

Annex D. Tissue & System Verification

The measuring results for tissue simulating liquid and system check are shown as below.

Note:

1. For Section 4.3, the dielectric properties of the tissue simulating liquid have been measured within 24 hours before the SAR testing and within ± 10 % of the target values. Liquid temperature during the SAR testing has kept within ± 2 °C.
2. For Section 4.4, The SAR measurement system was validated according to procedures in KDB 865664 D01. The validation status in tabulated summary is as below.
3. For Section 4.5, Comparing to the reference SAR value provided by SPEAG in dipole calibration certificate, the deviation of system check results is within its specification of 10 %. The result indicates the system check can meet the variation criterion and the plots please refer to Annex A of this report.

Tissue Verification								Validation for CW			Validation for Modulation			Date	System Validation					Note			
Plot No.	Frequency (MHz)	Liquid Temp. (°C)	Conductivity (σ)	Permittivity (ε _r)	Targeted Conductivity (σ)	Targeted Permittivity (ε _r)	Deviation Conductivity (σ)	Deviation Permittivity (ε _r)	Sensitivity Range	Probe Linearity	Probe Isotropy	Modulation Type	Duty Factor	PAR	Frequency (MHz)	Targeted 1g SAR (W/kg)	Measured 1g SAR (W/kg)	Normalized 1g SAR (W/kg)	Deviation (%)	Dipole S/N	Probe S/N	DAE S/N	
S01	835	23.2	0.927	41.987	0.9	41.5	3.00	1.17	Pass	Pass	Pass	N/A	N/A	N/A	Jun. 21, 2021	835	9.52	0.439	8.78	-7.77	4d121	7537	528
S02	1900	23.2	1.459	38.812	1.4	40	4.21	-2.97	Pass	Pass	Pass	N/A	N/A	N/A	Jun. 21, 2021	1900	40.40	1.97	39.40	-2.48	5d036	7537	528
S03	1900	23.2	1.459	38.812	1.4	40	4.21	-2.97	Pass	Pass	Pass	N/A	N/A	N/A	Jun. 21, 2021	1900	40.40	1.97	39.40	-2.48	5d036	7537	528
S04	835	23.2	0.927	41.987	0.9	41.5	3.00	1.17	Pass	Pass	Pass	N/A	N/A	N/A	Jun. 21, 2021	835	9.52	0.439	8.78	-7.77	4d121	7537	528
S05	1900	23.2	1.459	38.812	1.4	40	4.21	-2.97	Pass	Pass	Pass	N/A	N/A	N/A	Jun. 21, 2021	1900	40.40	1.97	39.40	-2.48	5d036	7537	528
S06	1900	23.1	1.455	39.598	1.4	40	3.93	-1.01	Pass	Pass	Pass	N/A	N/A	N/A	Jun. 21, 2021	1900	40.40	2.07	41.40	2.48	5d036	7537	528
S07	1750	23.2	1.322	39.378	1.37	40.1	-3.50	-1.80	Pass	Pass	Pass	N/A	N/A	N/A	Jun. 21, 2021	1750	36.00	1.63	32.60	-9.44	1055	7537	528
S08	1750	23.1	1.326	40.14	1.37	40.1	-3.21	0.10	Pass	Pass	Pass	N/A	N/A	N/A	Jun. 28, 2021	1750	36.00	1.65	33.00	-8.33	1055	7537	528
S09	835	23.2	0.927	41.987	0.9	41.5	3.00	1.17	Pass	Pass	Pass	N/A	N/A	N/A	Jun. 21, 2021	835	9.52	0.439	8.78	-7.77	4d121	7537	528
S10	2600	23.2	2.045	37.845	1.96	39	4.34	-2.96	Pass	Pass	Pass	N/A	N/A	N/A	Jun. 22, 2021	2600	55.50	2.77	55.40	-0.18	1020	7472	579
S11	750	23.2	0.891	43.289	0.89	41.9	0.11	3.32	Pass	Pass	Pass	N/A	N/A	N/A	Jun. 21, 2021	750	8.48	0.444	8.88	4.72	1013	7537	528
S12	750	23.2	0.891	43.289	0.89	41.9	0.11	3.32	Pass	Pass	Pass	N/A	N/A	N/A	Jun. 21, 2021	750	8.48	0.444	8.88	4.72	1013	7537	528
S13a	3500	23.2	2.938	36.985	2.91	37.9	0.96	-2.41	Pass	Pass	Pass	N/A	N/A	N/A	Jun. 22, 2021	3500	65.60	3.1	62.00	-5.49	1007	7472	579
S13b	3700	23.2	3.088	36.804	3.12	37.7	-1.03	-2.38	Pass	Pass	Pass	N/A	N/A	N/A	Jun. 22, 2021	3700	65.90	3.08	61.60	-6.53	1017	7472	579
S14	1750	23.2	1.319	39.296	1.37	40.1	-3.72	-2.00	Pass	Pass	Pass	N/A	N/A	N/A	Jun. 22, 2021	1750	36.00	1.7	34.00	-5.56	1055	7472	579
S15	1750	23.1	1.326	40.14	1.37	40.1	-3.21	0.10	Pass	Pass	Pass	N/A	N/A	N/A	Jun. 28, 2021	1750	36.00	1.65	33.00	-8.33	1055	7537	528
S16	750	23.2	0.894	43.854	0.89	41.9	0.45	4.66	Pass	Pass	Pass	N/A	N/A	N/A	Jun. 22, 2021	750	8.48	0.384	7.68	-9.43	1013	7472	579
S17	1900	23.2	1.455	39.708	1.4	40	3.93	-0.73	Pass	Pass	Pass	N/A	N/A	N/A	Jul. 23, 2021	1900	40.40	2.18	43.60	7.92	5d036	7555	1589
S18	1900	23.2	1.455	39.708	1.4	40	3.93	-0.73	Pass	Pass	Pass	N/A	N/A	N/A	Jul. 23, 2021	1900	40.40	2.18	43.60	7.92	5d036	7555	1589
S19	835	23.2	0.928	42.022	0.9	41.5	3.11	1.26	Pass	Pass	Pass	N/A	N/A	N/A	Jul. 23, 2021	835	9.52	0.518	10.36	8.82	4d121	7555	1589
S20	1750	23.2	1.321	40.261	1.37	40.1	-3.58	0.40	Pass	Pass	Pass	N/A	N/A	N/A	Jul. 23, 2021	1750	36.00	1.89	37.80	5.00	1055	7555	1589
S21	1750	23.2	1.321	40.261	1.37	40.1	-3.58	0.40	Pass	Pass	Pass	N/A	N/A	N/A	Jul. 23, 2021	1750	36.00	1.89	37.80	5.00	1055	7555	1589
S22	750	23.2	0.892	43.547	0.89	41.9	0.22	3.93	Pass	Pass	Pass	N/A	N/A	N/A	Jul. 23, 2021	750	8.48	0.434	8.68	2.36	1013	7555	1589
S25	2450	23.3	1.885	38.34	1.8	39.2	4.72	-2.19	Pass	Pass	Pass	OFDM	N/A	Pass	Jul. 03, 2021	2450	51.60	2.6	52.00	0.78	737	3650	1277
S26	5250	23.3	4.573	36.637	4.71	35.9	-2.91	2.05	Pass	Pass	Pass	OFDM	N/A	Pass	Jul. 03, 2021	5250	80.60	4.39	87.80	8.93	1019	3650	1277
S27	5600	23.3	4.913	36.164	5.07	35.5	-3.10	1.87	Pass	Pass	Pass	OFDM	N/A	Pass	Jul. 03, 2021	5600	82.40	4.34	86.80	5.34	1019	3650	1277
S28	5750	23.3	5.061	35.952	5.22	35.4	-3.05	1.56	Pass	Pass	Pass	OFDM	N/A	Pass	Jul. 03, 2021	5750	79.40	3.82	76.40	-3.78	1019	3650	1277
S29	2450	23.3	1.885	38.34	1.8	39.2	4.72	-2.19	Pass	Pass	Pass	OFDM	N/A	Pass	Jul. 05, 2021	2450	51.60	2.74	54.80	6.20	737	7555	1589
S30	835	23.3	0.921	42.338	0.9	41.5	2.33	2.02	Pass	Pass	Pass	N/A	N/A	N/A	Jun. 23, 2021	835	9.52	0.507	10.14	6.51	4d121	3650	1277
S31	1900	23.3	1.457	39.83	1.4	40	4.07	-0.43	Pass	Pass	Pass	N/A	N/A	N/A	Jun. 23, 2021	1900	40.40	2.22	44.40	9.90	5d036	3650	1277
S32	1900	23.3	1.457	39.83	1.4	40	4.07	-0.43	Pass	Pass	Pass	N/A	N/A	N/A	Jun. 23, 2021	1900	40.40	2.22	44.40	9.90	5d036	3650	1277
S33	835	23.3	0.921	42.338	0.9	41.5	2.33	2.02	Pass	Pass	Pass	N/A	N/A	N/A	Jun. 23, 2021	835	9.52	0.507	10.14	6.51	4d121	3650	1277
S34	1900	23.3	1.457	39.83	1.4	40	4.07	-0.43	Pass	Pass	Pass	N/A	N/A	N/A	Jun. 23, 2021	1900	40.40	2.22	44.40	9.90	5d036	3650	1277
S35	1900	23.1	1.455	39.598	1.4	40	3.93	-1.01	Pass	Pass	Pass	N/A	N/A	N/A	Jun. 28, 2021	1900	40.40	2.07	41.40	2.48	5d036	7537	528
S36	1750	23.2	1.336	38.751	1.37	40.1	-2.48	-3.36	Pass	Pass	Pass	N/A	N/A	N/A	Jun. 24, 2021	1750	36.00	1.73	34.60	-3.89	1055	7472	579
S37	1750	23.1	1.326	40.14	1.37	40.1	-3.21	0.10	Pass	Pass	Pass	N/A	N/A	N/A	Jun. 28, 2021	1750	36.00	1.65	33.00	-8.33	1055	7537	528
S38	835	23.3	0.921	42.338	0.9	41.5	2.33	2.02	Pass	Pass	Pass	N/A	N/A	N/A	Jun. 23, 2021	835	9.52	0.507	10.14	6.51	4d121	3650	1277
S39	2600	23.3	2.026	37.804	1.96	39	3.37	-3.07	Pass	Pass	Pass	N/A	N/A	N/A	Jun. 26, 2021	2600	55.50	2.56	51.20	-7.75	1020	7555	1589
S40	750	23.2	0.897	42.895	0.89	41.9	0.79	2.37	Pass	Pass	Pass	N/A	N/A	N/A	Jun. 24, 2021	750	8.48	0.404	8.08	-4.72	1013	7472	579
S41	750	23.2	0.897	42.895	0.89	41.9	0.79	2.37	Pass	Pass	Pass	N/A	N/A	N/A	Jun. 24, 2021	750	8.48	0.404	8.08	-4.72	1013	7472	579
S42a	3500	23.2	2.938	36.985	2.91	37.9	0.96	-2.41	Pass	Pass	Pass	N/A	N/A	N/A	Jun. 22, 2021	3500	65.60	3.1	62.00	-5.49	1007	7472	579
S42b	3700	23.2	3.088	36.804	3.12	37.7	-1.03	-2.38	Pass	Pass	Pass	N/A	N/A	N/A	Jun. 22, 2021	3700	65.90	3.08	61.60	-6.53	1017	7472	579
S43	1750	23.2	1.319	39.296	1.37	40.1	-3.72	-2.00	Pass	Pass	Pass	N/A	N/A	N/A	Jun. 22, 2021	1750	36.00	1.7	34.00	-5.56	1055	7472	579
S44	1750	23.1	1.326	40.14	1.37	40.1	-3.21	0.10	Pass	Pass	Pass	N/A	N/A	N/A	Jun. 28, 2021	1750	36.00	1.65	33.00	-8.33	1055	7537	528
S45	750	23.2	0.896	43.823	0.89	41.9	0.79	2.37	Pass	Pass	Pass	N/A	N/A	N/A	Jun. 24, 2021	750	8.48	0.404	8.08	-4.72	1013	7472	579
S46	1900	23.3	1.461	39.134	1.4	40	4.36	-2.17	Pass	Pass	Pass	N/A	N/A	N/A	Jul. 22, 2021	1900	40.40	1.86	37.20	-7.92	5d036	3971	1431
S47	1900	23.3	1.461	39.134	1.4	40	4.36	-2.17	Pass	Pass	Pass	N/A	N/A	N/A	Jul. 22, 2021	1900	40.40	1.86	37.20	-7.92	5d036	3971	1431
S48	835	23.3	0.919	41.768	0.9	41.5	2.11	0.65	Pass	Pass	Pass	N/A	N/A	N/A	Jul. 22, 2021	835	9.52	0.507	10.14	6.51	4d121	3971	1431
S49	1750	23.3	1.333	39.672	1.37	40.1	-2.70	-1.07	Pass	Pass	Pass	N/A	N/A	N/A	Jul. 22, 2021	1750	36.00	1.69	33.80	-6.11	1055	3971	1431
S50	1750	23.3	1.333	39.672	1.37	40.1	-2.70	-1.07	Pass	Pass	Pass	N/A	N/A	N/A	Jul. 22, 2021	1750	36.00	1.69	33.80	-6.11	1055	3971	1431
S51	750	23.3	0.893	42.955	0.89	41.9	0.34	2.52	Pass	Pass	Pass	N/A	N/A	N/A	Jul. 22, 2021	750	8.48	0.403	8.06	-4.95	1013	3971	1431
S54	2450	23.3	1.885	38.34	1.8	39.2	4.72	-2.19	Pass	Pass	Pass	OFDM	N/A	Pass	Jul. 03, 2021	2450	51.60	2.34	46.80	-9.30	737	7555	1589
S55	5250	23.3	4.573	36.637	4.71	35.9	-2.91	2.05	Pass	Pass	Pass	OFDM	N/A	Pass	Jul. 03, 2021	5250	80.60	4.4	88.00	9.18	1019	7555	1589
S56	5600	23.3	4.913	36.164	5.07	35.5	-3.10	1.87	Pass	Pass	Pass	OFDM	N/A	Pass	Jul. 03, 2021	5600	82.40	4.35	87.00	5.58	1019	7555	1589
S57	5750	23.3	5.061	35.952	5.22	35.4	-3.05	1.56	Pass	Pass	Pass	OFDM	N/A	Pass	Jul. 03, 2021	5750	79.40	3.69	73.80	-7.05	1019	7555	1589
S58	2450	23.3	1.885	38.34	1.8	39.2	4.72	-2.19	Pass	Pass	Pass	OFDM	N/A	Pass	Jul. 05, 2021	2450	51.60	2.74	54.80	6.20	737	7555	1589
S59	835	23.3	0.946	43.03																			

Tissue Verification									Validation for CW			Validation for Modulation				System Validation					Note		
Plot No.	Frequency (MHz)	Liquid Temp. (°C)	Conductivity (σ)	Permittivity (ε _r)	Targeted Conductivity (σ)	Targeted Permittivity (ε _r)	Deviation Conductivity (σ)	Deviation Permittivity (ε _r)	Sensitivity Range	Probe Linearity	Probe Isotropy	Modulation Type	Duty Factor	PAR	Date	Frequency (MHz)	Targeted 1g SAR (W/kg)	Measured 1g SAR (W/kg)	Normalized 1g SAR (W/kg)	Deviation (%)	Dipole S/N	Probe S/N	DAE S/N
S70	750	23.3	0.886	43.446	0.89	41.9	-0.45	3.69	Pass	Pass	Pass	N/A	N/A	N/A	Jun. 26, 2021	750	8.48	0.435	8.70	2.59	1013	7555	1589
S71a	3500	23.1	2.861	38.786	2.91	37.9	-1.68	2.34	Pass	Pass	Pass	N/A	N/A	N/A	Jun. 29, 2021	3500	65.60	3.4	68.00	3.66	1007	7537	528
S71b	3700	23.1	3.049	38.443	3.12	37.7	-2.28	1.97	Pass	Pass	Pass	N/A	N/A	N/A	Jun. 29, 2021	3700	65.90	3.06	61.20	-7.13	1017	7537	528
S72	1750	23.1	1.326	40.14	1.37	40.1	-3.21	0.10	Pass	Pass	Pass	N/A	N/A	N/A	Jun. 29, 2021	1750	36.00	1.82	36.40	1.11	1055	7537	528
S73	1750	23.1	1.326	40.14	1.37	40.1	-3.21	0.10	Pass	Pass	Pass	N/A	N/A	N/A	Jun. 28, 2021	1750	36.00	1.65	33.00	-8.33	1055	7537	528
S74	750	23.3	0.889	42.793	0.89	41.9	-0.11	2.13	Pass	Pass	Pass	N/A	N/A	N/A	Jun. 26, 2021	750	8.48	0.435	8.70	2.59	1013	7555	1589
S75	1900	23.2	1.454	40.464	1.4	40	3.86	1.16	Pass	Pass	Pass	N/A	N/A	N/A	Jul. 22, 2021	1900	40.40	2.01	40.20	-0.50	5d036	7537	1585
S76	1900	23.2	1.454	40.464	1.4	40	3.86	1.16	Pass	Pass	Pass	N/A	N/A	N/A	Jul. 22, 2021	1900	40.40	1.97	39.40	-2.48	5d036	3650	1277
S77	835	23.3	0.919	41.768	0.9	41.5	2.11	0.65	Pass	Pass	Pass	N/A	N/A	N/A	Jul. 22, 2021	835	9.52	0.507	10.14	6.51	4d121	3971	1431
S78	1750	23.3	1.333	39.672	1.37	40.1	-2.70	-1.07	Pass	Pass	Pass	N/A	N/A	N/A	Jul. 22, 2021	1750	36.00	1.69	33.80	-6.11	1055	3971	1431
S79	1750	23.3	1.333	39.672	1.37	40.1	-2.70	-1.07	Pass	Pass	Pass	N/A	N/A	N/A	Jul. 22, 2021	1750	36.00	1.69	33.80	-6.11	1055	3971	1431
S80	750	23.3	0.893	42.955	0.89	41.9	0.34	2.52	Pass	Pass	Pass	N/A	N/A	N/A	Jul. 22, 2021	750	8.48	0.403	8.06	-4.95	1013	3971	1431
S83	2450	23.1	1.885	38.34	1.8	39.2	4.72	-2.19	Pass	Pass	Pass	OFDM	N/A	Pass	Jul. 02, 2021	2450	51.60	2.47	49.40	-4.26	737	7472	579
S84	5250	23.1	4.573	36.637	4.71	35.9	-2.91	2.05	Pass	Pass	Pass	OFDM	N/A	Pass	Jul. 02, 2021	5250	80.60	3.68	73.60	-8.68	1019	7472	579
S85	5750	23.1	5.061	35.952	5.22	35.4	-3.05	1.56	Pass	Pass	Pass	OFDM	N/A	Pass	Jul. 02, 2021	5750	79.40	3.63	72.60	-8.56	1019	7472	579
S86	2450	23.1	1.885	38.34	1.8	39.2	4.72	-2.19	Pass	Pass	Pass	OFDM	N/A	Pass	Jul. 05, 2021	2450	51.60	2.54	50.80	-1.55	737	3887	861

Tissue Verification									Validation for CW			Validation for Modulation				System Validation					Note		
Plot No.	Frequency (MHz)	Liquid Temp. (°C)	Conductivity (σ)	Permittivity (ε _r)	Targeted Conductivity (σ)	Targeted Permittivity (ε _r)	Deviation Conductivity (σ)	Deviation Permittivity (ε _r)	Sensitivity Range	Probe Linearity	Probe Isotropy	Modulation Type	Duty Factor	PAR	Date	Frequency (MHz)	Targeted 10g SAR (W/kg)	Measured 10g SAR (W/kg)	Normalized 10g SAR (W/kg)	Deviation (%)	Dipole S/N	Probe S/N	DAE S/N
S87	1900	23.1	1.46	38.759	1.4	40	4.29	-3.10	Pass	Pass	Pass	N/A	N/A	N/A	Jul. 01, 2021	1900	21.10	1.13	22.60	7.11	5d036	7472	579
S88	1900	23.1	1.46	38.759	1.4	40	4.29	-3.10	Pass	Pass	Pass	N/A	N/A	N/A	Jul. 01, 2021	1900	21.10	1.13	22.60	7.11	5d036	7472	579
S89	1750	23.1	1.325	39.349	1.37	40.1	-3.28	-1.87	Pass	Pass	Pass	N/A	N/A	N/A	Jul. 01, 2021	1750	18.90	0.963	19.26	1.90	1055	7472	579
S90a	3500	23.1	2.917	36.705	2.91	37.9	0.24	-3.15	Pass	Pass	Pass	N/A	N/A	N/A	Jul. 01, 2021	3500	24.60	1.32	26.40	7.32	1007	7472	579
S90b	3700	23.1	3.088	36.804	3.12	37.7	-1.03	-2.38	Pass	Pass	Pass	N/A	N/A	N/A	Jul. 01, 2021	3700	24.00	1.15	23.00	-4.17	1017	7472	579
S91	1750	23.1	1.325	39.349	1.37	40.1	-3.28	-1.87	Pass	Pass	Pass	N/A	N/A	N/A	Jul. 01, 2021	1750	18.90	0.963	19.26	1.90	1055	7472	579
S92	1900	23.3	1.461	39.134	1.4	40	4.36	-2.17	Pass	Pass	Pass	N/A	N/A	N/A	Jul. 22, 2021	1900	21.10	0.983	19.66	-6.82	5d036	3971	1431
S95	5250	23.3	4.573	36.637	4.71	35.9	-2.91	2.05	Pass	Pass	Pass	OFDM	N/A	Pass	Jul. 03, 2021	5250	23.00	1.26	25.20	9.57	1019	7555	1589
S96	5600	23.3	4.913	36.164	5.07	35.5	-3.10	1.87	Pass	Pass	Pass	OFDM	N/A	Pass	Jul. 03, 2021	5600	23.30	1.26	25.20	8.15	1019	7555	1589