01	0.05	0.01	0.31	0.41	0.67
	M5		0.36	0.01	0.05	0.01	0.31	0.42	0.68
	M6		0.12	0.01	0.05	0.01	0.31	0.18	0.44
FR1 Band n38	M1		0.04	0.01	0.05	0.01	0.31	0.10	0.36
	M2		0.65	0.01	0.05	0.01	0.31	0.71	0.97
	M3		0.05	0.01	0.05	0.01	0.31	0.11	0.37
	M4		0.64	0.01	0.05	0.01	0.31	0.70	0.96
	M5		0.64	0.01	0.05	0.01	0.31	0.70	0.96
	M6		0.05	0.01	0.05	0.01	0.31	0.11	0.37
FR1 Band n48	M1		0.12	0.01	0.05	0.01	0.31	0.18	0.44
	M2		0.59	0.01	0.05	0.01	0.31	0.65	0.91
	M3		0.12	0.01	0.05	0.01	0.31	0.18	0.44
	M4		0.58	0.01	0.05	0.01	0.31	0.64	0.90
	M5		0.58	0.01	0.05	0.01	0.31	0.64	0.90
	M6		0.13	0.01	0.05	0.01	0.31	0.19	0.45

WWAN Band	Antenna	Exposure Position	1	2	3	4	5	1+2+3 Summed 1g SAR (W/kg)	1+4+5 Summed 1g SAR (W/kg)
			WWAN	2.4GHz Wi-Fi W1	2.4GHz Wi-Fi W2	5GHz Wi-Fi W1	5GHz Wi-Fi W2		
			1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)		
FR1 Band n66	M1	Back	0.06	0.01	0.05	0.01	0.31	0.12	0.38
	M2		0.67	0.01	0.05	0.01	0.31	0.73	0.99
	M3		0.06	0.01	0.05	0.01	0.31	0.12	0.38
	M4		0.61	0.01	0.05	0.01	0.31	0.67	0.93
	M5		0.66	0.01	0.05	0.01	0.31	0.72	0.98
	M6		0.06	0.01	0.05	0.01	0.31	0.12	0.38
FR1 Band n71	M1		0.11	0.01	0.05	0.01	0.31	0.17	0.43
	M2		0.38	0.01	0.05	0.01	0.31	0.44	0.70
	M3		0.11	0.01	0.05	0.01	0.31	0.17	0.43
	M4		0.37	0.01	0.05	0.01	0.31	0.43	0.69
	M5		0.37	0.01	0.05	0.01	0.31	0.43	0.69
	M6		0.11	0.01	0.05	0.01	0.31	0.17	0.43
FR1 Band n77	M1		0.10	0.01	0.05	0.01	0.31	0.16	0.42
	M2		0.58	0.01	0.05	0.01	0.31	0.64	0.90
	M3		0.10	0.01	0.05	0.01	0.31	0.16	0.42
	M4		0.57	0.01	0.05	0.01	0.31	0.63	0.89
	M5		0.29	0.01	0.05	0.01	0.31	0.35	0.61
	M6		0.05	0.01	0.05	0.01	0.31	0.11	0.37

The worst case summation is WCDMA Band 2 with 5 GHz WiFi (MIMO). The value is 1.22 W/kg which is below the limit. Therefore, the simultaneous evaluation is excluded..

LTE UL CA	Antenna	Exposure Position	1	2	3	4	5	6	1+2+3+4 Summed 1g SAR (W/kg)	1+2+5+6 Summed 1g SAR (W/kg)
			1 <sup>ST</sup> UL	2 <sup>ND</sup> UL	2.4GHz Wi-Fi W1	2.4GHz Wi-Fi W2	5GHz Wi-Fi W1	5GHz Wi-Fi W2		
			1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)		
12A-4A	M1	Back	0.21	0.05	0.01	0.05	0.01	0.31	0.32	0.58
	M2		0.30	0.54	0.01	0.05	0.01	0.31	0.90	1.16
	M3		0.20	0.05	0.01	0.05	0.01	0.31	0.31	0.57
	M4		0.26	0.51	0.01	0.05	0.01	0.31	0.83	1.09
	M5		0.27	0.52	0.01	0.05	0.01	0.31	0.85	1.11
	M6		0.22	0.05	0.01	0.05	0.01	0.31	0.33	0.59
12A-2A	M1		0.21	0.13	0.01	0.05	0.01	0.31	0.40	0.66
	M2		0.30	0.51	0.01	0.05	0.01	0.31	0.87	1.13
	M3		0.20	0.13	0.01	0.05	0.01	0.31	0.39	0.65
	M4		0.26	0.50	0.01	0.05	0.01	0.31	0.82	1.08
	M5		0.27	0.51	0.01	0.05	0.01	0.31	0.84	1.10
	M6		0.22	0.13	0.01	0.05	0.01	0.31	0.41	0.67
13A-2A	M1		0.06	0.13	0.01	0.05	0.01	0.31	0.25	0.51
	M2		0.28	0.51	0.01	0.05	0.01	0.31	0.85	1.11
	M3		0.06	0.13	0.01	0.05	0.01	0.31	0.25	0.51
	M4		0.26	0.50	0.01	0.05	0.01	0.31	0.82	1.08
	M5		0.25	0.51	0.01	0.05	0.01	0.31	0.82	1.08
	M6		0.06	0.13	0.01	0.05	0.01	0.31	0.25	0.51
13A-4A	M1		0.06	0.05	0.01	0.05	0.01	0.31	0.17	0.43
	M2		0.28	0.54	0.01	0.05	0.01	0.31	0.88	1.14
	M3		0.06	0.05	0.01	0.05	0.01	0.31	0.17	0.43
	M4		0.26	0.51	0.01	0.05	0.01	0.31	0.83	1.09
	M5		0.25	0.52	0.01	0.05	0.01	0.31	0.83	1.09
	M6		0.06	0.05	0.01	0.05	0.01	0.31	0.17	0.43
5A-2A	M1		0.06	0.13	0.01	0.05	0.01	0.31	0.25	0.51
	M2		0.37	0.51	0.01	0.05	0.01	0.31	0.94	1.20
	M3		0.07	0.13	0.01	0.05	0.01	0.31	0.26	0.52
	M4		0.37	0.50	0.01	0.05	0.01	0.31	0.93	1.19
	M5	0.39	0.51	0.01	0.05	0.01	0.31	0.96	1.22	
	M6	0.07	0.13	0.01	0.05	0.01	0.31	0.26	0.52	
5A-4A	M1	0.06	0.05	0.01	0.05	0.01	0.31	0.17	0.43	
	M2	0.37	0.54	0.01	0.05	0.01	0.31	0.97	1.23	
	M3	0.07	0.05	0.01	0.05	0.01	0.31	0.18	0.44	
	M4	0.37	0.51	0.01	0.05	0.01	0.31	0.94	1.20	
	M5	0.39	0.52	0.01	0.05	0.01	0.31	0.97	1.23	
	M6	0.07	0.05	0.01	0.05	0.01	0.31	0.18	0.44	
66A-2A	M1	0.06	0.13	0.01	0.05	0.01	0.31	0.25	0.51	
	M2	0.62	0.51	0.01	0.05	0.01	0.31	1.19	1.45	
	M3	0.06	0.13	0.01	0.05	0.01	0.31	0.25	0.51	
	M4	0.60	0.50	0.01	0.05	0.01	0.31	1.16	1.42	
	M5	0.61	0.51	0.01	0.05	0.01	0.31	1.18	1.44	
	M6	0.06	0.13	0.01	0.05	0.01	0.31	0.25	0.51	
66A-5A	M1	0.06	0.06	0.01	0.05	0.01	0.31	0.18	0.44	
	M2	0.62	0.37	0.01	0.05	0.01	0.31	1.05	1.31	
	M3	0.06	0.07	0.01	0.05	0.01	0.31	0.19	0.45	
	M4	0.60	0.37	0.01	0.05	0.01	0.31	1.03	1.29	
	M5	0.61	0.39	0.01	0.05	0.01	0.31	1.06	1.32	
	M6	0.06	0.07	0.01	0.05	0.01	0.31	0.19	0.45	
7A-5A	M1	0.18	0.06	0.01	0.05	0.01	0.31	0.30	0.56	
	M2	0.80	0.37	0.01	0.05	0.01	0.31	1.23	1.49	
	M3	0.17	0.07	0.01	0.05	0.01	0.31	0.30	0.56	
	M4	0.69	0.37	0.01	0.05	0.01	0.31	1.12	1.38	
	M5	0.68	0.39	0.01	0.05	0.01	0.31	1.13	1.39	
	M6	0.20	0.07	0.01	0.05	0.01	0.31	0.33	0.59	



LTE UL CA	Antenna	Exposure Position	1	2	3	4	5	6	1+2+3+4 Summed 1g SAR (W/kg)	1+2+5+6 Summed 1g SAR (W/kg)				
			1 <sup>ST</sup> UL	2 <sup>nd</sup> UL	2.4GHz Wi-Fi W1	2.4GHz Wi-Fi W2	5GHz Wi-Fi W1	5GHz Wi-Fi W2						
			1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)						
12A-n66A	M1	Back	0.21	0.06	0.01	0.05	0.01	0.31	0.33	0.59				
	M2		0.30	0.67	0.01	0.05	0.01	0.31	1.03	1.29				
	M3		0.20	0.06	0.01	0.05	0.01	0.31	0.32	0.58				
	M4		0.26	0.61	0.01	0.05	0.01	0.31	0.93	1.19				
	M5		0.27	0.66	0.01	0.05	0.01	0.31	0.99	1.25				
	M6		0.22	0.06	0.01	0.05	0.01	0.31	0.34	0.60				
12A-n2A	M1		Back	0.21	0.11	0.01	0.05	0.01	0.31	0.38	0.64			
	M2			0.30	0.35	0.01	0.05	0.01	0.31	0.71	0.97			
	M3			0.20	0.11	0.01	0.05	0.01	0.31	0.37	0.63			
	M4			0.26	0.33	0.01	0.05	0.01	0.31	0.65	0.91			
	M5			0.27	0.34	0.01	0.05	0.01	0.31	0.67	0.93			
	M6			0.22	0.11	0.01	0.05	0.01	0.31	0.39	0.65			
13A-n66A	M1			Back	0.06	0.06	0.01	0.05	0.01	0.31	0.18	0.44		
	M2				0.28	0.67	0.01	0.05	0.01	0.31	1.01	1.27		
	M3				0.06	0.06	0.01	0.05	0.01	0.31	0.18	0.44		
	M4				0.26	0.61	0.01	0.05	0.01	0.31	0.93	1.19		
	M5				0.25	0.66	0.01	0.05	0.01	0.31	0.97	1.23		
	M6				0.06	0.06	0.01	0.05	0.01	0.31	0.18	0.44		
13A-n2A	M1				Back	0.06	0.11	0.01	0.05	0.01	0.31	0.23	0.49	
	M2					0.28	0.35	0.01	0.05	0.01	0.31	0.69	0.95	
	M3					0.06	0.11	0.01	0.05	0.01	0.31	0.23	0.49	
	M4					0.26	0.33	0.01	0.05	0.01	0.31	0.65	0.91	
	M5					0.25	0.34	0.01	0.05	0.01	0.31	0.65	0.91	
	M6					0.06	0.11	0.01	0.05	0.01	0.31	0.23	0.49	
2A-n5A	M1					Back	0.13	0.10	0.01	0.05	0.01	0.31	0.29	0.55
	M2						0.51	0.27	0.01	0.05	0.01	0.31	0.84	1.10
	M3						0.13	0.10	0.01	0.05	0.01	0.31	0.29	0.55
	M4						0.50	0.26	0.01	0.05	0.01	0.31	0.82	1.08
	M5	0.51					0.27	0.01	0.05	0.01	0.31	0.84	1.10	
	M6	0.13					0.10	0.01	0.05	0.01	0.31	0.29	0.55	
2A-n71A	M1	Back					0.13	0.11	0.01	0.05	0.01	0.31	0.30	0.56
	M2						0.51	0.38	0.01	0.05	0.01	0.31	0.95	1.21
	M3						0.13	0.11	0.01	0.05	0.01	0.31	0.30	0.56
	M4						0.50	0.37	0.01	0.05	0.01	0.31	0.93	1.19
	M5		0.51				0.37	0.01	0.05	0.01	0.31	0.94	1.20	
	M6		0.13				0.11	0.01	0.05	0.01	0.31	0.30	0.56	
5A-n66A	M1		Back				0.06	0.06	0.01	0.05	0.01	0.31	0.18	0.44
	M2						0.37	0.67	0.01	0.05	0.01	0.31	1.10	1.36
	M3						0.07	0.06	0.01	0.05	0.01	0.31	0.19	0.45
	M4						0.37	0.61	0.01	0.05	0.01	0.31	1.04	1.30
	M5			0.39			0.66	0.01	0.05	0.01	0.31	1.11	1.37	
	M6			0.07			0.06	0.01	0.05	0.01	0.31	0.19	0.45	
5A-n2A	M1			Back			0.06	0.11	0.01	0.05	0.01	0.31	0.23	0.49
	M2						0.37	0.35	0.01	0.05	0.01	0.31	0.78	1.04
	M3						0.07	0.11	0.01	0.05	0.01	0.31	0.24	0.50
	M4						0.37	0.33	0.01	0.05	0.01	0.31	0.76	1.02
	M5				0.39		0.34	0.01	0.05	0.01	0.31	0.79	1.05	
	M6				0.07		0.11	0.01	0.05	0.01	0.31	0.24	0.50	
66A-n5A	M1				Back		0.06	0.10	0.01	0.05	0.01	0.31	0.22	0.48
	M2						0.62	0.27	0.01	0.05	0.01	0.31	0.95	1.21
	M3						0.06	0.10	0.01	0.05	0.01	0.31	0.22	0.48
	M4						0.60	0.26	0.01	0.05	0.01	0.31	0.92	1.18
	M5					0.61	0.27	0.01	0.05	0.01	0.31	0.94	1.20	
	M6					0.06	0.10	0.01	0.05	0.01	0.31	0.22	0.48	

LTE UL CA	Antenna	Exposure Position	1	2	3	4	5	6	1+2+3+4 Summed 1g SAR (W/kg)	1+2+5+6 Summed 1g SAR (W/kg)
			1 <sup>st</sup> UL	2 <sup>nd</sup> UL	2.4GHz Wi-Fi W1	2.4GHz Wi-Fi W2	5GHz Wi-Fi W1	5GHz Wi-Fi W2		
			1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)		
66A-n71A	M1	Back	0.06	0.11	0.01	0.05	0.01	0.31	0.23	0.49
	M2		0.62	0.38	0.01	0.05	0.01	0.31	1.06	1.32
	M3		0.06	0.11	0.01	0.05	0.01	0.31	0.23	0.49
	M4		0.60	0.37	0.01	0.05	0.01	0.31	1.03	1.29
	M5		0.61	0.37	0.01	0.05	0.01	0.31	1.04	1.30
	M6		0.06	0.11	0.01	0.05	0.01	0.31	0.23	0.49
7A-n5A	M1		0.18	0.10	0.01	0.05	0.01	0.31	0.34	0.60
	M2		0.80	0.27	0.01	0.05	0.01	0.31	1.13	1.39
	M3		0.17	0.10	0.01	0.05	0.01	0.31	0.33	0.59
	M4		0.69	0.26	0.01	0.05	0.01	0.31	1.01	1.27
	M5		0.68	0.27	0.01	0.05	0.01	0.31	1.01	1.27
	M6		0.20	0.10	0.01	0.05	0.01	0.31	0.36	0.62
7A-n71A	M1		0.18	0.11	0.01	0.05	0.01	0.31	0.35	0.61
	M2		0.80	0.38	0.01	0.05	0.01	0.31	1.24	1.50
	M3		0.17	0.11	0.01	0.05	0.01	0.31	0.34	0.60
	M4		0.69	0.37	0.01	0.05	0.01	0.31	1.12	1.38
	M5		0.68	0.37	0.01	0.05	0.01	0.31	1.11	1.37
	M6		0.20	0.11	0.01	0.05	0.01	0.31	0.37	0.63

The worst case summation is LTE Band 7 and FR1 band n71 with 5 GHz WiFi (MIMO). The value is 1.50 W/kg which is below the limit. Therefore, the simultaneous evaluation is excluded.

## 12. Test Equipment List

**Table 12.1 Equipment Specifications**

Type	Calibration Due Date	Calibration Done Date	Serial Number
Staubli Robot TX60L	N/A	N/A	F07/55M6A1/A/01
Measurement Controller CS8c	N/A	N/A	1012
ELI5 Flat Phantom	N/A	N/A	2037
Device Holder	N/A	N/A	N/A
Data Acquisition Electronics 4	04/19/2024	04/19/2023	1416
SPEAG E-Field Probe EX3DV4	02/10/2024	02/10/2023	3662
SPEAG E-Field Probe EX3DV4	01/17/2024	01/17/2023	7530
Speag Validation Dipole D750V2	06/04/2024	06/04/2021	1053
Speag Validation Dipole D900V2	06/04/2024	06/04/2021	1d128
Speag Validation Dipole D1750V2	06/03/2024	06/03/2021	1061
Speag Validation Dipole D1900V2	06/04/2024	06/04/2021	5d147
Speag Validation Dipole D2550V2	06/03/2024	06/03/2021	1003
Speag Validation Dipole D3700V2	04/13/2024	04/13/2021	1024
Speag Validation Dipole D2450V2	06/03/2024	06/03/2021	881
Speag Validation Dipole D5GHzV2	06/08/2024	06/08/2021	1119
Agilent N1911A Power Meter	03/14/2024	03/14/2023	GB45100254
Agilent N1922A Power Sensor	03/13/2024	03/13/2023	MY45240464
Agilent (HP) 8596E Spectrum Analyzer	03/13/2024	03/13/2023	3826A01468
Agilent (HP) 83752A Synthesized Sweeper	03/14/2024	03/14/2023	3610A01048
Agilent (HP) 8753C Vector Network Analyzer	03/14/2024	03/14/2023	3135A01724
Agilent (HP) 85047A S-Parameter Test Set	03/14/2024	03/14/2023	2904A00595
Copper Mountain R140 Vector Reflectometer	03/13/2024	03/13/2023	21390004
Anritsu MT8820C	N/A	N/A	6201381721
Apriel Dielectric Probe Assembly	N/A	N/A	0011
Head Equivalent Matter (750 MHz)	N/A	N/A	N/A
Head Equivalent Matter (900 MHz)	N/A	N/A	N/A
Head Equivalent Matter (1750 MHz)	N/A	N/A	N/A
Head Equivalent Matter (1900 MHz)	N/A	N/A	N/A
Head Equivalent Matter (2450 MHz)	N/A	N/A	N/A
Head Equivalent Matter (2550 MHz)	N/A	N/A	N/A
Head Equivalent Matter (3-6 GHz)	N/A	N/A	N/A

### **13. Conclusion**

The SAR measurement indicates that the EUT complies with the RF radiation exposure limits of the FCC/IC. These measurements are taken to simulate the RF effects exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests. The tested device complies with the requirements in respect to all parameters subject to the test. The test results and statements relate only to the item(s) tested.

Please note that the absorption and distribution of electromagnetic energy in the body is a very complex phenomena that depends on the mass, shape, and size of the body; the orientation of the body with respect to the field vectors; and, the electrical properties of both the body and the environment. Other variables that may play a substantial role in possible biological effects are those that characterize the environment (e.g. ambient temperature, air velocity, relative humidity, and body insulation) and those that characterize the individual (e.g. age, gender, activity level, debilitation, or disease). Because innumerable factors may interact to determine the specific biological outcome of an exposure to electromagnetic fields, any protection guide shall consider maximal amplification of biological effects as a result of field-body interactions, environmental conditions, and physiological variables.

## 14. References

- [1] Federal Communications Commission, ET Docket 93-62, Guidelines for Evaluating the Environmental Effects of Radio Frequency Radiation, August 1996
- [2] ANSI/IEEE C95.1 – 1992, American National Standard Safety Levels with respect to Human Exposure to Radio Frequency Electromagnetic Fields, 300kHz to 100GHz, New York: IEEE, 1992.
- [3] ANSI/IEEE C95.3 – 1992, IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields – RF and Microwave, New York: IEEE, 1992.
- [4] International Electrotechnical Commission, IEC 62209-2 (Edition 1.0), Human Exposure to radio frequency fields from hand-held and body mounted wireless communication devices – Human models, instrumentation, and procedures – Part 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.
- [5] IEEE Standard 1528 – 2013, IEEE Recommended Practice for Determining the Peak-Spatial Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communication Devices: Measurement Techniques, June 2013.
- [6] Industry Canada, RSS – 102 Issue 5, Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands), March 2015.
- [7] Health Canada, Safety Code 6, Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3kHz to 300 GHz, 2009.

# Appendix A – System Validation Plots and Data

\*\*\*\*\*  
 Test Result for UIM Dielectric Parameter  
 Wed 06/Sep/2023  
 Freq Frequency(GHz)  
 FCC\_eH Limits for Head Epsilon  
 FCC\_sH Limits for Head Sigma  
 Test\_e Epsilon of UIM  
 Test\_s Sigma of UIM  
 \*\*\*\*\*

Freq	FCC_eH	FCC_sH	Test_e	Test_s
0.6500	42.46	0.88	41.79	0.86
0.6600	42.41	0.88	41.73	0.87
0.6700	42.36	0.89	41.67	0.87
0.6800	42.31	0.89	41.61	0.87
0.6805	42.307	0.89	41.607	0.871*
0.6900	42.25	0.89	41.55	0.88
0.7000	42.20	0.89	41.49	0.88
0.7075	42.163	0.89	41.438	0.888*
0.7100	42.15	0.89	41.42	0.89
0.7200	42.10	0.89	41.37	0.90
0.7300	42.05	0.89	41.30	0.91
0.7400	41.99	0.89	41.24	0.91
0.7500	41.94	0.89	41.19	0.92
0.7600	41.89	0.89	41.13	0.93
0.7700	41.84	0.89	41.07	0.94
0.7800	41.79	0.90	41.01	0.94
0.7820	41.778	0.90	40.998	0.942*
0.7900	41.73	0.90	40.95	0.95
0.7930	41.715	0.90	40.938	0.95*
0.8000	41.68	0.90	40.91	0.95

\* value interpolated

\*\*\*\*\*  
 Test Result for UIM Dielectric Parameter  
 Tue 05/Sep/2023  
 Freq Frequency(GHz)  
 eH Limits for Head Epsilon  
 sH Limits for Head Sigma  
 Test\_e Epsilon of UIM  
 Test\_s Sigma of UIM  
 \*\*\*\*\*

Freq	eH	sH	Test_e	Test_s
0.8000	41.68	0.90	40.96	0.90
0.8100	41.63	0.90	40.91	0.91
0.8200	41.58	0.90	40.85	0.92
0.8225	41.568	0.90	40.863	0.92*
0.8300	41.53	0.90	40.90	0.92
0.8315	41.526	0.902	40.896	0.922*
0.8365	41.511	0.907	40.881	0.927*
0.8366	41.51	0.907	40.88	0.927*
0.8375	41.508	0.908	40.878	0.928*
0.8400	41.50	0.91	40.87	0.93
0.8500	41.50	0.92	40.85	0.94
0.8600	41.50	0.93	40.83	0.95
0.8700	41.50	0.94	40.81	0.96
0.8800	41.50	0.95	40.80	0.97
0.8900	41.50	0.96	40.79	0.98
0.8975	41.50	0.968	40.783	0.988*
0.9000	41.50	0.97	40.78	0.99
0.9100	41.50	0.98	40.77	1.00
0.9200	41.49	0.98	40.76	1.00

\* value interpolated

\*\*\*\*\*

Test Result for UIM Dielectric Parameter

Thu 07/Sep/2023

Freq Frequency(GHz)

eH Limits for Head Epsilon

sH Limits for Head Sigma

Test\_e Epsilon of UIM

Test\_s Sigma of UIM

\*\*\*\*\*

Freq	eH	sH	Test_e	Test_s
1.7000	40.16	1.34	39.45	1.34
1.7100	40.14	1.35	39.43	1.35
1.7200	40.13	1.35	39.41	1.36
1.7300	40.11	1.36	39.39	1.36
1.7326	40.105	1.363	39.385	1.363*
1.7400	40.09	1.37	39.37	1.37
1.7450	40.085	1.37	39.36	1.375*
1.7500	40.08	1.37	39.35	1.38
1.7600	40.06	1.38	39.33	1.39
1.7674	40.053	1.38	39.315	1.397*
1.7700	40.05	1.38	39.31	1.40
1.7800	40.03	1.39	39.29	1.40
1.7900	40.02	1.39	39.27	1.41

\* value interpolated

\*\*\*\*\*

Test Result for UIM Dielectric Parameter

Thu 31/Aug/2023

Freq Frequency(GHz)

eH Limits for Head Epsilon

sH Limits for Head Sigma

Test\_e Epsilon of UIM

Test\_s Sigma of UIM

\*\*\*\*\*

Freq	eH	sH	Test_e	Test_s
1.8500	40.00	1.40	39.54	1.41
1.8524	40.00	1.40	39.535	1.412*
1.8600	40.00	1.40	39.52	1.42
1.8700	40.00	1.40	39.50	1.42
1.8800	40.00	1.40	39.48	1.43
1.8825	40.00	1.40	39.475	1.43*
1.8900	40.00	1.40	39.46	1.43
1.9000	40.00	1.40	39.44	1.43
1.9076	40.00	1.40	39.425	1.438*
1.9100	40.00	1.40	39.42	1.44
1.9200	40.00	1.40	39.41	1.45

\* value interpolated



\*\*\*\*\*

Test Result for UIM Dielectric Parameter

Fri 01/Sep/2023

Freq Frequency(GHz)

FCC\_eH Limits for Head Epsilon

FCC\_sH Limits for Head Sigma

Test\_e Epsilon of UIM

Test\_s Sigma of UIM

\*\*\*\*\*

Freq	FCC_eH	FCC_sH	Test_e	Test_s
2.4900	39.15	1.84	39.02	1.86
2.5000	39.14	1.85	39.00	1.87
2.5100	39.12	1.87	38.97	1.88
2.5200	39.11	1.88	38.95	1.90
2.5300	39.10	1.89	38.93	1.91
2.5350	39.095	1.895	38.915	1.915*
2.5400	39.09	1.90	38.90	1.92
2.5500	39.07	1.91	38.88	1.94
2.5600	39.06	1.92	38.86	1.95
2.5700	39.05	1.93	38.83	1.96
2.5800	39.03	1.94	38.81	1.98
2.5900	39.02	1.95	38.78	1.99
2.5930	39.017	1.953	38.783	1.99*
2.6000	39.01	1.96	38.79	1.99
2.6100	39.00	1.97	38.77	2.00
2.6200	38.98	1.99	38.76	2.01
2.6300	38.97	2.00	38.74	2.02
2.6400	38.96	2.01	38.72	2.03
2.6500	38.95	2.02	38.70	2.04
2.6600	38.93	2.03	38.69	2.05
2.6700	38.92	2.04	38.67	2.06
2.6800	38.91	2.05	38.65	2.07
2.6900	38.89	2.06	38.63	2.08
2.7000	38.88	2.07	38.62	2.09

\* value interpolated

\*\*\*\*\*

Test Result for UIM Dielectric Parameter

Fri 08/Sep/2023

Freq Frequency(GHz)

FCC\_eH Limits for Head Epsilon

FCC\_sH Limits for Head Sigma

Test\_e Epsilon of UIM

Test\_s Sigma of UIM

\*\*\*\*\*

Freq	FCC_eH	FCC_sH	Test_e	Test_s
3.4000	38.04	2.81	37.53	2.84
3.4100	38.03	2.82	37.52	2.85
3.4200	38.02	2.83	37.51	2.86
3.4300	38.01	2.84	37.49	2.87
3.4400	38.00	2.85	37.48	2.88
3.4500	37.99	2.86	37.46	2.89
3.4600	37.97	2.87	37.44	2.90
3.4700	37.96	2.88	37.41	2.91
3.4800	37.95	2.89	37.39	2.92
3.4900	37.94	2.90	37.37	2.93
3.5000	37.93	2.91	37.34	2.94
3.5100	37.92	2.92	37.32	2.95
3.5200	37.91	2.93	37.30	2.96
3.5300	37.89	2.94	37.27	2.97
3.5400	37.88	2.95	37.24	2.98
3.5500	37.87	2.96	37.21	2.99
3.5600	37.86	2.97	37.19	3.00
3.5700	37.85	2.98	37.17	3.01
3.5800	37.84	2.99	37.15	3.02
3.5900	37.83	3.00	37.12	3.03
3.6000	37.81	3.02	37.10	3.04
3.6100	37.80	3.03	37.08	3.05
3.6200	37.79	3.04	37.07	3.06
3.6250	37.785	3.045	37.055	3.065*
3.6300	37.78	3.05	37.04	3.07
3.6400	37.77	3.06	37.01	3.08
3.6500	37.76	3.07	36.98	3.09
3.6600	37.75	3.08	36.96	3.10
3.6700	37.73	3.09	36.94	3.11
3.6800	37.72	3.10	36.92	3.12
3.6900	37.71	3.11	36.89	3.13
3.7000	37.70	3.12	36.87	3.14
3.7100	37.69	3.13	36.84	3.15
3.7200	37.68	3.14	36.82	3.16
3.7300	37.67	3.15	36.80	3.17
3.7400	37.65	3.16	36.78	3.18
3.7500	37.64	3.17	36.75	3.19

\* value interpolated

\*\*\*\*\*

Test Result for UIM Dielectric Parameter  
Fri 15/Sep/2023  
Freq Frequency(GHz)  
FCC\_eH Limits for Head Epsilon  
FCC\_sH Limits for Head Sigma  
Test\_e Epsilon of UIM  
Test\_s Sigma of UIM

\*\*\*\*\*

Freq	FCC_eH	FCC_sH	Test_e	Test_s
2.4100	39.26	1.76	38.73	1.78
2.4200	39.25	1.77	38.71	1.79
2.4300	39.24	1.78	38.69	1.80
2.4370	39.226	1.787	38.683	1.814*
2.4400	39.22	1.79	38.68	1.82
2.4420	39.216	1.792	38.67	1.822*
2.4500	39.20	1.80	38.63	1.83
2.4600	39.19	1.81	38.63	1.84
2.4700	39.17	1.82	38.61	1.85
2.4800	39.16	1.83	38.59	1.86

\* value interpolated

\*\*\*\*\*

Test Result for UIM Dielectric Parameter

Fri 15/Sep/2023

Freq Frequency(GHz)

FCC\_eH Limits for Head Epsilon

FCC\_sH Limits for Head Sigma

Test\_e Epsilon of UIM

Test\_s Sigma of UIM

\*\*\*\*\*

Freq	FCC_eH	FCC_sH	Test_e	Test_s
5.1000	36.10	4.55	35.32	4.57
5.1200	36.08	4.57	35.30	4.59
5.1400	36.05	4.59	35.27	4.61
5.1600	36.03	4.61	35.25	4.64
5.1800	36.01	4.63	35.23	4.66
5.2000	35.99	4.65	35.20	4.68
5.2200	35.96	4.68	35.18	4.70
5.2400	35.94	4.70	35.16	4.72
5.2500	35.93	4.71	35.145	4.735*
5.2600	35.92	4.72	35.13	4.75
5.2800	35.89	4.74	35.10	4.77
5.3000	35.87	4.76	35.07	4.79
5.3200	35.85	4.78	35.05	4.81
5.3400	35.83	4.80	35.03	4.84
5.3600	35.80	4.82	35.01	4.86
5.3800	35.78	4.84	34.98	4.88
5.4000	35.76	4.86	34.96	4.90
5.4200	35.73	4.88	34.94	4.93
5.4400	35.71	4.90	34.93	4.95
5.4600	35.69	4.92	34.90	4.97
5.4800	35.67	4.94	34.87	4.99
5.5000	35.64	4.96	34.84	5.01
5.5200	35.62	4.98	34.82	5.03
5.5400	35.60	5.00	34.80	5.05
5.5600	35.57	5.02	34.78	5.08
5.5800	35.55	5.04	34.75	5.10
5.6000	35.53	5.07	34.73	5.12
5.6200	35.51	5.09	34.70	5.14
5.6400	35.48	5.11	34.68	5.17
5.6600	35.46	5.13	34.66	5.19
5.6800	35.44	5.15	34.64	5.21
5.7000	35.41	5.17	34.61	5.23
5.7200	35.39	5.19	34.59	5.26
5.7400	35.37	5.21	34.57	5.28
5.7500	35.36	5.22	34.56	5.29*
5.7600	35.35	5.23	34.55	5.30
5.7800	35.32	5.25	34.53	5.32
5.7850	35.315	5.255	34.52	5.325*
5.8000	35.30	5.27	34.49	5.34
5.8200	35.28	5.29	34.47	5.37
5.8400	35.25	5.31	34.45	5.39
5.8600	35.23	5.33	34.43	5.41

\* value interpolated

# RF Exposure Lab

## Plot 1

**DUT: Dipole 750 MHz D750V3; Type: D750V3; Serial: D750V3 - SN 1053**

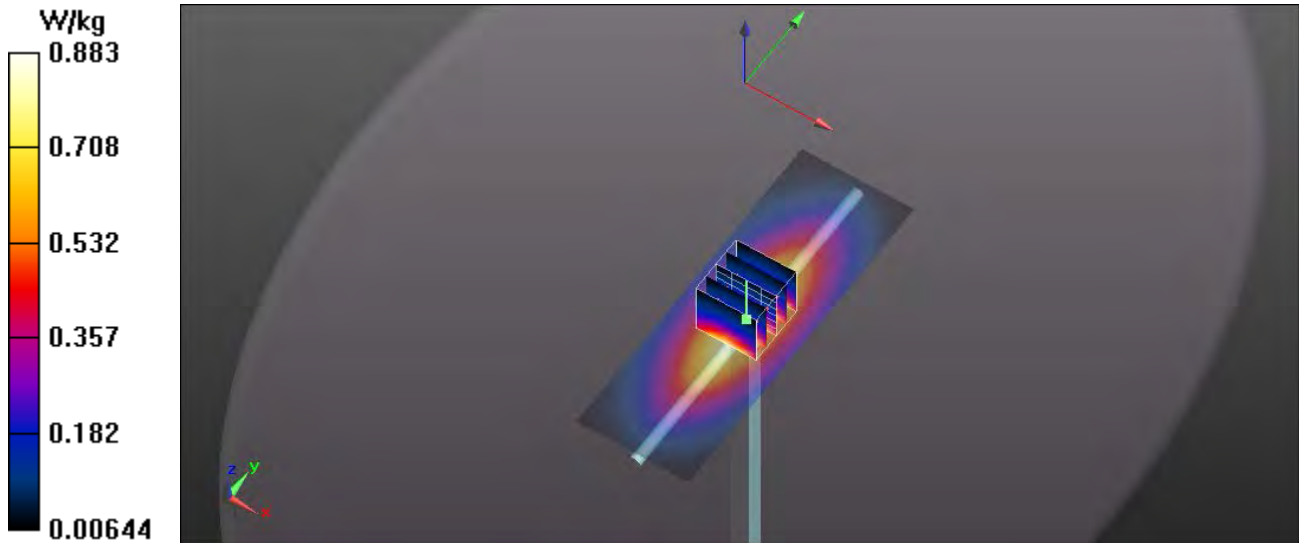
Communication System: CW; Frequency: 750 MHz; Duty Cycle: 1:1  
Medium: HSL750; Medium parameters used (interpolated):  $f = 750$  MHz;  $\sigma = 0.92$  S/m;  $\epsilon_r = 41.19$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

Test Date: Date: 9/6/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C  
Probe: EX3DV4 – SN3662; ConvF(9.28, 9.28, 9.28); Calibrated: 2/10/2023;  
Sensor-Surface: 2mm (Mechanical Surface Detection)  
Electronics: DAE4 Sn1416; Calibrated: 4/19/2023  
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037  
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

### Procedure Notes:

**750 MHz Head/Verification/Area Scan (41x121x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm  
Maximum value of SAR (interpolated) = 0.871 W/kg

**750 MHz Head/Verification /Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 33.964 V/m; Power Drift = -0.03 dB  
Peak SAR (extrapolated) = 1.72 mW/g  
 $P_{in} = 100$  mW  
**SAR(1 g) = 0.861 mW/g; SAR(10 g) = 0.556 mW/g**  
Maximum value of SAR (measured) = 0.885 W/kg



# RF Exposure Lab

## Plot 2

**DUT: Dipole 900 MHz D900V2; Type: D900V2; Serial: D900V2 - SN:1d128**

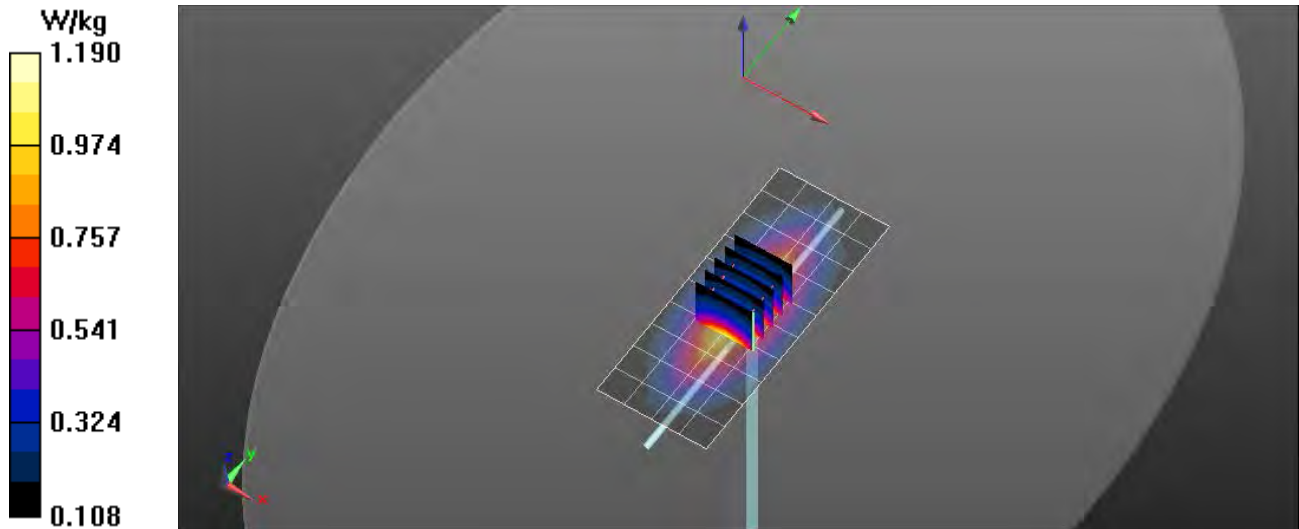
Communication System: CW; Frequency: 900 MHz; Duty Cycle: 1:1  
Medium: HSL900; Medium parameters used:  $f = 900$  MHz;  $\sigma = 0.99$  S/m;  $\epsilon_r = 40.78$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

Test Date: Date: 9/5/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C  
Probe: EX3DV4 – SN3662; ConvF(8.8, 8.8, 8.8); Calibrated: 2/10/2023;  
Sensor-Surface: 2mm (Mechanical Surface Detection)  
Electronics: DAE4 Sn1416; Calibrated: 4/19/2023  
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037  
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

### Procedure Notes:

**900 MHz Head/Verification/Area Scan (5x11x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (measured) = 1.26 W/kg

**900 MHz Head/Verification/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 30.579 V/m; Power Drift = -0.02 dB  
Peak SAR (extrapolated) = 1.51 W/kg  
 $P_{in} = 100$  mW  
**SAR(1 g) = 1.18 W/kg; SAR(10 g) = 0.723 W/kg**  
Maximum value of SAR (measured) = 1.21 W/kg



# RF Exposure Lab

## Plot 3

**DUT: Dipole 1750 MHz D1750V2; Type: D1750V2; Serial: D1750V2 - SN:1061**

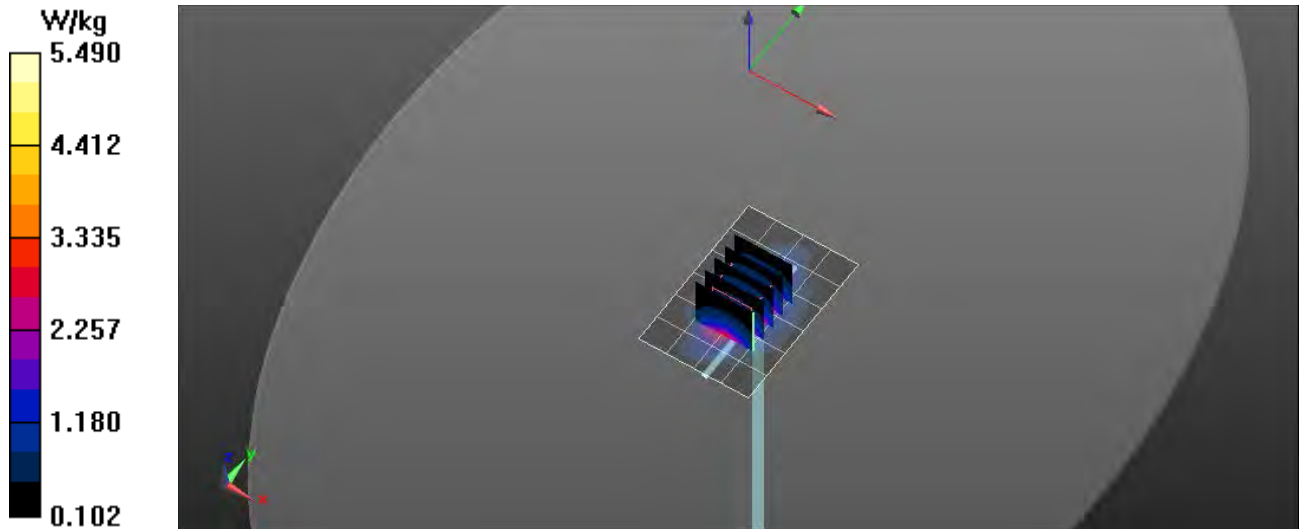
Communication System: CW; Frequency: 1750 MHz; Duty Cycle: 1:1  
Medium: HSL1750; Medium parameters used:  $f = 1750$  MHz;  $\sigma = 1.38$  S/m;  $\epsilon_r = 39.35$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

Test Date: Date: 9/7/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C  
Probe: EX3DV4 – SN3662; ConvF(7.91, 7.91, 7.91); Calibrated: 2/10/2023;  
Sensor-Surface: 2mm (Mechanical Surface Detection)  
Electronics: DAE4 Sn1416; Calibrated: 4/19/2023  
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037  
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

### Procedure Notes:

**1750 MHz Head/Verification/Area Scan (5x7x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (measured) = 5.41 W/kg

**1750 MHz Head/Verification/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 34.269 V/m; Power Drift = -0.02 dB  
Peak SAR (extrapolated) = 6.91 W/kg  
 $P_{in} = 100$  mW  
**SAR(1 g) = 3.82 W/kg; SAR(10 g) = 2.01 W/kg**  
Maximum value of SAR (measured) = 5.49 W/kg



# RF Exposure Lab

## Plot 4

**DUT: Dipole 1900 MHz D1900V2; Type: D1900V2; Serial: D1900V2 - SN: 5d147**

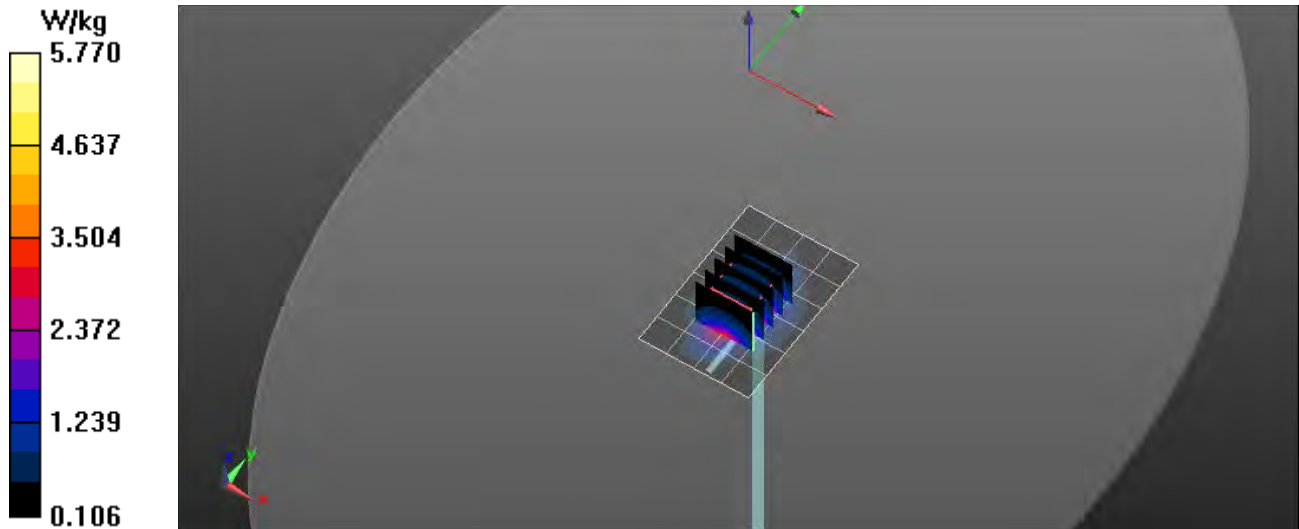
Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1  
 Medium: HSL1900; Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.43$  S/m;  $\epsilon_r = 39.44$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Phantom section: Flat Section

Test Date: Date: 8/31/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C  
 Probe: EX3DV4 – SN3662; ConvF(7.67, 7.67, 7.67); Calibrated: 2/10/2023;  
 Sensor-Surface: 2mm (Mechanical Surface Detection)  
 Electronics: DAE4 Sn1416; Calibrated: 4/19/2023  
 Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037  
 Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

### Procedure Notes:

**1900 MHz Head/Verification/Area Scan (5x7x1):** Measurement grid: dx=15mm, dy=15mm  
 Maximum value of SAR (measured) = 5.75 W/kg

**1900 MHz Head/Verification/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
 Reference Value = 35.267 V/m; Power Drift = -0.03 dB  
 Peak SAR (extrapolated) = 7.22 W/kg  
 $P_{in} = 100$  mW  
**SAR(1 g) = 4.15 W/kg; SAR(10 g) = 2.15 W/kg**  
 Maximum value of SAR (measured) = 5.77 W/kg





# RF Exposure Lab

## Plot 5

**DUT: Dipole 2550 MHz D2550V2; Type: D2550V2; Serial: D2550V2 - SN:1003**

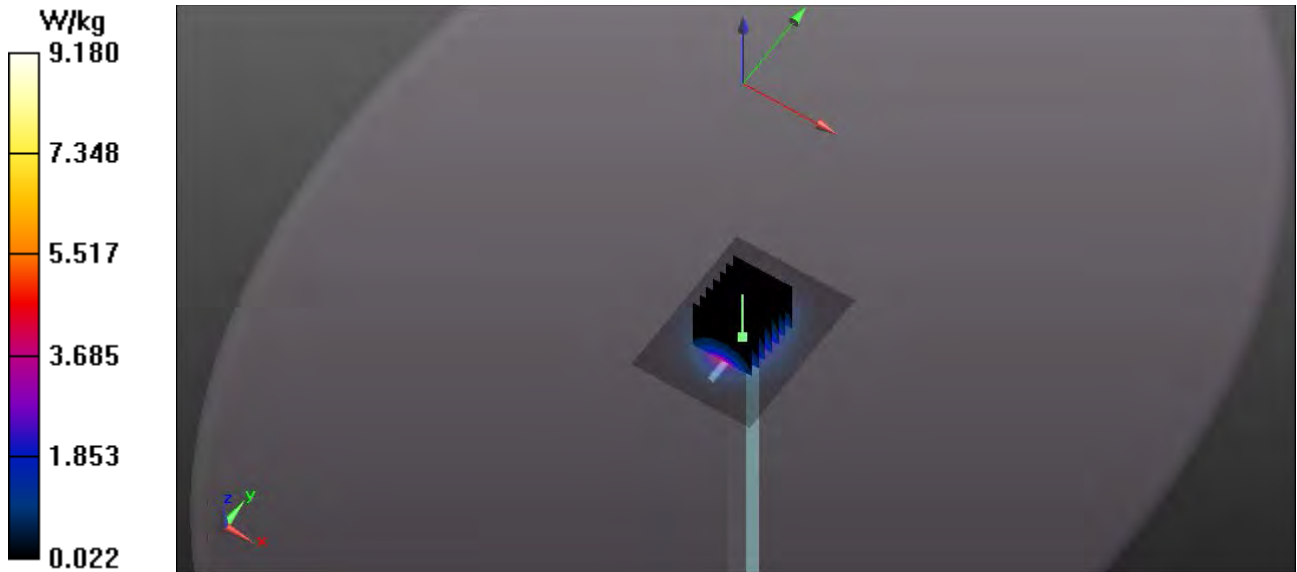
Communication System: CW; Frequency: 2550 MHz; Duty Cycle: 1:1  
Medium: HSL2550; Medium parameters used:  $f = 2550$  MHz;  $\sigma = 1.94$  S/m;  $\epsilon_r = 38.88$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

Test Date: Date: 9/1/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C  
Probe: EX3DV4 – SN3662; ConvF(7.11, 7.11, 7.11); Calibrated: 2/10/2023;  
Sensor-Surface: 2mm (Mechanical Surface Detection)  
Electronics: DAE4 Sn1416; Calibrated: 4/19/2023  
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037  
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

### Procedure Notes:

**2550 MHz Head/Verification/Area Scan (61x81x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm  
Maximum value of SAR (interpolated) = 9.16 W/kg

**2550 MHz Head/Verification/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm  
Reference Value = 56.394 V/m; Power Drift = -0.02 dB  
Peak SAR (extrapolated) = 11.9 W/kg  
 $P_{in} = 100$  mW  
**SAR(1 g) = 5.69 W/kg; SAR(10 g) = 2.48 W/kg**  
Maximum value of SAR (measured) = 9.17 W/kg



# RF Exposure Lab

## Plot 6

**DUT: Dipole D3700V2; Type: D3700V2; Serial: D3700V2 - SN: 1024**

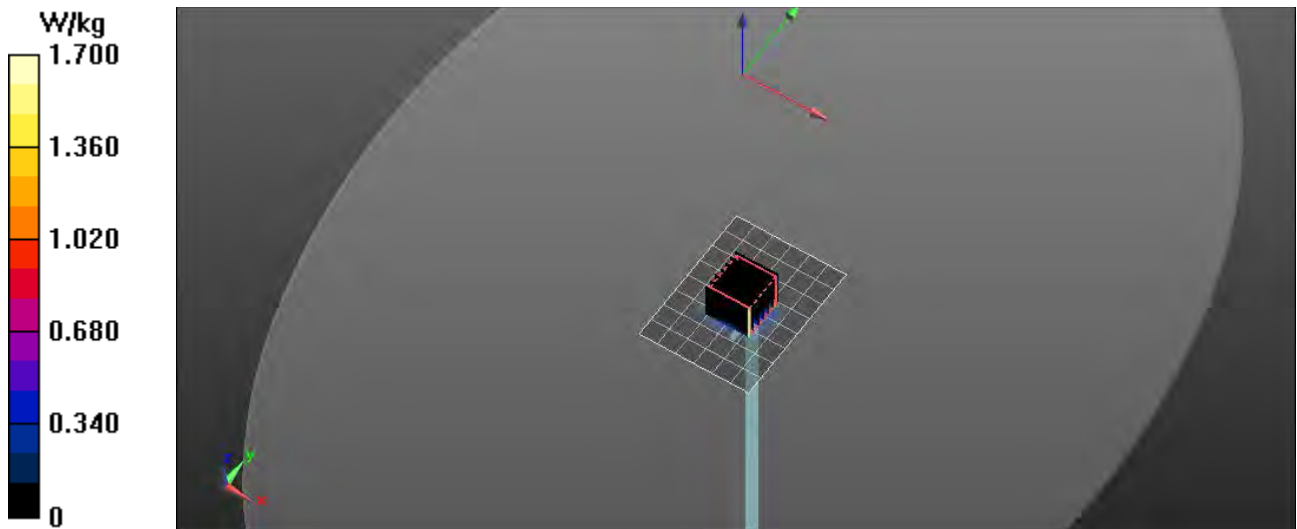
Communication System: CW; Frequency: 3700 MHz; Duty Cycle: 1:1  
 Medium: HSL3600; Medium parameters used:  $f = 3700$  MHz;  $\sigma = 3.14$  S/m;  $\epsilon_r = 36.87$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Phantom section: Flat Section

Test Date: Date: 9/8/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C  
 Probe: EX3DV4 – SN7530; ConvF(6.51, 6.52, 6.65); Calibrated: 1/17/2023;  
 Sensor-Surface: 2mm (Mechanical Surface Detection)  
 Electronics: DAE4 Sn1416; Calibrated: 4/19/2023  
 Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037  
 Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

### Procedure Notes:

**3700 MHz Head/Verification/Area Scan (7x9x1):** Measurement grid: dx=10mm, dy=10mm  
 Maximum value of SAR (measured) = 1.68 W/kg

**3700 MHz Head/Verification/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=4mm  
 Reference Value = 22.773 V/m; Power Drift = -0.01 dB  
 Peak SAR (extrapolated) = 3.74 W/kg  
 $P_{in} = 10$  mW  
**SAR(1 g) = 0.694 W/kg; SAR(10 g) = 0.253 W/kg**  
 Maximum value of SAR (measured) = 1.71 W/kg



# RF Exposure Lab

## Plot 7

**DUT: Dipole 2450 MHz D2450V2; Type: D2450V2; Serial: D2450V2 - SN: 881**

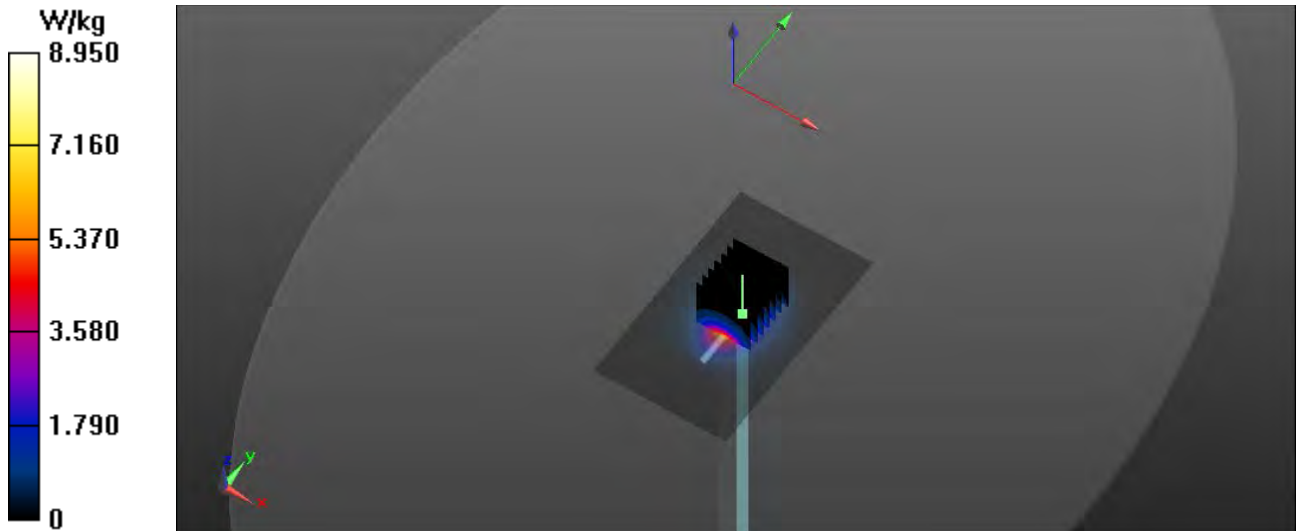
Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1  
 Medium: HSL2450; Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.83$  S/m;  $\epsilon_r = 38.63$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Phantom section: Flat Section

Test Date: Date: 9/15/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C  
 Probe: EX3DV4 – SN7530 ConvF(7.18, 7.11, 7.21); Calibrated: 1/17/2023;  
 Sensor-Surface: 2mm (Mechanical Surface Detection)  
 Electronics: DAE4 Sn1416; Calibrated: 4/19/2023  
 Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037  
 Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

### Procedure Notes:

**2450 MHz Head/Verification/Area Scan (61x101x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm  
 Maximum value of SAR (interpolated) = 8.22 W/kg

**2450 MHz Head/Verification/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm  
 Reference Value = 56.025 V/m; Power Drift = -0.03 dB  
 Peak SAR (extrapolated) = 11.05 W/kg  
 $P_{in} = 100$  mW  
**SAR(1 g) = 5.49 W/kg; SAR(10 g) = 2.54 W/kg**  
 Maximum value of SAR (measured) = 8.96 W/kg



# RF Exposure Lab

## Plot 8

**DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1119**

Communication System: CW; Frequency: 5250 MHz; Duty Cycle: 1:1  
Medium: HSL5GHz; Medium parameters used (interpolated):  $f = 5250$  MHz;  $\sigma = 4.735$  S/m;  $\epsilon_r = 35.145$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

Test Date: Date: 9/15/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C  
Probe: EX3DV4 – SN7530; ConvF(5.26, 5.2, 5.38); Calibrated: 1/17/2023;  
Sensor-Surface: 2mm (Mechanical Surface Detection)  
Electronics: DAE4 Sn1416; Calibrated: 4/19/2023  
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037  
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

### Procedure Notes:

**5250 MHz Head/Verification/Area Scan (61x81x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 1.47 W/kg

**5250 MHz Head/Verification/Zoom Scan (7x7x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 15.267 V/m; Power Drift = -0.02 dB

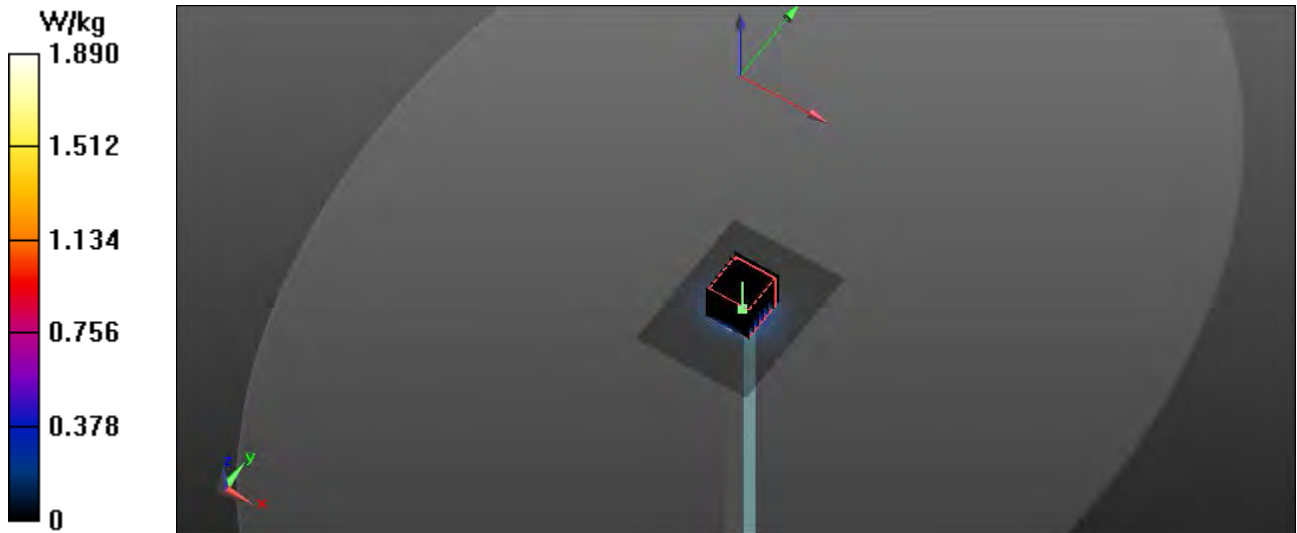
Peak SAR (extrapolated) = 3.22 W/kg

Pin=10 mW

**SAR(1 g) = 0.808 W/kg; SAR(10 g) = 0.227 W/kg**

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 1.88 W/kg



# RF Exposure Lab

## Plot 9

**DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1119**

Communication System: CW; Frequency: 5600 MHz; Duty Cycle: 1:1  
Medium: HSL5GHz; Medium parameters used:  $f = 5600$  MHz;  $\sigma = 5.12$  S/m;  $\epsilon_r = 34.73$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

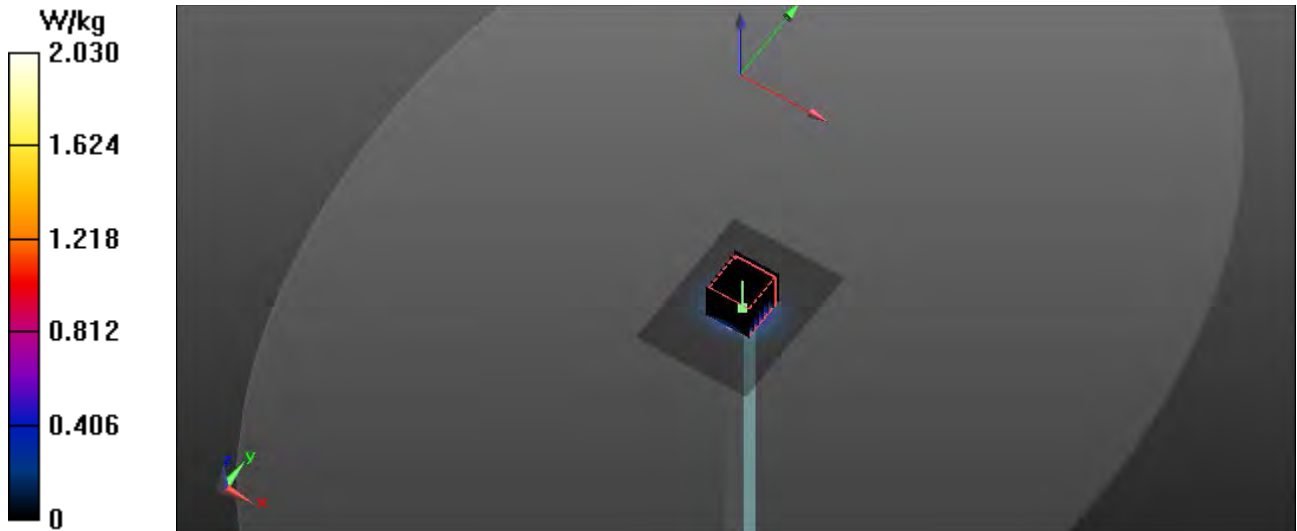
Test Date: Date: 9/15/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C  
Probe: EX3DV4 – SN7530; ConvF(4.49, 4.39, 4.63); Calibrated: 1/17/2023;  
Sensor-Surface: 2mm (Mechanical Surface Detection)  
Electronics: DAE4 Sn1416; Calibrated: 4/19/2023  
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037  
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

### Procedure Notes:

**Head Verification/5600 MHz/Area Scan (61x81x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm  
Maximum value of SAR (interpolated) = 1.72 W/kg

**Head Verification/5600 MHz/Zoom Scan (7x7x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm  
Reference Value = 15.398 V/m; Power Drift = -0.02 dB  
Peak SAR (extrapolated) = 3.59 W/kg  
Pin=10 mW

**SAR(1 g) = 0.841 W/kg; SAR(10 g) = 0.243 W/kg**  
Maximum value of SAR (measured) = 2.01 W/kg



# RF Exposure Lab

## Plot 10

**DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1119**

Communication System: CW; Frequency: 5750 MHz; Duty Cycle: 1:1  
Medium: HSL5GHz; Medium parameters used (interpolated):  $f = 5750$  MHz;  $\sigma = 5.29$  S/m;  $\epsilon_r = 34.56$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

Test Date: Date: 9/15/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C  
Probe: EX3DV4 – SN7530; ConvF(4.6, 4.58, 4.72); Calibrated: 1/17/2023;  
Sensor-Surface: 2mm (Mechanical Surface Detection)  
Electronics: DAE4 Sn1416; Calibrated: 4/19/2023  
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037  
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

### Procedure Notes:

**5750 MHz Head/Verification/Area Scan (61x81x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 1.61 W/kg

**5750 MHz Head/Verification/Zoom Scan (7x7x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 14.521 V/m; Power Drift = -0.02 dB

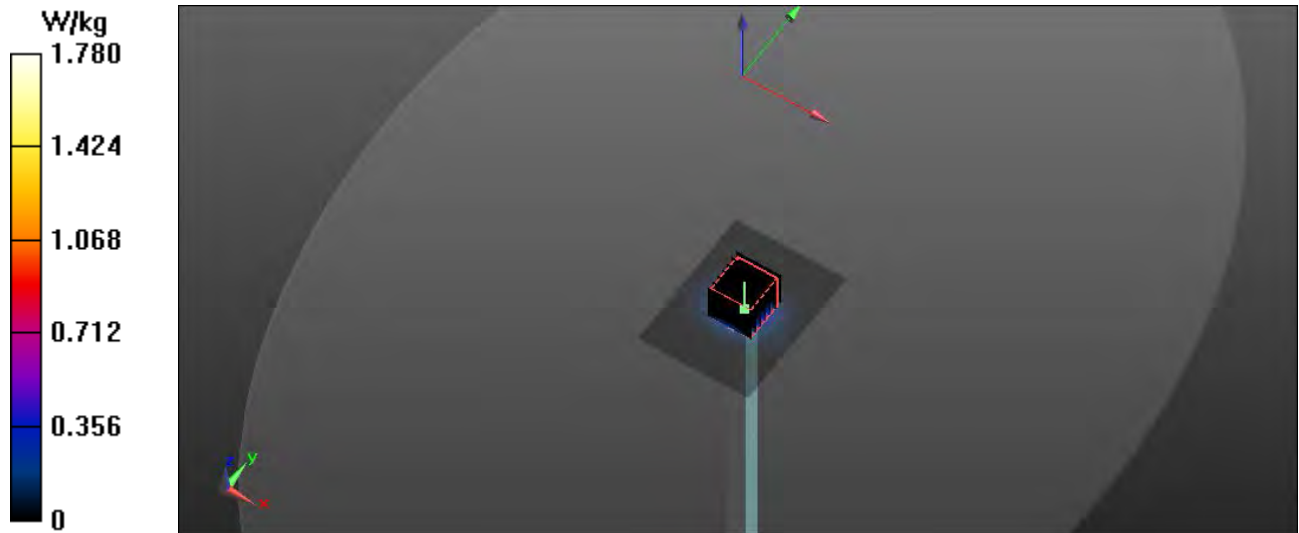
Peak SAR (extrapolated) = 2.34 W/kg

Pin=10 mW

**SAR(1 g) = 0.812 W/kg; SAR(10 g) = 0.235 W/kg**

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 1.78 W/kg



## Appendix B – SAR Test Data Plots

# RF Exposure Lab

## Plot 1

**DUT: PRO460; Type: Wireless TV Video Case; Serial: AVWPRO40523008992**

Communication System: UMTS (WCDMA); Frequency: 1880 MHz; Duty Cycle: 1:1  
Medium: HSL1900; Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.43$  S/m;  $\epsilon_r = 39.475$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

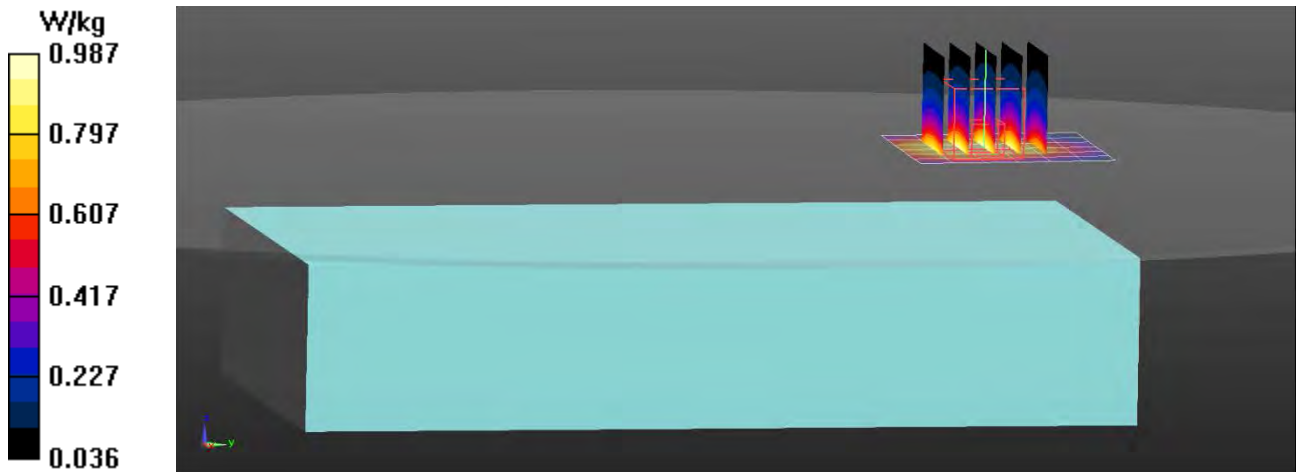
Test Date: Date: 8/31/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(7.67, 7.67, 7.67); Calibrated: 2/10/2023  
Sensor-Surface: 2mm (Mechanical Surface Detection)  
Electronics: DAE4 Sn1416; Calibrated: 4/19/2023  
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037  
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

### Procedure Notes:

**UMTS B2/Ant M2 Mid/Area Scan (7x7x1):** Measurement grid: dx=10mm, dy=10mm  
Maximum value of SAR (measured) = 0.979 W/kg

**UMTS B2/Ant M2 Mid/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 9.541 V/m; Power Drift = 0.01 dB  
Peak SAR (extrapolated) = 1.19 W/kg  
**SAR(1 g) = 0.776 W/kg; SAR(10 g) = 0.496 W/kg**  
Maximum value of SAR (measured) = 0.987 W/kg





# RF Exposure Lab

## Plot 2

**DUT: PRO460; Type: Wireless TV Video Case; Serial: AVWPRO40523008992**

Communication System: UMTS (WCDMA); Frequency: 1732.6 MHz; Duty Cycle: 1:1  
Medium: HSL1750; Medium parameters used (interpolated):  $f = 1732.6$  MHz;  $\sigma = 1.363$  S/m;  $\epsilon_r = 39.385$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

Test Date: Date: 9/7/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(7.91, 7.91, 7.91); Calibrated: 2/10/2023  
Sensor-Surface: 2mm (Mechanical Surface Detection)  
Electronics: DAE4 Sn1416; Calibrated: 4/19/2023  
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037  
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

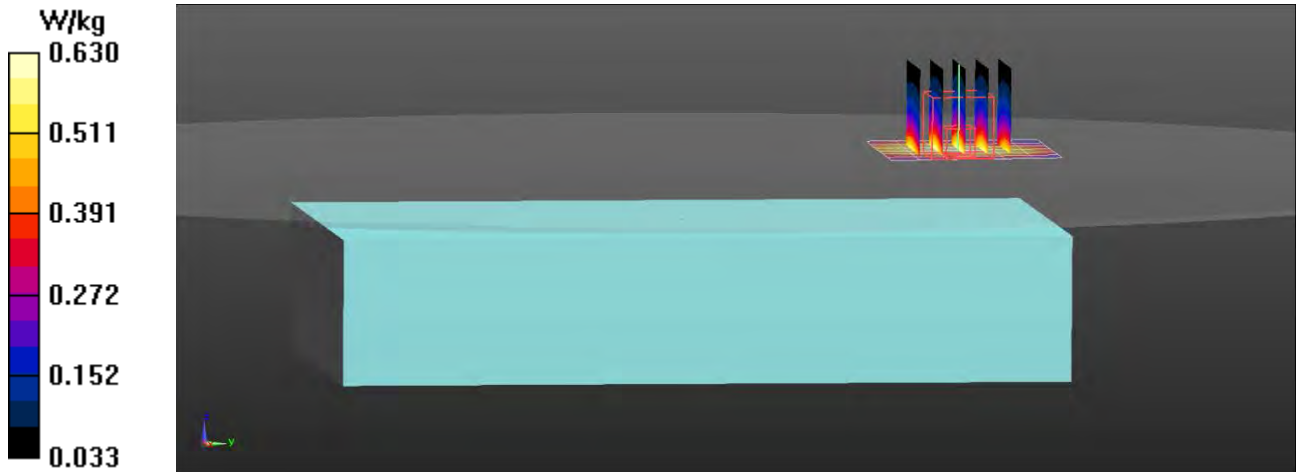
### Procedure Notes:

**UMTS B4/Ant M2 Mid/Area Scan (7x7x1):** Measurement grid: dx=10mm, dy=10mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)  
Maximum value of SAR (measured) = 0.627 W/kg

**UMTS B4/Ant M2 Mid/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 9.139 V/m; Power Drift = -0.07 dB  
Peak SAR (extrapolated) = 0.744 W/kg  
**SAR(1 g) = 0.499 W/kg; SAR(10 g) = 0.326 W/kg**

[Info: Interpolated medium parameters used for SAR evaluation.](#)  
Maximum value of SAR (measured) = 0.630 W/kg



# RF Exposure Lab

## Plot 3

**DUT: PRO460; Type: Wireless TV Video Case; Serial: AVWPRO40523008992**

Communication System: UMTS (WCDMA); Frequency: 836.6 MHz; Duty Cycle: 1:1  
Medium: HSL900; Medium parameters used (interpolated):  $f = 836.6$  MHz;  $\sigma = 0.927$  S/m;  $\epsilon_r = 40.88$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

Test Date: Date: 9/5/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(8.8, 8.8, 8.8); Calibrated: 2/10/2023  
Sensor-Surface: 2mm (Mechanical Surface Detection)  
Electronics: DAE4 Sn1416; Calibrated: 4/19/2023  
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037  
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

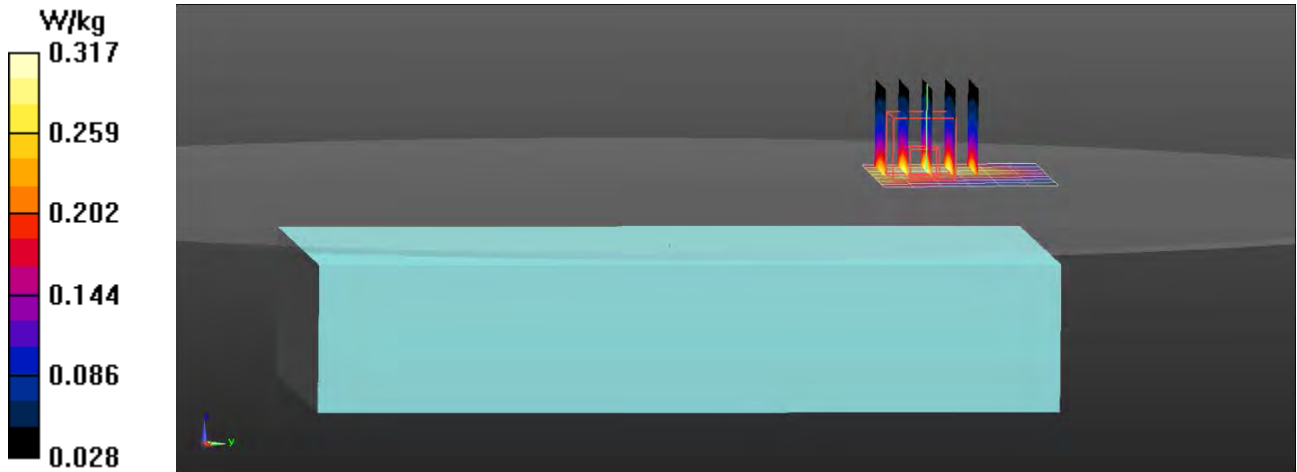
### Procedure Notes:

**UMTS B5/Ant M2 Mid/Area Scan (8x7x1):** Measurement grid: dx=10mm, dy=10mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)  
Maximum value of SAR (measured) = 0.320 W/kg

**UMTS B5/Ant M2 Mid/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 10.25 V/m; Power Drift = -0.04 dB  
Peak SAR (extrapolated) = 0.368 W/kg  
**SAR(1 g) = 0.255 W/kg; SAR(10 g) = 0.172 W/kg**

[Info: Interpolated medium parameters used for SAR evaluation.](#)  
Maximum value of SAR (measured) = 0.317 W/kg



# RF Exposure Lab

## Plot 4

**DUT: PRO460; Type: Wireless TV Video Case; Serial: AVWPRO40523008992**

Communication System: LTE (SC-FDMA, 1 RB, 20 MHz, QPSK); Frequency: 2535 MHz; Duty Cycle: 1:1  
Medium: HSL2550; Medium parameters used (interpolated):  $f = 2535$  MHz;  $\sigma = 1.915$  S/m;  $\epsilon_r = 38.915$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

Test Date: Date: 9/1/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(7.11, 7.11, 7.11); Calibrated: 2/10/2023  
Sensor-Surface: 2mm (Mechanical Surface Detection)  
Electronics: DAE4 Sn1416; Calibrated: 4/19/2023  
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037  
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

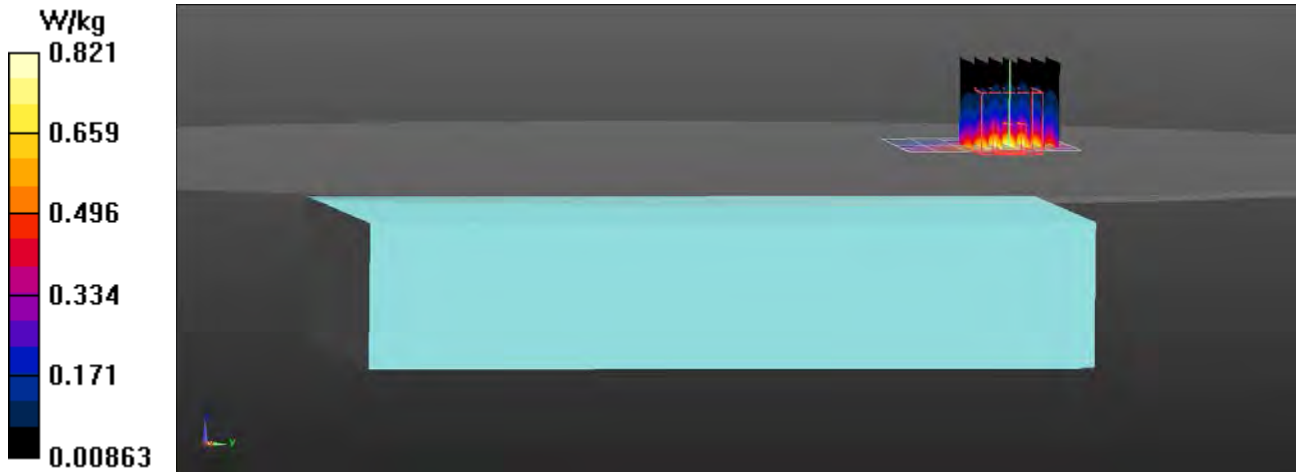
### Procedure Notes:

**B7 LTE/Ant M2 Mid 1 RB 49 Offset/Area Scan (7x7x1):** Measurement grid: dx=10mm, dy=10mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)  
Maximum value of SAR (measured) = 0.791 W/kg

**B7 LTE/Ant M2 Mid 1 RB 49 Offset/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm  
Reference Value = 6.891 V/m; Power Drift = -0.05 dB  
Peak SAR (extrapolated) = 1.04 W/kg  
**SAR(1 g) = 0.594 W/kg; SAR(10 g) = 0.337 W/kg**

[Info: Interpolated medium parameters used for SAR evaluation.](#)  
Maximum value of SAR (measured) = 0.821 W/kg



# RF Exposure Lab

## Plot 5

**DUT: PRO460; Type: Wireless TV Video Case; Serial: AVWPRO40523008992**

Communication System: LTE (SC-FDMA, 1 RB, 10 MHz, QPSK); Frequency: 707.5 MHz; Duty Cycle: 1:1  
Medium: HSL750; Medium parameters used (interpolated):  $f = 707.5$  MHz;  $\sigma = 0.888$  S/m;  $\epsilon_r = 41.438$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

Test Date: Date: 9/6/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(9.28, 9.28, 9.28); Calibrated: 2/10/2023  
Sensor-Surface: 2mm (Mechanical Surface Detection)  
Electronics: DAE4 Sn1416; Calibrated: 4/19/2023  
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037  
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

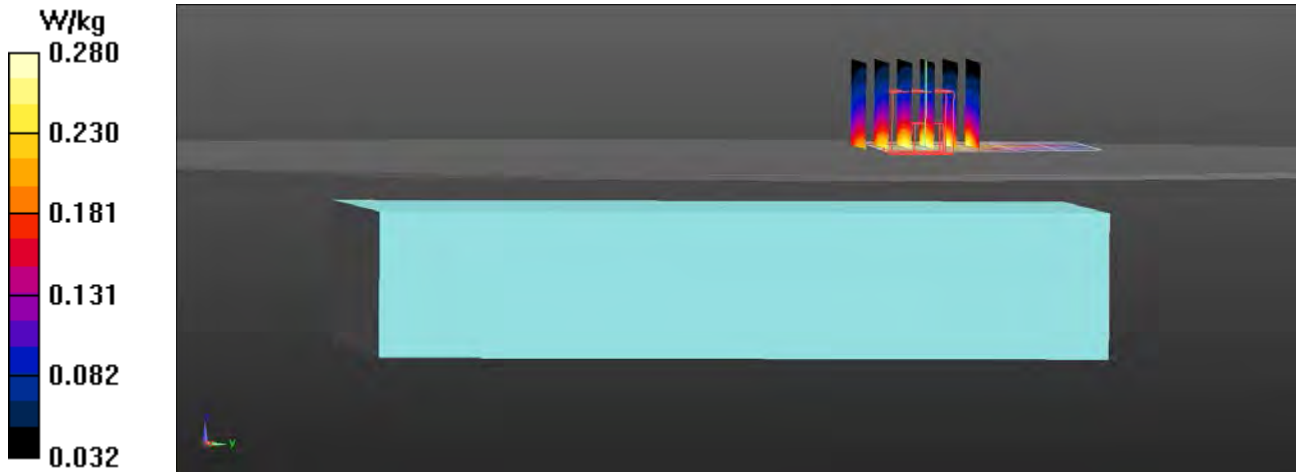
### Procedure Notes:

**B12 LTE/Ant M2 Mid 1 RB 24 Offset/Area Scan (6x6x1):** Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)  
Maximum value of SAR (measured) = 0.275 W/kg

**B12 LTE/Ant M2 Mid 1 RB 24 Offset/Zoom Scan (6x6x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 8.635 V/m; Power Drift = -0.01 dB  
Peak SAR (extrapolated) = 0.321 W/kg  
**SAR(1 g) = 0.231 W/kg; SAR(10 g) = 0.166 W/kg**

[Info: Interpolated medium parameters used for SAR evaluation.](#)  
Maximum value of SAR (measured) = 0.280 W/kg



# RF Exposure Lab

## Plot 6

**DUT: PRO460; Type: Wireless TV Video Case; Serial: AVWPRO40523008992**

Communication System: LTE (SC-FDMA, 1 RB, 10 MHz, QPSK); Frequency: 782 MHz; Duty Cycle: 1:1  
Medium: HSL750; Medium parameters used (interpolated):  $f = 782 \text{ MHz}$ ;  $\sigma = 0.942 \text{ S/m}$ ;  $\epsilon_r = 40.998$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Flat Section

Test Date: Date: 9/6/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(9.28, 9.28, 9.28); Calibrated: 2/10/2023  
Sensor-Surface: 2mm (Mechanical Surface Detection)  
Electronics: DAE4 Sn1416; Calibrated: 4/19/2023  
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037  
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

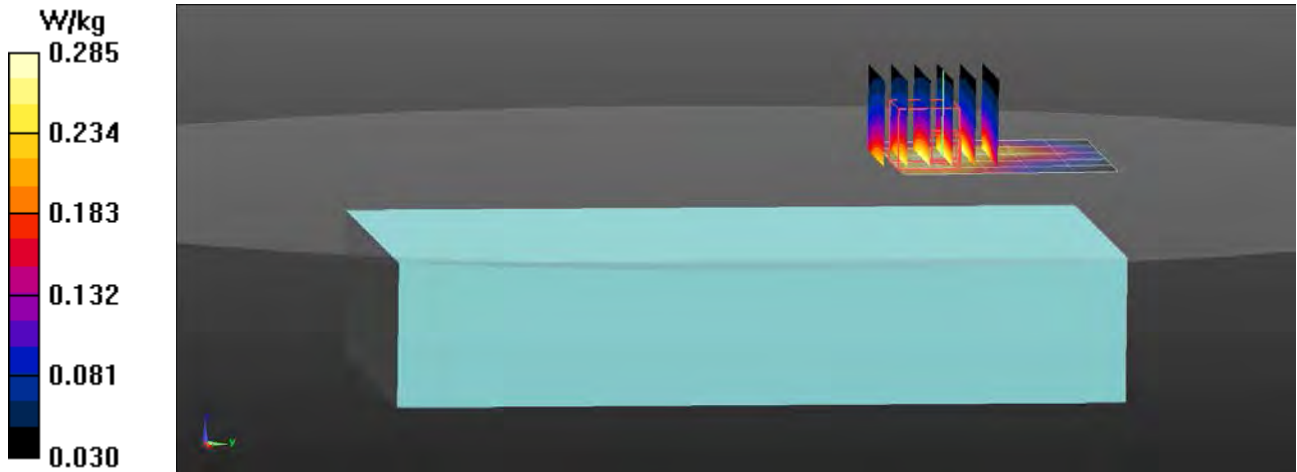
### Procedure Notes:

**B13 LTE/Ant M2 Mid 1 RB 24 Offset/Area Scan (6x6x1):** Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)  
Maximum value of SAR (measured) = 0.279 W/kg

**B13 LTE/Ant M2 Mid 1 RB 24 Offset/Zoom Scan (6x6x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 10.64 V/m; Power Drift = 0.02 dB  
Peak SAR (extrapolated) = 0.327 W/kg  
**SAR(1 g) = 0.234 W/kg; SAR(10 g) = 0.167 W/kg**

[Info: Interpolated medium parameters used for SAR evaluation.](#)  
Maximum value of SAR (measured) = 0.285 W/kg



# RF Exposure Lab

## Plot 7

**DUT: PRO460; Type: Wireless TV Video Case; Serial: AVWPRO40523008992**

Communication System: LTE (SC-FDMA, 1 RB, 10 MHz, QPSK); Frequency: 793 MHz; Duty Cycle: 1:1  
Medium: HSL750; Medium parameters used (interpolated):  $f = 793$  MHz;  $\sigma = 0.95$  S/m;  $\epsilon_r = 40.938$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

Test Date: Date: 9/7/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(9.28, 9.28, 9.28); Calibrated: 2/10/2023  
Sensor-Surface: 2mm (Mechanical Surface Detection)  
Electronics: DAE4 Sn1416; Calibrated: 4/19/2023  
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037  
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

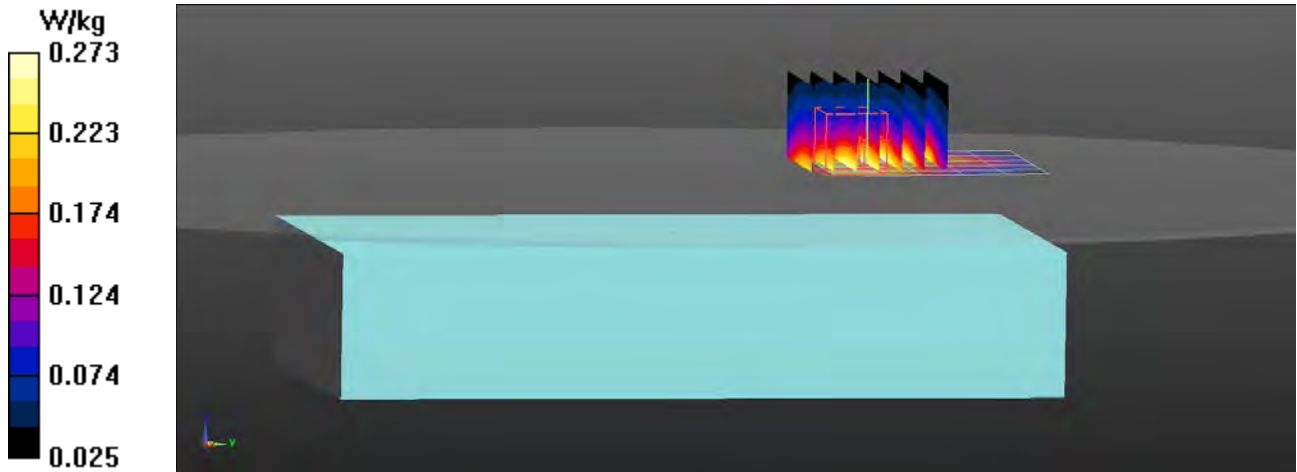
### Procedure Notes:

**B14 LTE/Ant M2 Mid 1 RB 24 Offset/Area Scan (6x6x1):** Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)  
Maximum value of SAR (measured) = 0.267 W/kg

**B14 LTE/Ant M2 Mid 1 RB 24 Offset/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 10.96 V/m; Power Drift = -0.04 dB  
Peak SAR (extrapolated) = 0.316 W/kg  
**SAR(1 g) = 0.224 W/kg; SAR(10 g) = 0.161 W/kg**

[Info: Interpolated medium parameters used for SAR evaluation.](#)  
Maximum value of SAR (measured) = 0.273 W/kg



# RF Exposure Lab

## Plot 8

**DUT: PRO460; Type: Wireless TV Video Case; Serial: AVWPRO40523008992**

Communication System: LTE (SC-FDMA, 1 RB, 20 MHz, QPSK); Frequency: 1882.5 MHz; Duty Cycle: 1:1  
Medium: HSL1900; Medium parameters used (interpolated):  $f = 1882.5$  MHz;  $\sigma = 1.43$  S/m;  $\epsilon_r = 39.475$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

Test Date: Date: 8/31/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(7.67, 7.67, 7.67); Calibrated: 2/10/2023  
Sensor-Surface: 2mm (Mechanical Surface Detection)  
Electronics: DAE4 Sn1416; Calibrated: 4/19/2023  
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037  
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

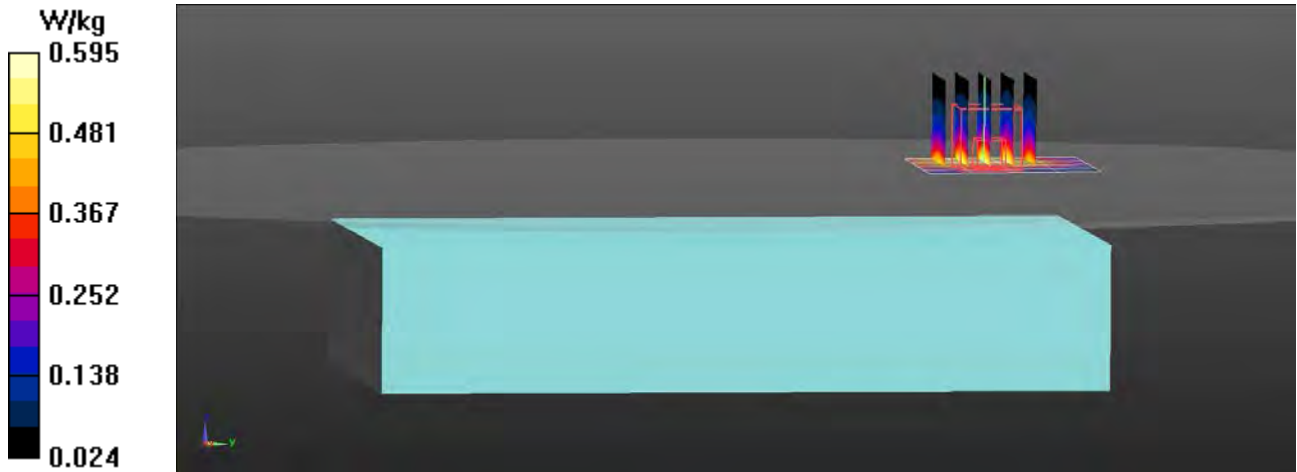
### Procedure Notes:

**B25 LTE/Ant M2 Mid 1 RB 49 Offset/Area Scan (5x5x1):** Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)  
Maximum value of SAR (measured) = 0.596 W/kg

**B25 LTE/Ant M2 Mid 1 RB 49 Offset/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 7.217 V/m; Power Drift = -0.04 dB  
Peak SAR (extrapolated) = 0.715 W/kg  
**SAR(1 g) = 0.467 W/kg; SAR(10 g) = 0.298 W/kg**

[Info: Interpolated medium parameters used for SAR evaluation.](#)  
Maximum value of SAR (measured) = 0.595 W/kg





# RF Exposure Lab

## Plot 9

**DUT: PRO460; Type: Wireless TV Video Case; Serial: AVWPRO40523008992**

Communication System: LTE (SC-FDMA, 1 RB, 15 MHz, QPSK); Frequency: 831.5 MHz; Duty Cycle: 1:1  
Medium: HSL900; Medium parameters used (interpolated):  $f = 831.5$  MHz;  $\sigma = 0.922$  S/m;  $\epsilon_r = 40.896$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

Test Date: Date: 9/6/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(8.8, 8.8, 8.8); Calibrated: 2/10/2023  
Sensor-Surface: 2mm (Mechanical Surface Detection)  
Electronics: DAE4 Sn1416; Calibrated: 4/19/2023  
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037  
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

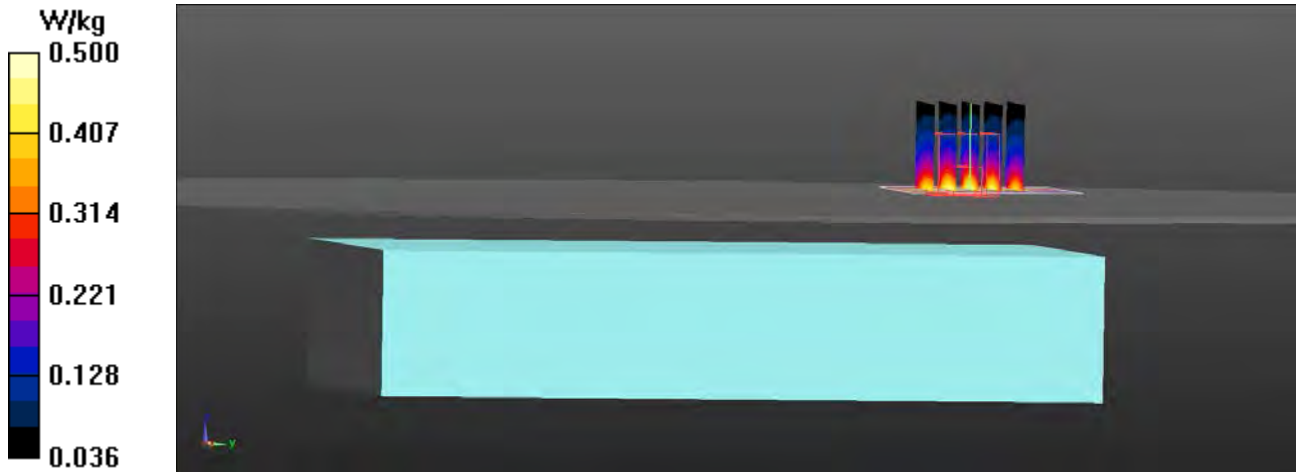
### Procedure Notes:

**B26 LTE/Ant M2 Mid 1 RB 37 Offset/Area Scan (5x5x1):** Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)  
Maximum value of SAR (measured) = 0.492 W/kg

**B26 LTE/Ant M2 Mid 1 RB 37 Offset/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 11.03 V/m; Power Drift = 0.01 dB  
Peak SAR (extrapolated) = 0.588 W/kg  
**SAR(1 g) = 0.394 W/kg; SAR(10 g) = 0.260 W/kg**

[Info: Interpolated medium parameters used for SAR evaluation.](#)  
Maximum value of SAR (measured) = 0.500 W/kg





# RF Exposure Lab

## Plot 10

**DUT: PRO460; Type: Wireless TV Video Case; Serial: AVWPRO40523008992**

Communication System: LTE (SC-FDMA, 1 RB, 20 MHz, QPSK); Frequency: 2593 MHz; Duty Cycle: 1:1  
Medium: HSL2550; Medium parameters used (interpolated):  $f = 2593$  MHz;  $\sigma = 1.99$  S/m;  $\epsilon_r = 38.783$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

Test Date: Date: 9/1/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(7.11, 7.11, 7.11); Calibrated: 2/10/2023  
Sensor-Surface: 2mm (Mechanical Surface Detection)  
Electronics: DAE4 Sn1416; Calibrated: 4/19/2023  
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037  
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

### Procedure Notes:

**B41 LTE/Ant M2 Mid 1 RB 49 Offset/Area Scan (7x7x1):** Measurement grid: dx=10mm, dy=10mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.862 W/kg

**B41 LTE/Ant M2 Mid 1 RB 49 Offset/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

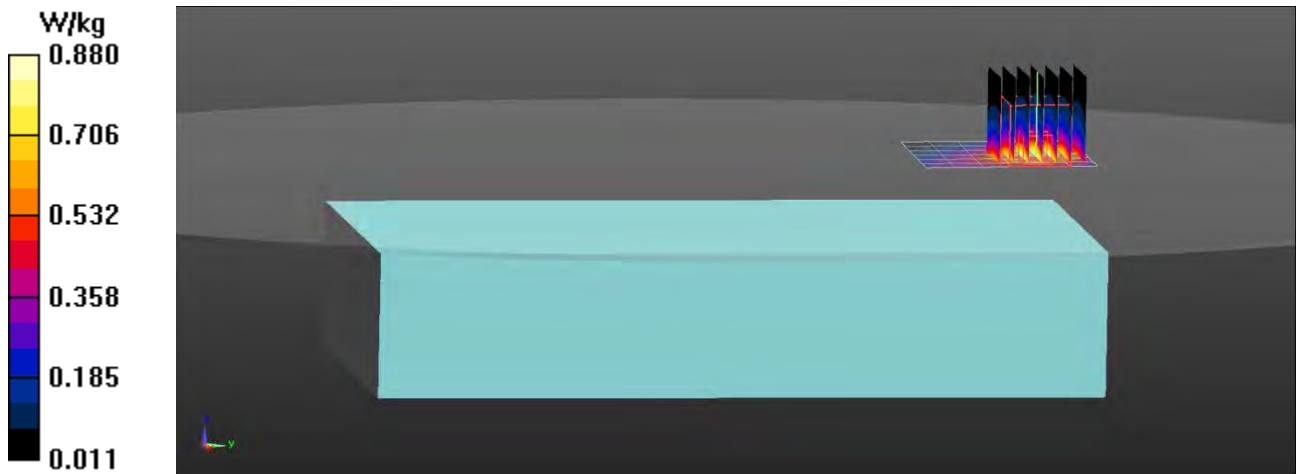
Reference Value = 6.422 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 1.12 W/kg

**SAR(1 g) = 0.646 W/kg; SAR(10 g) = 0.363 W/kg**

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.880 W/kg



# RF Exposure Lab

## Plot 11

**DUT: PRO460; Type: Wireless TV Video Case; Serial: AVWPRO40523008992**

Communication System: LTE (SC-FDMA, 1 RB, 20 MHz, QPSK); Frequency: 3625 MHz; Duty Cycle: 1:1  
Medium: HSL3600; Medium parameters used (interpolated):  $f = 3625$  MHz;  $\sigma = 3.065$  S/m;  $\epsilon_r = 37.055$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

Test Date: Date: 9/8/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN7530; ConvF(6.51, 6.52, 6.65); Calibrated: 1/17/2023  
Sensor-Surface: 2mm (Mechanical Surface Detection)  
Electronics: DAE4 Sn1416; Calibrated: 4/19/2023  
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037  
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

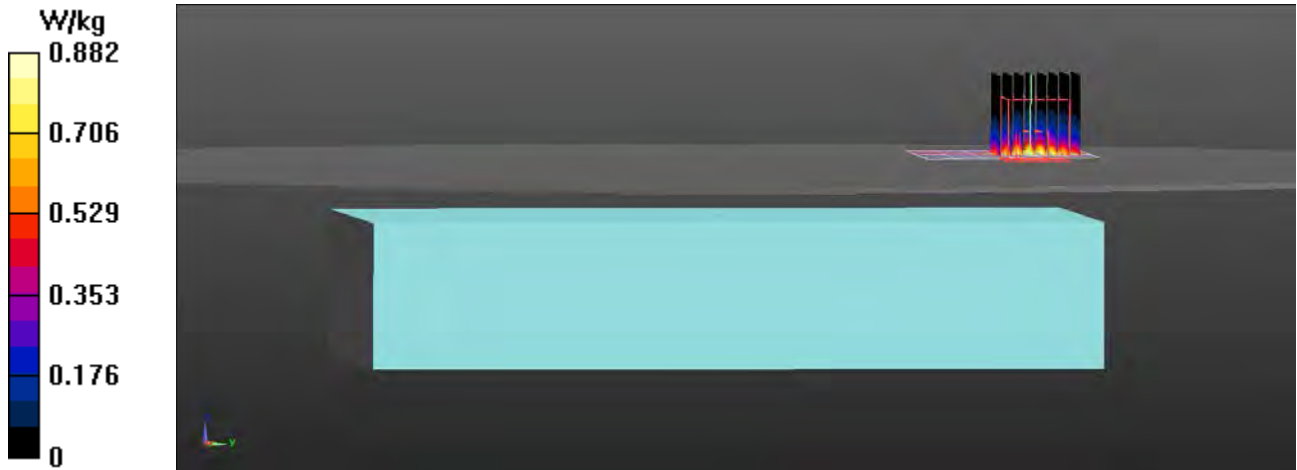
### Procedure Notes:

**B48 LTE/Ant M2 Mid 1 RB 49 Offset/Area Scan (7x7x1):** Measurement grid: dx=10mm, dy=10mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)  
Maximum value of SAR (measured) = 0.856 W/kg

**B48 LTE/Ant M2 Mid 1 RB 49 Offset/Zoom Scan (8x8x8)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=4mm  
Reference Value = 3.951 V/m; Power Drift = -0.02 dB  
Peak SAR (extrapolated) = 1.26 W/kg  
**SAR(1 g) = 0.575 W/kg; SAR(10 g) = 0.280 W/kg**

[Info: Interpolated medium parameters used for SAR evaluation.](#)  
Maximum value of SAR (measured) = 0.882 W/kg



# RF Exposure Lab

## Plot 12

**DUT: PRO460; Type: Wireless TV Video Case; Serial: AVWPRO40523008992**

Communication System: LTE (SC-FDMA, 1 RB, 20 MHz, QPSK); Frequency: 1745 MHz; Duty Cycle: 1:1  
Medium: HSL1750; Medium parameters used (interpolated):  $f = 1745$  MHz;  $\sigma = 1.375$  S/m;  $\epsilon_r = 39.36$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

Test Date: Date: 9/7/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(7.91, 7.91, 7.91); Calibrated: 2/10/2023  
Sensor-Surface: 2mm (Mechanical Surface Detection)  
Electronics: DAE4 Sn1416; Calibrated: 4/19/2023  
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037  
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

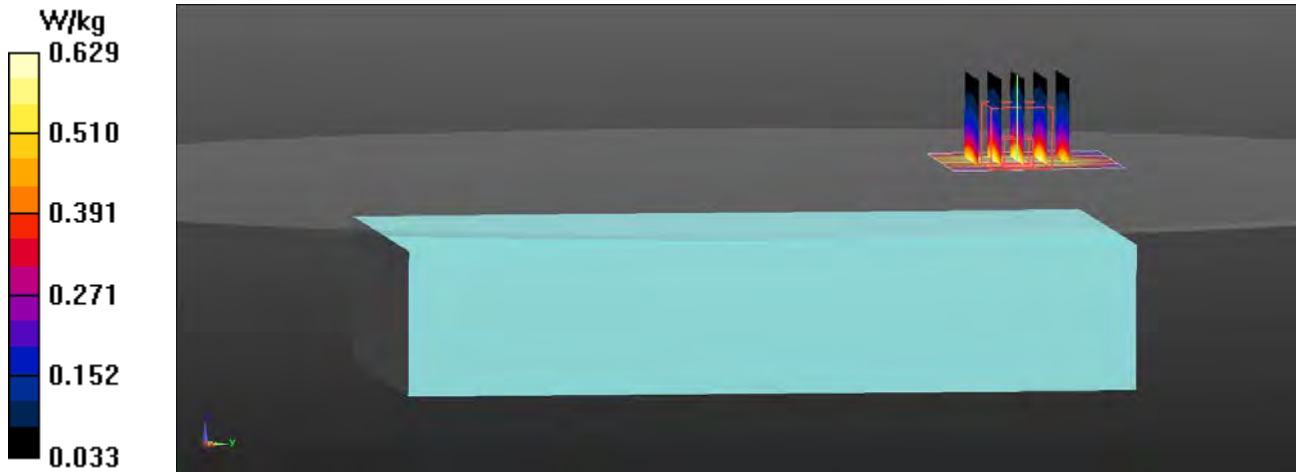
### Procedure Notes:

**B66 LTE/Ant M2 Mid 1 RB 49 Offset/Area Scan (5x5x1):** Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)  
Maximum value of SAR (measured) = 0.630 W/kg

**B66 LTE/Ant M2 Mid 1 RB 49 Offset/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 8.951 V/m; Power Drift = -0.02 dB  
Peak SAR (extrapolated) = 0.745 W/kg  
**SAR(1 g) = 0.501 W/kg; SAR(10 g) = 0.328 W/kg**

[Info: Interpolated medium parameters used for SAR evaluation.](#)  
Maximum value of SAR (measured) = 0.629 W/kg



# RF Exposure Lab

## Plot 13

**DUT: PRO460; Type: Wireless TV Video Case; Serial: AVWPRO40523008992**

Communication System: LTE (SC-FDMA, 1 RB, 20 MHz, QPSK); Frequency: 680.5 MHz; Duty Cycle: 1:1  
Medium: HSL750; Medium parameters used (interpolated):  $f = 680.5$  MHz;  $\sigma = 0.871$  S/m;  $\epsilon_r = 41.607$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

Test Date: Date: 9/7/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(9.28, 9.28, 9.28); Calibrated: 2/10/2023  
Sensor-Surface: 2mm (Mechanical Surface Detection)  
Electronics: DAE4 Sn1416; Calibrated: 4/19/2023  
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037  
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

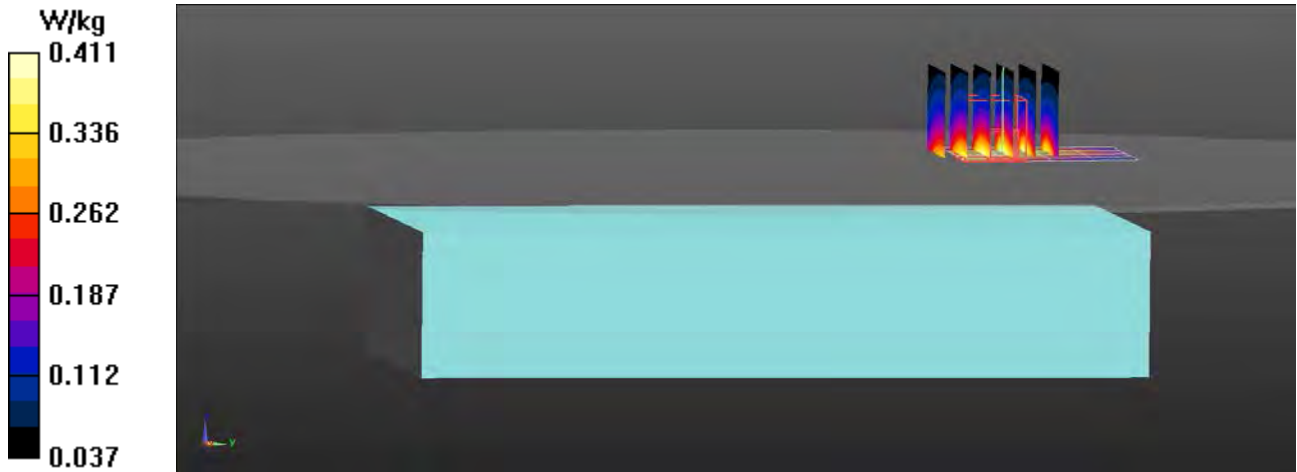
### Procedure Notes:

**B71 LTE/Ant M2 Mid 1 RB 49 Offset/Area Scan (5x5x1):** Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)  
Maximum value of SAR (measured) = 0.398 W/kg

**B71 LTE/Ant M2 Mid 1 RB 49 Offset/Zoom Scan (6x6x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 9.867 V/m; Power Drift = 0.02 dB  
Peak SAR (extrapolated) = 0.478 W/kg  
**SAR(1 g) = 0.333 W/kg; SAR(10 g) = 0.231 W/kg**

[Info: Interpolated medium parameters used for SAR evaluation.](#)  
Maximum value of SAR (measured) = 0.411 W/kg



# RF Exposure Lab

## Plot 14

**DUT: PRO460; Type: Wireless TV Video Case; Serial: AVWPRO40523008993**

Communication System: WiFi 802.11b (DSSS, 1 Mbps); Frequency: 2437 MHz; Duty Cycle: 1:1  
Medium: HSL2450; Medium parameters used (interpolated):  $f = 2437$  MHz;  $\sigma = 1.814$  S/m;  $\epsilon_r = 38.683$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

Test Date: Date: 9/15/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN7530; ConvF(7.18, 7.11, 7.21); Calibrated: 1/17/2023  
Sensor-Surface: 2mm (Mechanical Surface Detection)  
Electronics: DAE4 Sn1416; Calibrated: 4/19/2023  
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037  
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

### Procedure Notes:

**2450 MHz/Ant W2 Mid/Area Scan (7x7x1):** Measurement grid: dx=10mm, dy=10mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)  
Maximum value of SAR (measured) = 0.0481 W/kg

**2450 MHz/Ant W2 Mid/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm  
Reference Value = 0 V/m; Power Drift = 0.00 dB  
Peak SAR (extrapolated) = 0.112 W/kg  
**SAR(1 g) = 0.037 W/kg; SAR(10 g) = 0.014 W/kg**

[Info: Interpolated medium parameters used for SAR evaluation.](#)  
Maximum value of SAR (measured) = 0.0695 W/kg



# RF Exposure Lab

## Plot 15

**DUT: PRO460; Type: Wireless TV Video Case; Serial: AVWPRO40523008993**

Communication System: WiFi 802.11a (OFDM, 6 Mbps); Frequency: 5300 MHz; Duty Cycle: 1:1  
Medium: HSL5GHz; Medium parameters used:  $f = 5300$  MHz;  $\sigma = 4.79$  S/m;  $\epsilon_r = 35.07$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

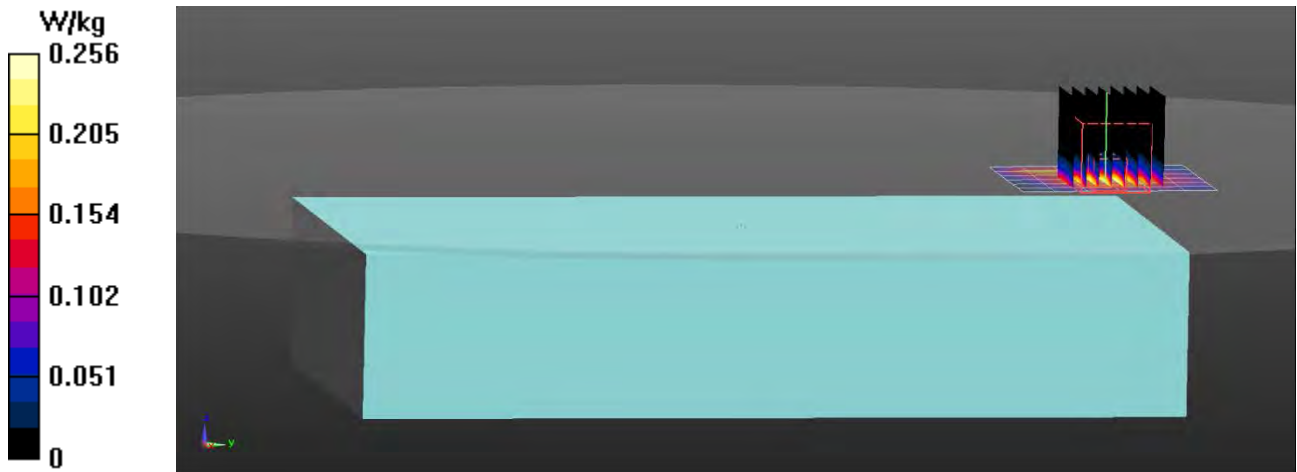
Test Date: Date: 9/15/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN7530; ConvF(5.26, 5.2, 5.38); Calibrated: 1/17/2023  
Sensor-Surface: 2mm (Mechanical Surface Detection)  
Electronics: DAE4 Sn1416; Calibrated: 4/19/2023  
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037  
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

### Procedure Notes:

**5200 MHz/Ant W2 60/Area Scan (7x7x1):** Measurement grid: dx=10mm, dy=10mm  
Maximum value of SAR (measured) = 0.239 W/kg

**5200 MHz/Ant W2 60/Zoom Scan (8x8x16)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm  
Reference Value = 0.9540 V/m; Power Drift = 0.06 dB  
Peak SAR (extrapolated) = 0.468 W/kg  
**SAR(1 g) = 0.140 W/kg; SAR(10 g) = 0.055 W/kg**  
Maximum value of SAR (measured) = 0.256 W/kg



# RF Exposure Lab

## Plot 16

**DUT: PRO460; Type: Wireless TV Video Case; Serial: AVWPRO40523008993**

Communication System: WiFi 802.11a (OFDM, 6 Mbps); Frequency: 5620 MHz; Duty Cycle: 1:1  
 Medium: HSL5GHz; Medium parameters used:  $f = 5620$  MHz;  $\sigma = 5.14$  S/m;  $\epsilon_r = 34.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Phantom section: Flat Section

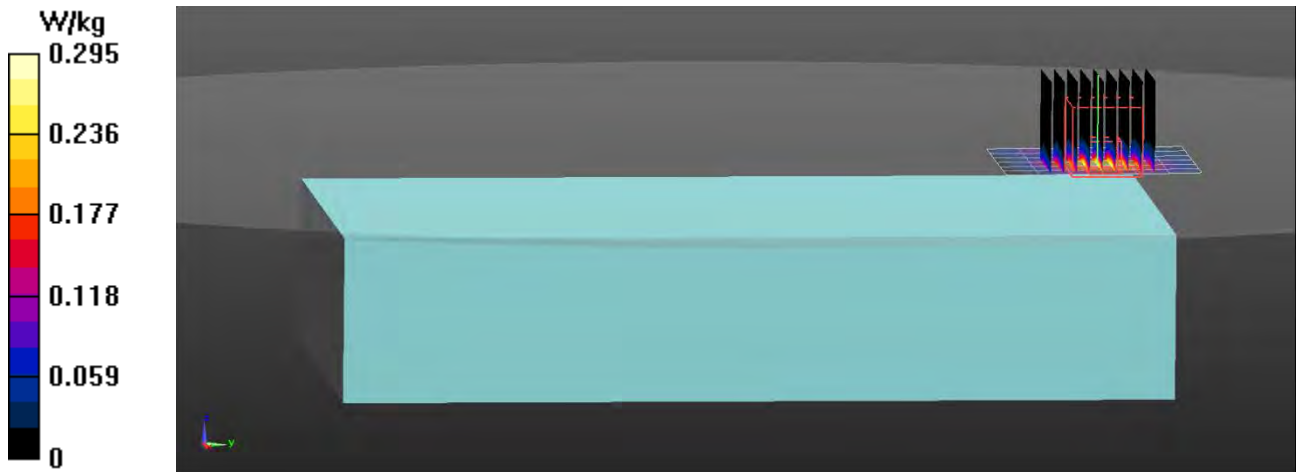
Test Date: Date: 9/15/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN7530; ConvF(4.49, 4.39, 4.63); Calibrated: 1/17/2023  
 Sensor-Surface: 2mm (Mechanical Surface Detection)  
 Electronics: DAE4 Sn1416; Calibrated: 4/19/2023  
 Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037  
 Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

### Procedure Notes:

**5600 MHz/Ant W2 124/Area Scan (7x7x1):** Measurement grid: dx=10mm, dy=10mm  
 Maximum value of SAR (measured) = 0.281 W/kg

**5600 MHz/Ant W2 124/Zoom Scan (9x9x16)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm  
 Reference Value = 0 V/m; Power Drift = 0.00 dB  
 Peak SAR (extrapolated) = 0.494 W/kg  
**SAR(1 g) = 0.150 W/kg; SAR(10 g) = 0.058 W/kg**  
 Maximum value of SAR (measured) = 0.295 W/kg





# RF Exposure Lab

## Plot 17

**DUT: PRO460; Type: Wireless TV Video Case; Serial: AVWPRO40523008993**

Communication System: WiFi 802.11a (OFDM, 6 Mbps); Frequency: 5785 MHz; Duty Cycle: 1:1  
Medium: HSL5GHz; Medium parameters used (interpolated):  $f = 5785$  MHz;  $\sigma = 5.325$  S/m;  $\epsilon_r = 34.52$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

Test Date: Date: 9/16/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN7530; ConvF(4.6, 4.58, 4.72); Calibrated: 1/17/2023  
Sensor-Surface: 2mm (Mechanical Surface Detection)  
Electronics: DAE4 Sn1416; Calibrated: 4/19/2023  
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037  
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

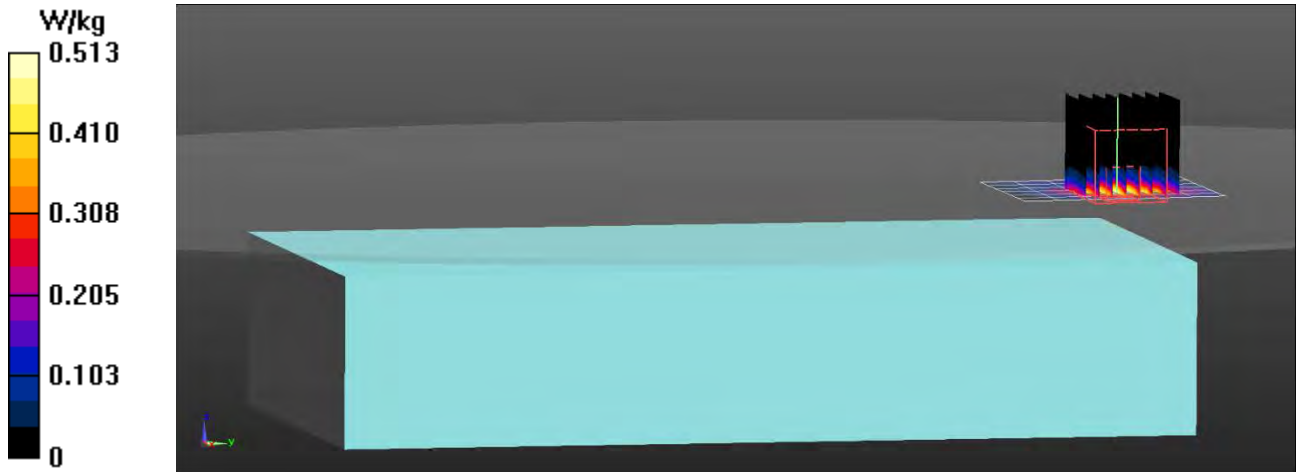
### Procedure Notes:

**5800 MHz/Ant W2 157/Area Scan (7x7x1):** Measurement grid: dx=10mm, dy=10mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)  
Maximum value of SAR (measured) = 0.478 W/kg

**5800 MHz/Ant W2 157/Zoom Scan (8x8x16)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm  
Reference Value = 0 V/m; Power Drift = 0.00 dB  
Peak SAR (extrapolated) = 0.965 W/kg  
**SAR(1 g) = 0.271 W/kg; SAR(10 g) = 0.108 W/kg**

[Info: Interpolated medium parameters used for SAR evaluation.](#)  
Maximum value of SAR (measured) = 0.513 W/kg





**Appendix C – SAR Test Setup Photos**

**Photo Removed**

**Test Position Back 15 mm Gap**

**Photo Removed**

**Front of Device**

**Photo Removed**

**Cable Side of Device**

**Photo Removed**

**Battery**

## Appendix D – Probe Calibration Data Sheets



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

Accreditation No.: **SCS 0108**

Client **RF Exposure Lab**

Certificate No **EX-3662\_Feb23**

**CALIBRATION CERTIFICATE**

Object **EX3DV4 - SN:3662**

Calibration procedure(s) **QA CAL-01.v10, QA CAL-12.v10, QA CAL-14.v7, QA CAL-23.v6,  
QA CAL-25.v8  
Calibration procedure for dosimetric E-field probes**

Calibration date **February 10, 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) °C and humidity < 70%.  
Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-22 (No. 217-03525/03524)	Apr-23
Power sensor NRP-Z91	SN: 103244	04-Apr-22 (No. 217-03524)	Apr-23
OCP DAK-3.5 (weighted)	SN: 1249	20-Oct-22 (OCP-DAK3.5-1249_Oct22)	Oct-23
OCP DAK-12	SN: 1016	20-Oct-22 (OCP-DAK12-1016_Oct22)	Oct-23
Reference 20 dB Attenuator	SN: CC2552 (20x)	04-Apr-22 (No. 217-03527)	Apr-23
DAE4	SN: 660	10-Oct-22 (No. DAE4-660_Oct22)	Oct-23
Reference Probe ES3DV2	SN: 3013	06-Jan-23 (No. ES3-3013_Jan23)	Jan-24

Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-22)	In house check: Jun-24
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-22)	In house check: Jun-24
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-22)	In house check: Jun-24
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-22)	In house check: Jun-24
Network Analyzer E8358A	SN: US41080477	31-Mar-14 (in house check Oct-22)	In house check: Oct-24

	Name	Function	Signature
Calibrated by	Michael Weber	Laboratory Technician	
Approved by	Sven Kühn	Technical Manager	

Issued: February 10, 2023

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



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Multilateral Agreement for the recognition of calibration certificates**

**Accreditation No.: SCS 0108**

## Glossary

TSL	tissue simulating liquid
NORM <sub>x,y,z</sub>	sensitivity in free space
ConvF	sensitivity in TSL / NORM <sub>x,y,z</sub>
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization $\varphi$	$\varphi$ rotation around probe axis
Polarization $\vartheta$	$\vartheta$ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ 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:

- IEC/IEEE 62209-1528, "Measurement Procedure For The Assessment Of Specific Absorption Rate Of Human Exposure To Radio Frequency Fields From Hand-Held And Body-Worn Wireless Communication Devices – Part 1528: Human Models, Instrumentation And Procedures (Frequency Range of 4 MHz to 10 GHz)", October 2020.
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

## Methods Applied and Interpretation of Parameters:

- NORM<sub>x,y,z</sub>**: Assessed for E-field polarization  $\vartheta = 0$  ( $f \leq 900$  MHz in TEM-cell;  $f > 1800$  MHz: R22 waveguide). NORM<sub>x,y,z</sub> are only intermediate values, i.e., the uncertainties of NORM<sub>x,y,z</sub> does not affect the E<sup>2</sup>-field uncertainty inside TSL (see below ConvF).
- NORM(f)<sub>x,y,z</sub>** = NORM<sub>x,y,z</sub> \* 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.
- DCP<sub>x,y,z</sub>**: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal. DCP does not depend on frequency nor media.
- PAR**: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- A<sub>x,y,z</sub>; B<sub>x,y,z</sub>; C<sub>x,y,z</sub>; D<sub>x,y,z</sub>; VR<sub>x,y,z</sub>**: A, B, C, D are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for  $f \leq 800$  MHz) and inside waveguide using analytical field distributions based on power measurements for  $f > 800$  MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM<sub>x,y,z</sub> \* ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from  $\pm 50$  MHz to  $\pm 100$  MHz.
- Spherical isotropy (3D deviation from isotropy)**: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- Connector Angle**: The angle is assessed using the information gained by determining the NORM<sub>x</sub> (no uncertainty required).

**Parameters of Probe: EX3DV4 - SN:3662****Basic Calibration Parameters**

	Sensor X	Sensor Y	Sensor Z	Unc (k = 2)
Norm ( $\mu\text{V}/(\text{V}/\text{m})^2$ ) <sup>A</sup>	0.41	0.49	0.48	$\pm 10.1\%$
DCP (mV) <sup>B</sup>	101.0	102.5	98.0	$\pm 4.7\%$

**Calibration Results for Modulation Response**

UID	Communication System Name		A dB	B dB $\sqrt{\mu\text{V}}$	C	D dB	VR mV	Max dev.	Max Unc <sup>E</sup> k = 2
0	CW	X	0.00	0.00	1.00	0.00	150.8	$\pm 3.0\%$	$\pm 4.7\%$
		Y	0.00	0.00	1.00		161.2		
		Z	0.00	0.00	1.00		147.6		

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

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

<sup>B</sup> Linearization parameter uncertainty for maximum specified field strength.

<sup>E</sup> Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.



**Parameters of Probe: EX3DV4 - SN:3662****Other Probe Parameters**

Sensor Arrangement	Triangular
Connector Angle	-96.9°
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

**Note:** Measurement distance from surface can be increased to 3–4 mm for an *Area Scan* job.

**Parameters of Probe: EX3DV4 - SN:3662****Calibration Parameter Determined in Head Tissue Simulating Media**

f (MHz) <sup>C</sup>	Relative Permittivity <sup>F</sup>	Conductivity <sup>F</sup> (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha <sup>G</sup>	Depth <sup>G</sup> (mm)	Unc (k = 2)
150	52.3	0.76	11.68	11.68	11.68	0.00	1.00	±13.3%
220	49.0	0.81	11.50	11.50	11.50	0.00	1.00	±13.3%
300	45.3	0.87	11.22	11.22	11.22	0.09	1.00	±13.3%
450	43.5	0.87	10.79	10.79	10.79	0.16	1.30	±13.3%
600	42.7	0.88	10.35	10.35	10.35	0.10	1.25	±13.3%
750	41.9	0.89	9.28	9.28	9.28	0.53	0.80	±12.0%
900	41.5	0.97	8.80	8.80	8.80	0.51	0.80	±12.0%
1450	40.5	1.20	8.26	8.26	8.26	0.33	0.80	±12.0%
1640	40.2	1.31	8.10	8.10	8.10	0.37	0.86	±12.0%
1750	40.1	1.37	7.91	7.91	7.91	0.31	0.86	±12.0%
1900	40.0	1.40	7.67	7.67	7.67	0.34	0.86	±12.0%
2300	39.5	1.67	7.60	7.60	7.60	0.33	0.90	±12.0%
2450	39.2	1.80	7.26	7.26	7.26	0.44	0.90	±12.0%
2600	39.0	1.96	7.11	7.11	7.11	0.45	0.90	±12.0%
5250	35.9	4.71	5.00	5.00	5.00	0.40	1.80	±14.0%
5600	35.5	5.07	4.70	4.70	4.70	0.40	1.80	±14.0%
5750	35.4	5.22	4.85	4.85	4.85	0.40	1.80	±14.0%

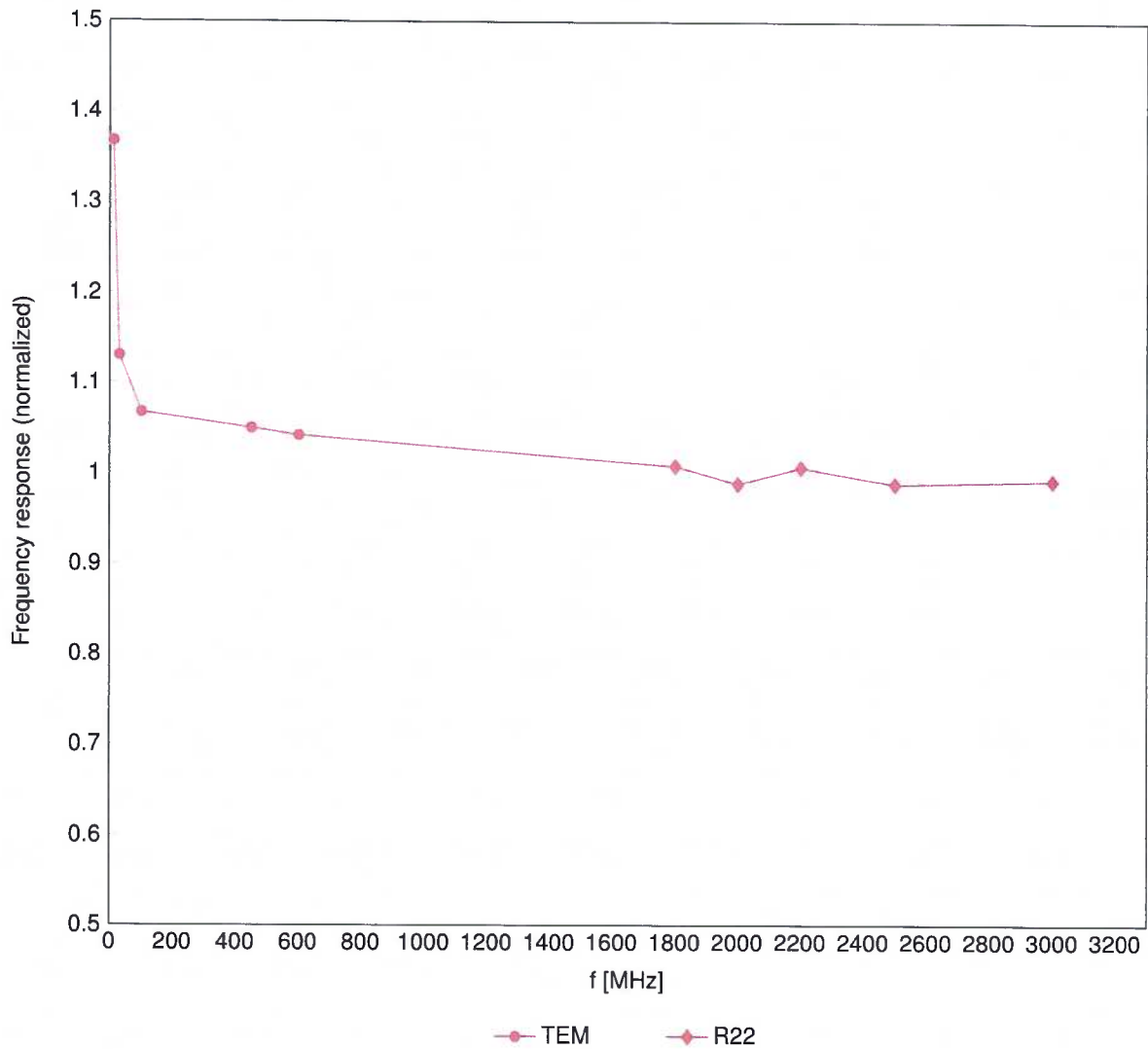
<sup>C</sup> Frequency validity above 300 MHz of ±100 MHz only applies for DASYS v4.4 and higher (see Page 2), else it is restricted to ±50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ±10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Validity of ConvF assessed at 6 MHz is 4–9 MHz, and ConvF assessed at 13 MHz is 9–19 MHz. Above 5 GHz frequency validity can be extended to ±110 MHz.

<sup>F</sup> The probes are calibrated using tissue simulating liquids (TSL) that deviate for  $\epsilon$  and  $\sigma$  by less than ±5% from the target values (typically better than ±3%) and are valid for TSL with deviations of up to ±10%. If TSL with deviations from the target of less than ±5% are used, the calibration uncertainties are 11.1% for 0.7 - 3 GHz and 13.1% for 3 - 6 GHz.

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

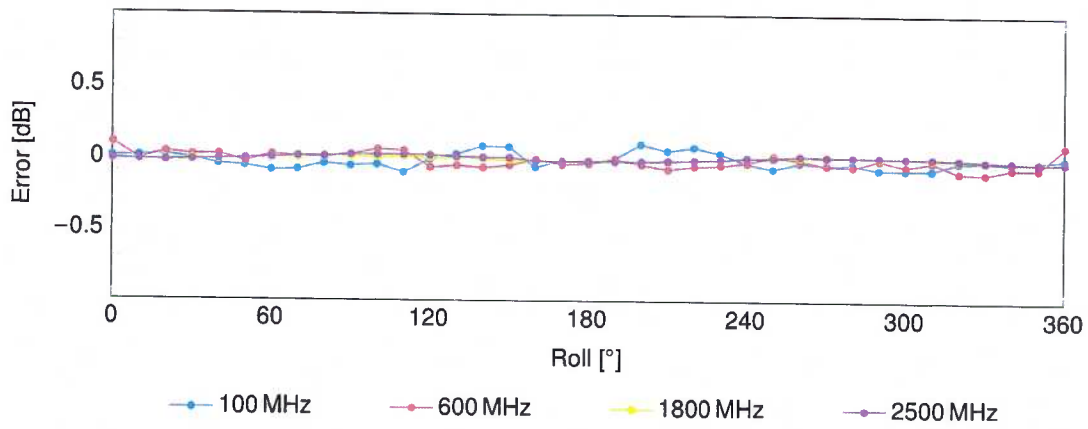
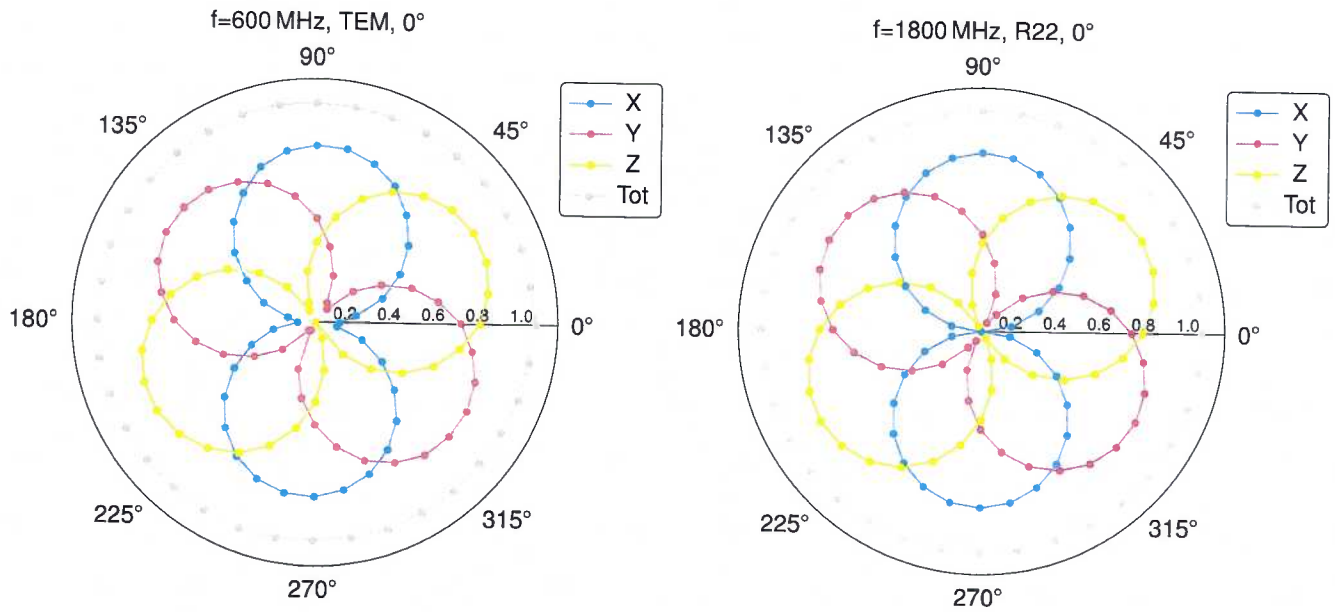
### Frequency Response of E-Field

(TEM-Cell:ifi110 EXX, Waveguide:R22)



Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  (k=2)

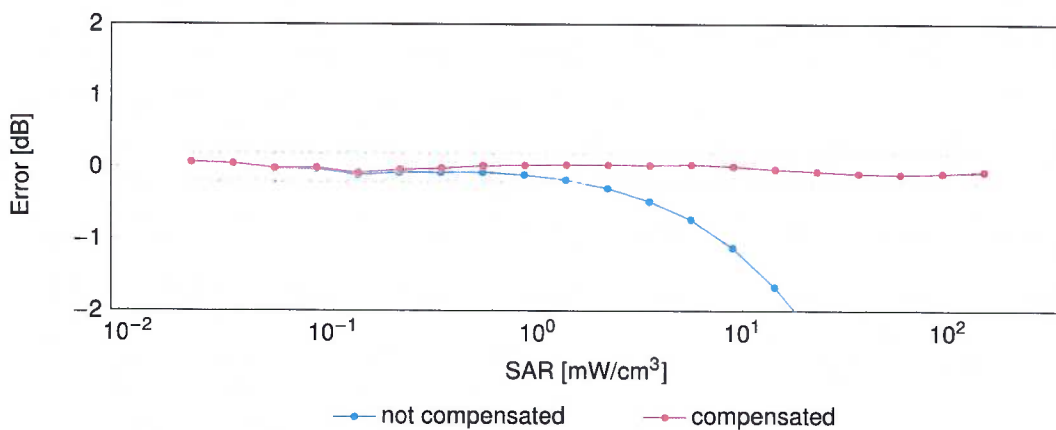
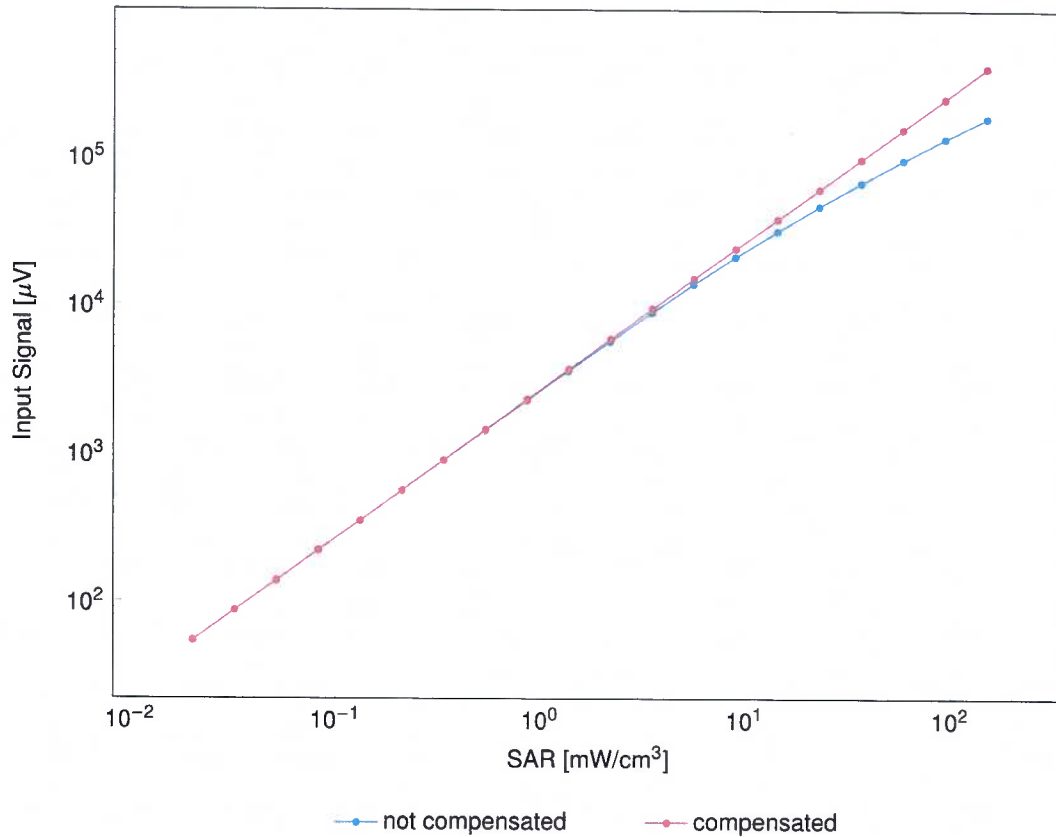
### Receiving Pattern ( $\phi$ ), $\theta = 0^\circ$



Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

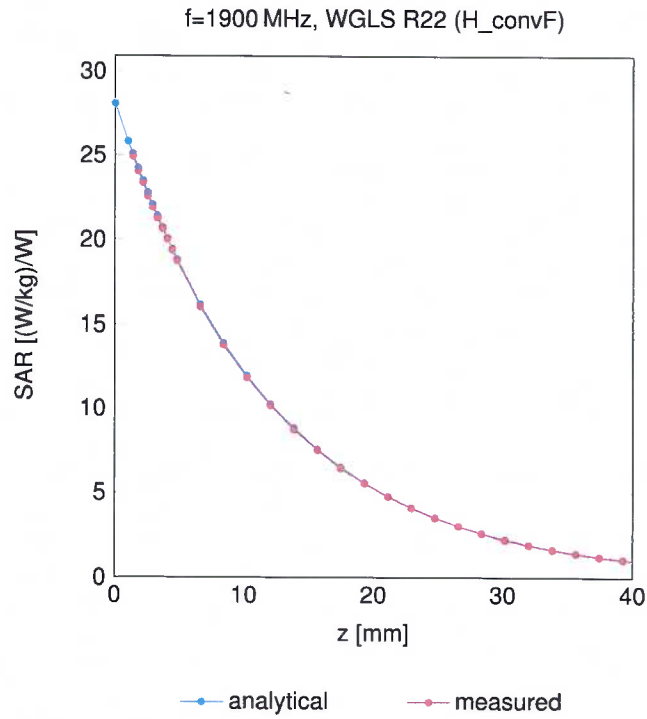
### Dynamic Range f(SAR<sub>head</sub>)

(TEM cell, f<sub>eval</sub> = 1900 MHz)



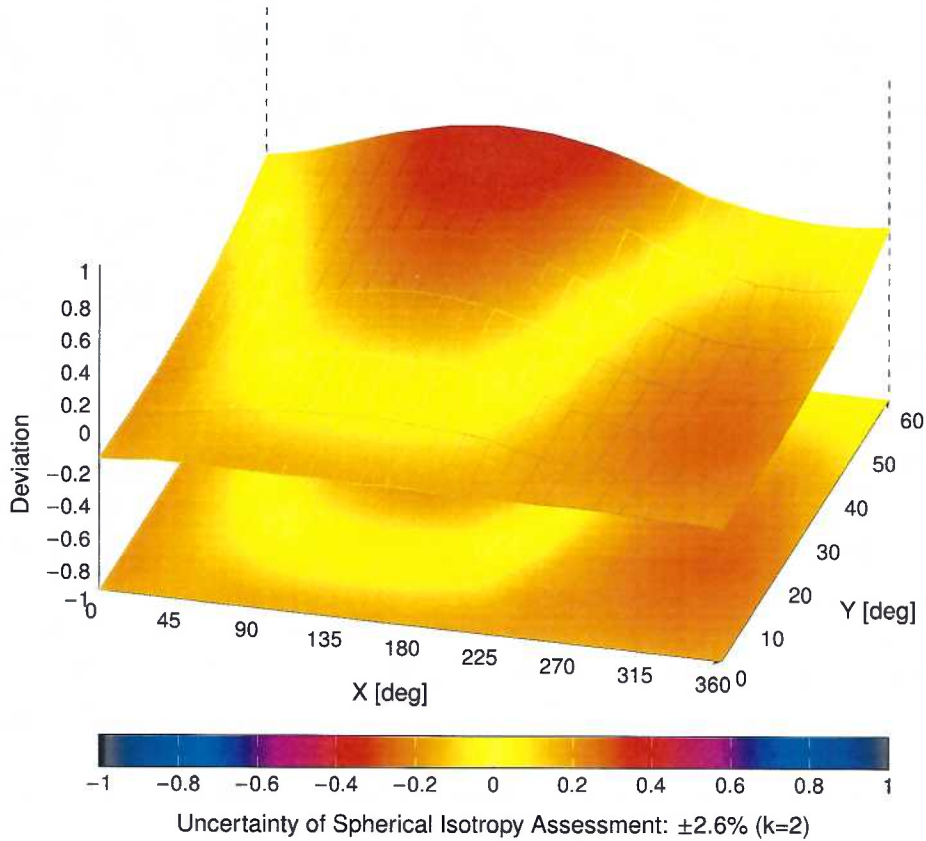
Uncertainty of Linearity Assessment: ±0.6% (k=2)

### Conversion Factor Assessment



### Deviation from Isotropy in Liquid

Error ( $\phi, \theta$ ), f = 900 MHz





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Multilateral Agreement for the recognition of calibration certificates**

Accreditation No.: **SCS 0108**

Client **RF Exposure Lab**

Certificate No **EX-7530\_Jan23**

**CALIBRATION CERTIFICATE**

Object **EX3DV4 - SN:7530**

Calibration procedure(s) **QA CAL-01.v10, QA CAL-12.v10, QA CAL-14.v7, QA CAL-23.v6,  
QA CAL-25.v8  
Calibration procedure for dosimetric E-field probes**

Calibration date **January 17, 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) °C and humidity < 70%.  
Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-22 (No. 217-03525/03524)	Apr-23
Power sensor NRP-Z91	SN: 103244	04-Apr-22 (No. 217-03524)	Apr-23
OCP DAK-3.5 (weighted)	SN: 1249	20-Oct-22 (OCP-DAK3.5-1249_Oct22)	Oct-23
OCP DAK-12	SN: 1016	20-Oct-22 (OCP-DAK12-1016_Oct22)	Oct-23
Reference 20 dB Attenuator	SN: CC2552 (20x)	04-Apr-22 (No. 217-03527)	Apr-23
DAE4	SN: 660	10-Oct-22 (No. DAE4-660_Oct22)	Oct-23
Reference Probe ES3DV2	SN: 3013	06-Jan-23 (No. ES3-3013_Jan23)	Jan-24

Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-22)	In house check: Jun-24
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-22)	In house check: Jun-24
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-22)	In house check: Jun-24
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-22)	In house check: Jun-24
Network Analyzer E8358A	SN: US41080477	31-Mar-14 (in house check Oct-22)	In house check: Oct-24

	Name	Function	Signature
Calibrated by	Joanna Lleshaj	Laboratory Technician	
Approved by	Sven Kühn	Technical Manager	

Issued: January 23, 2023

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



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

**Accreditation No.: SCS 0108**

## Glossary

TSL	tissue simulating liquid
NORM <sub>x,y,z</sub>	sensitivity in free space
ConvF	sensitivity in TSL / NORM <sub>x,y,z</sub>
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization $\varphi$	$\varphi$ rotation around probe axis
Polarization $\vartheta$	$\vartheta$ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ 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:

- IEC/IEEE 62209-1528, "Measurement Procedure For The Assessment Of Specific Absorption Rate Of Human Exposure To Radio Frequency Fields From Hand-Held And Body-Worn Wireless Communication Devices – Part 1528: Human Models, Instrumentation And Procedures (Frequency Range of 4 MHz to 10 GHz)", October 2020.
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

## Methods Applied and Interpretation of Parameters:

- NORM<sub>x,y,z</sub>**: Assessed for E-field polarization  $\vartheta = 0$  ( $f \leq 900$  MHz in TEM-cell;  $f > 1800$  MHz: R22 waveguide). NORM<sub>x,y,z</sub> are only intermediate values, i.e., the uncertainties of NORM<sub>x,y,z</sub> does not affect the E<sup>2</sup>-field uncertainty inside TSL (see below ConvF).
- NORM(f)<sub>x,y,z</sub> = NORM<sub>x,y,z</sub> \* 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.
- DCP<sub>x,y,z</sub>**: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal. DCP does not depend on frequency nor media.
- PAR**: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- A<sub>x,y,z</sub>; B<sub>x,y,z</sub>; C<sub>x,y,z</sub>; D<sub>x,y,z</sub>; VR<sub>x,y,z</sub>**: A, B, C, D are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for  $f \leq 800$  MHz) and inside waveguide using analytical field distributions based on power measurements for  $f > 800$  MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM<sub>x,y,z</sub> \* ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from  $\pm 50$  MHz to  $\pm 100$  MHz.
- Spherical isotropy (3D deviation from isotropy)**: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- Connector Angle**: The angle is assessed using the information gained by determining the NORM<sub>x</sub> (no uncertainty required).



**Parameters of Probe: EX3DV4 - SN:7530****Basic Calibration Parameters**

	Sensor X	Sensor Y	Sensor Z	Unc ( $k = 2$ )
Norm ( $\mu\text{V}/(\text{V}/\text{m})^2$ ) <sup>A</sup>	0.42	0.53	0.42	$\pm 10.1\%$
DCP (mV) <sup>B</sup>	96.0	95.0	98.0	$\pm 4.7\%$

**Calibration Results for Modulation Response**

UID	Communication System Name		A dB	B dB $\sqrt{\mu\text{V}}$	C	D dB	VR mV	Max dev.	Max Unc <sup>E</sup> $k = 2$
0	CW	X	0.00	0.00	1.00	0.00	128.4	$\pm 2.5\%$	$\pm 4.7\%$
		Y	0.00	0.00	1.00		120.9		
		Z	0.00	0.00	1.00		104.7		

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

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

<sup>B</sup> Linearization parameter uncertainty for maximum specified field strength.

<sup>E</sup> Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

**Parameters of Probe: EX3DV4 - SN:7530****Other Probe Parameters**

Sensor Arrangement	Triangular
Connector Angle	35.7°
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

**Note:** Measurement distance from surface can be increased to 3–4 mm for an *Area Scan* job.

**Parameters of Probe: EX3DV4 - SN:7530****Calibration Parameter Determined in Head Tissue Simulating Media**

f (MHz) <sup>C</sup>	Relative Permittivity <sup>F</sup>	Conductivity <sup>F</sup> (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha <sup>G</sup>	Depth <sup>G</sup> (mm)	Unc (k = 2)
13	55.0	0.75	22.02	22.02	22.02	0.00	1.25	±13.3%
30	55.0	0.75	19.87	19.87	19.87	0.00	1.25	±13.3%
750	41.9	0.89	9.62	9.26	10.37	0.35	1.27	±12.0%
900	41.5	0.97	9.50	9.25	9.30	0.35	1.27	±12.0%
1300	40.8	1.14	8.19	8.15	8.38	0.40	1.27	±12.0%
1750	40.1	1.37	8.28	8.22	8.47	0.28	1.27	±12.0%
1900	40.0	1.40	8.14	8.08	8.31	0.29	1.27	±12.0%
2300	39.5	1.67	7.59	7.55	7.71	0.30	1.27	±12.0%
2450	39.2	1.80	7.18	7.11	7.21	0.32	1.27	±12.0%
2600	39.0	1.96	7.54	7.33	7.61	0.32	1.27	±12.0%
3300	38.2	2.71	6.92	6.92	7.03	0.35	1.27	±14.0%
3500	37.9	2.91	6.65	6.65	6.76	0.36	1.27	±14.0%
3700	37.7	3.12	6.51	6.52	6.65	0.37	1.27	±14.0%
3900	37.5	3.32	6.83	6.80	6.94	0.37	1.27	±14.0%
4200	37.1	3.63	6.47	6.47	6.61	0.37	1.27	±14.0%
4600	36.7	4.04	6.22	6.23	6.35	0.40	1.27	±14.0%
4950	36.3	4.40	5.65	5.58	5.83	0.43	1.36	±14.0%
5250	35.9	4.71	5.26	5.20	5.38	0.34	1.62	±14.0%
5600	35.5	5.07	4.49	4.39	4.63	0.41	1.67	±14.0%
5750	35.4	5.22	4.60	4.58	4.72	0.43	1.75	±14.0%

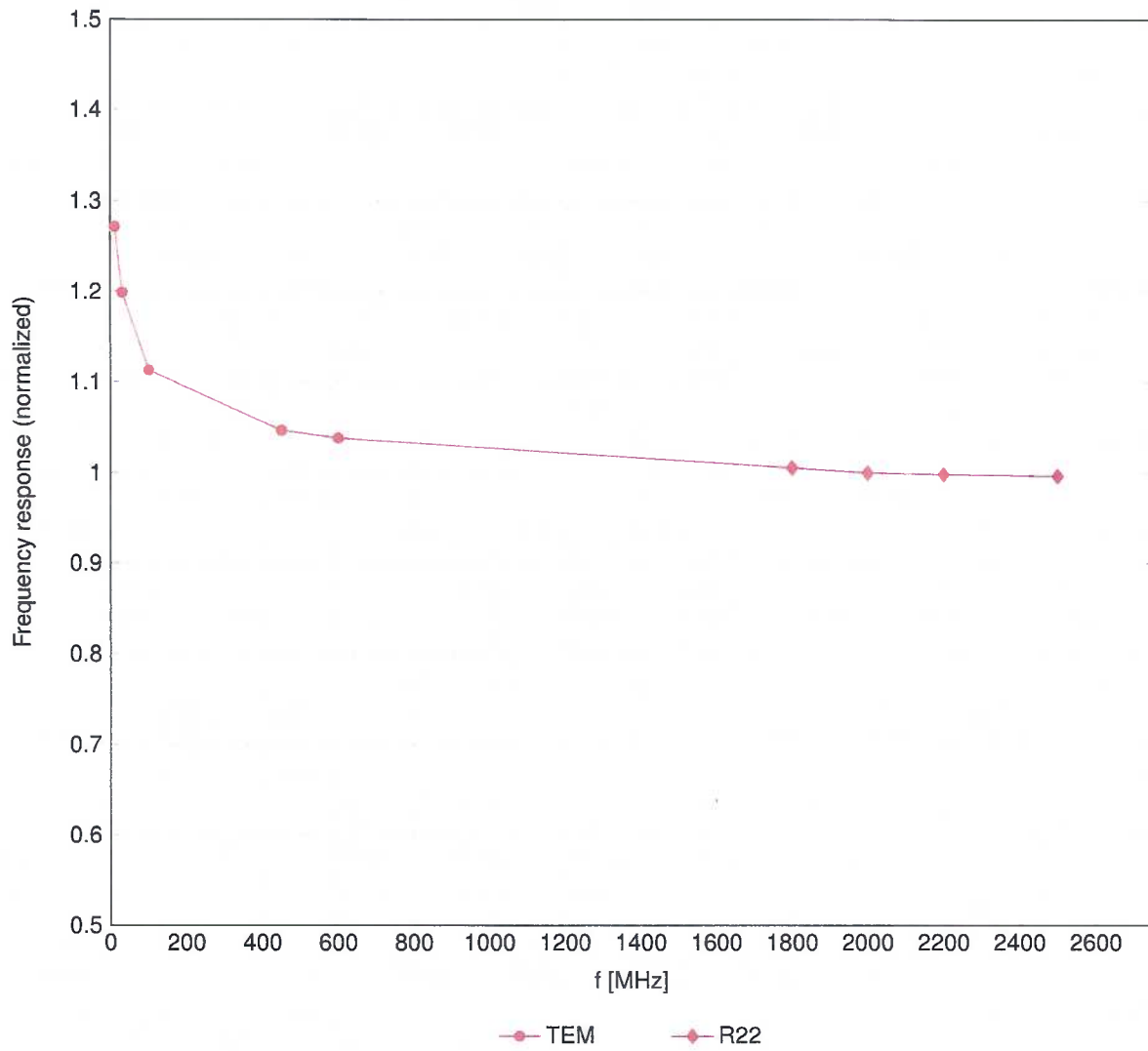
<sup>C</sup> Frequency validity above 300 MHz of ±100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ±50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ±10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Validity of ConvF assessed at 6 MHz is 4–9 MHz, and ConvF assessed at 13 MHz is 9–19 MHz. Above 5 GHz frequency validity can be extended to ±110 MHz.

<sup>F</sup> The probes are calibrated using tissue simulating liquids (TSL) that deviate for  $\epsilon$  and  $\sigma$  by less than ±5% from the target values (typically better than ±3%) and are valid for TSL with deviations of up to ±10%. If TSL with deviations from the target of less than ±5% are used, the calibration uncertainties are 11.1% for 0.7 - 3 GHz and 13.1% for 3 - 6 GHz.

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

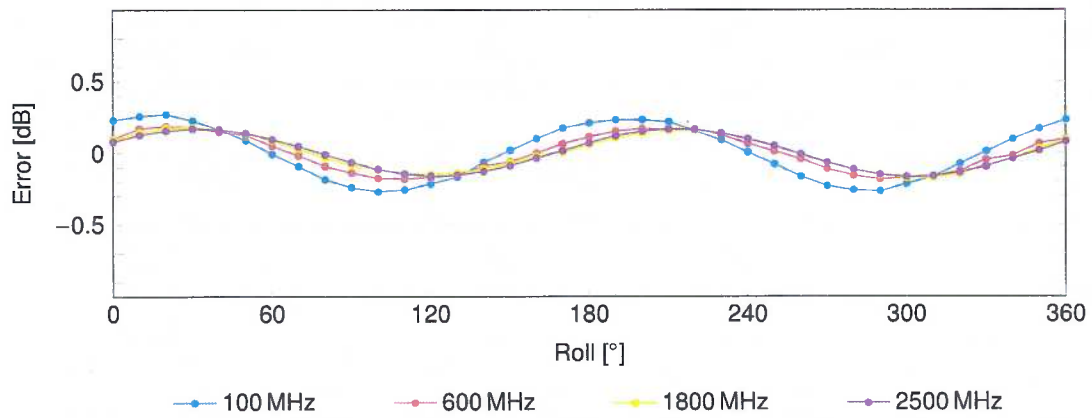
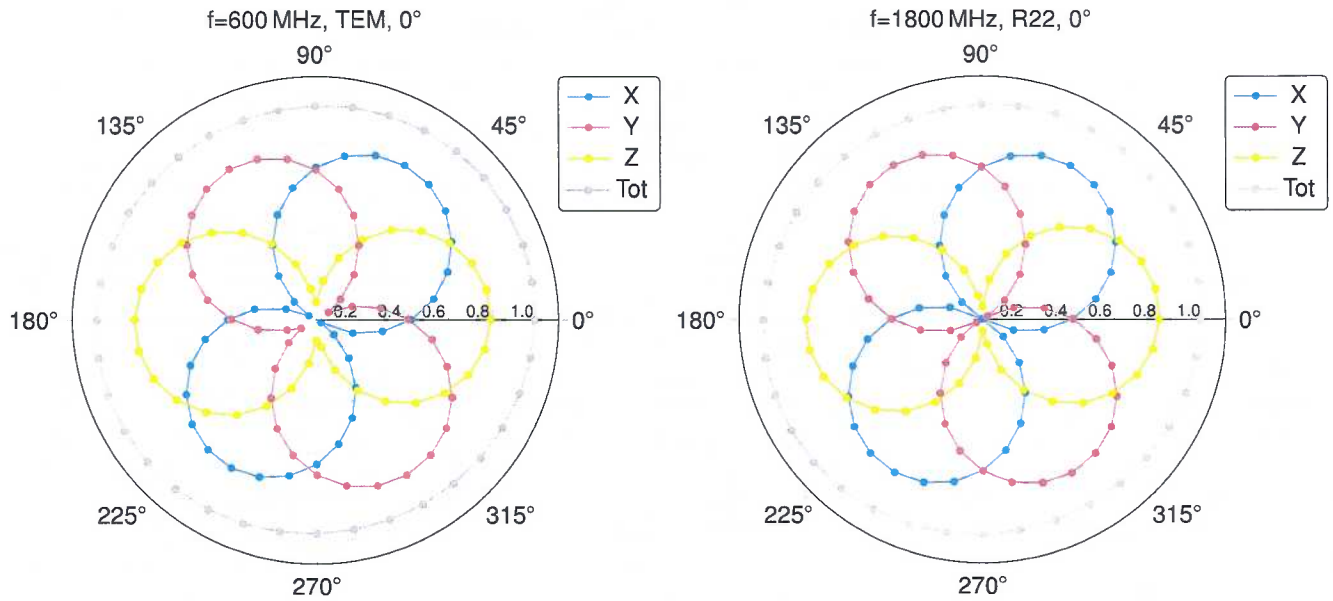
### Frequency Response of E-Field

(TEM-Cell:ifi110 EXX, Waveguide:R22)



Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  (k=2)

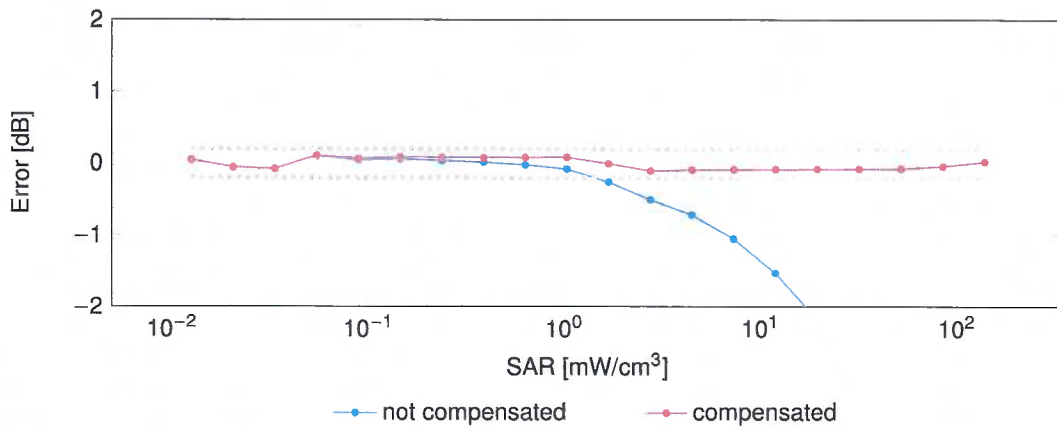
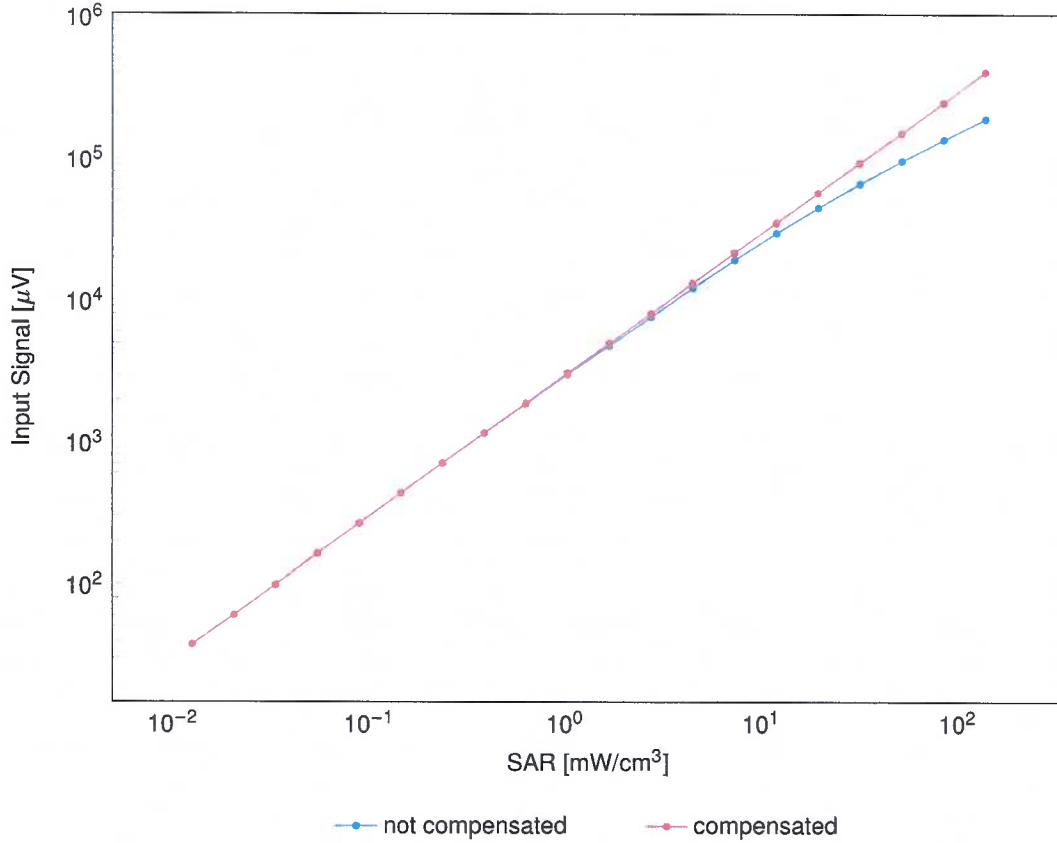
### Receiving Pattern ( $\phi$ ), $\vartheta = 0^\circ$



Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

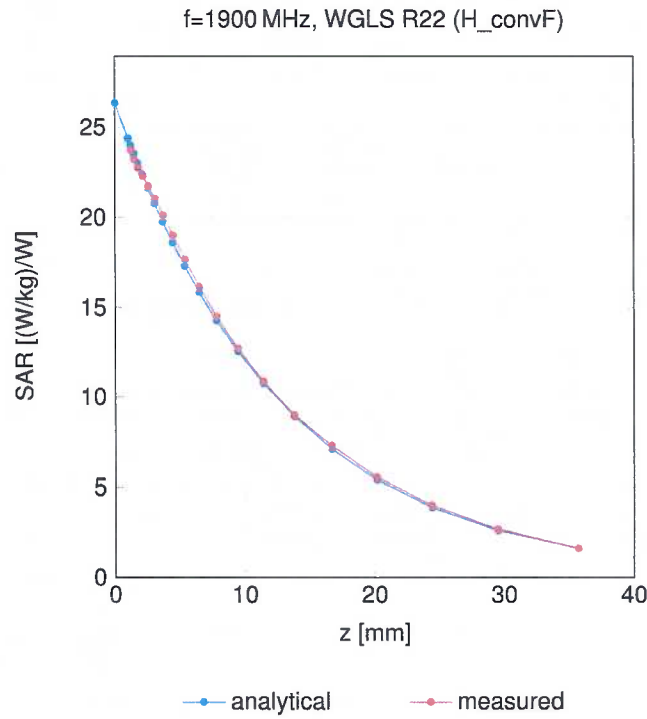
### Dynamic Range $f(\text{SAR}_{\text{head}})$

(TEM cell,  $f_{\text{eval}} = 1900 \text{ MHz}$ )



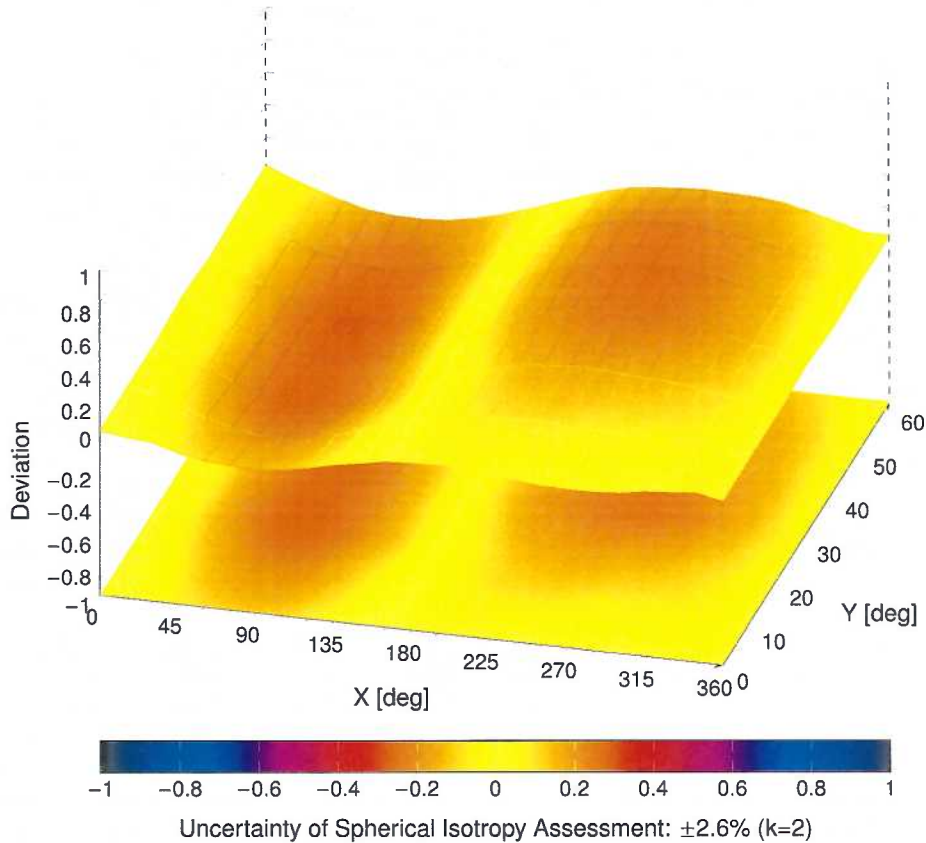
Uncertainty of Linearity Assessment:  $\pm 0.6\%$  ( $k=2$ )

### Conversion Factor Assessment



### Deviation from Isotropy in Liquid

Error ( $\phi, \theta$ ), f = 900 MHz



## Appendix E – Dipole Calibration Data Sheets



gm

**Calibration Laboratory of  
Schmid & Partner  
Engineering AG**  
Zeughausstrasse 43, 8004 Zurich, Switzerland



**S** Schweizerischer Kalibrierdienst  
**C** Service suisse d'étalonnage  
**S** Servizio svizzero di taratura  
**S** Swiss Calibration Service

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

Accreditation No.: **SCS 0108**

Client **RF Exposure Lab**

Certificate No: **D750V3-1053\_Jun21**

## CALIBRATION CERTIFICATE

Object **D750V3 - SN:1053**

Calibration procedure(s) **QA CAL-05.v11  
Calibration Procedure for SAR Validation Sources between 0.7-3 GHz**

Calibration date: **June 04, 2021**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	09-Apr-21 (No. 217-03291/03292)	Apr-22
Power sensor NRP-Z91	SN: 103244	09-Apr-21 (No. 217-03291)	Apr-22
Power sensor NRP-Z91	SN: 103245	09-Apr-21 (No. 217-03292)	Apr-22
Reference 20 dB Attenuator	SN: BH9394 (20k)	09-Apr-21 (No. 217-03343)	Apr-22
Type-N mismatch combination	SN: 310982 / 06327	09-Apr-21 (No. 217-03344)	Apr-22
Reference Probe EX3DV4	SN: 7349	28-Dec-20 (No. EX3-7349_Dec20)	Dec-21
DAE4	SN: 601	02-Nov-20 (No. DAE4-601_Nov20)	Nov-21
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-20)	In house check: Oct-22
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-20)	In house check: Oct-21

Calibrated by: **Michael Weber**      Name: Michael Weber      Function: Laboratory Technician

Signature:

Approved by: **Katja Pokovic**      Name: Katja Pokovic      Function: Technical Manager

Signature:

Issued: June 8, 2021

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



Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

### Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

### Calibration is Performed According to the Following Standards:

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

### Additional Documentation:

- DASY4/5 System Handbook

### Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

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

## Measurement Conditions

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

<b>DASY Version</b>	DASY5	V52.10.4
<b>Extrapolation</b>	Advanced Extrapolation	
<b>Phantom</b>	Modular Flat Phantom	
<b>Distance Dipole Center - TSL</b>	15 mm	with Spacer
<b>Zoom Scan Resolution</b>	dx, dy, dz = 5 mm	
<b>Frequency</b>	750 MHz $\pm$ 1 MHz	

## Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Head TSL parameters</b>	22.0 °C	41.9	0.89 mho/m
<b>Measured Head TSL parameters</b>	(22.0 $\pm$ 0.2) °C	42.7 $\pm$ 6 %	0.91 mho/m $\pm$ 6 %
<b>Head TSL temperature change during test</b>	< 0.5 °C	----	----

## SAR result with Head TSL

<b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b>	Condition	
SAR measured	250 mW input power	2.17 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>8.57 W/kg <math>\pm</math> 17.0 % (k=2)</b>

<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b>	condition	
SAR measured	250 mW input power	1.41 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>5.58 W/kg <math>\pm</math> 16.5 % (k=2)</b>

## Appendix (Additional assessments outside the scope of SCS 0108)

### Antenna Parameters with Head TSL

Impedance, transformed to feed point	56.5 $\Omega$ + 0.1 j $\Omega$
Return Loss	- 24.3 dB

### General Antenna Parameters and Design

Electrical Delay (one direction)	1.035 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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#### Extended Calibration

Usage of SAR dipoles calibrated less than 3 years ago but more than 1 year ago were confirmed in maintaining return loss (<-20 dB, within 20% of prior calibration) and impedance (within 5 ohm from prior calibration) requirements per extended calibrations in KDB Publication 865664 D01 v01r04.

D750V3 SN: 1053 - Head						
Date of Measurement	Return Loss (dB)	$\Delta\%$	Impedance Real ( $\Omega$ )	$\Delta\Omega$	Impedance Imaginary (j $\Omega$ )	$\Delta\Omega$
6/4/2021	-24.3		56.5		0.1	
6/4/2022	-26.2	7.8	57.9	1.4	0.3	0.2
6/6/2023	-25.6	5.3	55.2	-1.3	0.4	0.3

## DASY5 Validation Report for Head TSL

Date: 04.06.2021

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1053**

Communication System: UID 0 - CW; Frequency: 750 MHz

Medium parameters used:  $f = 750$  MHz;  $\sigma = 0.91$  S/m;  $\epsilon_r = 42.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.11, 10.11, 10.11) @ 750 MHz; Calibrated: 28.12.2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.11.2020
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

### Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 59.74 V/m; Power Drift = 0.01 dB

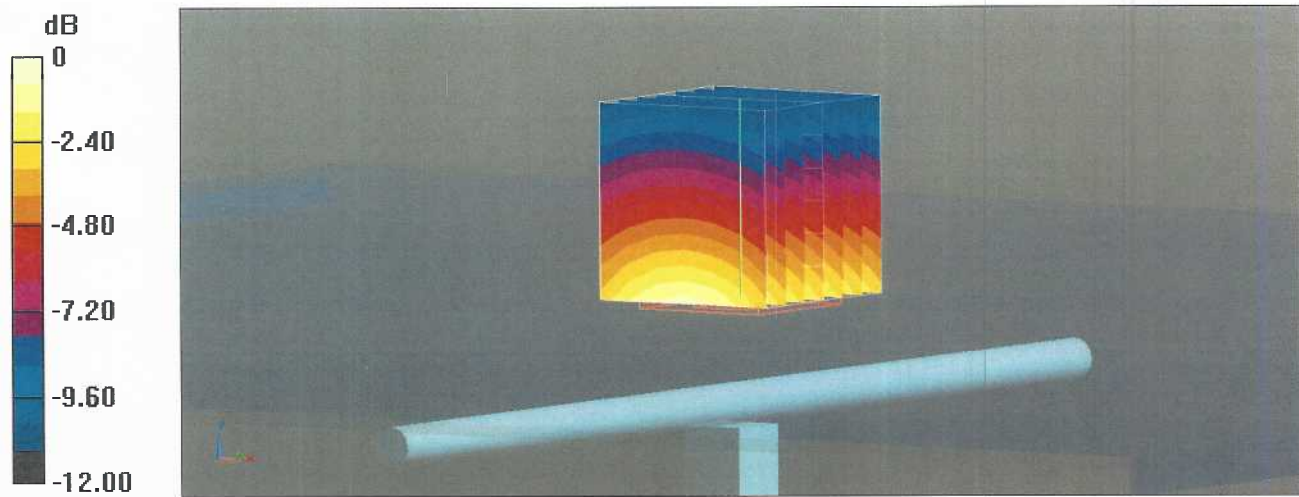
Peak SAR (extrapolated) = 3.30 W/kg

**SAR(1 g) = 2.17 W/kg; SAR(10 g) = 1.41 W/kg**

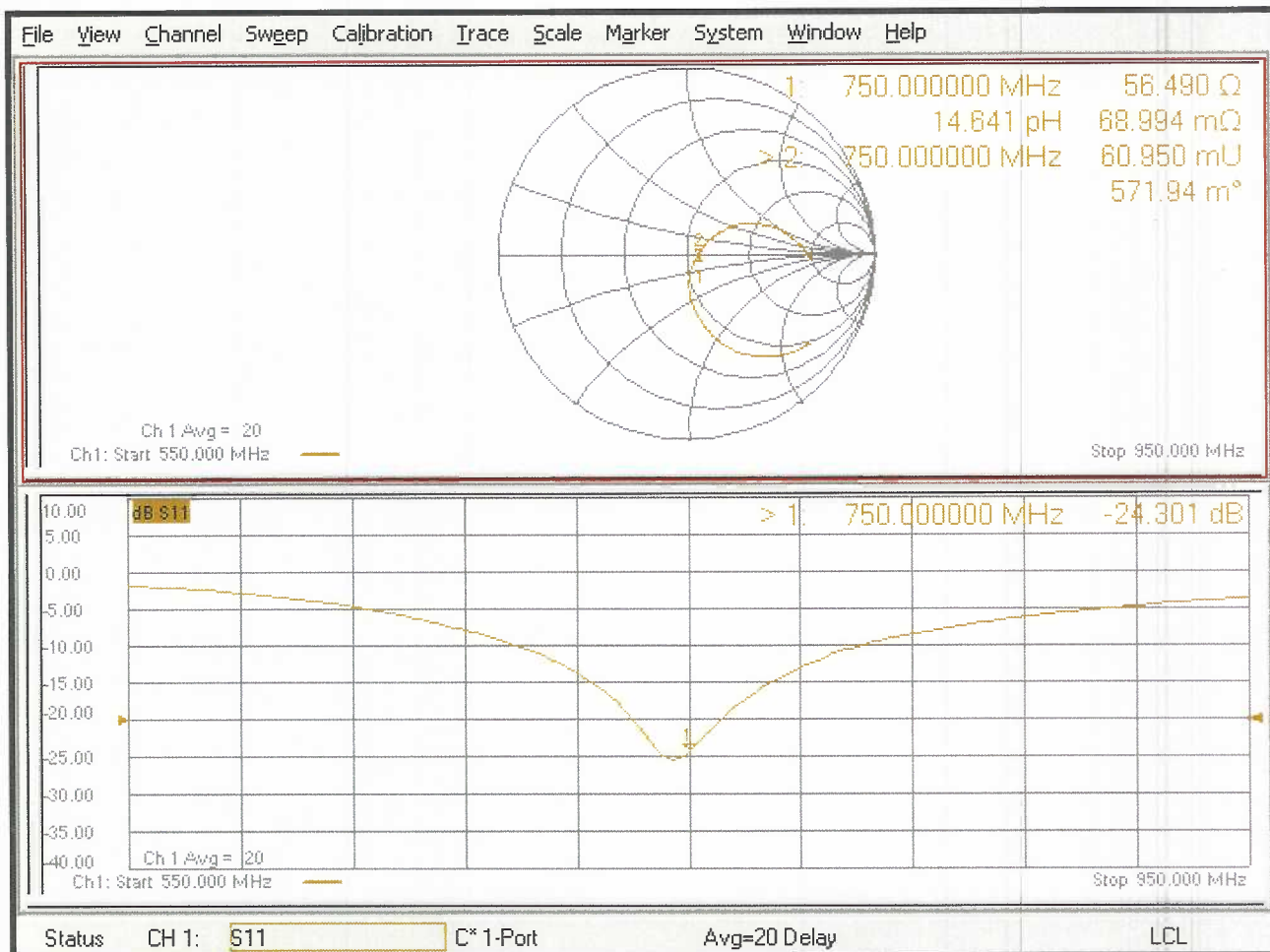
Smallest distance from peaks to all points 3 dB below: Larger than measurement grid (> 30mm)

Ratio of SAR at M2 to SAR at M1 = 65.5%

Maximum value of SAR (measured) = 2.93 W/kg



# Impedance Measurement Plot for Head TSL



*Jm*

**Calibration Laboratory of  
Schmid & Partner  
Engineering AG**  
Zeughausstrasse 43, 8004 Zurich, Switzerland



**S** Schweizerischer Kalibrierdienst  
**C** Service suisse d'étalonnage  
**S** Servizio svizzero di taratura  
**S** Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)  
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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **RF Exposure Lab**

Certificate No: **D900V2-1d128\_Jun21**

## CALIBRATION CERTIFICATE

Object **D900V2 - SN:1d128**

Calibration procedure(s) **QA CAL-05.v11  
Calibration Procedure for SAR Validation Sources between 0.7-3 GHz**

Calibration date: **June 04, 2021**

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 ( $22 \pm 3$ )°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	09-Apr-21 (No. 217-03291/03292)	Apr-22
Power sensor NRP-Z91	SN: 103244	09-Apr-21 (No. 217-03291)	Apr-22
Power sensor NRP-Z91	SN: 103245	09-Apr-21 (No. 217-03292)	Apr-22
Reference 20 dB Attenuator	SN: BH9394 (20k)	09-Apr-21 (No. 217-03343)	Apr-22
Type-N mismatch combination	SN: 310982 / 06327	09-Apr-21 (No. 217-03344)	Apr-22
Reference Probe EX3DV4	SN: 7349	28-Dec-20 (No. EX3-7349_Dec20)	Dec-21
DAE4	SN: 601	02-Nov-20 (No. DAE4-601_Nov20)	Nov-21
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-20)	In house check: Oct-22
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-20)	In house check: Oct-21

Calibrated by:	Name <b>Michael Weber</b>	Function Laboratory Technician	Signature 
Approved by:	Name <b>Katja Pokovic</b>	Function Technical Manager	Signature 

Issued: June 8, 2021

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Accredited by the Swiss Accreditation Service (SAS)

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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

### Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

### Calibration is Performed According to the Following Standards:

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

### Additional Documentation:

- DASY4/5 System Handbook

### Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

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



## Measurement Conditions

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

<b>DASY Version</b>	DASY5	V52.10.4
<b>Extrapolation</b>	Advanced Extrapolation	
<b>Phantom</b>	Modular Flat Phantom	
<b>Distance Dipole Center - TSL</b>	15 mm	with Spacer
<b>Zoom Scan Resolution</b>	dx, dy, dz = 5 mm	
<b>Frequency</b>	900 MHz ± 1 MHz	

## Head TSL parameters

The following parameters and calculations were applied.

	<b>Temperature</b>	<b>Permittivity</b>	<b>Conductivity</b>
<b>Nominal Head TSL parameters</b>	22.0 °C	41.5	0.97 mho/m
<b>Measured Head TSL parameters</b>	(22.0 ± 0.2) °C	42.3 ± 6 %	0.96 mho/m ± 6 %
<b>Head TSL temperature change during test</b>	< 0.5 °C	----	----

## SAR result with Head TSL

<b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b>	Condition	
SAR measured	250 mW input power	2.76 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>11.2 W/kg ± 17.0 % (k=2)</b>

<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b>	condition	
SAR measured	250 mW input power	1.77 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>7.14 W/kg ± 16.5 % (k=2)</b>

## Appendix (Additional assessments outside the scope of SCS 0108)

### Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.0 $\Omega$ - 0.6 $j\Omega$
Return Loss	- 38.5 dB

### General Antenna Parameters and Design

Electrical Delay (one direction)	1.412 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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#### Extended Calibration

Usage of SAR dipoles calibrated less than 3 years ago but more than 1 year ago were confirmed in maintaining return loss (<-20 dB, within 20% of prior calibration) and impedance (within 5 ohm from prior calibration) requirements per extended calibrations in KDB Publication 865664 D01 v01r04.

D900V2 SN: 1d128 - Head						
Date of Measurement	Return Loss (dB)	$\Delta\%$	Impedance Real ( $\Omega$ )	$\Delta\Omega$	Impedance Imaginary ( $j\Omega$ )	$\Delta\Omega$
6/4/2021	-38.5		51.0		-0.6	
6/4/2022	-37.2	-3.4	52.3	1.3	-0.8	-0.2
6/6/2023	-36.8	-4.4	52.9	1.9	-0.7	-0.1

# DASY5 Validation Report for Head TSL

Date: 04.06.2021

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN:1d128**

Communication System: UID 0 - CW; Frequency: 900 MHz

Medium parameters used:  $f = 900$  MHz;  $\sigma = 0.96$  S/m;  $\epsilon_r = 42.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.62, 9.62, 9.62) @ 900 MHz; Calibrated: 28.12.2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.11.2020
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

## Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 65.79 V/m; Power Drift = 0.03 dB

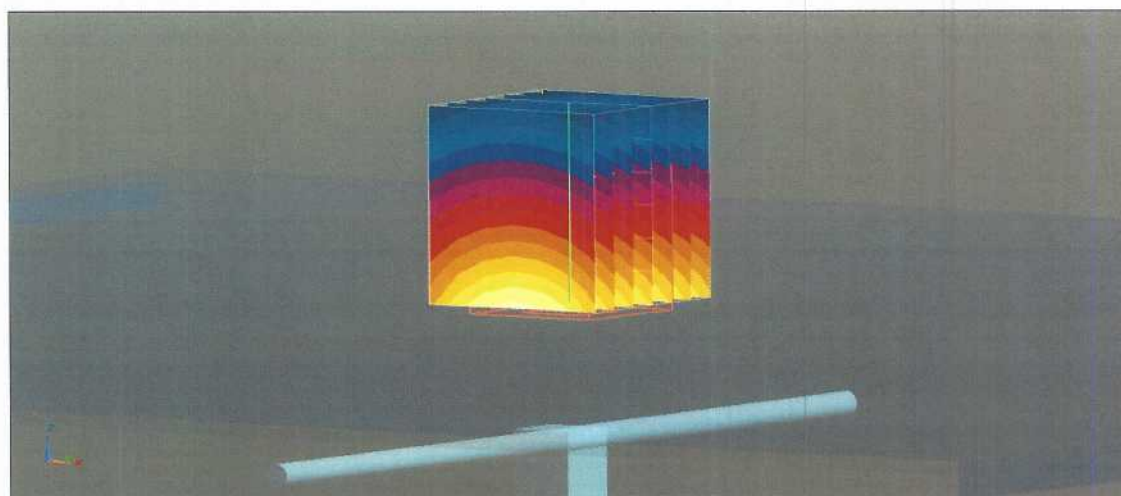
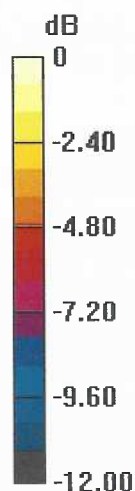
Peak SAR (extrapolated) = 4.23 W/kg

**SAR(1 g) = 2.76 W/kg; SAR(10 g) = 1.77 W/kg**

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

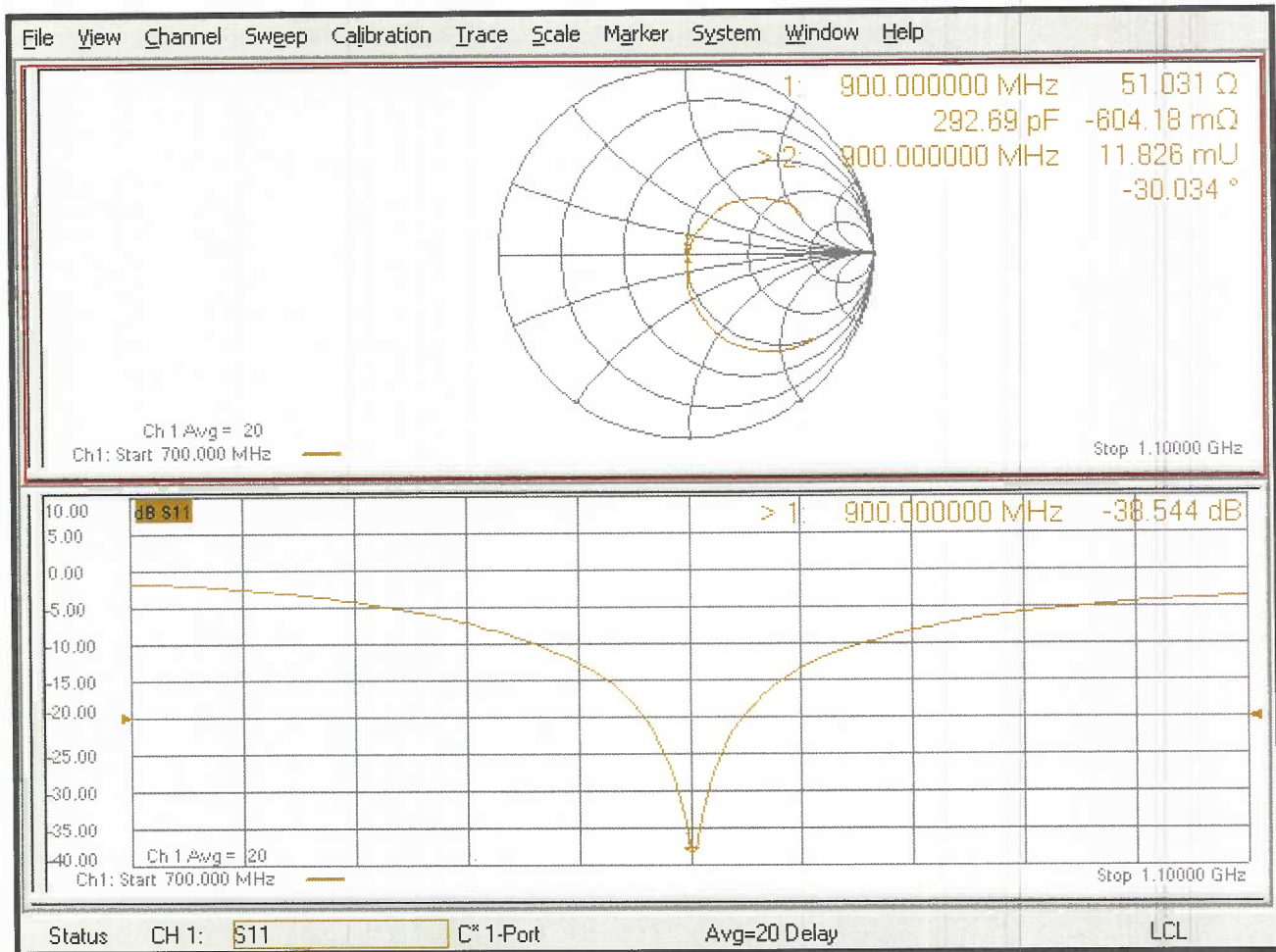
Ratio of SAR at M2 to SAR at M1 = 65%

Maximum value of SAR (measured) = 3.74 W/kg



0 dB = 3.74 W/kg = 5.73 dBW/kg

# Impedance Measurement Plot for Head TSL



gm

**Calibration Laboratory of  
Schmid & Partner  
Engineering AG**  
Zeughausstrasse 43, 8004 Zurich, Switzerland



**S** Schweizerischer Kalibrierdienst  
**C** Service suisse d'étalonnage  
**S** Servizio svizzero di taratura  
**S** Swiss Calibration Service

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The Swiss Accreditation Service is one of the signatories to the EA  
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **RF Exposure Lab**

Certificate No: **D1750V2-1061\_Jun21**

## CALIBRATION CERTIFICATE

Object **D1750V2 - SN:1061**

Calibration procedure(s) **QA CAL-05 v11  
Calibration Procedure for SAR Validation Sources between 0.7-3 GHz**

Calibration date: **June 03, 2021**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	09-Apr-21 (No. 217-03291/03292)	Apr-22
Power sensor NRP-Z91	SN: 103244	09-Apr-21 (No. 217-03291)	Apr-22
Power sensor NRP-Z91	SN: 103245	09-Apr-21 (No. 217-03292)	Apr-22
Reference 20 dB Attenuator	SN: BH9394 (20k)	09-Apr-21 (No. 217-03343)	Apr-22
Type-N mismatch combination	SN: 310982 / 06327	09-Apr-21 (No. 217-03344)	Apr-22
Reference Probe EX3DV4	SN: 7349	28-Dec-20 (No. EX3-7349_Dec20)	Dec-21
DAE4	SN: 601	02-Nov-20 (No. DAE4-601_Nov20)	Nov-21

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-20)	In house check: Oct-22
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-20)	In house check: Oct-21

Calibrated by:	Name <b>Jeffrey Katzman</b>	Function <b>Laboratory Technician</b>	Signature 
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Approved by:	Name <b>Katja Pokovic</b>	Function <b>Technical Manager</b>	
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Issued: June 8, 2021

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



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

### Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

### Calibration is Performed According to the Following Standards:

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

### Additional Documentation:

- DASY4/5 System Handbook

### Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

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

## Measurement Conditions

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

<b>DASY Version</b>	DASY5	V52.10.4
<b>Extrapolation</b>	Advanced Extrapolation	
<b>Phantom</b>	Modular Flat Phantom	
<b>Distance Dipole Center - TSL</b>	10 mm	with Spacer
<b>Zoom Scan Resolution</b>	dx, dy, dz = 5 mm	
<b>Frequency</b>	1750 MHz ± 1 MHz	

## Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Head TSL parameters</b>	22.0 °C	40.1	1.37 mho/m
<b>Measured Head TSL parameters</b>	(22.0 ± 0.2) °C	40.7 ± 6 %	1.37 mho/m ± 6 %
<b>Head TSL temperature change during test</b>	< 0.5 °C	----	----

## SAR result with Head TSL

<b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b>	Condition	
SAR measured	250 mW input power	9.38 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>37.7 W/kg ± 17.0 % (k=2)</b>

<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b>	condition	
SAR measured	250 mW input power	4.93 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>19.8 W/kg ± 16.5 % (k=2)</b>

## Appendix (Additional assessments outside the scope of SCS 0108)

### Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.4 $\Omega$ + 0.0 j $\Omega$
Return Loss	- 44.5 dB

### General Antenna Parameters and Design

Electrical Delay (one direction)	1.221 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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#### Extended Calibration

Usage of SAR dipoles calibrated less than 3 years ago but more than 1 year ago were confirmed in maintaining return loss (<-20 dB, within 20% of prior calibration) and impedance (within 5 ohm from prior calibration) requirements per extended calibrations in KDB Publication 865664 D01 v01r04.

D1750V2 SN: 1061 - Head						
Date of Measurement	Return Loss (dB)	$\Delta\%$	Impedance Real ( $\Omega$ )	$\Delta\Omega$	Impedance Imaginary (j $\Omega$ )	$\Delta\Omega$
6/3/2021	-44.5		49.4		0.0	
6/4/2022	-42.3	-4.9	47.9	-1.5	-0.2	-0.2
6/6/2023	-43.6	-2.0	48.5	-0.9	-0.3	-0.3



# DASY5 Validation Report for Head TSL

Date: 03.06.2021

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN:1061**

Communication System: UID 0 - CW; Frequency: 1750 MHz

Medium parameters used:  $f = 1750$  MHz;  $\sigma = 1.37$  S/m;  $\epsilon_r = 40.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.67, 8.67, 8.67) @ 1750 MHz; Calibrated: 28.12.2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.11.2020
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

## Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 107.4 V/m; Power Drift = 0.08 dB

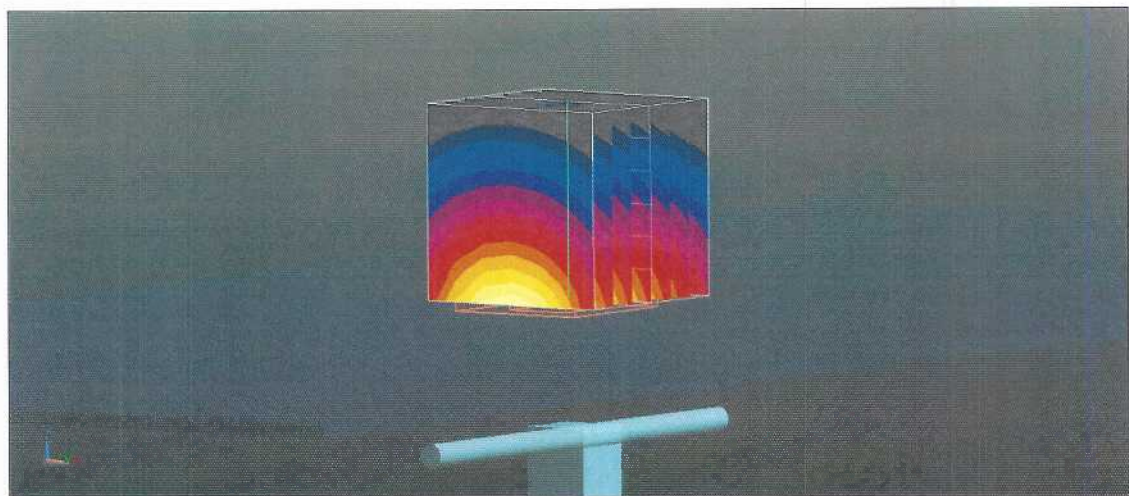
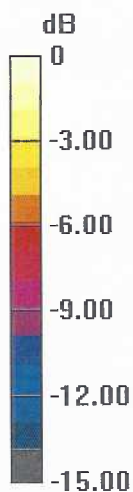
Peak SAR (extrapolated) = 17.5 W/kg

**SAR(1 g) = 9.38 W/kg; SAR(10 g) = 4.93 W/kg**

Smallest distance from peaks to all points 3 dB below = 9.1 mm

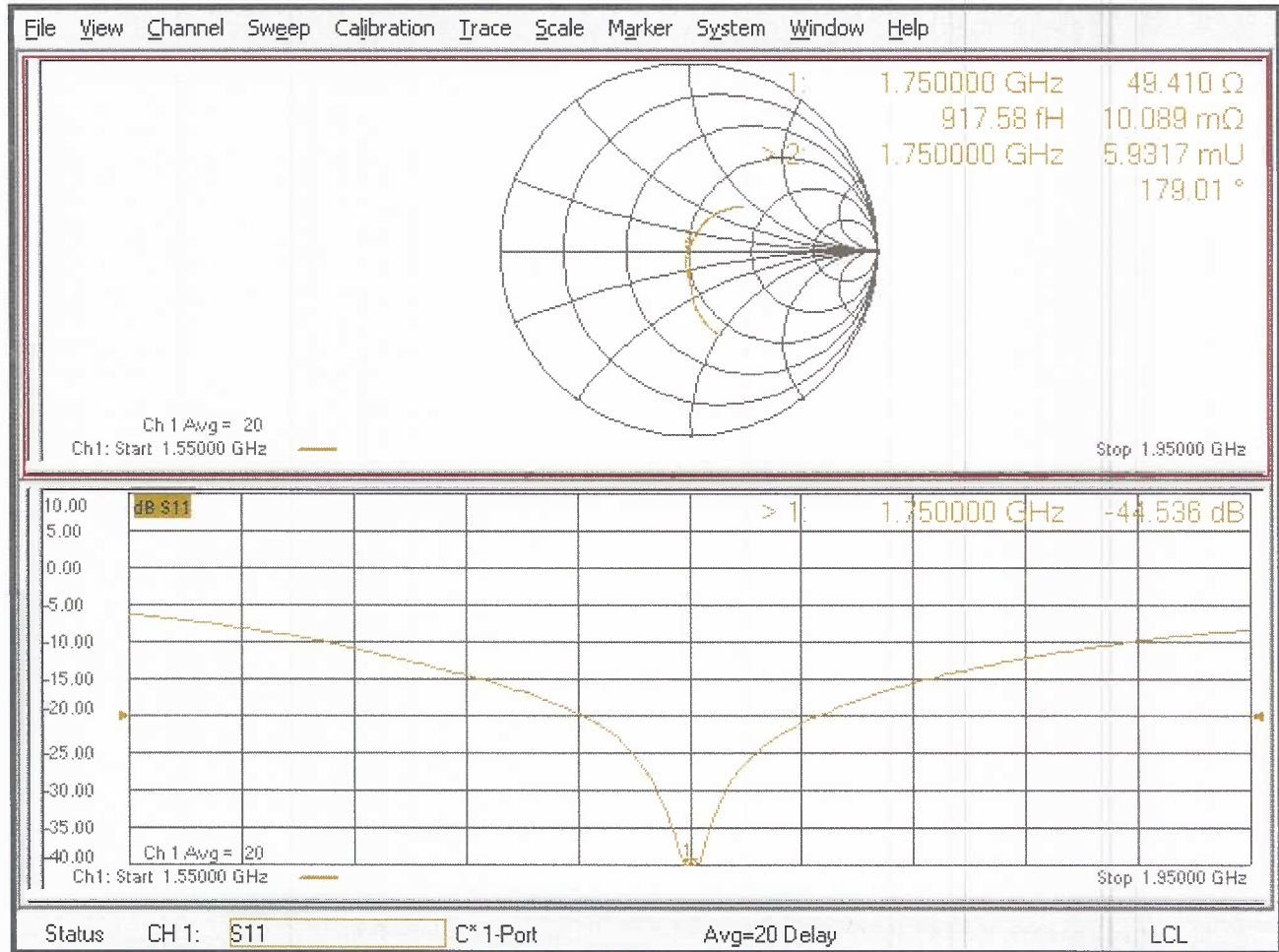
Ratio of SAR at M2 to SAR at M1 = 54%

Maximum value of SAR (measured) = 14.6 W/kg



0 dB = 14.6 W/kg = 11.64 dBW/kg

# Impedance Measurement Plot for Head TSL



Jon

**Calibration Laboratory of  
Schmid & Partner  
Engineering AG**  
Zeughausstrasse 43, 8004 Zurich, Switzerland



**S** Schweizerischer Kalibrierdienst  
**C** Service suisse d'étalonnage  
**S** Servizio svizzero di taratura  
**S** Swiss Calibration Service

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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **RF Exposure Lab**

Certificate No: **D1900V2-5d147\_Jun21**

## CALIBRATION CERTIFICATE

Object **D1900V2 - SN:5d147**

Calibration procedure(s) **QA CAL-05.v11  
Calibration Procedure for SAR Validation Sources between 0.7-3 GHz**

Calibration date: **June 04, 2021**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	09-Apr-21 (No. 217-03291/03292)	Apr-22
Power sensor NRP-Z91	SN: 103244	09-Apr-21 (No. 217-03291)	Apr-22
Power sensor NRP-Z91	SN: 103245	09-Apr-21 (No. 217-03292)	Apr-22
Reference 20 dB Attenuator	SN: BH9394 (20k)	09-Apr-21 (No. 217-03343)	Apr-22
Type-N mismatch combination	SN: 310982 / 06327	09-Apr-21 (No. 217-03344)	Apr-22
Reference Probe EX3DV4	SN: 7349	28-Dec-20 (No. EX3-7349_Dec20)	Dec-21
DAE4	SN: 601	02-Nov-20 (No. DAE4-601_Nov20)	Nov-21
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-20)	In house check: Oct-22
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-20)	In house check: Oct-21

Calibrated by: **Michael Weber**      Name: Michael Weber      Function: Laboratory Technician

Signature:

Approved by: **Katja Pokovic**      Name: Katja Pokovic      Function: Technical Manager

Signature:

Issued: June 8, 2021

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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

### Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

### Calibration is Performed According to the Following Standards:

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

### Additional Documentation:

- DASY4/5 System Handbook

### Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

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

## Measurement Conditions

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

<b>DASY Version</b>	DASY5	V52.10.4
<b>Extrapolation</b>	Advanced Extrapolation	
<b>Phantom</b>	Modular Flat Phantom	
<b>Distance Dipole Center - TSL</b>	10 mm	with Spacer
<b>Zoom Scan Resolution</b>	dx, dy, dz = 5 mm	
<b>Frequency</b>	1900 MHz $\pm$ 1 MHz	

## Head TSL parameters

The following parameters and calculations were applied.

	<b>Temperature</b>	<b>Permittivity</b>	<b>Conductivity</b>
<b>Nominal Head TSL parameters</b>	22.0 °C	40.0	1.40 mho/m
<b>Measured Head TSL parameters</b>	(22.0 $\pm$ 0.2) °C	40.9 $\pm$ 6 %	1.41 mho/m $\pm$ 6 %
<b>Head TSL temperature change during test</b>	< 0.5 °C	----	----

## SAR result with Head TSL

<b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b>	Condition	
SAR measured	250 mW input power	10.1 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>40.4 W/kg <math>\pm</math> 17.0 % (k=2)</b>

<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b>	condition	
SAR measured	250 mW input power	5.28 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>21.1 W/kg <math>\pm</math> 16.5 % (k=2)</b>

## Appendix (Additional assessments outside the scope of SCS 0108)

### Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.3 $\Omega$ + 5.4 j $\Omega$
Return Loss	- 24.2 dB

### General Antenna Parameters and Design

Electrical Delay (one direction)	1.192 ns
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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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#### Extended Calibration

Usage of SAR dipoles calibrated less than 3 years ago but more than 1 year ago were confirmed in maintaining return loss (<-20 dB, within 20% of prior calibration) and impedance (within 5 ohm from prior calibration) requirements per extended calibrations in KDB Publication 865664 D01 v01r04.

D1900V2 SN: 5d147 - Head						
Date of Measurement	Return Loss (dB)	$\Delta\%$	Impedance Real ( $\Omega$ )	$\Delta\Omega$	Impedance Imaginary (j $\Omega$ )	$\Delta\Omega$
6/4/2021	-24.2		53.3		5.4	
6/4/2022	-25.6	5.8	52.6	-0.7	5.7	0.3
6/6/2023	-26.2	8.3	54.6	1.3	5.5	0.1

## DASY5 Validation Report for Head TSL

Date: 04.06.2021

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d147**

Communication System: UID 0 - CW; Frequency: 1900 MHz

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.41$  S/m;  $\epsilon_r = 40.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.43, 8.43, 8.43) @ 1900 MHz; Calibrated: 28.12.2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.11.2020
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

### Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 110.2 V/m; Power Drift = 0.04 dB

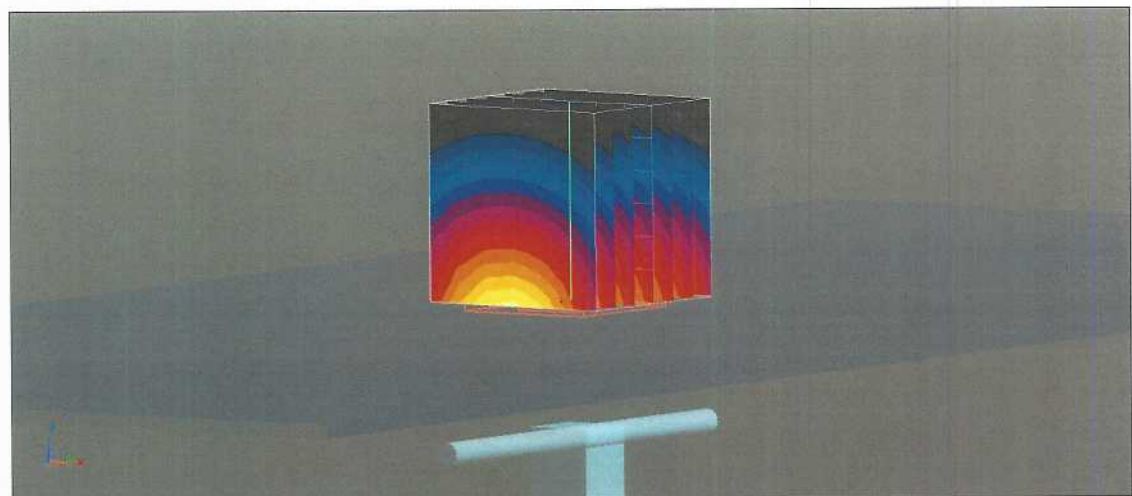
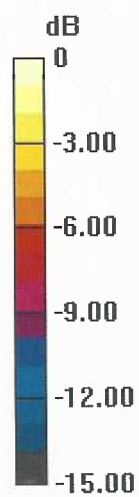
Peak SAR (extrapolated) = 18.7 W/kg

**SAR(1 g) = 10.1 W/kg; SAR(10 g) = 5.28 W/kg**

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

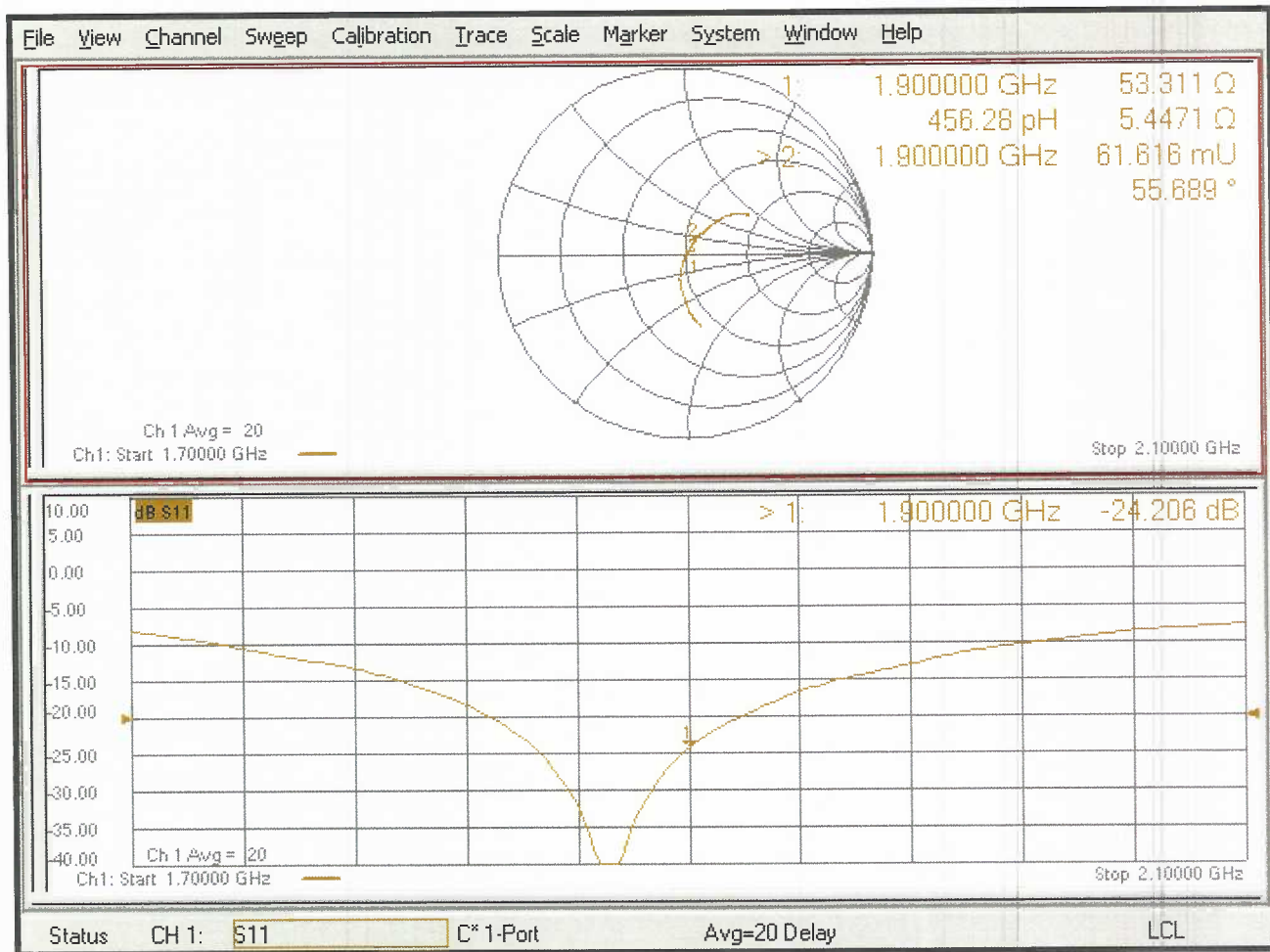
Ratio of SAR at M2 to SAR at M1 = 54.6%

Maximum value of SAR (measured) = 15.6 W/kg





# Impedance Measurement Plot for Head TSL





**Calibration Laboratory of  
Schmid & Partner  
Engineering AG**  
Zeughausstrasse 43, 8004 Zurich, Switzerland



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**S** Servizio svizzero di taratura  
**S** Swiss Calibration Service

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The Swiss Accreditation Service is one of the signatories to the EA  
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **RF Exposure Lab**

Certificate No: **D2550V2-1003\_Jun21**

## CALIBRATION CERTIFICATE

Object **D2550V2 - SN:1003**

Calibration procedure(s) **QA CAL-05.v11  
Calibration Procedure for SAR Validation Sources between 0.7-3 GHz**

Calibration date: **June 03, 2021**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	09-Apr-21 (No. 217-03291/03292)	Apr-22
Power sensor NRP-Z91	SN: 103244	09-Apr-21 (No. 217-03291)	Apr-22
Power sensor NRP-Z91	SN: 103245	09-Apr-21 (No. 217-03292)	Apr-22
Reference 20 dB Attenuator	SN: BH9394 (20k)	09-Apr-21 (No. 217-03343)	Apr-22
Type-N mismatch combination	SN: 310982 / 06327	09-Apr-21 (No. 217-03344)	Apr-22
Reference Probe EX3DV4	SN: 7349	28-Dec-20 (No. EX3-7349_Dec20)	Dec-21
DAE4	SN: 601	02-Nov-20 (No. DAE4-601_Nov20)	Nov-21

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-20)	In house check: Oct-22
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-20)	In house check: Oct-21

	<b>Name</b>	<b>Function</b>	<b>Signature</b>
Calibrated by:	<b>Jeffrey Katzman</b>	<b>Laboratory Technician</b>	

	<b>Name</b>	<b>Function</b>	<b>Signature</b>
Approved by:	<b>Katja Pokovic</b>	<b>Technical Manager</b>	

Issued: June 8, 2021

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



Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signatories to the EA  
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

### Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

### Calibration is Performed According to the Following Standards:

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

### Additional Documentation:

- DASY4/5 System Handbook

### Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

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

## Measurement Conditions

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

<b>DASY Version</b>	DASY5	V52.10.4
<b>Extrapolation</b>	Advanced Extrapolation	
<b>Phantom</b>	Modular Flat Phantom	
<b>Distance Dipole Center - TSL</b>	10 mm	with Spacer
<b>Zoom Scan Resolution</b>	dx, dy, dz = 5 mm	
<b>Frequency</b>	2550 MHz ± 1 MHz	

## Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Head TSL parameters</b>	22.0 °C	39.1	1.91 mho/m
<b>Measured Head TSL parameters</b>	(22.0 ± 0.2) °C	37.3 ± 6 %	1.98 mho/m ± 6 %
<b>Head TSL temperature change during test</b>	< 0.5 °C	---	---

## SAR result with Head TSL

<b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b>	Condition	
SAR measured	250 mW input power	14.2 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>55.3 W/kg ± 17.0 % (k=2)</b>

<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b>	condition	
SAR measured	250 mW input power	6.28 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>24.7 W/kg ± 16.5 % (k=2)</b>

## Appendix (Additional assessments outside the scope of SCS 0108)

### Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.4 $\Omega$ - 3.5 j $\Omega$
Return Loss	- 29.0 dB

### General Antenna Parameters and Design

Electrical Delay (one direction)	1.156 ns
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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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#### Extended Calibration

Usage of SAR dipoles calibrated less than 3 years ago but more than 1 year ago were confirmed in maintaining return loss (<-20 dB, within 20% of prior calibration) and impedance (within 5 ohm from prior calibration) requirements per extended calibrations in KDB Publication 865664 D01 v01r04.

D2550V2 SN: 1003 - Head						
Date of Measurement	Return Loss (dB)	$\Delta\%$	Impedance ( $\Omega$ )	$\Delta\Omega$	Impedance Imaginary (j $\Omega$ )	$\Delta\Omega$
6/3/2021	-29.0		49.4		-3.5	
6/4/2022	-28.6	-1.4	48.5	-0.9	-3.8	-0.3
6/6/2023	-27.3	-5.9	47.1	-2.3	-4.1	-0.6

## DASY5 Validation Report for Head TSL

Date: 03.06.2021

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 2550 MHz; Type: D2550V2; Serial: D2550V2 - SN:1003**

Communication System: UID 0 - CW; Frequency: 2550 MHz

Medium parameters used:  $f = 2550$  MHz;  $\sigma = 1.98$  S/m;  $\epsilon_r = 37.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.85, 7.85, 7.85) @ 2550 MHz; Calibrated: 28.12.2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.11.2020
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

### Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 117.6 V/m; Power Drift = 0.07 dB

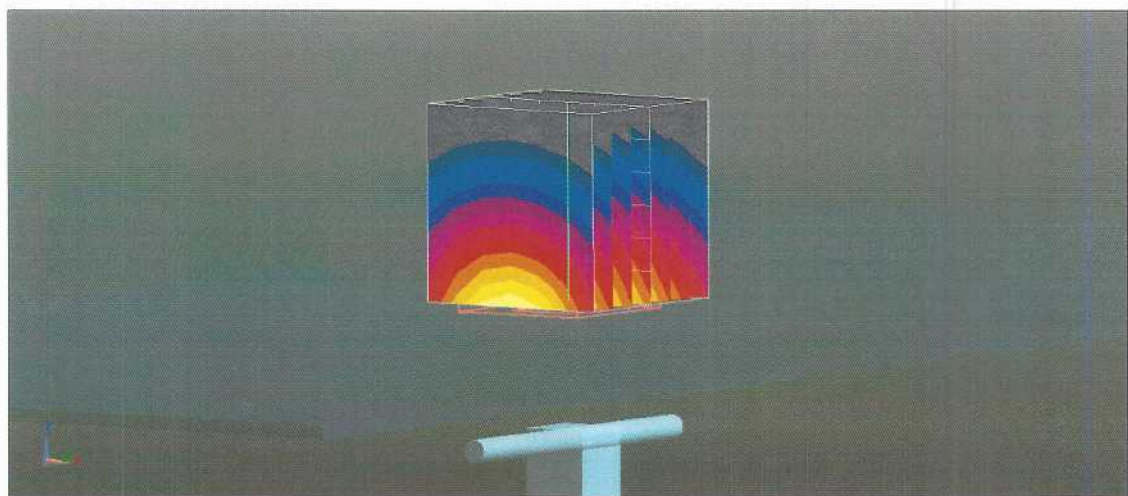
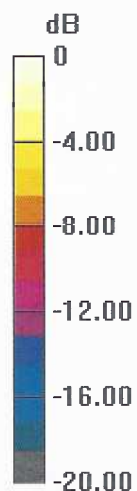
Peak SAR (extrapolated) = 29.9 W/kg

**SAR(1 g) = 14.2 W/kg; SAR(10 g) = 6.28 W/kg**

Smallest distance from peaks to all points 3 dB below = 8.5 mm

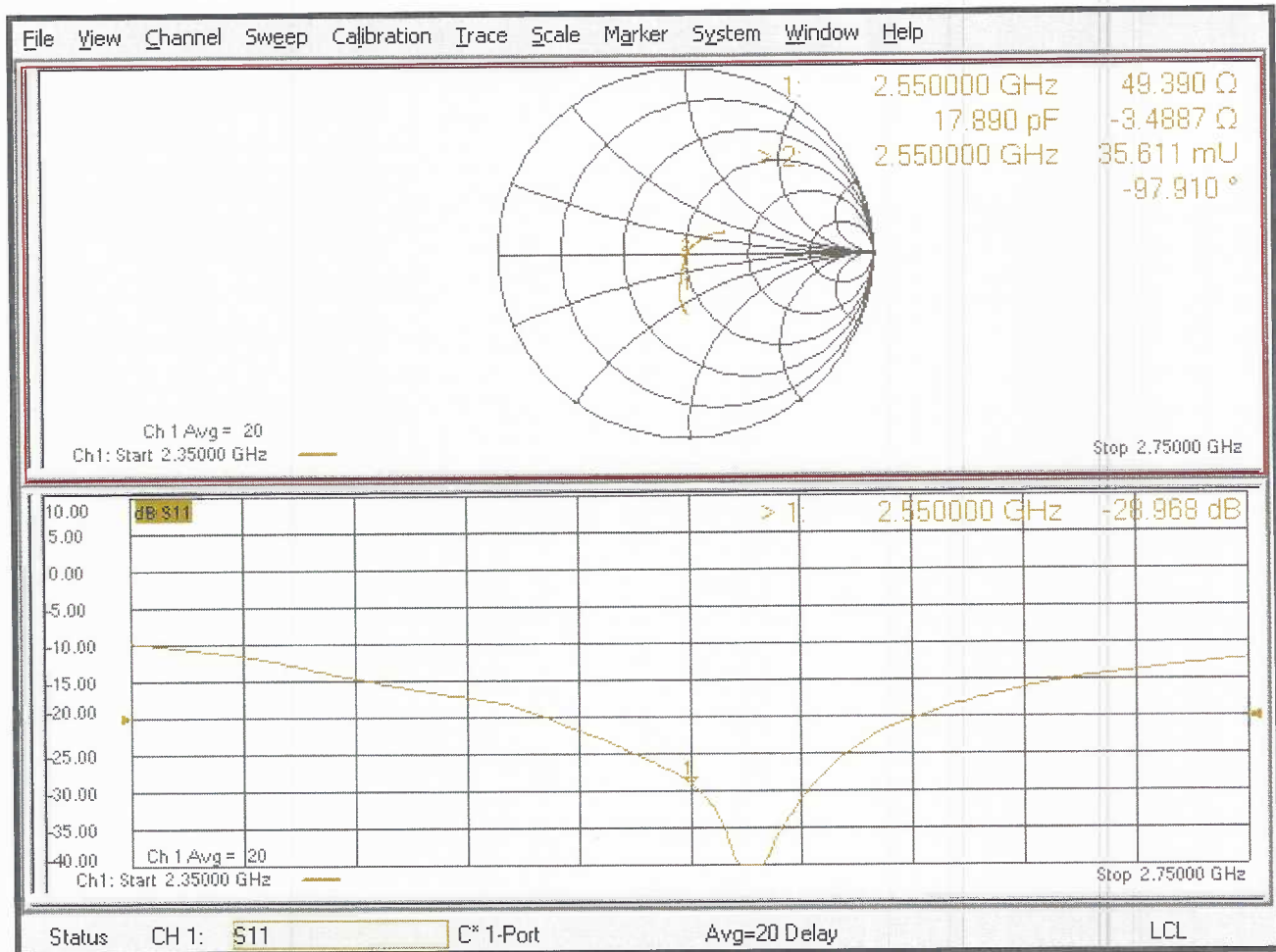
Ratio of SAR at M2 to SAR at M1 = 47.1%

Maximum value of SAR (measured) = 24.3 W/kg



0 dB = 24.3 W/kg = 13.86 dBW/kg

# Impedance Measurement Plot for Head TSL



*gm*

**Calibration Laboratory of  
Schmid & Partner  
Engineering AG**  
Zeughausstrasse 43, 8004 Zurich, Switzerland



**S** Schweizerischer Kalibrierdienst  
**C** Service suisse d'étalonnage  
**S** Servizio svizzero di taratura  
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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **RF Exposure Lab**

Certificate No: **D3700V2-1024\_Apr21**

## CALIBRATION CERTIFICATE

Object **D3700V2 - SN:1024**

Calibration procedure(s) **QA CAL-22.v6  
Calibration Procedure for SAR Validation Sources between 3-10 GHz**

Calibration date: **April 13, 2021**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	09-Apr-21 (No. 217-03291/03292)	Apr-22
Power sensor NRP-Z91	SN: 103244	09-Apr-21 (No. 217-03291)	Apr-22
Power sensor NRP-Z91	SN: 103245	09-Apr-21 (No. 217-03292)	Apr-22
Reference 20 dB Attenuator	SN: BH9394 (20k)	09-Apr-21 (No. 217-03343)	Apr-22
Type-N mismatch combination	SN: 310982 / 06327	09-Apr-21 (No. 217-03344)	Apr-22
Reference Probe EX3DV4	SN: 3503	30-Dec-20 (No. EX3-3503_Dec20)	Dec-21
DAE4	SN: 601	02-Nov-20 (No. DAE4-601_Nov20)	Nov-21
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-20)	In house check: Oct-22
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-20)	In house check: Oct-21

Calibrated by:	Name <b>Michael Weber</b>	Function <b>Laboratory Technician</b>	Signature <i>M. Weber</i>
Approved by:	<b>Katja Pokovic</b>	<b>Technical Manager</b>	<i>[Signature]</i>

Issued: April 15, 2021

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Accreditation No.: **SCS 0108**

**Glossary:**

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

**Calibration is Performed According to the Following Standards:**

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

**Additional Documentation:**

- DASY4/5 System Handbook

**Methods Applied and Interpretation of Parameters:**

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

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



## Measurement Conditions

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

<b>DASY Version</b>	DASY5	V52.10.4
<b>Extrapolation</b>	Advanced Extrapolation	
<b>Phantom</b>	Modular Flat Phantom	
<b>Distance Dipole Center - TSL</b>	10 mm	with Spacer
<b>Zoom Scan Resolution</b>	dx, dy = 4 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
<b>Frequency</b>	3700 MHz $\pm$ 1 MHz	

## Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Head TSL parameters</b>	22.0 °C	37.7	3.12 mho/m
<b>Measured Head TSL parameters</b>	(22.0 $\pm$ 0.2) °C	37.0 $\pm$ 6 %	3.09 mho/m $\pm$ 6 %
<b>Head TSL temperature change during test</b>	< 0.5 °C	----	----

## SAR result with Head TSL

<b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b>	Condition	
SAR measured	100 mW input power	6.85 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>68.3 W/kg <math>\pm</math> 19.9 % (k=2)</b>

<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b>	condition	
SAR measured	100 mW input power	2.47 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>24.6 W/kg <math>\pm</math> 19.5 % (k=2)</b>

## Appendix (Additional assessments outside the scope of SCS 0108)

### Antenna Parameters with Head TSL

Impedance, transformed to feed point	46.1 $\Omega$ + 2.2 j $\Omega$
Return Loss	- 26.7 dB

### General Antenna Parameters and Design

Electrical Delay (one direction)	1.127 ns
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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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#### Extended Calibration

Usage of SAR dipoles calibrated less than 3 years ago but more than 1 year ago were confirmed in maintaining return loss (<-20 dB, within 20% of prior calibration) and impedance (within 5 ohm from prior calibration) requirements per extended calibrations in KDB Publication 865664 D01 v01r04.

D3700V2 SN: 1024 - Head						
Date of Measurement	Return Loss (dB)	$\Delta\%$	Impedance ( $\Omega$ )	$\Delta\Omega$	Impedance Imaginary (j $\Omega$ )	$\Delta\Omega$
4/13/2021	-26.7		46.1		2.2	
4/13/2022	-25.3	-5.2	44.5	-1.6	1.8	-0.4
4/13/2023	-27.5	8.7	47.2	2.7	2.5	0.7

# DASY5 Validation Report for Head TSL

Date: 13.04.2021

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 3700 MHz; Type: D3700V2; Serial: D3700V2 - SN: 1024**

Communication System: UID 0 - CW; Frequency: 3700 MHz

Medium parameters used:  $f = 3700$  MHz;  $\sigma = 3.09$  S/m;  $\epsilon_r = 37$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(7.73, 7.73, 7.73) @ 3700 MHz; Calibrated: 30.12.2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.11.2020
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

## Dipole Calibration for Head Tissue/Pin=100 mW, d=10mm 3700/Zoom Scan, dist=1.4mm

**(8x8x8)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 71.95 V/m; Power Drift = 0.04 dB

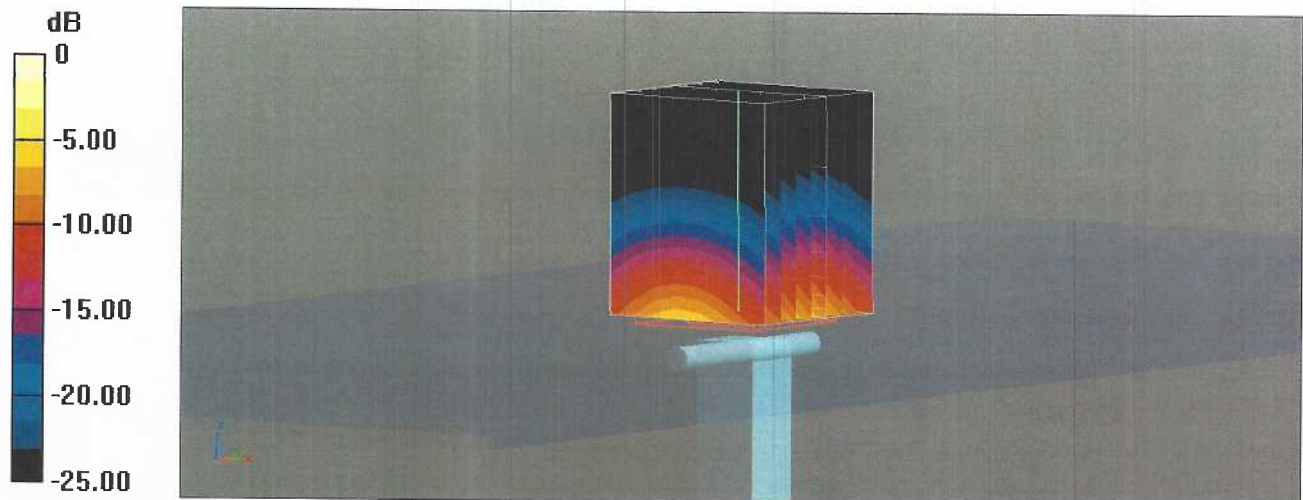
Peak SAR (extrapolated) = 19.6 W/kg

**SAR(1 g) = 6.85 W/kg; SAR(10 g) = 2.47 W/kg**

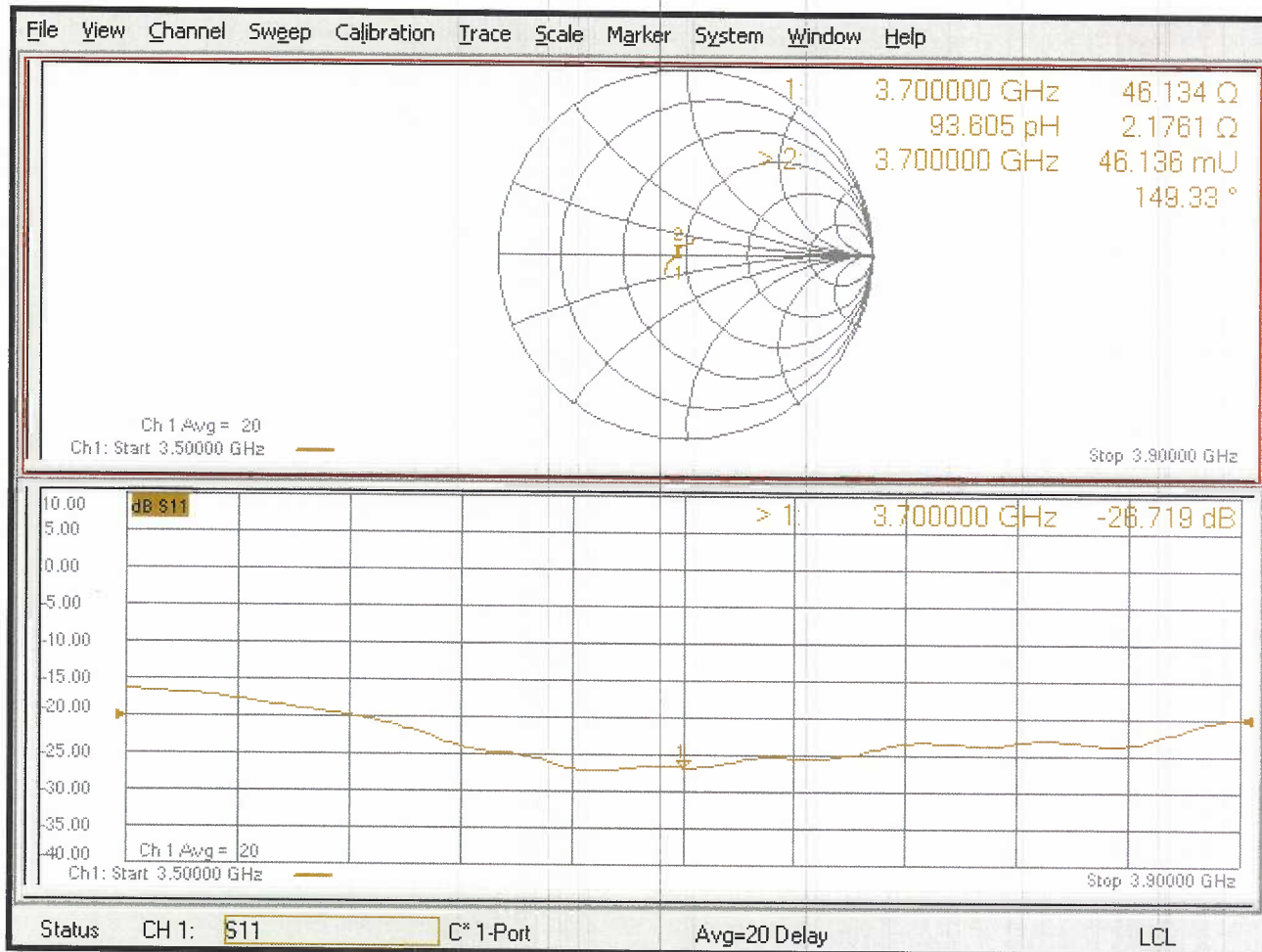
Smallest distance from peaks to all points 3 dB below = 8 mm

Ratio of SAR at M2 to SAR at M1 = 73.2%

Maximum value of SAR (measured) = 13.7 W/kg



# Impedance Measurement Plot for Head TSL



*Jm*

**Calibration Laboratory of  
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Engineering AG**  
Zeughausstrasse 43, 8004 Zurich, Switzerland



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**C** Service suisse d'étalonnage  
**S** Servizio svizzero di taratura  
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Accreditation No.: **SCS 0108**

Client **RF Exposure Lab**

Certificate No: **D2450V2-881\_Jun21**

## CALIBRATION CERTIFICATE

Object **D2450V2 - SN:881**

Calibration procedure(s) **QA CAL-05 v11  
Calibration Procedure for SAR Validation Sources between 0.7-3 GHz**

Calibration date: **June 03, 2021**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	09-Apr-21 (No. 217-03291/03292)	Apr-22
Power sensor NRP-Z91	SN: 103244	09-Apr-21 (No. 217-03291)	Apr-22
Power sensor NRP-Z91	SN: 103245	09-Apr-21 (No. 217-03292)	Apr-22
Reference 20 dB Attenuator	SN: BH9394 (20k)	09-Apr-21 (No. 217-03343)	Apr-22
Type-N mismatch combination	SN: 310982 / 06327	09-Apr-21 (No. 217-03344)	Apr-22
Reference Probe EX3DV4	SN: 7349	28-Dec-20 (No. EX3-7349_Dec20)	Dec-21
DAE4	SN: 601	02-Nov-20 (No. DAE4-601_Nov20)	Nov-21

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-20)	In house check: Oct-22
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-20)	In house check: Oct-21

	Name	Function	Signature
Calibrated by:	Jeffrey Katzman	Laboratory Technician	<i>J. Katzman</i>

Approved by:	Katja Pokovic	Technical Manager	<i>K. Pokovic</i>
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Issued: June 8, 2021

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*Jm*

**Calibration Laboratory of  
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**S** Servizio svizzero di taratura  
**S** Swiss Calibration Service

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Multilateral Agreement for the recognition of calibration certificates**

Accreditation No.: **SCS 0108**

Client **RF Exposure Lab**

Certificate No: **D5GHzV2-1119\_Jun21**

## CALIBRATION CERTIFICATE

Object **D5GHzV2 - SN:1119**

Calibration procedure(s) **QA CAL-22.v6  
Calibration Procedure for SAR Validation Sources between 3-10 GHz**

Calibration date: **June 08, 2021**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	09-Apr-21 (No. 217-03291/03292)	Apr-22
Power sensor NRP-Z91	SN: 103244	09-Apr-21 (No. 217-03291)	Apr-22
Power sensor NRP-Z91	SN: 103245	09-Apr-21 (No. 217-03292)	Apr-22
Reference 20 dB Attenuator	SN: BH9394 (20k)	09-Apr-21 (No. 217-03343)	Apr-22
Type-N mismatch combination	SN: 310982 / 06327	09-Apr-21 (No. 217-03344)	Apr-22
Reference Probe EX3DV4	SN: 3503	30-Dec-20 (No. EX3-3503_Dec20)	Dec-21
DAE4	SN: 601	02-Nov-20 (No. DAE4-601_Nov20)	Nov-21
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-20)	In house check: Oct-22
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-20)	In house check: Oct-21

Calibrated by: **Michael Weber**      Name: **Michael Weber**      Function: **Laboratory Technician**

Signature: *M. Weber*

Approved by: **Katja Pokovic**      Name: **Katja Pokovic**      Function: **Technical Manager**

Signature: *Katja Pokovic*

Issued: June 8, 2021

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### Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

### Calibration is Performed According to the Following Standards:

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

### Additional Documentation:

- DASY4/5 System Handbook

### Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

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

## Measurement Conditions

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

<b>DASY Version</b>	DASY5	V52.10.4
<b>Extrapolation</b>	Advanced Extrapolation	
<b>Phantom</b>	Modular Flat Phantom V5.0	
<b>Distance Dipole Center - TSL</b>	10 mm	with Spacer
<b>Zoom Scan Resolution</b>	dx, dy = 4.0 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
<b>Frequency</b>	5250 MHz ± 1 MHz 5600 MHz ± 1 MHz 5750 MHz ± 1 MHz	

## Head TSL parameters at 5250 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Head TSL parameters</b>	22.0 °C	35.9	4.71 mho/m
<b>Measured Head TSL parameters</b>	(22.0 ± 0.2) °C	34.6 ± 6 %	4.59 mho/m ± 6 %
<b>Head TSL temperature change during test</b>	< 0.5 °C	---	---

## SAR result with Head TSL at 5250 MHz

<b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b>	Condition	
SAR measured	100 mW input power	8.02 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>79.5 W/kg ± 19.9 % (k=2)</b>

<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b>	condition	
SAR measured	100 mW input power	2.32 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>22.9 W/kg ± 19.5 % (k=2)</b>

## Head TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Head TSL parameters</b>	22.0 °C	35.5	5.07 mho/m
<b>Measured Head TSL parameters</b>	(22.0 ± 0.2) °C	34.1 ± 6 %	4.95 mho/m ± 6 %
<b>Head TSL temperature change during test</b>	< 0.5 °C	---	---

## SAR result with Head TSL at 5600 MHz

<b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b>	Condition	
SAR measured	100 mW input power	8.40 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>83.2 W/kg ± 19.9 % (k=2)</b>

<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b>	condition	
SAR measured	100 mW input power	2.41 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>23.8 W/kg ± 19.5 % (k=2)</b>



## Head TSL parameters at 5750 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.4	5.22 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	33.9 ± 6 %	5.10 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

## SAR result with Head TSL at 5750 MHz

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.13 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>80.5 W/kg ± 19.9 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.33 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>23.0 W/kg ± 19.5 % (k=2)</b>

## Appendix (Additional assessments outside the scope of SCS 0108)

### Antenna Parameters with Head TSL at 5250 MHz

Impedance, transformed to feed point	51.9 $\Omega$ - 7.3 j $\Omega$
Return Loss	- 22.6 dB

### Antenna Parameters with Head TSL at 5600 MHz

Impedance, transformed to feed point	56.8 $\Omega$ - 1.3 j $\Omega$
Return Loss	- 23.8 dB

### Antenna Parameters with Head TSL at 5750 MHz

Impedance, transformed to feed point	56.9 $\Omega$ - 1.8 j $\Omega$
Return Loss	- 23.5 dB

### General Antenna Parameters and Design

Electrical Delay (one direction)	1.206 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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#### Extended Calibration

Usage of SAR dipoles calibrated less than 3 years ago but more than 1 year ago were confirmed in maintaining return loss (<-20 dB, within 20% of prior calibration) and impedance (within 5 ohm from prior calibration) requirements per extended calibrations in KDB Publication 865664 D01 v01r04.

D5GHzV2 SN: 1085 - Head							
Date of Measurement	Frequency	Return Loss (dB)	$\Delta\%$	Impedance Real ( $\Omega$ )	$\Delta\Omega$	Impedance Imaginary (j $\Omega$ )	$\Delta\Omega$
6/8/2021	5250 MHz	-22.6		51.9		-7.3	
6/5/2022		-22.9	1.3	52.6	0.7	-7.7	-0.4
6/8/2023		-22.7	0.4	52.9	1.0	-7.5	-0.2
6/8/2021	5600 MHz	-23.8		56.8		-1.3	
6/5/2022		-24.6	3.4	55.2	-1.6	-1.6	-0.3
6/8/2023		-24.2	1.7	56.9	0.1	-1.5	-0.2
6/8/2021	5750 MHz	-23.5		56.9		-1.8	
6/5/2022		-24.8	5.5	56.2	-0.7	-2.5	-0.7
6/8/2023		-22.8	-3.0	57.3	0.4	-2.2	-0.4

## DASY5 Validation Report for Head TSL

Date: 08.06.2021

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1119**

Communication System: UID 0 - CW; Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz

Medium parameters used:  $f = 5250$  MHz;  $\sigma = 4.59$  S/m;  $\epsilon_r = 34.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>,

Medium parameters used:  $f = 5600$  MHz;  $\sigma = 4.95$  S/m;  $\epsilon_r = 34.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>,

Medium parameters used:  $f = 5750$  MHz;  $\sigma = 5.1$  S/m;  $\epsilon_r = 33.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.5, 5.5, 5.5) @ 5250 MHz, ConvF(5.1, 5.1, 5.1) @ 5600 MHz, ConvF(5.08, 5.08, 5.08) @ 5750 MHz; Calibrated: 30.12.2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.11.2020
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

**Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5250 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 76.83 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 27.1 W/kg

**SAR(1 g) = 8.02 W/kg; SAR(10 g) = 2.32 W/kg**

Smallest distance from peaks to all points 3 dB below = 7.2 mm

Ratio of SAR at M2 to SAR at M1 = 70.7%

Maximum value of SAR (measured) = 17.7 W/kg

**Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 76.09 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 30.6 W/kg

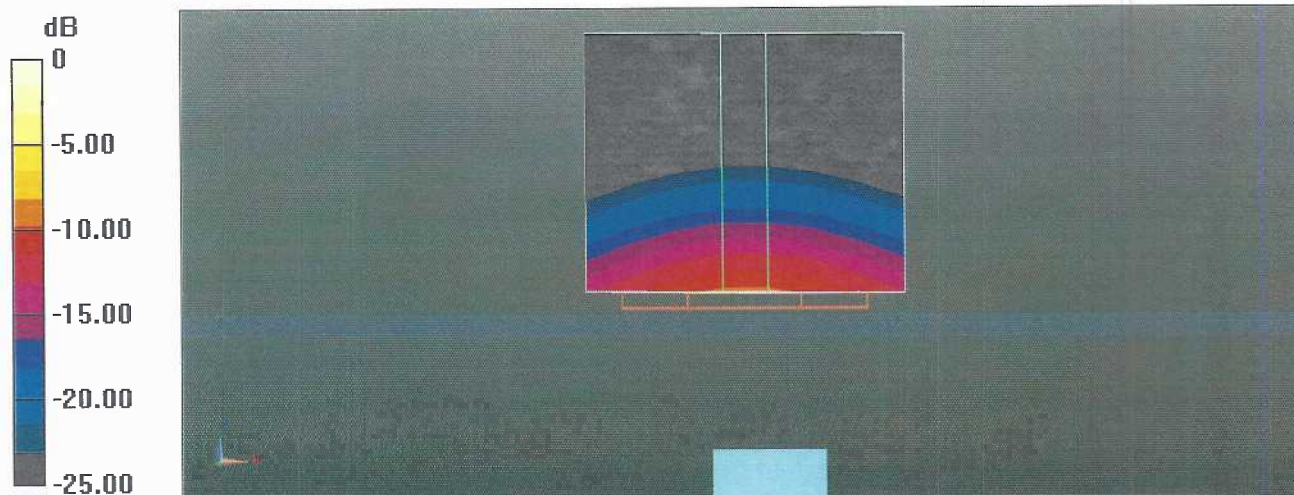
**SAR(1 g) = 8.4 W/kg; SAR(10 g) = 2.41 W/kg**

Smallest distance from peaks to all points 3 dB below = 7.5 mm

Ratio of SAR at M2 to SAR at M1 = 68.4%

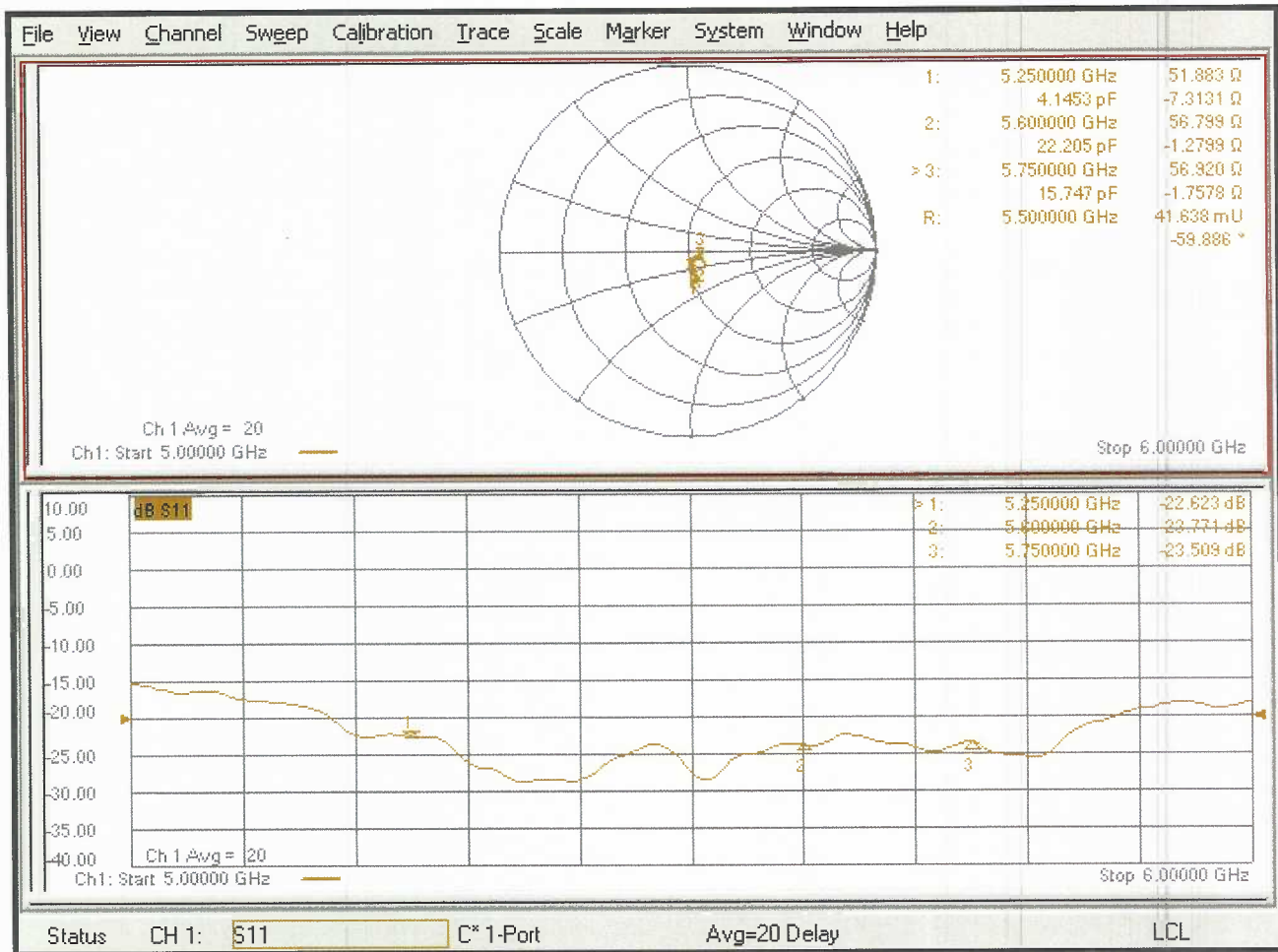
Maximum value of SAR (measured) = 19.1 W/kg

**Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm  
Reference Value = 75.64 V/m; Power Drift = 0.02 dB  
Peak SAR (extrapolated) = 31.8 W/kg  
**SAR(1 g) = 8.13 W/kg; SAR(10 g) = 2.33 W/kg**  
Smallest distance from peaks to all points 3 dB below = 7.4 mm  
Ratio of SAR at M2 to SAR at M1 = 65.4%  
Maximum value of SAR (measured) = 19.3 W/kg



0 dB = 19.3 W/kg = 12.86 dBW/kg

# Impedance Measurement Plot for Head TSL





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Accreditation No.: **SCS 0108**

The Swiss Accreditation Service is one of the signatories to the EA  
Multilateral Agreement for the recognition of calibration certificates

### Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

### Calibration is Performed According to the Following Standards:

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

### Additional Documentation:

- DASY4/5 System Handbook

### Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

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

## Measurement Conditions

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

<b>DASY Version</b>	DASY5	V52.10.4
<b>Extrapolation</b>	Advanced Extrapolation	
<b>Phantom</b>	Modular Flat Phantom	
<b>Distance Dipole Center - TSL</b>	10 mm	with Spacer
<b>Zoom Scan Resolution</b>	dx, dy, dz = 5 mm	
<b>Frequency</b>	2450 MHz ± 1 MHz	

## Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Head TSL parameters</b>	22.0 °C	39.2	1.80 mho/m
<b>Measured Head TSL parameters</b>	(22.0 ± 0.2) °C	37.7 ± 6 %	1.87 mho/m ± 6 %
<b>Head TSL temperature change during test</b>	< 0.5 °C	----	----

## SAR result with Head TSL

<b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b>	Condition	
SAR measured	250 mW input power	13.9 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>54.1 W/kg ± 17.0 % (k=2)</b>

<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b>	condition	
SAR measured	250 mW input power	6.34 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>25.0 W/kg ± 16.5 % (k=2)</b>

## Appendix (Additional assessments outside the scope of SCS 0108)

### Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.3 $\Omega$ + 4.3 j $\Omega$
Return Loss	- 24.7 dB

### General Antenna Parameters and Design

Electrical Delay (one direction)	1.156 ns
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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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#### Extended Calibration

Usage of SAR dipoles calibrated less than 3 years ago but more than 1 year ago were confirmed in maintaining return loss (<-20 dB, within 20% of prior calibration) and impedance (within 5 ohm from prior calibration) requirements per extended calibrations in KDB Publication 865664 D01 v01r04.

D2450V2 SN: 829 - Head						
Date of Measurement	Return Loss (dB)	$\Delta\%$	Impedance Real ( $\Omega$ )	$\Delta\Omega$	Impedance Imaginary (j $\Omega$ )	$\Delta\Omega$
6/3/2021	-24.7		54.3		4.3	
6/3/2022	-25.3	2.4	55.2	0.9	4.1	-0.2
6/6/2023	-26.2	6.1	53.1	-1.2	4.2	-0.1



## DASY5 Validation Report for Head TSL

Date: 03.06.2021

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:881**

Communication System: UID 0 - CW; Frequency: 2450 MHz

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.87$  S/m;  $\epsilon_r = 37.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.96, 7.96, 7.96) @ 2450 MHz; Calibrated: 28.12.2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.11.2020
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

### Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 119.0 V/m; Power Drift = 0.05 dB

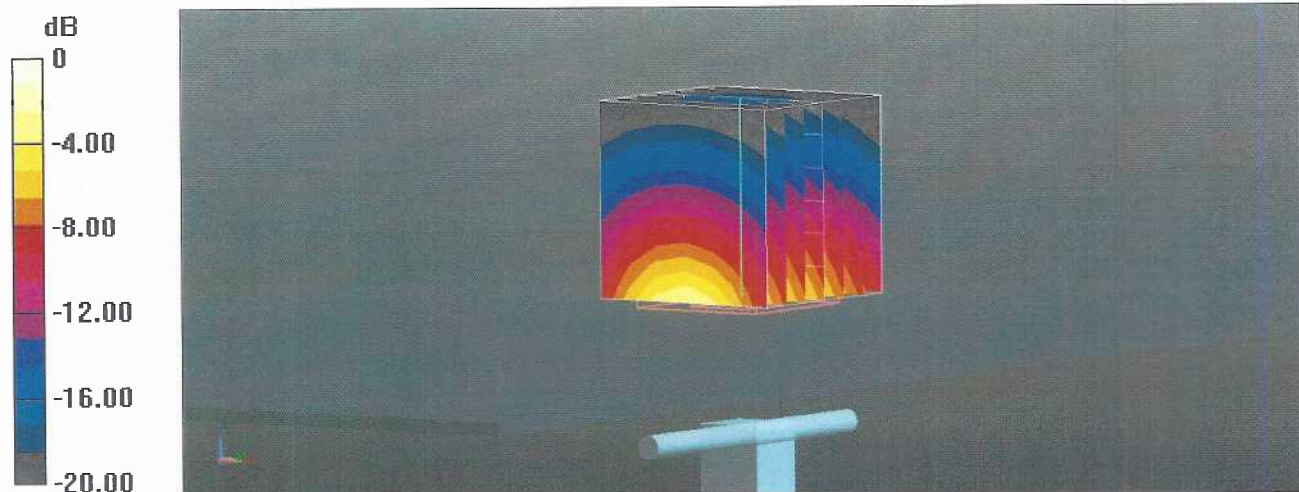
Peak SAR (extrapolated) = 28.0 W/kg

**SAR(1 g) = 13.9 W/kg; SAR(10 g) = 6.34 W/kg**

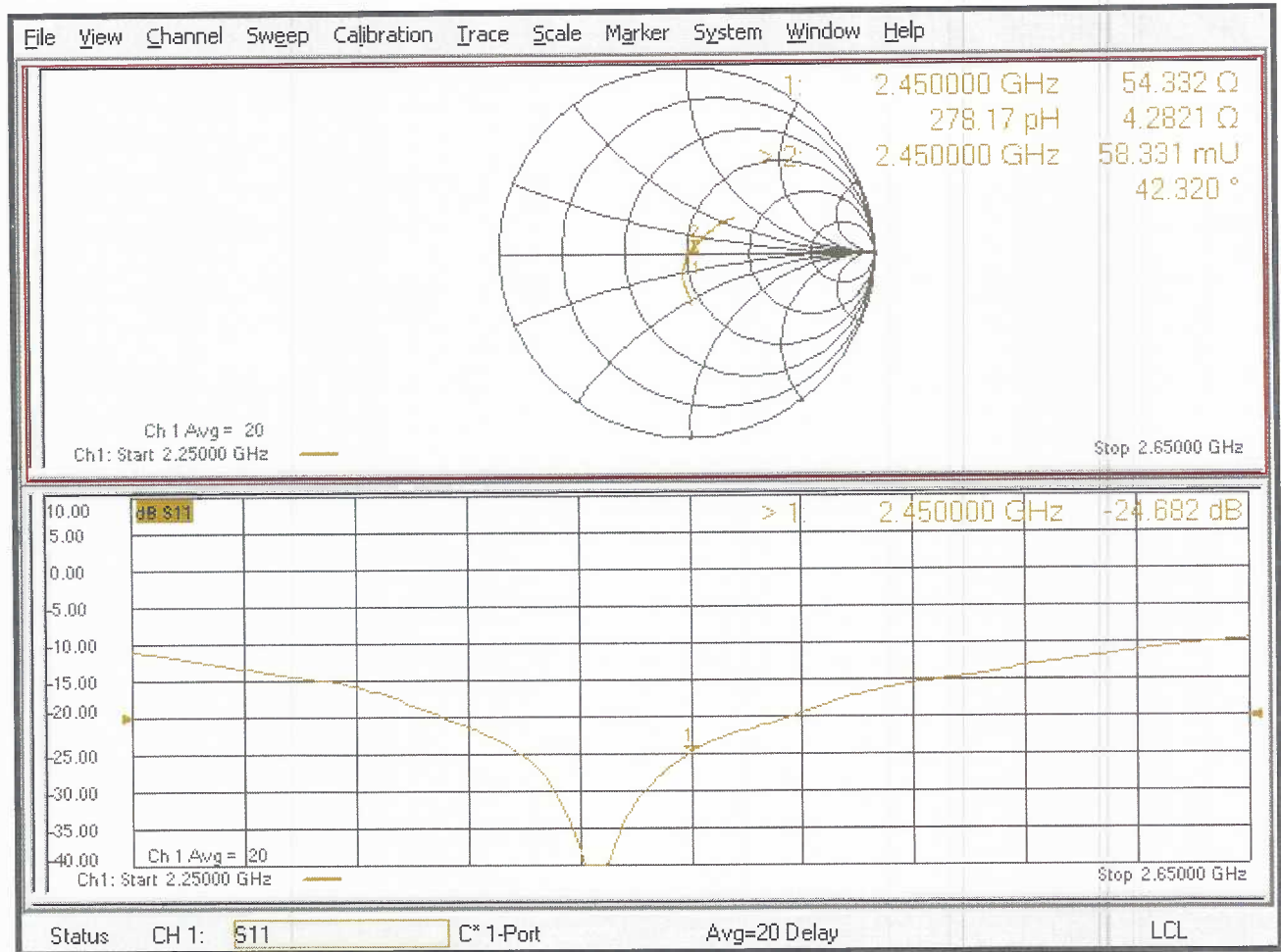
Smallest distance from peaks to all points 3 dB below = 9 mm

Ratio of SAR at M2 to SAR at M1 = 49.5%

Maximum value of SAR (measured) = 23.1 W/kg



# Impedance Measurement Plot for Head TSL



## Appendix F – DAE Calibration Data Sheets



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **RF Exposure Lab**  
San Marcos, USA

Certificate No: **DAE4-1416\_Apr23**

## CALIBRATION CERTIFICATE

Object **DAE4 - SD 000 D04 BM - SN: 1416**

Calibration procedure(s) **QA CAL-06.v30**  
**Calibration procedure for the data acquisition electronics (DAE)**

Calibration date: **April 19, 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 ( $22 \pm 3$ )°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Keithley Multimeter Type 2001	SN: 0810278	29-Aug-22 (No:34389)	Aug-23
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Auto DAE Calibration Unit	SE UWS 053 AA 1001	27-Jan-23 (in house check)	In house check: Jan-24
Calibrator Box V2.1	SE UMS 006 AA 1002	27-Jan-23 (in house check)	In house check: Jan-24

Calibrated by: **Adrian Gehring**      **Adrian Gehring**      **Adrian Gehring**  
Name      Function      Signature  
Laboratory Technician

Approved by: **Sven Kühn**      **Sven Kühn**      **Sven Kühn**  
Technical Manager

Issued: April 19, 2023

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



Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signatories to the EA  
Multilateral Agreement for the recognition of calibration certificates

## 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 following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.
  - *DC Voltage Measurement Linearity:* Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
  - *Common mode sensitivity:* Influence of a positive or negative common mode voltage on the differential measurement.
  - *Channel separation:* Influence of a voltage on the neighbor channels not subject to an input voltage.
  - *AD Converter Values with inputs shorted:* Values on the internal AD converter corresponding to zero input voltage
  - *Input Offset Measurement:* Output voltage and statistical results over a large number of zero voltage measurements.
  - *Input Offset Current:* Typical value for information; Maximum channel input offset current, not considering the input resistance.
  - *Input resistance:* Typical value for information: DAE input resistance at the connector, during internal auto-zeroing and during measurement.
  - *Low Battery Alarm Voltage:* Typical value for information. Below this voltage, a battery alarm signal is generated.
  - *Power consumption:* Typical value for information. Supply currents in various operating modes.

## DC Voltage Measurement

A/D - Converter Resolution nominal

High Range: 1LSB = 6.1 $\mu$ V, full range = -100...+300 mV

Low Range: 1LSB = 61nV, full range = -1.....+3mV

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Calibration Factors	X	Y	Z
High Range	403.576 $\pm$ 0.02% (k=2)	403.882 $\pm$ 0.02% (k=2)	404.149 $\pm$ 0.02% (k=2)
Low Range	3.97826 $\pm$ 1.50% (k=2)	3.99531 $\pm$ 1.50% (k=2)	3.97142 $\pm$ 1.50% (k=2)

## Connector Angle

Connector Angle to be used in DASY system	181.0 $^{\circ}$ $\pm$ 1 $^{\circ}$
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## Appendix (Additional assessments outside the scope of SCS0108)

### 1. DC Voltage Linearity

High Range	Reading ( $\mu\text{V}$ )	Difference ( $\mu\text{V}$ )	Error (%)
Channel X + Input	199994.69	-0.41	-0.00
Channel X + Input	20001.60	-1.04	-0.01
Channel X - Input	-20000.15	1.22	-0.01
Channel Y + Input	199996.57	1.52	0.00
Channel Y + Input	20000.09	-2.36	-0.01
Channel Y - Input	-20003.05	-1.65	0.01
Channel Z + Input	199995.51	0.44	0.00
Channel Z + Input	19999.49	-2.93	-0.01
Channel Z - Input	-20003.45	-2.02	0.01

Low Range	Reading ( $\mu\text{V}$ )	Difference ( $\mu\text{V}$ )	Error (%)
Channel X + Input	2001.59	-0.18	-0.01
Channel X + Input	202.16	0.15	0.07
Channel X - Input	-197.31	0.40	-0.20
Channel Y + Input	2001.43	-0.20	-0.01
Channel Y + Input	201.00	-0.84	-0.42
Channel Y - Input	-198.62	-0.66	0.33
Channel Z + Input	2001.53	-0.06	-0.00
Channel Z + Input	200.32	-1.54	-0.76
Channel Z - Input	-199.56	-1.57	0.79

### 2. Common mode sensitivity

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Common mode Input Voltage (mV)	High Range Average Reading ( $\mu\text{V}$ )	Low Range Average Reading ( $\mu\text{V}$ )
Channel X	200	-3.92	-4.61
	- 200	7.37	4.65
Channel Y	200	-5.88	-7.43
	- 200	6.96	5.86
Channel Z	200	-23.77	-23.62
	- 200	21.74	21.52

### 3. Channel separation

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Input Voltage (mV)	Channel X ( $\mu\text{V}$ )	Channel Y ( $\mu\text{V}$ )	Channel Z ( $\mu\text{V}$ )
Channel X	200	-	2.98	-4.77
Channel Y	200	7.89	-	2.79
Channel Z	200	9.17	6.36	-

#### 4. AD-Converter Values with inputs shorted

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	High Range (LSB)	Low Range (LSB)
Channel X	15996	17581
Channel Y	16150	16491
Channel Z	16130	15361

#### 5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Input 10M $\Omega$

	Average ( $\mu$ V)	min. Offset ( $\mu$ V)	max. Offset ( $\mu$ V)	Std. Deviation ( $\mu$ V)
Channel X	0.78	-0.03	1.52	0.32
Channel Y	-0.79	-1.76	0.77	0.41
Channel Z	-0.57	-1.39	0.58	0.37

#### 6. Input Offset Current

Nominal Input circuitry offset current on all channels: <25fA

#### 7. Input Resistance (Typical values for information)

	Zeroing (kOhm)	Measuring (MOhm)
Channel X	200	200
Channel Y	200	200
Channel Z	200	200

#### 8. Low Battery Alarm Voltage (Typical values for information)

Typical values	Alarm Level (VDC)
Supply (+ Vcc)	+7.9
Supply (- Vcc)	-7.6

#### 9. Power Consumption (Typical values for information)

Typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)
Supply (+ Vcc)	+0.01	+6	+14
Supply (- Vcc)	-0.01	-8	-9



## Appendix G – Phantom Calibration Data Sheets

**Certificate of Conformity / First Article Inspection**

Item	Oval Flat Phantom ELI 4.0
Type No	QD OVA 001 B
Series No	1003 and higher
Manufacturer	Untersee Composites Knebelstrasse 8 CH-8268 Mannenbach, Switzerland

**Tests**

Complete tests were made on the prototype units QD OVA 001 AA 1001, QD OVA 001 AB 1002, pre-series units QD OVA 001 BA 1003-1005 as well as on the series units QD OVA 001 BB, 1006 ff.

Test	Requirement	Details	Units tested
Material thickness	Compliant with the standard requirements	Bottom plate: 2.0mm +/- 0.2mm	all
Material parameters	Dielectric parameters for required frequencies	< 6 GHz: Rel. permittivity = 4 +/-1, Loss tangent ≤ 0.05	Material sample
Material resistivity	The material has been tested to be compatible with the liquids defined in the standards if handled and cleaned according to the instructions.	DGBE based simulating liquids. Observe Technical Note for material compatibility.	Equivalent phantoms, Material sample
Shape	Thickness of bottom material, Internal dimensions, Sagging compatible with standards from minimum frequency	Bottom elliptical 600 x 400 mm Depth 190 mm, Shape is within tolerance for filling height up to 155 mm, Eventual sagging is reduced or eliminated by support via DUT	Prototypes, Sample testing

**Standards**

- [1] CENELEC EN 50361-2001, « Basic standard for the measurement of the Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz – 3 GHz) », July 2001
- [2] IEEE 1528-2003, "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques, December 2003
- [3] IEC 62209 – 1, "Specific Absorption Rate (SAR) in the frequency range of 300 MHz to 3 GHz – Measurement Procedure, Part 1: Hand-held mobile wireless communication devices", February 2005
- [4] IEC 62209 – 2, Draft, "Human Exposure to Radio Frequency Fields from Handheld and Body-Mounted Wireless Communication Devices – Human models, Instrumentation and Procedures – Part 2: Procedure to determine the Specific Absorption Rate (SAR) in the head and body for 30 MHz to 6 GHz Handheld and Body-Mounted Devices used in close proximity to the Body.", February 2005
- [5] OET Bulletin 65, Supplement C, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields", Edition January 2001

Based on the tests above, we certify that this item is in compliance with the standards [1] to [5] if operated according to the specific requirements and considering the thickness. The dimensions are fully compliant with [4] from 30 MHz to 6 GHz. For the other standards, the minimum lower frequency limit is limited due to the dimensional requirements ([1]: 450 MHz, [2]: 300 MHz, [3]: 800 MHz, [5]: 375 MHz) and possibly further by the dimensions of the DUT.

Date 28.4.2008 Signature / Stamp

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## Appendix H – Validation Summary

Per FCC KDB 865664 D02 v01r02, SAR system validation status should be documented to confirm measurement accuracy. The SAR systems (including SAR probes, system components and software versions) used for this device were validated against its performance specifications prior to the SAR measurements. Reference dipoles were used with the required tissue equivalent media for system validation according to the procedures outlined in FCC KDB 865664 D01 v01r04 and IEEE 1528-2013. Since SAR probe calibrations are frequency dependent, each probe calibration point was validated at a frequency within the valid frequency range of the probe calibration point using the system that normally operates with the probe for routine SAR measurements and according to the required tissue equivalent media.

A tabulated summary of the system validation status including the validation date(s), measurement frequencies, SAR probes and tissue dielectric parameters has been included.

**Table H-1  
SAR System Validation Summary**

SAR System #	Freq. (MHz)	Date	Probe S/N	Probe Type	Probe Cal. Point	Cond. ( $\sigma$ )	Perm. ( $\epsilon_r$ )	CW Validation			Modulation Validation			
								Sens-itivity	Probe Linearity	Probe Isotropy	Modulation Type	Duty Factor	PAR	
3	750	02/20/2023	3662	EX3DV4	750	Head	0.90	41.67	Pass	Pass	Pass	QPSK	Pass	Pass
3	900	02/20/2023	3662	EX3DV4	900	Head	0.99	40.53	Pass	Pass	Pass	WCDMA	Pass	Pass
3	900	02/20/2023	3662	EX3DV4	900	Head	0.99	40.53	Pass	Pass	Pass	QPSK	Pass	Pass
3	1750	02/20/2023	3662	EX3DV4	1750	Head	1.40	39.21	Pass	Pass	Pass	WCDMA	Pass	Pass
3	1750	02/20/2023	3662	EX3DV4	1750	Head	1.40	39.21	Pass	Pass	Pass	QPSK	Pass	Pass
3	1900	02/21/2023	3662	EX3DV4	1900	Head	1.41	39.07	Pass	Pass	Pass	WCDMA	Pass	Pass
3	1900	02/21/2023	3662	EX3DV4	1900	Head	1.41	39.07	Pass	Pass	Pass	QPSK	Pass	Pass
3	2550	02/21/2023	3662	EX3DV4	2550	Head	1.94	38.25	Pass	Pass	Pass	QPSK	Pass	Pass
3	3700	2/08/2023	7530	EX3DV4	3700	Head	3.15	36.84	Pass	Pass	Pass	QPSK	Pass	Pass
3	2450	2/09/2023	7530	EX3DV4	3900	Head	1.83	38.49	Pass	Pass	Pass	DSS/OFDM	Pass	Pass
3	5250	2/10/2023	7530	EX3DV4	5250	Head	4.75	35.21	Pass	Pass	Pass	OFDM	Pass	Pass
3	5600	2/10/2023	7530	EX3DV4	5600	Head	5.11	34.95	Pass	Pass	Pass	OFDM	Pass	Pass
3	5750	2/10/2023	7530	EX3DV4	5750	Head	5.27	34.72	Pass	Pass	Pass	OFDM	Pass	Pass