

February 19, 2024

Parameters of Probe: EUmmWV4 - SN:9464

Calibration Results for Linearity Response

Frequency GHz	Target E-Field V/m	Deviation Sensor X dB	Deviation Sensor Y dB	Unc (k = 2) dB
0.9	50.0	-0.07	0.11	±0.2
0.9	100.0	0.00	0.03	±0.2
0.9	500.0	0.02	-0.00	±0.2
0.9	1000.0	0.04	0.02	±0.2
0.9	1500.0	0.03	0.02	±0.2
0.9	2100.0	0.00	0.01	±0.2

Sensor Frequency Model Parameters (750 MHz - 55 GHz)

	Sensor X	Sensor Y
R (Ω)	53,67	71.53
R _p (Ω)	71.49	100.42
L (nH)	0.05070	0.06278
C (pF)	0.3580	0.3306
Cp (pF)	0.1020	0.0814

Sensor Frequency Model Parameters (55 GHz - 110 GHz)

	Sensor X	Sensor Y
R (Ω)	38.57	52.47
R _p (Ω)	140.57	197,16
L (nH)	0.06273	0.09122
C (pF)	0.0765	0.0544
Cp (pF)	0.0745	0.0513

Sensor Model Parameters

	C1 fF	C2 fF	ν-1	T1 msV ⁻²	T2 msV ⁻¹	T3 ms	T4 V-2	T5 V ⁻¹	T6
×	23.4	169.76	33.74	2,66	2.34	4.98	0.00	0.51	1.01
У	24.2	176.10	33.95	0.92	2.24	4.99	0.00	0.64	1.01

Other Probe Parameters

Sensor Arrangement	Rectangular
Connector Angle	72.9°
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	320 mm
Probe Body Diameter	B mm
Tip Length	23 mm
Tip Diameter	8.0 mm
Probe Tip to Sensor X Calibration Point	1.5 mm
Probe Tip to Sensor Y Calibration Point	1.5 mm

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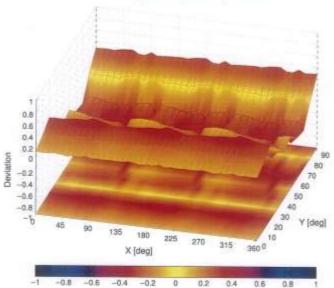
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Deviation from Isotropy in Air 30GHz: 3D isotropy, E-field parallel to probe axis 0.8 0.6 0,4 0.2 -0.2 -0.4 60 -0.6 -0.8 Y [deg] 3600 180 225 270 315 X [deg]

60GHz: 3D isotropy, E-field parallel to probe axis



Probe isotropy for E_{tot} : probe rotated $\phi = 0^{\circ}$ to 360°, tilted from field propagation direction \hat{k} Parallel to the field propagation $(\psi = 0^{\circ} - 90^{\circ})$ at 30 GHz: deviation within ± 0.48 dB Parallel to the field propagation $(\psi = 0^{\circ} - 90^{\circ})$ at 60 GHz: deviation within ± 0.43 dB

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Appendix: Modulation Calibration Parameters

UID	Hev	Communication System Name	Group	PAR (dB)	Unch k = 2
0		CW	CW	0.00	±4.7
10010	CAB	SAR Validation (Square, 100 ms, 10 ms)	Test	10.00	±9.6
10011	CAC	UMTS-FDD (WCDMA)	WCDMA	2.91	±9.6
10012	CAB	IEEE 802.11b WIFI 2.4 GHz (DSSS, 1 Mbps)	WLAN	1.87	±9,6
10013	CA8	IEEE 802.11g WIFI 2.4 GHz (DSSS-OFDM, 6 Mbps)	WLAN	9.46	#8.6
10021	DAC	GSM-FDD (TDMA, GMSK)	GSM	9.39	±9.6
10023	DAC	GPRS-FDD (TDMA, GMSK, TN 0)	GSM	9.57	±9.6
10024	DAC	GPRS-FDD (TDMA, GMSK, TN 0-1)	GSM	6.56	19.6
10025	DAC	EDGE FDD (TDMA, 8PSK, TN 0)	GSM	12.62	19.6
10028	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1)	GSM	9.55	±9.6
10027	DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2)	GSM	4.80	±9.6
10028	DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)	GSM	3.55	±9.6
10029	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2)	GSM	7.78	19.6
10030	CAA	IEEE 802.15.1 Bluetooth (GPSK, DH1)	Bluetooth	5.38	#9.6
10031	CAA	IEEE 802.15.1 Bluetooth (GFSK, DH2)	Bluetooth	1.87	±9.6
10032	CAA	IEEE 802.15.1 Bluetooth (GFSK, DH5)	Bluetpoth	1.16	±9.6
10033	CAA	IEEE 802.15.1 Bluetouth (PV4-DQPSK, DH1)	Bluetpoin	7.74	±9.6
10034	CAA	(EEE 802.15.1 Bluetooth (PV4-DQPSK, DH3)	Bluetooth	4.53	19.6
10035	CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH5)	Bluetooth	3.83	19.6
10036	CAA	IEEE 802 15.1 Bluetooth (8-DPSK, DH1)	Bluetooth	8.01	19.6
10037	CAA	IEEE 802.15.1 Bluetouth (8-DPSK, DH3)	Bluetooth	4.77	19.6
10038	CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DHS)	Bluetooth	4.10	19.6
10039	CAB	CDMA2000 (1xRTT, RC1)	CDMA2000	4.57	1110000
10042	CAB	IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Halfrate)	AMPS	7.78	19.6
10044	CAA	IS-91/EIA/TIA-653 FDD (FDMA, FM)	0.000000		19.6
10048	CAA	DECT (TOO, TOMAFDM, GFSK, Full Slot, 24)	AMPS	0.00	±9.6
10049	CAA	DECT (TDD, TDMA/FDM, GFSK, Double Stot, 12)	DECT	13.80	±9.6
10056	CAA		DECT	10.79	±9.6
10058	DAC	UMTS-TBD (TD-SCDMA, 1.28Mcps)	TD-SCDMA	11.01	±9.6
		EDGE-F00 (TDMA, 8PSK, TN 0-1-2-3)	GSM	6.52	49.6
10099	CAB	IEEE 802.11b WIFI 2.4 GHz (DSSS, 2Mbps)	WLAN	2.12	±9.6
10060	CAB	IEEE 802.11b WIFI 2.4 GHz (DSSS, 5.5 Mbps)	WLAN	2.83	±9.6
10061	CAB	IEEE 802.11b W.Fl 2.4 GHz (DSSS, 11 Mbps)	WLAN	3.60	±9.6
10062	CAE	IEEE 802,11a/h WIFI 5 GHz (OFDM, 6 Mbps)	WLAN	8.68	±9.8
10063	CAE	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps)	WLAN	5.63	±9.6
10064	CAE	IEEE 802:11a/h WIFI 5 GHz (OFDM, 12 Mbps)	WLAN	9.09	±9.6
10065	CAE	IEEE 802.11a/h WIFI 5 GHz (OFDM, 18 Mbps)	WLAN	9.00	±9.6
10066	CAE	IEEE 802.11a/h WIFI 5 GHz (OFDM, 24 Mbps)	WLAN	9.38	±9.6
10067	CAE	IEEE 802.11a/h WIFI 5 GHz (OFDM, 38 Mbps)	WLAN	10.12	±9.6
10068	CAE	IEEE 802.11a/h WIFI 5 GHz (OFDM, 48 Mbps)	WLAN	10.24	±9.6
10069	CAE	IEEE 802.11a/h WIFI 5 GHz (OFDM, 54 Mbps)	WLAN	10.56	±9.6
10071	CAB	IEEE 802.11g WFI 2.4 GHz (DSSS/OFDM, 9 Mbps)	WLAN	9.83	±9.6
10072	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 12 Mbps)	WLAN	9.62	±9.6
10073	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 18 Mbps)	WLAN	9.94	±9.5
10074	CAB	IEEE 802.11g WIFI 2.4 GHz (DSSS/OFDM, 24 Mbps)	WLAN	10.30	±9.6
10075	CAB	IEEE 802.11g WIFI 2.4 GHz (DISSS/OFDM, 36 Mbps)	WLAN	10.77	±9.6
10076	CAB	IEEE 802,11g WiFi 2.4 GHz (DSSS/OFDM, 48 Mbps)	WLAN	10.94	±9.6
10077	CAB	IEEE 802.11g WiFi 2.4 GHz (DBSS/OFDM, 54 Mbps)	WLAN	11.00	±9.6
0.081	CAB	CDMA2000 (1xRTT, RC3)	CDMA2000	3.97	±9.6
0.082	GAB:	IS-64 / IS-136 FOD (TDMA/FDM, PV4-DQPSK, Fulkate)	AMPS	4.77	19.6
0090	DAC	GPRS-FOD (TDMA, GMSK, TN 0-4)	GSM	6.56	±9.6
0.097	CAC	UMTS-FDD (HSDRA)	WCEMA	3.98	±9.6
0098	CAC.	UMTS-FDD (HSUPA, Subtlest 2)	WCDMA	3.98	±9.6
0099	DAC	EDGE-FDD (TDMA, BPSK, TN 0-4)	GSM	9.66	±9.6
0100	CAF	LTE-FDD (SC-FDMA, 100% RB, 20MHz, QPSK)	LTE-FDD	5.67	
0101	CAF	LTE-FDD (SC-FDMA, 100% RB, 20MHz, 16-QAM)	LTE-FDD	6.42	±9.6
0102	CAF.	LTE-FDD (SC-FDMA, 100% RB, 20MHz, 64-QAM)	LTE-FOD	6.60	19.6
0103	CAH	LTE-TDD (SC-FDMA, 100% RB, 20MHz, QPSK)	LTE-TOD		±9.6
0104	CAH	LTE-TDD (SC-FDMA, 100% RB, 20MHz, 16-QAM)		9.29	±9.6
0105	CAH	LTE-TOD (SC-FOMA, 100% RB, 20MHz, 16-QAM)	LTE-TOD	9.97	±9.6
0108	CAH	LTE-FDD (SC-FOMA, 100% RB, 10MHz, GPSK)	LTE-TD0	10.01	19.6
0108	CAH	LTE-FDD (SC-FDMA, 100% RB, 10MHz, 16-QAM)	LTE-FDD	5.80	±9.6
0110	CAH		LTE-FDD	6.43	±9.6
0110	CAH	LTE-FDD (SC-FDMA, 100% RB, 5MHz, QPSK)	LTE-FOD	5.75	±9.6
	Turket.	LTE-F00 (SC-F0MA, 100% RB, 5MHz, 18-QAM)	LTE-FOO	6.44	19.6

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A	Rev	Communication System Name	Group	PAR (dB)	Unc ⁸ k =
	CAH	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	LTE-FDD	6.59	±9.6
	CAH	LTE-FDD (SC-FDMA, 100% RB, 5MHz, 64-QAM)	LTE-FDD	6.62	±9.6
	CAE	IEEE 802.11n (HT Greenfield, 13.5 Mbps, BPSK)	WLAN	8.10	#9.6
	CAE	IEEE 802.11n (HT Greenfield, 81 Mbps, 16-QAM)	WLAN	8.46	±9.6
	CAE	IEEE 802.11n (HT Greenfield, 135 Mbps, 64-QAM)	WLAN	8.15	±9.6
	CAE	IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK)	WLAN	8.07	±9.6
10118	CAE	IEEE 802.11n (HT Mixed, 81 Mbps, 18-QAM)	WLAN	8.59	±9.6
10139	CAE	IEEE 802.11n (HT Mixed, 135 Mbps, 54-QAM)	WLAN	8,13	±9.6
10140	CAF	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	LTE-F00	8.49	±9.6
10:145	CAF.	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	LTE-FD0	6.53	±9.6
0142	CAF	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	LTE-FOO	5.73	19.6
0143	CAF	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	LTE-F00	6.35	±9.6
0.144	CAF	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	LTE-FDO	6.65	±9.6
0.145	CAG	LTE-FDD (SC-FDMA, 100% RB. 1.4 MHz, QPSK)	LTE-F00	5.76	±9.6
0.146	CAG	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	LTE-FDD	6.41	±9.6
0147	CAG	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	LTE-FDD	6.72	±9.6
0149	CAF	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	LTE-FOO	6.42	±9.6
0150	CAF	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	LTE-FD0	8,60	±9.6
	CAH	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	LTE-TOO	9.28	±9.6
0152	CAH	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	LTE-TDO	9.92	19.6
0.153	CAH	LTE-TOD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	LTE-TD0	10.05	±9.6
0154	CAH	LTE-FDD (BC-FDMA, 50% RB, 10 MHz, QPSK)	LTE-FDQ	5.75	19.6
0166	CAH	LTE FDD (SC FDMA, 50% RB, 10 MHz, 16-QAM)	LTE-FD0	6.43	±9.6
0158	CAH	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	LTE-FDD	5.79	±9.6
0157	CAH	LTE-FDD (SC-FDMA, 50% RB, 5MHz, 16-QAM)	LTE-FDO	8.49	±9.6
0188	CAH	LTE-FDO (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	LTE-FOD	6.62	±9.5
0159	CAH	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	LTE-FDD	6.56	±9.6
	CAF	LTE-FDO (SC-FDMA, 50% RB, 15 MHz, QPSK)	LTE-FDD	5.82	19.6
0161	CAF	LTE-FOD (SC-FOMA: 50% RB, 15 MHz; 16-QAM)	LTE-FOD	6.43	±9.6
	CAF	LTE FDD (SC-FDMA, 50% RB, 15MHz, 64-QAM)	LTE-FDD	6.58	±9.6
	CAG	LTE-FDD (SC-FDMA, 50% RB, 1.4MHz, QPSK)	LTE-FDD	5.46	±9.6
	CAG	LTE-FDD (SC-FDMA, 50% FIB, 1.4 MHz, 16-QAM)	LTE-FDD	8.21	±9.6
	CAG	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	LTE-FDD	6.78	
	CAF	LTE-FDD (SC-FDMA, 1 RB, 20MHz, QPSK)	LTE-FDD	5.73	±9.6
	CAF	LTE-FDD (SC-FDMA, 1 RB, 20MHz, 16-QAM)	LTE FDO	6.52	±9.6
	AAF	LTE-FDD (SC-FDMA, 1 RB, 20MHz, 64-QAM)	UE-F00	6.49	19.6
	CAH	LTE-TDD (SC-FDMA, 1 RB, 20MHz, QPSK)	LTE-TDO	9.21	±9.6
	CAH	LTE-TDD (SC-FDMA, 1 RB, 20MHz, 18-QAM)	LTE-700	9.48	±9.6
	CAH	LTE-TDD (SC-FDMA, 1 R8, 20 MHz, 84-QAM)	LTE-TD0	10.25	±9.6
	CAH	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	LTE-FDD	5.72	±9.6
	CAH	LTE-FOD (SC-FDMA, 1 RB, 10 MHz, 16 QAM)	LTE-FDD	6.52	-
	CAJ	LTE-FDD (SC-FDMA, 1 RB, 5MHz, QPSK)	LTE-FDD	41000	±9,6
	CAH	LTE-FDD (SC-FDMA, 1 RB, 5 MH), 16-QAM)	LTE-FOO	5.73	±9.6
	CAH	LTE-FOO (SC-FOMA, 1 RB, 10 MHz, 84-QAM)	THE PERSON NAMED IN COLUMN 1	6.52	±9/8
	GAH	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 64-GAM)	LTE-FOO	6.50	±9.6
	CAF	LTE-FDD (SG-FDMA, 1 RB, 15 MHz, QPSK)	LTE-FDD	6.50	±9,6
	CAF	LTE FOD (SC FOMA, 1 RB. 15MHz, 16-QAM)	LTE-FOO	5.72	±9.6
	AAE	LTE-FOD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	LTE-FDD	6.52	±9.6
******	CAF	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	LTE-F00	6.50	±9.6
	CAF	LTE-FOD (SC-FOMA, 1 RB, 3 MHz, 16-QAM)	LTE-FDD	5.79	±9.6
2000	AAF	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	LTE-FDD	6.51	±9,6
	CAG	LTE-FDD (SC-FDMA, 1 RB, 1.4MHz, QPSK)	LTE-FDD	6.50	19.6
	CAG	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, GFGK)	LTE-FOD	5.73	3.6±
	AAG	LTE-FDD (SC-FDMA, 1 RB, 1.4MHz, 16-QAM)	LTE FOO	6.52	±9.6
	CAE	IEEE 802.11n (HT Greenfield, 6.5 Mbps, 8PSK)	LTE-F00	6.50	±9.6
	CAE	IEEE 802 11n (HT Greenfield, 8.5 Mops, 16-QAM)	WLAN	8.09	±9.6
-	CAE	EEE 802.11n (HT Greenfield, 85 Mbps, 84-QAM)	WLAN	8.12	±9.6
-	CAE	IEEE 802.11n (HT Mixed, 6.5 Mbps, 64-QAM)	W.AN	8.21	±9.6
	CAE	IEEE 802.11n (HT Mixed, 6.5 Mbps, 8PSK)	W.AN	8.10	±9.6
	CAE		WLAN	0.13	±9.6
	-	IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)	WLAN	8.27	±9.5
ereire full files	CAE	IEEE 802.11n (HT Mixed, 7.2 Mbps, BPSK)	WLAN	8.03	±9.6
no to the second second	CAE	IEEE 802.11n (HT Mbred, 43.3Mbps, 18-QAM)	WLAN	8.13	±9.6
	CAE	IEEE 802.11n (HT Mixed, 72.2 Mbps, 64-QAM)	WLAN	8.27	±9.6
	CAE	IEEE 802.11n (HT Mised, 15 Mbps, BPSK)	WLAN	8.06	19.5
	CAE	IEEE 807.11n (HT Mbsed, 90 Mbps, 16-QAM)	WLAN	8.48	28.6
224 (CAE	IEEE 802,11n (HT Mixed, 150 Mbps, 64-QAM)	WLAN	8.08	±9.6

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UID	Hev	Communication System Name	Group	PAR (dB)	Unc [®] k →
10225	CAC	UMTS-FDD (HSPN+)	WCDMA	5.97	±9.6
10226	CAC	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	LTE-TDD	9.49	±9.6
10227	CAC	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	LTE-TDD	10.26	±9.6
10228	CAC	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	LTE-TDD	9.22	±9.6
10229	CAE	LTE-TDD (SD-FDMA, 1 RB, 3 MHz, 16-QAM)	LTE-TOD	9.48	±9.6
10230	CAE	LTE-TDD (SC-FDMA, 1 RB, 3MHz, 64-QAM)	LTE-TOD	10.25	±9.6
10231	CAE	LTE-TDD (SC-FDMA, 1 RB, 5MHz, QPSK)	LTE-TOD	9,19	±9.6
10232	CAH	LTE-TDD (SC-FDMA, 1 RB, 5MHz, 16-QAM)	LTE-TOD	9.48	±9.6
10233	CAH	LTE-TDD (SC-FDMA, 1 RB, 5MHz, 64-QAM)	LTE-TOD	10.25	±9.6
10:234	CAH	LTE-TDD (SC-FDMA, 1 RB, 5MHz, QPSK)	LTE-TDD	9.21	±9.6
10:235	CAH	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	LTE-TOD	9.48	±9.6
10236	CAH	LTE-TOD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	LTE-TOO	10.25	19.6
10237	CAH	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	LTE-TOD	9.21	19.8
10238	CAG	LTE-TDD (SC-FDMA, 1 RB, 15MHz, 16-DAM)	LTE-TDD	9.48	19.6
10239	CAG	LTE-TDO (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	LTE-TOO	10.25	±9.6
10240	CAG	LTE-TOD (SC-FOMA, 1 RB. 15 MHz, QPSK)	LTE-TOD		1000000
10241	CAC	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	The state of the s	9.21	±9.6
Permitted and the last	CAC		LTE-TOO	9.82	±9.6
10242	CAC	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	LTE-TOO	9.86	19.6
		LTE-TOD (SC-FDMA, 50% RB, 1.4 MHz, GPSK)	LTE-TD0	9.46	±9.6
10244	CAE	LTE-TOD (SC-FOMA, 50% R8, 3 MHz, 16-QAM)	LTE-TDD	10.06	±9.6
10245	CAE	LTE-TOD (SC-FDMA, 50% RB, 3 MHz, 84-QAM)	LTE-TOO	10.06	±9.6
10246	CAE	LTE-TDD (SC-FDMA, 50% RB, 3MHz, GPSK)	LTE-TD0	9.30	±9.8
10247	CAH	LTE-TOD (SC-FDMA, 50% RB, 5 MHz, 16 QAM)	LTE-TOD	9.91	±9,6
10248	CAH	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	LTE-TOO	10.09	±9.6
10249	CAH	LTE-TDD (SC-FDMA, 50% RB, 5MHz, QPSK)	LTE-TOD	9.29	±9,6
10250	CAH	LTE-TOD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	LTE-TOO	9.81	±9.8
10251	CAH	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	LTE-TD0	10.17	±9.6
10252	CAH	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	LTE-TDD	9.24	±9.6
10253	CAG	LTE-TOD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	LTE-TDD	9.90	±9.6
10254	CAG	LTE-T00 (SC-F0MA, 50% RB, 15 MHz, 64-QAM)	LTE-TOD	10.14	±9.6
10255	CAG	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	LTE-TOD	9.20	±9.6
10256	CAC	LTE-TDD (SC-FDMA, 100% RB, 1.4MHz, 16-QAM)	LTE-TDD	9.90	±9.6
10257	CAC	LTE-TOD (SC-FOMA, 100% RB, 1.4MHz, 64-QAM)	LTE-TD0	10.08	±9.6
10258	GAC	LTE-TOD (SC-FDMA, 100% RB, 1.4 MHz, QPSK).	LTE-TDD	9.34	±9.6
10259	CAE	LTE-TDD (SC-FDMA, 100% RB, 3MHz, 16-QAM)	LTE-TDD	9.98	±9.6
10260	CAE	LTE-TDD (SC-FDMA, 100% RB, 3MHz, 64-QAM)	LTE-TDD	9.97	±9.6
10261	CAE	LTE-TDD (SC-FDMA, 100% RB, 3MHz, QPSK)	LTE-TOD	9.24	±9.6
10282	CAH	LTE-TDD (SC-FDMA, 100% RB, 5MHz, 16-QAM)	LTE-TOD	9.83	±9.6
10263	CAH	LTE-TDD (BC-FDMA, 100% RB, 5 MHz, 84-QAM)	LTE-TOD	10.16	±9.6
10:264	CAH	LTE-TDD (SC-FDMA, 100% RB, 5MHz, QPSK)	LYE-TOD	9.23	±9.6
10/265	CAH	LTE-TDD (5C-FDMA, 100% RB, 18 MHz, 15 QAM)	LTE-TDD	9.92	±9.6
10:266	CAH	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	LTE-TOD	10,07	19.6
10:267	CAH	LTE-TDD (SC-FDMA, 100% RB. 10 MHz, QPSK)	LTE-TOO	9.30	±9.6
10268	CAG	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16 QAM)	LTE-TOD	10.06	±9.6
0269	CAG	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	LTE-TOD	10.13	±9.6
10:270	CAG	LTE-TDD (SC-FDMA, 100% RB, 15MHz, QPSK)	LTE-TOO	9.58	±9.6
10274	CAC	UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8 10)	WCDMA	4.87	±9.6
10276	CAC	UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.4)	WCDMA	3.96	±9.6
0277	CAA	PHS (QPSK)	PHS	11.81	-
0278	CAA	PHS (QPSK, BW 884 MHz, Rolloff 0.5)	PHS	The second second	19.6
0279	CAA	PHS (QPSK, BW 884 MHz, Rolloff 0.38)	PHS	11.81	±9.6
0580	AAB	CDMA2000, RC1, SO55, Full Rate	CDMA2000	12.18	±9.6
0.291	AAB	CDMA2000, RC3, SO55, Full Rate		3.91	19.6
0292	AAB	CDMA2000, RC3, SC32, Full Rate	CDMA2000	3.46	19.6
0293	AAB	CDMA2000, RC3, SC32, FUE Hate	CDMA2000	3.39	19.5
0295	AAB	CDMA2000, RC1, SO3, 1/8th Rate 25 fr.	CDMA2000	3.50	±9.6
0297	AAE		CDMA2000	12.48	±9.6
not be included	AAE	LTE-FD0 (SC-FDMA, 50% RB, 20MHz, QPSK)	LTE-FDD	5.81	±0.8
0298		LTE-FDD (SC-FDMA, 50% RB, 3MHz, QPSK)	LTE-FDD	5.72	±8.6
0299	AAE	LTE FDD (SC FDMA, 50% RB, 3 MHz, 16-QAM)	LTE-FDD	6.38	±9.6
0300	AAE	LTE-FDD (SC-FDMA, 50% RB, 3MHz, 64-QAM)	LTE-F00	6.90	19.6
0301	AAA	IEEE 802.16e WIMAX (29:18, 5 ms, 10 MHz, QPSK, PUSC)	WIMAX	12:03	±9.6
0.302	AAA	IEEE 802 16e WIMAX (29:18, 5 ms, 10 MHz, QPSK, PUSC, 3 CTRL symbols)	WIMAX	12.57	±9.6
0303	AAA	IEEE 802.16e WIMAX (31:15, 5ms, 10 MHz, 64QAM, PUSC)	WMAX	12.52	±9.6
0304	AAA	IEEE 802.16e WIMAX (29:18, 5 ms, 10 MHz, 64QAM, PUSC)	WMAX	11.86	±9.6
0305	AAA	IEEE 802,16a WIMAX (31:15, 10 ms, 10 MHz, 64QAM, PUSC, 15 symbols)	WIMAX	15.24	±9.6
0306	AAA	IEEE 802.15e WIMAX (29:18, 10 ms, 10 MHz, 64QAM, PUSC, 18 symbols)	WIMAX	14.67	±9.6

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0307	AAA	IEEE 800.16e WIMAX (29:18, 10 ms, 10 MHz, QPSK, PUSC, 18 symbols)	WIMAX	14,49	19.6
0368	AAA	IEEE 802.18e WIMAX (29:18, 10 ms, 10 MHz, 16QAM, PUSC)	WIMAX	14.46	±9.6
0309	AAA	IEEE 802.15e WIMAX (29:18, 10 ms, 10 MHz, 16QAM, AMC 2x3, 18 symbols)	WIMAX	14.58	±9.6
0310	AAA	IEEE 802.15e WIMAX (29:18, 10 ms, 10 MHz, QPSK, AMC 2x3, 18 symbols)	WIMAX	14.57	±9.6
0311	AAE	LTE-FDD (SC-FDMA, 100% RB, 15MHz, QPSK)	LTE-FOD	6.06	±9.6
0313	AAA	IDEN 13	IDEN	10.51	±9.6
10314	AAA.	IDEN 1:6	DEN	13.48	+9.6
10315	AAB	IEEE 802.11b WFI 2.4 GHz (DSSS, 1 Mbps, 96pc duty cycle)	WLAN	1.71	±9.6
10316	AAB	IEEE 802.11g WIFI 2.4 GHz (ERP-OFDM, 6 Mbps, 96pc duty cycle)	WLAN	8.36	±9.6
10317	AAE	IEEE 802.11a WFi 5 GHz (OFDM, 6 Mbps, 96pc duty cycle)	WLAN	8.36	±9.6
10392	AAA	Potse Wavetorm (200Hz, 10%)	Generic	10.00	±8.6
10353	AAA	Pulse Waveform (200Hz, 20%)	Generic	6.99	±9.6
10354	AAA	Pulse Waveform (200Hz, 40%)	Generic	3.98	±9.6
10355	AAA	Pulse Waveform (200Hz, 60%)	Generic	2.22	±9.6
10358	AAA	Putse Waveform (200Hz, 80%)	Generic	0.97	±9.6
10387	AAA	QPSK Waveform, 1 MHz	Generic	5.10	±9.6
10388	AAA	QPSK Waveform, 10 MHz	Generic	5.22	±9.6
10396	AAA	64-QAM Waveform, 100 kHz	Generic	6.27	±9.5
10399	AAA.	54-QAM Waveform, 40 MHz	Generio	6.27	±9.6
10400	AAF	IEEE 802.11ac WIFI (20 MHz, 64-QAM, 99pc duty cycle)	WLAN	8.37	19.6
10401	AAF	IEEE 802 11ac WIFI (40 MHz, 64 QAM, 99pc duty cycle)	WLAN	8.60	19.6
10402	AAF	IEEE 802.11ac WFI (80 MHz, 64-QAM, 99pc duty cycle)	WLAN	8.53	±9.6
10403	AAB	CDMA2000 (1xEV-DQ. Rev. 0)	CDMA2000	3.78	19.6
10404	AAB	CDMA2000 (1xEV-DO, Rev. A)	CDMA2000	3.77	19.6
10.408	AAR	CDMA2000, RC3, SO32, SCH0, Full Rate	CDMA2000	5.22	19.6
10410	AAH	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9, Subframe Conf=4)	LTE-TOD	7.82	19.6
10414	AAA	WLAN CCDF, 84-QAM, 40 MHz	Generic Generic	8.54	
10415	AAA	IEEE 802.11b WIFI 2.4 GHz (DSSS, 1 Mbpe, 99pc duty cycle)	410-0110		19.6
10418	AAA	IEEE 802.11g WIFI 2.4 GHz (ERP-OFDM, 6Mbps, 99pc duty cycle)	WLAN.	1.54	±9.6
10417	AAD		WLAN	8.23	±9.6
0418	AAA	IEEE 802 11a/h WIFLS GHz (OFDM, 6 Mbps, 99pc duty cycle)	WLAN	8.23	±9.6
	AAA	IEEE 802.11g WIFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc duty cycle, Long preambule)	WLAN	8.14	±9.6
10419	AAD	IEEE 802.11g WIF) 2.4 GHz (DSSS-OFDM, 6 Mbps, 89pc duty cycle, Short preambule)	WEAN	8.19	±9.6
10423	AAD	IEEE 802.11n (HT Greenfield, 7.2 Mops, BPSK)	WLAN	8.32	±9.6
10424	AAD	IEEE 802.11n (HT Greenfeld, 43.3 Mbps, 16-QAM) IEEE 802.11n (HT Greenfeld, 72.2 Mbps, 64-QAM)	WLAN	8,47	±9.6
10425	AAD		WLAN	8.40	±9.6
10426	AAD	IEEE 802.11n (HT Greenfield, 15 Mops, BPSK) IEEE 802.11n (HT Greenfield, 90 Mops, 16-QAM)	WLAN.	8.41	±9.6
10427	AAD		WLAN	B:45	±9,6
10430	AAE	IEEE 802.11n (HT Greenfeld, 150Mbps, 84-QAM) LTE-FDD (OFDMA, 5 MHz, E-TM 3.1)	WLAN	8.41	±9.6
10431	AAE		LTE-FDD	8.28	±9.6
0432	AAD.	LTE-FDD (OFDMA, 10MHz, E-TM 3.1) LTE-FDD (OFDMA, 15MHz, E-TM 3.1)	LTE-FDD	8.38	±9.6
10433	AAD		LTE-FDD	8.34	±9.6
10434	AAB	(TE-FOD (OFDMA, 20MHz, E-TM 3.1)	LTE-FDD	8.34	±8.6
0435	AAG	W-CDMA (BS Test Model 1, 64 DPCH)	WCDMA	8.60	±9.6
	AAE	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Subframe+2,3,4,7,8,9)	LTE-TOD	7,82	19.5
10447		LTE-FDD (OFDMA, 5MHz, E-TM 3.1, Clipping 44%)	LTE-FDD	7,56	±9.6
10448	AAE	LTE-FDD (OFDMA, 10MHz, E-TM 3.1, Clippin 44%)	LTE-FDD	7.53	±9.6
0.450	AAD	LTE-FDD (OFDMA, 15MHz, E-TM 3.1, Citing 44%)	LTE-FOD	7.51	±9.6
0.450	AAB	LTE-FDD (OFDMA, 20MHz, E-TM 3.1, Cipping 44%)	LTE-FOO	7.48	±9.6
0.453	and the latest and	W-CDMA (BS Test Model 1, 84 DPCH, Clipping 44%)	WCDMA	7,59	±9.6
0456	AAE	Validation (Square, 10 ms, 1 ms)	Test	10:00	±9.6
0.457	AAB	IEEE 802.11ac WIFI (190 MHz, 64-QAM, 99pc duty cycle)	WLAN:	8.63	19.6
	1.00	UMTS-FDD (DC-HSDPA)	WCDMA	6.62	19.8
0458	AAA	CDMA2000 (1xEV-DO, Rev. B, 2 carriers)	GDMA2000	0.55	±9.6
0459	AAA	CDMA2000 (txEV-DO, Rev. B, 3 carriers)	CDMA2000	8.25	±9,6
	1000	UMTS-FDD (WCDMA, AMR)	WCDMA	2.39	±9.6
0461	AAC	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK, UL Subhame=2,3,4,7,8,9)	LTE-TOO	7.82	±9.6
-	AAC	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM, UL Subframe»2,3,4,7,8,9)	LTE-TOO	8.30	±9.6
0.463	AAC	LTE-TDD (SC-FDMA, 1 RB, 1.4MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TOO	8.56	19.6
0464	AAD	LTE-TDD (SC-FDMA, 1 RB, 3MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TOD	7.82	±9.6
0.465	AAD	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM, UL Subframe=2.3,4,7,8,9)	LTE-TDD	8.32	±9.6
0468	AAD	LTE-TOD (SC-FDMA, 1 RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TOD	8.57	19.6
0467	AAG	LTE-TDD (SC-FDMA, 1 RB, 5MHz, QPSK, UL Subhame=2,0,4,7,6,9)	LTE-TOD	7.82	3,9,5
0468	AAG	LTE-TOO (SC-FOMA, 1 RB, 5 MHz, 16-QAM, UL Subtrarre-2,3,4,7,8,9)	LTE-TDD	8.32	±9.6
0469	AAG	LTE-TOD (SC-FDMA, 1 RB, 5 MHz, 64-QAM, UL Subtrame=2,3,4,7,8,9)	LTE-TDD	8.56	±9.6
0470	AAG	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.82	19.8
0471	AAG	LTE-TDD (SC-FDMA, 1 RB, 10MHz, 18-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.32	±9.8

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10473	AAG	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.57	±9.6
10474	AAF	LTE-TDD (SC-FDMA, 1 RB, 15MHz, QPSK, UL Subtrarre=2,3,4,7,8,8)	LTE-TOD	7.82	±9.6
10475	AAF	LTE-TDD (SC-FDMA, 1 RB, 15MHz, 16-QAM, UL Subframe-2,3,4,7,8,9) LTE-TDD (SC-FDMA, 1 RB, 15MHz, 64-QAM, UL Subframe+2,3,4,7,8,9)	LTE-TOD	8.32	±9.6
10477	DAA	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM, UL Subframe+2,3,4,7,8,9)	LTE-TOD	8.57	±9.6
0478	AAG	LTE-TDD (SC-FDMA, 1 R8, 20 MHz, 64-QAM, UL Subtrame=2,3,4,7,8,9)	LTE-TOO	8.57	±9.6 ±9.6
10479	AAC	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK, Ut. Subframe=2.3,4,7,8,9)	LTE-TOO	7.74	±9.6
10480	AAC	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM, UL Sublame=2,3,4,7,8,9)	LTE-TD0	8.18	±9.6
10481	AAC	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 54-QAM, UL Subtrame=2,3,4,7,8.9)	LTE-TOO	8.45	19.6
10482	AAD	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK, UL Subtramev2,3,4,7,8,9)	LTE-TDD	7.71	±9.6
18483	AAD	LTE-TDD (SC-FDMA, 50% R8, 3 MHz, 18-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.39	±9.6
0484	AAD	LTE-TDD (SC-FDMA, 50% RB, 3MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.47	±9.6
0485	AAG	LTE-TDO (SC-FDMA, 50% RB, 5 MHz, QPSK, UL Subframe+2,3,4,7,8,9)	LTE-TOD	7,59	±9.6
0486	AAG	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TOO	8.38	±9.6
0487	AAG	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.60	±9.6
0488	AAG	LTE-TDG (SC-FDMA, 50% RB, 10 MHz, QPSK, Ut. Subframe=2,3,4,7,6,9)	LTE-TDD	7.70	±9.6
0.489	AAG	LTE-TDO (SC-FDMA, 50% RB, 10MHz, 16-QAM, UL Subframe+2.3,4,7,8,9)	LTE-TDD	8.31	±9.6
0480	AAG	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 54-QAM, UL Subframex2.3,4,7,8,9)	LTE-TDD	8.54	±9.6
0491	AAF	LTE-TDD (SC-FDMA, 50% R8, 15MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7,74	±9.6
0482	AAF	LTE-TDD (SC-FDMA, 50% RB, 15MHz, 16-QAM, UL Subframe=2.3,4,7,8,9)	LTE-TDD	8.41	±9.6
0493	AAF	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM, UL Subframe=2.3,4,7,8,9)	LTE-TDD	8.55	±9.6
0495	AAG	LTE-TDD (SC-FDMA, 50% RB, 20MHz, QPSK, UL Subframe=2,3,4,7,8,9) LTE-TDD (SC-FDMA, 50% RB, 20MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.74	±9,6
0496	AAG	LTE-TDD (SC-FDMA, 50% RB, 20MHz, 64-QAM, UL Subtrame=2,3,4,7,8,9)	LTE-TDD	8.37	#9.6
0497	AAC	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK, UL Subframe-2,3.4,7,8,9)	LTE-TDD	8.54 7.87	±9.6
0498	AAC	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-DAM, UL Subtrame=2,3.4,7,8.9)	LTE-TOD	7.67 B.40	±9.6
0499	MAG	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM, UL Subtrame+2,3.4,7,9.9)	LTE-TDD	8.68	#9.6
0500	AAD	LTE-TDD (SC-FDMA, 100% RB, 3MHz, QPSK, UI, Subhame-2,3.4,7.8,9)	LTE-TOD	7.67	±9.6
0501	AAD	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM, Ut. Subframe=2,3,4,7,8,9)	LTE-TOD	8.44	19.6
0502	AAD	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TOD	8.52	19.6
0503	AAG	LTE-TDD (SC-FDMA, 100% RB, 5MHz, QPSK, UL Subframe=2,3.4,7,8.9)	LTE-TDD	7.72	19.6
0504	AAG	LTE-TDD (SC-FDMA, 100% RB, 5MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TOD	8.31	19.6
0505	AAG	LTE-TDD (SC-FDMA, 100% RB, 5MHz, 64-QAM, UL Subframe=2.3,4,7,8,9)	LTE-TDD	8.54	±9.6
0505	AAG	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.74	19.6
0507	AAG	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 18-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.36	±9.6
0508	AAG	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.55	±9.6
0509	AAF	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK, UL Subframe=2.3,4,7,8,9)	LTE-TOO	7.99	19.6
0510	AAF	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TOD	8.49	±9.6
0511	AAF	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 54-QAM, UL Subtrame=2,3,4,7,8,9)	LTE-TOO	8.51	±9.6
0512	AAG	LTE-TDD (SC-FDMA, 100% RB, 30 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TOD	7.74	±9.6
0513	AAG	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM, UL Subhame=2,3,4,7,8,9)	LTE-TDD	8.42	±9.6
0514 0515	AAG	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TOD	8.45	±9.6
0516	AAA	IEEE 802.11b WIFI 2.4 GHz (OSSS, 2Mbps, 99pc duty cycle)	WLAN	1.58	±9.6
0517	AAA	IEEE 802.11b WFI 2.4 GHz (DSSS, 5.5 Mbps, 99pc duty cycle) IEEE 802.11b WFI 2.4 GHz (DSSS, 11 Mbps, 99pc duty cycle)	WLAN	1.57	±9-6
0518	AAD	IEEE 802.11ah WIFI S GHz (DFDM, 9 Mbps, 99pc duty cycle)	WLAN	1.58	±9.6
0519	AAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps, 89pc duty cycle)	WLAN	8.29	±9.6
0520	AAD	IEEE 802.11a/h WIFI 5 GHz (OFDM, 18 Mbps, 88pc duty cycle)	WLAN	8.12	±9.6
0521	AAD	IEEE 802.11a/h WIFI 5 GHz (OFDM, 24 Mbps, 98pc duty cycle)	WLAN	7.97	±9.6
0522	AAD	IEEE 802.11a/h WIFI 5 GHz (OFDM, 35 Mbps, 99pc duty cycle)	WLAN	8.45	±9.6
0523	AAD	IEEE 802.11a/h WIFI 5 GHz (OFOM, 48 Mbps, 99pc duty cycle)	WLAN	8.08	±9.6
0524	AAD	IEEE 802.11a/h WIFLS GHz (OFOM, 54 Mbps, 99pc duty cycle)	WLAN	8.27	±9.6
0525	AAD	IEEE 802.11ac WiFi (20 MHz, MCS0, 99pc duty cycle)	WLAN	8.36	±9.6
0526	AAD	IEEE 802.11ac WFI (20 MHz, MCS1, 99pc duty cycle)	WLAN	8.42	±9.5
0527	AAD	IEEE 802,11ac WiFI (20 MHz, MCS2, 99pc duty cycle)	WLAN	8.21	±9.6
0528	AAD	IEEE 802.11ac WiFI (20 MHz, MCS3, 99pc duty cycle)	WLAN.	8.36	±9.6
0529	AAD	IEEE 802.11ec WIFI (20 MHz, MCS4, 99pc duty cycle)	WLAN	8.36	±9.6
0531	AAD	IEEE 802.11ac WIFI (20 MHz, MCS8, 98pc duty cycle)	WLAN	8.43	±9.6
	AAD	EEEE 802 11ac WIFI (20 MHz, MCS7, 99pc duty cycle)	WLAN	8.29	±9.6
0532			160 461	8.38	±9.6
0532 0533	AAD	IEEE 802.11ac WIFI (20 MHz, MCS8, 99pc duty cycle)	WLAN	8.38	100,000,000
0532 0533 0594	AAD	IEEE 802.11ac WIFI (40 MHz, MCS0, 88pc duty cycle)	WLAN	8.45	±9.6
0532 0533 0504 0505	AAD AAD AAD	IEEE 902.11ac WIFI (40 MHz, MCS0, 88pc duty cycle) IEEE 902.11ac WIFI (40 MHz, MCS1, 88pc duty cycle)	WLAN WLAN	8.45 8.45	
0532 0533 0534 0535 0536	AAD AAD AAD AAD	IEEE 802.11ac WIFI (40 MHz, MCS0, 88pc duty cycle) IEEE 802.11ac WIFI (40 MHz, MCS1, 88pc duty cycle) IEEE 802.11ac WIFI (40 MHz, MCS2, 98pc duty cycle)	WLAN WLAN WLAN	8.45 8.45 8.32	±9.6
0532 0533 0534 0535 0536 0537	AAD AAD AAD AAO AAO	REEE 802.11 ac WIFI (40 MHz, MCS0, 88pc duty cycle) IEEE 802.11 ac WIFI (40 MHz, MCS1, 98pc duty cycle) IEEE 802.11 ac WIFI (40 MHz, MCS2, 98pc duty cycle) IEEE 802.11 ac WIFI (40 MHz, MCS3, 98pc duty cycle)	WLAN WLAN WLAN	8.45 8.45 8.32 8.44	±9.6 ±9.6
0532 0533 0534 0535 0536 0536 0538 0538	AAD AAD AAD AAD	IEEE 802.11ac WIFI (40 MHz, MCS0, 88pc duty cycle) IEEE 802.11ac WIFI (40 MHz, MCS1, 88pc duty cycle) IEEE 802.11ac WIFI (40 MHz, MCS2, 98pc duty cycle)	WLAN WLAN WLAN	8.45 8.45 8.32	±9.6 ±9.6 ±9.8

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UID	Rev	Communication System Name	Group	PAR (dB)	Unc ^E k =
10541	AAD	IEEE 802.11ac WIFI (40 MHz, MCS7, 99pc duty cycle)	WLAN	8:46	±9.6
10542	AAD	IEEE 802,11ac WIFI (40 MHz, MCS8, 99pc duty cycle)	WLAN	8.65	±9.6
10543	AAD	IEEE 802.11ac WIFI (40 MHz, MCS9, 98pc duty cycle)	WLAN	8,65	±9.6
10544	AAD	IEEE 802.11ac WIFI (80 MHz, MCS0, 99pc duty cycle)	WLAN	8.47	±9.6
10545	AAD	IEEE 802 11ac WIFI (80 MHz, MCS1, 99pc duty cycle)	WLAN	8.55	19.6
10546	AAD	IEEE 802.11ac WIFI (80 MHz, MCS2, 98pc duty cycle)	WLAN	8.35	±9.6
10547	AAD	IEEE 802.11ac W.Fl (80 MHz, MCS3, 99pc duty cycle)	WLAN	8.49	±9.6
10548	AAD	IEEE 802.11ac WIFI (80 MHz, MCS4, 99pc duty cycle)	WLAN	8.37	±9.6
10550	AAD	IEEE 802.11ac WFI (80 MHz, MCS6, 99pc duty cycle)	WLAN	8.38	19.6
18551	AAD	IEEE 802.11ac WIFI (80 MHz, MCS7, 99pc duty cycle)	WLAN	8.50	±9.6
10552	AAD	IEEE 802.11ac WIFI (80 MHz, MCS8, 98pc duty cycle)	WLAN	8.42	±9.6
10553	AAD	IEEE 802.11ac WIFI (80 MHz, MCS9, 99pc duty cycle)	WLAN	8.45	±9.6
10554	AAE	IEEE 802.11ac WIFI (160 MHz, MCS0, 99pc duty cycle)	WLAN	8.48	19.6
10556	AAE	IEEE 802.11ac WIFI (160 MHz, MCS1, 99pc duty cycle)	WLAN	8.47	19.6
10556	AAE	IEEE 802.11ac WIF (160MHz, MCSI), 99pc duty cycle)	WLAN	8.50	±9.6
10557	AAE	IEEE 802,11ac WFI (165 MHz, MCS3, 99pc duty cycle)	WLAN	8.52	±9.6
10560	AAE	IEEE 802 T1ac WFI (160 MHz, MCS4, 99pc duty cycle)	WLAN	8.61	±9.6
10561	AAE	IEEE 802.11ac WFI (160 MHz, MCS6, 99pc duty cycle)	WLAN	8.73	19.6
10562	AAE	IEEE 802.11ac WFI (160 MHz, MCS7, 99pc duty cycle) IEEE 802.11ac WFI (160 MHz, MCS8, 99pc duty cycle)	WLAN	8.56	19.6
0563	AAE	IEEE 802.11ac WFI (160 MHz, MCS8, sept outy cycle)	W.AN	8.69	±9.6
0564	AAA	IEEE 802.11g WIF (140 MHz, MCS9, sape outy cycle)	WLAN	8.25	±9.6
10565	AAA	IEEE 802.11g WIF 2.4 GHz (DSSS-OFDM, 9 Mops, 99pc duty cycle)	WLAN	8.45	±9.6
0566	AAA	IEEE 802.11g WIFI 2.4 GHz (DSSS-OFDM, 18 Mbps, 98pc duty cycle)	WLAN	8.13	19.6
0587	AAA	IEEE 802,11g W/FI 2.4 GHz (DSSS-OFDM, 24 Mbps, 99pc duty cycle)	WLAN	8.00	19.6
0568	AAA	IEEE 802.11g WFI 2.4 GHz (DSSS-OFDM, 36 Mbps, 99pc duty cycle)	WLAN	8.37	±9.6
0569	AAA	IEEE 802.11g WFI 2.4 GHz (DSSS-OFDM, 48 Mbps, 99pc duty cycle)	WLAN	8.10	±9.6
0670	AAA	IEEE 802.11g WIFI 2.4 GHz (DSSS-OFDM, 54 Mbps, 99bc duty cycle)	WLAN	8.30	±9.6
0571	AAA	(EEE 802,116 WFI 2.4 GHz (DSSS, 1 Mbps, 90pc duty cycle)	WLAN	1.99	±9.6
0572	AAA	IEEE 802.11b W/FI 2.4 GHz (DSSS, 2Mbps, 90pc duty cycle)	WLAN	1.99	±9:6
0573	AAA	IEEE 802.11b WIFI 2.4 GHz (DSSS, 5.5 Mbps, 90pc duty cycle)	WLAN	1.98	±9.6
0574	AAA	IEEE 602.11b WFI 2.4 GHz (DSSS, 11 Mbps, 90pc duty cycle)	WLAN	1.98	±9.6
0575	AAA	IEEE 802.11g WFI 2.4 GHz (DSSS-OFDM, 6 Mbps, 90pc duty cycle)	WLAN	8.59	±9.6
0576	AAA	IEEE 802.11g WIFI 2.4 GHz (DSSS-OFDM, 9 Mbps, 90pc duty cycle)	WLAN	8.60	±9:6
10577	AAA.	IEEE 802.11g WIFI 2.4 GHz (DSSS-OFDM, 12 Mbps, 90pc duty cycle)	WLAN	8.70	±9.6
0578	AAA	IEEE 802.11g WIP: 2.4 GHz (DSSS-OFDM, 18 Mbps. 90pc duty cycle)	WLAN	8.49	±9.6
10579	AAA	IEEE 802.11g WIFI 2.4 GHz (DSSS-OFDM, 24 Mops, 90pc duty cycle)	WLAN	8.36	±9.6
10580	AAA	IEEE 802.11g WIFI 2.4 GHz (DSSS-OFDM, 36 Mbps, 90pc duty cycle)	WLAN	8.76	±9.6
10581	AAA	IEEE 802.11g WIFI 2.4 GHz (DGSS-OFDM, 48Mbps, 90pc duty cycle)	WLAN	8.35	±9.6
10582	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFOM, 54 Mbps, 90pc duty cycle)	WLAN	8.67	±9.6
10583	AAD	IEEE 802.11a/h WIFI 5 GHz (OFDM, 6 Mbps, 90pc duty cycle)	WLAN	8.59	±9.6
0584	AAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mops, 90pc duty cycle)	WLAN	8.60	±9.6
0585	AAD	IEEE 802.11a/h WIFI 5 GHz (OFDM, 12 Mbps, 90pc duty cycle)	WLAN	8.70	±9.6
0586	AAD	IEEE 802.11a/h WIFI 5 GHz (OFDM, 18 Mbps, 90pc duty cycle)	WLAN	8.49	±9.6
0587	AAD	IEEE 802 11a/h WIFI 5 GHz (OFDM, 24 Mbps, 90pc duty cycle)	WLAN	8.36	±9.6
0588	AAD	IEEE 802.11a/h WIFi 5 GHz (OFOM, 36 Mbps, 90pc duty cycle)	WLAN	8.76	±9.6
0.589	AAD	IEEE 802.11a/h WIFI 5 GHz (OFDM, 48 Mbps, 90pc duty cycle)	WLAN	8.35	±9.6
0590	AAD	IEEE 802,11a/h WFI 5 GHz (OFDM, 54 Mbps, 90pc duty cycle)	WLAN	8.67	±9.6
0591	CAA	IEEE 802.11n (HT Mixed, 20 MHz, MCS0, 90pc duty cycle)	WLAN	8.63	±9.6
0592 0593	AAD	IEEE 802.11n (HT Mixed, 20 MHz, MCS1, 90pc duty cycle)	WLAN	8.79	±9.6
0594	AAD.	IEEE 802.11n (HT Mixed, 20 MHz, MCS2, 90pc duty cycle)	WLAN	8.64	±9.6
1	AAD	IEEE 802.11n (HT Mixed, 20 MHz, MCS3, 90pc duty cycle)	WLAN	8.74	±9.6
0596	AAD	IEEE 802.11n (HT Mixed, 30 MHz, MCS4, 90pc duty cycle)	WLAN	8.74	±9.6
0597	AAD	IEEE 802.11n (HT Mixed, 20 MHz, MCS5, 90pc duty cycle) IEEE 802.11n (HT Mixed, 20 MHz, MCS6, 90pc duty cycle)	WLAN	8.71	±9.6
0598	AAD	IEEE 808.11n (HT Mixed, 20 MHz, MCS6, 90pc duty cycle)	WLAN	8.72	±9.6
0598	AAD	IEEE 802.11n (HT Mixed, 40 MHz, MCS0, 90pc duty cycle)	WLAN	8.50	±9.6
0600	AAD	IEEE 802.11n (HT Mixed, 40 MHz, MCS1, 90pc duty cycle)	WLAN	8.79	±9.6
0601	AAD	IEEE 802.11n (HT Mixed, 40 MHz, MCS2, 90pc duty cycle)	0.000	8.88	±9.6
0605	AAD	IEEE 802.11n (HT Mixed, 40 MHz, MCS3, 90pc duty cycle)	WLAN	8.82	±9.6
0603	AAD	IEEE 802.11n (HT Mixed, 40 MHz, MCS4, 90pc duty cycle)	WLAN	8.94	±9.6
0604	AAD	IEEE 802.11n (HT Mixed, 40 MHz, MCB5, 90pc duty cycle)	WLAN	9.03	18.6
0605	AAD	IEEE 802.11n (HT Mixed, 40 MHz, MCS6, 90pc duty cycle)	WLAN	8.97	19.6
0606	AAD	IEEE 802.11n (HT Mised, 40 MHz, MCS7, 90pc duty cycle)	WLAN	8.82	±9.6
0607	AAD	IEEE 802 11ac WIFI (20 MHz, MCS0, 90pc duty cycle)	WLAN	8.82	±9.6
		IEEE 802.11ac W/FI (20 MHz, MCS1, SOpc duty cycle)	11000	0.04	11.5

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UID	Rev	Communication System Name	Group	PAR (dB)	Uno ^{li} k
10609	AAD	IEEE 802.11ac WIFI (20 MHz, MCS2, 90pc duty cycle)	WLAN	8.57	±9.6
10610	AAD	IEEE 802.11ac WIFI (20 MHz, MCS3, 90pc duty cycle)	WLAN	6.76	±9.6
10611	AAD	IEEE 802.11ac WiFi (20 MHz, MCS4, 90pc duty cycle)	WLAN	8.70	±9.6
10612	AAD	IEEE 802.11ac WiFi (20 MHz, MCSS, 90pc duty cycle)	WLAN	8.77	±9.6
0613	AAD	IEEE 802.11ac WiFi (20 MHz, MCS6, 90pc duty cycle)	WLAN	8.94	±9.6
0614	AAD	IEEE 802.11ac WiFi (20 MHz, MCS7, 90pc duty cycle)	WLAN	8.59	±8.6
0615	AAD	IEEE 802.11ac WIFI (20 MHz, MCS8, 90pc duty cycle)	WLAN	8.82	±9.6
0816	AAD	IEEE 802.11ac WIFI (40 MHz, MCS0, 90pc duty cycle)	WLAN	8.82	±9.6
0617	AAD	IEEE 802.11ac WiFi (40 MHz, MCS1, 90pc duty cycle)	WLAN	8.81	±9.6
0618	AAD	IEEE 802.11ac WIFI (40 MHz, MCS2, 90pc duty cycle)	WLAN	8.58	+9.6
0619	AAD	IEEE 802.11ac WIFI (40 MHz, MCS3, 90pc duty cycle)	WLAN	8.86	±9.6
0620	AAD	IEEE 802.11ac WIFI (40 MHz, MCS4, 90pc duty cycle)	WLAN	8.87	±9.6
0621	AAD	IEEE 802.11ac WiFi (40 MHz, MCSS, 90pc duty cycle)	WLAN	8.77	±9.6
0622	AAD	IEEE 802.11ac WiFi (40 MHz, MCS8, 90pc duty cycle)	WLAN	8.68	±9.6
0623	AAD	IEEE 802.11ac WIFi (40 MHz, MCS7, 90pc duty cycle)	WLAN	8.82	±8.1
0624	AAD	IEEE 802.11ac WIFI (40 MHz, MCS8, 90pc duty cycle)	WLAN	8.96	±9.6
0625	AAD	IEEE 802.11ac WiFi (40 MHz, MCS8, 90pc duty cycle)	WLAN	8.96	19.6
0626	AAD	IEEE 802.11ac WIFI (80 MHz, MCS0, 90pc duty cycle)	WLAN	8.83	±9.0
0627	AAD	IEEE 802.11ac WIFI (80 MHz, MCS1, 90pc duty cycle)	WLAN	8.88	±9.6
0628	AAD	IEEE 802.11ac WIFI (80 MHz, MCS2, 90pc duty cycle)	WLAN	8.71	±9/
0658	AAD	IEEE 802.11ac WIFI (80 MHz, MCS3, 90pc duty cycle)	WLAN	8.85	
0630	AAD			The second secon	±9.6
	AAD	IEEE 802.11ac WIFI (80 MHz, MCS4, 90pc duty cycle)	WLAN	8.72	±9.1
0631	AAD	IEEE 802 11ac WIFI (80 MHz, MC55, 90pc duty cycle)	WLAN	8.81	±97
		IEEE 802.11ac WiF (80 MHz, MCS6, 90pc duty cycle)	WLAN	8.74	±8.6
0833	AAD	IEEE 802.11ac WiFi (80 MHz, MCS7, 90pc duty cycle)	WLAN	8.83	±9.5
0634	AAD	IEEE 802.11ac WIFI (80 MHz, MCS8, 90pc duty cycle)	WLAN	8.80	39.5
0635	AAD	IEEE 802.11ac WIFI (80 MHz, MCSB, 90pc duty cycle)	WLAN	8.81	±9.6
0636	AAE	IEEE 802.11ac WIFI (160 MHz, MCS0, 90pc duty cycle)	WLAN	8.83	±9.6
0637	AAE	IEEE 802.11ac WiFi (160 MHz, MCS1, H0pc duty cycle)	WLAN	8.79	±9.6
0638	AAE	IEEE 802.11ac WIFI (160 MHz, MCS2, 90pc duty cycle)	WLAN	8.86	19.8
0.638	AAE	IEEE 802.11ac WIFI (160 MHz, MCS3, 90pc duty cycle)	WLAN	8.85	±9.6
0640	AAE	IEEE 802,11ac WIFI (160 MHz, MCS4, 90pc duty cycle)	WLAN	8.98	±9.6
10641	AAE	IEEE 802.11ac WIFI (160 MHz, MCS5, 90pc duty cycle)	WLAN	9:06	±9.6
0642	AAE	IEEE 802.11ac WIFI (180 MHz, MCS8, 90pc duty cycle)	WLAN	9.06	198
0643	AAE	IEEE 802.11ac WIFI (160 MHz, MCS7, 90pc duty cycle)	WLAN	8.89	±9.6
10644	AAE	IEEE 802:11ae WIFI (160 MHz, MCS8, 90pc duty cycle)	WLAN	9.05	±9.6
10645	AAE	IEEE 802.11ac WIFI (160 MHz, MCS9, 90pc duty cycle)	WLAN	9.11	#0.6
0846	AAH	LTE-TOD (SC-FDMA, 1 R8, 5 MHz, QPSK, UL Subframe=2,7)	LTE-TOD	11.96	±9.6
10647	AAG	LTE-TDD (SC-FDMA, 1 RB, 20MHz, QPSK, UL Subtrame=2,7)	LTE-TOD	11,96	19.6
0648	AAA	CDMA2000 (1x Advanced)	GDMA2000	3.45	±9.6
10852	AAF	LTE-TDD (OFDMA, 5 MHz, E-TM 3.1, Clipping 44%)	LTE-TDD	6.91	19.6
0653	AAF	LTE-TDD (OFDMA, 10 MHz, E-TM 3.1, Clipping 44%)	LTE-TOD	7,42	±9.6
0854	AAE	LTE-TBD (OFDMA, 15MHz, E-TM 3.1, Clipping 44%)	LTE-TOD	6.96	±9.0
0.655	AAF	LTE-TOD (OFDMA, 20 MHz, E-TM 3.1, Clipping 44%)	LTE-TOD	7.21	±9.6
0658	AAB	Pulse Waveform (200Hz, 10%)	Teat	10.00	19.6
0659	AAB	Pulse Waveform (200Hz, 20%)	Test	6.99	±9.6
0.660	AAB.	Pulse Waveform (200Hz, 40%)	Test	3.98	±9.6
0.661	AAB	Pulse Waveform (200Hz, 50%)	Yest	2.22	±9.8
0662	AAB	Pulse Waveform (200Hz, 80%)	Test	0.97	19.6
0670	AAA	Bluetooth Low Energy	Bluetcoth	2.19	±9.6
0671	AAC	IEEE 802.11ax (20 MHz, MCS0, 90pc duty cycle)	WLAN	9.09	±9.6
0672	AAC	IEEE 809, 11ax (20 MHz, MCS1, 90pc duty cycle)	WLAN	8.57	
0673	AAC	IEEE 802.11ax (20 MHz, MCS2, 90pc duty cycle)	WLAN	8.78	±9.6
0674	AAC	IEEE 802.11ax (20 MHz, MCSS, 90pc duty cycle)	WLAN	8.74	
0675	AAC	IEEE 802.11ax (20 MHz, MCS4, 90pc duty cycle)	WLAN		±9.4
0676	AAC	IEEE 802.11ax (20 MHz, MCSS, 90pc duty cycle)	WLAN	8.90	±9.6
0677	AAC	IEEE 802.11ax (20 MHz, MCS8, 90pc duty cycle)	WLAN	8.77	29.8
0678	AAC	IEEE 802.11ax (20 MHz. MGS7, 90pc duty cycle)	1.00 (% 1) 5 ()	8.73	20.6
0679	AAC	IEEE 802.11ax (20 MHz, MCSR, 90pc duty cycle)	WLAN	8.78	#8.6
0680	AAC		WLAN	8.89	±9.6
	AAC	IEEE 802.11ax (20 MHz, MCS9, 90pc duty cycle)	WLAN	8,80	29.6
0681	AAC	IEEE 802.11ax (20 MHz, MCS10, 90pc duty cycle)	WLAN	8-62	±9.6
0682	and the balance of the balance of	IEEE 802.11ax (20 MHz, MCS11, 90pc duty cycle)	WLAN	8.83	±8.6
0683	AAC	IEEE 802.11ax (20 MHz, MCS0, 99pc duty cycle)	WLAN	8.42	±9.€
0684	AAC	IEEE 802.11ax (20 MHz, MCS1, 99pc duty cycle)	WLAN	8.26	±9.8
0685	AAC	IEEE 807.11ax (20 MHz, MCS2, 99pc duty cycle)	WLAN	8.33	±9.6
0686		IEEE 802.11ax (20 MHz, MCS3, 99pc duty cycle)	WLAN	8.28	±9.6

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UID	Rev	Communication System Name	Group	PAR (dB)	Unc ^E k + 2
10887	AAC	IEEE 802.11ax (20 MHz, MCS4, 99pc duty cycle)	WLAN	8.45	±9.6
10688	AAC	IEEE 802.11ax (20 MHz, MCSS, 99pc duty cycle)	WLAN	8.29	±9.6
10689	AAC	IEEE 802.11ax (20 MHz, MCS6, 99pc duty cycle)	WLAN	8.55	+9.6
0690	AAC	IEEE 802 11ax (20 MHz, MCS7, 99po duty cycle)	WLAN	8.29	±9.6
10891	AAC	IEEE 802.11ax (20 MHz, MCS8, 99pc duty cycle)	WLAN	8.25	19.6
10.692	AAC	IEEE 802.11ax (20 MHz, MCS9, 99pc duty cycle)	WLAN	8.29	±9.6
10693	AAC	IEEE 802.11ax (20 MHz, MCS10, 99pc duty cycle)	WLAN	8.25	±9.6
10694	AAC	IEEE 802.11 gx (20 MHz, MCS11, 99pc duty cycle)	WLAN	8.57	±9.6
	AAC	IEEE 802.11ax (40 MHz, MCS0, 90pc duty cycle)	100000000000000000000000000000000000000	The state of the s	
10695	AAC		WLAN	8.78	±9.6
10696	F (1) (1)	IEEE 802,11ax (40 MHz, MCS1, 90pc duty cycle)	WLAN	8.91	19.6
10897	AAC	IEEE 802.11ax (40 MHz, MCS2, 90pc duty cycle)	WLAN	9,61	±9.6
10698	AAC	IEEE 802.11ax (40 MHz, MCS3, 90pc duty cycle)	WLAN	8,89	±9.6
10699	AAC	E.E.E. 802.11ax (40 MHz, MCS4, 90pc duty cycle)	WLAN	8.82	±9.6
10700	AAC	IEEE 802.11ax (40 MHz, MCS5, 90pc duty cycle)	WLAN	8.73	±9.6
10701	AAC	IEEE 802.11ax (40 MHz, MCS6, 90pc duty cycle)	WLAN	8.86	±9.6
10702	AAC	IEEE 802.11ax (40 MHz, MCS7, 90pc duty cycle)	WLAN	8.70	±8.6
10703	AAC:	IEEE 802.11ax (40 MHz, MCS8, 90pc duty cycle)	WLAN	8.82	±9.6
10704	AAG	IEEE 802.11ax (40 MHz, MCS9, 90pc duty cycle)	WLAN	8.56	±9.6
10705	AAC	IEEE 802.11ax (40 MHz, MCS10, 90pc duty cycle)	WLAN	8.69	19.6
0.706	AAC	IEEE 802.11ax (40 MHz, MCS11, 90pc duty cycle)	WLAN	8.66	±9.6
10707	AAC.	IEEE 802.11ax (40 MHz, MCS0, 99pc duty cycle)	WLAN	8.32	±9.6
10708	AAC	IEEE 802.11ax (40 MHz, MCS1, 99pc duty cycle)	WLAN	8.55	±9.6
10709	AAC	IEEE 802.11 kx (40 MHz, MCS2, 99pc duty cycle)	WLAN	8.33	±9.6
10710	AAC	IEEE 802 11ax (40 MHz, MCS3, 99pc duty cycle)	WLAN	8.29	±9.6
10711	AAC.	(EEE 902.11ax (40 MHz, MCS4, 99pc duty cycle)	WEAN	0.39	±8.6
10712	AAC	IEEE 802 11ax (40 MHz, MCS5, 99pc duty cycle)	WLAN	8.67	±9.6
10713	AAG	IEEE 802.11ax (40 MHz, MCS8, 99pc duty cycle)	WLAN	8.33	±9.6
10714	AAC	IEEE 802.11ax (40 MHz, MCS7, 99pc duty cycle)	WLAN	8.26	19.6
10715	AAC	IEEE 802 T1ax (40 MHz, MCS8, 99pc duty cycle)	WLAN	9.45	
10718	AAC	IEEE 802.11ax (40 MHz, MCS9, 98pc duty cycle)	WLAN	80.756	±9.6
10717	AAC		21000	8.30	±9.6
		IEEE 802.11ax (40 MHz, MCS10, 99pc duty cycle)	WLAN	8.48	±9.6
10718	AAC	IEEE 802.11ax (40 MHz, MCS11, 99pc duty cycle)	WLAN	8.24	±9,6
10719	AAC	IEEE 802.11ax (80 MHz, MCS0, 90pc duty cycle)	WLAN	8.81	±9.6
10720	AAC	IEEE 802.11ax (80 MHz, MCS1, 90pc duty cycle)	WLAN	6.87	±9,6
10721	AAC	IEEE 802.11ax (80 MHz, MCS2, 90pc duty cycle)	WLAN	8.78	19.6
10722	AAC	IEEE 802.11ax (80 MHz, MCS3, 90pc duty cycle)	WLAN	8.55	±9.6
10723	AAC	IEEE 802.11ax (80 MHz, MCS4, 90pc duty cycle)	WLAN	8.70	±8,6
10724	AAC	IEEE 802.11ax (80 MHz, MCSS, 90pc duty cycle)	WLAN	8.90	±9.6
10725	AAC	IEEE 802.11ax (80 MHz, MCS6, 90pc duty cycle)	WLAN:	8.74	±9.6
10726	AAC	IEEE 802.11ax (80 MHz, MCS7, 90pc duty cycle)	WLAN	8.72	±9.6
10727	AAC	IEEE 802.11ax (80 MHz, MCS8, 90pc duty cycle)	WLAN	8.66	±9.6
10728	AAG.	IEEE 802.11ax (80 MHz, MCS6, 90pc duty cycle)	WLAN	8.85	3.8±
10729	AAC	IEEE 802.11ax (80 MHz, MCS10, 90pc duty cycle)	WLAN	8.84	±9.6
10730	AAC	IEEE 802.11ax (80 MHz, MCS11, 90pc duty cycle)	WLAN	8.67	±9.6
10731	AAC	IEEE 802.11ax (80MHz, MCS0, 99pc duty cycle)	WLAN	8.42	±9.6
10732	AAC	IEEE 802.11ax (80 MHz, MCS1, 99pc duty cycle)	WLAN	8.46	±9.8
10733	AAC	IEEE 802.11ax (80 MHz, MCS2, 99pc duty cycle)	WLAN	8.40	19.6
10734	AAC	IEEE 802 11ax (80 MHz, MCS3, 99pc duty cycle)	WLAN	8.25	19.6
10735	AAC	IEEE 802.11ax (80 MHz, MCS4, 99pc duty cycle)	WLAN	8.33	±9.6
10736	AAC	IEEE 802.11ax (80 MHz, MCSS, 99pc duty cycle)	WLAN	8.27	
10737	AAC	IEEE 802.11ax (80 MHz, MCS6, 99pc duty cycle)	WLAN		19.6
10758	AAC	IEEE 802.11ax (80 MHz, MCS7, 99pc duly cycle)	2,5 49,54 51	8.36	±9.6
10739	AAC		WLAN	8,42	±9.6
10740	AAC	IEEE 802 11 ax (80 MHz, MCS8, 99pc duty cycle)	WLAN	8.29	±9.6
-	-	IEEE 802.11ax (80 MHz, MCS9, 99pc duty cycle)	WLAN	8.48	±9.6
10741	AAC	IEEE 902.11ax (80 MHz, MCS10, 99pc duty cycle)	WLAN	8.40	±9.6
10742	AAC	IEEE 802.11ax (80 MHz, MCS11, 99pc duty cycle)	WLAN	8.43	±9.6
10743	AAC	IEEE 809,11ax (160 MHz, MCS0, 90pc duty cycle)	WLAN	8.94	±9.6
10744	AAC	IEEE 802.11ax (160 MHz, MCS1, 90pc duty cycle)	WLAN	9.16	19.6
10745	AAC	IEEE 802.11ax (160 MHz, MGS2, 90pc duty cycle)	WLAN	8.93	±9.6
10746	AAC	IEEE 800.11ax (160 MHz, MCS3, 90pc duty cycle)	WLAN	9.11	±9.6
0.747	AAC	IEEE 802.11ax (160 MHz, MCS4, 90pc duty cycle)	WLAN	9.04	±9.6
10748	AAC	IEEE 802.11ax (160 MHz, MC85, 90pc duty cycle)	WLAN	8.90	±9.6
10749	AAC	IEEE 802.11ax (160 MHz, MCS6, 90pc duty cycle)	WLAN	8.90	±9.6
0750	AAC	IEEE 802.11ax (160 MHz, MCS7, 90pc duty cycle)	WLAN	8.79	±9.6
0751	AAC	IEIEE 802.11ax (160 MHz, MGS8, 90pc duty cycle)	WLAN	8.82	±9.6
	AAC	IEEE 802.11ax (160 MHz, MCS8, 90pc duty cycle)	WLAN	8.81	±9.8

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UID	Rev	Communication System Name	Group	PAR (dB)	Unc ^E k = 2
10753	AAC	IEEE 802.11ax (160 MHz, MCS10, 90pc duty cycle)	WLAN	9.00	19.6
10754	AAC	IEEE 802,11ax (160 MHz, MCS11, 90pc duty cycle)	WLAN	8.94	19.6
10755	AAC	IEEE 802:11ax (160 MHz, MCS0, 99pc duty cycle) IEEE 802:11ax (160 MHz, MCS1, 99pc duty cycle)	WLAN WLAN	8.64	±9.6
10787	AAG	IEEE 802.11ax (160 MHz, MCS2, 99pc duty cycle)	WLAN	8.77	±9.6
10758	AAC	IEEE 802.11ax (160 MHz, MCS3, 99pc duty cycle)	WLAN	8.69	±9.6
10750	AAC	IEEE 802.11ax (160 MHz, MCS4, 99pc duty cycle)	WLAN	8.58	19.6
10760	AAC	IEEE 802.11ax (160 MHz, MCSS, 99pc duty cycle)	WLAN	8.49	±9.6
10761	AAC	JEEE 802.11ax (160 MHz, MCS6, 99pc duty cycle)	WLAN	8.58	±9.6
10762	AAC	IEEE 802.11ex (160 MHz, MCS7, 99pc duty cycle)	WLAN	8.49	±9.6
10783	AAC	IEEE 802,11ax (160 MHz, MCS8, 99pc duty cycle)	WLAN	8.53	19.6
10764	AAC	IEEE 802.11ax (160MHz, MCSB, 99pc duty cycle)	WLAN	8.54	±9.6
10765	AAC	IEEE 802,11ax (160 MHz, MCS10, 99pc duty cycle)	WLAN	8.54	±9.6
10766	AAC	IEEE 802,11ax (160 MHz, MCS11, 99pc duty cycle)	WLAN	8.51	±9.6
10767	AAG	50. NR (CP-OFOM, 1 RB, 5MHz, QPSK, 15kHz)	50 NR FR1 TDD	7.99	±9.6
10788	AAE	5G NR (CP-OFDM, 1 RB, 10MHz, QPSK, 15kHz)	5G NR FR1 TOO	8.01	19.6
10768	AAD	5G NR (CP-OFOM, 1 RB, 15MHz, QPSK, 15kHz)	5G NR FRI TOD	8.01	±9.6
10770	AAE	5G NR (CP-OFDM, 1 RB, 20MHz, QPSK, 15kHz)	5G NR FR1 TDD	8.02	±9.6
10771	AAD	5G NR (CP-OFDM, 1 RB, 25MHz, QPSK, 15kHz)	5G NR FR1 TOD	8.02	±9.6
10772	AAE	5G NR (CP OFDM, 1 RB, 30MHz, QPSK, 15kHz)	5G NR FR1 TDD	8.23	19.6
10773	AAF	SG NR (CP-OFOM, 1 RB, 40MHz, QPSK, 15kHz)	5G NR FRI TOD	8.03	±9.6
10774	AAE	5G NR (CP-OFDM, 1 RB, 50MHz, QPSK, 15kHz)	5G NR FRI TOD	8.02	±9.6
10775	AAF	SG NR (CP-OFDM, 50% RB, 5MHz, QPSK, 15kHz)	5G NR FR1 TDD	8.31	±9.6
10776	AAF	5G NR (CP-OFDM, 50% R8, 10MHz, QPSK, 15kHz)	5G NR FR1 TDD	8.30	±9.6
10777	AAC	5G NR (CP-OFDM, 50% RB, 15MHz, QPSK, 15kHz)	5G NR FR1 TDD	8.30	19:6
10778	AAE	5G NR (CP-OFOM, 50% RB, 20MHz, QPSK, 15kHz)	5G NR FR1 TDD	8.34	±9.6
10779	AAC	5G NR (CP-OFDM, 50% RB, 25MHz, QPSK, 154Hz)	5G NR FRI TOD	8.42	±9.6
10780	AAE	5G NR (CP-OFDM, 50% RB, 30 MHz, OPSK, 15 kHz)	SG NR FR1 TOD	8.38	±9.6
10781	AAF	5G NR (CP-OFDM, 50% RB, 40 MHz, QPSK, 15 RHz)	5G NR FR1 TOD	838	49.6
0782	AAE	5G NR (CP-OFDM, 50% RB, 50 MHz, QPSK, 15 kHz)	SG NR FR1 TDD	8.43	±9.6
0783	AAG	5G NR (CP-OFOM, 100% RB, SMHz, OPSK, 15kHz)	5G NR FR1 TDD	8.31	±9.6
10784	AAE	5G NR (CP-OFOM, 100% RB. 10 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.29	±9.6
10785	AAD	53 NR (CP-OFOM, 100% RB. 15 MHz, QPSK, 15 kHz)	5G NR FRI TOD	8.40	±9.6
10786	AAE	5G NR (CP-OFDM, 100% RB, 20 MHz, QPSK, 15 kHz)	5G NR FRI TOO	8.35	19.6
10787	AAD	5G NR (CP OFOM, 100% RB, 25MHz, QPSK, 15 kHz)	SG NR FRI TOD	8,44	19.6
10788	AAE	5G NR (CP-OFDM, 100% RB, 30 MHz, QPSK, 15 kHz)	SG NR FR1 TDO	8.39	±9.6
10789	AAF	5G NR (CP-QFDM, 100% RB, 40 MHz, QPSK, 15 HHz)	5G NR FR1 TDD	8.37	±9.6
10790	AAE	5G NR (CP-OFDM, 100% RB, 50 MHz, QPSK, 15 kHz)	5G NR FRI TOO	8.38	±9.6
10791	AAG	5G NR (CP-OFDM, 1 RB, 5MHz, QPSK, 30kHz)	SG NR FR1 TOD	7.83	19.6
10792	AAE	5G NR (CP-QF0M, 1 R8, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.92	19.6
10793	AAD	5G NR (CP-OFDM, 1 RB, 15 MHz, QPSK, 30 kHz)	SG NA FRI TOD	7.95	19.6
10794	AAE	5G NR (CP-OFDM, 1 RB. 20 MHz, QPSK, 30 kHz)	5G NA FA1 TOD	7.82	19.6
10795	AAD	5G NR (CP-OFDM, 1 RB, 25 MHz, QPSK, 30 kHz)	5G NR FRI TDD	7.84	±9.6
10798	AAE	5G NR (CP-OFDM, 1 RB, 30 MHz, QPSK, 30 kHz)	SG NR FR1 TDD	7.82	±8.6
10797	AAF	5G NR (CP-OFDM, 1 RB, 48 MHz, QPSK, 30 kHz)	5G NR FRI TOD	8.01	19.6
10798	AAE	5G NR (CP-OFDM, 1 R8, 50 MHz, QPSK, 30 kHz)	SG NR FR1 TDD	7.89	19.6
10799	AAF	5G NR (CP-OFDM, 1 RB, 60 MHz, QPSK, 30 kHz)	5G NR FRI TOD	7.93	19.6
10801	AAF.	5G NR (CP-QFDM, 1 RB, 80 MHz, QPSK, 50 kHz)	5G NR FRI TOD	7.89	19.6
10802	AAE	5G NR (CP-OFDM, 1 RB, 90 MHz, QPSK, 30 kHz)	5G NR FRI TOD	7.87	±9.6
10.803	AAF	5G NR (CP-OFDM, 1 RB, 100 MHz, QPSK, 30 KHz)	5G NR FRI TDD	7.93	19.6
10805	AAE	SG NR (CP-QFDM, 50% RB, 10 MHz, QPSK, 30 MHz)	5G NR FRI TDD	8:34	+9.6
10800	AAD	5G NR (CP-OFDM, 50% RB, 15MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.37	19.6
0800	AAE	5G NR (CP-OFDM, 50% RB, 30 MHz, QPSK, 30 kHz)	5G NR FRI TDD	8.34	19.6
0810	AAF	5G NR (CP-OFDM, 50% RB, 40 MHz, QPSK, 30 kHz)	5G NR FRI TOD	8.34	±9.6
0812	AAF	5G NR (CP-OFDM, 50% RE, 50MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.35	±9.6
0817	AAG	5G NR (CP-OFDM, 100% RB, 5 MHz, QPSK, 30 kHz)	5G NR FRI TDD	B.35	19.6
8180	AAE	5G NR (CP-OFDM, 100% RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TOD	8.34	±0.6
0819	AAD	5G NR (CP-OFDM, 100% RB, 15 MHz, QPSK, 30 kHz)	50 NR FRI TOD	8.33	±9.6
0620	AAE	5G NR (CP-OFDM, 100% RB, 20 MHz, QPSK, 30 kHz)	5G NR FRI TDD	8.30	±9.6
0821	AAD	5G NR (CP-OFDM, 100% RB, 25 MHz, QPSK, 30 kHz)	5G NR FRI TOD	8.41	±9.6
0822	AAE	5G NR (CP-OFOM, 100% RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.41	19.6
0823	AAF	50 NR (CP-OFDM, 100% RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.36	29.6
0824	AAE	5G NR (CP-OFOM, 100% RB, 50 MHz, QPSK, 30 KHz)	SG NR FRI TOD	8.39	19.6
terror to the later of	AAF	5G NR (CP-OFDM, 100% RB, 60 MHz, QPSK, 30 kHz)	SG NR FR1 TD0	6.41	19.6
0825			100000000000000000000000000000000000000		49.4
0825	AAF	5G NR (CP-OFDM, 100% RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.42	±9.6

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UID	Rev	Communication System Name	Group	PAR (dB)	Unc ^E k =
10829	AAF	5G NR (CP-OFDM, 100% RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDO	8.40	±9.6
10830	AAE	5G NR (CP-OFDM, 1 RB, 10 MHz, QPSK, 80 kHz)	5G NR FR1 TOO	7.63	±9.8
10831	AAD:	5G NR (CP-OFOM, 1 RB, 15 MHz, QPSK, 60 kHz)	5G NR FR1 TOD	7.73	±9.6
10832	AAE	5G NR (CP-DFDM, 1 RB, 20 MHz, QPSK, 60 kHz)	5G NR FR1 T00	7.74	±9.6
0833	AAD	5G NR (CP-OFOM, 1 RB, 25 MHz, QPSK, 60 kHz)	5G NR FR1 TD0	7.70	±9.6
0834	AAE	5G NR (CP-OFOM, 1 RB, 30 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.75	±9.8
0835	AAF	5G NR (CP-OFDM, 1 RB, 40 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.70	±9.6
0836	AAE	5G NR (CP-OFDM, 1 RB, 50 MHz, QPSK, 50 kHz)	5G NR FR1 TDD	7.66	±9.6
0837	AAF	5G NR (CP-OFDM, 1 RB, 60 MHz, QPSK, 60 kHz)	5G NR FR1 TD0	7.68	±9.6
0839	AAF	5G NR (CP-OFDM, 1 RB, 80 MHz, QPSK, 60 kHz)	50 NR FR1 TDD	7.70	±9.6
0840	AAE	5G NR (CP-OFDM, 1 RB, 90 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.67	±9.6
0841	AAF	5G NR (CP OFDM, 1 RB, 100 MHz, QPSK, 60 kHz)	SG NR FR1 TDD	7.71	±9.6
0843	AAD	5G NR (CP-OFDM, 50% RB, 15 MHz, QPSK, 60 kHz)	5G NR FRI TDD	8.49	±9.6
0.844	AAE	5G NR (CP-OFDM, 50% RB, 20 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.34	19.6
0846	AAE	5G NR (CP-OFDM, 50% RB, 30 MHz, QPSK, 60 kHz)	50 NR FR1 TDD	8.41	±9.6
0.854	AAE	5G NR (CP-OFDM, 100% RB, 10MHz, QPSK, 60 kHz)	SG NR FR1 TDD	8.34	±9.6
0.855	AAD.	5G NR (CP-OFDM, 100% RB, 15MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.36	±9.6
0.856	AAE	5G NR (CP-OFDM, 100% RB, 20MHz, QPSK, 60 kHz)	5G NR FR1 TD0	8.37	±9.6
0.857	AAD	5G NR (CP-OFDM, 100% RB, 25MHz, QPSK, 60 kHz)	50 NR FR1 TDD	8.35	±9.6
0858	AAE	5G NR (CP-OFDM, 100% RB, 30MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.36	±9.6
0859	AAF	5G NR (CP-OFDM, 100% RB, 40 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.34	±9.6
0860	AAE	5G NR (CP-OFDM, 100% RB, 50 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.41	±9.6
0861	AAF	5G NR (CP-QFOM, 100% RB, 60 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.40	±9.6
0.863	AAF.	5G NR (CP-OFDM, 100% RB, 80 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.41	±9.6
0864	AAE	50 NR (CP-OFDM, 100% RB, 90 MHz, QPSK, 60 kHz)	5G NR FR1 TD0	8.37	±9.6
0.865	AAF	50 NR (CP-OFOM, 100% RB, 100 MHz, QPSK, 60 kHz)	5G NR FR1 TDO	8.41	±9.6
0886	AAF	5G NR (DFT-s-OFDM, 1 RB, 100MHz, QPSK, 30kHz)	5G NR FR1 TDD	5.68	±9.6
0868	AAF	5G NR (DFT-s-OFDM, 100% RB, 100 MHz, QPSK, 30 kHz)	5G NR FRI TDD	5.89	±9.6
0869	AAE	5G NR (DFT-s-OFDM, 1 RB, 100 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	5.75	±9.6
0870	AAE	50 NR (DFT-a-OFDM, 100% RB, 100 MHz, QPSK, 120 kHz)	5G NR FR2 TDO	5.86	±9.6
0871	AAE	5G NR (DFT-s-OFDM, 1 RB, 100 MHz, 16QAM, 120 kHz)	50 NR FR2 TDD	5.75	±9.6
0872	AAE	5G NR (DFT-s-OFDM, 100% RB, 100 MHz, 16QAM, 120kHz)	SG NR FR2 TOO	6.52	±9.6
0873	AAE	5G NR (DFT-a-OFDM, 1 RB, 100MHz, 64QAM, 120kHz)	5G NR FR2 100	6.61	±9.6
0874	AAE	5G NR (DFT-s-OFDM, 190% RB, 100 MHz, 84QAM, 120 kHz)	5G NR FR2 TDD	6.65	±9.6
0875	AAE	5G NR (CP-OFDM, 1 RB, 100 MHz, QPSK, 120 kHz)	50 NR FR2 TDD	7.78	±9.6
0876	AAE	5G NR (CP-DFDM, 100% RB, 100MHz, QPSK, 120kHz)	5G NR FR2 TDD	8.39	±9.6
0877	AAE	5G NR (CP-OFDM, 1 RB, 100 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	7.95	±9.6
0878	AAE	5G NR (CP-OFDM, 100% RB, 100 MHz, 18QAM, 120 kHz)	5G NR FR2 TDD	8.41	±9.6
0.879	AAE	5G NR (CP-OFDM, 1 R8, 100 MHz, 64QAM, 120 HHz)	5G NR FR2 TOO	8.12	±9.6
0880	AAE	5G NR (CP-OFDM, 100% RB, 100 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	8.38	±9.6
0881	AAE	5G NR (DFT:s-OFDM, 1 RB, 50MHz, QPSK, 120kHz)	5G NR FR2 TDD	5.75	±9.6
0.862	AAE	5G NR (DFT-s-OFOM, 190% RB, 50 MHz, QPSK, 120 kHz)	SG NR FR2 TDD	5.96	±9.6
0883	AAE	5G NR (DFT-s-OFDM, 1 RB, 50 MHz, 18QAM, 120 kHz)	SG NR FR2 TDD	6.57	±9.6
0.884	AAE	5G NR (DFT-s-OFDM, 100% RB, 50 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	6.53	±9.6
0885	AAE	5G NR (DFT-s-OFDM, 1 RB, 50 MHz, 64QAM, 120 kHz)	5G NR FR2 TOD	6.61	±9.6
0.886	AAE	5G NR (DFT-e-OFDM, 100% RB, 50 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	8.85	
0.887	AAE	5G NR (CP-OFDM, 1 RB, 50 MHz, QP5K, 120 kHz)	9G NR FR2 TDD		19.6
0888	AAE	5G NR (CP-GFDM, 190% RB, 50MHz, GPSK, 120kHz)	50 NA FR2 T00	7.78 8.35	±9.6
0889	AAE	5G NR (CP-GFDM, 188, 50 MHz, 15QAM, 120 kHz)			±9.6
0890	AAE	5G NR (CP-GFDM, 100% RB, 50 MHz, 16QAM, 120 kHz)	50 NR FR2 TD0	8.02	±9.6
0891	AAE	5G NR (CP-OFOM, 180% HB, 50 MHz, 16QAM, 120 KHz)	SG NR FR2 TDD	8.40	±9.6
0892	AAE	5G NR (CP-OFDM, 100% RB, 50MHz, 64QAM, 120kHz)	777777777777777777777777777777777777777	8.13	±9.6
0897	AAE	5G NR (DFT-e-OFDM, 1 RB, 5 MHz, QPSK, 30 kHz)	5G NR FR2 TDD	8.41	±9.6
0898	AAC	5G NR (DFTs-OFDM, 1 RB, 10MHz, QPSK, 30MHz)	50 NR FR1 TOD	5.66	±9.6
0.899	AAB	5G NR (DFT-9-DFDM, 1 RB, 15MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.67	19.6
0900	AAC	5G NR (DFT-s-OFDM, 1 RB, 25MHz, QPSK, 30KHz)	5G NA FR1 TDD	5.67	±9.6
1080	AAB	5G NR (DFT-s-OFDM, 1 RB, 25MHz, QPSK, 30kHz) 5G NR (DFT-s-OFDM, 1 RB, 25MHz, QPSK, 30kHz)	50 NA FR1 TD0	5.68	±9.5
0.808	AAC		5G NR FR1 TDD	5.68	±9.6
0.903	AAD	5G NR (DFT-s-OFDM, 1 RB, 30 MHz, OPSK, 30 kHz)	5G NR FR1 TDD	5.68	±9.6
	AAC	5G NR (DFT-6-DFDM, 1 RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	±9.6
0904	7.570	5G NR (DFT-e-OFDM, 1 RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	±9.6
0905	AAD	SG NR (DFT:s-OFDM, 1 RB, 66 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	19.6
0906	AAD:	5G NR (DFT-s-OFDM, 1 RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	19.6
0907	AAE	50 NR (OFT-s-OFOM, 50% RB, 5 MHz, QPSK, 30kHz)	50 NR FR1 TOD	5.78	±9.8
0908	AAC	5G NR (DFT-s-OFDM, 50% RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.93	±9.6
0908	BAA	5G NR (DFT-s-OFDM, 50% RB, 15 MHz, QPSK, 30 kHz)	53 NR FR1 T00	5.96	±9.6
0910	AAC	5G NR (DFT-s-OFDM, 50% RB, 20 MHz, QPSK, 30 kHz)	5G NR FRI TOD	5.83	±9.6

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10911	AAB	5G NR (OFT-e-OFOM, 50% RB, 25 MHz, OPSK, 30 kHz)	5G NR FR1 TDD	5.93	±9.6
10912	AAC	\$G NR (DFT-s-OFDM, 50% RB, 30 MHz, QPSK, 30 kHz)	5G NR FRI TDD	5.84	±9.6
10913	AAD	SG NR (DFT's OFDM, 50% RB, 40 MHz, QPSK, 30 kHz)	5G NR FRI TDD	5.84	±9.6
10914	AAC	5G NR (DFT-s-OFOM, 50% RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.85	±9.6
10915	AAD	5G NR (DFT-e-OFDM, 50% RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.83	±9.6
10916	AAD	5G NR (DFT-s-OFDM, 50% RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.87	19.6
10917	AAD	5G NR (DFT-6-OFDM, 50% RB, 100 MHz, QPSK, 30 kHz)	5G NA FR1 TDD	5.94	±9.6
10918	AAE	SG NR (DFTs-DFDM, 100% RB, 5 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.86	±9.6
10919	AAC	SG NR (DFT-s-OFDM, 100% RB, 10 MHz, QPSK, 30 kHz)	SG NR FR1 TDD	5.86	±9.6
10920	AAB	50 NR (DFT-s-OFDM, 100% RB, 15 MHz, QPSK, 30 kHz)	50 NR FR1 TDD	5.87	±9.6
10021	AAC	5G NR (DFT s-OFDM, 100% RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	±9.6
10922	BAA	5G NR (DFT s-DFDM, 100% RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.82	±9.6
10923	AAC	5G NR (DFT-s-OFDM, 100% RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	±9.6
10924	AAD	5G NR (DFT+-OFDM, 100% RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5,84	±9.6
10925	AAC	SG NR (DFT-s-DFDM, 100% RB, 50 MHz, QPSK, 30 kHz)	50 NR FR1 TDD	5.95	±9.6
10926	AAD	5G NR (OFT a-OFOM, 100% RB, 60 MHz, QPSK, 30 kHz)	50 NR FR1 TDD	5.84	±9.6
10927	CAA	5G NR (DFT-s-OFDM, 100% RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.94	±9.8
10926	AAD	SG NR (DFT-s-OFDM, 1 RB, 5MHz, QPSK, 15kHz)	5G NR FR1 FDD	5.52	±9,6
10929	AAD	5G NR (OFT-s-OFOM, 1 RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.82	±9.6
10930	AAC	SG NR (DFT-s-OFDM, 1 RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.52	±9.6
10931	AAC	SG NR (DFT-s-DFDM, 1 RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	±9.6
10932	AAC	5G NR (OFT-s-OFDM, 1 RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5,51	±9.6
10933	AAC	5G NR (DFT-s-OFDM, 1-RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5,51	±9.6
10934	AAC	SG NR (DFT s-DFDM, 1 RB, 40 MHz, QPSK, 15 kHz)	50 NR FR1 FDD	5.51	±9.6
10935	CAA	SG NR (OFT-s-OFDM, 1 RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	±9.8
10936	AAD	SG NR (DFT-6-OFDM, 50% RB, 5MHz, QPSK, 15kHz)	5G NR FR1 FDD	5.90	±9.8
10937	AAD	5G NR (OFT's-OFOM, 50% RB, 10 MHz, QPSK, 15kHz)	5G NR FR1 FDD	5.77	±9,6
10938	AAC	5G NR (DFT-s-OFDM, 50% RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.90	±9.6
10939	AAC	5G NR (DFT-e-OFDM, 50% RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5,82	±9.6
10940	AAC	SG NR (DFT 6-OFDM, 50% RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.89	±9.6
10941	AAC	5G NR (DFT s-OFDM, 50% RB, 30 MHz, QPSK, 15 kHz)	50 NR FR1 FDD	5.83	±9.6
10942	AAC	5G NR (DFT+s-OFDM, 50% RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.85	±9.6
10943	AAD	SG NR (DFT s-OFDM, 50% RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.95	19.6
10944	AAD	SG NR (DFT s-OFDM, 100% RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.81	±9.8
10945	AAD	5G NR (DFT-s-OFDM, 100% RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.85	±9.8
10946	AAC	5G NR (DFT+-OFDM, 100% RB, 15MHz, QPSK, 15KHz)	5G NR FR1 FDD	5.83	±9.6
10947	AAC	SG NR (DFT-s-OFDM, 100% RR, 20 MHz, QPSK, 15 kHz)	5G NR FR1 FOD	5.87	±9.6
10948	AAC	5G NR (DFT-s-OFDM, 160% RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.94	±9.8
10949	AAC	5G NR (DFT-s-OFDM, 100% RB, 30 MHz, QPSK, 15 kHz)	50 NA FR1 F00	5.87	±9.6
10955	AAD	SG NR (DFT-s-OFDM, 100% RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.94	±9.6
10951	AAA	5G NR (DFT-s-OFDM, 100% RB, 50 MHz, QPSK, 15 kHz) 5G NR DL (CP-OFDM, TM 3.1, 5MHz, 64-QAM, 15 kHz)	SG NR FR1 FDD	5.92	19.6
10953	AAA		SG NR FR1 FDD	8.25	19.6
10954	AAA	59 NR DL (CP-OFDM, TM 3.1, 10 MHz, 64-QAM, 15 kHz) 59 NR DL (CP-OFDM, TM 3.1, 15 MHz, 64-QAM, 15 kHz)	SG NR FR1 FDD	8.15	19.6
10955	AAA	5G NR DL (CP-OFDM, TM 3.1, 20 MHz, 64-QAM, 15 kHz)	58 NR FR1 F00	8,23	±9.6
10956	AAA	5G NR DL (CP-OFDM, TM 3.1, 5 MHz, 64-QAM, 30 kHz)	SG NR FR1 FD0	8.42	±9.6
10957	AAA	5G NR DL (CP-OFDM, TM 3.1, 10 MHz, 64-QAM, 30 kHz)	SG NR FR1 FDD	8.14	±9.6
10958	AAA	5G NR OL (CP-OFDM, TM 3.1, 15MHz, 64-QAM, 30KHz)	50 NR FR1 FD0	8.31	±9.6
10959	AAA	SG NR DL (CP-OFDM, TM 3.1, 15 MHz, 64 QAM, 30 KHz)	5G NR FR1 FDD	8.61	19.6
10960	AAE	5G NR DL ICP-OFOM, TM 3.1, 5 MHz, 64-QAM, 15 KHz)	SG NR FR1 FDD	8.33	±9.6
10961	AAC	5G NR DL (CP-OFOM, TM 3.1, 5 WHZ, 64-QAM, 15 kHz)	SG NR FR1 TDD	9.32	±9.6
0962	AAB	5G NR DL (CP-OFOM, TM 3.1, 15MHz, 64-QAM, 15KHz)	50 NR FR1 TDD	9,36	19.6
10963	AAC	5G NR DL (CP-OFOM, TM 0.1, 19MHz, 64-QAM, 15KHz)	5G NR FR1 TDD	9.40	±9.6
10964	AAE	5G NR DL (CP-OFOM, TM 3.1, 5MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.55	±9.6
0965	AAC	5G NR DL (CP-OFOM, TM 3.1, 10MHz, 64-QAM, 30 kHz)	50 NR FR1 TDD	9.29	±9.6
0966	AAB	5G NR DL (CP-OFOM, TM 3.1, 15 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.37	±9.6
0967	AAC	5G NR DL (CP-OFOM, TM 3.1, 20MHz, 64-QAM, 30 kHz)	The second control of	and the second second	±9.6
0968	AAD	SG NFLDL (CP-OFDM, TM 3.1, 100 MHz, 84-QAM, 30 MHz)	50 NR FR1 TDD	9.42	19.6
0972	AAC	SG NR (CP-OFDM, 1 RB, 20 MHz, QPSK, 15 kHz)	50 NR FR1 TDD	9.49	±9.8
0973	AAD	5G NR (DFTs-OFDM, 1 RB, 100 MHz, QPSK, 30 kHz)	The state of the s	11.59	±9.6
0974	AAD	5G NR (CP-OFDM, 100% RB, 100 MHz, 256-QAM, 30 kHz)	5G NR FR1 TDD	9.06	±9/6
0978	AAA	ULLA BDR	5G NR FR1 TOO	10.28	±9.6
0979	AAA	ULLA HDR4	ULLA	1.16	±9.6
0980	AAA	ULLA HDR8	ULLA	8.58	±9.6
0981	AAA	The state of the s	ULLA	10,32	19.6
09B2	AAA	ULLA HDRo4	ULLA	3.19	29.6
	MARK	ULLA HDRp8	ULLA	3.43	±9.6

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February 19, 2024

UID	Rev	Communication System Name	Group	PAR (dB)	Unc ^E k = 2
10.983	AAC	5G NR DL (CP-OFDM, TM 3.1, 40 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	9.31	±8.6
10984	AAB	53 NR DL (CF-OFDM, TM 3.1, 50 MHz, 64-QAM, 15×Hz)	5G NR FR1 TDD	9.42	±9.6
10985	AAC	5G NR DL (CP-OFDM, TM 3.1, 40 MHz, 64-QAM, 30 kHz)	50 NR FR1 T00	9.54	±9.6
10986	AAB	5G NR DL (CP-OFDM, TM 3.1, 50 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.50	±9.6
10987	AAC	50 NR DL (CP-OFDM, TM 3.1, 60 MHz, 84-QAM, 30 kHz)	5G NR FR1 TDD	9.53	±9.6
10988	AAB	5G NR DL (CP-OFDM, TM 3.1, 70 MHz, 64-QAM, 30 kHz)	5G NR FR1 TOD	9.38	±9.6
10989	AAC	5G NR DL (CP-OFDM, TM 3.1, 80 MHz, 64-QAM, 30 kHz)	5G NR FR1 TOD	9.33	±9.6
10990	AAB	5G NR DL (CP-OFDM, TM 3.1, 90 MHz, 64-QAM, 30 kHz)	50 NR FR1 TDD	9.52	±9.6
11003	AAA	5G NR DL (CP-OFDM, TM 3.1, 30 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	10.24	±9.6
11004	AAA	5G NR DL (CP-OFDM, TM 3.1, 30 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	10.73	±9.6
11005	AAA	5G NR DL (CP-OFDM, TM 3.1, 25 MHz, 64-QAM, 15 kHz)	50 NR FR1 FDD	8.70	±9.6
11006	AAA	5G NR DL (CP-OFDM, TM 3.1, 30 MHz, 64-QAM, 15 kHz)	50 NR FR1 FDD	8.55	±9.6
11007	AAA	5G NR DL (CP-OFDM, TM 3.1, 40 MHz, 84-QAM, 15 kHz)	5G NR FR1 FDD	8.46	±9.6
11008	AAA	50 NR DL (CP-OFDM, TM 3.1, 50 MHz, 64-QAM, 15 kHz)	5G NR FR1 FDD	8.51	±9.6
11009	AAA	5G NR DL (CP-OFDM, TM 3.1, 25 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8,76	±9.6
11010	AAA	5G NR DL (CP-OFDM, TM 3.1, 30 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8,95	±9:6
11011	AAA	5G NR DL (CP-OFDM, TM 3.1, 40 MHz, 64-QAM, 30 kHz)	50 NR FR1 FDD	8.96	±9.6
11012	AAA	5G NFI DL (CP-QFDM, TM 3.1, 50 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.68	±9.6
11013	AAB	IEEE 802.11be (320 MHz, MCS1, 99pc duty cycle)	WLAN	8.47	±9.6
11014	AAB	IEEE 802,11be (320 MHz, MCS2, 99pc duty cycle)	WLAN	8.45	±9.6
11015	AAB	IEEE 802.11be (320 MHz, MCS3, 98pc duty cycle)	WLAN	8.44	±9.6
11016	AAB	IEEE 802,11be (320 MHz, MCS4, 99pc duty cycle)	WLAN	8.44	±9.6
11017	AAB	IEEE 802.11be (320 MHz, MCS5, 99pc duty cycle)	WLAN	8.41	±9.fi
11018	AAB	IEEE 802.11be (320 MHz, MCS8, 99pc duty cycle)	WLAN	8.40	±9.6
11019	AAB	IEEE 802.11be (320 MHz, MCS7, 98pc duty cycle)	WLAN	8,29	±9.6
11020	AAB	IEEE 802,11be (320 MHz, MCS8, 99pc duty cycle)	WLAN	6.27	±9.6
11021	AAB	IEEE 802.11be (320 MHz, MCS9, 99pc duty cycle)	WLAN	8.46	±9.8
11022	BAA	IEEE 802.11be (320 MHz, MCS10, 96pc duty cycle)	WLAN	8.36	±9.6
11023	AAB	IEEE 802.11be (320 MHz, MCS11, 99pc duty cycle)	WLAN	8.09	±9.6
11024	BAA	IEEE 802.11be (320 MHz, MCS12, 99pc duty cycle)	WLAN	8.42	±9.8
11025	AAB	IEEE 802.11be (326 MHz, MCS13, 99pc duty cycle)	WLAN	8.37	±9.6
11026	AAB	IEEE 802.11be (320 MHz, MCS0, 99pc duty cycle)	WLAN	8.39	±9.6

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

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Appendix G. – Dipole Calibration Data

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



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

Accreditation No.: SCS 0108

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

Client HCT

Gyeonggi-do, Republic of Korea

Certificate No. CLA13-1016_Sep23

Calibration Procedure for SAR Validation Sources below 700 MHz Calibration date: September 21, 2023 This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI), he measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate, and 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 # Cali Date (Certificate No.) Scheduled Certificate No.) Primary Standards ID # Calibration (Certificate No.) Scheduled Certificate No.) Scheduled Certificate No.) Scheduled Certificate No. (Certificate No.) Scheduled Certificate No.) Primary Standards ID # Calibration (Certificate No.) Scheduled Certificate No.) Scheduled Certificate No. (Certificate No.) Scheduled Certificate No.) Scheduled Certificate No. (Certificate No.) Scheduled Certificate No.) Scheduled Certificate No. (Certificate No.) Scheduled Certificate No. (Certifi	Object	CLA13 - SN: 101	6	
Priss celibration 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 celibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%. Celibration Equipment used (M&TE critical for celibration) Primary Standards ID # Call Date (Certificate No.) Scheduled Celibration Prower meter NRP2 SN: 104778 30-Mar-23 (No. 217-03804/03805) Mar-24 Prower sensor NRP-Z91 SN: 103244 30-Mar-23 (No. 217-03806) Mar-24 Prower sensor NRP-Z91 SN: 103245 30-Mar-23 (No. 217-03806) Mar-24 Teleference 20 dis Attenuator SN: 210982 / 06327 30-Mar-23 (No. 217-03806) Mar-24 Teleference 20 dis Attenuator SN: 3077 06-Jan-23 (No. 217-03806) Mar-24 Prower sensor NRP-Z91 SN: 3077 06-Jan-23 (No. EX3-3977_Jan-23) Jan-24 DAE4 SN: 554 27-Jan-23 (No. DAE4-654_Jan23) Jan-24 DAE4 Secondary Standards ID # Check Date (in house) Scheduled Check Prower meter NRP2 SN: 107183 08-Nov-21 (in house check Dec-22) In house check: Dec-24 Prower sensor NRP-Z91 SN: 103824 SN: 103842 (31700 04-Aug-99 (in house check Duc-22) In house check: Dec-24 Prower sensor NRP-Z91 SN: 103824 Name Function Signaturey Celibrated by: Jeton Rastrati Laboratory Technician Technical Manager	Calibration procedure(s)		dure for SAR Validation Sources	below 700 MHz
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 # CaliDate (Certificate No.) Scheduled Calibration Primary Standards ID # CaliDate (Certificate No.) Scheduled Calibration Prower meter NRP2 SN: 10477B 30-Mar-23 (No. 217-03804) Mar-24 Prower sensor NRP-2B1 SN: 103244 30-Mar-23 (No. 217-03805) Mar-24 Prower sensor NRP-2B1 SN: 103245 30-Mar-23 (No. 217-03806) Mar-24 Prower sensor NRP-2B1 SN: 103245 30-Mar-23 (No. 217-03806) Mar-24 Prower sensor NRP-2B1 SN: 105245 30-Mar-23 (No. 217-03806) Mar-24 Prower sensor Probe EX3DV4 SN: 3877 06-Jan-23 (No. EX3-3877_Jan-23) Jan-24 DAE-4 SN: 654 27-Jan-23 (No. DAE-4-654_Jan-23) Jan-24 DAE-4 SN: 654 27-Jan-23 (No. DAE-4-654_Jan-23) Jan-24 Prower sensor NRP-2B1 SN: 107193 08-Nov-21 (in house check Dec-22) In house check: Dec-24 Prower sensor NRP-2B1 SN: 107193 08-Nov-21 (in house check Dec-22) In house check: Dec-24 Prower sensor NRP-2B1 SN: 100418 01-Jan-04 (in house check Dec-22) In house check: Dec-24 Prower sensor NRP-2B1 SN: 100418 01-Jan-04 (in house check Dec-22) In house check: Dec-24 Prower sensor NRP-2B1 SN: 103842U01700 04-Aug-98 (in house check Dec-22) In house check: Dec-24 Name Function Signaturey Laboratory Technician Approved by: Svan Kohn Technician Name Function Signaturey Laboratory Technician	Calibration date:	September 21, 20	023	
Primary Standards ID # Cal Date (Certificate No.) Scheduled Calibration Power meter NRP2 SN: 104778 30-Mar-23 (No. 217-03804) Mar-24 Power sensor NRP-ZP1 SN: 103244 30-Mar-25 (No. 217-03804) Mar-24 Power sensor NRP-ZP3 SN: 103245 30-Mar-23 (No. 217-03805) Mar-24 Reference 20 dB Attenuator SN: CC2582 (20x) 30-Mar-23 (No. 217-03809) Mar-24 Power sensor NRP-ZP3 SN: 30044 SN: 3677 08-Jan-23 (No. 217-03810) Mar-24 Power sensor Probe EX3DV4 SN: 3877 08-Jan-23 (No. EX3-3877_Jan-23) Jan-24 DAE4 SN: 654 27-Jan-23 (No. DAE4-654_Jan23) Jan-24 DAE5 Secondary Standards ID # Check Date (In house) Scheduled Check Power meter NRP2 SN: 107193 08-Nov-21 (in house check Dec-22) In house check: Dec-24 Power sensor NRP-ZP1 SN: 100322 15-Dec-09 (in house check Dec-22) In house check: Dec-24 Power sensor NRP-ZP1 SN: 100418 01-Jan-04 (in house check Dec-22) In house check: Dec-24 Power sensor NRP-ZP1 SN: US3842U01700 04-Aug-99 (in house check Jun-22) In house check: Dec-24 Retwork Analyzer Agilant E8358A SN: US41080477 31-Mar-14 (in house check Oct-22) In house check: Dec-24 Name Function Signature Calibrated by: Jan-24 SN: US3842U01700 Laboratory Technician Signaturey Dator Kastrasi Laboratory Technician Signaturey Dator Kastrasi Laboratory Technician Signaturey Dator Kastrasi Laboratory Technician	The measurements and the uncert	sintles with confidence pr	robability are given on the following pages and	I are part of the certificate.
Power sensor NRP-ZB1		William Commencer Commence	Cal Date /Cortificate No.	School and Palibration
Power sensor NRP-ZB1	Power meter NRP2	110	CONTRACTOR	THE PROPERTY OF THE PROPERTY O
Secondary Standards	Power sensor NRP-Z91	SN: 103244	30-Mar-23 (No. 217-03804)	Mar-24
Type-N mismatch combination	ower sensor NRP-Z91	SN: 103245	30-Mar-23 (No. 217-03805)	Mar-24
Secondary Standards	Reference 20 dB Attenuator	SN: CC2552 (20x)	30-Mar-23 (No. 217-03809)	Mar-24
DAE4 SN: 654 27-Jan-23 (No. DAE4-654_Jan23) Jan-24 Secondary Standards ID # Check Date (in house) Scheduled Check Power meter NRP2 SN: 107193 08-Nov-21 (in house check Dec-22) In house check: Dec-24 Power sensor NRP-ZB1 SN: 100922 15-Dec-08 (in house check Dec-22) In house check: Dec-24 Power sensor NRP-ZB1 SN: 100418 01-Jan-04 (in house check Dec-22) In house check: Dec-24 RP generator HP 8646C SN: US3642U01700 04-Aug-98 (in house check Jun-22) In house check: Jun-24 Network Analyzer Agilant EB35BA SN: US41080477 31-Mar-14 (in house check Oct-22) In house check: Oct-24 Name Function Signature Calibrated by: Jeton Kastrus Laboratory Technician Signature Laboratory Technician Signature Technical Manager		GN- 910989 / 06397	30-Mar-23 (No. 217-03810)	Mar-24
Secondary Standards ID # Check Date (In house) Scheduled Check Power meter NRP2 SN: 107193 08-Nov-21 (In house check Dec-22) In house check: Dec-24 Power sensor NRP-ZB1 SN: 100922 15-Dec-09 (In house check Dec-22) In house check: Dec-24 Power sensor NRP-ZB1 SN: 100418 01-Jan-04 (In house check Dec-22) In house check: Dec-24 RF generator HP 8848C SN: US3842U01700 04-Aug-99 (In house check Jun-22) In house check: Dec-24 Network Analyzer Agilant EB358A SN: US341080477 31-Mar-14 (In house check Oct-22) In house check: Oct-24 Name Function Signature Cellibrated by: Jeton Kastrasi Laboratory Technician Signature Approved by: Swan-Kohn Technical Manager		Die Signori back		1990, 304
Power meter NRP2 SN: 107193 08-Nov-21 (in house check Dec-22) in house check: Dec-24 Power sensor NRP-ZB1 SN: 100922 15-Dec-08 (in house check Dec-22) in house check: Dec-24 Power sensor NRP-ZB1 SN: 100418 01-Jan-04 (in house check Dec-22) in house check: Dec-24 RF generator HIP 8848C SN: US3642U01700 04-Aug-99 (in house check Jun-22) in house check: Jun-24 Network Analyzer Agilant EB358A SN: US41080477 31-Mar-14 (in house check Oct-22) in house check: Oct-24 Name Function Signature Calibrated by: Jun-24 Laboratory Technician Signature Laboratory Technician Signature Laboratory Technician Signature Technical Manager	Reference Probe EX3DV4	SN: 3877		Jan-24
Power meter NRP2 SN: 107193 08-Nov-21 (in house check Dec-22) in house check: Dec-24 Power sensor NRP-ZB1 SN: 100922 15-Dec-08 (in house check Dec-22) in house check: Dec-24 Power sensor NRP-ZB1 SN: 100418 01-Jan-04 (in house check Dec-22) in house check: Dec-24 RF generator HIP 8848C SN: US3642U01700 04-Aug-99 (in house check Jun-22) in house check: Jun-24 Network Analyzer Agilant EB358A SN: US41080477 31-Mar-14 (in house check Oct-22) in house check: Oct-24 Name Function Signature Calibrated by: Jun-24 Laboratory Technician Signature Laboratory Technician Signature Laboratory Technician Signature Technical Manager	Reference Probe EX3DV4	SN: 3877		Jan-24
Power sensor NRP-Z91 SN: 100922 15-Dec-06 (in tiouse check Dec-22) In house check: Dec-24 Power sensor NRP-Z91 SN: 100418 01-Jan-04 (in house check Dec-22) In house check: Dec-24 In h	Type-N mismatch combination Reference Probe EX3DV4 DAE4	SN: 3877 SN: 654	27-Jen-23 (No. DAE4-654_Jan23)	Jan-24 Jan-24
RF generator HP 8848C SN: US3842U01700 04-Aug-98 (in house check Jun-22) In house check: Jun-24 Network Analyzer Agilant EB358A SN: US41080477 31-Mar-14 (in house check Oct-22) In house check: Oct-24 In hou	Reference Probe EX3DV4 DAE4 Secondary Standarda	SN: 3877 SN: 654	27-Jan-23 (No. DAE4-654_Jan23) Check Date (in house)	Jen-24 Jan-24 Scheduled Check
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Calibrated by: Daton Kastruti Laboratory Technician Approved by: Svan Köhn Technical Manager	Reference Probe EX3DV4	SN: 3877 SN: 654 ID # SN: 107193 SN: 100922	27-Jan-23 (No. DAE4-654_Jan23) Check Date (in house) 08-Nov-21 (in house check Dec-22) 15-Dec-08 (in house check Dec-22)	Jan-24 Jan-24 Scheduled Check In house check: Dec-24 In house check: Dec-24
Calibrated by: Joton Kastrati Laboratory Technician C	Reference Probe EX3DV4 DAE4 Secondary Standards Power meter NRP2 Power sensor NRP-ZB1 Power sensor NRP-ZB1	SN: 3877 SN: 654 ID # SN: 107193 SN: 100922 SN: 100418	27-Jan-23 (No. DAE4-654_Jan23) Check Date (in house) 08-Nov-21 (in house check Dec-22) 15-Dec-08 (in house check Dec-22) 01-Jan-04 (in house check Dec-22)	Jan-24 Jan-24 Scheduled Check In house check: Dec-24 In house check: Dec-24 In house check: Dec-24
Calibrated by: Joton Kastrati Laboratory Technician C	Reference Probe EX3DV4 DAE4 Secondary Standards Power meter NRP2 Power sensor NRP-281 Power sensor NRP-291 RF generator HP 8848C	SN: 3877 SN: 654 ID # SN: 107183 SN: 100922 SN: 100418 SN: US3842U01700	27-Jan-23 (No. DAE4-654_Jan23) Check Date (in house) 98-Nov-21 (in house check Dec-22) 15-Dec-08 (in house check Dec-22) 01-Jan-04 (in house check Dec-22) 04-Aug-98 (in house check Jun-22)	Jan-24 Jan-24 Scheduled Check In house check: Dec-24 In house check: Dec-24 In house check: Dec-24 In house check: Jun-24
Approved by: Svan-Kühn Technical Manager 7. 4	Reference Probe EX3DV4 DAE4 Secondary Standards Power meter NRP2 Power sensor NRP-ZB1	SN: 3877 SN: 654 ID # SN: 107193 SN: 100922 SN: 100418 SN: US3842U01700 SN: US41080477	27-Jan-23 (No. DAE4-654_Jan23) Check Date (in house) 08-Nov-21 (in house check Dec-22) 15-Dec-08 (in house check Dec-22) 01-Jan-04 (in house check Dec-22) 04-Aug-98 (in house check Jun-22) 31-Mar-14 (in house check Oct-22)	Jan-24 Jan-24 Schaduled Check In house check: Dec-24 In house check: Dec-24 In house check: Dec-24 In house check: Oci-24 In house check: Jun-24 In house check: Jun-24
	Reference Probe EX3DV4 DAE4 Secondary Standards Power meter NRP2 Power sensor NRP-ZB1 Power sensor NRP-ZB1 RF generator HP 8648C Network Analyzer Agilant EB358A	SN: 3877 SN: 654 ID # SN: 107193 SN: 100922 SN: 100418 SN: US3842U01700 SN: US41080477 Name	27-Jan-23 (No. DAE4-654_Jan23) Check Date (in house) 08-Nov-21 (in house check Dec-22) 15-Dec-09 (in house check Dec-22) 01-Jan-04 (in house check Dec-22) 04-Aug-99 (in house check Jun-22) 31-Mar-14 (in house check Oct-22) Function	Jan-24 Jan-24 Schaduled Check In house check: Dec-24 In house check: Dec-24 In house check: Dec-24 In house check: Oc-24 In house check: Jun-24 In house check: Jun-24
	Reference Probe EX3DV4 DAE4 Secondary Standards Power meter NRP2 Power sensor NRP-ZB1 Power sensor NRP-ZB1 RF generator HP 8648C Network Analyzer Agilant EB358A	SN: 3877 SN: 654 ID # SN: 107193 SN: 100922 SN: 100418 SN: US3842U01700 SN: US41080477 Name	27-Jan-23 (No. DAE4-654_Jan23) Check Date (in house) 08-Nov-21 (in house check Dec-22) 15-Dec-09 (in house check Dec-22) 01-Jan-04 (in house check Dec-22) 04-Aug-99 (in house check Jun-22) 31-Mar-14 (in house check Oct-22) Function	Jan-24 Jan-24 Schaduled Check In house check: Dec-24 In house check: Dec-24 In house check: Dec-24 In house check: Oc-24 In house check: Jun-24 In house check: Jun-24
Issuert September 21, 2023	Reference Probe EX3DV4 DAE4 Secondary Standards Power meter NRP2 Power sensor NRP-291 Power sensor NRP-291 RF generator HP 8848C Network Analyzer Agilant EB358A Calibrated by:	SN: 3877 SN: 654 ID # SN: 107193 SN: 100922 SN: 100418 SN: US3842U01700 SN: US41080477 Name Jeton Kastrali	27-Jan-23 (No. DAE4-654 Jan23) Check Date (in house) 98-Nov-21 (in house check Dec-22) 15-Dec-08 (in house check Dec-22) 01-Jan-04 (in house check Dec-22) 04-Aug-98 (in house check Jun-22) 31-Mar-14 (in house check Oct-22) Function Laboratory Technician	Jan-24 Jan-24 Scheduled Check In house check: Dec-24 In house check: Dec-24 In house check: Dec-24 In house check: Jun-24 In house check: Jun-24 Signaturey
	Reference Probe EX3DV4 DAE4 Secondary Standards Power meter NRP2 Power sensor NRP-ZB1 Power sensor NRP-ZB1 RF generator HP 8648C Network Analyzer Agilant EB358A	SN: 3877 SN: 654 ID # SN: 107193 SN: 100922 SN: 100418 SN: US3842U01700 SN: US41080477 Name Jeton Kastrali	27-Jan-23 (No. DAE4-654 Jan23) Check Date (in house) 98-Nov-21 (in house check Dec-22) 15-Dec-08 (in house check Dec-22) 01-Jan-04 (in house check Dec-22) 04-Aug-98 (in house check Jun-22) 31-Mar-14 (in house check Oct-22) Function Laboratory Technician	Jan-24 Jan-24 Scheduled Check In house check: Dec-24 In house check: Dec-24 In house check: Dec-24 In house check: Jun-24 In house check: Jun-24 Signaturey

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





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

Accreditation No.: SCS 0108

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:

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:

- a) 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.
- b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

c) DASY 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 source is mounted in a touch configuration below the center marking of the flat phantom.
- Return Loss: This parameter is measured with the source positioned under the liquid filled phantom (as described in the measurement condition clause). The Return Loss ensures low reflected power. 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%.

Certificate No: CLA13-1016_Sep23

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Measurement Conditions

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

DASY Version	DASY5	V52,10,4
Extrapolation	Advanced Extrapolation	
Phantom	ELI4 Flat Phantom	Shell thickness: 2 ± 0.2 mm
EUT Positioning	Touch Position	
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction
Frequency	13 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	55.0	0.75 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	53.1 ± 6 %	0.72 mha/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	1 W input power	0.539 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	0.553 W/kg ± 18.4 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	1 W input power	0.335 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	0.343 W/kg ± 18.0 % (k=2)



Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.3 Ω + 0.0 jΩ
Return Loss	- 37.8 dB

Additional EUT Data

Manufactured by	SPEAG

Certificate No: CLA13-1016_Sep23

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DASY5 Validation Report for Head TSL

Date: 21.09.2023

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: CLA13; Type; CLA13; Serial: CLA13 - SN: 1016

Communication System; UID 0 - CW; Frequency: 13 MHz

Medium parameters used: f = 13 MHz; $\sigma = 0.72$ S/m; $\varepsilon_r = 53.1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: EX3DV4 SN3877; ConvF(15.33, 15.33, 15.33) @ 13 MHz; Calibrated: 06.01.2023
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn654; Calibrated: 27.01.2023
- Phantom: ELI v6.0; Type: QDOVA003AA; Serial: TP:2034
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

CLA Calibration for HSL-LF Tissue/CLA-13, touch configuration, Pin=1W/Zoom Scan,

dist=1.4mm (8x10x8)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 30.91 V/m; Power Drift = 0.05 dB

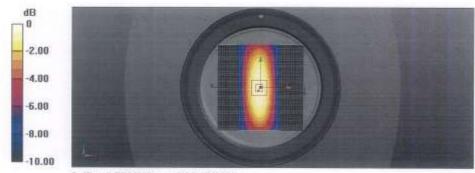
Peak SAR (extrapolated) = 1.09 W/kg

SAR(1 g) = 0.539 W/kg; SAR(10 g) = 0.335 W/kg

Smallest distance from peaks to all points 3 dB below = 17.6 mm

Ratio of SAR at M2 to SAR at M1 = 78.6%

Maximum value of SAR (measured) = 0.796 W/kg



0 dB = 0.796 W/kg = -0.99 dBW/kg

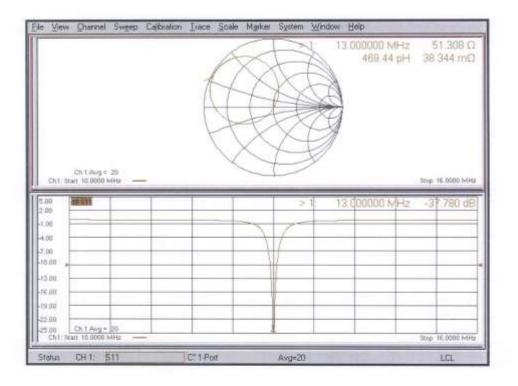
Certificate No: CLA13-1016_Sep23

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Impedance Measurement Plot for Head TSL



Certificate No: CLA13-1016_Sep23

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





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

Accreditation No.: SCS 0108

Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signatories to the EA

Multilateral Agreement for the recognition of calibration certificates

Client HCT
Gyeonggi-do, Republic of Korea

Certificate No. D750V3-1014_May24

CALIBRATION CI	ERTIFICATE	2		
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Power meter NRP2 Power sensor NRP-291 Power sensor NRP-291 Reference 20 dB Attenuator Reference 20 db Attenuator Reference Probe EX3DV4 AAE4	SN: 104778 SN: 103244 SN: 103245 SN: BH8394 (20k) SN: 310982 / 06327 SN: 7349 SN: 781	26-Mar-24 (No. 217-04036/04037) 26-Mar-24 (No. 217-04036) 26-Mar-24 (No. 217-04037) 26-Mar-24 (No. 217-04047) 26-Mar-24 (No. 217-04047) 03-Nov-23 (No. EX3-7349_Nov23) 16-Fev-24 (No. DAE4-781_Fev24)	Mar- Mar- Mar- Mar- Nov- Pev- Sche	25 25 28 25 25 22 24
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Power meter NRP2 Power sensor NRP-Z91 Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E44198 Power sensor HP 8481A RF generator R&S SMT-06	SN: 104778 SN: 103244 SN: 103245 SN: BH9394 (20k) SN: 310982 / 06327 SN: 7349 SN: 781 ID# SN: GB39512478 SN: US37292783 SN: MY41093315 SN: 100972	26-Mar-24 (No. 217-04036/04037) 26-Mar-24 (No. 217-04036) 26-Mar-24 (No. 217-04037) 26-Mar-24 (No. 217-04047) 26-Mar-24 (No. 217-04047) 03-Nov-23 (No. EX3-7349 Nov23) 16-Fev-24 (No. DAE4-781_Fev24) Check Date (In house) 30-Oct-14 (in house check Oct-22) 07-Oct-15 (in house check Oct-22) 15-Jun-15 (in house check Oct-22)	Mar- Mar- Mar- Mar- Nov- Fev- Sche In ho In ho In ho In ho	25 25 25 25 24 25 25 26 25 26 27 28 28 29 20 20 20 20 20 20 20 20 20 20 20 20 20
Power meter NRP2 Power sensor NRP-Z91 Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E44198 Power sensor HP 8481A RF generator R&S SMT-06	SN: 104778 SN: 103244 SN: 103245 SN: BH8394 (20k) SN: 310982 / 06327 SN: 781 ID# SN: GB39512475 SN: US37292783 SN: MY41083315 SN: 100972 SN: US41080477	26-Mar-24 (No. 217-04036/04037) 26-Mar-24 (No. 217-04036) 26-Mar-24 (No. 217-04037) 26-Mar-24 (No. 217-04037) 26-Mar-24 (No. 217-04047) 03-Nov-23 (No. EX3-7349_Nov23) 16-Fev-24 (No. DAE4-781_Fev24) Check Date (in house) 30-Oct-14 (in house check Oct-22) 07-Oct-15 (in house check Oct-22) 15-Jun-15 (in house check Oct-22) 31-Mar-14 (in house check Oct-22)	Mar- Mar- Mar- Mar- Nov- Fev- Sche In ho In ho In ho In ho	25 25 25 25 25 24 25 24 25 26 24 25 25 24 25 26 24 25 26 24 25 26 27 28 28 28 28 28 28 28 28 28 28 28 28 28

Certificate No: D750V3-1014_May24

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Calibration Laboratory of

Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland





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

Accreditation No.: SCS 0108

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:

TSL ConvF

N/A

tissue simulating liquid

sensitivity in TSL / NORM x,y,z not applicable or not measured

Calibration is Performed According to the Following Standards:

- a) 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-Worm Wireless Communication Devices - Part 1528: Human Models, Instrumentation And Procedures (Frequency Range of 4 MHz to 10 GHz)", October 2020.
- b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

c) DASY 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 source is mounted in a touch configuration below the center marking of the flat phantom.
- Return Loss: This parameter is measured with the source positioned under the liquid filled phantom (as described in the measurement condition clause). The Return Loss ensures low reflected power. 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%.

Certificate No: D750V3-1014_May24

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Measurement Conditions

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

DASY Version	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) "C	43.2 ± 6 %	0.88 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		1000

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.09 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	8.50 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.37 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	5.54 W/kg ± 16.5 % (k=2)

Certificate No: D750V3-1014_May24

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Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.6 Ω + 2.7 jΩ
Return Loss	- 27.3 dB

General Antenna Parameters and Design

Bectrical Delay (one direction)	1.037 ns
---------------------------------	----------

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

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Manufactured by	SPEAG

Certificate No: D750V3-1014_May24

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DASY5 Validation Report for Head TSL

Date: 20.05.2024

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1014

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

Medium parameters used: f = 750 MHz; $\sigma = 0.88$ S/m; $\epsilon_r = 43.2$; $\rho = 1000$ kg/m³

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: 03.11.2023
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn781; Calibrated: 16.02.2024
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

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 = 59.58 V/m; Power Drift = 0.03 dB

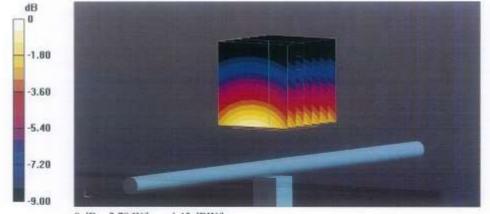
Peak SAR (extrapolated) = 3.13 W/kg

SAR(1 g) = 2.09 W/kg; SAR(10 g) = 1.37 W/kg

Smallest distance from peaks to all points 3 dB below = 24.1 mm

Ratio of SAR at M2 to SAR at M1 = 66.4%

Maximum value of SAR (measured) = 2.79 W/kg



0 dB = 2.79 W/kg = 4.45 dBW/kg

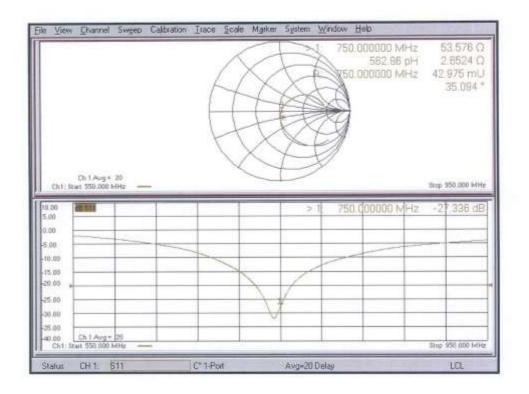
Certificate No: D750V3-1014_May24

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Impedance Measurement Plot for Head TSL



Certificate No: D750V3-1014_May24

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





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S Swiss Calibration Service

Accreditation No.: SCS 0108

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA

Multilateral Agreement for the recognition of calibration certificates

Client HCT

Client HCT Certificate No. D835V2-441_Apr24
Gyeonggi-do, Republic of Korea

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Calibration procedure(s)	QA CAL-05.v12 Calibration Proce	dure for SAR Validation Sources	The second secon
Calibration date:	April 18, 2024		
This calibration certificate documen	its the traceability to natio	onal standards, which realize the physical unit	ts of measurements (SI).
The measurements and the uncertainty	ainties with confidence pr	obability are given on the following pages and	d are part of the certificate.
All calibrations have been conducte	ed in the closed laborator	y facility: environment temperature (22 ± 3)°C	and humidity < 70%.
The second course proper soullistance	- The second interesting	Y mentile accommon in conference of the ± 53, p.	Caran Charleston, 2, 1 (Charles
Calibration Equipment used (M&TE	critical for calibration)		
Primary Standards	ID#	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP2	SN: 104778	26-Mar-24 (No. 217-04036/04037)	Mar-25
Power sensor NRP-Z91	SN: 103244	26-Mar-24 (No. 217-04036)	Mar-25
Power sensor NRP-Z91	SN: 103245	26-Mar-24 (No. 217-04037)	Mar-25
Contract Specialist Later Contract	SN: BH9394 (20k)	26-Mar-24 (No. 217-04046)	Mar-25
Reference 20 dB Attenuator			Mar-25
	SN: 310982 / 06327	26-Mar-24 (No. 217-04047)	With ED
Reference 20 dB Attenuator Type-N mismatch combination	SN: 310982 / 06327 SN: 7349	26-Mar-24 (No. 217-04047) 03-Nov-23 (No. EX3-7349_Nov23)	Nov-24
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Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards	SN: 7348 SN: 601	03-Nov-23 (No. EX3-7349 Nov23) 30-Jan-24 (No. DAE4-601_Jan24) Check Date (in house)	Nov-24 Jan-25 Scheduled Check
Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX30V4 DAE4 Secondary Standards Power meter E4419B	SN: 7348 SN: 601 ID # SN: GB39512475	03-Nov-23 (No. EX3-7349 Nov23) 30-Jan-24 (No. DAE4-601_Jan24) Check Date (in house) 30-Dct-14 (in house check Oct-22)	Nov-24 Jan-25 Scheduled Check In house check: Oct-24
Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX30V4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A	SN: 7348 SN: 601 ID # SN: GB39512475 SN: US37292783	03-Nov-23 (No. EX3-7349 Nov23) 30-Jan-24 (No. DAE4-601_Jan24) Check Date (in house) 30-Dct-14 (in house check Oct-22) 97-Oct-15 (in house check Oct-22)	Nov-24 Jan-25 Scheduled Check
Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX30V4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A Power sensor HP 8481A	SN: 7348 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: MY410B3315	03-Nov-23 (No. EX3-7349 Nov23) 30-Jan-24 (No. DAE4-601_Jan24) Check Date (in house) 30-Dct-14 (in house check Oct-22) 07-Oct-15 (in house check Oct-22) 07-Oct-15 (in house check Oct-22)	Nov-24 Jan-25 Scheduled Check In house check: Oct-24 In house check: Oct-24 In house check: Oct-24
Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX30V4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A Power sensor HP 8481A RF generator R&S SMT-06	SN: 7348 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: MY41093315 SN: 100972	03-Nov-23 (No. EX3-7349 Nov23) 30-Jan-24 (No. DAE4-601_Jan24) Check Date (in house) 30-Dct-14 (in house check Oct-22) 97-Oct-15 (in house check Oct-22)	Nov-24 Jan-25 Scheduled Check In house check: Oct-24 In house check: Oct-24
Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX30V4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A	SN: 7348 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: MY410B3315	03-Nov-23 (No. EX3-7349 Nov23) 30-Jan-24 (No. DAE4-601_Jan24) Check Date (in house) 30-Dct-14 (in house check Oct-22) 07-Oct-15 (in house check Oct-22) 07-Oct-15 (in house check Oct-22)	Nov-24 Jan-25 Scheduled Check In house check: Oct-24 In house check: Oct-24 In house check: Oct-24
Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX30V4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A Power sensor HP 8481A RF generator R&S SMT-06 Natwork Analyzer Agilent E8358A	SN: 7348 SN: 601 ID W SN: GB39512475 SN: US37292783 SN: MY410B3315 SN: 100972 SN: US41080477 Name	03-Nov-23 (No. EX3-7349_Nov23) 30-Jan-24 (No. DAE4-601_Jan24) Check Date (in house) 30-Dct-14 (in house check Oct-22) 07-Oct-15 (in house check Oct-22) 07-Oct-15 (in house check Oct-22) 15-Jun-15 (in house check Oct-22) 31-Mar-14 (in house check Oct-22)	Nov-24 Jan-25 Scheduled Check In house check: Och-24 In house check: Och-24 In house check: Och-24 In house check: Och-24
Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX30V4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A Power sensor HP 8481A RF generator R&S SMT-06	SN: 7348 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: WY41093315 SN: 100972 SN: US41080477	03-Nov-23 (No. EX3-7349 Nov23) 30-Jan-24 (No. DAE4-601_Jan24) Check Date (in house) 30-Oct-14 (in house check Oct-22) 07-Oct-15 (in house check Oct-22) 07-Oct-15 (in house check Oct-22) 15-Jun-15 (in house check Oct-22) 31-Mar-14 (in house check Oct-22)	Nov-24 Jan-25 Scheduled Check In house check: Oct-24 In house check: Oct-24 In house check: Oct-24 In house check: Oct-24 In house check: Oct-24
Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX30V4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A RF generator R&S SMT-06 Network Analyzer Agilent E8358A Calibrated by:	SN: 7348 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: MY41083315 SN: 100972 SN: US41080477 Name	03-Nov-23 (No. EX3-7349 Nov23) 30-Jan-24 (No. DAE4-601_Jan24) Check Date (in house) 30-Dct-14 (in house check Oct-22) 07-Oct-15 (in house check Oct-22) 07-Oct-15 (in house check Oct-22) 15-Jun-15 (in house check Oct-22) 31-Mar-14 (in house check Oct-22) Function	Nov-24 Jan-25 Scheduled Check In house check: Oct-24 In house check: Oct-24 In house check: Oct-24 In house check: Oct-24 In house check: Oct-24
Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX30V4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A Power sensor HP 8481A RF generator R&S SMT-06 Natwork Analyzer Agilent E8358A	SN: 7348 SN: 601 ID W SN: GB39512475 SN: US37292783 SN: MY410B3315 SN: 100972 SN: US41080477 Name	03-Nov-23 (No. EX3-7349_Nov23) 30-Jan-24 (No. DAE4-601_Jan24) Check Date (in house) 30-Dct-14 (in house check Oct-22) 07-Oct-15 (in house check Oct-22) 07-Oct-15 (in house check Oct-22) 15-Jun-15 (in house check Oct-22) 31-Mar-14 (in house check Oct-22)	Nov-24 Jan-25 Scheduled Check In house check: Oct-24 In house check: Oct-24 In house check: Oct-24 In house check: Oct-24 In house check: Oct-24

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Calibration Laboratory of Schmid & Partner

Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland





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

Accreditation No.: SCS 0108

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:

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:

- a) 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.
- b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

c) DASY 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 source is mounted in a touch configuration below the center marking of the flat phantom.
- Return Loss: This parameter is measured with the source positioned under the liquid filled phantom (as described in the measurement condition clause). The Return Loss ensures low reflected power. No uncertainty required.
- · SAR measured: SAR measured at the stated antenna input power.
- SAR normalized: SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.

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

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Measurement Conditions DASY system configuration, as

ASY system configuration, as far as not	given on page 1.	
DASY Version	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	42.6 ± 6 %	0.93 mha/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.48 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	9.73 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.62 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	5.37 W/kg ± 16.5 % (k≈2)



Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.5 Ω - 2.5 βΩ	
Return Loss	- 31.7 dB	

General Antenna Parameters and Design

Electrical Delay (one direction)	1.374 ns

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

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Certificate No: D835V2-441_Apr24

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DASY5 Validation Report for Head TSL

Date: 18.04.2024

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:441

Communication System: UID 0 - CW; Frequency: 835 MHz

Medium parameters used: f = 835 MHz; $\sigma = 0.93$ S/m; $\epsilon_r = 42.6$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 SN7349; ConvF(9.69, 9.69, 9.69) @ 835 MHz; Calibrated: 03.11.2023
- · Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.01.2024
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (8x8x7)/Cube 0:

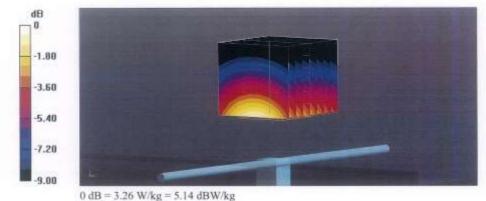
Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 63.37 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 3.71 W/kg

SAR(1 g) = 2.48 W/kg; SAR(10 g) = 1.62 W/kg

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

Ratio of SAR at M2 to SAR at M1 = 66.8% Maximum value of SAR (measured) = 3.26 W/kg



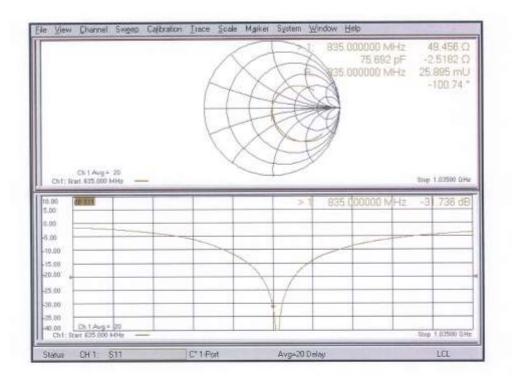
0 me 3100 11 mg 211 1 mm 11 mg

Certificate No: D835V2-441_Apr24

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Impedance Measurement Plot for Head TSL



Certificate No: D835V2-441_Apr24

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





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

Accreditation No.: SCS 0108

Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signatories to the EA

Multilateral Agreement for the recognition of calibration certificates

Client HCT
Gyeonggi-do, Republic of Kores

Certificate No. D1800V2-2d007_Apr24

	ERTIFICATE	and the second s	
Object	D1800V2 - SN:20	1007 7(2)	t 1804
St. Company of the Co	Territoria de l'ancient	1 7 2074-950	13 Section 2
Calibration procedure(s)	QA CAL-05.v12 Calibration Proce	dure for SAR Validation Sources	between 0.7-3 GHz
Calibration date:	April 15, 2024	CONTRACT ACCORDS	
The measurements and the uncert	ainties with confidence pr	onal standards, which realize the physical uni- robability are given on the following pages an- y facility: environment temperature $(22 \pm 3)^{\circ}$ C	d are part of the certificate.
Calibration Equipment used (M&TE	critical for calibration)		
Primary Standards	ID#	Cal Date (Certificate No.)	Scheduled Calibration
	Carlot Control of the first		
Power meter NRP2	SN: 104778	26-Mar-24 (No. 217-04036/04037)	Mar-25
	SN: 104778 SN: 103244	26-Mar-24 (No. 217-04036/04037) 26-Mar-24 (No. 217-04036)	Mar-25 Mar-25
Power sensor NRP-Z91			
Power sensor NRP-Z91 Power sensor NRP-Z91	SN: 103244	26-Mar-24 (No. 217-04036)	Mar-25
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator	SN: 103244 SN: 103245	26-Mar-24 (No. 217-04036) 26-Mar-24 (No. 217-04037)	Mar-25 Mar-25
Power sensor NRP-Z81 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination	SN: 103244 SN: 103245 SN: BH9394 (20k)	26-Mar-24 (No. 217-04036) 26-Mar-24 (No. 217-04037) 26-Mar-24 (No. 217-04046)	Mar-25 Mar-25 Mar-25
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4	SN: 103244 SN: 103245 SN: BH9394 (20k) SN: 310982 / 06327	26-Mar-24 (No. 217-04036) 26-Mar-24 (No. 217-04037) 26-Mar-24 (No. 217-04046) 26-Mar-24 (No. 217-04047)	Mar-25 Mar-25 Mar-25 Mar-25
Power meter NRP2 Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards	SN: 103244 SN: 103245 SN: BH9394 (20k) SN: 310982 / 06327 SN: 7349	26-Mar-24 (No. 217-04036) 26-Mar-24 (No. 217-04037) 26-Mar-24 (No. 217-04046) 26-Mar-24 (No. 217-04047) 03-Nov-23 (No. EX3-7349 Nov23)	Mar-25 Mar-25 Mar-25 Mar-25 Nov-24
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4	SN: 103244 SN: 103245 SN: BH3394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601	26-Mar-24 (No. 217-04036) 26-Mar-24 (No. 217-04037) 26-Mar-24 (No. 217-04046) 26-Mar-24 (No. 217-04047) 03-Nov-23 (No. EX3-7349, Nov23) 30-Jan-24 (No. DAE4-601_Jan24)	Mar-25 Mar-25 Mar-25 Mar-25 Nov-24 Jan-25
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards	SN: 103244 SN: 103245 SN: BH3394 (20K) SN: 310982 / 06327 SN: 7349 SN: 601	26-Mar-24 (No. 217-04036) 26-Mar-24 (No. 217-04037) 26-Mar-24 (No. 217-04046) 26-Mar-24 (No. 217-04047) 03-Nov-23 (No. EX3-7349 Nov23) 30-Jan-24 (No. DAE4-601 Jan24) Check Date (in house)	Mar-25 Mar-25 Mar-25 Mar-25 Nov-24 Jan-25 Scheduled Check
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N initimatich combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B	SN: 103244 SN: 103245 SN: BH8394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601	26-Mar-24 (No. 217-04036) 26-Mar-24 (No. 217-04037) 26-Mar-24 (No. 217-04046) 26-Mar-24 (No. 217-04047) 03-Nov-23 (No. EX3-7349 Nov/23) 30-Jan-24 (No. DAE4-601 Jan24) Check Date (in house) 30-Oct-14 (in house check Oct-22)	Mar-25 Mar-25 Mar-25 Mar-25 Nov-24 Jan-25 Scheduled Check In house check: Oct-24
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 d8 Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E44198 Power sensor HP 8481A	SN: 103244 SN: 103245 SN: BH8394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783	26-Mar-24 (No. 217-04036) 26-Mar-24 (No. 217-04037) 26-Mar-24 (No. 217-04046) 20-Mar-24 (No. 217-04047) 03-Nev-23 (No. EX3-7349_Nov23) 30-Jan-24 (No. DAE4-601_Jan24) Check Date (in house) 30-Oct-14 (in house check Oct-22) 07-Oct-15 (in house check Oct-22)	Mar-25 Mar-25 Mar-25 Mar-25 Nov-24 Jan-25 Scheduled Check In house check: Oct-24 In house check: Oct-24
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A RF generator R&S SMT-06	SN: 103244 SN: 103245 SN: BH9394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601 ID# SN: GB99512475 SN: US37292783 SN: MY41093316	26-Mar-24 (No. 217-04036) 26-Mar-24 (No. 217-04037) 26-Mar-24 (No. 217-04046) 26-Mar-24 (No. 217-04047) 03-Nev-23 (No. EX3-7349_Nov23) 30-Jan-24 (No. DAE4-601_Jan24) Check Date (in house) 30-Oct-14 (in house check Oct-22) 07-Oct-15 (in house check Oct-22) 07-Oct-15 (in house check Oct-22)	Mar-25 Mar-25 Mar-25 Mar-25 Nov-24 Jan-25 Scheduled Check In house check: Oct-24 In house check: Oct-24 In house check: Oct-24
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A	SN: 103244 SN: 103245 SN: BH3394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: WY41093315 SN: 100972	26-Mar-24 (No. 217-04036) 26-Mar-24 (No. 217-04037) 26-Mar-24 (No. 217-04046) 26-Mar-24 (No. 217-04047) 03-Nov-23 (No. EX3-7349, Nov23) 30-Jan-24 (No. DAE4-601_Jan24) Check Date (in house) 30-Oct-14 (in house check Oct-22) 07-Oct-15 (in house check Oct-22) 15-Jun-15 (in house check Oct-22)	Mar-25 Mar-25 Mar-25 Nov-24 Jan-25 Scheduled Check In house check: Oct-24
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A Power sensor HP 8481A RF generator R&S SMT-06	SN: 103244 SN: 103245 SN: BH3394 (20K) SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: WY41083315 SN: 100972 SN: US41080477	26-Mar-24 (No. 217-04036) 26-Mar-24 (No. 217-04037) 26-Mar-24 (No. 217-04046) 26-Mar-24 (No. 217-04046) 30-Nov-23 (No. EX3-7349 Nov23) 30-Jan-24 (No. DAE4-601 Jan/24) Check Date (in house) 30-Oct-14 (in house check Oct-22) 07-Oct-15 (in house check Oct-22) 17-Oct-15 (in house check Oct-22) 31-Mar-14 (in house check Oct-22)	Mar-25 Mar-25 Mar-25 Mar-25 Nov-24 Jan-25 Scheduled Check In house check: Oct-24 Signature
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N initimatich combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A RF generator R&S SMT-06 Network Analyzer Agilent E8358A	SN: 103244 SN: 103245 SN: BH3394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39612475 SN: US37292783 SN: WY4109315 SN: 100972 SN: US41080477 Name	26-Mar-24 (No. 217-04036) 26-Mar-24 (No. 217-04037) 26-Mar-24 (No. 217-04046) 26-Mar-24 (No. 217-04046) 26-Mar-24 (No. 217-04047) 03-Nov-23 (No. EX3-7349 Nov23) 30-Jan-24 (No. DAE4-601 Jan24) Check Date (in house) 30-Oct-14 (in house check Oct-22) 07-Oct-15 (in house check Oct-22) 15-Jun-15 (in house check Oct-22) 15-Jun-15 (in house check Oct-22) 31-Mar-14 (in house check Oct-22)	Mar-25 Mar-25 Mar-25 Mar-25 Nov-24 Jan-25 Scheduled Check In house check: Oct-24
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N initimatich combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A RF generator R&S SMT-06 Network Analyzer Agilent E8358A	SN: 103244 SN: 103245 SN: BH3394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39612475 SN: US37292783 SN: WY4109315 SN: 100972 SN: US41080477 Name	26-Mar-24 (No. 217-04036) 26-Mar-24 (No. 217-04037) 26-Mar-24 (No. 217-04046) 26-Mar-24 (No. 217-04046) 26-Mar-24 (No. 217-04047) 03-Nov-23 (No. EX3-7349 Nov23) 30-Jan-24 (No. DAE4-601 Jan24) Check Date (in house) 30-Oct-14 (in house check Oct-22) 07-Oct-15 (in house check Oct-22) 15-Jun-15 (in house check Oct-22) 15-Jun-15 (in house check Oct-22) 31-Mar-14 (in house check Oct-22)	Mar-25 Mar-25 Mar-25 Mar-25 Nov-24 Jan-25 Scheduled Check In house check: Oct-24 Signature

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Calibration Laboratory of Schmid & Partner

Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland





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

Accreditation No.: SCS 0108

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:

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:

- a) 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.
- b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

c) DASY 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 source is mounted in a touch configuration below the center marking of the flat phantom.
- Return Loss: This parameter is measured with the source positioned under the liquid filled phantom (as described in the measurement condition clause). The Return Loss ensures low reflected power. 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%.

Certificate No; D1800V2-2d007_Apr24

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Measurement Conditions

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

DASY Version	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1800 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1,40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.8 ± 6 %	1.39 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	-	777

SAR result with Head TSL

SAR averaged over 1 cm3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.67 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	39.0 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.08 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	20.4 W/kg ± 16.5 % (k=2)



Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	45.9 Ω - 7.0 jΩ
Return Loss	- 21.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.203 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

Certificate No: D1800V2-2d007_Apr24

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DASY5 Validation Report for Head TSL

Date: 15.04.2024

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN:2d007

Communication System: UID 0 - CW; Frequency; 1800 MHz

Medium parameters used: f = 1800 MHz; $\sigma = 1.39$ S/m; $\epsilon_c = 40.8$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 SN7349; ConvF(8.63, 8.63, 8.63) @ 1800 MHz; Calibrated: 03.11.2023
- · Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.01.2024
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

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 = 109.6 V/m; Power Drift = 0.05 dB

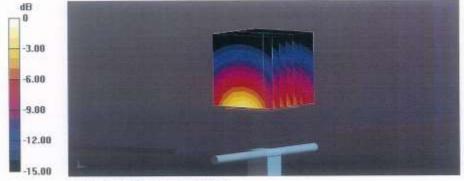
Peak SAR (extrapolated) = 17.9 W/kg

SAR(1 g) = 9.67 W/kg; SAR(10 g) = 5.08 W/kg

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

Partie of SAR at M2 to SAR at M1 = 54.5%

Ratio of SAR at M2 to SAR at M1 = 54.5% Maximum value of SAR (measured) = 15.0 W/kg



0 dB = 15.0 W/kg = 11.76 dBW/kg

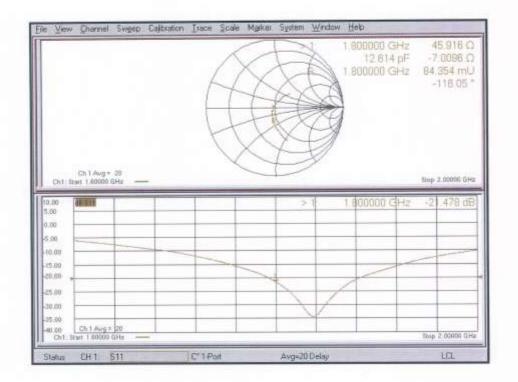
Certificate No: D1800V2-2d007_Apr24

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Impedance Measurement Plot for Head TSL



Certificate No: D1800V2-2d007_Apr24

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



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

Accreditation No.: SCS 0108

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

Client HCT

Certificate No. D1900V2-5d032_Jan24

Object	D1900V2 - SN:50	1032		
Calibration procedure(s)	QA CAL-05.v12 Calibration Proce	dure for SAR Validation	H W A	ween 0.7-3 GHz
Calibration date:	January 18, 2024	5	1 2 3 1 2 3 1 2 4 8 2 4 5 2 0 1	(9 htz
This calibration certificate document				
The measurements and the uncert	шинов мин солиценсе р	organist are final on the lonows.	A heñas aun uta	part of the pertinuate.
All calibrations have been conducti	ed in the closed laborator	y facility: environment temperature	e (22 ± 3)°C and	humidity < 70%.
Calibration Equipment used (M&T)	E critical for calibration)			
	MATERIA MATERIA	Cal Date (Cadilloste No.)		School feel Calibration
rimary Standards	ID #	Cal Date (Certificate No.)	05)	Scheduled Calibration
rimary Standards ower meter NRP2	MATERIA MATERIA	30-Mar-23 (No. 217-03804/038	05)	Mar-24
Primary Standards Power meter NRP2 Power sensor NRP-Z01	ID # SN: 104778	30-Mar-23 (No. 217-03804/038 30-Mar-23 (No. 217-03804)	06)	
Primary Standards Power meter NRP2 Power sensor NRP-Z91 Power sensor NRP-Z91	ID # SN: 104778 SN: 103244 SN: 103245	30-Mar-23 (No. 217-03804/038 30-Mar-23 (No. 217-03804) 30-Mar-23 (No. 217-03805)	05)	Mar-24 Mar-24 Mar-24
Primary Standards Power meter NRP2 Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator	ID # SN: 104778 SN: 103244 SN: 103245 SN: BH9394 (20k)	30-Mar-23 (No. 217-03804/038 30-Mar-23 (No. 217-03804) 30-Mar-23 (No. 217-03805) 30-Mar-23 (No. 217-03809)	05)	Mar-24 Mar-24 Mar-24 Mar-24
Primary Standards Power meter NRP2 Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismistich combination	ID # SN: 104778 SN: 103244 SN: 103245 SN: 814334 (20k) SN: 310982 / 06327	30-Mar-23 (No. 217-03804/038 30-Mar-23 (No. 217-03804) 30-Mar-23 (No. 217-03805) 30-Mar-23 (No. 217-03809) 30-Mar-23 (No. 217-03810)		Mar-24 Mar-24 Mar-24 Mar-24 Mar-24
Primary Standards Power meter NRP2 Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismasch combination Reference Probe EX3DV4	ID # SN: 104778 SN: 103244 SN: 103245 SN: BH9394 (20k)	30-Mar-23 (No. 217-03804/038 30-Mar-23 (No. 217-03804) 30-Mar-23 (No. 217-03805) 30-Mar-23 (No. 217-03809)	23)	Mar-24 Mar-24 Mar-24 Mar-24
Primary Standards Power meter NRP2 Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX30V4 DAE4	ID # SN: 104778 SN: 103244 SN: 103245 SN: BH3394 (20k) SN: 310982 / 06327 SN: 7349	30-Mar-23 (No. 217-03804/038 30-Mar-25 (No. 217-03804) 30-Mar-23 (No. 217-03805) 30-Mar-23 (No. 217-03809) 30-Mar-23 (No. 217-03810) 03-Nov-23 (No. EX3-7349, Nov	23)	Mar-24 Mar-24 Mar-24 Mar-24 Mar-24 Nov-24
Primary Standards Power meter NRP2 Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismistch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B	ID # SN: 104778 SN: 103244 SN: 103245 SN: BH8394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601	30-Mar-23 (No. 217-03804/038 30-Mar-23 (No. 217-03804) 30-Mar-23 (No. 217-03805) 30-Mar-23 (No. 217-03805) 30-Mar-23 (No. 217-03810) 03-Nov-23 (No. EX3-7349, Nov 03-Oct-23 (No. DAE4-601_Oct	23) 23)	Mar-24 Mar-24 Mar-24 Mar-24 Mar-24 Nov-24 Oct-24 Scheduled Check
Primary Standards Power meter NRP2 Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismisch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A	ID # SN: 104778 SN: 103244 SN: 103245 SN: BH3394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601	30-Mair-23 (No. 217-03804/038 30-Mair-23 (No. 217-03804) 30-Mair-23 (No. 217-03805) 30-Mair-23 (No. 217-03809) 30-Mair-23 (No. 217-03810) 03-Nov-23 (No. EX3-7349_Nov 03-Oct-23 (No. DAE4-801_Oct Check Date (In house)	23) 23) 22)	Mar-24 Mar-24 Mar-24 Mar-24 Mar-24 Nov-24 Cot-24 Scheduled Check In house check: Oct-24
Primary Standards Power meter NRP2 Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismisch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E44198 Power sensor HP 8481A	ID # SN: 104778 SN: 103244 SN: 103245 SN: 813346 SN: 813982 / 08327 SN: 7349 SN: 601 ID # SN: GB38612475	30-Mar-23 (No. 217-03804/038 30-Mar-23 (No. 217-03804) 30-Mar-23 (No. 217-03805) 30-Mar-23 (No. 217-03809) 30-Mar-23 (No. 217-03810) 03-Nov-23 (No. EX3-7349 Nov 03-Oct-23 (No. DAE4-601_Oct Check Date (in house)	23) 23) 22) 22)	Mar-24 Mar-24 Mar-24 Mar-24 Mar-24 Nov-24 Oct-24 Scheduled Check In house check: Oct-2 In house check: Oct-2
Primary Standards Power meter NRP2 Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismasch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A RF generator HP 8481A	ID # SN: 104778 SN: 103244 SN: 103245 SN: BH8394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: MY41083315 SN: 100972	30-Mar-23 (No. 217-03804/038 30-Mar-23 (No. 217-03804) 30-Mar-23 (No. 217-03805) 30-Mar-23 (No. 217-03809) 30-Mar-23 (No. 217-03810) 03-Nov-23 (No. EX3-7349 Nov 03-Oct-23 (No. DAE4-801_Oct Check Date (in house check Oct- 07-Oct-15 (in house check Oct-	23) 23) 22) 22) 22)	Mar-24 Mar-24 Mar-24 Mar-24 Nov-24 Oct-24 Scheduled Check In house check: Oct-2- In house check: Oct-2- In house check: Oct-2- In house check: Oct-2-
Primary Standards Power meter NRP2 Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismasch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A RF generator H& SMT-08	ID # SN: 104778 SN: 103244 SN: 103245 SN: BH3394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: MY41093315	30-Mar-23 (No. 217-03804/038 30-Mar-23 (No. 217-03804) 30-Mar-23 (No. 217-03805) 30-Mar-23 (No. 217-03809) 30-Mar-23 (No. 217-03810) 03-Nov-23 (No. EX3-7349, Nov 03-Oct-23 (No. DAE4-601_Oct Check Date (in house) 30-Oct-14 (in house check Oct- 07-Oct-15 (in house check Oct- 07-Oct-15 (in house check Oct-	23) 23) 22) 22) 22)	Mar-24 Mar-24 Mar-24 Mar-24 Mar-24 Cot-24 Scheduled Check In house check: Oct-2- In house check: Oct-2-
Calibration Equipment used (M&TE Primary Standards Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismisch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power sensor HP 8461A Power sensor HP 8461A RF generator R&S SMT-08 Network Analyzer Agilent E8358A	ID # SN: 104778 SN: 103244 SN: 103245 SN: BH8394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: MY41083315 SN: 100972	30-Mar-23 (No. 217-03804/038 30-Mar-23 (No. 217-03804) 30-Mar-23 (No. 217-03805) 30-Mar-23 (No. 217-03805) 30-Mar-23 (No. 217-03810) 03-Nov-23 (No. EX3-7349, Nov 03-Oct-23 (No. DAE4-601_Oct Check Date (in house) 30-Oct-14 (in house check Oct- 07-Oct-15 (in house check Oct-	23) 23) 22) 22) 22)	Mar-24 Mar-24 Mar-24 Mar-24 Mar-24 Nov-24 Oct-24
Primary Standards Power meter NRP2 Power sensor NRP-Z31 Power sensor NRP-Z31 Reference 20 dB Attenuator Type-N mismasch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8461A Power sensor HP 8461A RF generator R&S SMT-08	ID # SN: 104778 SN: 104778 SN: 103244 SN: 103245 SN: BH3394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB38512475 SN: US37292783 SN: MY41083315 SN: 100972 SN: US41080477	30-Mar-23 (No. 217-03804/038 30-Mar-23 (No. 217-03804) 30-Mar-23 (No. 217-03805) 30-Mar-23 (No. 217-03809) 30-Mar-23 (No. 217-03810) 03-Nov-23 (No. EX3-7349 Nov 03-Oct-23 (No. DAE4-601_Oct Check Date (in house) 30-Oct-15 (in house check Oct- 07-Oct-15 (in house check Oct- 15-Jun-15 (in house check Oct- 15-Jun-15 (in house check Oct- 15-Jun-15 (in house check Oct- 31-Mar-14 (in house check Oct- 31-Mar-14 (in house check Oct-	23) 23) 22) 22) 22) 22) 22) 22)	Mar-24 Mar-24 Mar-24 Mar-24 Mar-24 Cot-24 Scheduled Check In house check: Oct-2-
Primary Standards Power meter NRP2 Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismisch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A Power sensor HP 8481A RF generator R&S SMT-08 Network Analyzer Agilent E8358A	ID # SN: 104778 SN: 103244 SN: 103245 SN: BH3994 (20k) SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB38512475 SN: US37292783 SN: MY41093315 SN: 100972 SN: US41080477 Name	30-Mair-23 (No. 217-03804/038 30-Mair-23 (No. 217-03804) 30-Mair-23 (No. 217-03805) 30-Mair-23 (No. 217-03805) 30-Mair-23 (No. 217-03810) 03-Nov-23 (No. Ex3-7349 Nov 03-Oct-23 (No. DAE4-601_Oct Check Date (in house) 30-Oct-14 (in house check Oct- 07-Oct-15 (in house check Oct- 07-Oct-15 (in house check Oct- 15-Jun-15 (in house check Oct- 15-Jun-15 (in house check Oct- 131-Mair-14 (in house check Oct- Thouse check Oct-	23) 23) 22) 22) 22) 22) 22)	Mar-24 Mar-24 Mar-24 Mar-24 Mar-24 Cot-24 Scheduled Check In house check: Oct-2-

Certificate No: D1900V2-5d032_Jan24

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Calibration Laboratory of

Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland





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Service suisse d'étalonnage
Servizio svizzero di taratura
Swies Calibration Service

Accreditation No.: SCS 0108

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:

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:

- a) 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.
- b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

c) DASY 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 source is mounted in a touch configuration below the center marking of the flat phantom.
- Return Loss: This parameter is measured with the source positioned under the liquid filled phantom (as described in the measurement condition clause). The Return Loss ensures low reflected power. 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%.

Certificate No: D1900V2-5d032_Jan24

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Measurement Conditions

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

DASY Version	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.3 ± 6 %	1.40 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	and the same	

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.97 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	40.2 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5,22 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	21.0 W/kg ± 16.5 % (k=2)



Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.2 Ω + 6.8 μΩ
Return Loss	- 23.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.182 ns

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

The dipote 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

production and the second seco	
Manufactured by	SPEAG

Certificate No: D1900V2-5d032_Jan24

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DASY5 Validation Report for Head TSL

Date: 18.01.2024

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d032

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

Medium parameters used: f = 1900 MHz; $\sigma = 1.4 \text{ S/m}$; $\varepsilon_c = 41.3$; $\rho = 1000 \text{ kg/m}^3$

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: 03.11.2023
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 03.10.2023
- Phantom: Flat Phantom 5.0 (front); Type; QD000P50AA; Serial: 1001
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

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

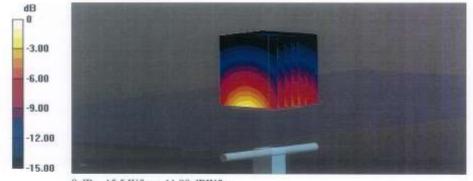
Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 109.9 V/m; Power Drift = 0.03 dB Peak SAR (extrapolated) = 18.3 W/kg

SAR(1 g) = 9.97 W/kg; SAR(10 g) = 5.22 W/kg

Smallest distance from peaks to all points 3 dB below = 9.8 mm

Ratio of SAR at M2 to SAR at M1 = 54.9%

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



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

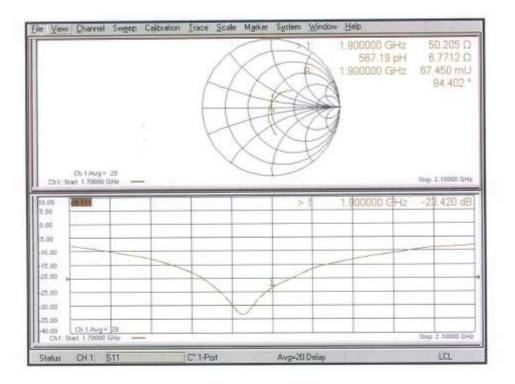
Certificate No: D1900V2-5d032_Jan24

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Impedance Measurement Plot for Head TSL



Certificate No: D1900V2-5d032_Jan24

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Calibration Laboratory of Schmid & Partner

Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland



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

Accreditation No.: SCS 0108

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

Client HCT Gyeonggi-do, Republic of Korea

Certificate No. D2450V2-743_Mar24

	ERTIFICAT	E 결 보보	지의에지
Object	D2450V2 - SN:7	43 A 2 1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Calibration procedure(s)	QA CAL-05.v12	11 11 25.45.41	24248994
		edure for SAR Validation Source	s between 0.7-3 GHz
Calibration date:	March 14, 2024		
The measurements and the uncert	aintes with confidence p	onal standards, which realize the physical un robability are given on the following pages a ry facility: environment temperature (22 ± 3)	and are part of the certificate.
Calibration Equipment used (M&T)		y tourney, er witchinness temperature (22 ± 3)	to and numbery < 70%.
Primary Standards	ID#	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP2	SN: 104778	30-Mar-23 (No. 217-03804/03805)	Mar-24
ower sensor NRP-Z91	SN: 103244	30-Mar-23 (No. 217-03804)	Mar-24
ower sensor NRP-291	SN: 103245	30-Mar-23 (No. 217-03806)	Mnr-24
OMBI DELIBRI (ALL: 473)	SN: 8H9394 (20k)	30-Mar-23 (No. 217-03809)	Mar-24
	THE RESIDENCE PROPERTY.	30"MB("23 (190, 217"U3800)	WHT+209
Reference 20 dB Attenuator	SN: 310982 / 06327	30-Mar-23 (No. 217-03810)	Mar-24
Reference 20 dB Attenuator Type-N mismatch combination		30-Mar-23 (No. 217-03810)	
Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4	SN: 310982 / 06327		Mar-24
Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards	SN: 310982 / 06327 SN: 7349	30-Mar-23 (No. 217-03810) 03-Nov-23 (No. EX3-7349_Nov23)	Mar-24 Nov-24
Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards	SN: 310982 / 06327 SN: 7349 SN: 601	30-Mar-23 (No. 217-03810) 03-Nov-23 (No. EX3-7348_Nov23) 30-Jan-24 (No. DAE4-601_Jan/24)	Mar-24 Nov-24 Jan-25 Scheduled Check
Reference 2D dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B	SN: 310982 / 06327 SN: 7349 SN: 601	30-Mar-23 (No. 217-03810) 03-Nov-23 (No. EX3-7348_Nov23) 30-Jen-24 (No. DAE4-601_Jan24) Check Date (in house)	Mar-24 Nov-24 Jan-25 Scheduled Check In house check: Oct-24
Reference 2D dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4418B Power sensor HP 8481A	SN: 310962 / 06327 SN: 7349 SN: 601 ID: # SN: GB39512475	30-Mar-23 (No. 217-03810) 03-Nov-23 (No. EX3-7348_Nov23) 30-Jen-24 (No. DAE4-601_Jan/24) Check Date (in house) 30-Oct-14 (in house check Oct-22)	Mar-24 Nov-24 Jan-25 Scheduled Check In house check: Oct-24 In house check: Oct-24
reference 20 dB Attenuator ype-N mismatch combination reference Probe EX3DV4 AE4 econdary Standards ower meter E4418B ower sensor HP B481A ower sensor HP B481A	SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783	30-Mar-23 (No. 217-03810) 03-Nov-23 (No. EX3-7349_Nov23) 30-Jen-24 (No. DAE4-601_Jan/24) Check Date (in house) 30-Oct-14 (in house check Oct-22) 07-Oct-15 (in house check Oct-22)	Mar-24 Nov-24 Jan-25 Scheduled Check In house check: Oct-24 In house check: Oct-24 In house check: Oct-24
Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Recondary Standards Fower meter E4419B Fower sensor HP 8481A RF generator R&S SMT-06	SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: MY410B3315	30-Mar-23 (No. 217-03810) 03-Nov-23 (No. EX3-7349_Nov23) 30-Jen-24 (No. DAE4-601_Jan/24) Check Date (in house) 30-Oct-14 (in house check Oct-22) 07-Oct-15 (in house check Oct-22) 07-Oct-15 (in house check Oct-22)	Mari24 Nov-24 Jan-25 Scheduled Check In house check: Oct-24 In house check: Oct-24 In house check: Oct-24 In house check: Oct-24
Reference 20 dB Attenuator ype-N mismatch combination Reference Probe EX3DV4 IAE4 Recondary Standards Fower meter E4418B Fower sensor HP 8481A RF generator R&S SMT-06	SN: 310982 / 06327 SN: 7349 SN: 601 ID.# SN: GB39512475 SN: US37282783 SN: MY41093315 SN: 100972	30-Mar-23 (No. 217-03810) 03-Nev-23 (No. EX3-7348_Nov23) 30-Jen-24 (No. DAE4-601_Jan24) Check Date (in house) 30-Oct-14 (in house check Oct-22) 07-Oct-15 (in house check Oct-22) 07-Oct-15 (in house check Oct-22) 15-Jun-15 (in house check Oct-22)	Mar-24 Nov-24 Jan-25
Reference 2D dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A Power sensor HP 8481A RF generator R&S SMT-06 Network Analyzer Agizent E83S8A	SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: MY41080315 SN: 100872 SN: US41080477	30-Mar-23 (No. 217-03810) 03-Nov-23 (No. EX3-7348_Nov23) 30-Jan-24 (No. DAE4-601_Jan/24) Check Date (in house) 30-Oct-14 (in house check Oct-22) 07-Oct-15 (in house check Oct-22) 07-Oct-15 (in house check Oct-22) 15-Jun-15 (in house check Oct-22) 31-Mar-14 (in house check Oct-22)	Mar-24 Nov-24 Jan-25 Scheduled Check In house check: Oct-24
Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E44186 Power sensor HP 8481A Power sensor HP 8481A RF generator R&S SMT-06 Network Analyzer Agitent E83S8A Calibrated by:	SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: MY41093315 SN: 100972 SN: US41080477 Name	30-Mar-23 (No. 217-03810) 03-Nov-23 (No. EX3-7349_Nov23) 30-Jan-24 (No. DAE4-601_Jan/24) Check Date (in house) 30-Oct-14 (in house check Oct-22) 07-Oct-15 (in house check Oct-22) 15-Jun-15 (in house check Oct-22) 31-Mar-14 (in house check Oct-22)	Mar-24 Nov-24 Jan-25 Scheduled Check In house check: Oct-24
Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A Power sensor HP 8481A RF generator R&S SMT-06 Network Analyzer Agilent E83S8A	SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: MY41093315 SN: 100972 SN: US41080477 Name	30-Mar-23 (No. 217-03810) 03-Nov-23 (No. EX3-7349_Nov23) 30-Jan-24 (No. DAE4-601_Jan/24) Check Date (in house) 30-Oct-14 (in house check Oct-22) 07-Oct-15 (in house check Oct-22) 15-Jun-15 (in house check Oct-22) 31-Mar-14 (in house check Oct-22)	Mari 24 Nov-24 Jan-25 Scheduled Check In house check: Oct-24

Certificate No: D2450V2-743_Mar24

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Calibration Laboratory of

Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland





S Schweizerischer Kalibrierdienst
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Swiss Calibration Service

Accreditation No.: SCS 0108

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:

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:

- a) 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.
- b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

c) DASY 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 source is mounted in a touch configuration below the center marking of the flat phantom.
- Return Loss: This parameter is measured with the source positioned under the liquid filled phantom (as described in the measurement condition clause). The Return Loss ensures low reflected power. 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%.

Certificate No: D2450V2-743_Mar24

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Measurement Conditions

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

DASY Version	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.5 ± 6 %	1.83 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		

SAR result with Head TSL

SAR averaged over 1 cm3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.1 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	51.8 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.09 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	24.2 W/kg ± 16.5 % (k=2)



Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.5 Ω + 6.1 JΩ	
Return Loss	- 22.8 dB	

General Antenna Parameters and Design

Electrical Delay (one direction)	1.159 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 couxial 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

Certificate No: D2450V2-743_Mar24

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DASY5 Validation Report for Head TSL

Date: 14.03.2024

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:743

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

Medium parameters used: f = 2450 MHz; $\sigma = 1.83$ S/m; $\epsilon_r = 38.5$; $\rho = 1000$ kg/m³

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: 03.11.2023
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.01.2024
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

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 = 115.1 V/m; Power Drift = 0.07 dB

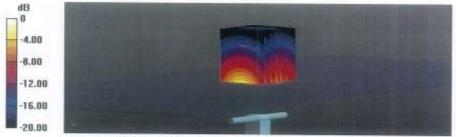
Peak SAR (extrapolated) = 26.4 W/kg

SAR(1 g) = 13.1 W/kg; SAR(10 g) = 6.09 W/kg

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

Ratio of SAR at M2 to SAR at M1 = 50.1%

Maximum value of SAR (measured) = 21.4 W/kg



0 dB = 21.4 W/kg = 13.30 dBW/kg

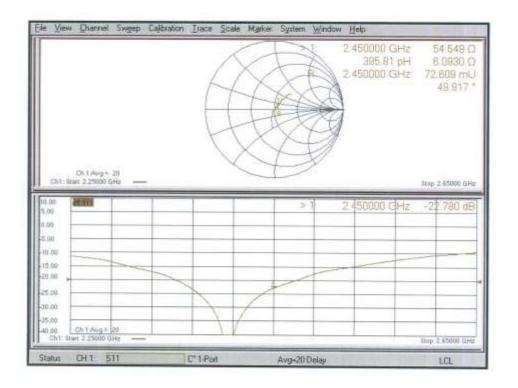
Certificate No: D2450V2-743_Mar24

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Impedance Measurement Plot for Head TSL



Certificate No: D2450V2-743_Mar24

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Appendix: Transfer Calibration at Four Validation Locations on SAM Head¹

Evaluation Condition

Phantom	SAM Head Phantom	For usage with cSAR3DV2-R/L
The state of the s	The state of the s	

SAR result with SAM Head (Top ≅ C0)

SAR averaged over 1 cm3 (1 g) of Head TSL	Condition	
SAR for nominal Head TSL parameters	normalized to 1W	55.2 W/kg ± 17.5 % (k=2)
	condition	
SAR averaged over 10 cm ³ (10 g) of Head TSL	CONDITION	

SAR result with SAM Head (Mouth F90)

SAR averaged over 1 cm3 (1 g) of Head TSL	Condition	
SAR for nominal Head TSL parameters	normalized to 1W	56.3 W/kg ± 17.5 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	

SAR result with SAM Head (Neck ≅ H0)

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR for nominal Head TSL parameters	normalized to 1W	53.0 W/kg ± 17.5 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	

SAR result with SAM Head (Ear ≅ D90)

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR for nominal Head TSL parameters	normalized to 1W	34.0 W/kg ± 17.5 % (k=2)
SAR averaged over 10 cm3 (10 g) of Head TSL	condition	

Certificate No: D2450V2-743_Mar24

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Additional assessments outside the current scope of SCS 0108



Calibration Laboratory of Schmid & Partner

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Swiss Calibration Service

Accreditation No.: SCS 0108

Accredited by the Swiss Accreditation Service (SAS)

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

Client HCT

Gyeonggi-do, Republic of Korea

Certificate No. D2600V2-1015_Apr24

CALIBRATION CERTIFICATE Object D2600V2 - SN:1015 4 20405,07 Calibration procedure(s) QA CAL-05.v12 2029 145 62 Calibration Procedure for SAR Validation Sources between 0.7-3 GHz Calibration date: April 22, 2024 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 NRP2 SN: 104778 26-Mar-24 (No. 217-04036/04037) Mar-25 Power sensor NRP-Z91 RN: 103244 26-Mar-24 (No. 217-04038) Mar-25 Power sensor NRP-Z91 SN: 103245 26-Mar-24 (No. 217-04037) Mar-25 Reference 20 dB Attenuator SN: BH9394 (20k) 26-Mar-24 (No. 217-04046) Mar-25 Type-N mismatch combination SN: 310982 / 06327 26-Mar-24 (No. 217-04047) Mar-25 Reference Probe EX30V4 SN: 7349 03-Nov-23 (No. EX3-7349_Nov23) Nov-24 DAE4 SN: 601 30-Jan-24 (No. DAE4-801_Jan24) Jan-25 Secondary Standards ID # Check Date (in house) Scheduled Check Power meter E44198 SN: GB39512475 30-Oct-14 (in house check Oct-22) In house check: Oct-24 Power sensor HP 8481A SN: US37292783 07-Oct-15 (in house check Oct-22) In house check: Oct-24 Power sensor HP 8481A SN: MY41093315 07-Oct-15 (in house check Oct-22) In house check: Oct-24 RF generator R&S SMT-06 SN: 100972 15-Jun-15 (in house check Oct-22) In house check: Oct-24 Network Analyzor Agillent EB358A SN: US41080477 31-Mar-14 (in house check Oct-22) In house check: Oct-24 Function Calibrated by: Joanna Lleshai Laboratory Technician Aplusy Approved by: Sven Kühn Technical Manager Issued April 23, 2024 This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Certificate No: D2600V2-1015_Apr24

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





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C Service suisse d'étalonnage
Servizio svizzero di taratura
S swiss Calibration Service

Accreditation No.: SCS 0108

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:

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:

- a) 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.
- b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

c) DASY 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 source is mounted in a touch configuration below the center marking of the flat phantom.
- Return Loss: This parameter is measured with the source positioned under the liquid filled phantom (as described in the measurement condition clause). The Return Loss ensures low reflected power. 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%.

Certificate No: D2600V2-1015_Apr24

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Measurement Conditions

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

DASY Version	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2600 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.0	1.96 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	37.4 ± 6 %	2.04 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		treat.

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	14.5 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	56.4 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.41 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	25.2 W/kg ± 16.5 % (k=2)

Certificate No: D2600V2-1015_Apr24

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Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	48.4 Ω - 5.1 μΩ	
Return Loss	- 25.2 dB	

General Antenna Parameters and Design

Electrical Delay (one direction)	1,150 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

- 1		
	Manufactured by	SPEAG

Certificate No: D2600V2-1015_Apr24

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DASY5 Validation Report for Head TSL

Date: 22.04.2024

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN:1015

Communication System: UID 0 - CW; Frequency: 2600 MHz

Medium parameters used: f = 2600 MHz; $\sigma = 2.04 \text{ S/m}$; $\varepsilon_r = 37.4$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

DASY52 Configuration:

Probe: EX3DV4 - SN7349; ConvF(7.84, 7.84, 7.84) @ 2600 MHz; Calibrated: 03.11.2023

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn601; Calibrated: 30.01.2024

Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001

DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

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

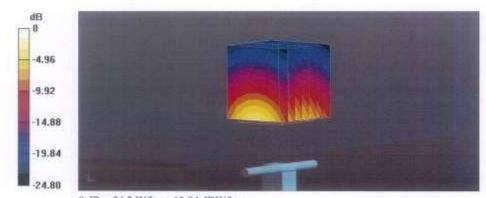
Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 119.3 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 29.4 W/kg

SAR(1 g) = 14.5 W/kg; SAR(10 g) = 6.41 W/kg

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

Ratio of SAR at M2 to SAR at M1 = 49.4% Maximum value of SAR (measured) = 24.2 W/kg



0 dB = 24.2 W/kg = 13.84 dBW/kg

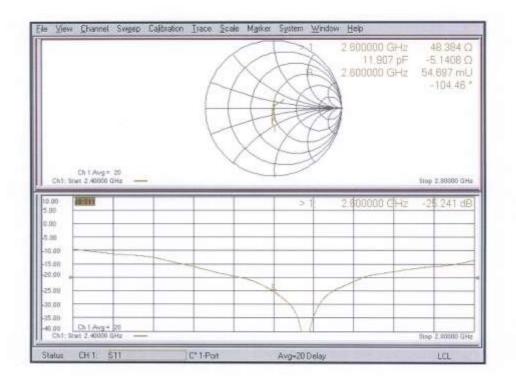
Certificate No: D2600V2-1015_Apr24

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Impedance Measurement Plot for Head TSL



Certificate No: D2600V2-1015_Apr24

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Calibration Laboratory of Schmid & Partner

Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland





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

Accreditation No.: SCS 0108

Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signatories to the EA

Multilateral Agreement for the recognition of calibration certificates

Client HCT Certificate No. D3500V2-1132_Jan24
Gveonopi-do, Republic of Korea

	ERTIFICATE		
		7121	1 2
Object	D3500V2 - SN:11	132	1
			प्रमा (५ क्ट्र
		2024.0	10.40700
Calibration procedure(s)	QA CAL-22:v7 Calibration Proce	edure for SAR Validation Sources	s between 3-10 GHz
Celibration date:	January 23, 2024	1	
		onal standards, which realize the physical un robability are given on the following pages ar	
All calibrations have been conduct	ted in the closed laborator	y facility: environment temperature (22 ± 3)*	C and humidity < 70%.
Calibration Equipment used (M&T)	E critical for calibration)		
Primary Standards	ID#	Cal Date (Certificate No.)	Scheduled Calibration
	SN: 104778	THE RESERVE OF THE PERSON ASSESSMENT	100000000
Power meter NRP2	SIR. 104110	30-Mar-23 (No. 217-03804/03805)	Mar-24
	SN: 103244	30-Mar-23 (No. 217-03804/03805) 30-Mar-23 (No. 217-03804)	Mar-24 Mar-24
Power sensor NRP-Z91			500000000000000000000000000000000000000
Power sensor NRP-Z91 Power sensor NRP-Z91	SN: 103244	30-Mar-23 (No. 217-03804)	Mar-24
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator	SN: 103244 SN: 103245	30-Mar-23 (No. 217-03804) 30-Mar-23 (No. 217-03805)	Mar-24 Mar-24
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Alternator Type-N mismatch combination	SN: 103244 SN: 103245 SN: BH9394 (20k)	30-Mar-23 (No. 217-03804) 30-Mar-23 (No. 217-03805) 30-Mar-23 (No. 217-03809) 30-Mar-23 (No. 217-03810)	Mar-24 Mar-24 Mar-24
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Alternator Type-N mismatch combination Reference Probe EX3DV4	SN: 103244 SN: 103245 SN: BH9394 (20k) SN: 310982 / 06327	30-Mar-23 (No. 217-03804) 30-Mar-23 (No. 217-03805) 30-Mar-23 (No. 217-03809)	Mar-24 Mar-24 Mar-24 Mar-24
Power meter NRP2 Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards	SN: 103244 SN: 103245 SN: BH9394 (20k) SN: 310982 / 06327 SN: 3503	30-Mer-23 (No. 217-03804) 30-Mer-23 (No. 217-03805) 30-Mer-23 (No. 217-03809) 30-Mer-23 (No. 217-03810) 07-Mer-23 (No. EX3-3503_Mer23)	Mar-24 Mar-24 Mar-24 Mar-24
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Atternator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards	SN: 103244 SN: 103245 SN: BH9394 (20k) SN: 310982 / 06327 SN: 3503 SN: 601	30-Mar-23 (No. 217-03804) 30-Mar-23 (No. 217-03805) 30-Mar-23 (No. 217-03809) 30-Mar-23 (No. 217-03809) 07-Mar-23 (No. EX3-3503_Mar23) 03-Oct-23 (No. DAE4-601_Oct23)	Mar-24 Mar-24 Mar-24 Mar-24 Mar-24 Oct-24 Scheduled Check
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E44196	SN: 103244 SN: 103245 SN: BH9394 (20k) SN: 31082 / 06327 SN: 3503 SN: 601	30-Mar-23 (No. 217-03804) 30-Mar-23 (No. 217-03805) 30-Mar-23 (No. 217-03809) 30-Mar-23 (No. 217-03810) 07-Mar-23 (No. EX3-3503_Mar23) 03-Oct-23 (No. DAE4-601_Oct23) Check Date (in house)	Mar-24 Mar-24 Mar-24 Mar-24 Oct-24 Scheduled Check In house check: Oct-24
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E44196 Power sensor HP 8481A	SN: 103244 SN: 103245 SN: 8H9394 (20k) SN: 31082 / 06327 SN: 3503 SN: 601	30-Mar-23 (No. 217-03804) 30-Mar-23 (No. 217-03805) 30-Mar-23 (No. 217-03809) 30-Mar-23 (No. 217-03810) 07-Mar-23 (No. EX3-3503_Mar23) 03-Oct-23 (No. DAE4-601_Oct23) Check Date (in house check Oct-22)	Mar-24 Mar-24 Mar-24 Mar-24 Oct-24 Scheduled Check In house check: Oct-24 In house check: Oct-24
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E44198 Power sensor HP 8481A Power sensor HP 8481A	SN: 103244 SN: 103245 SN: 8H9394 (20k) SN: 310982 / 06327 SN: 3503 SN: 601 ID # SN: GB38512475 SN: US37292783	30-Mar-23 (No. 217-03804) 30-Mar-23 (No. 217-03805) 30-Mar-23 (No. 217-03809) 30-Mar-23 (No. 217-03810) 07-Mar-23 (No. EX3-3503_Mar23) 03-Oct-23 (No. DAE4-601_Oct23) Check Date (in house) 30-Oct-14 (in house check Oct-22) 07-Oct-15 (in house check Oct-22)	Mar-24 Mar-24 Mar-24 Mar-24 Mar-24 Oct-24 Scheduled Check In house check: Oct-24 In house check: Oct-24 In house check: Oct-24
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A RF generator R&S SMT-06	SN: 103244 SN: 103245 SN: BH9394 (20k) SN: 310982 / 06327 SN: 3503 SN: 601 ID # SN: GB38512475 SN: US37292783 SN: MY41093315 SN: 100972	30-Mar-23 (No. 217-03804) 30-Mar-23 (No. 217-03805) 30-Mar-23 (No. 217-03809) 30-Mar-23 (No. 217-03810) 07-Mar-23 (No. EX3-3503_Mar23) 03-Oct-23 (No. DAE4-601_Oct23) Check Date (in house) 30-Oct-14 (in house check Oct-22) 07-Oct-15 (in house check Oct-22) 07-Oct-15 (in house check Oct-22)	Mar-24 Mar-24 Mar-24 Mar-24 Mar-24 Oct-24 Scheduled Check In house check: Oct-24 In house check: Oct-24 In house check: Oct-24 In house check: Oct-24
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E44196 Power sensor HP 8481A RF generator R&S SMT-08	SN: 103244 SN: 103245 SN: BH9394 (20k) SN: 310982 / 06327 SN: 3503 SN: 601 ID # SN: GB38512475 SN: US37292783 SN: MY41093315 SN: 100972	30-Mar-23 (No. 217-03804) 30-Mar-23 (No. 217-03805) 30-Mar-23 (No. 217-03809) 30-Mar-23 (No. 217-03809) 30-Mar-23 (No. EX3-3503_Mar23) 03-Oct-23 (No. DAE4-601_Oct23) Check Date (in house) 30-Oct-14 (in house check Oct-22) 07-Oct-15 (in house check Oct-22) 15-Jun-15 (in house check Oct-22)	Mar-24 Mar-24 Mar-24 Mar-24 Mar-24 Oct-24 Scheduled Check In house check: Oct-24 In house check: Oct-24 In house check: Oct-24 In house check: Oct-24
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Atternator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E44196 Power sensor HP 8481A Power sensor HP 8481A RF generator R&S SMT-06 Network Analyzer Agilent E8358A	SN: 103244 SN: 103245 SN: 8H9394 (20k) SN: 31082 / 06327 SN: 3503 SN: 601 ID# SN: GB38512475 SN: US37292783 SN: MY41093315 SN: 100972 SN: US41080477	30-Mar-23 (No. 217-03804) 30-Mar-23 (No. 217-03805) 30-Mar-23 (No. 217-03809) 30-Mar-23 (No. 217-03809) 30-Mar-23 (No. EX3-3503_Mar23) 03-Oct-23 (No. DAE4-601_Oct23) Check Date (in house) 30-Oct-14 (in house check Oct-22) 07-Oct-15 (in house check Oct-22) 15-Jun-15 (in house check Oct-22) 31-Mar-14 (in house check Oct-22)	Mar-24 Mar-24 Mar-24 Mar-24 Mar-24 Oct-24 Scheduled Check In house check: Oct-24
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Alternator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E44196 Power sensor HP 8481A Power sensor HP 8481A RF generator R&S SMT-06 Network Analyzer Agilent E8358A	SN: 103244 SN: 103245 SN: BH9394 (20k) SN: 31082 / 06327 SN: 3503 SN: 601 ID # SN: GB38512475 SN: US37292783 SN: MY41093315 SN: 100972 SN: US41080477	30-Mar-23 (No. 217-03804) 30-Mar-23 (No. 217-03805) 30-Mar-23 (No. 217-03809) 30-Mar-23 (No. EX3-3503_Mar23) 03-Oct-23 (No. DAE4-601_Oct23) Check Date (in house) 30-Oct-14 (in house check Oct-22) 07-Oct-15 (in house check Oct-22) 15-Jun-15 (in house check Oct-22) 31-Mar-14 (in house check Oct-22)	Mar-24 Mar-24 Mar-24 Mar-24 Mar-24 Oct-24 Scheduled Check In house check: Oct-24
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type- N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E44196	SN: 103244 SN: 103245 SN: BH9394 (20k) SN: 31082 / 06327 SN: 3503 SN: 601 ID # SN: GB38512475 SN: US37292783 SN: MY41093315 SN: 100972 SN: US41080477	30-Mar-23 (No. 217-03804) 30-Mar-23 (No. 217-03805) 30-Mar-23 (No. 217-03809) 30-Mar-23 (No. EX3-3503_Mar23) 03-Oct-23 (No. DAE4-601_Oct23) Check Date (in house) 30-Oct-14 (in house check Oct-22) 07-Oct-15 (in house check Oct-22) 15-Jun-15 (in house check Oct-22) 31-Mar-14 (in house check Oct-22)	Mar-24 Mar-24 Mar-24 Mar-24 Mar-24 Oct-24 Scheduled Check In house check: Oct-2-

Certificate No: D3500V2-1132_Jan24

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Calibration Laboratory of

Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland





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

Accreditation No.: SCS 0108

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:

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:

- a) 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.
- b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

c) DASY 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 source is mounted in a touch configuration below the center marking of the flat phantom.
- Return Loss: This parameter is measured with the source positioned under the liquid filled phantom (as described in the measurement condition clause). The Return Loss ensures low reflected power. No uncertainty required.
- SAR measured: SAR measured at the stated antenna input power.
- SAR normalized: SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.

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

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Measurement Conditions

DASV system configuration, as far as not given on nage 1

ASY system configuration, as far as no	DASY52	V52.10.4
DASY Version	DWOTOZ	V32.10.9
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	3500 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	37.9	2.91 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.1 ± 6 %	2.90 mha/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		

SAR result with Head TSL

SAR averaged over 1 cm3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	6.50 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	65.1 W/kg ± 19.9 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.46 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	24.6 W/kg ± 19.5 % (k=2)



Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.9 Ω - 3.8 μΩ	
Return Loss	- 27.6 dB	

General Antenna Parameters and Design

p	
Electrical Delay (one direction)	1.130 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

Certificate No: D3500V2-1132_Jan24

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DASY5 Validation Report for Head TSL

Date: 23.01.2024

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 3500 MHz; Type: D3500V2; Serial: D3500V2 - SN:1132

Communication System: UID 0 - CW; Frequency: 3500 MHz

Medium parameters used: f = 3500 MHz; $\sigma = 2.9$ S/m; $\epsilon_r = 38.1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 SN3503; ConvF(7.91, 7.91, 7.91) @ 3500 MHz; Calibrated: 07.03.2023
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 03.10,2023
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

Dipole Calibration for Head Tissue/Pin=100 mW, d=10mm, f=3500MHz/Zoom Scan,

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

Reference Value = 66.18 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 17.1 W/kg

SAR(1 g) = 6.50 W/kg; SAR(10 g) = 2.46 W/kg

Smallest distance from peaks to all points 3 dB below = 8.4 mm.

Ratio of SAR at M2 to SAR at M1 = 75.7%

Maximum value of SAR (measured) = 12.2 W/kg



0 dB = 12.2 W/kg = 10.86 dBW/kg

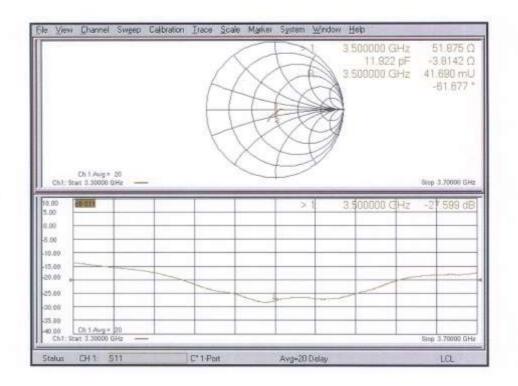
Certificate No: D3500V2-1132_Jan24

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Impedance Measurement Plot for Head TSL



Certificate No: D3500V2-1132_Jan24

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



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

Accreditation No.: SCS 0108

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

Client HCT

Certificate No. D3700V2-1105_Nov23

Object	D3700V2 - SN:1	105	
Calibration procedure(s)	QA CAL-22.v7 Calibration Proce	edure for SAR Validation Source:	s between 3-10 GHz
Calibration date:	November 20, 20	023	
The measurements and the uncert	airries with confidence p	consistandards, which resilize the physical un robability are given on the following pages ar ry facility: environment temperature $(22 \pm 3)^{\circ}$	nd are part of the certificate.
Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
	The same of the sa	Carl Comp Constitutional Land	OCHOODIGE CHIEFMIUN
	SN: 104778 SN: 109244	30-Man 23 (No. 217-03804/03805) 30-Man 23 (No. 217-03804)	Mar-24
Power sensor NRP-Z91	SN: 103244	30-Mer-23 (No. 217-03804)	Mar-24
Power sensor NRP-Z91 Power sensor NRP-Z91	SN: 103244 SN: 103245	30-Mer-23 (No. 217-03804) 30-Mer-23 (No. 217-03805)	Mar-24 Mar-24
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator	SN: 103244 SN: 103245 SN: BH9394 (20k)	30-Mer-23 (No. 217-03804) 30-Mer-23 (No. 217-03805) 30-Mer-23 (No. 217-03809)	Mar-24 Mar-24 Mar-24
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination	SN: 103244 SN: 103245	30-Mer-23 (No. 217-03804) 30-Mer-23 (No. 217-03805) 30-Mer-23 (No. 217-03809) 30-Mer-23 (No. 217-03810)	Mar-24 Mar-24 Mar-24 Mar-24
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4	SN: 103244 SN: 103245 SN: 8H9394 (20k) SN: 310982 / 05327	30-Mer-23 (No. 217-03804) 30-Mer-23 (No. 217-03805) 30-Mer-23 (No. 217-03809)	Mar-24 Mar-24 Mar-24
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4	SN: 103244 SN: 103245 SN: 8H9394 (20k) SN: 310982 / 06327 SN: 3603	30-Mer-23 (No. 217-03804) 30-Mer-23 (No. 217-03805) 30-Mer-23 (No. 217-03809) 30-Mer-23 (No. 217-03810) 07-Mer-23 (No. EX2-3503, Mer23)	Mar-24 Mar-24 Mar-24 Mar-24
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power mater E4419B	SN: 103244 SN: 103245 SN: BH9394 (20k) SN: 310882 / 06327 SN: 3503 SN: 801	30-Mer-23 (No. 217-03804) 30-Mer-23 (No. 217-03805) 30-Mer-23 (No. 217-03809) 30-Mer-23 (No. 217-03810) 07-Mer-23 (No. EX2-3503, Mer23) 03-Oct-23 (No. DAE4-801, Oct23)	Mar-24 Mar-24 Mar-24 Mar-24 Mar-24 Oct-24
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power mater E4419B Power sensor HP 8481A	SN: 103244 SN: 103245 SN: BH8394 (20k) SN: 310982 / 06327 SN: 3603 SN: 601 ID # SN: GB39512475 SN: US37292783	30-Mer-23 (No. 217-03804) 30-Mer-23 (No. 217-03805) 30-Mer-23 (No. 217-03808) 30-Mer-23 (No. 217-03810) 07-Mer-23 (No. EX3-3503, Mer23) 03-Oct-23 (No. DAE4-601, Oct23)	Mar-24 Mar-24 Mar-24 Mar-24 Oct-24 Scheduled Check
Power meter NRP2 Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A	SN: 103244 SN: 103245 SN: BH9394 (20k) SN: 310982 / 05327 SN: 3603 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: MY41083315	30-Mer-23 (No. 217-03804) 30-Mer-23 (No. 217-03805) 30-Mer-23 (No. 217-03808) 30-Mer-23 (No. 217-03810) 07-Mer-23 (No. EX3-3503_Mer23) 03-Oct-23 (No. DAE4-801_Oct23) Check Date (in house)	Mar-24 Mar-24 Mar-24 Mar-24 Oct-24 Scheduled Check In house check: Oct-24
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power mater E4419B Power sensor HP 8481A Power sensor HP 8481A RF generator R&S SMT-08	SN: 103244 SN: 103245 SN: BH9394 (20k) SN: 310982 / 06327 SN: 3603 SN: 501 ID # SN: GB39512475 SN: US37292783 SN: MY41083315 SN: 100972	30-Mer-23 (No. 217-03804) 30-Mer-23 (No. 217-03805) 30-Mer-23 (No. 217-03808) 30-Mer-23 (No. E17-03810) 07-Mer-23 (No. EX3-3503. Mer23) 03-Oct-23 (No. DAE4-601. Oct-23) Check Date (in house) 30-Oct-14 (in house check Oct-22) 07-Oct-15 (in house check Oct-22) 15-Jun-15 (in house check Oct-22)	Mar-24 Mar-24 Mar-24 Mar-24 Oct-24 Scheduled Chack In house check: Oct-24 In house check: Oct-24
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power mater E4419B Power sensor HP 8481A Power sensor HP 8481A RF generator R&S SMT-08	SN: 103244 SN: 103245 SN: BH9394 (20k) SN: 310982 / 05327 SN: 3603 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: MY41083315	30-Mer-23 (No. 217-03804) 30-Mer-23 (No. 217-03805) 30-Mer-23 (No. 217-03808) 30-Mer-23 (No. 217-03810) 07-Mer-23 (No. EX3-3503_Mer23) 03-Oct-23 (No. DAE4-801_Oct23) Check Date (in house) 30-Oct-14 (in house check Oct-22) 07-Oct-15 (in house check Oct-22) 07-Oct-15 (in house check Oct-22)	Mar-24 Mar-24 Mar-24 Mar-24 Cot-24 Softeduled Chack In house check: Oct-24 In house check: Oct-24 In house check: Oct-24
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power mater E4419B Power sensor HP 8481A	SN: 103244 SN: 103245 SN: BH9394 (20k) SN: 310982 / 06327 SN: 3603 SN: 501 ID # SN: GB39512475 SN: US37292783 SN: MY41083315 SN: 100972	30-Mar-23 (No. 217-03804) 30-Mar-23 (No. 217-03805) 30-Mar-23 (No. 217-03808) 30-Mar-23 (No. 217-03810) 07-Mar-23 (No. EX2-3503_Mar23) 03-Oct-23 (No. EX2-3503_Mar23) 03-Oct-23 (No. DAE4-801_Oct23) Check Date (in house) 30-Oct-14 (in house check Oct-22) 07-Oct-15 (in house check Oct-22) 07-Oct-15 (in house check Oct-22) 15-Jun-15 (in house check Oct-22) 31-Mar-14 (in house check Oct-22)	Mar-24 Mar-24 Mar-24 Mar-24 Mar-24 Oct-24 Softeduled Chack In house check: Oct-24 In house check: Oct-24 In house check: Oct-24 In house check: Oct-24
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power mater E4419B Power sensor HP 8481A Power sensor HP 8481A RF generator R&S SMT-08	SN: 103244 SN: 103245 SN: BH9394 (20k) SN: 310982 / 06327 SN: 3803 SN: 401 ID # SN: GB39512475 SN: US37292783 SN: MY41080315 SN: 100972 SN: US41060477	30-Mer-23 (No. 217-03804) 30-Mer-23 (No. 217-03805) 30-Mer-23 (No. 217-03808) 30-Mer-23 (No. E17-03810) 07-Mer-23 (No. EX3-3503. Mer23) 03-Oct-23 (No. DAE4-601. Oct-23) Check Date (in house) 30-Oct-14 (in house check Oct-22) 07-Oct-15 (in house check Oct-22) 15-Jun-15 (in house check Oct-22)	Mar-24 Mar-24 Mar-24 Mar-24 Mar-24 Oct-24 Softeduled Chack In house check: Oct-24
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A RF generator R&S SMT-06 Notwork Analyzer Agilent E8358A	SN: 103244 SN: 103245 SN: BH9394 (20k) SN: 310982 / 06327 SN: 3603 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: MY41083315 SN: 103972 SN: US41080477	30-Mer-23 (No. 217-03804) 30-Mer-23 (No. 217-03805) 30-Mer-23 (No. 217-03808) 30-Mer-23 (No. 217-03808) 30-Mer-23 (No. EX3-3503 Mer23) 03-Oct-23 (No. EX3-3503 Mer23) 03-Oct-23 (No. EX3-3503 Mer23) Check Date (in house) 30-Oct-14 (in house check Oct-22) 07-Oct-15 (in house check Oct-22) 15-Jun-15 (in house check Oct-22) 31-Mer-14 (in house check Oct-22)	Mar-24 Mar-24 Mar-24 Mar-24 Mar-24 Oct-24 Softeduled Chack In house check: Oct-24 In house check: Oct-24 In house check: Oct-24 In house check: Oct-24

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





S Schweitzerischer Kalibrierdienat
C Service suisse d'étalonnage
Servizio svizzero di taratura
S wiss Calibration Service

Accreditation No.: SCS 0108

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:

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:

- a) 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.
- b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

c) DASY 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 source is mounted in a touch configuration below the center marking of the flat phantom.
- Return Loss: This parameter is measured with the source positioned under the liquid filled phantom (as described in the measurement condition clause). The Return Loss ensures low reflected power, No uncertainty required.
- · SAR measured: SAR measured at the stated antenna input power.
- SAR normalized: SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.

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

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Measurement Conditions

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

DASY Version	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	2.71
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	3700 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	37.7	3.12 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.1 ± 6 %	3.06 mha/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		2,777

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	6.66 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	67.1 W/kg ± 19.9 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.43 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	24.4 W/kg ± 19.5 % (k=2)

Certificate No: D3700V2-1105_Nov23

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Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	45.8 Ω - 0.6 jΩ	
Return Loss	- 27.0 dB	

General Antenna Parameters and Design

	100000000000000000000000000000000000000
Electrical Delay (one direction)	1.139 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

Certificate No: D3700V2-1105_Nov23

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DASY5 Validation Report for Head TSL

Date: 20.11.2023

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 3700 MHz; Type: D3700V2; Serial: D3700V2 - SN:1105

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

Medium parameters used: f = 3700 MHz; $\sigma = 3.06$ S/m; $\epsilon_r = 38.1$; $\rho = 1000$ kg/m³

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: 07.03.2023
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 03.10.2023
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

Dipole Calibration for Head Tissue/Pin=100 mW, d=10mm, f=3700MHz/Zoom Scan,

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

Reference Value = 68.83 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 18.2 W/kg

SAR(1 g) = 6.66 W/kg; SAR(10 g) = 2.43 W/kg

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

Ratio of SAR at M2 to SAR at M1 = 74.7%

Maximum value of SAR (measured) = 13.0 W/kg



0 dB = 13.0 W/kg = 11.13 dBW/kg

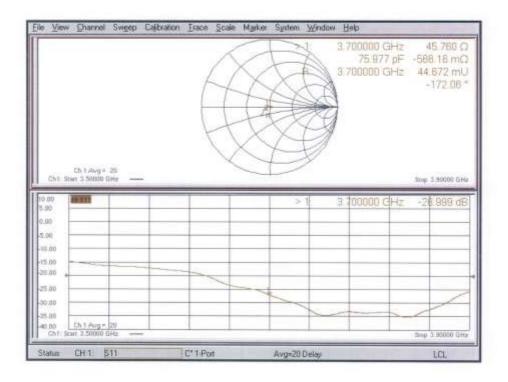
Certificate No: D3700V2-1105_Nov23

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Impedance Measurement Plot for Head TSL



Certificate No: D3700V2-1105_Nov23

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





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

Accreditation No.: SCS 0108

Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signatories to the EA

Multilateral Agreement for the recognition of calibration certificates

Client HCT
Gyeonggi-do, Republic of Korea

Certificate No. D3900V2-1086_May24

CALIBRATION CERTIFICATE D3900V2 - SN:1086 Object / 州亚马 바건성 SW 2024,060 202406.05 Calibration procedure(s) QA CAL-22.V7 Calibration Procedure for SAR Validation Sources between 3-10 GHz Calibration date: May 21, 2024 This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (51), 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 Cal Date (Certificate No.) Scheduled Calibration Power meter NRP2 SN: 104778 26-Mar-24 (No. 217-04036/04037) Mar-25 Power sensor NRP-291 SN: 103244 26-Mar-24 (No. 217-04038) Mar-25 Power sensor NRP-Z91 SN: 103245 26-Mar-24 (No. 217-04037) Mar-25 Reference 20 dB Attenuator SN: BH9394 (20k) 26-Mar-24 (No. 217-04046) Mar-25 Type-N mismatch combination SN: 310982 / 06327 26-Mar-24 (No. 217-04047) Mar-25 Reference Probe EX3DV4 SN: 3503 07-Mar-24 (No. EX3-3503_Mar24) DAE4 SN: 781 16-Feb-24 (No. DAE4-781_Feb24) Feb-25 Secondary Standards Check Date (in house) Scheduled Check Power meter E4419B SN: GB39512475 30-Oct-14 (in house check Oct-22) In house check: Oct-24 Power sensor HP 8481A SN: US37292783 07-Oct-15 (in house check Oct-22) In house check: Oct-24 Power sensor HP 8481A SN: MY41093315 07-Oct-15 (in house check Oct-22) In house check: Oct-24 RF generator R&S SMT-06 SN: 100972 15-Jun-15 (in house check Oct-22) In house check: Oct-24 Network Analyzer Agilent E8358A SN: US41080477 31-Mar-14 (in house check Oct-22) In house check: Oct-24 Namo Function Signature Calibrated by: Led Klysner Laboratory Technician Approved by: Sven Köhn Technical Manager Issued: May 21, 2024 This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Certificate No: D3900V2-1086_May24

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Calibration Laboratory of

Schmid & Partner Engineering AG Zeughausstrasse 43, 5004 Zurich, Switzerland





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Accreditation No.: SCS 0108

Accordited by the Swiss Accreditation Service (SAS)

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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:

- a) 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.
- b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

c) DASY 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 source is mounted in a touch configuration below the center marking of the flat phantom.
- Return Loss: This parameter is measured with the source positioned under the liquid filled phantom (as described in the measurement condition clause). The Return Loss ensures low reflected power. 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%.

Certificate No: D3900V2-1086_May24

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Measurement Conditions

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

AST System configuration, as ist as no		0.025.035.0
DASY Version	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	3900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	37.5	3.32 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.1 ± 6 %	3.26 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	-	:

SAR result with Head TSL

SAR averaged over 1 cm3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	6.72 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	67.6 W/kg ± 19.9 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.35 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	23.6 W/kg ± 19.5 % (k=2)

Certificate No: D3900V2-1086_May24

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Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	44.0 Ω - 5.7 jΩ	
Return Loss	-21.1 dB	

General Antenna Parameters and Design

Electrical Delay (one direction)	1.099 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

Certificate No: D3900V2-1086_May24

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DASY5 Validation Report for Head TSL

Date: 21.05.2024

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 3900 MHz; Type: D3900V2; Serial: D3900V2 - SN:1086

Communication System: UID 0 - CW; Frequency: 3900 MHz

Medium parameters used: f = 3900 MHz; $\sigma = 3.26$ S/m; $\varepsilon_r = 38.1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

Probe: EX3DV4 - SN3503; ConvF(7.32, 7.32, 7.32) @ 3900 MHz; Calibrated: 07.03.2024

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn781; Calibrated: 16.02.2024

Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001

DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

Dipole Calibration for Head Tissue/Pin=100 mW, d=10mm, f=3900MHz/Zoom Scan,

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

Reference Value = 69.07 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 18.4 W/kg

SAR(1 g) = 6.72 W/kg; SAR(10 g) = 2.35 W/kg

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

Ratio of SAR at M2 to SAR at M1 = 74.9%

Maximum value of SAR (measured) = 13.0 W/kg



0 dB = 13.0 W/kg = 11.15 dBW/kg

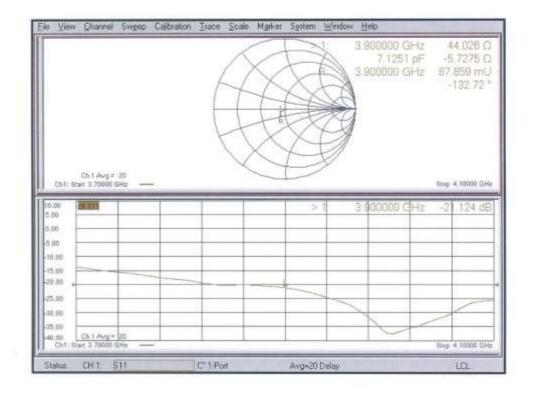
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Impedance Measurement Plot for Head TSL



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Accreditation No.: SCS 0108

Accredited by the Swiss Accreditation Service (SAS)

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

Client HCT
Gyeonggi-do, Republic of Korea

Certificate No. D5GHzV2-1107_Apr24

CALIBRATION CERTIFICATE Object D5GHzV2 - SN:1107 Calibration procedure(s) QA CAL-22.v7 Calibration Procedure for SAR Validation Sources between 3-10 GHz Calibration date: April 19, 2024 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 Cal Date (Certificate No.) Scheduled Calibration SN: 104778 Power meter NRP2 26-Mar-24 (No. 217-04036/04037) Mar-25 Power sensor NRP-Z91 SN: 103244 26-Mar-24 (No. 217-04038) Mar-25 Power sensor NRP-Z91 SN: 103245 26-Mar-24 (No. 217-04037) Mar-25 Reference 20 dB Attenuator SN: BH9394 (20k) 26-Mar-24 (No. 217-04046) Mar-26 Type-N mismatch combination SN: 310962 / 06327 26-Mar-24 (No. 217-04047) Mar-25 Reference Probe EX3DV4 SN: 3503 07-Mar-24 (No. EX3-3503 Mar24) Mar-25 DAE4 SN: 601 30-Jan-24 (No. DAE4-601_Jan24) Jan-25 Secondary Standards ID# Check Date (in house) Scheduled Check Power meter E4419B SN: GB39512475 38-Oct-14 (in house check Oct-22) In house check: Oct-24 Power sensor HP 8481A BN: US37292783 07-Oct-15 (in house check Oct-22) In house check: Oct-24 Power sensor HP 8481A 5N: MY41093315 07-Oct-15 (in house check Oct-22) In house check: Oct-24 RF generator R&S SMT-06 SN: 100972 15-Jun-15 (in house check Oct-22) In house check: Oct-24 Network Analyzer Agilent E8358A SN: US41080477 31-Mar-14 (in house check Oct-22) In house check: Oct-24 Signature Calibrated by: Paulo Pina Laboratory Technician Sven Kühn Approved by: Technical Manager Issued: April 23; 2024 This calibration certificate shall not be reproduced except in full without written approval of the laboratory

Certificate No: D5GHzV2-1107_Apr24

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Accreditation No.: SCS 0108

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Glossary:

TSL tlssue 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:

- a) 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.
- b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

c) DASY 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 source is mounted in a touch configuration below the center marking of the flat phantom.
- Return Loss: This parameter is measured with the source positioned under the liquid filled phantom (as described in the measurement condition clause). The Return Loss ensures low reflected power. 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%.

Certificate No: D5GHzV2-1107_Apr24

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Measurement Conditions

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

DASY Version	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	5250 MHz ± 1 MHz 5600 MHz ± 1 MHz 5750 MHz ± 1 MHz 5800 MHz ± 1 MHz	

Head TSL parameters at 5250 MHz The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.9	4.71 mbo/m
Measured Head TSL parameters	(22.0 ± 0.2) "C	37.1 ± 6 %	4.65 mha/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	£1002	-

SAR result with Head TSL at 5250 MHz

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.97 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	80.2 W/kg ± 19.9 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.29 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	23.1 W/kg ± 19.5 % (k=2)



Head TSL parameters at 5600 MHz

The following parameters and calculations were applied

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.5	5.07 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	36.5 ± 6 %	5.05 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	7-2	1533

SAR result with Head TSL at 5600 MHz

SAR averaged over 1 cm3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.17 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	82.1 W/kg ± 19.9 % (k=2)

SAR averaged over 10 cm ³ (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	23.5 W/kg ± 19.5 % (k=2)

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	36.3 ± 6 %	5.22 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 ³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.95 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	79.9 W/kg ± 19.9 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.26 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	22.8 W/kg ± 19.5 % (k=2)

Certificate No: D5GHzV2-1107_Apr24



Head TSL parameters at 5800 MHz

The following parameters and calculations were applied

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.3	5,27 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	36.2 ± 6 %	5.27 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	****	

SAR result with Head TSL at 5800 MHz

SAR averaged over 1 cm3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.89 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	79.3 W/kg ± 19.9 % (k=2)

SAR averaged over 10 cm3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.24 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	22.5 W/kg ± 19.5 % (k=2)



Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL at 5250 MHz

Impedance, transformed to feed point	49.0 Ω - 2.7 jΩ	
Return Loss	- 30.8 dB	

Antenna Parameters with Head TSL at 5600 MHz

Impedance, transformed to feed point	54.2 Ω + 1.9 μΩ
Return Loss	-27.1 dB

Antenna Parameters with Head TSL at 5750 MHz

Impedance, transformed to feed point	56.1 Ω + 1.6 JΩ
Return Loss	- 24.6 dB

Antenna Parameters with Head TSL at 5800 MHz

Impedance, transformed to feed point	55.3 Ω + 0.5 JΩ	
Return Loss	- 25.9 dB	

General Antenna Parameters and Design

Electrical Delay (one direction) 1.196 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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Certificate No: D5GHzV2-1107_Apr24

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DASY5 Validation Report for Head TSL

Date: 19.04.2024

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1107

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

MHz, Frequency: 5800 MHz

Medium parameters used: f = 5250 MHz; σ = 4.65 S/m; ϵ_r = 37.1; ρ = 1000 kg/m 3 ,

Medium parameters used: f = 5600 MHz; $\sigma = 5.05$ S/m; $\epsilon_r = 36.5$; $\rho = 1000$ kg/m³,

Medium parameters used: f = 5750 MHz; $\sigma = 5.22$ S/m; $\epsilon_r = 36.3$; $\rho = 1000$ kg/m³

Medium parameters used: f = 5800 MHz; $\sigma = 5.27$ S/m; $\epsilon_r = 36.2$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 SN3503; ConvF(5.39, 5.39, 5.39) @ 5250 MHz, ConvF(5, 5, 5) @ 5600 MHz, ConvF(4.98, 4.98, 4.98) @ 5750 MHz, ConvF(4.86, 4.86, 4.86) @ 5800 MHz; Calibrated: 07.03.2024
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.01.2024
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52:10.4(1535); SEMCAD X 14.6.14(7501)

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 = 73.63 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 26.9 W/kg

SAR(1 g) = 7.97 W/kg; SAR(10 g) = 2.29 W/kg

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

Ratio of SAR at M2 to SAR at M1 = 70.9%

Maximum value of SAR (measured) = 18.2 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 = 72.81 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 30.3 W/kg

SAR(1 g) = 8.17 W/kg; SAR(10 g) = 2.33 W/kg

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

Ratio of SAR at M2 to SAR at M1 = 68%

Maximum value of SAR (measured) = 19.4 W/kg

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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 = 71.06 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 30.9 W/kg

SAR(1 g) = 7.95 W/kg; SAR(10 g) = 2.26 W/kg

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

Ratio of SAR at M2 to SAR at M1 = 66.2%

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

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan,

dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 71.08 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 31.1 W/kg

SAR(1 g) = 7.89 W/kg; SAR(10 g) = 2.24 W/kg

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

Ratio of SAR at M2 to SAR at M1 = 65.8%

Maximum value of SAR (measured) = 19.2 W/kg



0 dB = 19.4 W/kg = 12.88 dBW/kg

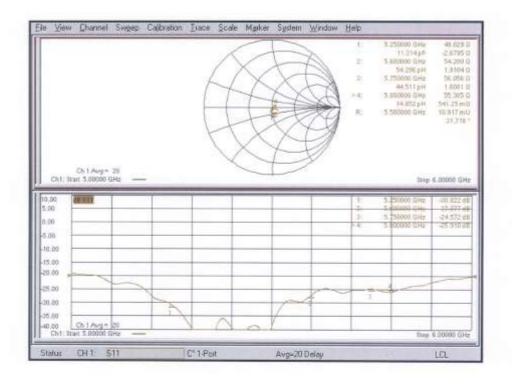
Certificate No: D5GHzV2-1107_Apr24

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Impedance Measurement Plot for Head TSL



Certificate No: DSGHzV2-1107_Apr24

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Appendix: Transfer Calibration at Four Validation Locations on SAM Head¹

Evaluation Conditions (f=5250 MHz)

T		
Phantom	SAM Head Phantom	For usage with cSAR3DV2-R/L

SAR result with SAM Head (Top)

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR for nominal Head TSL parameters	normalized to 1W	85.8 W/kg ± 20.3 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	

SAR result with SAM Head (Mouth)

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR for nominal Head TSL parameters	normalized to 1W	85.0 W/kg ± 20.3 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	

SAR result with SAM Head (Neck)

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR for nominal Head TSL parameters	normalized to 1W	83.1 W/kg ± 20.3 % (k=2)
The second secon		
SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	

SAR result with SAM Head (Ear)

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR for nominal Head TSL parameters	normalized to 1W	53.8 W/kg ± 20.3 % (k≈2)
SAR averaged over 10 cm3 (10 g) of Head TSL	condition	

Certificate No: D5GHzV2-1107_Apr24

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Additional assessments outside the current scope of SCS 0108



Appendix: Transfer Calibration at Four Validation Locations on SAM Head²

Evaluation Conditions (f=5800 MHz)

Phantom	SAM Head Phantom	For usage with cSAR3DV2-R/L

SAR result with SAM Head (Top)

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR for nominal Head TSL parameters	normalized to 1W	82.4 W/kg ± 20.3 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	

SAR result with SAM Head (Mouth)

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR for nominal Head TSL parameters	normalized to 1W	89.1 W/kg ± 20.3 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	

SAR result with SAM Head (Neck)

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR for nominal Head TSL parameters	normalized to 1W	79.5 W/kg ± 20.3 % (k=2)
SAR averaged over 10 cm ² (10 g) of Head TSL	condition	

SAR result with SAM Head (Ear)

SAR averaged over 1 cm3 (1 g) of Head TSL	Condition	
SAR for nominal Head TSL parameters	normalized to 1W	56.6 W/kg ± 20.3 % (k=2)
SAR averaged over 10 cm ² (10 g) of Head TSL	condition	
SAR for nominal Head TSL parameters	normalized to 1W	19.1 W/kg ± 19.9 % (k=2)

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Additional assessments outside the current scope of SCS 0108







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Client HCT:

Certificate No. D6.5GHzV2-1012_Sep23

Accreditation No.: SCS 0108

Gyeonggi-do, Republic of Korea CALIBRATION CERTIFICATE Object D6.5GHzV2 - SN:1012 Calibration procedure(s) QA CAL-22.v7 Calibration Procedure for SAR Validation Sources between 3-10 GHz September 21, 2023 Calibration date: This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The messurements and the uncertainties with confidence probability are given on the following pages and are part of the cartificate. 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) Scheduled Calibration Primary Standards ID# Cal Date (Certificate No.) Power sensor R&S NRP33T SN: 100967 03-Apr-23 (No. 217-03806) Apr-24 Reference 20 dB Attenuator SN: BH9394 (20k) 30-Mar-23 (No. 217-03809) Mar-24 Mismatch combination SN: 84224 / 360D 03-Apr-23 (No. 217-03812) Apr-24 Reference Probe EX3DV4 SN: 7405 12-Jun-23 (No. EX3-7405_Jun23) Jun-24 DAE4 SN: 908 03-Jul-23 (No. DAE4-908_Jul23) Jul-24 Secondary Standards ID # Check Date (in house) Scheduled Check RF generator Anapico APSIN20G SN: 827 18-Dec-18 (in house check Dec-21) In house check: Dep-23 Power sensor NRP-Z23 SN: 100169 10-Jan-19 (in house check Nov-22) In house check: Nov-23 Power sensor NRP-18T SN: 100950 28-Sep-22 (in house check Nov-22) In house check: Nov-23 Network Analyzer Keysight E5063A SN:MY54504221 31-Oct-19 (in house check Oct-22) In house check: Oct-25 Function Jeton Kasman Calibrated by: Laboratory Technicum Approved by: Svett-Kühn. Technical Manager This calibration certificate shall not be reproduced except in full without written approval of the laboratory. Certificate No: D8.5GHzV2-1012_Sep23 Page 1 of 6

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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:

 a) 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.

Additional Documentation:

b) DASY 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 Return Loss ensures low reflected power. 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 absorbed power density (APD): The absorbed power density is evaluated according to Samaras T, Christ A, Kuster N, "Compliance assessment of the epithelial or absorbed power density above 6 GHz using SAR measurement systems", Bioelectromagnetics, 2021 (submitted). The additional evaluation uncertainty of 0.55 dB (rectangular distribution) is considered.

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

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Measurement Conditions

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

DASY Version	DASY6	V16.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	5 mm	with Spacer
Zoom Scan Resolution	dx, dy = 3.4 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	6500 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	34,5	6.07 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	33.3 ± 6 %	6.09 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		_

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	29.4 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	292 W/kg ± 24.7 % (k=2)

SAR averaged over 8 cm ¹ (8 g) of Head TSL	Condition	
SAR measured	100 mW input power	6.63 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	65.7 W/kg ± 24.4 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	5.43 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	53.8 W/kg ± 24.4 % (k=2)



Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.3 Ω - 8.4 jΩ	
Return Loss	- 21.5 dB	

APD (Absorbed Power Density)

APD averaged over 1 cm ²	Condition	
APD measured	100 mW input power	291 W/m²
APD measured	normalized to 1W	2910 W/m2 ± 29.2 % (k=2)

APD averaged over 4 cm ²	candition	
APD measured	100 mW input power	133 W/m²
APD measured	normalized to 1W	1330 W/m ² ± 28.9 % (k=2)

[&]quot;The reported APD values have been derived using the psSAR1g and psSAR8g.

General Antenna Parameters and Design

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

Certificate No: D6,5GHzV2-1012_Sep23

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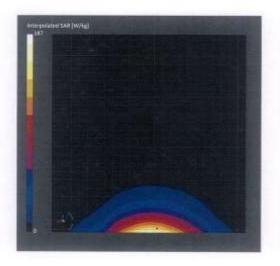
DASY6 Validation Report for Head TSL

Measurement Report for D6.5GHz-1012, UID 0 -, Channel 6500 (6500.0MHz)

Name, Manuf	Test Properties acturer Di	mensions	[mm]	IMEI	DUT Ty	pe	
D6.5GHz	10	0.0 x 10.0 x	10.0	SN: 1012			
Exposure Con	ditions						
Phantom	Position, Test	Band	Group,	Frequency	Conversion	TSL Cond.	TSL
Section, TSL	Distance [mm]		UID	[MHz]	Factor	[S/m]	Permittivity
Flat, HSL	5.00	Band	CW.	6500	5.50	6.09	33.3

Hardware Setup Phantom	TSL	Probe, Calibration Date	DAE, Calibration Date
MFP V8.0 Center - 1182	HBBL600-10000V6	EX3DV4 - SN7405, 2023-06-12	DAE4 Sn908, 2023-07-03
Scan Setup		Measurement Results	
	Zoom Scan		Zoom Scan
Grid Extents [mm]	22.0 × 22.0 × 22.0	Date	2023-09-21, 13:10
Grid Steps [mm]	3.4 x 3.4 x 1.4	psSAR1g [W/Kg]	29.4
Sensor Surface [mm]	1.4	psSAR8g [W/Kg]	6.63
Graded Grid	Yes	psSAR10g [W/Kg]	5.43
Grading Ratio	1.4	Power Drift [dB]	-0.02
MAIA	N/A	Power Scaling	Disabled
Surface Detection	VMS + 6p	Scaling Factor [dB]	
Scan Method	Measured	TSL Correction	No correction
		M2/M1 F%I	55.7

Dist 3dB Peak [mm]

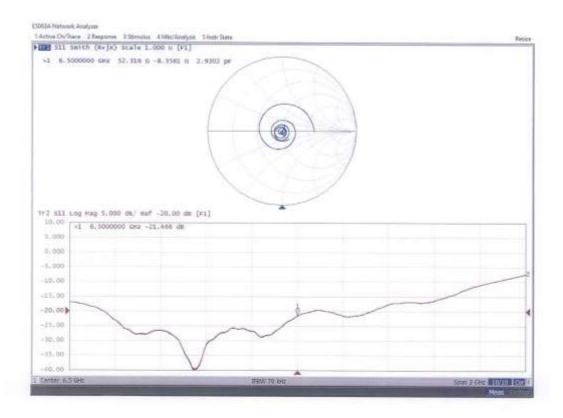


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Impedance Measurement Plot for Head TSL



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HCT

Certificate No. 5G-Veri10-1018_Apr24

Accreditation No.: SCS 0108

CALIBRATION C	ERTIFICAT	E		
Object	5G Verification S	ferification Source 10 GHz - SN: 1018		
	QA CAL-45.v5 Calibration proc	edure for sources in air above 6 GH	Z	
Calibration date:	April 17, 2024			
The measurements and the uncertain	inties with confidence p	fional standards, which realize the physical units probability are given on the following pages and a pry facility: environment temperature (22 \pm 3)°C a	are part of the certificate.	
Primary Standards	10#	Cal Date (Certificate No.)	Scheduled Calibration	
Reference Probe EUmmWV3 DAE4ip	SN: 9374 SN: 1602	04-Dec-23 (No. EUmm-9374_Dec23) 08-Nov-23 (No. DAE4ip-1602_Nov23)	Dec-24 Nov-24	
Secondary Standards	ID#	Check Date (in house)	Scheduled Check	
RF generator R&S SMF100A Power sensor R&S NRP18S-10 Network Analyzer Keysight E5063A	SN: 100184 SN: 101258 SN: MY54504221	29-Nov-23 (in house check Nov-23) 29-Nov-23 (in house check Nov-23) 31-Oct-19 (in house check Oct-22)	In house check: Nov-24 In house check: Nov-24 In house check: Oct-25	
		절 발 당 자 제 7년 2년 제 10 2 / 기가년 제 지 26 14 45.65	10 11 15 15 15 15 15 15 15 15 15 15 15 15	
	Name	Function	Signature	
Celibrated by:	Leif Klysner	Laboratory Technician	Sef Man	
Approved by:	Sven Kühn	Technical Manager	Sin	

Certificate No: 5G-Veri10-1018_Apr24

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Glossary

CW

Continuous wave

Calibration is Performed According to the Following Standards

- Internal procedure QA CAL-45, Calibration procedure for sources in air above 6 GHz.
- IEC/IEEE 63195-1, "Assessment of power density of human exposure to radio frequency fields from wireless devices in close proximity to the head and body (frequency range of 6 GHz to 300 GHz)", May 2022

Methods Applied and Interpretation of Parameters

- Coordinate System: z-axis in the waveguide horn boresight, x-axis is in the direction of the E-field, y-axis normal to the others in the field scanning plane parallel to the horn flare and horn flange.
- Measurement Conditions: (1) 10 GHz: The radiated power is the forward power to the horn
 antenna minus ohmic and mismatch loss. The forward power is measured prior and after
 the measurement with a power sensor. During the measurements, the horn is directly
 connected to the cable and the antenna ohmic and mismatch losses are determined by farfield measurements. (2) 30, 45, 60 and 90 GHz: The verification sources are switched on for
 at least 30 minutes. Absorbers are used around the probe cub and at the ceiling to minimize
 reflections.
- Hom Positioning: The waveguide horn is mounted vertically on the flange of the waveguide source to allow vertical positioning of the EUmmW probe during the scan. The plane is parallel to the phantom surface. Probe distance is verified using mechanical gauges positioned on the flare of the horn.
- E- field distribution; E field is measured in two x-y-plane (10mm, 10mm + λ/4) with a
 vectorial E-field probe. The E-field value stated as calibration value represents the E-fieldmaxima and the averaged (1cm² and 4cm²) power density values at 10mm in front of the
 horn.
- Field polarization: Above the open horn, linear polarization of the field is expected. This is verified graphically in the field representation.

Calibrated Quantity

 Local peak E-field (V/m) and average of peak spatial components of the poynting vector (W/m²) averaged over the surface area of 1 cm² and 4cm² at the nominal operational frequency of the verification source. Both square and circular averaging results are listed.

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

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Measurement Conditions

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

DASY Version	DASY8 Module mmWave	V3.2
Phantom	5G Phantom	
Distance Horn Aperture - plane	10 mm	
Number of measured planes	2 (10mm, 10mm + \lambda/4)	
Frequency	10 GHz ± 10 MHz	

Calibration Parameters, 10 GHz

Circular Averaging

Distance Hom Aperture to Measured Plane	Prad ¹ (mW)	Max E-field (V/m)	Uncertainty (k = 2)	Avg Power Density Avg (osP0m+, psP0tot+, psP0mod+) (W/m²)		Uncertainty (k = 2)
				1 cm ²	4 cm ²	
10 mm	93.3	154	1.27 dB	61.4	57.0	1.28 dB

	Pradi (mW)	Max E-field (V/m)	Uncertainty (k = 2)	Power Density psPDn+, psPDtot+, psPDmod+ (W/m²)		Uncertainty (k = 2)
				1 cm²	4 cm ²	
10 mm	93.3	154	1.27 dB	61.0, 61.5, 61.7	56.5, 57.1, 57.3	1.28 dB

Square Averaging

Distance Horn Aperture to Measured Plane	Prad' (mW)	Max E-field (V/m)	Uncertainty (k = 2)	Avg Power Density Avg (psPDn+, psPDtnod+) (W/m²)		Uncertainty (k = 2)
				1 cm ²	4 cm ²	
10 mm	93.3	154	1.27 dB	61.4	56.9	1.28 dB

The state of the s	Prad ^o (mW)	Max E-field (V/m)	Uncertainty (k = 2)	Power Density psPDn+, psPDtot+, psPDmod+ (W/m²)		Uncertainty (k = 2)
				1 cm²	4 cm ²	
10 mm	93.3	154	1.27 dB	61.0, 61.5, 61.7	56.4, 57.0, 57.2	1.28 dB

Max Power Density

Distance Hom Aperture to Measured Plane	Prad ¹ (mW)	Max E-field (V/m)	Uncertainty (k = 2)	Max Power Density Sn, Stot, Stot (W/m²)	Uncertainty (k = 2)
10 mm	93.3	154	1.27 dB	62.6, 63.1, 63.3	1.28 dB

Assessed ohmic and mismatch loss plus numerical offset: 0,30 dB

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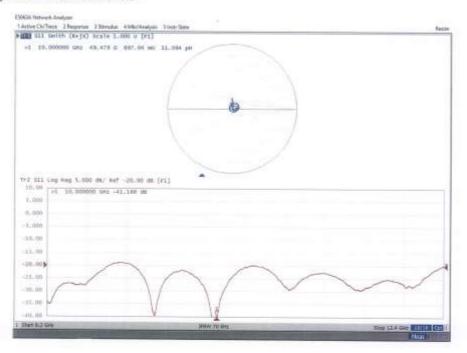


Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters

Impedance, transformed to feed point	49.5 Ω + 0.70 jΩ
Return Loss	- 41.2 dB

Impedance Measurement Plot



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Measurement Report for 5G Verification Source 10 GHz, UID 0 -, Channel 10000 (10000.0MHz)

Device under Test Prop Name, Manufacturer	Dimensions (mm	0.0	IMEL	mark m	
				DUT Type	
5G Verification Source 10 GF	12 100.0 x 100.0 x 1	172.0	SN: 1018		
Exposure Conditions					
Phantom Section	Position, Test Distance [mm]	Band	Group,	Frequency [MHz], Channel Number	Conversion Factor
5G+	10.0 mm	Validation band	CW	10000.0, 10000	10
Hardware Setup					
Phantom	Medium		Probe, Calibr	ration Date	DAE, Calibration Date
mmWave Phantom - 1002	Air		EUmmWV3 - 2023-12-04	SN9374_F1-55GHz,	DAE4ip 5rt1602, 2023-11-08
Scan Setup				nent Results	
		5G 5			5G Scar
Sensor Surface [mm]			IO:0 Date		2024-04-17, 09:50
MAIA		MAIA not u		cm ¹	1.00
			Avg. Type		Circular Averaging
			psPDn+ (W)		51.0
			psPDtot+ \		61.5
			psP0mod+		61.7
			Max(Sn) (W		52.6
			Max(Stot) [W/m/s	63.
			Add of Land of the	CHALL ST. P.	V 224
			Max[Stot Enu [V/m]	1 [W/m²]	63.3 154



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Measurement Report for 5G Verification Source 10 GHz, UID 0 -, Channel 10000 (10000.0MHz)

Device under Test Pro Name, Manufacturer	Dimensions [mn	n]	IMEI	DUT Type	
SG Verification Source 10 G			SN: 1018		
Exposure Conditions					
Phantom Section	Position, Test Distance [mm]	Bland	Group,	Frequency [MHz] Channel Number	
SG =	10.0 mm	Validation band	CW	10000.0, 20000	1.0
Hardware Setup					
hantom	Medium		Probe, Ca	allibration Date	DAE, Calibration Date
nmWave Phantom - 1002	Air			V3 - SN9374_F1-55GHz,	DAE4lp 5n1602, 2023-11-88
Scan Setup				rement Results	
CONTRACTOR DESCRIPTIONS		5G S			SG Scar
Sensor Surface (mm)		1	0.0 Date		2024-04-17, 09:50
MAIA		MAIA not us			4.00
			Avg. Typ		Orcular Averaging
			psPOn+		56.
				1+ [W/m ³]	57.
				od+ [W/m²] i [W/m²]	57.3
				ot) [W/m²]	63.
				tot])[W/m ²]	63.
			Erm IV/		15
				Drift Ceth1	-0.0



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Measurement Report for 5G Verification Source 10 GHz, UID 0 -, Channel 10000 (10000 0MHz

Name, Manufacturer	Dimensions [mm	d	IMIEL	DUT Type	
SG Verification Source 10 G	H2 100.0 x 100.0 x	1,72.0	SN: 1018	200/86	
Exposure Conditions					
Phantom Section	Position, Test Distance [mm]	Band	Group,	Frequency [MHz], Channel Number	Conversion Factor
sg -	30.0 mm	Validation band	CW	10000:0, 10000	1.0
Hardware Setup					
Phantom	Medium		Probe, Calib	ration Date	DAE, Calibration Date
mmWave Phantom - 1002	Air		EUmm/WV3 2023-12-04	-5N9974_F1-55GHz.	DAE4ip Sn1602, 2023-11-08
Scan Setup				ment Results	
		5G 5			5G Scar
Sensor Surface [mm] MAIA		The second secon	0.0 Date	NOSE.	2024-04-17, 09:50
DEPLA		MAIA not u	11.00	[cm ⁻]	1.00
			Avg. Type psPDn+ (W	(/B	Square Averaging
			psPDtot+[61.0
			psPDmod+		61.3
			Max(Sn) (V		52.6
			Max(Stot)		63.1
			Maw(Stot] [W/m ²]	63.3
			Wash Bilden F		154



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Measurement Report for 5G Verification Source 10 GHz, UID 0 -, Channel 10000 (10000.0MHz)

		- 7.00			
Device under Test Pro	operties				
Name, Manufacturer	Dimensions (mm	1	IME	DUTType	
5G Verification Source 10 G	SH2 100.0 x 100.0 x 3	172.0	5N: 1018		
Exposure Conditions					
Phantom Section	Position, Test Distance [mm]	Bend	Group,	Frequency [MHz]. Channel Number	Conversion Factor
5G -	30.0 mm	Validation band	CW	10000.0, 10000	1,0
Hardware Setup					
Phantom	Medium		Probe, Calib	eration Date	DAE, Calibration Date
mer/Wave Phantom - 1002	Air			- SN9374_F1-SSGHz,	DAE-tip 5n1602, 2023-11-08
Scan Setup				ment Results	
TENEDOS CALVANTAS SE		5G 5			56 Scan
Sensor Surface [mm]			0.0 Date		2024-04-17, 09:50
MAIA.		MAIA not u		[cm ⁻]	4.00
			Avg. Type		Square Averaging
			psPDn+ (V		56.4
			psPDtot+ [57.0
			psPDmod4 Mex(Sn) (V		57.2
			Max(Stot)		62.6
			Max()Stot		63.1
			Ens [V/m]		63.3 154
			Fower Orif		0.00



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