Test report No:
23A0778R-RF-US-P03V01

SAR TEST REPORT

Product Name	Tablet
Trademark	MobileDemand
Model and /or type reference	xTablet T1175
FCC ID	O86-T1175
IC	10591A-T1175
Applicant´s name / address	MobileDemand, LC 1501 Boyson Square Drive, Suite 101, Hiawatha, IA 52233, USA
Test method requested, standard	FCC 47CFR §2.1093 IEEE Std 1528-2013 IEC TR 63170:2018 ANSI C95.1:2019 RSS-102 Measurement (SAR):2021 BS EN IEC/IEEE 62209-1528:2021
Maximum SAR	Standalone SAR: 1g SAR: 1.199 W/kg Simultaneous Transmission SAR: 1g SAR: 1.317 W/kg
Verdict Summary	IN COMPLIANCE
Tested by (name / position & signature)	Tim Cao/Project Engineer Tim.Cao
Approved by (name / position & signature)	Jack Zhang/ Manager Jack Zhang
Date of issue	2023-11-23
Report Version	V1.0
Report template No.	Template_FCC SAR-RF-V1.0

INDEX

Page

COMPETENCES AND GUARANTEES

DEKRA is a testing laboratory competent to carry out the tests described in this report.
In order to assure the traceability to other national and international laboratories, DEKRA has a calibration and maintenance program for its measurement equipment.

DEKRA guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated in the report and it is based on the knowledge and technical facilities available at DEKRA at the time of performance of the test.

DEKRA is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

IMPORTANT: No parts of this report may be reproduced or quoted out of context, in any form or by any means, except in full, without the previous written permission of DEKRA.

GENERAL CONDITIONS

Test Location	No. 99, Hongye Road, Suzhou Industrial Park Suzhou, 215006, P.R. China
Date(receive sample)	Oct. 31, 2023
Date (start test)	Nov. 01, 2023
Date (finish test)	Nov. 07, 2023

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or Competent Authorities.
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ENVIRONMENTAL CONDITIONS

The climatic conditions during the tests are within the limits specified by the manufacturer for the operation of the EUT and the test equipment. The climatic conditions during the tests were within the following limits:

Ambient temperature	18 °C – 25 °C
Relative Humidity air	30% - 60%

If explicitly required in the basic standard or applied product / product family standard the climatic values are recorded and documented separately in this test report.

POSSIBLE TEST CASE VERDICTS

Test case does not apply to test object	N/A
Test object does meet requirement	P (Pass) / PASS
Test object does not meet requirement	F (Fail) / FAIL
Not measured	N/M

DOCUMENT HISTORY

Report No.	Version	Description	Issued Date
23A0778R-RF-US-P03V01	V1.0	Initial issue of report.	2023-11-23

REMARKS AND COMMENTS

1. The equipment under test (EUT) does meet the essential requirements of the stated standard(s)/test(s).
2. These test results on a sample of the device are for the purpose of demonstrating Compliance with FCC 47 CFR§2.1093, IEEE Std 1528-2013, IEC TR 63170:2018, ANSI C95.1:2019, RSS-102 Measurement (SAR):2021.; BS EN IEC/IEEE 62209-1528:2021.
3. The measurement result is considered in conformance with the requirement if it is within the prescribed limit, It is not necessary to account the uncertainty associated with the measurement result.
4. The test results presented in this report relate only to the object tested.
5. The test report shall not be reproduced without the written approval of DEKRA Testing and Certification (Suzhou) Co., Ltd.
6. This report will not be used for social proof function in China market.
7. DEKRA declines any responsibility with the following test data provided by customer that may affect the validity of result:
   - Chapter 1.1 General Description of the Item(s);
   - Chapter 1.2 Antenna Information.
   - Chapter 1.3 Antenna location diagram.
   - Chapter 1.4 Date Rate
   - Chapter 1.3 Channel List.

1 General Information

1.1 General Description of the Item(s)

Product Name ....:	Tablet
Model No. ....:	xTablet T1175
Trademark...................................:	MobileDemand
FCC ID..:	O86-T1175
IC..:	10591A-T1175
SoftwareVersion...........................:	END82ID6.008
HardwareVersion ....:	0B
Operating temperature ....:	-20°C to +50°C
Manufacturer................................:	MobileDemand, LC
Manufacturer address...................:	No.88 East Qianjin Road, Kunshan city, Jiangsu province, China

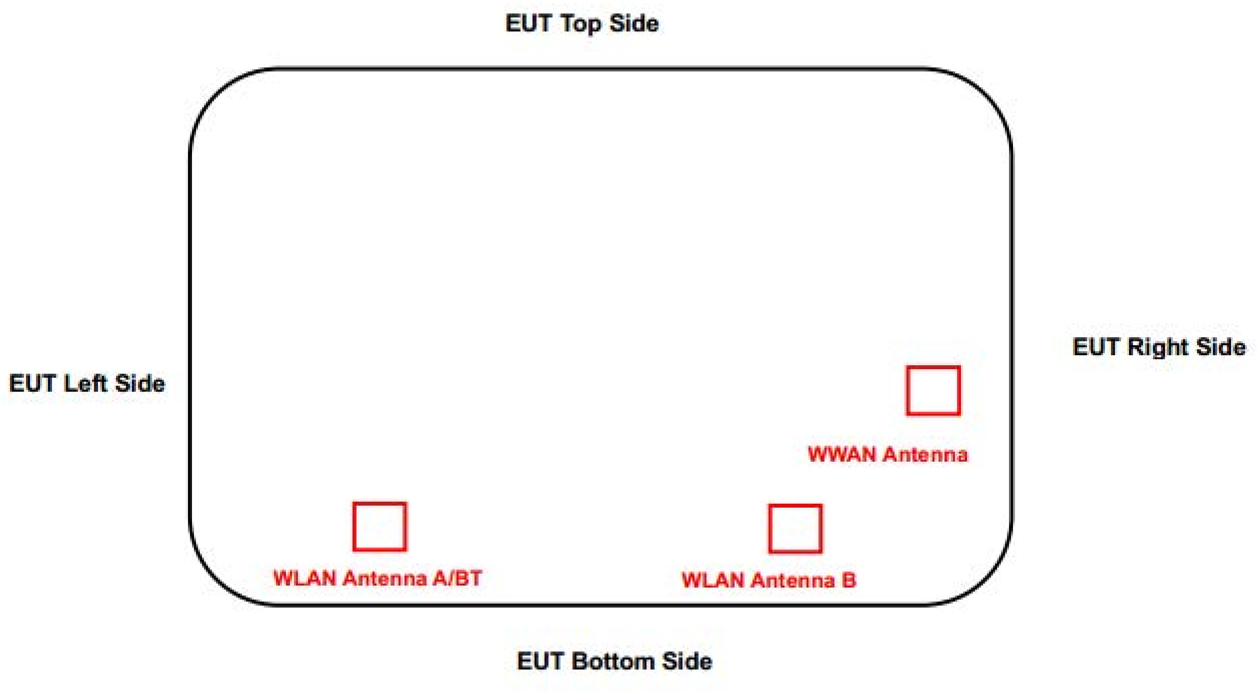
Wireless specification...................:	WIFI 6E
Type of Modulation.......................:	OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM,4096QAM
Frequency Range ....:	U-NII 5: 5925 MHz~ 6425 MHz
	U-NII 6: 6425 MHz~ 6525 MHz
	U-NII 7: 6525 MHz~ 6875 MHz
	U-NII 8: 6875 MHz~ 7125 MHz
Number of Channels ....:	802.11a/n/ac/ax 20MHz: 59
	802.11n/ac/ax 40MHz:29
	802.11ac/ax 80MHz: 14
	802.11ac/ax 160MHz: 7
Date Rate ....:	802.11a: 6/9/12/18/24/36/48/54 Mbps
	802.11n: up to 600 Mbps
	802.11ac: up to 3464 Mbps
	802.11ax: up to 4804 Mbps

Rated power supply............... :	Voltage and Frequency	
	☐	AC: 220 - 240 V, 50/60 Hz
	☐	AC: 100 - 240 V, 50/60 Hz
	☒	Battery 7.68V, 8600mAh, 66Wh
	☐	Poe:
	☒	Adapter:
Adapter Model....................... :	A20-065N3A	
	Input: AC 100-240V~1.6A, 50Hz/60Hz Output: 5V, 3A, 15W; 9V, 3A; 12V, 3A; 15V, 3A; 20V, 3.25A, 65W	
Mounting position .... :	☒	Tabletop equipment
	☐	Wall/Ceiling mounted equipment
	☐	Floor standing equipment
	☒	Hand-held/Portable equipment
	☐	Other:

1.2 Antenna Information

Antenna Delivery ....:	☒	1TX + 1RX		
	☒	2TX + 2RX		
	☐	Others: ………		
Antenna technology.......................:	☒	SISO		
	☒	MIMO	☒	CDD
			☐	Beam-forming
Antenna Type ....:	☐	External	☐	Dipole
			☐	Sectorized
	☒	Internal	☐	Ceramic Chip
			☐	PIFA
			☒	PCB
			☐	Others………

1.3 Antenna location diagram



<EUT Front View>

1.4 Date Rate

MCS Index for 802.11n	Spatial Streams	Data Rate (Mbps)						
		802.11b	802.11g	802.11a	20MHz Bandwidth		40MHz Bandwidth	
					800ns GI	400ns GI	800ns GI	400ns GI
0	1	---	---	6	6.5	7.2	13.5	15.0
1	1	---	---	9	13.0	14.4	27.0	30.0
2	1	---	---	12	19.5	21.7	40.5	45.0
3	1	---	---	18	26.0	28.9	54.0	60.0
4	1	---	---	24	39.0	43.3	81.0	90.0
5	1	---	---	36	52.0	57.8	108.0	120.0
6	1	---	---	48	58.5	65.0	121.5	135.0
7	1	---	---	54	65.0	72.2	135.0	150.0
8	2	---	---	---	13.0	14.4	27.0	30.0
9	2	---	---	---	26.0	28.9	54.0	60.0
10	2	---	---	---	39.0	43.3	81.0	90.0
11	2	---	---	---	52.0	57.8	108.0	120.0
12	2	---	---	---	78.0	86.7	162.0	180.0
13	2	---	---	---	104.0	115.6	216.0	240.0
14	2	---	---	---	117.0	130.0	243.0	270.0
15	2	---	---	---	130.0	144.0	270.0	300.0
16	3	---	---	---	19.5	21.6	40.5	45
17	3	---	---	---	39	43.2	81	90
18	3	---	---	---	58.5	65.1	121.5	135
19	3	---	---	---	78	86.7	162	180
20	3	---	---	---	117	129.9	243	270
21	3	---	---	---	156	173.4	324	360
22	3	---	---	---	175.5	195	364.5	405
23	3	---	---	---	195	216.6	405	450
24	4	---	---	---	26	28.8	54	60
25	4	---	---	---	52	57.6	108	120
26	4	---	---	---	78	86.8	162	180
27	4	---	---	---	104	115.6	216	240
28	4	---	---	---	156	173.2	324	360
29	4	---	---	---	208	231.2	432	480
30	4	---	---	---	234	260	486	540
31	4	---	---	---	260	288.8	540	600

Note1: The blue form is the maximum power data rate.
2: The EUT supports 4 spatial streams.

Spatial Streams (Note1)	MCS Index	Modulation type	Coding rate	Data Rate(Mb/s)							
				20MHz		40MHz		80MHz		160MHz	
				Guard Interval		Guard Interval		Guard Interval		Guard Interval	
				1600ns	800ns	1600ns	800ns	1600ns	800ns	1600ns	800ns
1	0	BPSK	1/2	6.5	7.2	13.5	15	29.3	32.5	58.5	65
	1	QPSK	1/2	13	14.4	27	30	58.5	65	117	130
	2	QPSK	3/4	19.5	21.7	40.5	45	87.8	97.5	175.5	195
	3	16-QAM	1/2	26	28.9	54	60	117	130	234	260
	4	16-QAM	3/4	39	43.3	81	90	175.5	195	351	390
	5	64-QAM	2/3	52	57.8	108	120	234	260	468	520
	6	64-QAM	3/4	58.5	65	121.5	135	263.3	292.5	526.5	585
	7	64-QAM	5/6	65	72.2	135	150	292.5	325	585	650
	8	256-QAM	3/4	78	86.7	162	180	351	390	702	780
	9	256-QAM	5/6	N/A	N/A	180	200	390	433.3	780	866
2	10	BPSK	1/2	13	14.4	27	30	58.6	65	117	130
	11	QPSK	1/2	26	28.8	54	60	117	130	234	260
	12	QPSK	3/4	39	43.4	81	90	175.6	195	351	390
	13	16-QAM	1/2	52	57.8	108	120	234	260	468	520
	14	16-QAM	3/4	78	86.6	162	180	351	390	702	780
	15	64-QAM	2/3	104	115.6	216	240	468	520	936	1040
	16	64-QAM	3/4	117	130	243	270	526.6	585	1053	1170
	17	64-QAM	5/6	130	144.4	270	300	585	650	1170	1300
	18	256-QAM	3/4	156	173.4	324	360	702	780	1404	1560
	19	256-QAM	5/6	N/A	N/A	360	400	780	866.6	1560	1732
3	20	BPSK	1/2	19.5	21.6	40.5	45	87.9	97.5	175.5	195
	21	QPSK	1/2	39	43.2	81	90	175.5	195	351	390
	22	QPSK	3/4	58.5	65.1	121.5	135	263.4	292.5	526.5	585
	23	16-QAM	1/2	78	86.7	162	180	351	390	702	780
	24	16-QAM	3/4	117	129.9	243	270	526.5	585	1053	1170
	25	64-QAM	2/3	156	173.4	324	360	702	780	1404	1560
	26	64-QAM	3/4	175.5	195	364.5	405	789.9	877.5	1579.5	1755
	27	64-QAM	5/6	195	216.6	405	450	877.5	975	1755	1950
	28	256-QAM	3/4	234	260.1	486	540	1053	1170	2106	2340
	29	256-QAM	5/6	N/A	N/A	540	600	1170	1299.9	2340	2598
4	30	BPSK	1/2	26	28.8	54	60	117.2	130	234	260
	31	QPSK	1/2	52	57.6	108	120	234	260	468	520
	32	QPSK	3/4	78	86.8	162	180	351.2	390	702	780
	33	16-QAM	1/2	104	115.6	216	240	468	520	936	1040
	34	16-QAM	3/4	156	173.2	324	360	702	780	1404	1560
	35	64-QAM	2/3	208	231.2	432	480	936	1040	1872	2080
	36	64-QAM	3/4	234	260	486	540	1053.2	1170	2106	2340
	37	64-QAM	5/6	260	288.8	540	600	1170	1300	2340	2600
	38	256-QAM	3/4	312	346.8	648	720	1404	1560	2808	3120
	39	256-QAM	5/6	N/A	N/A	720	800	1560	1733.2	3120	3464

Note 1: The blue form is the maximum power data rate.
2: The EUT supports 4 spatial streams.

Spatial Streams (Note1)	MCS Index	Modulation type	Coding rate	Data Rate(Mb/s)							
				20MHz		40MHz		80MHz		160MHz	
				Guard Interval		Guard Interval		Guard Interval		Guard Interval	
				1600 ns GI	800 ns GI	1600 ns GI	800 ns GI	1600 ns GI	800 ns GI	1600 ns GI	800 ns GI
1	0	BPSK	1/2	4	4	8	9	17	18	34	36
	1	QPSK	1/2	16	17	33	34	68	72	136	144
	2	QPSK	3/4	24	26	49	52	102	108	204	216
	3	16-QAM	1/2	33	34	65	69	136	144	272	282
	4	16-QAM	3/4	49	52	98	103	204	216	408	432
	5	64-QAM	2/3	65	69	130	138	272	288	544	576
	6	64-QAM	3/4	73	77	146	155	306	324	613	649
	7	64-QAM	5/6	81	86	163	172	340	360	681	721
	8	256-QAM	3/4	98	103	195	207	408	432	817	865
	9	256-QAM	5/6	108	115	217	229	453	480	907	961
	10	1024-QAM	3/4	122	129	244	258	510	540	1021	1081
	11	1024-QAM	5/6	135	143	271	287	567	600	1134	1201
2	12	BPSK	1/2	8	8	16	18	34	36	68	72
	13	QPSK	1/2	32	34	66	68	136	144	272	288
	14	QPSK	3/4	48	52	98	104	204	216	408	432
	15	16-QAM	1/2	66	68	130	138	272	288	544	564
	16	16-QAM	3/4	98	104	196	206	408	432	816	864
	17	64-QAM	2/3	130	138	260	276	544	576	1088	1152
	18	64-QAM	3/4	146	154	292	310	612	648	1226	1298
	19	64-QAM	5/6	162	172	326	344	680	720	1362	1442
	20	256-QAM	3/4	196	206	390	414	816	864	1634	1730
	21	256-QAM	5/6	216	230	434	458	906	960	1814	1922
	22	1024-QAM	3/4	244	258	488	516	1020	1080	2042	2162
	23	1024-QAM	5/6	270	286	542	574	1134	1200	2268	2402
3	24	BPSK	1/2	12	12	24	27	51	54	102	108
	25	QPSK	1/2	48	51	99	102	204	216	408	432
	26	QPSK	3/4	72	78	147	156	306	324	612	648
	27	16-QAM	1/2	99	102	195	207	408	432	816	846
	28	16-QAM	3/4	147	156	294	309	612	648	1224	1296
	29	64-QAM	2/3	195	207	390	414	816	864	1632	1728
	30	64-QAM	3/4	219	231	438	465	918	972	1839	1947
	31	64-QAM	5/6	243	258	489	516	1020	1080	2043	2163
	32	256-QAM	3/4	294	309	585	621	1224	1296	2451	2595
	33	256-QAM	5/6	324	345	651	687	1359	1440	2721	2883
	34	1024-QAM	3/4	366	387	732	774	1530	1620	3063	3243
	35	1024-QAM	5/6	405	429	813	861	1701	1800	3402	3603
4	36	BPSK	1/2	16	16	32	36	68	72	136	144
	37	QPSK	1/2	64	68	132	136	272	288	544	576
	38	QPSK	3/4	96	104	196	208	408	432	816	864
	39	16-QAM	1/2	132	136	260	276	544	576	1088	1128
	40	16-QAM	3/4	196	208	392	412	816	864	1632	1728
	41	64-QAM	2/3	260	276	520	552	1088	1152	2176	2304
	42	64-QAM	3/4	292	308	584	620	1224	1296	2452	2596

	43	64-QAM	5/6	324	344	652	688	1360	1440	2724	2884
	44	256-QAM	3/4	392	412	780	828	1632	1728	3268	3460
	45	256-QAM	5/6	432	460	868	916	1812	1920	3628	3844
	46	1024-QAM	3/4	488	516	976	1032	2040	2160	4084	4324
	47	1024-QAM	5/6	540	572	1084	1148	2268	2400	4536	4804
Note 1: The blue form is the maximum power data rate. 2: The EUT supports 4 spatial streams.											

Symbol	Explanation
R	Code rate
GI	guard interval

Note: We have evaluated low/mid/high data rate, the blue font is the highest power data rate.

1.5 Channel List

U-NII 5:

802.11a/n/ac/ax(20MHz) Working Frequency of Each Channel:							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	5955 MHz	5	5975 MHz	9	5995 MHz	13	6015 MHz
17	6035 MHz	21	6055 MHz	25	6075 MHz	29	6095 MHz
33	6115 MHz	37	6135 MHz	41	6155 MHz	45	6175 MHz
49	6195 MHz	53	6215 MHz	57	6235 MHz	61	6255 MHz
65	6275 MHz	69	6295 MHz	73	6315 MHz	77	6335 MHz
81	6355 MHz	85	6375 MHz	89	6395 MHz	93	6415 MHz
802.11n/ac/ax(40MHz) Working Frequency of Each Channel:							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
3	5965 MHz	11	6005 MHz	19	6045 MHz	27	6085 MHz
35	6125 MHz	43	6165 MHz	51	6205 MHz	59	6245 MHz
67	6285 MHz	75	6325 MHz	83	6365 MHz	81	6405 MHz
802.11ac/ax(80MHz) Working Frequency of Each Channel:							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
7	5985 MHz	23	6065 MHz	39	6145 MHz	55	6225 MHz
71	6305 MHz	87	6385 MHz	N/A	N/A	N/A	N/A
802.11ac/ax(160MHz) Working Frequency of Each Channel:							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
15	6025 MHz	47	6185 MHz	79	6345 MHz	N/A	N/A

U-NII 6:

802.11a/n/ac/ax(20MHz) Working Frequency of Each Channel:							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
97	6435 MHz	101	6455 MHz	105	6475 MHz	109	6495 MHz
113	6515 MHz	N/A	N/A	N/A	N/A	N/A	N/A
802.11n/ac/ax(40MHz) Working Frequency of Each Channel:							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
99	6465 MHz	107	6485 MHz	115	6525 MHz	N/A	N/A
802.11ac/ax(80MHz) Working Frequency of Each Channel:							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
109	6465 MHz	119	6545 MHz	N/A	N/A	N/A	N/A
802.11ac/ax(160MHz) Working Frequency of Each Channel:							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
111	6505 MHz	N/A	N/A	N/A	N/A	N/A	N/A

Note: The blue form are channels crossing U-NII 6 and U-NII 7.

U-NII 7:

802.11a/n/ac/ax(20MHz) Working Frequency of Each Channel:							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
117	6535 MHz	121	6555 MHz	125	6575 MHz	129	6595 MHz
133	6615 MHz	137	6635 MHz	141	6655 MHz	145	6675 MHz
149	6695 MHz	153	6715 MHz	157	6735 MHz	161	6755 MHz
165	6775 MHz	169	6795 MHz	173	6815 MHz	177	6835 MHz
181	6855 MHz	185	6875 MHz	N/A	N/A	N/A	N/A
802.11n/ac/ax(40MHz) Working Frequency of Each Channel:							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
115	6525 MHz	123	6565 MHz	131	6605 MHz	139	6645 MHz
147	6685 MHz	155	6725 MHz	163	6765 MHz	171	6805 MHz
179	6845 MHz	187	6885 MHz	N/A	N/A	N/A	N/A
802.11ac/ax(80MHz) Working Frequency of Each Channel:							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
119	6545 MHz	135	6625 MHz	151	6705 MHz	167	6785 MHz
183	6865 MHz	N/A	N/A	N/A	N/A	N/A	N/A
802.11ac/ax(160MHz) Working Frequency of Each Channel:							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency

111	6505 MHz	143	6665 MHz	175	6825 MHz	N/A	N/A

Note: The blue form are channels crossing U-NII 6 and U-NII 7; The orange form are channels crossing U-NII 7 and U-NII 8.

U-NII 8:

802.11a/n/ac/ax(20MHz) Working Frequency of Each Channel:							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
185	6875 MHz	189	6895 MHz	193	6915 MHz	197	6935 MHz
201	6955 MHz	205	6975 MHz	209	6995 MHz	213	7015 MHz
217	7035 MHz	221	7055 MHz	225	7075 MHz	229	7095 MHz
233	7115 MHz	N/A	N/A	N/A	N/A	N/A	N/A
802.11n/ac/ax(40MHz) Working Frequency of Each Channel:							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
187	6885 MHz	195	6925 MHz	203	6965 MHz	211	7005 MHz
219	7045 MHz	227	7085 MHz	N/A	N/A	N/A	N/A
802.11ac/ax(80MHz) Working Frequency of Each Channel:							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
183	6865 MHz	199	6945 MHz	215	7025 MHz	N/A	N/A
802.11ac/ax(160MHz) Working Frequency of Each Channel:							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
175	6825 MHz	207	6985 MHz	N/A	N/A	N/A	N/A

Note: The orange form are channels crossing U-NII 7 and U-NII 8.

Note: The general description of the Item(s), antenna information, data rate and channel list in clause 1 are provided and confirmed by the client.

1.6 Power setting in test

Mode	Channel	Frequency (MHz)	Power setting		
			SISO:ANT1	SISO:ANT2	CDD:ANT1+2
802.11a	36	5180	13.0	12.0	N/A
	44	5220	13.0	12.0	N/A
	48	5240	13.0	12.0	N/A
	52	5260	13.0	12.0	N/A
	60	5300	13.0	12.0	N/A
	64	5320	13.0	12.0	N/A
	100	5500	13.0	12.0	N/A
	116	5580	13.0	12.0	N/A
	140	5700	13.0	12.0	N/A
	149	5745	13.0	12.0	N/A
	157	5785	13.0	12.0	N/A
	165	5825	13.0	12.0	N/A
802.11n(20MHz)	36	5180	13.0	12.0	13.0
	44	5220	13.0	12.0	13.0
	48	5240	13.0	12.0	13.0
	52	5260	13.0	12.0	13.0
	60	5300	13.0	12.0	13.0
	64	5320	13.0	12.0	13.0
	100	5500	13.0	12.0	13.0
	116	5580	13.0	12.0	13.0
	140	5700	13.0	12.0	13.0
	149	5745	13.0	12.0	13.0
	157	5785	13.0	12.0	13.0
	165	5825	13.0	12.0	13.0
802.11n(40MHz)	38	5190	13.0	12.0	13.0
	46	5230	13.0	12.0	13.0
	54	5270	13.0	12.0	13.0
	62	5310	13.0	12.0	13.0
	102	5510	13.0	12.0	13.0
	118	5590	13.0	12.0	13.0
	134	5670	13.0	12.0	13.0
	151	5755	13.0	12.0	13.0

	159	5795	13.0	12.0	13.0
802.11ac(20MHz)	36	5180	13.0	12.0	13.0
	44	5220	13.0	12.0	13.0
	48	5240	13.0	12.0	13.0
	52	5260	13.0	12.0	13.0
	60	5300	13.0	12.0	13.0
	64	5320	13.0	12.0	13.0
	100	5500	13.0	12.0	13.0
	116	5580	13.0	12.0	13.0
	140	5700	13.0	12.0	13.0
	149	5745	13.0	13.0	13.0
	157	5785	13.0	13.0	13.0
	165	5825	13.0	13.0	13.0
802.11ac(40MHz)	38	5190	13.0	12.0	13.0
	46	5230	13.0	12.0	13.0
	54	5270	13.0	12.0	13.0
	62	5310	13.0	12.0	13.0
	102	5510	13.0	12.0	13.0
	118	5590	13.0	12.0	13.0
	134	5670	13.0	12.0	13.0
	151	5755	13.0	13.0	13.0
	159	5795	13.0	13.0	13.0
802.11ac(80MHz)	42	5210	13.0	12.0	13.0
	58	5290	13.0	12.0	13.0
	106	5530	13.0	12.0	13.0
	155	5775	13.0	12.0	13.0

2 INTRODUCTION

2.1 SAR Definition

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

The SAR definition is the time derivative (rate) of the incremental energy (dw) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density (p).The equation description is as below:

$$\mathrm{SAR} = \frac{d}{dt}\left(\frac{dW}{dm}\right) = \frac{d}{dt}\left(\frac{dW}{\rho dv}\right)$$

SAR measurement can be related to the electrical field in the tissue by

$$\mathrm{SAR} = \frac{\sigma|E|^2}{\rho}$$

Where:

σ= conductivity of the tissue (S/m)

p= mass density of the tissue (kg/m3)

E = RMS electric field strength (V/m)

SAR is expressed in units of Watts per kilogram (W/kg).

2.2 Power Density Definition

The power density for an electromagnetic field represents the rate of energy transfer per unit area. The local power density (i.e. Poynting vector) at a given spatial point is deduced from electromagnetic fields by the following formula:

$$S = \frac{1}{2}\mathrm{Re}\{E \times H^*\} \cdot \vec{n}$$

Where: E is the complex electric field peak phasor and H is the complex conjugate magnetic field peak phasor.

The spatial-average power density distribution on the evaluation surface is determined per the IEC TR 63170. The spatial area, Ais specified by the applicable exposure limit or regulatory requirements. The circular shape was used.

$$S_{av} = \frac{1}{2A}\Re\left(\int E \times H^* \cdot \hat{n} dA\right)$$

2.3 RF Exposure Limits

Table 1 Safety Limits for Controlled / Uncontrolled Environment Exposure

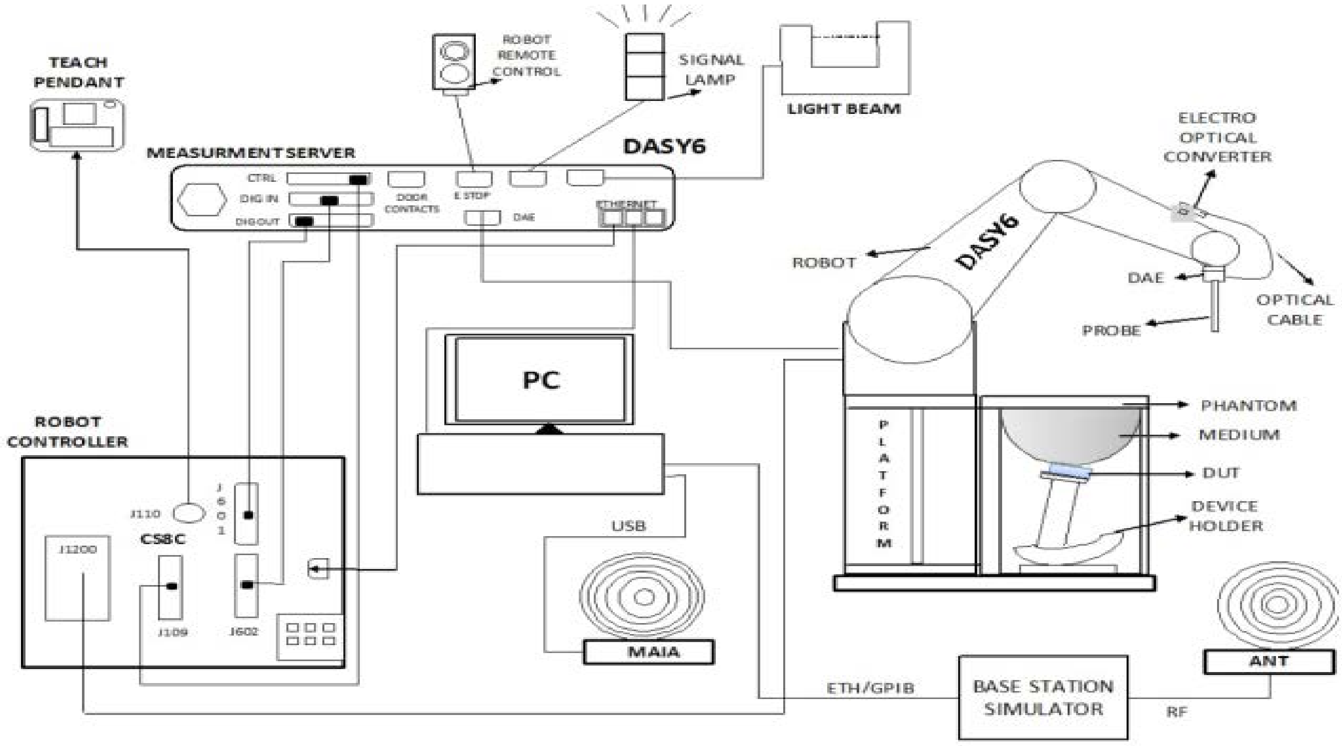
SAR Exposure Limit		
	General Population / Uncontrolled Exposure [1] (W/kg)	Occupational / Controlled Exposure [2] (W/kg)
Spatial Peak SAR [3] (head or Body)	1.60	8.00
Spatial Peak SAR [4] (Whole Body)	0.08	0.40
Spatial Peak SAR [5] (Hands / Feet / Ankle / Wrist)	4.00	20.00
Power Density Exposure Limit (1,500 - 100,000 MHz)		
	General Population / Uncontrolled Exposure (mW/cm^2) [6]	Occupational / Controlled Exposure (mW/cm^2)
Power Density (S)	1.0	5.0

Notes:

1. **General Population / Uncontrolled Environments** are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.
2. **Occupational / Controlled Environments** are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation).
3. The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.
4. The Spatial Average value of the SAR averaged over the whole body.
5. The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.
6. 1 mW/cm^2 = 10 W/m^2,

3 SAR MEASUREMENT SYSTEM

3.1 DASY6 SAR System Description

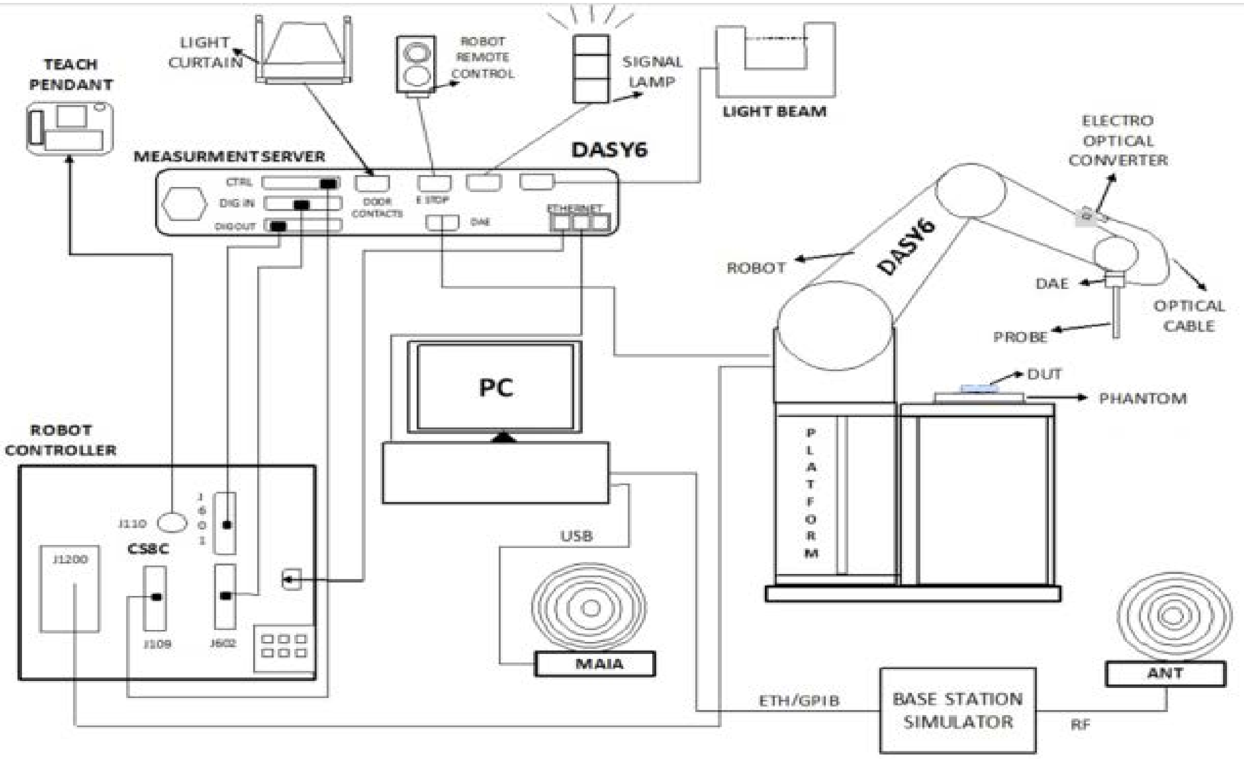


The DASY6 system for performing compliance tests consists of the following items:
1. A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
2. A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
3. The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
4. The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
5. A computer running Windows 11 and the DASY6 software.
6. Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
7. The phantom, the device holder and other accessories according to the targeted measurement.

3.2 DASY6 Power Density System Description

DASY6 system

Power density measurements for mmWave frequencies were performed using SPEAG DASY6 with cDASY6 5G module. The DASY6 included a high precision robotics system (Staubli), robot controller, desktop computer, near-field probe, probe alignment sensor, and the 5G phantom cover.



EUmmWVx probe:
The EUmmWVx probe is based on the pseudo-vector probe design, which not only measures the field magnitude but also derives its polarization ellipse. The design entails two small0.8mm dipole sensors mechanically protected by high-density foam, printed on both sides of a0.9mm wide and 0.12mm thick glass substrate. The body of the probe is specifically constructed to minimize distortion by the scattered fields. The probe consist of two sensors with different angles (1 and 2) arranged in the same plane in the probe axis. Three or more measurements of the two sensors are taken for different probe rotational angles to derive the amplitude and polarization information. The probe design allows measurements at distances as small as 2mm from the sensors to the surface of the device under test (DuT). The typical sensor to probe tip distance is 1.5 mm. The exact distance is calibrated.2. A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted.

2.1.1. Applications

Predefined procedures and evaluations for automated compliance testing with all worldwide standards, e.g., IEC/IEEE 62209-1528, EN 50360, EN 50383, EN62311 and others.

2.1.2. Area & Zoom Scan Procedures

First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan measures points and step size follow as below. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR-distribution. The measure settings are referred to KDB 865664 D01v01r04:

<table>
<tr><th colspan="3"></th><th>≤ 3 GHz</th><th>> 3 GHz</th></tr>
<tr><td colspan="3">Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface</td><td>5 mm ± 1 mm</td><td>½·δ·ln(2) mm ± 0.5 mm</td></tr>
<tr><td colspan="3">Maximum probe angle from probe axis to phantom surface normal at the measurement location</td><td>30° ± 1°</td><td>20° ± 1°</td></tr>
<tr><td colspan="3" rowspan="2">Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}</td><td>≤ 2 GHz: ≤ 15 mm
2 – 3 GHz: ≤ 12 mm</td><td>3 – 4 GHz: ≤ 12 mm
4 – 6 GHz: ≤ 10 mm</td></tr>
<tr><td colspan="2">When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.</td></tr>
<tr><td colspan="3">Maximum zoom scan spatial resolution: Δx_{Area}, Δy_{Area}</td><td>≤ 2 GHz: ≤ 8 mm
2 – 3 GHz: ≤ 5 mm*</td><td>3 – 4 GHz: ≤ 5 mm*
4 – 6 GHz: ≤ 4 mm*</td></tr>
<tr><td rowspan="3">Maximum zoom scan spatial resolution, normal to phantom surface</td><td colspan="2">uniform grid: $\Delta z_{Zoom}(n)$</td><td>≤ 5 mm</td><td>3 – 4 GHz: ≤ 4 mm
4 – 5 GHz: ≤ 3 mm
5 – 6 GHz: ≤ 2 mm</td></tr>
<tr><td rowspan="2">Graded grid</td><td>$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface</td><td>≤ 4 mm</td><td>3 – 4 GHz: ≤ 3 mm
4 – 5 GHz: ≤ 2.5 mm
5 – 6 GHz: ≤ 2 mm</td></tr>
<tr><td>$\Delta z_{Zoom}(n>1)$: between subsequent points</td><td colspan="2">≤ 1.5·$\Delta z_{Zoom}(n-1)$ mm</td></tr>
<tr><td>Minimum zoom scan volume</td><td colspan="2">x, y, z</td><td>≥ 30 mm</td><td>3 – 4 GHz: ≥ 28 mm
4 – 5 GHz: ≥ 25 mm
5 – 6 GHz: ≥ 22 mm</td></tr>
<tr><td colspan="5">Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see IEEE Std 1528-2013 for details.
* When zoom scan is required and the reported SAR from the area scan based 1-g SAR estimation procedures of KDB Publication 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.</td></tr>
</table>

2.1.4. Uncertainty of Inter-/Extrapolation and Averaging

In order to evaluate the uncertainty of the interpolation, extrapolation and averaged SAR calculation algorithms of the Postprocessor, DASY6 allows the generation of measurement grids which are artificially predefined by analytically based test functions. Therefore, the grids of area scans and zoom scans can be filled with uncertainty test data, according to the SAR benchmark functions of IEC/IEEE 62209-1528.The three analytical functions shown in equations as below are used to describe the possible range of the expected SAR distributions for the tested handsets. The field gradients are covered by the spatially flat distribution f1, the spatially steep distribution f3 and f2 accounts for H-field cancellation on the phantom/tissue surface.

$$f_1(x,y,z) = Ae^{-\frac{z}{2a}} \cos^2\left(\frac{\pi}{2}\frac{\sqrt{x'^2+y'^2}}{5a}\right)$$

$$f_2(x,y,z) = Ae^{-\frac{z}{a}} \frac{a^2}{a^2+x'^2}\left(3-e^{-\frac{2z}{a}}\right)\cos^2\left(\frac{\pi}{2}\frac{y'}{3a}\right)$$

$$f_3(x,y,z) = A\frac{a^2}{\frac{a^2}{4}+x'^2+y'^2}\left(e^{-\frac{2z}{a}}+\frac{a^2}{2(a+2z)^2}\right)$$

3.3 DASY6 E-Field Probe

The SAR measurement is conducted with the dosimetric probe manufactured by SPEAG. The probe is specially designed and calibrated for use in liquid with high permittivity. The dosimetric probe has special calibration in liquid at different frequency.

SPEAG conducts the probe calibration in compliance with international and national standards (e.g. IEC/IEEE 62209-1528, etc.) under ISO 17025. The calibration data are in Appendix D**.**

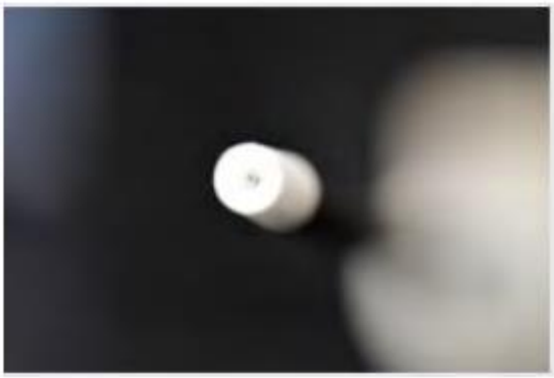
Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Frequency	4 MHz to 10 GHz Linearity: ± 0.2 dB (30 MHz to 10 GHz)
Directivity	±0.1 dB in TSL (rotation around probe axis) ±0.3 dB in TSL (rotation normal to probe axis)
Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm
Calibration	ISO/IEC 17025 calibration service available

EX3DV4 E-Field Probe

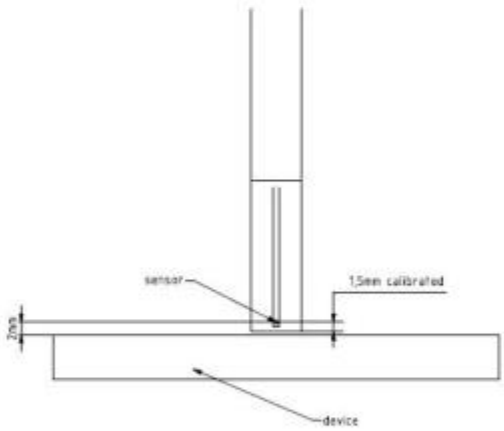
Probe setup on robot

The EUmmWV3 probe is based on the pseudo-vector probe design, which not only measures the field magnitude but also derives its polarization ellipse. This probe concept also has the advantage that the sensor angle errors or distortions of the field by the substrate can be largely nullified by calibration. This is particularly important as, at these very high frequencies, field distortions by the substrate are dependent on the wavelength. It has two dipoles optimally arranged to obtain pseudo-vector information. It has minimum 3 measurements/point, 120° rotated around probe axis. Sensors (0.8 mm length) printed on glass substrate protected by high density foam. Low perturbation of the measured field. Requires positioner which can do accurate probe rotation.

Frequency Range	750 MHz - 110 GHz
Dynamic Range	< 20 V/m - 10'000 V/m with PRE-10 (min < 50 V/m - 3000 V/m)
Position Precision	< 0.2 mm
Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: encapsulation 8 mm (internal sensor < 1mm) Distance from probe tip to dipole centers: < 2 mm Sensor displacement to probe's calibration point: < 0.3 mm
Applications	Electric field measurements of 5G devices and other mm-wave transmitters operating above 10 GHz in <2 mm distance from device (free-space) Power density, magnetic field, and far-field analysis using total field reconstruction (cDASY6 5G or ICEy-mmW module required)
compatibility	cDASY6 + 5G-Module SW1.0 and higher



E-Field mm-Wave Probe



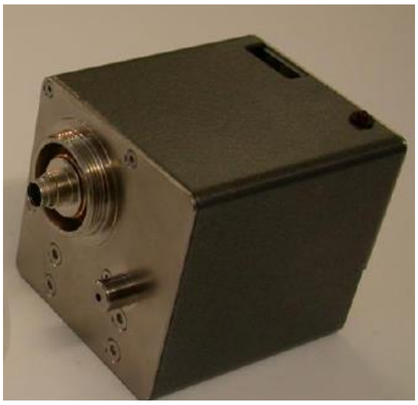
Sensor to DUT Surface

3.4 Boundary Detection Unit and Probe Mounting Device

The DASY probes use a precise connector and an additional holder for the probe, consisting of a plastic tube and a flexible silicon ring to center the probe. The connector at the DAE is flexibly mounted and held in the default position with magnets and springs. Two switching systems in the connector mount detect frontal and lateral probe collisions and trigger the necessary software response.

3.5 DATA Acquisition Electronics (DAE) and Measurement Server

The data acquisition electronics (DAE) consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit.
Transmission to the measurement server is accomplished through an optical downlink for data and status information as well as an optical uplink for commands and the clock.
The input impedance of the DAE4 is 200M Ohm; the inputs are symmetrical and floating. Common mode rejection is above 80dB.



The DASY6 measurement server is based on a PC/104 CPU board with a 400MHz intel ULV Celeron, 128MB chipdisk and 128MB RAM. The necessary circuits for communication with the DAE electronics box, as well as the 16 bit AD converter system for optical detection and digital I/O interface are contained on the DASY6 I/O board, which is directly connected to the PC/104 bus of the CPU board.

3.6 Robot

The DASY6 system uses the high precision robots TX60 XL type out of the newer series from Stäubli SA (France). For the 6-axis controller DASY6 system, the CS8C robot controller version from Stäubli is used.
The XL robot series have many features that are important for our application:

- High precision (repeatability 0.02 mm)
- High reliability (industrial design)
- Jerk-free straight movements
- Low ELF interference (the closed metallic construction shields against motor control fields)
- 6-axis controller

3.7 Light Beam Unit

The light beam switch allows automatic "tooling" of the probe. During the process, the actual position of the probe tip with respect to the robot arm is measured, as well as the probe length and the horizontal probe offset. The software then corrects all movements, such that the robot coordinates are valid for the probe tip.
The repeatability of this process is better than 0.1 mm. If a position has been taught with an aligned probe, the same position will be reached with another aligned probe within 0.1 mm, even if the other probe has different dimensions. During probe rotations, the probe tip will keep its actual position.

3.8 Device Holder

The DASY6 device holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation center for both scales is the ear reference point (EPR).
Thus the device needs no repositioning when changing the angles.
The DASY6 device holder has been made out of low-loss POM material having the following dielectric parameters: relative permittivity εr =3 and loss tangent δ = 0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.

The extension is lightweight and made of POM, acrylic glass and foam. It fits easily on the upper part of the mounting device in place of the phone positioned. The extension is fully compatible with the SAM Twin and ELI phantoms.

The DASY6 device holder has been made out of low-loss POM material having the following dielectric parameters: relative permittivity εr =3 and loss tangent δ = 0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.

3.9 SAM Twin Phantom

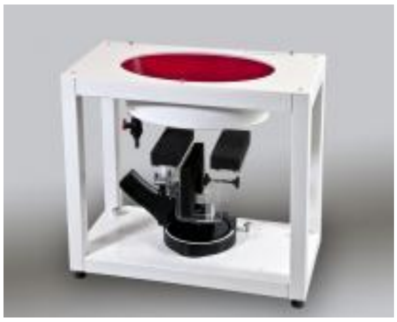
SAM Twin Phantom

The SAM twin phantom is a fiberglass shell phantom with 2mm shell thickness (except the ear region where shell thickness increases to 6mm). It has three measurement areas:

- Left head
- Right head
- Flat phantom

The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. A white cover is provided to tap the phantom during off-periods to prevent water evaporation and changes in the liquid parameters. On the phantom top, three reference markers are provided to identify the phantom position with respect to the robot.

ELI Phantom



The SAM phantom is a fiberglass shell phantom with 2mm shell thickness. It has one measurement areas:

- ELI phantom

The ELI phantom is intended for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI4 is fully compatible with standard and all known tissue simulating liquids.

4 TISSUE SIMULATING LIQUID

4.1 The composition of the tissue simulating liquid

Simulate 600MHz~10000MHz liquid, manufactured by SPEAG

Table F.1 – Suggested recipes for achieving target dielectric properties, 30 MHz to 900 MHz

Frequency (MHz)	30	50		144		450		835	900	
Recipe source number	3	3	2	2	3	2	4	2	2	4
Ingredients (% by weight)										
De-ionized water	48,30	48,30	53,53	55,12	48,30	48,53	56	50,36	50,31	56
Tween 20			44,70	43,31		49,51		48,39	48,34	
Oxidized mineral oil							44			44
Diethylenglycol monohexylether										
Triton X-100										
Diacetin	50,00	50,00			50,00					
DGBE										
NaCl	1,60	1,60	1,77	1,57	1,60	1,96		1,25	1,35	
Additives and salt	0,10	0,10			0,10					
Measured temperature dependence										
Temp. (°C)			21	21		21	20	21	21	20
$\varepsilon_{\text{liquid temp. unc.}}$ (%)	0,8	0,1			0,1	0,1		0,04	0,04	
$\sigma_{\text{liquid temp. unc.}}$ (%)	2,8	2,8			2,6	4,2		1,6	1,6	

Table F.2 – Suggested recipes for achieving target dielectric properties, 1 800 MHz to 10 000 MHz

Frequency (MHz)	1 800		2 450	4 000	5 000	5 200	5 800	6 000	8 000	10 000
Recipe source number	2	4	4	4	4	1	1	4	5	5
Ingredients (% by weight)										
De-ionized water	54,23	56	56	56	56	65,53	65,53	56	67,8	66,0
Tween	45,27								31,1	33,0
Oxidized mineral oil		44	44	44	44			44		
Diethylenglycol monohexylether						17,24	17,24			
Triton X-100						17,24	17,24			
Diacetin										
DGBE										
NaCl	0,50									
Additives and salt										
Measured temperature dependence										
Temp. (°C)	21	20	20	20	20	22	22	20	20	20
$\varepsilon_{\text{liquid temp. unc.}}$ (%)	0,4					1,7	1,8			
$\sigma_{\text{liquid temp. unc.}}$ (%)	2,3					2,7	2,6			

NOTE 1 Multiple columns under a single frequency indicate optional recipes.

NOTE 2 Recipe source numbers: 1 verified by different labs, 2 Reference [59], 3 developed by IT'IS Foundation, 4 developed by IT'IS Foundation, 5 Reference [60].

NOTE 3 The values of $\varepsilon_{\text{liquid temp. unc.}}$ and $\sigma_{\text{liquid temp. unc.}}$ are liquid temperature uncertainties described in O.9.6, based on measurements of the applicable liquid recipes given above. These are not part of the original publications but have been subsequently developed by the project team.

NOTE 4 The recipes at 8 000 MHz and 10 000 MHz are sufficiently broadband that they cover the frequency range of 6 000 MHz to 10 000 MHz within a tolerance of ±10 % for permittivity and conductivity.

4.2 Tissue Calibration Result

The dielectric parameters of the liquids were verified prior to the SAR evaluation using DASY6 Dielectric Probe Kit and Agilent Vector Network Analyzer E5071C

Head Tissue Simulant Measurement				
Frequency [MHz]	Description	Dielectric Parameters		Tissue Temp. [°C]
		ε_r	σ [s/m]	
6500 MHz	Reference result ± 5% window	34.5 32.78 to 36.23	6.07 5.77 to 6.37	N/A
	01-11-2023	34.38	6.01	21.0

Head Tissue Simulant Measurement							
Frequency [MHz]	Dielectric Parameters						Tissue Temp. [°C]
	Conductivity σ	Permittivity εr	Conductivity Target σ	Permittivity Target εr	Delta (σ) %	Delta (εr) %	
6025	5.45	34.99	5.51	35.07	-1.09	-0.31	21.0
6185	5.58	34.78	5.70	34.88	-2.11	-0.34	21.0
6345	5.81	34.61	5.89	34.69	-1.36	-0.26	21.0
6505	6.03	34.34	6.08	34.49	-0.82	-0.46	21.0
6665	6.23	34.21	6.26	34.30	-0.48	-0.26	21.0
6825	6.41	34.03	6.45	34.11	-0.62	-0.21	21.0
6985	6.65	33.91	6.63	33.92	0.30	0.03	21.0

Note:

1. The delta (εr) and (σ) are within ±5%, delta SAR value was not calculated in this report.
2. As per IEC/IEEE 62209-1528 Annex F, the SAR correction factor is given by:

   $\Delta SAR = c_\varepsilon \, \Delta\varepsilon_r + c_\sigma \, \Delta\sigma$

   For the1g average SAR Cε and Cσ are given by:
   Cε = -7.854x10^-4f^3 + 9.402x10^-3f^2 – 2.742x10^-2f – 0.2026
   Cσ = 9.804x10^-3f^3 – 8.661x10^-2f^2 + 2.981x10^-2f + 0.7829
   Where f is the frequency in GHz.

Head Tissue Simulant Measurement						
Frequency [MHz]	Dielectric Parameters					Tissue Temp. [°C]
	Delta (σ) %	Delta (ε r) %	Cσ	Cε	Delta SAR%	
6025	-1.09	-0.31	-0.04	-0.20	0.10	21.0
6185	-2.11	-0.34	-0.03	-0.20	0.12	21.0
6345	-1.36	-0.26	-0.01	-0.20	0.07	21.0
6505	-0.82	-0.46	0.01	-0.20	0.08	21.0
6665	-0.48	-0.26	0.04	-0.20	0.03	21.0
6825	-0.62	-0.21	0.07	-0.20	0.00	21.0
6985	0.30	0.03	0.11	-0.20	0.03	21.0

Note: The ΔSAR refers to the percent change in SAR relative to the percent change in dielectric properties versus the target values. A negative ΔSAR would translate to a lower measured SAR value than what would be measured if using dielectric properties equal to the target values. A positive ΔSAR would translate to a higher measured SAR value than what would be measured if using dielectric properties equal to the target values. SAR correction shall not be made when the ΔSAR has a positive sign to provide a conservative SAR value. The SAR is only corrected when ΔSAR has a negative sign.

4.3 Tissue Dielectric Parameters for Head Phantoms

The head tissue dielectric parameters recommended by the IEC/IEEE 62209-1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in a human head. Other head and body tissue parameters that have not been specified in IEC/IEEE 62209-1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations described in Reference [12] and extrapolated according to the head parameters specified in IEC/IEEE 62209-1528.

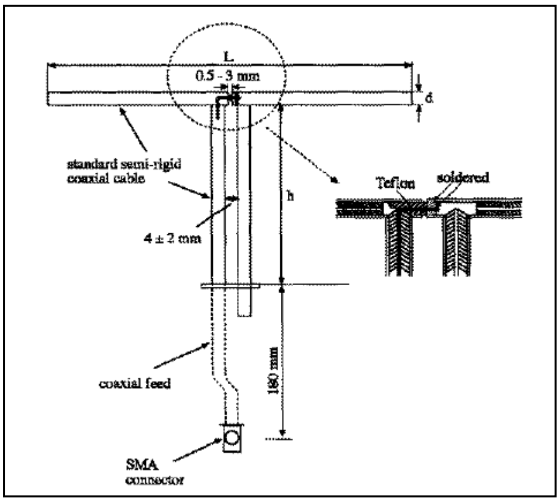
Target Frequency	**Head**	
(MHz)	Relative Permittivity (ε_r)	Conductivity (σ)
150	52.30	0.76
300	45.30	0.87
450	43.50	0.87
750	41.90	0.89
835	41.50	0.90
900	41.50	0.97
915	41.50	0.98
1450	40.50	1.20
1610	40.30	1.29
1800 – 2000	40.00	1.40
2450	39.20	1.80
2600	39.00	1.96
3000	38.50	2.40
5800	35.30	5.07
6000	35.01	5.48
6500	34.50	6.07
7000	33.90	6.65

(ε_r = relative permittivity, σ = conductivity and ρ = 1000 kg/m^3)

5 SAR MEASUREMENT PROCEDURE

5.1 SAR System Validation

4.1.1. Validation Dipoles



The dipoles used is based on the IEC/IEEE 62209-1528 standard, and is complied with mechanical and electrical specifications in line with the requirements of both IEEE and FCC Supplement C. the table below provides details for the mechanical and electrical specifications for the dipoles.

Frequency	L (mm)	h (mm)	d (mm)
2450MHz	51.5	30.4	3.6
5000-6000MHz	20.6	40.3	3.6
6000-8000MHz	14.5	35.1	2.2

Note: The L, h, and d, dimensions shall be within +2 % tolerance.

4.1.2. Validation Result

System Performance Check at 6500MHz				
Frequency [MHz]	Description	SAR [w/kg] 1g	SAR [w/kg] 10g	Tissue Temp. [°C]
6500 MHz	Reference result ± 10% window	29.3 26.37 to 32.23	5.41 4.87 to 5.95	N/A
	01-11-2023	28.3	5.30	21.0
Note: All SAR values are normalized to 1W forward power.				

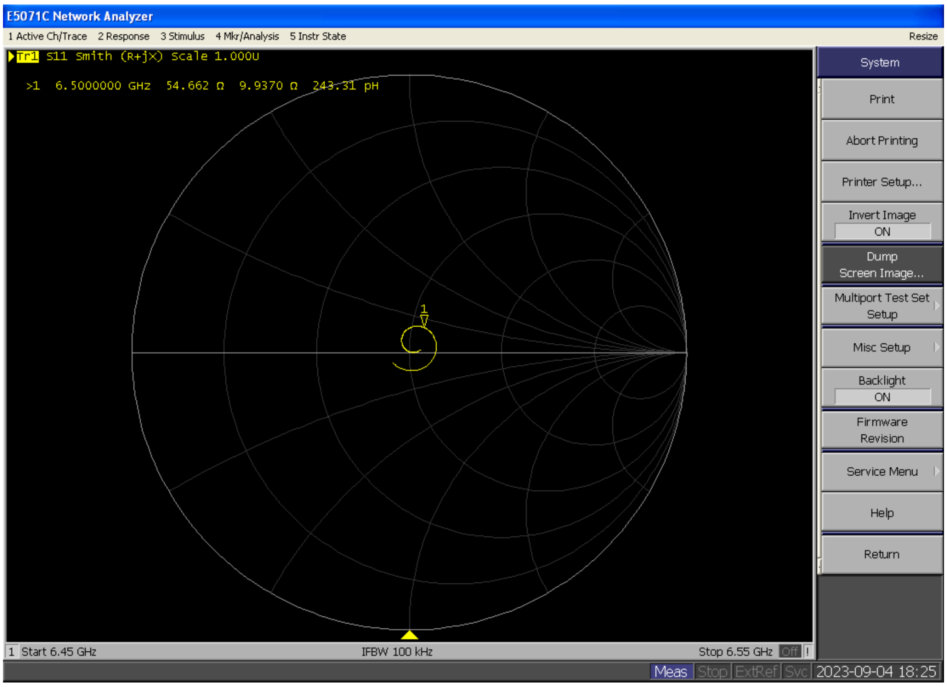
System Performance Check at 10 GHz					
Frequency [MHz]	Description	Prad (mW)	Max E-field (V/m)	Avg Power Density $1cm^2$ Total PD (W/m^2)	Avg Power Density $4cm^2$ Total PD (W/m^2)
10 GHz	Reference result ± 10% window	86.1 77.5 to 94.7	147 132 to 162	54.6 49.1 to 60.1	50.1 45.1 to 55.1
	07-11-2023	86.3	152	55.2	50.3

4.1.3. Dipole Calibration Data

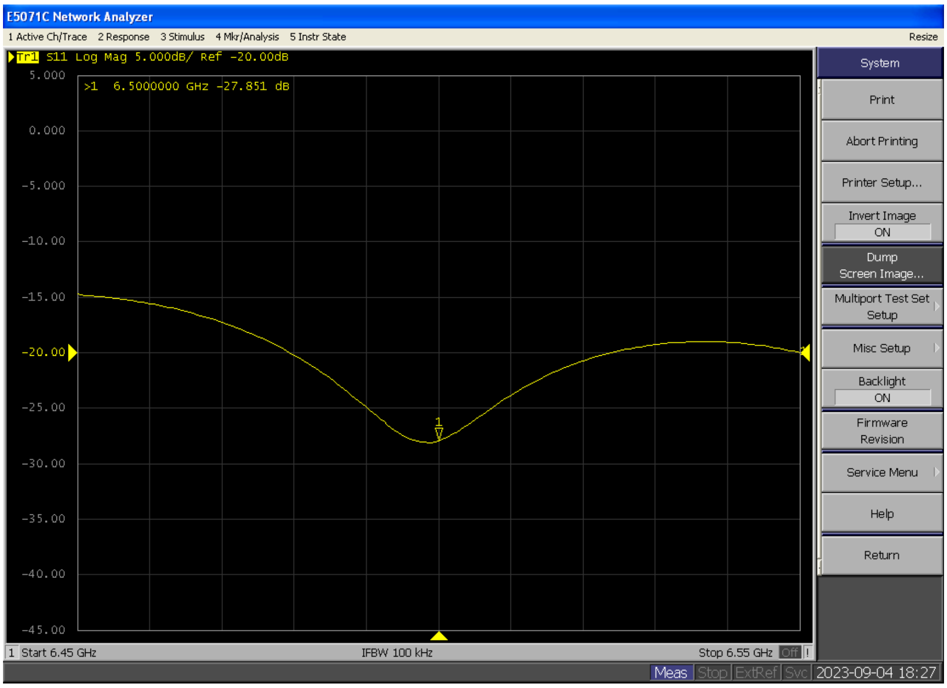
Impedance Plot for D6.5GHzV2

6.5GHz Head

Calibrated impedance: 52.497 Ω; Measured impedance: 54.662 Ω (within 5Ω)



Calibrated return loss: -27.076 dB; Measured impedance: -27.851 dB (within 20%)



Note: Per KDB 450824 D02 requirements for dipole calibration, DEKRA Lab has adopted three years calibration interval. On annual basis, every measurement dipole has been evaluated and is in compliance with the following criteria:

1. There is no physical damage on the dipole;
2. System validation with specific dipole is within 10% of calibrated value;
3. Return-loss is within 20% of calibrated measurement (Show above);
4. Impedance is within 5Ω of calibrated measurement (Show above).

6 TEST EQUIPMENT LIST

Instrument	Manufacturer	Model No.	Serial No.	Cal.Date	Next Cal. Date	Firmware Version	Software Version
Stäubli Robot TX60L	Stäubli	TX60L	F10/5C90A1/A/01	N/A	N/A	N/A	N/A
Controller	Stäubli	SP1	S-0034	N/A	N/A	N/A	N/A
Dipole Validation Kits	Speag	D6.5GHzV2	1084	2022.09.12	2025.09.11	N/A	N/A
Dipole Validation Kits		5G Verification Source 10 GHz	1055	2022.09.09	2025.09.08	N/A	N/A
SAM Twin Phantom	Speag	SAM	TP-1562	N/A	N/A	N/A	N/A
mmWave Phantom	Speag	mmWave	1108	N/A	N/A	N/A	N/A
Device Holder	Speag	SD 000 H01 HA	N/A	N/A	N/A	N/A	N/A
Data Acquisition Electronic	Speag	DAE4	1220	2023.03.20	2024.03.19	N/A	N/A
E-Field Probe	Speag	EX3DV4	7761	2023.09.13	2024.09.12	N/A	N/A
E-Field Probe	Speag	EUmmWV4	9681	2023.09.05	2024.09.04	N/A	N/A
SAR Software	Speag	DASY6	V5.2 Build 162	N/A	N/A	N/A	V16.2.4.2448
Power Amplifier	Mini-Circuit	ZVA-183-S+	N657400950	N/A	N/A	N/A	N/A
Dual Directional Coupler	woken	0110A05A82Z-20	CMLC66W1A1	2023.07.23	2024.07.22	N/A	N/A
Tissue fluid test probe	SPEAG	DAK 3.5	1308	2023.02.10	2024.02.09	N/A	N/A
Vector Network	Agilent	E5071C	MY46103316	2023.08.26	2024.08.25	A.11.31	N/A
Signal Generator	R&S	SMBV100A	263697	2023.05.14	2024.05.13	V4.15.125.49	N/A
Power Meter	Keysight	N1912A	MY60300004	2023.08.26	2024.08.25	A2.06.01	N/A
Temperature/Humidity Meter	Rites	RTS-8S	RF06	2023.05.19	2024.05.18	N/A	N/A
Temperature Meter	Dretec	O-274	N/A	2022.11.22	2023.11.21	N/A	N/A

7 MEASUREMENT UNCERTAINTY

DASY6 SAR Uncertainty Measurement uncertainty for 300 MHz to 3 GHz averaged over 1 gram / 10 gram.								
Error Description	Uncert. value	Prob. Dist.	Div.	(ci) 1g	(ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	(vi) veff
Measurement System								
Probe Calibration	±5.5%	N	1	1	1	±5.5%	±5.5%	∞
Axial Isotropy	±4.7%	R	$\sqrt{3}$	0.7	0.7	±1.9%	±1.9%	∞
Hemispherical Isotropy	±9.6%	R	$\sqrt{3}$	0.7	0.7	±3.9%	±3.9%	∞
Boundary Effects	±1.0%	R	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
Linearity	±4.7%	R	$\sqrt{3}$	1	1	±2.7%	±2.7%	∞
System Detection Limits	±1.0%	R	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
Readout Electronics	±0.3%	N	1	1	1	±0.3%	±0.3%	∞
Response Time	±0.8%	R	$\sqrt{3}$	1	1	±0.5%	±0.5%	∞
Integration Time	±2.6%	R	$\sqrt{3}$	1	1	±1.5%	±1.5%	∞
RF Ambient Noise	±3.0%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
RF Ambient Reflections	±3.0%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
Probe Positioner	±0.4%	R	$\sqrt{3}$	1	1	±0.2%	±0.2%	∞
Probe Positioning	±2.9%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
Max. SAR Eval.	±1.0%	R	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
Test Sample Related								
Device Positioning	±2.9%	N	1	1	1	±2.9%	±2.9%	145
Device Holder	±3.6%	N	1	1	1	±3.6%	±3.6%	5
Power Drift	±5.0%	R	$\sqrt{3}$	1	1	±2.9%	±2.9%	∞
Phantom and Setup								
Phantom Uncertainty	±4.0%	R	$\sqrt{3}$	1	1	±2.3%	±2.3%	∞
Liquid Conductivity (meas.)	±2.5%	N	1	0.78	0.71	±2.0%	±1.8%	∞
Liquid Permittivity (meas.)	±2.5%	N	1	0.26	0.26	±0.6%	±0.7%	∞
Combined Std. Uncertainty						±10.6%	±10.5%	361
Expanded STD Uncertainty						±21.2%	±21.1%	

DASY6 SAR Uncertainty								
Measurement uncertainty for 3 GHz to 6 GHz averaged over 1 gram / 10 gram.								
Error Description	Uncert. value	Prob. Dist.	Div.	(c_i) 1g	(c_i) 10g	Std. Unc. (1g)	Std. Unc. (10g)	(v_i) V_{eff}
Measurement System								
Probe Calibration	±6.65%	N	1	1	1	±6.65%	±6.65%	∞
Axial Isotropy	±4.7%	R	$\sqrt{3}$	0.7	0.7	±1.9%	±1.9%	∞
Hemispherical Isotropy	±9.6%	R	$\sqrt{3}$	0.7	0.7	±3.9%	±3.9%	∞
Boundary Effects	±2.0%	R	$\sqrt{3}$	1	1	±1.2%	±1.2%	∞
Linearity	±4.7%	R	$\sqrt{3}$	1	1	±2.7%	±2.7%	∞
System Detection Limits	±1.0%	R	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
Readout Electronics	±0.3%	N	1	1	1	±0.3%	±0.3%	∞
Response Time	±0.8%	R	$\sqrt{3}$	1	1	±0.5%	±0.5%	∞
Integration Time	±2.6%	R	$\sqrt{3}$	1	1	±1.5%	±1.5%	∞
RF Ambient Noise	±3.0%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
RF Ambient Reflections	±3.0%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
Probe Positioner	±0.8%	R	$\sqrt{3}$	1	1	±0.5%	±0.5%	∞
Probe Positioning	±6.7%	R	$\sqrt{3}$	1	1	±3.9%	±3.9%	∞
Max. SAR Eval.	±4.0%	R	$\sqrt{3}$	1	1	±2.3%	±2.3%	∞
Test Sample Related								
Device Positioning	±2.9%	N	1	1	1	±2.9%	±2.9%	145
Device Holder	±3.6%	N	1	1	1	±3.6%	±3.6%	5
Power Drift	±5.0%	R	$\sqrt{3}$	1	1	±2.9%	±2.9%	∞
Phantom and Setup								
Phantom Uncertainty	±4.0%	R	$\sqrt{3}$	1	1	±2.3%	±2.3%	∞
Liquid Conductivity (meas.)	±2.5%	N	1	0.78	0.71	±2.0%	±1.8%	∞
Liquid Permittivity (meas.)	±2.5%	N	1	0.26	0.26	±0.6%	±0.7%	∞
Combined Std. Uncertainty						±1 2.0%	±12.0%	784
Expanded STD Uncertainty						±24.0%	±23.9%	

DASY6 SAR Uncertainty (Frequency band: 6 GHz–10 GHz range)								
Symbol	Error Description	Uncert. value	Prob. Dist.	Div.	(*ci*) (1 g)	(*ci*) (10 g)	Std. Unc. (1 g)	Std. Unc. (10 g)
Measurement System Errors								
CF	Probe Calibration	±18.6%	N	2	1	1	±9.3%	±9.3%
CF*drif t*	Probe Calibration Drift	±1.7%	R	√3	1	1	±1.0%	±1.0%
LIN	Probe Linearity	±4.7%	R	√3	1	1	±2.7%	±2.7%
BBS	Broadband Signal	±2.8%	R	√3	1	1	±1.6%	±1.6%
ISO	Probe Isotropy	±7.6%	R	√3	1	1	±4.4%	±4.4%
DAE	Other Probe+Electronic	±2.4%	N	1	1	1	±2.4%	±2.4%
AMB	RF Ambient	±1.8%	N	1	1	1	±1.8%	±1.8%
Δ *sys*	Probe Positioning	±0.005 mm	N	1	0.5	0.5	±0.25%	±0.25%
DAT	Data Processing	±3.5%	N	1	1	1	±3.5%	±3.5%
Phantom and Device Errors								
LIQ(σ)	Conductivity (meas.)*DAK*	±2.5%	N	1	0.78	0.71	±2.0%	±1.8%
LIQ(Tσ)	Conductivity (temp.)*BB*	±2.4%	R	√3	0.78	0.71	±1.1%	±1.0%
EPS	Phantom Permittivity	±14.0%	R	√3	0.5	0.5	±4.0%	±4.0%
DIS	Distance DUT – TSL	±2.0%	N	1	2	2	±4.0%	±4.0%
D *xyz*	Device Positioning	±1.0%	N	1	1	1	±1.0%	±1.0%
H	Device Holder	±3.6%	N	1	1	1	±3.6%	±3.6%
MOD	DUT Modulation*m*	±2.4%	R	√3	1	1	±1.4%	±1.4%
TAS	Time-average SAR	±1.7%	R	√3	1	1	±1.0%	±1.0%
RF*drif t*	DUT drift	±2.5%	N	1	1	1	±2.5%	±2.5%
VAL	Val Antenna Unc.*val*	±0.0%	N	1	1	1	±0%	±0%
RF*in*	Unc. Input Power*val*	±0.0%	N	1	1	1	±0%	±0%
Correction to the SAR results								
C(ε, σ)	Deviation to Target	±1.9%	N	1	1	0.84	±1.9%	±1.6%
C(R)	SAR scaling*p*	±0%	R	√3	1	1	±0%	±0%

u	Random uncertainty	±0.6% for 1g and ±0.5% for 10g	N	1	1	1	±0.6%	±0.5%
u(ΔSAR)	Combined Uncertainty						±14.2%	±13.9%
U	**Expanded Uncertainty**						±28.4%	±28.3%

cDASY6 Mo dule mmWave Uncertainty Budget Evaluation Distances to the Antennas > λ/2π In Compliance with IEC/IEEE 63195						
Symbol	Error Description	Uncertainty Value (±dB)	Probability	Divisor	(Ci)	Standard Uncertainty (±dB)
Uncertainty terms dep indent on the measurement system						
CAL	Probe Calibration	0.49	N	1	1	0.49
COR	Probe correction	0.00	R	1.732	1	0.00
FRS	Frequency response	0.20	R	1.732	1	0.12
SCC	Sensor cross coupling	0.00	R	1.732	1	0.00
ISO	Isotropy	0.50	R	1.732	1	0.29
LIN	Linearity	0.20	R	1.732	1	0.12
PSC	Probe scattering	0.00	R	1.732	1	0.00
PPO	Probe positioning offset	0.30	R	1.732	1	0.17
PPR	Probe positioning repeatability	0.04	R	1.732	1	0.02
SMO	Sensor mechanical offset	0.00	R	1.732	1	0.00
PSR	Probe spatial resolution	0.00	R	1.732	1	0.00
FLD	Field impedance dependance	0.00	R	1.732	1	0.00
APD	Amplitude and phase drift	0.00	R	1.732	1	0.00
APN	Amplitude and phase noise	0.04	R	1.732	1	0.02
TR	Measurement area truncation	0.00	R	1.732	1	0.00
DAQ	Data acquisition	0.03	N	1	1	0.03
SMP	Sampling	0.00	R	1.732	1	0.00
REC	Field reconstruction	2.00	R	1.732	1	1.15
TRA	Forward transformation	0.00	R	1.732	1	0.00
SCA	Power density scaling	0.00	R	1.732	1	0.00
SAV	Spatial averaging	0.10	R	1.732	1	0.06
SDL	System detection limit	0.04	R	1.732	1	0.02
Uncertainty terms dep indent on the DUT and environmental factors						
PC	Probe coupling with DUT	0.00	R	1.732	1	0.00
MOD	Modulation response	0.40	R	1.732	1	0.23
IT	Integration time	0.00	R	1.732	1	0.00
RT	Response time	0.00	R	1.732	1	0.00
DH	Device holder influence	0.10	R	1.732	1	0.06
DA	DUT alignment	0.00	R	1.732	1	0.00

AC	RF ambient conditions	0.04	R	1.732	1	0.02
AR	Ambient reflections	0.04	R	1.732	1	0.02
MSI	Immunity / secondary reception	0.00	R	1.732	1	0.00
DRI	Drift of the DUT	0.00	R	1.732	1	0.00
u	Random uncertainty	0.00	N	1	1	0.00
u(P D)	Combined Std. Uncertainty					1.34
U	**Expanded STD Uncertainty (95%)**					2.68

8 POWER TEST RESULTS

6GHz 802.11n HT20：

Test Frequency (MHz)	Conducted Power Output (dBm)		Conducted Power Output (dBm)	Tune up Power Output (dBm)		Tune up Factor			Duty Cycle [%]
	SISO		MIMO	SISO	MIMO	SISO		MIMO	
	Ant1	Ant2	Total(Ant1+2)			Ant1	Ant2	Ant1+2	
5955	2.04	2.40	5.23	3.00	6.00	1.247	1.148	1.194	87.80
6175	2.44	2.33	5.40	3.00	6.00	1.138	1.167	1.148	
6415	2.03	2.33	5.19	3.00	6.00	1.250	1.167	1.205	
6435	2.10	2.53	5.33	3.00	6.00	1.230	1.114	1.167	
6475	2.24	2.66	5.47	3.00	6.00	1.191	1.081	1.130	
6515	2.41	2.92	5.68	3.00	6.00	1.146	1.019	1.076	
6535	2.38	2.73	5.57	3.00	6.00	1.153	1.064	1.104	
6695	2.54	2.70	5.63	3.00	6.00	1.112	1.072	1.089	
6855	2.45	2.53	5.50	3.00	6.00	1.135	1.114	1.122	
6875	2.46	2.55	5.52	3.00	6.00	1.132	1.109	1.117	
6895	2.18	2.47	5.34	3.00	6.00	1.208	1.130	1.164	
6995	2.07	2.47	5.28	3.00	6.00	1.239	1.130	1.180	
7115	-2.45	-1.53	1.04	-1.00	2.00	1.396	1.130	1.247	

6GHz 802.11n HT40：

Test Frequency (MHz)	Conducted Power Output (dBm)		Conducted Power Output (dBm)	Tune up Power Output (dBm)		Tune up Factor			Duty Cycle [%]
	SISO		MIMO	SISO	MIMO	SISO		MIMO	
	Ant1	Ant2	Total(Ant1+2)			Ant1	Ant2	Ant1+2	
5965	5.09	5.63	8.38	6.00	9.00	1.233	1.089	1.153	87.18
6165	5.08	5.25	8.18	6.00	9.00	1.236	1.189	1.208	
6405	4.71	5.39	8.07	6.00	9.00	1.346	1.151	1.239	
6445	5.10	5.70	8.42	6.00	9.00	1.230	1.072	1.143	
6485	4.54	5.52	8.07	6.00	9.00	1.400	1.117	1.239	
6525	4.70	5.71	8.24	6.00	9.00	1.349	1.069	1.191	
6565	5.14	5.58	8.38	6.00	9.00	1.219	1.102	1.153	
6685	5.22	5.37	8.31	6.00	9.00	1.197	1.156	1.172	
6845	5.28	5.17	8.24	6.00	9.00	1.180	1.211	1.191	
6885	4.50	4.66	7.59	6.00	9.00	1.413	1.361	1.384	
6925	5.03	5.38	8.22	6.00	9.00	1.250	1.153	1.197	
6965	4.94	5.26	8.11	6.00	9.00	1.276	1.186	1.227	
7085	5.24	5.62	8.44	6.00	9.00	1.191	1.091	1.138	

6GHz 802.11ac VHT20：

Test Frequency (MHz)	Conducted Power Output (dBm)		Conducted Power Output (dBm)	Tune up Power Output (dBm)		Tune up Factor			Duty Cycle [%]
	SISO		MIMO	SISO	MIMO	SISO		MIMO	
	Ant1	Ant2	Total(Ant1+2)			Ant1	Ant2	Ant1+2	
5955	2.11	2.69	5.42	3.00	6.00	1.227	1.074	1.143	86.49
6175	2.19	2.49	5.35	3.00	6.00	1.205	1.125	1.161	
6415	2.05	2.63	5.36	3.00	6.00	1.245	1.089	1.159	
6435	2.11	2.64	5.39	3.00	6.00	1.227	1.086	1.151	
6475	2.18	2.70	5.46	3.00	6.00	1.208	1.072	1.132	
6515	2.19	2.88	5.53	3.00	6.00	1.205	1.028	1.114	
6535	2.14	2.66	5.42	3.00	6.00	1.219	1.081	1.143	
6695	2.26	2.49	5.39	3.00	6.00	1.186	1.125	1.151	
6855	2.20	2.28	5.25	3.00	6.00	1.202	1.180	1.189	
6875	2.29	2.32	5.32	3.00	6.00	1.178	1.169	1.169	
6895	2.20	2.45	5.34	3.00	6.00	1.202	1.135	1.164	
6995	1.89	3.31	5.12	3.00	6.00	1.291	0.931	1.225	
7115	-2.74	-1.54	0.91	-1.00	2.00	1.493	1.132	1.285	

6GHz 802.11ac VHT40：

Test Frequency (MHz)	Conducted Power Output (dBm)		Conducted Power Output (dBm)	Tune up Power Output (dBm)		Tune up Factor			Duty Cycle [%]
	SISO		MIMO	SISO	MIMO	SISO		MIMO	
	Ant1	Ant2	Total(Ant1+2)			Ant1	Ant2	Ant1+2	
5965	4.94	5.08	8.02	6.00	9.00	1.276	1.236	1.253	86.11
6165	5.00	4.79	7.91	6.00	9.00	1.259	1.321	1.285	
6405	4.57	5.01	7.81	6.00	9.00	1.390	1.256	1.315	
6445	4.42	5.11	7.79	6.00	9.00	1.439	1.227	1.321	
6485	4.60	5.19	7.92	6.00	9.00	1.380	1.205	1.282	
6525	4.91	5.41	8.18	6.00	9.00	1.285	1.146	1.208	
6565	5.04	5.31	8.19	6.00	9.00	1.247	1.172	1.205	
6685	5.20	5.15	8.19	6.00	9.00	1.202	1.216	1.205	
6845	5.16	4.94	8.06	6.00	9.00	1.213	1.276	1.242	
6885	4.75	4.96	7.87	6.00	9.00	1.334	1.271	1.297	
6925	5.01	5.16	8.10	6.00	9.00	1.256	1.213	1.230	
6965	4.87	5.03	7.96	6.00	9.00	1.297	1.250	1.271	
7085	5.16	5.42	8.30	6.00	9.00	1.213	1.143	1.175	

6GHz 802.11ac VHT80:

Test Frequency (MHz)	Conducted Power Output (dBm)		Conducted Power Output (dBm)	Tune up Power Output (dBm)		Tune up Factor			Duty Cycle [%]
	SISO		MIMO	SISO	MIMO	SISO		MIMO	
	Ant1	Ant2	Total(Ant1+2)			Ant1	Ant2	Ant1+2	
5985	7.68	7.92	10.81	8.00	11.00	1.076	1.019	1.045	85.29
6145	7.63	7.65	10.65	8.00	11.00	1.089	1.084	1.084	
6385	7.50	7.76	10.64	8.00	11.00	1.122	1.057	1.086	
6465	7.33	8.02	10.70	8.00	11.00	1.167	0.995	1.072	
6545	7.94	8.27	11.12	8.00	11.00	1.014	0.940	0.973	
6625	7.86	8.05	10.97	8.00	11.00	1.033	0.989	1.007	
6705	7.90	7.89	10.91	8.00	11.00	1.023	1.026	1.021	
6785	8.03	7.94	11.00	8.00	11.00	0.993	1.014	1.000	
6865	7.84	7.80	10.83	8.00	11.00	1.038	1.047	1.040	
6945	7.77	7.97	10.88	8.00	11.00	1.054	1.007	1.028	
7025	7.54	7.92	10.74	8.00	11.00	1.112	1.019	1.062	

6GHz 802.11ac VHT160：

Test Frequency (MHz)	Conducted Power Output (dBm)		Conducted Power Output (dBm)	Tune up Power Output (dBm)		Tune up Factor			Duty Cycle [%]
	SISO		MIMO	SISO	MIMO	SISO		MIMO	
	Ant1	Ant2	Total(Ant1+2)			Ant1	Ant2	Ant1+2	
6025	9.97	10.21	13.10	11.00	14.00	1.268	1.199	1.230	85.29
6185	9.97	10.00	13.00	11.00	14.00	1.268	1.259	1.259	
6345	9.74	10.05	12.91	11.00	14.00	1.337	1.245	1.285	
6505	10.04	10.45	13.26	11.00	14.00	1.247	1.135	1.186	
6665	10.33	10.20	13.28	11.00	14.00	1.167	1.202	1.180	
6825	10.53	10.37	13.46	11.00	14.00	1.114	1.156	1.132	
6985	10.11	10.61	13.38	11.00	14.00	1.227	1.094	1.153	

6GHz 802.11ax HE20:

<table>
<tr><th rowspan="3">Test Frequency (MHz)</th><th colspan="2">Conducted Power Output (dBm)</th><th>Conducted Power Output (dBm)</th><th colspan="2" rowspan="1">Tune up Power Output (dBm)</th><th colspan="3">Tune up Factor</th><th rowspan="3">Duty Cycle [%]</th></tr>
<tr><th colspan="2">SISO</th><th>MIMO</th><th rowspan="2">SISO</th><th rowspan="2">MIMO</th><th colspan="2">SISO</th><th>MIMO</th></tr>
<tr><th>Ant1</th><th>Ant2</th><th>Total(Ant1+2)</th><th>Ant1</th><th>Ant2</th><th>Ant1+2</th></tr>
<tr><td>5955</td><td>2.52</td><td>2.86</td><td>5.70</td><td>3.00</td><td>6.00</td><td>1.117</td><td>1.033</td><td>1.072</td><td rowspan="13">90.57</td></tr>
<tr><td>6175</td><td>2.34</td><td>2.54</td><td>5.45</td><td>3.00</td><td>6.00</td><td>1.164</td><td>1.112</td><td>1.135</td></tr>
<tr><td>6415</td><td>2.20</td><td>2.64</td><td>5.44</td><td>3.00</td><td>6.00</td><td>1.202</td><td>1.086</td><td>1.138</td></tr>
<tr><td>6435</td><td>2.06</td><td>2.77</td><td>5.44</td><td>3.00</td><td>6.00</td><td>1.242</td><td>1.054</td><td>1.138</td></tr>
<tr><td>6475</td><td>2.11</td><td>2.86</td><td>5.51</td><td>3.00</td><td>6.00</td><td>1.227</td><td>1.033</td><td>1.119</td></tr>
<tr><td>6515</td><td>2.42</td><td>3.18</td><td>5.83</td><td>3.00</td><td>6.00</td><td>1.143</td><td>0.959</td><td>1.040</td></tr>
<tr><td>6535</td><td>2.46</td><td>3.01</td><td>5.75</td><td>3.00</td><td>6.00</td><td>1.132</td><td>0.998</td><td>1.059</td></tr>
<tr><td>6695</td><td>2.50</td><td>2.79</td><td>5.66</td><td>3.00</td><td>6.00</td><td>1.122</td><td>1.050</td><td>1.081</td></tr>
<tr><td>6855</td><td>2.38</td><td>2.69</td><td>5.55</td><td>3.00</td><td>6.00</td><td>1.153</td><td>1.074</td><td>1.109</td></tr>
<tr><td>6875</td><td>2.45</td><td>2.53</td><td>5.50</td><td>3.00</td><td>6.00</td><td>1.135</td><td>1.114</td><td>1.122</td></tr>
<tr><td>6895</td><td>1.99</td><td>2.36</td><td>5.19</td><td>3.00</td><td>6.00</td><td>1.262</td><td>1.159</td><td>1.205</td></tr>
<tr><td>6995</td><td>2.16</td><td>2.73</td><td>5.46</td><td>3.00</td><td>6.00</td><td>1.213</td><td>1.064</td><td>1.132</td></tr>
<tr><td>7115</td><td>-2.81</td><td>-1.57</td><td>0.86</td><td>-1.00</td><td>2.00</td><td>1.517</td><td>1.140</td><td>1.300</td></tr>
</table>

6GHz 802.11ax HE40：

Test Frequency (MHz)	Conducted Power Output (dBm)		Conducted Power Output (dBm)	Tune up Power Output (dBm)		Tune up Factor			Duty Cycle [%]
	SISO		MIMO	SISO	MIMO	SISO		MIMO	
	Ant1	Ant2	Total(Ant1+2)			Ant1	Ant2	Ant1+2	
5965	4.73	5.19	7.98	6.00	9.00	1.340	1.205	1.265	85.71
6165	4.71	4.82	7.78	6.00	9.00	1.346	1.312	1.324	
6405	4.34	4.93	7.66	6.00	9.00	1.466	1.279	1.361	
6445	4.26	5.04	7.68	6.00	9.00	1.493	1.247	1.355	
6485	4.51	5.2	7.88	6.00	9.00	1.409	1.202	1.294	
6525	4.78	5.39	8.11	6.00	9.00	1.324	1.151	1.227	
6565	4.71	5.22	7.98	6.00	9.00	1.346	1.197	1.265	
6685	4.80	5.07	7.95	6.00	9.00	1.318	1.239	1.274	
6845	4.81	4.88	7.86	6.00	9.00	1.315	1.294	1.300	
6885	4.55	4.74	7.66	6.00	9.00	1.396	1.337	1.361	
6925	4.55	5.01	7.8	6.00	9.00	1.396	1.256	1.318	
6965	4.50	4.86	7.69	6.00	9.00	1.413	1.300	1.352	
7085	4.80	5.13	7.98	6.00	9.00	1.318	1.222	1.265	

6GHz 802.11ax HE80：

Test Frequency (MHz)	Conducted Power Output (dBm)		Conducted Power Output (dBm)	Tune up Power Output (dBm)		Tune up Factor			Duty Cycle [%]
	SISO		MIMO	SISO	MIMO	SISO		MIMO	
	Ant1	Ant2	Total(Ant1+2)			Ant1	Ant2	Ant1+2	
5985	7.38	7.77	10.59	8.00	11.00	1.153	1.054	1.099	85.71
6145	7.28	7.54	10.42	8.00	11.00	1.180	1.112	1.143	
6385	7.13	7.59	10.38	8.00	11.00	1.222	1.099	1.153	
6465	7.24	7.85	10.57	8.00	11.00	1.191	1.035	1.104	
6545	7.64	8.03	10.85	8.00	11.00	1.086	0.993	1.035	
6625	7.62	7.84	10.74	8.00	11.00	1.091	1.038	1.062	
6705	7.67	7.63	10.66	8.00	11.00	1.079	1.089	1.081	
6785	7.80	7.91	10.87	8.00	11.00	1.047	1.021	1.030	
6865	7.56	7.55	10.57	8.00	11.00	1.107	1.109	1.104	
6945	7.50	7.74	10.63	8.00	11.00	1.122	1.062	1.089	
7025	7.30	7.74	10.54	8.00	11.00	1.175	1.062	1.112	

6GHz 802.11ax HE160：

Test Frequency (MHz)	Conducted Power Output (dBm)		Conducted Power Output (dBm)	Tune up Power Output (dBm)		Tune up Factor			Duty Cycle [%]
	SISO		MIMO	SISO	MIMO	SISO		MIMO	
	Ant1	Ant2	Total(Ant1+2)			Ant1	Ant2	Ant1+2	
6025	9.91	10.16	13.05	11.00	14.00	1.285	1.213	1.245	85.71
6185	9.91	9.86	12.90	11.00	14.00	1.285	1.300	1.288	
6345	9.63	9.88	12.77	11.00	14.00	1.371	1.294	1.327	
6505	9.93	10.33	13.14	11.00	14.00	1.279	1.167	1.219	
6665	10.11	10.18	13.16	11.00	14.00	1.227	1.208	1.213	
6825	10.25	10.30	13.29	11.00	14.00	1.189	1.175	1.178	
6985	9.91	10.07	13.00	11.00	14.00	1.285	1.239	1.259	

9 SAR TEST RESULTS

9.1 SAR and Power Density Measurements

SAR TEST											
Band	**Mode**	**Test Position**	**Gap (mm)**	**Channel**	**Frequency**	**Antenna**	**Average Power (dBm)**	**Tune-up Scaling Factor**	**Measured 1g SAR (W/kg)**	**Reported 1g SAR (W/kg)**	**APD W/m^2 ($4cm^2$)**
Bady SAR Limit 1g 1.6(W/kg)											
WLAN6GHz	802.11ac (160M)	Back	0	15	6025	Ant 1+2	13.10	1.230	0.130	0.160	0.95
WLAN6GHz	802.11ac (160M)	Left Side	0	15	6025	Ant 1+2	13.10	1.230	0.004	0.005	0.00
WLAN6GHz	802.11ac (160M)	Right Side	0	15	6025	Ant 1+2	13.10	1.230	0.067	0.082	0.00
WLAN6GHz	802.11ac (160M)	Bottom Side	0	15	6025	Ant 1+2	13.10	1.230	**0.715**	**0.880**	**4.19**
WLAN6GHz	802.11ac (160M)	Bottom Side	0	47	6185	Ant 1+2	13.00	1.259	0.692	0.871	3.79
WLAN6GHz	802.11ac (160M)	Bottom Side	0	79	6345	Ant 1+2	12.91	1.285	0.602	0.774	3.33
WLAN6GHz	802.11ac (160M)	Bottom Side	0	111	6505	Ant 1+2	13.26	1.186	**0.659**	**0.781**	**3.61**
WLAN6GHz	802.11ac (160M)	Bottom Side	0	143	6665	Ant 1+2	13.28	1.180	0.688	0.812	3.73
WLAN6GHz	802.11ac (160M)	Bottom Side	0	175	6825	Ant 1+2	13.46	1.132	0.621	0.703	3.32
WLAN6GHz	802.11ac (160M)	Bottom Side	0	207	6985	Ant 1+2	13.38	1.153	**0.641**	**0.739**	**4.19**

Power Density TEST

Band	Mode	Test Position	Gap (mm)	Channel	Frequency	Antenna	Average Power (dBm)	Tune-up Scaling Factor	Scaling Factor Measurement Uncertainty	E Peak (V/m)	H Peak (A/m)	Averaging Area [4cm²] Normal PD [W/m²]	Averaging Area [4cm²] Total PD [W/m²]	Scaling Averaging Area [4cm²] Normal PD [W/m²]	Scaling Averaging Area [4cm²] Total PD [W/m²]
WLAN 6GHz	802.11ac (160M)	Bottom Side	2	15	6025	Ant 1+2	13.10	1.230	1.550	69	0.386	1.700	2.490	3.240	4.750
WLAN 6GHz	802.11ac (160M)	Bottom Side	2	47	6185	Ant 1+2	13.00	1.259	1.550	71	0.391	1.790	2.910	3.490	5.680
WLAN 6GHz	802.11ac (160M)	Bottom Side	2	79	6345	Ant 1+2	12.91	1.285	1.550	73	0.397	1.420	2.740	2.830	5.460
WLAN 6GHz	802.11ac (160M)	Bottom Side	2	111	6505	Ant 1+2	13.26	1.186	1.550	64	0.374	1.190	2.070	2.190	3.800
WLAN 6GHz	802.11ac (160M)	Bottom Side	2	143	6665	Ant 1+2	13.28	1.180	1.550	46	0.203	0.694	1.450	1.270	2.650
WLAN 6GHz	802.11ac (160M)	Bottom Side	2	175	6825	Ant 1+2	13.46	1.132	1.550	101	**0.552**	**1.820**	**3.600**	**3.190**	**6.320**
WLAN 6GHz	802.11ac (160M)	Bottom Side	2	207	6985	Ant 1+2	13.38	1.153	1.550	61	0.364	0.792	1.740	1.420	3.110

Note 1: The test spacing is the distance between probe sensor and DUT surface.

Note 2: 1.0 W/m² = 0.1 mW/cm².

Note 3: We tested the results for all modes, showing only WLAN6G worst mode data.

Note 4: Liquid tissue depth was at least 15.0 cm for all frequencies.

Note 5: The multiple test positions require SAR measurements in head, hotspot mode or UMPC mini-tablet configurations may be reduced according to the highest reported SAR determined using the initial test position(s) by applying the DSSS or OFDISAR measurement procedures in the required wireless mode test configuration(s). The initial test position(s) is measured using the highest measured maximum output power channel in the required wireless mode test configuration(s). When the reported SAR for the initial test position is:

- ≤ 0.4 Wika, further SAR measurement is not required for the other test positions in that exposure configuration and wireless mode combination within the frequency band or aggregated band. DSSS and OFDM configurations are considered separately according to the required SAR procedures.
- 0.4 W/ka. SAR is repeated using the same wireless mode test configuration tested in the initial test position to measure the subsequent next closet/smallest test separation distance and maximum coupling test position, on

the highest maximum output power channel, until the reported SAR is s 0.8 W/kg or all required test positions are tested For subsequent test position with equivalent test separation distance or when exposure is dominated by coupling conditions, the position for maximum coupling condition should be tested. When it is unclear, all equivalent conditions must be tested.

- For all positions/configurations tested using the initial test position and subsequent test positions, when the reported SAR is > 0.8 W/kg, measure the SAR for positions/configurations on the subsequent next highest measured output power channel(s) until the reported SAR is ≤1.2 W/kg or all required test channels are considered.
- When the specified maximum output power is the same for both UNII 1 and UNII 2A, begin SAR measurements in UNII 2A with the channel with the highest measured output power. If the reported SAR for UNII 2A is ≤ 1.2 W/kg, SARI is not required for UNII 1; otherwise treat the remaining bands separately and test them independently for SAR.
- When the specified maximum output power is different between UNII 1 and UNII 2A, begin SAR with the band that has the higher specified maximum output. If the highest reported SAR for the band with the highest specified power is ≤ 1.2 W/kg, testing for the band with the lower specified output power is not required; otherwise test the remaining bands independently for SAR.

Note 6: To determine the initial test position, Area Scans were performed to determine the position with the Maximum Value of SARI (measured). The position that produced the highest Maximum Value of SAR is considered as the worst case position; thusl used as the initial test position.

- After an initial test configuration is determined, if multiple test channels have the same measured maximum output power, the channel chosen for SAR measurement is determined according to the following:
  (1) The channel closest to mid-band frequency is selected for SAR measurement.
  (2) For channels with equal separation from mid-band frequency; for example, high and low channels or two mid-band channels, the higher frequency (number) channel is selected for SAR measurement.
  These channel selection procedures apply to both the initial test configuration and subsequent test configuration(s) selection.

Note 7: WIFI6E SAR and Power Density measurements were implemented according to the U-NII 6-7 GHz Interim Procedures described in Oct. 2020 TCB workshop.

- The SAR evaluations using 6-7 GHz parameters were performed per IEC/IEEE 62209-1528, and the Absorbed Power Density (APD) were reported based on SAR measurements.
  According to DASY Application Note, the APD is evaluated numerically using the FDTD method of Sim4Life V5.2. For comparison with the basic restrictions, the APD is averaged over square surface areas of 1 cm2 and 4 cm2 in the lowermost voxel layer of a flat phantom at a frequency of 6.5 GHz. The phantom consists of a dielectric shell of 2 mml thickness and a relative permittivity r=3.7. It is filled with a tissue-simulating liquid with &=34.5 and o=6.07 S/m.

9.2 SAR Measurement Variability

Band	Mode	Test Position	Ch.	Freq. (MHz)	Original 1g SAR (W/kg)	First 1g SAR (W/kg)	First Ratio SAR 1g
WLAN 6G	802.11ac-VHT80 (160M)	Bottom Side	15	6025	0.715	0.703	1.71%

Note:

According to KDB 865664 D01v01r04, SAR measurement variability must be assessed for each frequency band, which is determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media are required for SAR measurements in a frequency band, the variability measurement procedures should be applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium.

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

1. The original highest measured Reported SAR 1-g ≥ 0.80 W/kg, repeated that measurement once.
2. Perform a second repeated measurement the ratio of the largest to the smallest SAR for the original and first repeated measurements is <1.2 W/kg, or when the original or repeated measurement ≥ 1.45 W/kg (~10% from the 1-g SAR limit).

Appendix A. SAR And Power Density Validation Data

Measurement Report for Device, CW, Channel6500 (6500 MHz)

Exposure Conditions

Phantom Section, TSL	Frequency [MHz], Channel Number	TSL Conductivity [S/m]	TSL Permittivity
Flat, HSL	6500 MHz, 6500	6.01	34.38

Hardware Setup

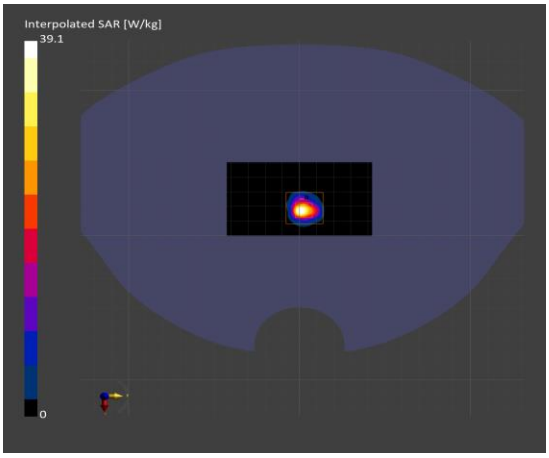
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
Twin-SAM V5.0	HBBL-600-10000	EX3DV4 - SN7761, 2023-09-13	DAE4 Sn1220, 2023-03-20

Scans Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	51.0 x 85.0	22.0 x 22.0 x 22.0
Grid Steps [mm]	8.5 x 8.5	3.4 x 3.4 x 1.4
Sensor Surface [mm]	3.0	1.4

Measurement Results

	Area Scan	Zoom Scan
Date	2023-11-01, 16:18	2023-11-01, 16:37
psSAR1g [W/Kg]	23.2	28.3
psSAR10g [W/Kg]	4.91	5.30
Power Drift [dB]	0.06	0.05



Measurement Report for Device, Validation band, Channel 10000 (10000.0 MHz)Device Under Test Properties

Model, Manufacturer	Dimensions [mm]
Device,	100.0 x 100.0 x 173.0

Exposure Conditions

Phantom Section	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor
5G	FRONT, 10.00	Validation band	CW, 10554-AAD	10000, 10000	1.0

Hardware Setup

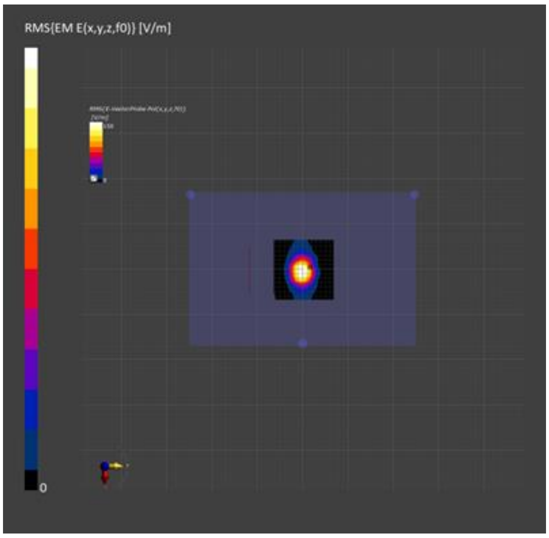
Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave	Air	EUmmWV4 - SN9681_F1-55GHz, 2023-09-05	DAE4 Sn1220, 2023-03-20

Scans Setup

Scan Type	5G Scan
Grid Extents [mm]	25.0 x 25.0
Grid Steps [lambda]	0.25 x 0.25
Sensor Surface [mm]	10.0

Measurement Results

Scan Type	5G Scan
Date	2023-11-07, 11:45
Avg. Area [cm2]	4.00
psPDn+ [W/m2]	47.7
psPDtot+ [W/m2]	50.3
psPDmod+ [W/m2]	55.7
Emax [V/m]	152
Power Drift [dB]	-0.01


RMS(EM E(x,y,z,f0)) [V/m]
0

Appendix B. SAR And Power Density Test Data

Measurement Report for Device, BOTTOM, U-NII-5, IEEE 802.11ac WiFi (160MHz, MCS0), Channel 15 (6025MHz)

Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	DUT Type
Device,	70.0 x 180.0 x 15.0	Tablet

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	TSL Conductivity [S/m]	TSL Permittivity
Flat, HSL	BOTTOM, 0.00	U-NII-5	WLAN, 10554-AAE	6025, 15	5.45	34.99

Hardware Setup

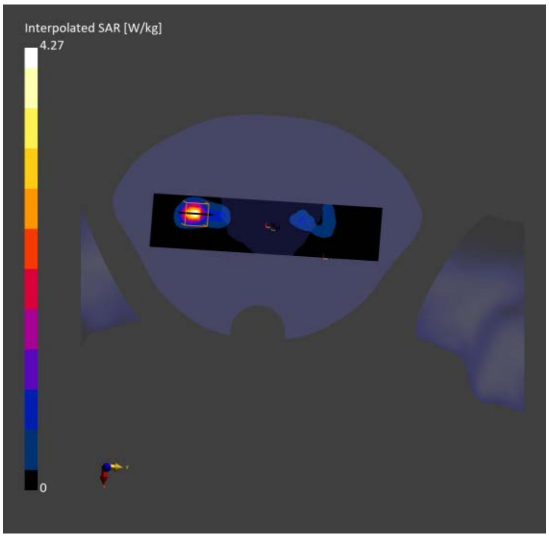
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
Twin-SAM V5.0	HBBL-600-10000	EX3DV4 - SN7761, 2023-09-13	DAE4 Sn1220, 2023-03-20

Scans Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	51.0 x 221.0	22.0 x 22.0 x 22.0
Grid Steps [mm]	8.5 x 8.5	3.4 x 3.4 x 1.4
Sensor Surface [mm]	3.0	1.4

Measurement Results

	Area Scan	Zoom Scan
Date	2023-11-02, 10:37	2023-11-02, 11:09
psSAR1g [W/Kg]	0.616	0.715
psSAR10g [W/Kg]	0.170	0.178
Power Drift [dB]	-0.11	-0.10


Interpolated SAR [W/kg]
4.27
0

Measurement Report for Device,BOTTOM, U-NII-7, IEEE 802.11ac WiFi (160MHz, MCS0), Channel 175 (6825MHz)

Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	DUT Type
Device,	50.0 x 300.0 x 200.0	Tablet

Exposure Conditions

Phantom Section	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor
5G	EDGE BOTTOM, 2.00	U-NII-7	WLAN, 10554-AAE	6825, 175	1.0

Hardware Setup

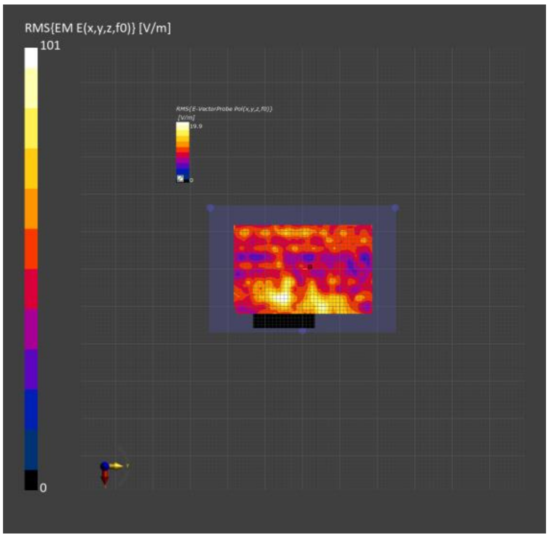
Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave	Air -	EUmmWV4 - SN9681_F1-55GHz, 2023-09-05	DAE4 Sn1220, 2023-03-20

Scans Setup

Scan Type	5G Scan
Grid Extents [mm]	150.0 x 150.0
Grid Steps [lambda]	0.25 x 0.25
Sensor Surface [mm]	2.0

Measurement Results

Scan Type	5G Scan
Date	2023-11-07, 22:26
Avg. Area [cm2]	4.00
psPDn+ [W/m2]	1.82
psPDtot+ [W/m2]	3.60
psPDmod+ [W/m2]	12.1
Emax [V/m]	101
Power Drift [dB]	0.11



Note: We evaluated and tested all modes and channels, and only the worst modes and worst channels were reported in the report.

Appendix C. Probe Calibration Data

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

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Accreditation No.: **SCS 0108**

Client **Dekra**
Suzhou

Certificate No. **EX-7761_Sep23**

CALIBRATION CERTIFICATE

Object: EX3DV4 - SN:7761

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

Calibration date: September 13, 2023

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP2	SN: 104778	30-Mar-23 (No. 217-03804/03805)	Mar-24
Power sensor NRP-Z91	SN: 103244	30-Mar-23 (No. 217-03804)	Mar-24
OCP DAK-3.5 (weighted)	SN: 1249	20-Oct-22 (OCP-DAK3.5-1249_Oct22)	Oct-23
OCP DAK-12	SN: 1016	20-Oct-22 (OCP-DAK12-1016_Oct22)	Oct-23
Reference 20 dB Attenuator	SN: CC2552 (20x)	30-Mar-23 (No. 217-03809)	Mar-24
DAE4	SN: 660	16-Mar-23 (No. DAE4-660_Mar23)	Mar-24
Reference Probe ES3DV2	SN: 3013	06-Jan-23 (No. ES3-3013_Jan23)	Jan-24

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

	Name	Function	Signature
Calibrated by	Aidonia Georgiadou	Laboratory Technician	
Approved by	Sven Kühn	Technical Manager	

Issued: September 13, 2023

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

Certificate No: EX-7761_Sep23 Page 1 of 22

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

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Accreditation No.: **SCS 0108**

Glossary

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

Calibration is Performed According to the Following Standards:

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"

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z*: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- *DCPx,y,z*: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal. DCP does not depend on frequency nor media.
- *PAR*: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z: A, B, C, D* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters*: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- *Connector Angle*: The angle is assessed using the information gained by determining the *NORMx* (no uncertainty required).

Parameters of Probe: EX3DV4 - SN:7761

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc ($k = 2$)
Norm (μV/(V/m)^2) [A]	0.62	0.61	0.68	±10.1%
DCP (mV) [B]	107.9	109.9	108.1	±4.7%

Calibration Results for Modulation Response

UID	Communication System Name		A dB	B dB$\sqrt{\mu V}$	C	D dB	VR mV	Max dev.	Max Unc[E] $k = 2$
0	CW	X	0.00	0.00	1.00	0.00	123.8	±1.6%	±4.7%
		Y	0.00	0.00	1.00		131.7		
		Z	0.00	0.00	1.00		128.2		
10352	Pulse Waveform (200Hz, 10%)	X	1.49	60.35	6.07	10.00	60.0	±3.4%	±9.6%
		Y	1.50	60.00	5.95		60.0		
		Z	1.45	60.35	6.39		60.0		
10353	Pulse Waveform (200Hz, 20%)	X	20.00	74.00	9.00	6.99	80.0	±2.7%	±9.6%
		Y	1.02	60.00	5.06		80.0		
		Z	0.81	60.00	5.05		80.0		
10354	Pulse Waveform (200Hz, 40%)	X	0.20	143.63	0.15	3.98	95.0	±3.1%	±9.6%
		Y	0.68	60.00	4.06		95.0		
		Z	0.09	132.31	0.06		95.0		
10355	Pulse Waveform (200Hz, 60%)	X	6.92	159.98	12.10	2.22	120.0	±1.9%	±9.6%
		Y	15.04	148.39	0.01		120.0		
		Z	5.85	159.99	13.73		120.0		
10387	QPSK Waveform, 1 MHz	X	0.50	62.19	10.27	1.00	150.0	±5.0%	±9.6%
		Y	0.42	60.73	9.99		150.0		
		Z	0.52	61.86	10.36		150.0		
10388	QPSK Waveform, 10 MHz	X	1.23	64.29	12.69	0.00	150.0	±1.2%	±9.6%
		Y	1.26	65.10	13.06		150.0		
		Z	1.24	63.98	12.77		150.0		
10396	64-QAM Waveform, 100 kHz	X	1.83	66.04	16.68	3.01	150.0	±0.9%	±9.6%
		Y	1.79	65.41	16.18		150.0		
		Z	1.67	64.09	15.79		150.0		
10399	64-QAM Waveform, 40 MHz	X	2.73	65.63	14.50	0.00	150.0	±3.0%	±9.6%
		Y	2.78	66.19	14.75		150.0		
		Z	2.73	65.32	14.44		150.0		
10414	WLAN CCDF, 64-QAM, 40 MHz	X	3.76	65.43	14.84	0.00	150.0	±5.1%	±9.6%
		Y	3.77	65.93	15.00		150.0		
		Z	3.96	65.90	15.17		150.0		

Note: For details on UID parameters see Appendix

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

[A] The uncertainties of Norm X,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 5 and 6).
[B] Linearization parameter uncertainty for maximum specified field strength.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

Parameters of Probe: EX3DV4 - SN:7761

Sensor Model Parameters

	C1 fF	C2 fF	α V^{-1}	T1 $ms\,V^{-2}$	T2 $ms\,V^{-1}$	T3 ms	T4 V^{-2}	T5 V^{-1}	T6
x	10.9	78.78	33.07	3.82	0.00	4.93	0.65	0.00	1.01
y	9.8	68.53	31.49	10.46	0.00	4.90	0.73	0.00	1.01
z	11.9	86.75	33.70	3.52	0.00	4.96	0.00	0.10	1.01

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle	27.6°
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

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

Parameters of Probe: EX3DV4 - SN:7761

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz)[C]	Relative Permittivity[F]	Conductivity[F] (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha[G]	Depth[G] (mm)	Unc (k = 2)
450	43.5	0.87	10.32	10.32	10.32	0.16	1.30	±13.3%
750	41.9	0.89	9.48	9.03	9.03	0.41	1.27	±12.0%
835	41.5	0.90	9.30	8.98	8.83	0.39	1.27	±12.0%
900	41.5	0.97	9.06	8.36	8.53	0.38	1.27	±12.0%
1750	40.1	1.37	8.46	8.26	8.16	0.28	1.27	±12.0%
1900	40.0	1.40	8.39	8.14	8.04	0.30	1.27	±12.0%
2100	39.8	1.49	8.16	7.89	7.80	0.31	1.27	±12.0%
2300	39.5	1.67	8.00	7.77	7.66	0.32	1.27	±12.0%
2450	39.2	1.80	7.55	7.31	7.22	0.31	1.27	±12.0%
2600	39.0	1.96	7.50	7.28	7.20	0.30	1.27	±12.0%
3300	38.2	2.71	7.00	6.80	6.69	0.36	1.27	±14.0%
3500	37.9	2.91	6.99	6.77	6.68	0.35	1.27	±14.0%
3700	37.7	3.12	6.83	6.62	6.53	0.36	1.27	±14.0%
3900	37.5	3.32	6.54	6.36	6.30	0.37	1.27	±14.0%
4100	37.2	3.53	6.42	6.22	6.18	0.37	1.27	±14.0%
4200	37.1	3.63	6.41	6.21	6.16	0.38	1.27	±14.0%
4400	36.9	3.84	6.34	6.13	6.09	0.39	1.27	±14.0%
4600	36.7	4.04	6.26	6.05	6.01	0.40	1.27	±14.0%
4800	36.4	4.25	6.25	6.04	6.00	0.38	1.27	±14.0%
4950	36.3	4.40	6.01	5.76	5.74	0.41	1.36	±14.0%
5250	35.9	4.71	5.57	5.50	5.46	0.37	1.53	±14.0%
5600	35.5	5.07	4.84	4.73	4.74	0.36	1.75	±14.0%
5750	35.4	5.22	5.10	4.88	4.91	0.35	1.84	±14.0%

[C] Frequency validity above 300 MHz of ±100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ±50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ±10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Validity of ConvF assessed at 6 MHz is 4–9 MHz, and ConvF assessed at 13 MHz is 9–19 MHz. Above 5 GHz frequency validity can be extended to ±110 MHz.
[F] The probes are calibrated using tissue simulating liquids (TSL) that deviate for ε and σ by less than ±5% from the target values (typically better than ±3%) and are valid for TSL with deviations of up to ±10%. If TSL with deviations from the target of less than ±5% are used, the calibration uncertainties are 11.1% for 0.7 - 3 GHz and 13.1% for 3 - 6 GHz.
[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ±1% for frequencies below 3 GHz and below ±2% for frequencies between 3–6 GHz at any distance larger than half the probe tip diameter from the boundary.

Parameters of Probe: EX3DV4 - SN:7761

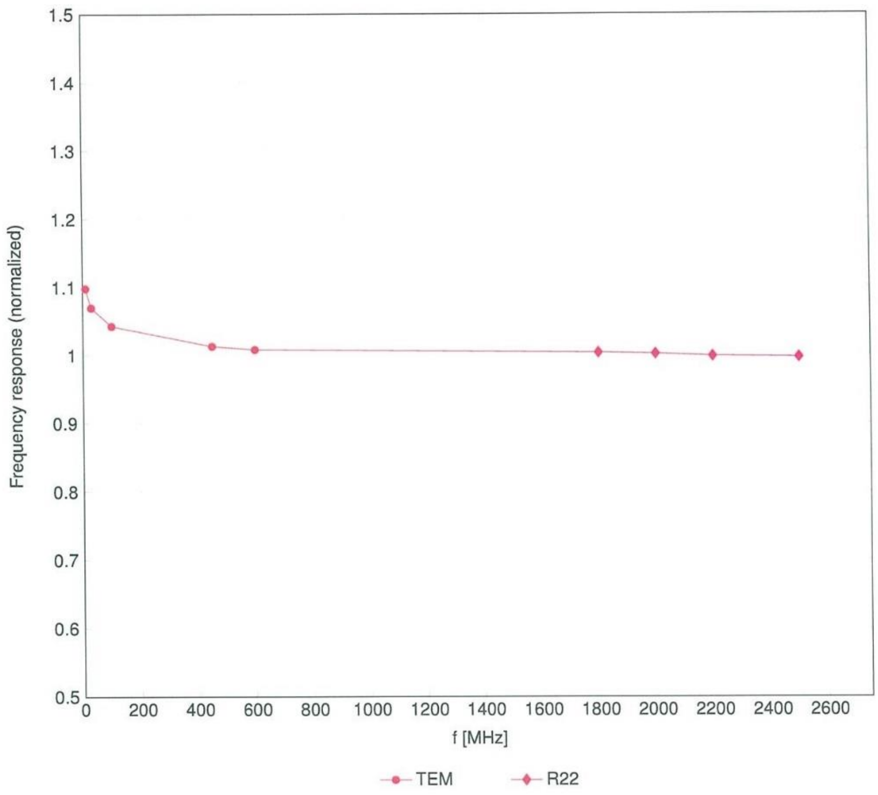
Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz)[C]	Relative Permittivity[F]	Conductivity[F] (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha[G]	Depth[G] (mm)	Unc ($k = 2$)
6500	34.5	6.07	5.35	5.08	5.06	0.20	2.00	±18.6%

[C] Frequency validity at 6.5 GHz is −600/+700 MHz, and ±700 MHz at or above 7 GHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] The probes are calibrated using tissue simulating liquids (TSL) that deviate for ε and σ by less than ±10% from the target values (typically better than ±6%) and are valid for TSL with deviations of up to ±10%.
[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ±1% for frequencies below 3 GHz; below ±2% for frequencies between 3–6 GHz; and below ±4% for frequencies between 6–10 GHz at any distance larger than half the probe tip diameter from the boundary.

Frequency Response of E-Field

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



Uncertainty of Frequency Response of E-field: ±6.3% (k=2)