RF Exposure report

The following samples were submitted and identified on behalf of the client as:

Product Name	Notebook Computer
Brand Name	acer
Model No.	N21C2
Applicant	Acer Incorporated 8F., No. 88, Sec. 1, Xintai 5th Rd., Xizhi, New Taipei City 22181, Taiwan (R.O.C)
Standards	IEEE/ANSI C95.1-1992, IEEE 1528-2013
FCC ID	HLZAX211NG
Date of Receipt	Feb. 08, 2021
Date of Test(s)	Mar. 07, 2022 ~ Mar. 15, 2022
Date of Issue	Mar. 28, 2022

In the configuration tested, the EUT complied with the standards specified above.

Remarks:

This report details the results of the testing carried out on one sample, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS Taiwan Ltd. Central RF Lab or testing done by SGS Taiwan Ltd. Central RF Lab in connection with distribution or use of the product described in this report must be approved by SGS Taiwan Ltd. Central RF Lab in writing.

Signed on behalf of SGS

Clerk / Kimmy Chiou	PM / Jasper Wang	Approved By / John Yeh
Kimmy Chiou	Jasper Wang	John Yeh

Date: Mar. 28, 2022

Revision History

Report Number	Revision	Description	Issue Date	Revised By	Remark
ES/2022/20003	Rev.00	Initial creation of document	Mar. 28, 2022	Kimmy Chiou	

Note:

1. The mark " * " is the revised version of the report due to comments submitted by the certification.

Contents

0. Guidance applied

- ANSI/IEEE C95.1-1992
- IEEE 1528-2013
- IEC/IEEE 62209-1528:2020
- SPEAG DASY6 System Handbook
- SPEAG DASY6 Application Note

(Interim Procedure for Device Operation at 6GHz-10GHz)

- IEC TR 63170:2018
- IEC 62479:2010
- FCC KDB 865664 D01 v01r04
- FCC KDB 865664 D02 v01r02
- FCC KDB 447498 D01 v06
- FCC KDB 616217 D04 v01r02
- FCC KDB 248227 D01 v02r02

1. General Information

1.1 Testing Laboratory

SGS Taiwan Ltd. Central RF Lab	
No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan	
FCC Designation Number	TW0027
Tel	+886-2-2299-3279
Fax	+886-2-2298-0488
Internet	http://www.tw.sgs.com/

1.2 Details of Applicant

Company Name	Acer Incorporated
Company Address	8F., No. 88, Sec. 1, Xintai 5th Rd., Xizhi, New Taipei City 22181, Taiwan (R.O.C)

1.3 Description of EUT

General Information of Host:

Product Name	Notebook Computer	
Brand Name	acer	
Model No.	N21C2	
Integrated Module	Brand Name: Intel® Wi-Fi 6E AX211 Model Name: AX211NGW	
FCC ID	HLZAX211NG	
Mode of Operation	☒WLAN802.11 ☒Bluetooth	
Duty Cycle	WLAN802.11	Refer to page 35-37
	Bluetooth	77.1%
Supported Radios	802.11b/g/n/ax	2.4GHz (2400.0 – 2483.5 MHz)
	802.11a/n/ac/ax	5.2GHz (5150.0 – 5350.0 MHz) 5.6GHz (5470.0 – 5725.0 MHz) 5.8GHz (5725.0 – 5850.0 MHz)
	802.11ax	6.0GHz (5925.0 - 7125.0MHz)
	Bluetooth 5.2	2.4GHz (2400.0 – 2483.5 MHz)

Summary of Maximum SAR and Power Density Value			
Mode	Highest SAR1g Body (W/kg)	Highest APD (mW/cm^2)	Highest PD (mW/cm^2)
2.4G WLAN	0.97	N/A	N/A
5G WLAN	1.18	N/A	N/A
6E WLAN	1.10	0.76	1.00
Bluetooth(GFSK)	0.42	N/A	N/A

WLAN conducted power table:

Full power

Main						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
2.45GHz	802.11b	1	2412	1Mbps	18.00	17.91
		6	2437		18.00	17.97
		11	2462		18.00	17.93
	802.11g	1	2412	6Mbps	18.00	17.72
		6	2437		18.00	17.79
		11	2462		18.00	17.87
	802.11n20-HT0	1	2412	MCS0	18.00	17.87
		6	2437		18.00	17.81
		11	2462		18.00	17.70
	802.11ax20-HE0	1	2412	MCS0	18.00	17.90
		6	2437		18.00	17.81
		11	2462		18.00	17.89
	802.11n40-HT0	3	2422	MCS0	16.50	16.36
		6	2437		18.00	17.70
		9	2452		17.00	16.76
	802.11ax40-HE0	3	2422	MCS0	16.50	16.20
		6	2437		18.00	17.90
		9	2452		17.00	16.68

Main						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
5.15-5.25 GHz	802.11a	36	5180	6Mbps	18.00	17.89
		40	5200		18.00	17.68
		44	5220		18.00	17.83
		48	5240		18.00	17.81
	802.11n20-HT0	36	5180	MCS0	18.00	17.87
		40	5200		18.00	17.69
		44	5220		18.00	17.69
		48	5240		18.00	17.90
	802.11ax20-HE0	36	5180	MCS0	18.00	17.70
		40	5200		18.00	17.68
		44	5220		18.00	17.67
		48	5240		18.00	17.69
	802.11n40-HT0	38	5190	MCS0	17.75	17.46
		46	5230		18.00	17.66
	802.11ax40-HE0	38	5190	MCS0	17.75	17.59
		46	5230		18.00	17.86
	802.11ac80-VHT0	42	5210	MCS0	18.00	17.96
	802.11ax80-HE0	42	5210	MCS0	18.00	17.79
	802.11ac160-VHT0	50	5250	MCS0	15.25	14.93
	802.11ax160-HE0	50	5250	MCS0	15.25	15.16

Main						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
5.25-5.35 GHz	802.11a	52	5260	6Mbps	18.00	17.68
		56	5280		18.00	17.69
		60	5300		18.00	17.83
		64	5320		18.00	17.92
	802.11n20-HT0	52	5260	MCS0	18.00	17.78
		56	5280		18.00	17.79
		60	5300		18.00	17.67
		64	5320		18.00	17.81
	802.11ax20-HE0	52	5260	MCS0	18.00	17.68
		56	5280		18.00	17.68
		60	5300		18.00	17.65
		64	5320		18.00	17.65
	802.11n40-HT0	54	5270	MCS0	18.00	17.98
		62	5310		17.00	16.92
	802.11ax40-HE0	54	5270	MCS0	18.00	17.87
		62	5310		17.00	16.79
	802.11ac80-VHT0	58	5290	MCS0	17.75	17.47
	802.11ax80-HE0	58	5290	MCS0	17.75	17.67

Main						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
5.6GHz	802.11a	100	5500	6Mbps	18.00	17.70
		120	5600		18.00	17.88
		140	5700		18.00	17.76
	802.11n20-HT0	100	5500	MCS0	18.00	17.88
		120	5600		18.00	17.87
		140	5700		18.00	17.76
	802.11ax20-HE0	100	5500	MCS0	18.00	17.78
		120	5600		18.00	17.67
		140	5700		18.00	17.67
	802.11n40-HT0	102	5510	MCS0	18.00	17.95
		118	5590		18.00	17.94
		134	5670		18.00	17.94
		142	5710		18.00	17.79
	802.11ax40-HE0	102	5510	MCS0	18.00	17.71
		118	5590		18.00	17.88
		134	5670		18.00	17.68
		142	5710		18.00	17.92
	802.11ac80-VHT0	106	5530	MCS0	18.00	17.87
		122	5610		18.00	17.93
		138	5690		18.00	17.96
	802.11ax80-HE0	106	5530	MCS0	18.00	17.88
		122	5610		18.00	17.82
		138	5690		18.00	17.78
	802.11ac160-VHT0	114	5570	MCS0	15.50	15.22
	802.11ax160-HE0	114	5570	MCS0	15.50	15.42

Main						
Mode	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
5.8GHz	802.11a	149	5745	6Mbps	18.00	17.83
		157	5785		18.00	17.78
		165	5825		18.00	17.88
	802.11n20-HT0	149	5745	MCS0	18.00	17.93
		157	5785		18.00	17.83
		165	5825		18.00	17.80
	802.11ax20-HE0	149	5745	MCS0	18.00	17.81
		157	5785		18.00	17.92
		165	5825		18.00	17.67
	802.11n40-HT0	151	5755	MCS0	18.00	17.84
		159	5795		18.00	17.66
	802.11ax40-HE0	151	5755	MCS0	18.00	17.77
		159	5795		18.00	17.87
	802.11ac80-VHT0	155	5775	MCS0	18.00	17.98
	802.11ax80-HE0	155	5775	MCS0	18.00	17.85

Main						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
U-NII-5 6.2GHz	802.11ax20-HE0	1	5955	MCS0	7.00	6.94
		45	6175		7.00	6.92
		93	6415		7.00	6.92
	802.11ax40-HE0	3	5965	MCS0	10.00	9.93
		43	6165		10.00	9.95
		91	6405		10.00	9.94
	802.11ax80-HE0	7	5985	MCS0	13.00	12.94
		39	6145		13.00	12.94
		87	6385		13.00	12.94
	802.11ax160-HE0	15	6025	MCS0	13.50	13.47
		47	6185		13.50	13.43
		79	6345		13.50	13.46

Main						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
U-NII-6 6.5GHz	802.11ax20-HE0	97	6435	MCS0	7.00	6.93
		105	6475		7.00	6.92
		113	6515		7.00	6.93
	802.11ax40-HE0	99	6445	MCS0	10.00	9.93
		107	6485		10.00	9.95
	802.11ax80-HE0	103	6465	MCS0	13.00	12.94
		119	6545		13.00	12.93
	802.11ax160-HE0	111	6505	MCS0	13.50	13.48

Main						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
U-NII-7 6.7GHz	802.11ax20-HE0	117	6535	MCS0	7.00	6.93
		149	6695		7.00	6.95
		181	6855		7.00	6.93
	802.11ax40-HE0	115	6525	MCS0	10.00	9.94
		147	6685		10.00	9.94
		179	6845		10.00	9.93
	802.11ax80-HE0	135	6625	MCS0	13.00	12.93
		151	6705		13.00	12.95
		167	6785		13.00	12.92
	802.11ax160-HE0	143	6665	MCS0	13.50	13.49
		175	6825		13.50	13.46

Main						
Mode	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
U-NII-8 7.0GHz	802.11ax20-HE0	185	6875	MCS0	7.00	6.95
		209	6995		7.00	6.93
		233	7115		7.00	6.92
	802.11ax40-HE0	187	6885	MCS0	10.00	9.93
		227	7085		10.00	9.94
	802.11ax80-HE0	183	6865	MCS0	13.00	12.93
		199	6945		13.00	12.95
		215	7025		13.00	12.93
	802.11ax160-HE0	207	6985	MCS0	13.50	13.46

Aux						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
2.45GHz	802.11b	1	2412	1Mbps	18.00	17.90
		6	2437		18.00	17.96
		11	2462		18.00	17.91
	802.11g	1	2412	6Mbps	18.00	17.81
		6	2437		18.00	17.75
		11	2462		18.00	17.79
	802.11n20-HT0	1	2412	MCS0	18.00	17.71
		6	2437		18.00	17.77
		11	2462		18.00	17.76
	802.11ax20-HE0	1	2412	MCS0	18.00	17.90
		6	2437		18.00	17.86
		11	2462		18.00	17.74
	802.11n40-HT0	3	2422	MCS0	16.25	15.95
		6	2437		18.00	17.75
		9	2452		16.00	15.70
	802.11ax40-HE0	3	2422	MCS0	16.25	16.02
		6	2437		18.00	17.70
		9	2452		16.00	15.82

Aux						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
5.15-5.25 GHz	802.11a	36	5180	6Mbps	18.00	17.90
		40	5200		18.00	17.81
		44	5220		18.00	17.70
		48	5240		18.00	17.77
	802.11n20-HT0	36	5180	MCS0	18.00	17.78
		40	5200		18.00	17.69
		44	5220		18.00	17.79
		48	5240		18.00	17.86
	802.11ax20-HE0	36	5180	MCS0	18.00	17.85
		40	5200		18.00	17.95
		44	5220		18.00	17.76
		48	5240		18.00	17.81
	802.11n40-HT0	38	5190	MCS0	18.00	17.80
		46	5230		18.00	17.79
	802.11ax40-HE0	38	5190	MCS0	18.00	17.68
		46	5230		18.00	17.66
	802.11ac80-VHT0	42	5210	MCS0	18.00	17.98
	802.11ax80-HE0	42	5210	MCS0	18.00	17.73
	802.11ac160-VHT0	50	5250	MCS0	16.00	15.80
	802.11ax160-HE0	50	5250	MCS0	16.00	15.79

Aux						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
5.25-5.35 GHz	802.11a	52	5260	6Mbps	18.00	17.84
		56	5280		18.00	17.66
		60	5300		18.00	17.88
		64	5320		18.00	17.67
	802.11n20-HT0	52	5260	MCS0	18.00	17.78
		56	5280		18.00	17.83
		60	5300		18.00	17.71
		64	5320		18.00	17.78
	802.11ax20-HE0	52	5260	MCS0	18.00	17.87
		56	5280		18.00	17.93
		60	5300		18.00	17.89
		64	5320		18.00	17.86
	802.11n40-HT0	54	5270	MCS0	18.00	17.87
		62	5310		18.00	17.76
	802.11ax40-HE0	54	5270	MCS0	18.00	17.82
		62	5310		18.00	17.91
	802.11ac80-VHT0	58	5290	MCS0	18.00	17.97
	802.11ax80-HE0	58	5290	MCS0	18.00	17.91

Aux						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
5.6GHz	802.11a	100	5500	6Mbps	18.00	17.81
		120	5600		18.00	17.89
		140	5700		18.00	17.95
	802.11n20-HT0	100	5500	MCS0	18.00	17.92
		120	5600		18.00	17.88
		140	5700		18.00	17.82
	802.11ax20-HE0	100	5500	MCS0	18.00	17.66
		120	5600		18.00	17.67
		140	5700		18.00	17.92
	802.11n40-HT0	102	5510	MCS0	18.00	17.75
		118	5590		18.00	17.83
		134	5670		18.00	17.74
		142	5710		18.00	17.68
	802.11ax40-HE0	102	5510	MCS0	18.00	17.81
		118	5590		18.00	17.92
		134	5670		18.00	17.93
		142	5710		18.00	17.93
	802.11ac80-VHT0	106	5530	MCS0	18.00	17.91
		122	5610		18.00	17.87
		138	5690		18.00	17.98
	802.11ax80-HE0	106	5530	MCS0	18.00	17.81
		122	5610		18.00	17.73
		138	5690		18.00	17.89
	802.11ac160-VHT0	114	5570	MCS0	16.25	16.01
	802.11ax160-HE0	114	5570	MCS0	16.25	16.18

Aux						
Mode	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
5.8GHz	802.11a	149	5745	6Mbps	18.00	17.67
		157	5785		18.00	17.79
		165	5825		18.00	17.68
	802.11n20-HT0	149	5745	MCS0	18.00	17.65
		157	5785		18.00	17.93
		165	5825		18.00	17.93
	802.11ax20-HE0	149	5745	MCS0	18.00	17.67
		157	5785		18.00	17.89
		165	5825		18.00	17.90
	802.11n40-HT0	151	5755	MCS0	18.00	17.83
		159	5795		18.00	17.82
	802.11ax40-HE0	151	5755	MCS0	18.00	17.88
		159	5795		18.00	17.70
	802.11ac80-VHT0	155	5775	MCS0	18.00	17.99
	802.11ax80-HE0	155	5775	MCS0	18.00	17.89

Aux						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
U-NII-5 6.2GHz	802.11ax20-HE0	1	5955	MCS0	7.00	6.95
		45	6175		7.00	6.94
		93	6415		7.00	6.93
	802.11ax40-HE0	3	5965	MCS0	10.00	9.92
		43	6165		10.00	9.95
		91	6405		10.00	9.92
	802.11ax80-HE0	7	5985	MCS0	13.00	12.95
		39	6145		13.00	12.93
		87	6385		13.00	12.95
	802.11ax160-HE0	15	6025	MCS0	13.50	13.47
		47	6185		13.50	13.48
		79	6345		13.50	13.44

Aux						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
U-NII-6 6.5GHz	802.11ax20-HE0	97	6435	MCS0	7.00	6.93
		105	6475		7.00	6.93
		113	6515		7.00	6.93
	802.11ax40-HE0	99	6445	MCS0	10.00	9.94
		107	6485		10.00	9.95
	802.11ax80-HE0	103	6465	MCS0	13.00	12.92
		119	6545		13.00	12.94
	802.11ax160-HE0	111	6505	MCS0	13.50	13.45

Aux						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
U-NII-7 6.7GHz	802.11ax20-HE0	117	6535	MCS0	7.00	6.94
		149	6695		7.00	6.93
		181	6855		7.00	6.92
	802.11ax40-HE0	115	6525	MCS0	10.00	9.92
		147	6685		10.00	9.93
		179	6845		10.00	9.94
	802.11ax80-HE0	135	6625	MCS0	13.00	12.92
		151	6705		13.00	12.94
		167	6785		13.00	12.95
	802.11ax160-HE0	143	6665	MCS0	13.50	13.44
		175	6825		13.50	13.48

Aux						
Mode	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
U-NII-8 7.0GHz	802.11ax20-HE0	185	6875	MCS0	7.00	6.93
		209	6995		7.00	6.93
		233	7115		7.00	6.94
	802.11ax40-HE0	187	6885	MCS0	10.00	9.92
		227	7085		10.00	9.92
	802.11ax80-HE0	183	6865	MCS0	13.00	12.92
		199	6945		13.00	12.93
		215	7025		13.00	12.95
	802.11ax160-HE0	207	6985	MCS0	13.50	13.47

Down power

Main						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
2.45GHz	802.11b	1	2412	1Mbps	14.50	14.42
		6	2437		14.50	14.46
		11	2462		14.50	14.47
	802.11g	1	2412	6Mbps	14.50	14.21
		6	2437		14.50	14.38
		11	2462		14.50	14.36
	802.11n20-HT0	1	2412	MCS0	14.50	14.40
		6	2437		14.50	14.37
		11	2462		14.50	14.42
	802.11ax20-HE0	1	2412	MCS0	14.50	14.35
		6	2437		14.50	14.17
		11	2462		14.50	14.31
	802.11n40-HT0	3	2422	MCS0	14.50	14.37
		6	2437		14.50	14.44
		9	2452		14.50	14.29
	802.11ax40-HE0	3	2422	MCS0	14.50	14.21
		6	2437		14.50	14.33
		9	2452		14.50	14.20

Main						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
5.15-5.25 GHz	802.11a	36	5180	6Mbps	11.50	11.34
		40	5200		11.50	11.16
		44	5220		11.50	11.34
		48	5240		11.50	11.43
	802.11n20-HT0	36	5180	MCS0	11.50	11.33
		40	5200		11.50	11.15
		44	5220		11.50	11.22
		48	5240		11.50	11.32
	802.11ax20-HE0	36	5180	MCS0	11.50	11.37
		40	5200		11.50	11.42
		44	5220		11.50	11.18
		48	5240		11.50	11.42
	802.11n40-HT0	38	5190	MCS0	11.50	11.28
		46	5230		11.50	11.34
	802.11ax40-HE0	38	5190	MCS0	11.50	11.32
		46	5230		11.50	11.23
	802.11ac80-VHT0	42	5210	MCS0	11.50	11.38
	802.11ax80-HE0	42	5210	MCS0	11.50	11.24
	802.11ac160-VHT0	50	5250	MCS0	11.50	11.46
	802.11ax160-HE0	50	5250	MCS0	11.50	11.40

Main						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
5.25-5.35 GHz	802.11a	52	5260	6Mbps	11.50	11.16
		56	5280		11.50	11.38
		60	5300		11.50	11.19
		64	5320		11.50	11.20
	802.11n20-HT0	52	5260	MCS0	11.50	11.19
		56	5280		11.50	11.42
		60	5300		11.50	11.19
		64	5320		11.50	11.22
	802.11ax20-HE0	52	5260	MCS0	11.50	11.16
		56	5280		11.50	11.35
		60	5300		11.50	11.21
		64	5320		11.50	11.19
	802.11n40-HT0	54	5270	MCS0	11.50	11.23
		62	5310		11.50	11.15
	802.11ax40-HE0	54	5270	MCS0	11.50	11.31
		62	5310		11.50	11.23
	802.11ac80-VHT0	58	5290	MCS0	11.50	11.46
	802.11ax80-HE0	58	5290	MCS0	11.50	11.19

Main						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
5.6GHz	802.11a	100	5500	6Mbps	12.00	11.86
		120	5600		12.00	11.84
		140	5700		12.00	11.82
	802.11n20-HT0	100	5500	MCS0	12.00	11.66
		120	5600		12.00	11.66
		140	5700		12.00	11.85
	802.11ax20-HE0	100	5500	MCS0	12.00	11.94
		120	5600		12.00	11.84
		140	5700		12.00	11.67
	802.11n40-HT0	102	5510	MCS0	12.00	11.76
		118	5590		12.00	11.86
		134	5670		12.00	11.68
		142	5710		12.00	11.67
	802.11ax40-HE0	102	5510	MCS0	12.00	11.75
		118	5590		12.00	11.82
		134	5670		12.00	11.93
		142	5710		12.00	11.66
	802.11ac80-VHT0	106	5530	MCS0	12.00	11.97
		122	5610		12.00	11.89
		138	5690		12.00	11.93
	802.11ax80-HE0	106	5530	MCS0	12.00	11.65
		122	5610		12.00	11.91
		138	5690		12.00	11.74
	802.11ac160-VHT0	114	5570	MCS0	12.00	11.98
	802.11ax160-HE0	114	5570	MCS0	12.00	11.83

Main						
Mode	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
5.8GHz	802.11a	149	5745	6Mbps	11.50	11.40
		157	5785		11.50	11.17
		165	5825		11.50	11.22
	802.11n20-HT0	149	5745	MCS0	11.50	11.22
		157	5785		11.50	11.41
		165	5825		11.50	11.40
	802.11ax20-HE0	149	5745	MCS0	11.50	11.26
		157	5785		11.50	11.28
		165	5825		11.50	11.20
	802.11n40-HT0	151	5755	MCS0	11.50	11.19
		159	5795		11.50	11.32
	802.11ax40-HE0	151	5755	MCS0	11.50	11.36
		159	5795		11.50	11.39
	802.11ac80-VHT0	155	5775	MCS0	11.50	11.49
	802.11ax80-HE0	155	5775	MCS0	11.50	11.32

Main						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
U-NII-5 6.2GHz	802.11ax20-HE0	1	5955	MCS0	7.00	6.83
		45	6175		7.00	6.74
		93	6415		7.00	6.70
	802.11ax40-HE0	3	5965	MCS0	10.00	9.94
		43	6165		10.00	9.88
		91	6405		10.00	9.78
	802.11ax80-HE0	7	5985	MCS0	13.00	12.75
		39	6145		13.00	12.71
		87	6385		13.00	12.87
	802.11ax160-HE0	15	6025	MCS0	13.00	12.98
		47	6185		13.00	12.97
		79	6345		13.00	12.89

Main				
Band	Mode	Channel	Frequency (MHz)	Data Rate
U-NII-7 6.7GHz	802.11ax20-HE0	117	6535	MCS0
		149	6695	
		181	6855	
	802.11ax40-HE0	115	6525	MCS0
		147	6685	
		179	6845	
	802.11ax80-HE0	135	6625	MCS0
		151	6705	
		167	6785	
	802.11ax160-HE0	143	6665	MCS0
		175	6825	

Aux						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
2.45GHz	802.11b	1	2412	1Mbps	14.00	13.91
		6	2437		14.00	13.97
		11	2462		14.00	13.95
	802.11g	1	2412	6Mbps	14.00	13.66
		6	2437		14.00	13.86
		11	2462		14.00	13.69
	802.11n20-HT0	1	2412	MCS0	14.00	13.75
		6	2437		14.00	13.70
		11	2462		14.00	13.81
	802.11ax20-HE0	1	2412	MCS0	14.00	13.79
		6	2437		14.00	13.94
		11	2462		14.00	13.68
	802.11n40-HT0	3	2422	MCS0	14.00	13.82
		6	2437		14.00	13.76
		9	2452		14.00	13.78
	802.11ax40-HE0	3	2422	MCS0	14.00	13.75
		6	2437		14.00	13.95
		9	2452		14.00	13.90

Aux						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
5.15-5.25 GHz	802.11a	36	5180	6Mbps	12.00	11.89
		40	5200		12.00	11.92
		44	5220		12.00	11.75
		48	5240		12.00	11.82
	802.11n20-HT0	36	5180	MCS0	12.00	11.69
		40	5200		12.00	11.68
		44	5220		12.00	11.84
		48	5240		12.00	11.66
	802.11ax20-HE0	36	5180	MCS0	12.00	11.71
		40	5200		12.00	11.84
		44	5220		12.00	11.87
		48	5240		12.00	11.80
	802.11n40-HT0	38	5190	MCS0	12.00	11.75
		46	5230		12.00	11.80
	802.11ax40-HE0	38	5190	MCS0	12.00	11.69
		46	5230		12.00	11.76
	802.11ac80-VHT0	42	5210	MCS0	12.00	11.70
	802.11ax80-HE0	42	5210	MCS0	12.00	11.71
	802.11ac160-VHT0	50	5250	MCS0	12.00	11.96
	802.11ax160-HE0	50	5250	MCS0	12.00	11.91

Aux						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
5.25-5.35 GHz	802.11a	52	5260	6Mbps	12.00	11.92
		56	5280		12.00	11.78
		60	5300		12.00	11.86
		64	5320		12.00	11.69
	802.11n20-HT0	52	5260	MCS0	12.00	11.92
		56	5280		12.00	11.81
		60	5300		12.00	11.82
		64	5320		12.00	11.87
	802.11ax20-HE0	52	5260	MCS0	12.00	11.73
		56	5280		12.00	11.83
		60	5300		12.00	11.75
		64	5320		12.00	11.73
	802.11n40-HT0	54	5270	MCS0	12.00	11.72
		62	5310		12.00	11.83
	802.11ax40-HE0	54	5270	MCS0	12.00	11.91
		62	5310		12.00	11.70
	802.11ac80-VHT0	58	5290	MCS0	12.00	11.94
	802.11ax80-HE0	58	5290	MCS0	12.00	11.72

Aux						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
5.6GHz	802.11a	100	5500	6Mbps	11.00	10.91
		120	5600		11.00	10.73
		140	5700		11.00	10.91
	802.11n20-HT0	100	5500	MCS0	11.00	10.90
		120	5600		11.00	10.87
		140	5700		11.00	10.89
	802.11ax20-HE0	100	5500	MCS0	11.00	10.73
		120	5600		11.00	10.84
		140	5700		11.00	10.94
	802.11n40-HT0	102	5510	MCS0	11.00	10.77
		118	5590		11.00	10.77
		134	5670		11.00	10.88
		142	5710		11.00	10.80
	802.11ax40-HE0	102	5510	MCS0	11.00	10.78
		118	5590		11.00	10.94
		134	5670		11.00	10.76
		142	5710		11.00	10.71
	802.11ac80-VHT0	106	5530	MCS0	11.00	10.93
		122	5610		11.00	10.94
		138	5690		11.00	10.86
	802.11ax80-HE0	106	5530	MCS0	11.00	10.87
		122	5610		11.00	10.69
		138	5690		11.00	10.78
	802.11ac160-VHT0	114	5570	MCS0	11.00	10.98
	802.11ax160-HE0	114	5570	MCS0	11.00	10.88

Aux						
Mode	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
5.8GHz	802.11a	149	5745	6Mbps	12.00	11.86
		157	5785		12.00	11.74
		165	5825		12.00	11.83
	802.11n20-HT0	149	5745	MCS0	12.00	11.71
		157	5785		12.00	11.90
		165	5825		12.00	11.77
	802.11ax20-HE0	149	5745	MCS0	12.00	11.72
		157	5785		12.00	11.67
		165	5825		12.00	11.73
	802.11n40-HT0	151	5755	MCS0	12.00	11.90
		159	5795		12.00	11.95
	802.11ax40-HE0	151	5755	MCS0	12.00	11.81
		159	5795		12.00	11.80
	802.11ac80-VHT0	155	5775	MCS0	12.00	11.98
	802.11ax80-HE0	155	5775	MCS0	12.00	11.76

Aux				
Band	Mode	Channel	Frequency (MHz)	Data Rate
U-NII-5 6.2GHz	802.11ax20-HE0	1	5955	MCS0
		45	6175	
		93	6415	
	802.11ax40-HE0	3	5965	MCS0
		43	6165	
		91	6405	
	802.11ax80-HE0	7	5985	MCS0
		39	6145	
		87	6385	
	802.11ax160-HE0	15	6025	MCS0
		47	6185	
		79	6345	

Aux						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
U-NII-7 6.7GHz	802.11ax20-HE0	117	6535	MCS0	7.00	6.65
		149	6695		7.00	6.91
		181	6855		7.00	6.80
	802.11ax40-HE0	115	6525	MCS0	10.00	9.67
		147	6685		10.00	9.80
		179	6845		10.00	9.75
	802.11ax80-HE0	135	6625	MCS0	12.50	12.42
		151	6705		12.50	12.25
		167	6785		12.50	12.34
	802.11ax160-HE0	143	6665	MCS0	12.50	12.46
		175	6825		12.50	12.45

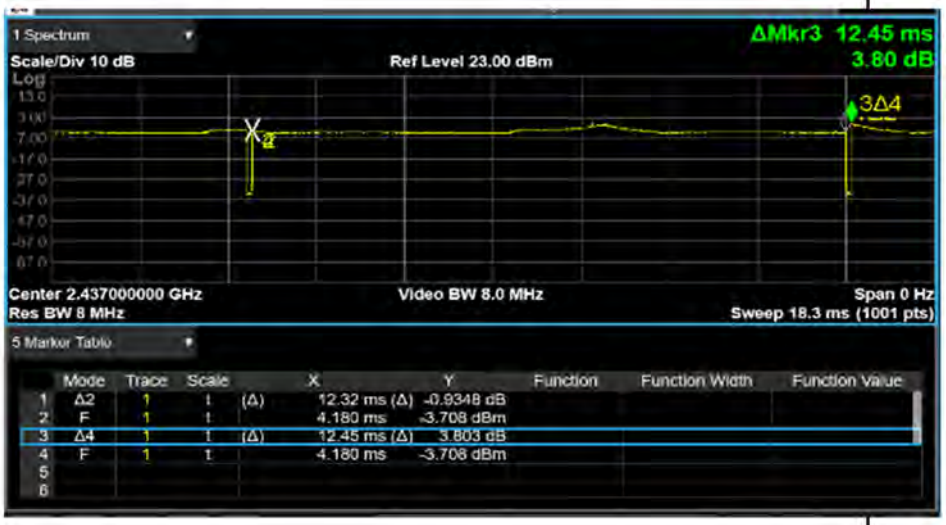
Bluetooth conducted power table:

Mode	Channel	Frequency (MHz)	1Mbps		2Mbps		3Mbps	
			Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
BR/EDR	CH 00	2402	10.50	8.51	9.50	7.50	9.50	7.50
	CH 39	2441		8.57		7.89		7.88
	CH 78	2480		9.08		8.35		8.34

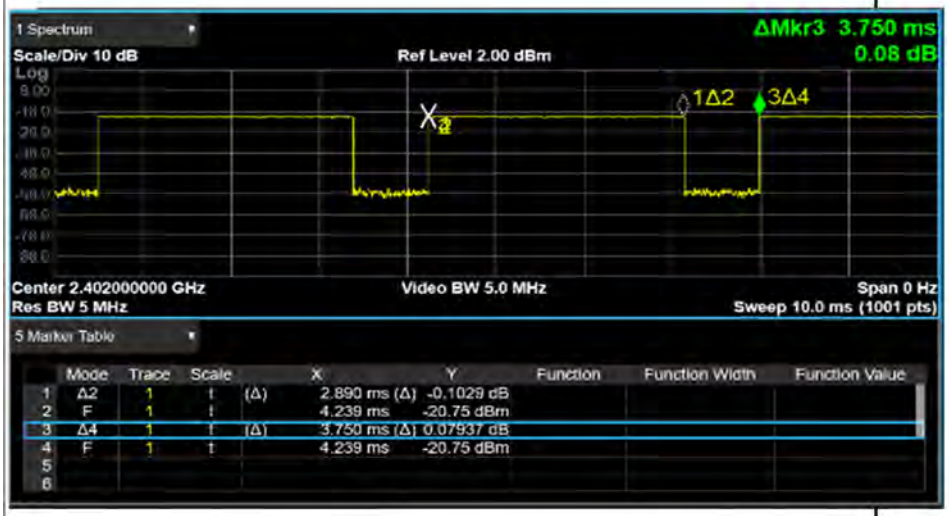
Mode	Channel	Frequency (MHz)	GFSK	
			Max. Rated Avg.Power + Max. Tolerance (dBm)	Average Output Power (dBm)
BLE_1M	CH 00	2402	9	8.06
	CH 19	2440		8.37
	CH 39	2480		8.87

Mode	Channel	Frequency (MHz)	GFSK	
			Max. Rated Avg.Power + Max. Tolerance (dBm)	Average Output Power (dBm)
BLE_2M	CH 00	2402	9	7.21
	CH 19	2440		7.46
	CH 39	2480		7.97

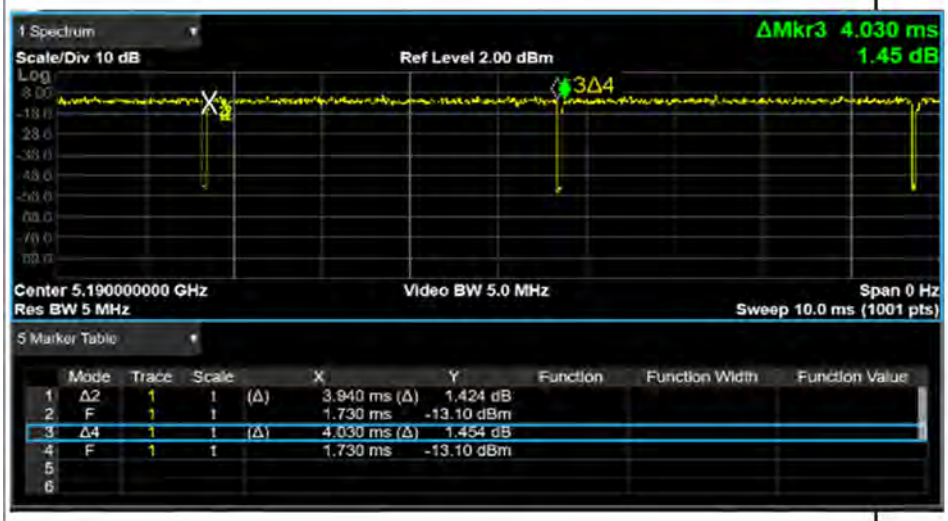
2.4G b duty	(12.32/12.45=0.990) Scaling Factor=1.010



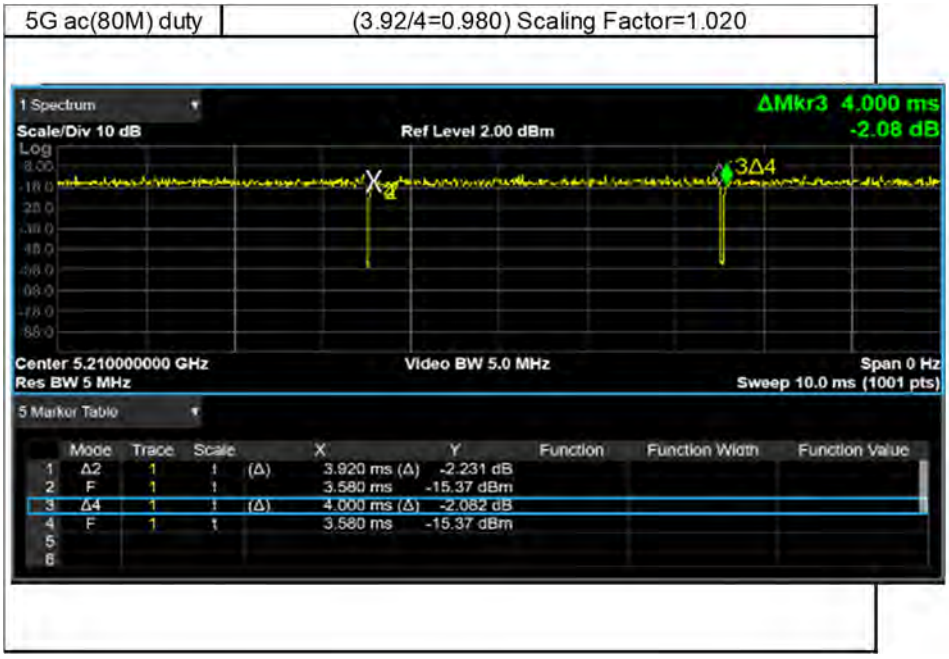
BT duty	(2.89/3.75=0.771) Scaling Factor=1.297



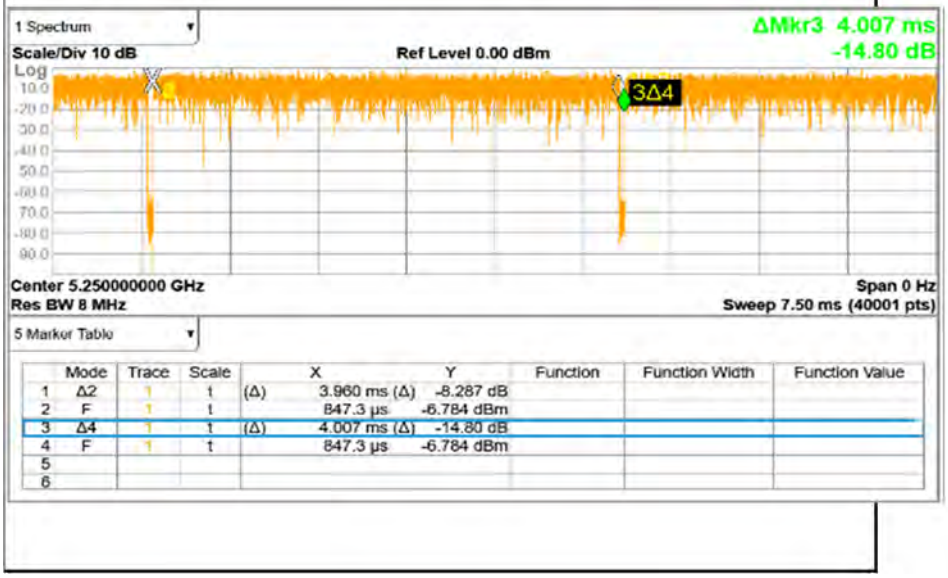
5G n(40M) duty	(3.94/4.03=0.978) Scaling Factor=1.022



5G ac(80M) duty	(3.92/4=0.980) Scaling Factor=1.020

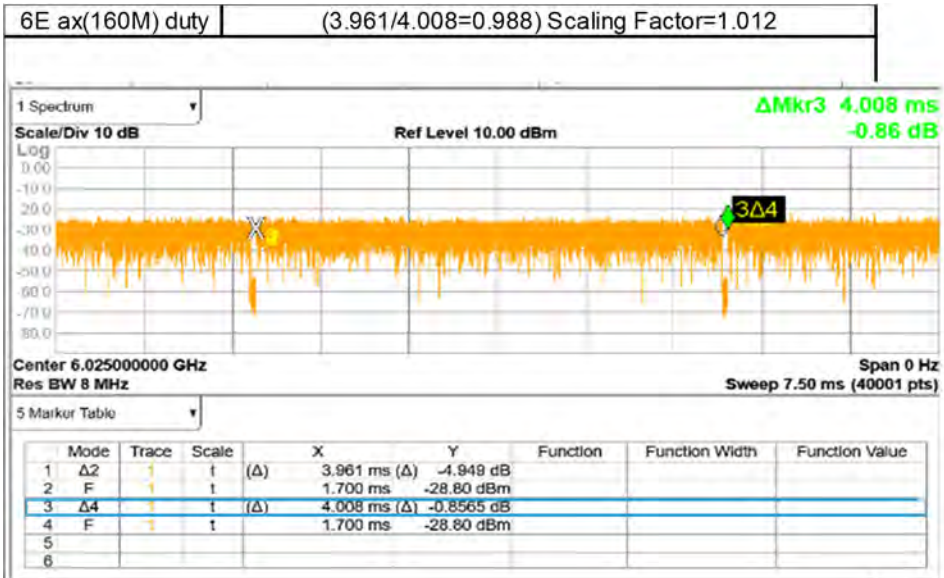


5G ac(160M) duty | (3.96/4.007=0.988) Scaling Factor=1.012



	Mode	Trace	Scale		X	Y	Function	Function Width	Function Value
1	Δ2	1	t	(Δ)	3.960 ms (Δ)	-8.287 dB			
2	F	1	t		847.3 µs	-6.784 dBm			
3	Δ4	1	t	(Δ)	4.007 ms (Δ)	-14.80 dB			
4	F	1	t		847.3 µs	-6.784 dBm			
5									
6									

6E ax(160M) duty | (3.961/4.008=0.988) Scaling Factor=1.012



	Mode	Trace	Scale		X	Y	Function	Function Width	Function Value
1	Δ2	1	t	(Δ)	3.961 ms (Δ)	-4.949 dB			
2	F	1	t		1.700 ms	-28.80 dBm			
3	Δ4	1	t	(Δ)	4.008 ms (Δ)	-0.8565 dB			
4	F	1	t		1.700 ms	-28.80 dBm			
5									
6									

1.4 Test Environment

Ambient Temperature: 22±2° C
Tissue Simulating Liquid: 22±2° C

1.5 Operation Description

1. An initial test configuration is determined for OFDM transmission modes according to the channel bandwidth, modulation and data rate combination(s) with the highest maximum output power specified for production units in each standalone and aggregated frequency band.
2. SAR is measured using the highest measured maximum output power channel. When the reported SAR of the initial test configuration is > 0.8 W/kg, SAR measurement is required for the subsequent next highest measured output power channel(s) in the initial test configuration until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.
3. Since the highest reported SAR for the initial test configuration is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR is not required for subsequent test configuration.
4. Per 201904 TCBC workshops, general principles of FCC KDB Publication 248227 D01 can be applied to determine the SAR Initial Test Configurations and test reduction for 802.11ax SAR testing.
5. In applying the test guidance, the IEEE 802.11 mode with the maximum output power (out of all modes) should be considered for testing. For modes with the same maximum output power, the guidance from section 5.3.2 a) of FCC KDB Publication 248227 D01 should be applied, with 802.11ax being considered as the highest 802.11 mode for the appropriate frequency bands
6. According to KDB865664 D01, SAR measurement variability must be assessed for each frequency band. When the original highest measured SAR is ≥ 0.8 W/kg, repeated that measurement once. Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg (~10% from the 1-g SAR limit)
7. WIFI 6E of the device was configured to transmit continuously at the required data rate, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools.
8. Per October 2020 & April 2021 TCB Workshop Interim procedures and FCC guidance, start instead with a minimum of 5 test channels across the full band, then adapt and apply conducted power and SAR test reduction procedures of KDB Pub. 248227 v02r02.
9. WIFI 6E SAR is measured by using 6-7GHz parameters per IEC/IEEE62209-1528:2020 and report also estimated absorbed PD (for reference purposes only, not specifically for compliance).

10. For the highest SAR test configurations also measure incident PD (total) using mmW near-field probe and total-field/power-density reconstruction method.
11. The PD test was performed with a 2 mm separation between probe sensor and EUT bottom surface.
12. According to October 2020 TCB Workshop Interim procedures, power density results were scaled according to IEC 62479:2010 for the portion of the measurement uncertainty > 30%. Total expanded uncertainty of 2.67 dB (85%) was used to determine the psPD measurement scaling factor.

1.6 EUT Testing Position

For laptop PC, according to KDB 616217 D04, SAR evaluation is required for the bottom surface of the keyboard. This EUT was tested in the base of EUT directly against the flat phantom. The required minimum test separation distance for incorporating transmitters and antennas into laptop computer display is determined with the display screen opened at an angle of 90° to the keyboard compartment.

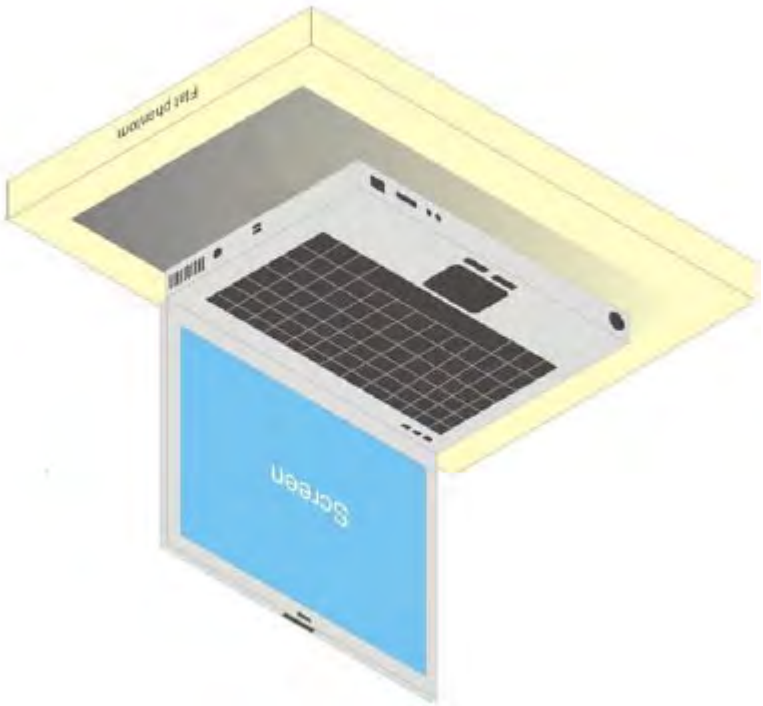


Illustration for Laptop Setup

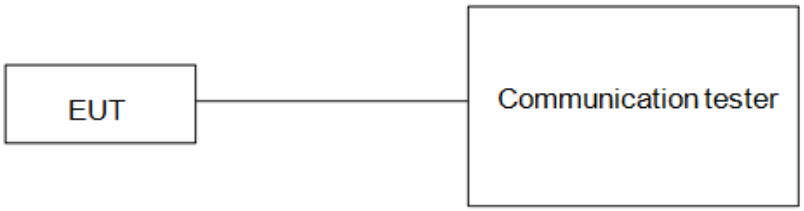
1.7 Proximity sensor operation description

The P-sensor being used to reduce output power is capacitive in which when the object such as human body, metal or plastic is being approached, the sensing capacitance would be increased with the antenna pad. Once the capacitance is accumulated, and reached over the threshold as set in MCU of the microchip, the interruption signal is pulled low (High state without trigger) and further inform modem module of the transmitter to make power reduction.

1.7.1 Proximity sensor measurement procedure

1. The proximity sensor is collocated with WLAN antenna.

2. Output power is measured, and monitored by using the base station simulator. A RF cables with sufficient length was being attached from the antenna port of the module, and used for the measurement. The appropriate loss attenuated from cable is compensated in the test setup.



1.7.2 Trigger distances for bottom

Test procedure:

1. The entire bottom surface of the keyboard is positioned below a flat phantom filled with the required tissue equivalent medium and positioned at least 20 mm further than the distance that triggers power reduction.

2. The bottom surface of the keyboard is moved toward the phantom in 3 mm steps until the sensor triggers.

3. The bottom surface of the keyboard is then moved back (further away) from the phantom until maximum output power is returned to the normal maximum level.

4. The bottom surface of the keyboard is again moved toward the phantom, but in 1 mm steps, until it is at least 5 mm past the triggering point or touching the phantom

5. If the bottom surface of the keyboard is not touching the phantom, it is moved in 3 mm steps until it touches the phantom to confirm that the sensor remains triggered and the maximum power stays reduced.

6. The process is then reversed by moving the bottom surface of the keyboard away from the phantom to determine triggering release, until it is at least 10 mm beyond the point that triggers the return of normal maximum power.

7. The measured output power within ± 5 mm of the triggering points, or until the bottom surface of the keyboard is touching the phantom, for movements to and from the phantom should be tabulated.

8. To ensure all production units are compliant, it is generally necessary to reduce the triggering distance determined from the triggering tests by 1 mm, or more if it is necessary, and use the smallest distance for movements to and from the phantom, minus 1 mm, as the sensor triggering distance for determining the SAR measurement distance.

9. For bottom surface of the keyboard, the trigger distance is 9mm.

1.7.3 Tilt angle testing (This is not required for this device)

Test procedure:

1. The influence of table tilt angles to proximity sensor triggering is determined by positioning each tablet edge that contains a transmitting antenna, perpendicular to the flat phantom, at the smallest sensor triggering test distance determined in sections 1.7.2 by rotating the tablet around the edge next to the phantom in ≤ 10 deg increments until the tablet is +/- 45deg or more from the vertical position at 0 deg.

2. If sensor triggering is released and normal maximum output power is restored within the +/- 45deg range, the procedures in step 1) should be repeated by reducing the tablet to phantom separation distance by 1 mm until the proximity sensor no longer releases triggering, and maximum output power remains in the reduced mode.

3. The smallest separation distance determined in steps 1) and 2), minus 1 mm, is the sensor triggering distance for tablet tilt coverage. The smallest separation distance determined in sections 1.7.2, 1.7.3 minus 1 mm should be used in the SAR measurements.

1.7.4 Proximity sensor coverage (This is not required for this device because the antenna and sensor are collocated and the peak SAR location is overlapping with the sensor.)

The following procedures do not apply and are not required for configurations where the antenna and sensor are collocated and the peak SAR location is overlapping with the sensor.

Test procedure:

1. The back surface or edges of the tablet is positioned at a test separation distance less than or equal to the distance required for back surface or edge triggering, with both the antenna and sensor pad located at least 20 mm laterally outside the edge (boundary) of the phantom, along the direction of maximum antenna and sensor offset.

2. The similar sequence of steps applied to determine sensor triggering distance in section 1.7.2 are used to verify back surface and edge sensor coverage by moving the tablet (sensor and antenna) horizontally toward the phantom while maintaining the same vertical separation between the back surface or edge and the phantom.

3. After the exact location where triggering of power reduction is determined, with respect to the sensor and antenna, the tablet movement should be continued, in 3 mm increments, until both the sensor and antenna(s) are fully under the phantom and at least 20 mm inside the phantom edge.

4. The process is then repeated from the other direction, at the opposite end of maximum antenna and sensor offset, by rotating the tablet 180 degrees.

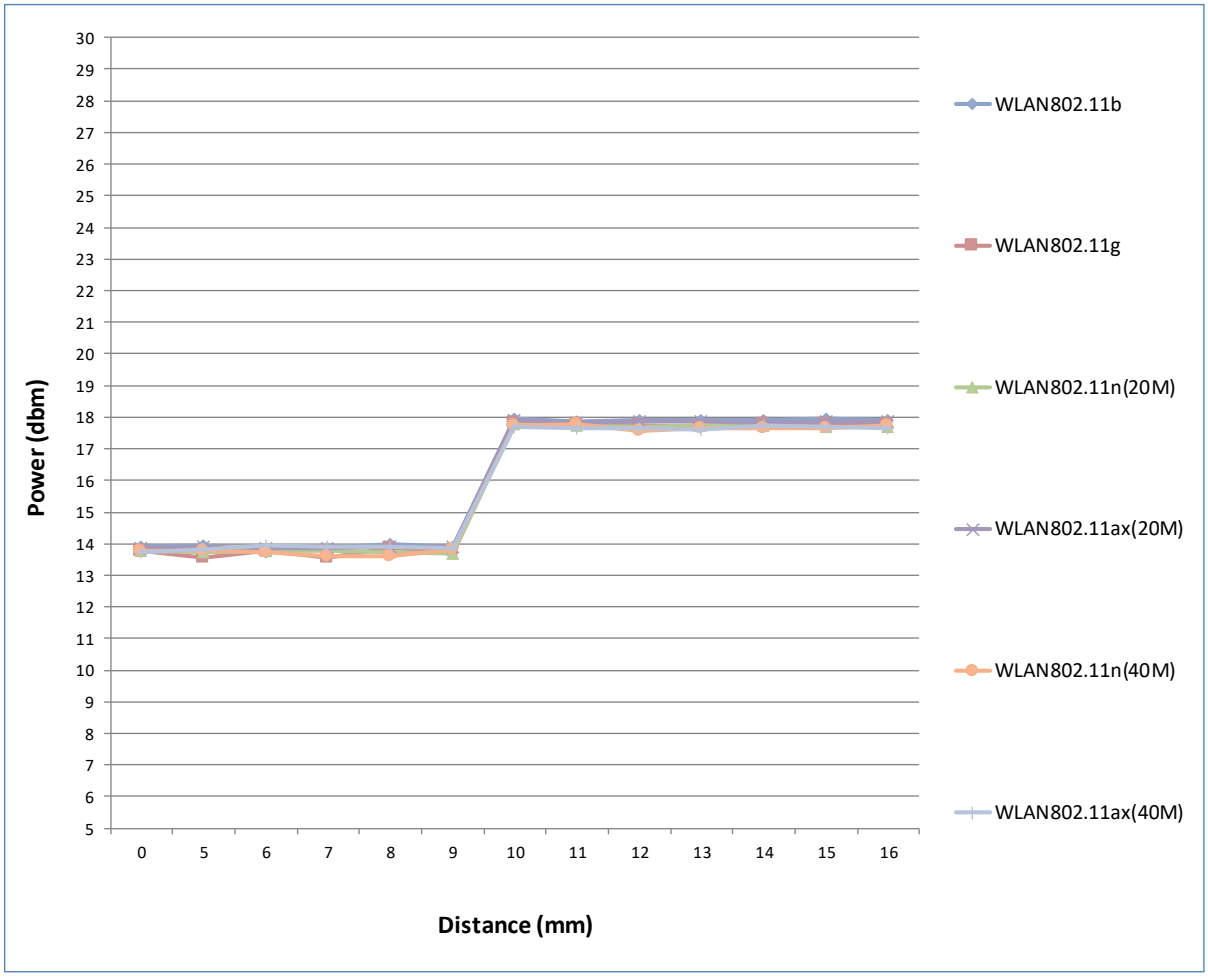
1.7.5 Results

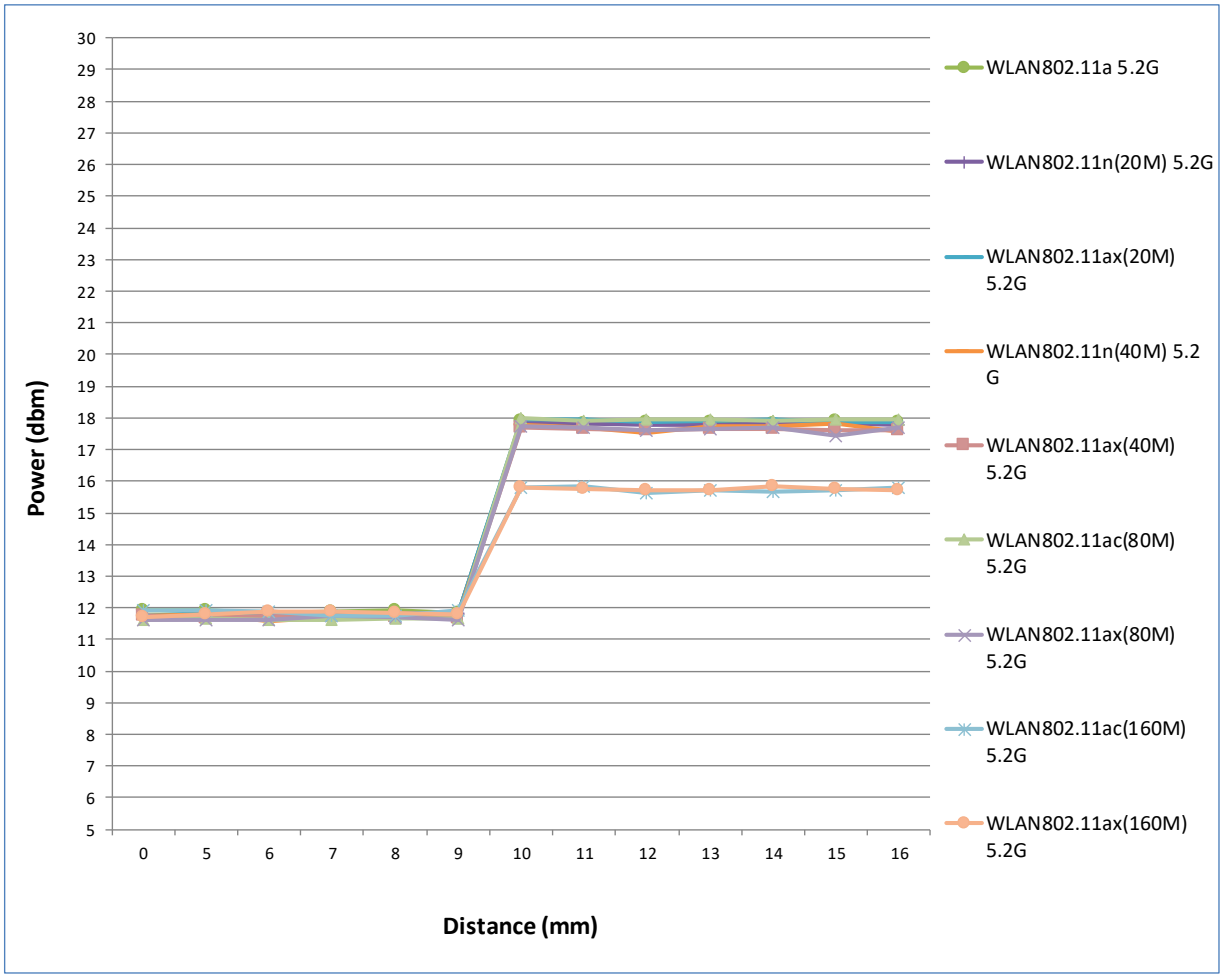
The measured output power within ± 5 mm of the triggering points, or until the bottom surface of the keyboard is touching the phantom, for movements to and from the phantom is tabulated in the following.

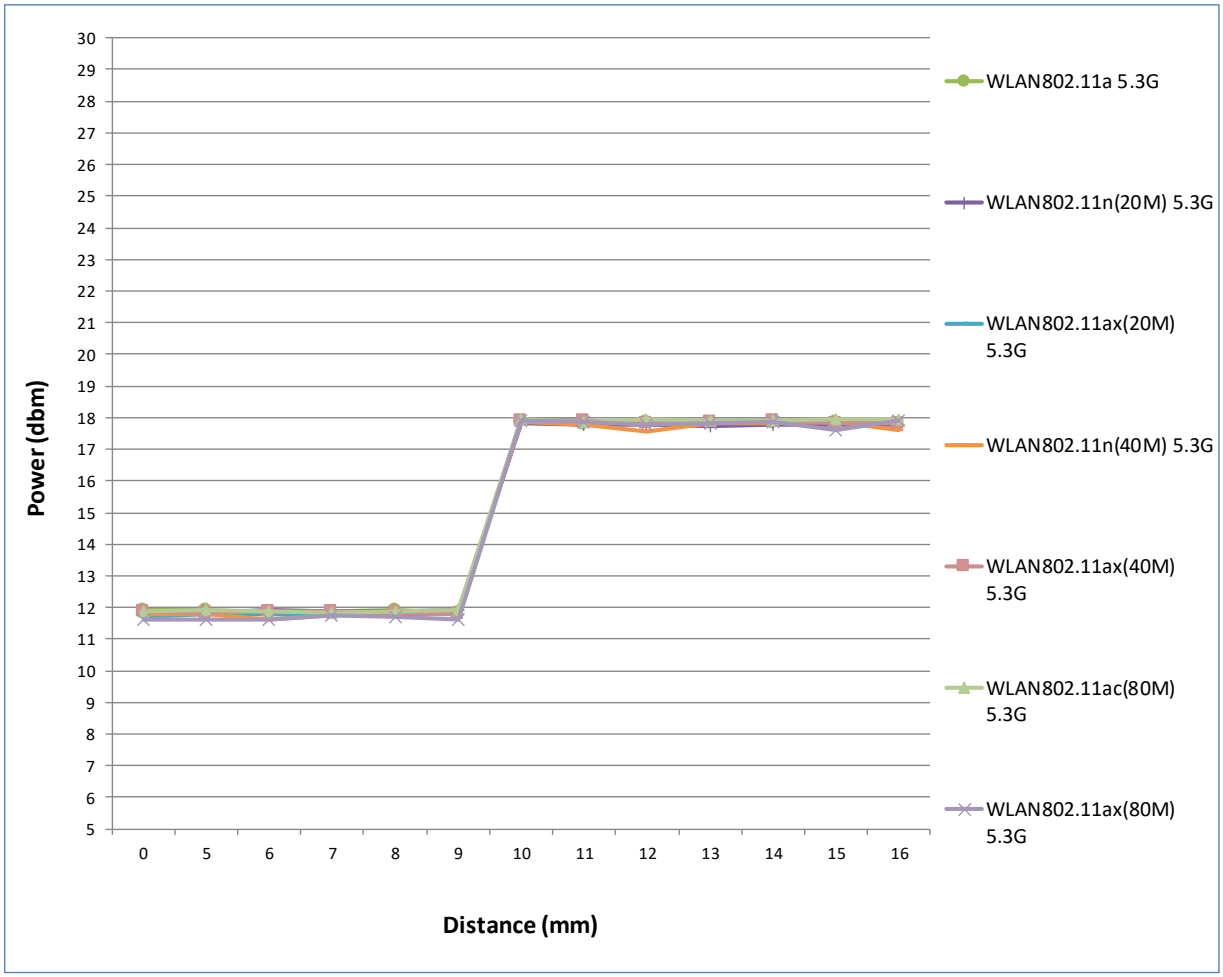
Bottom Surface

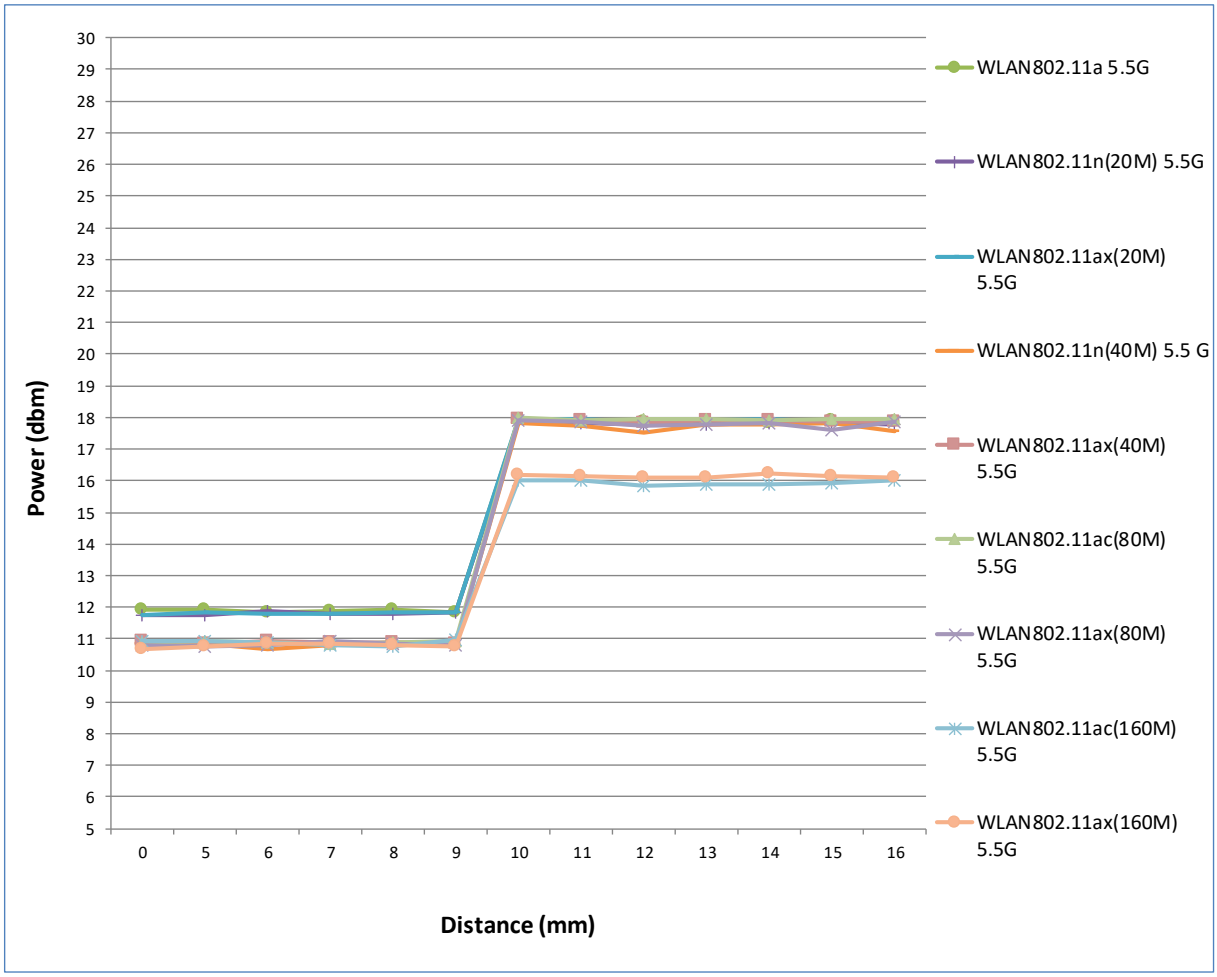
Moving device toward the phantom

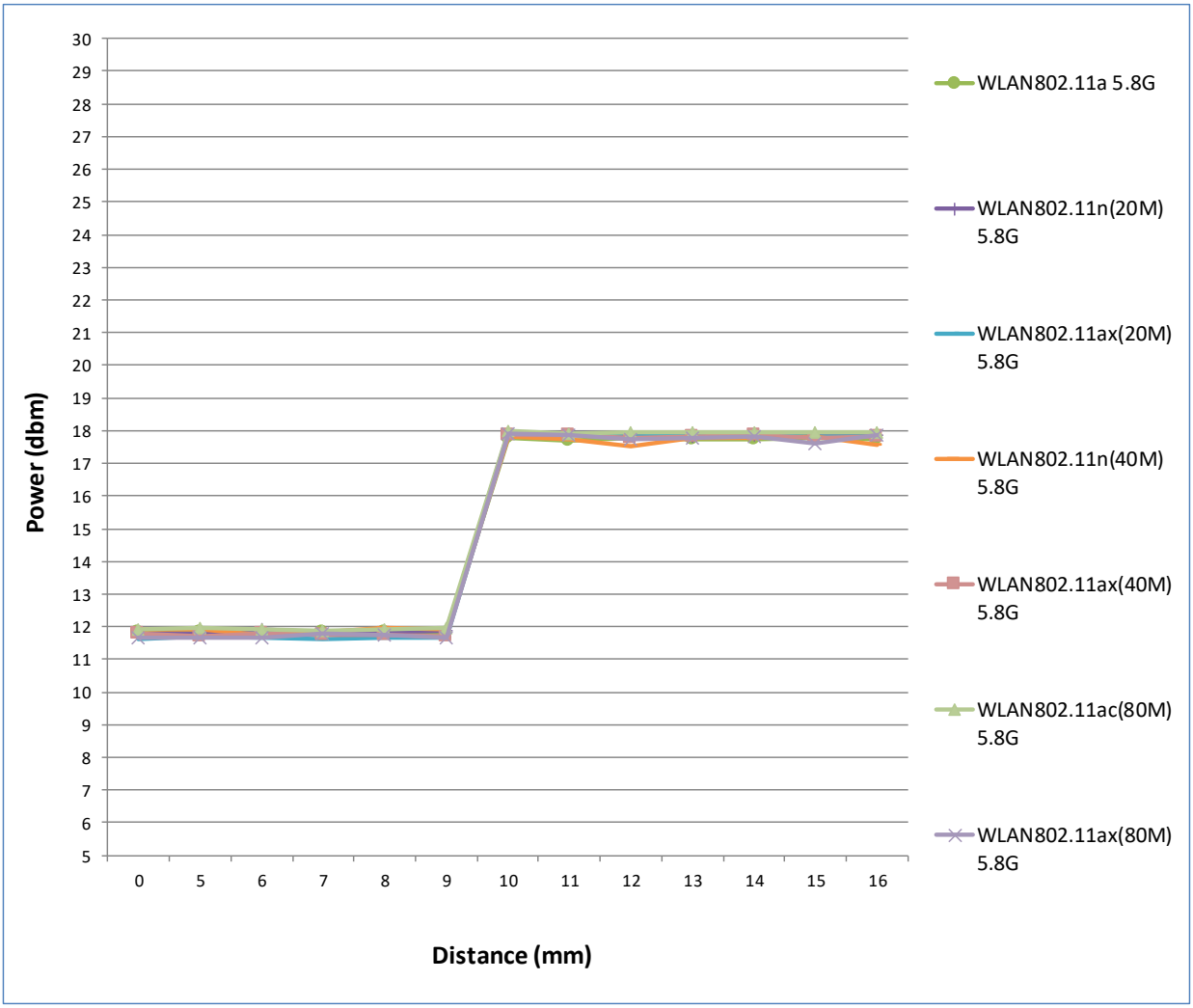
Aux antenna

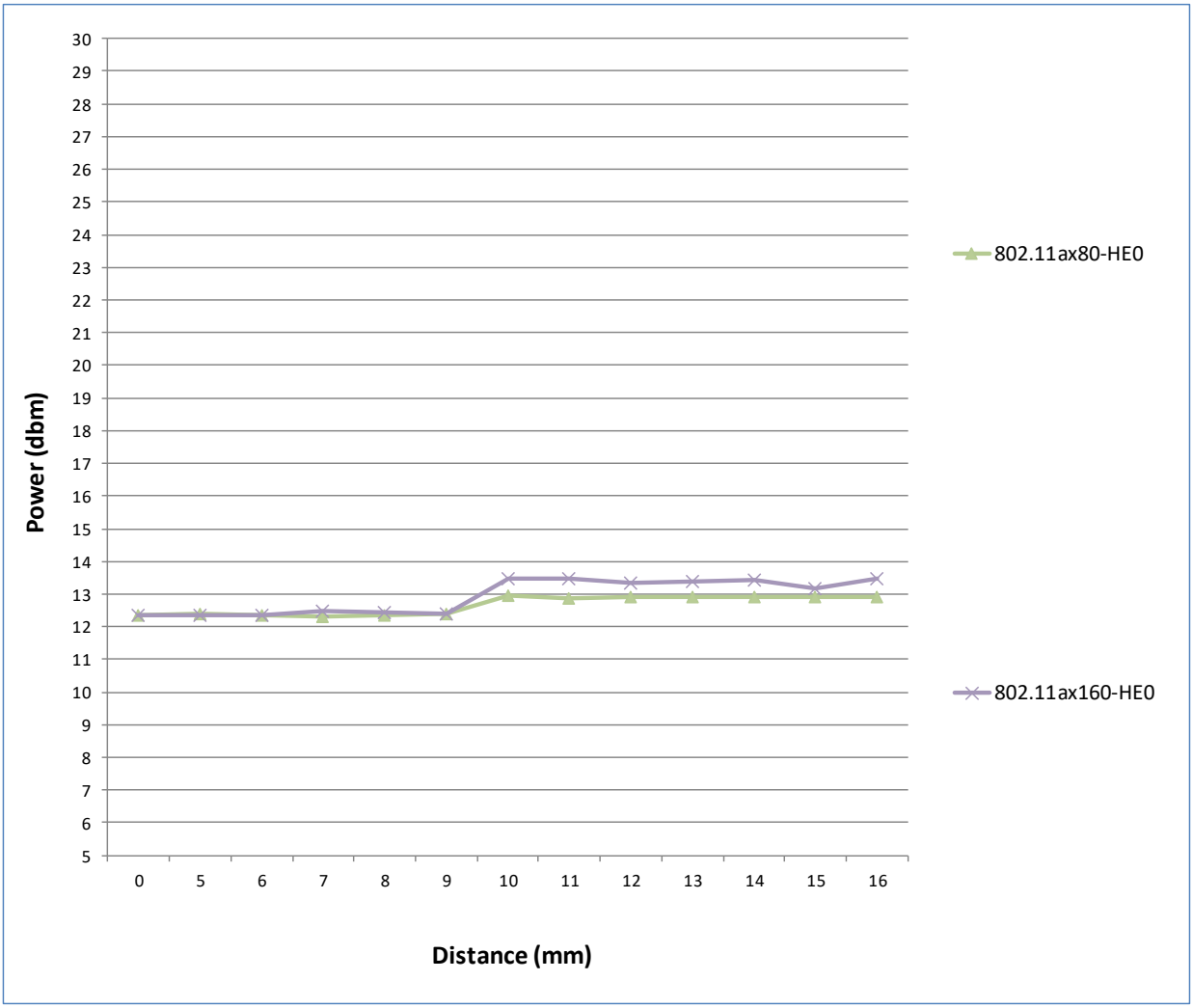




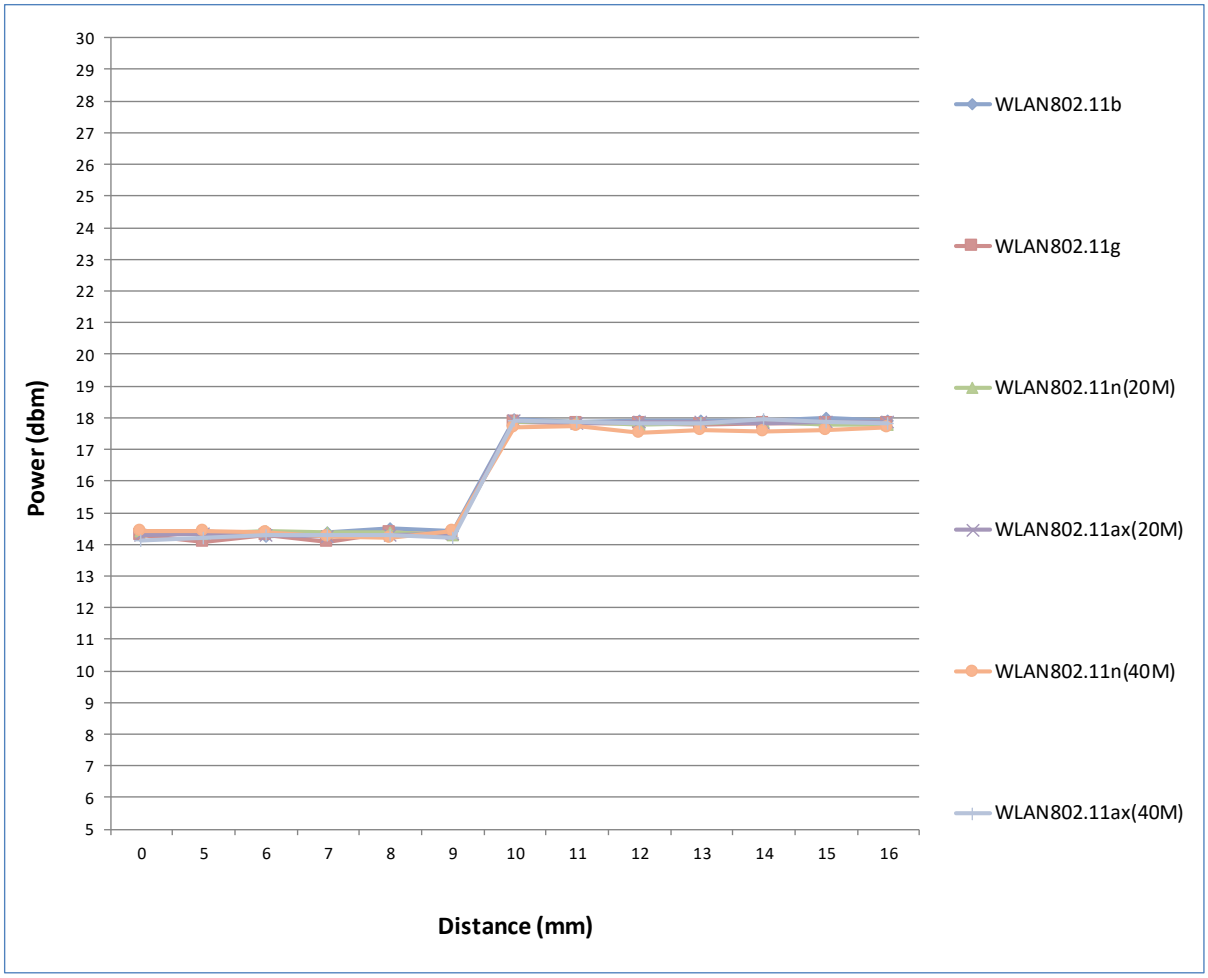


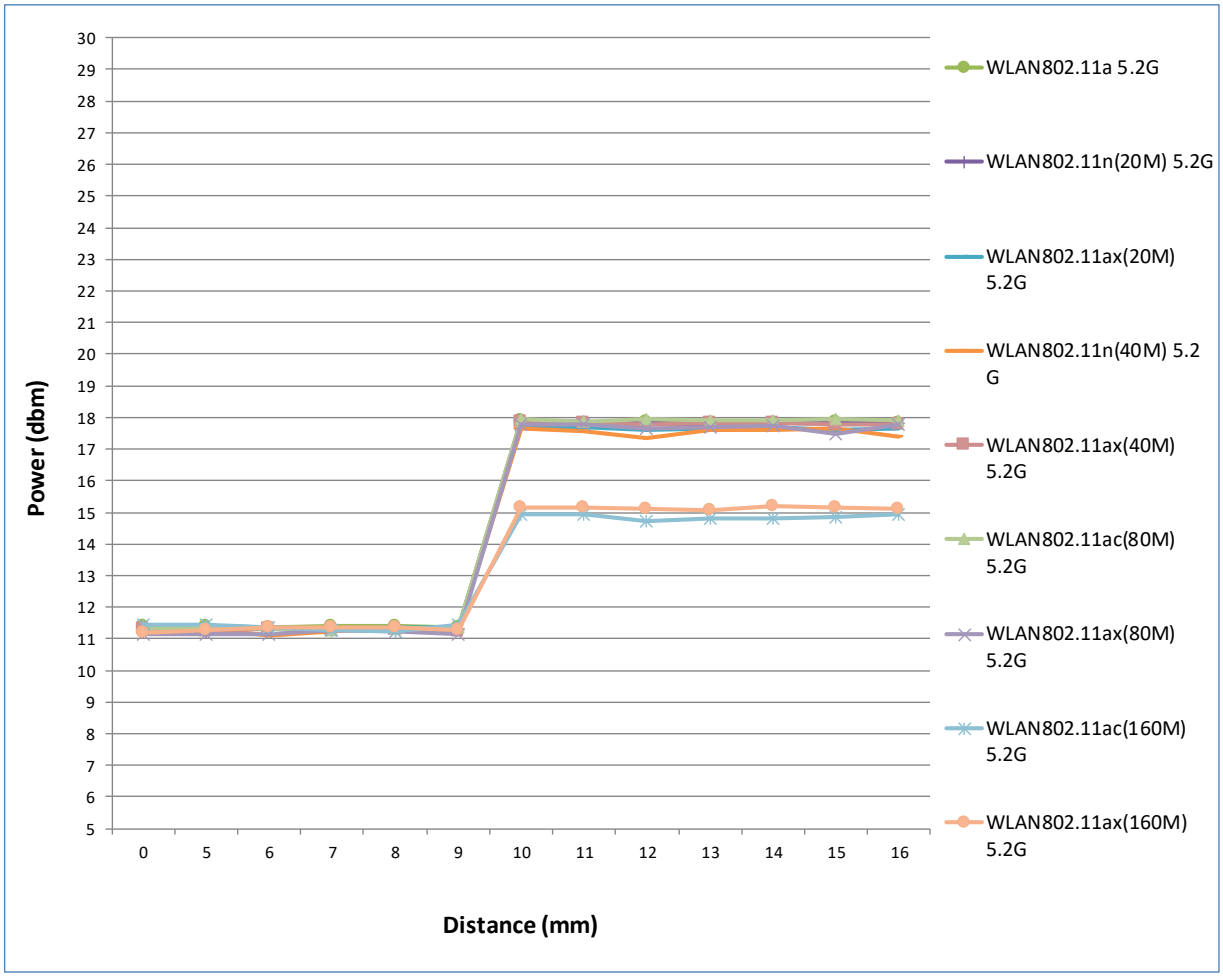


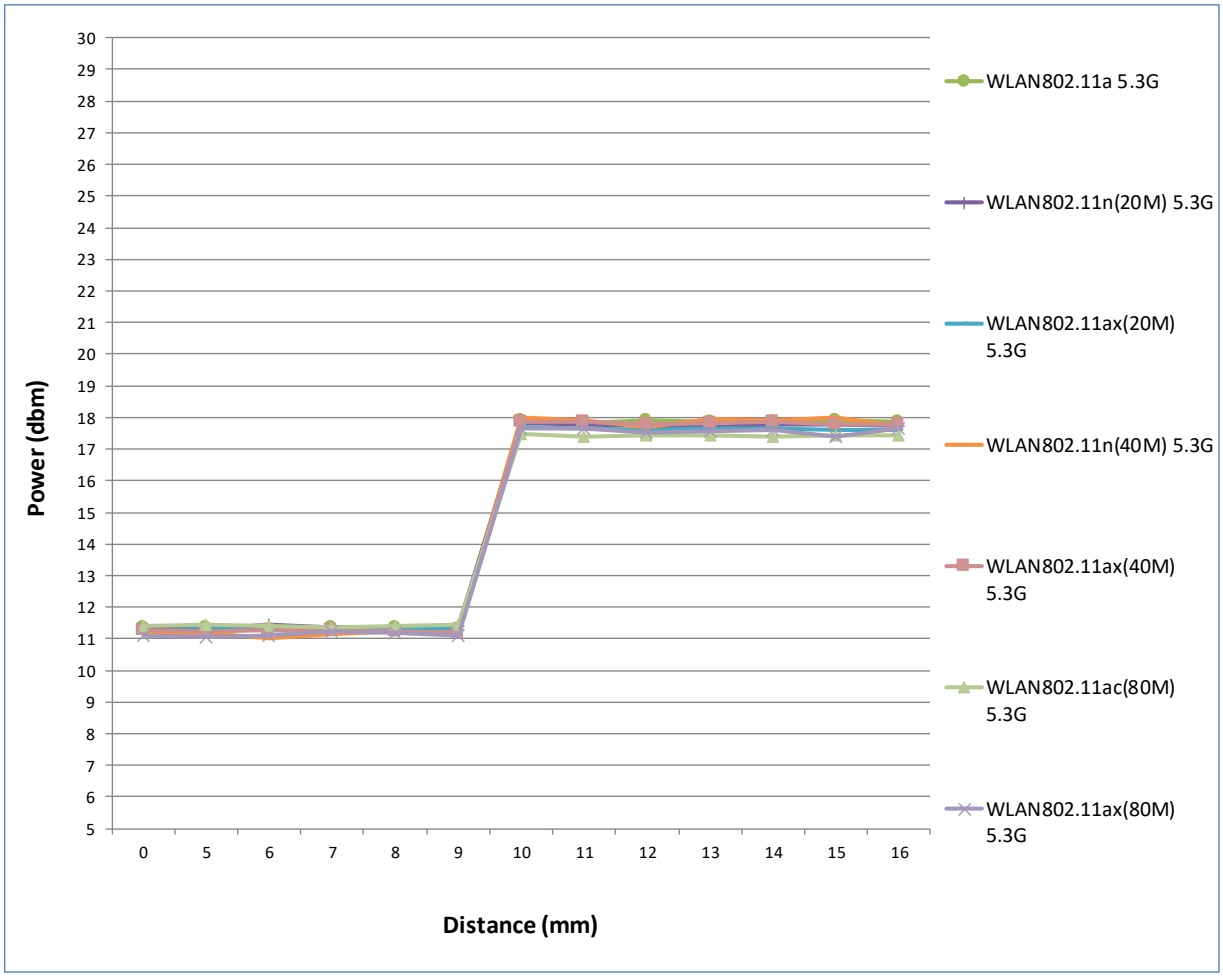


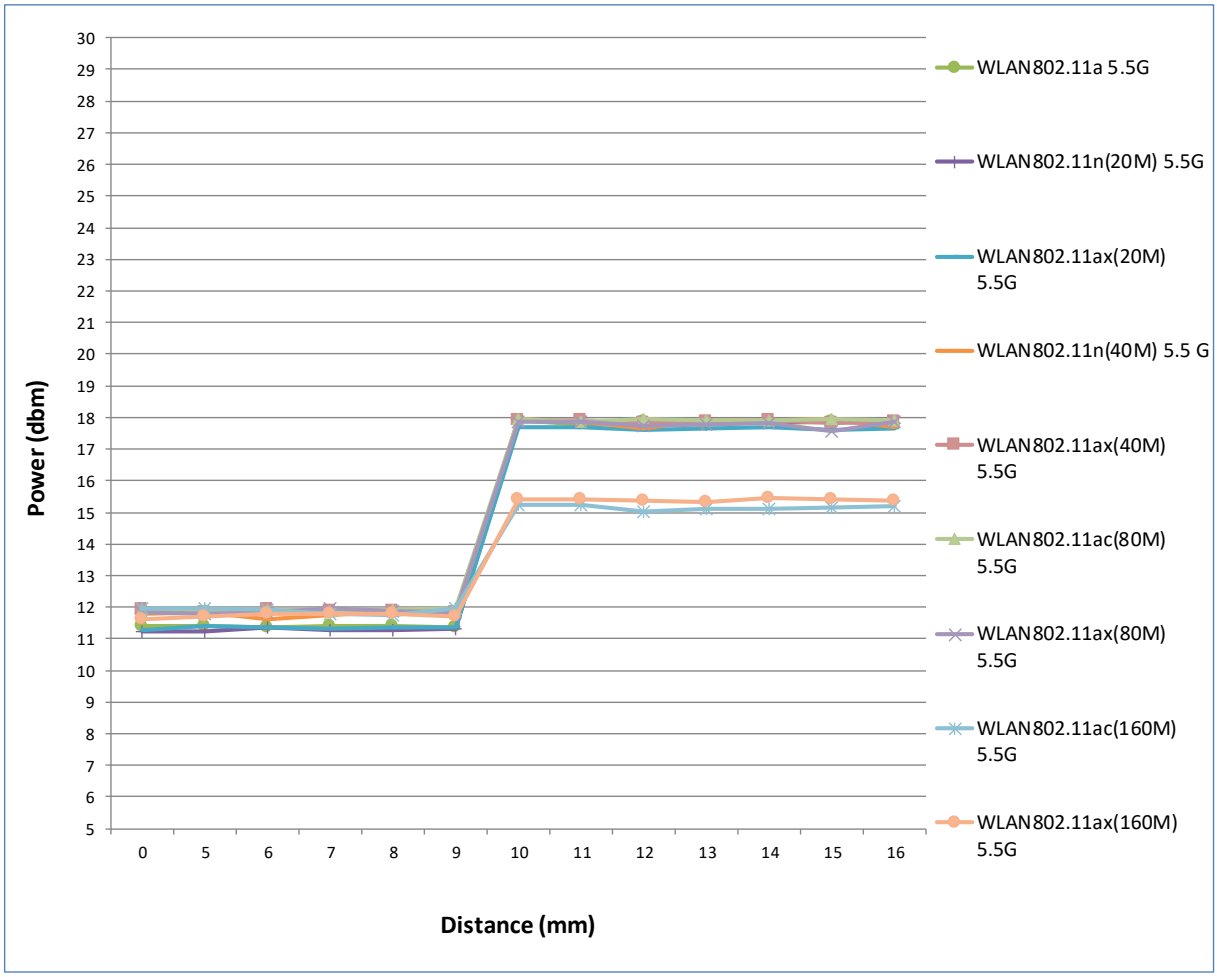


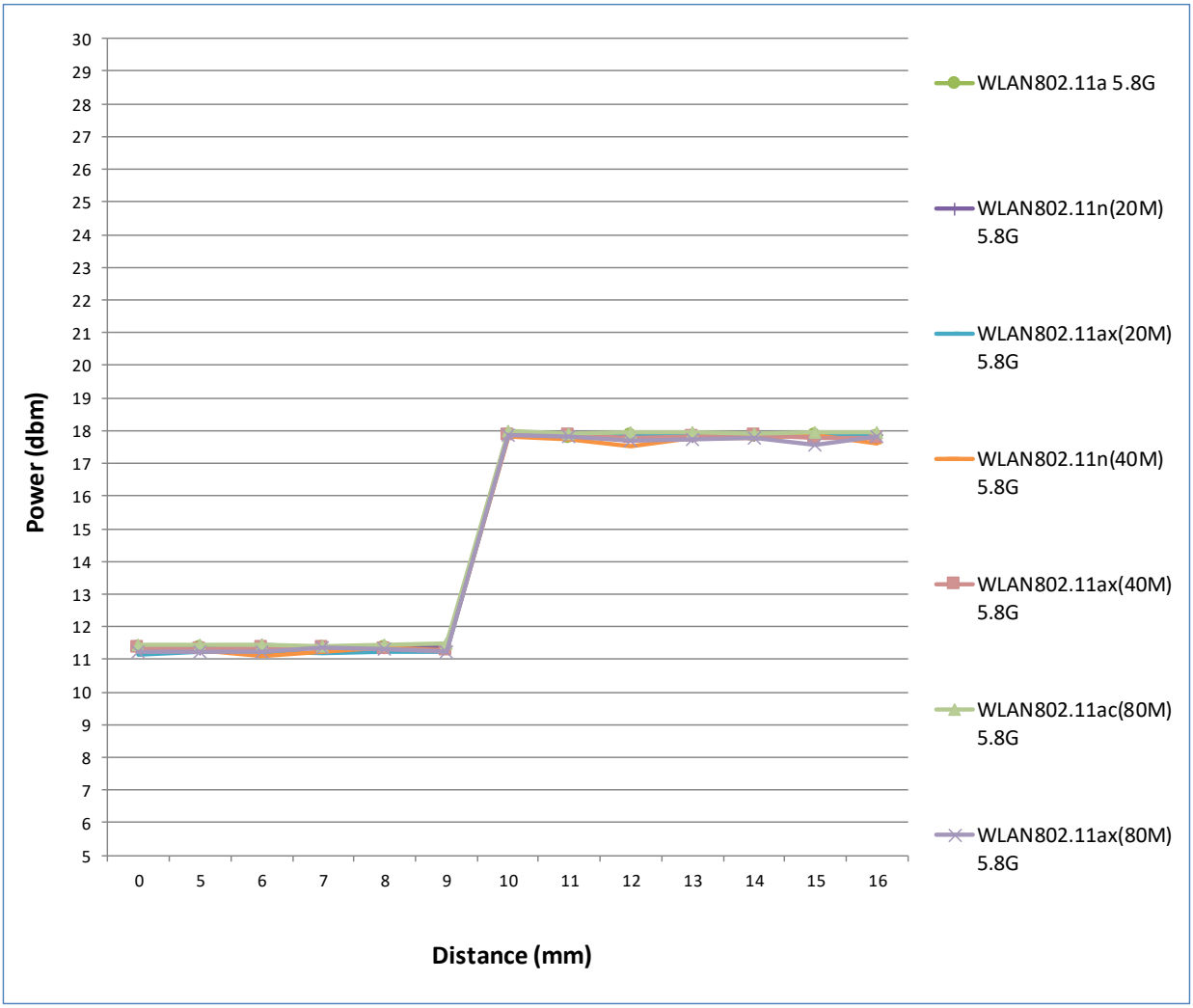
Main antenna

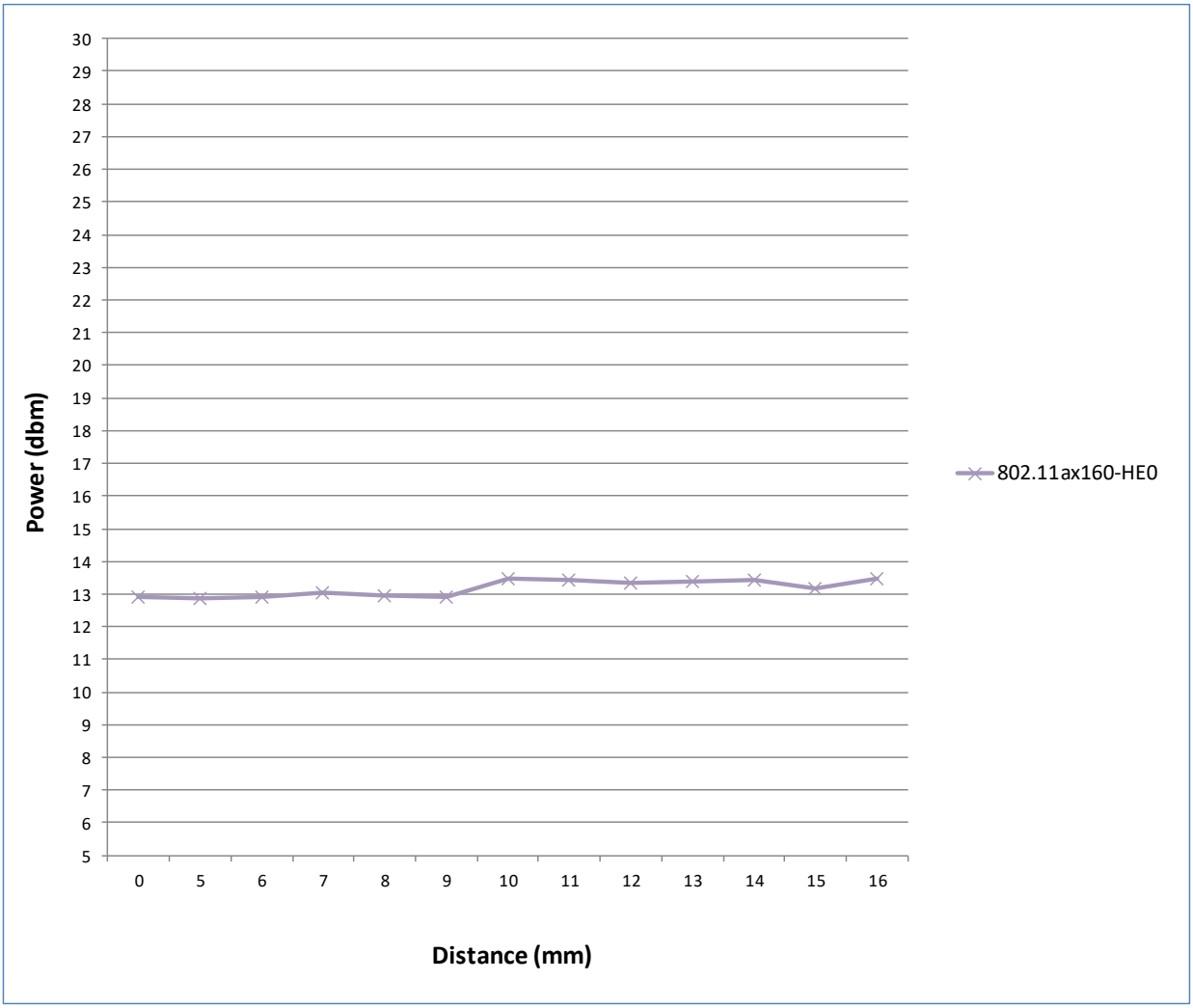






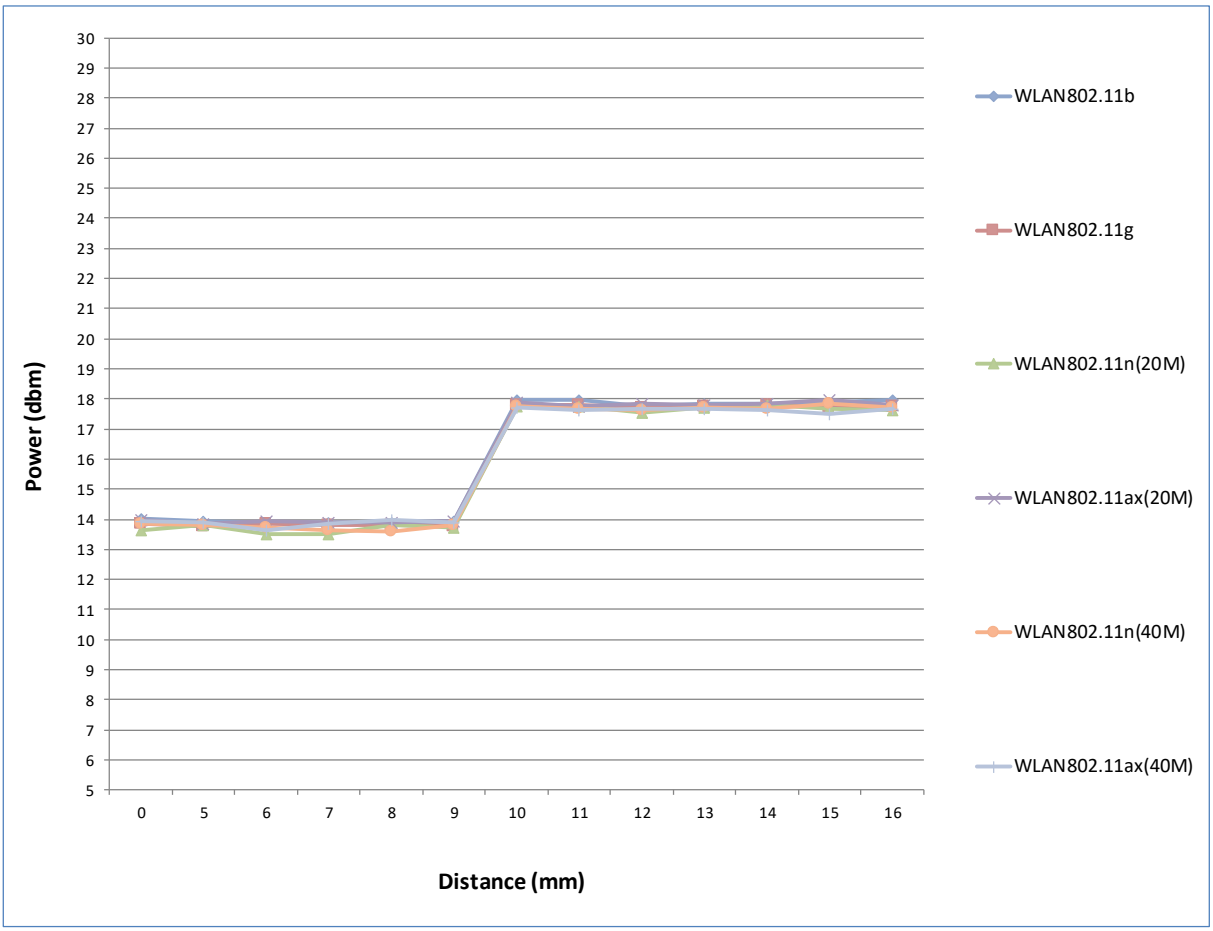


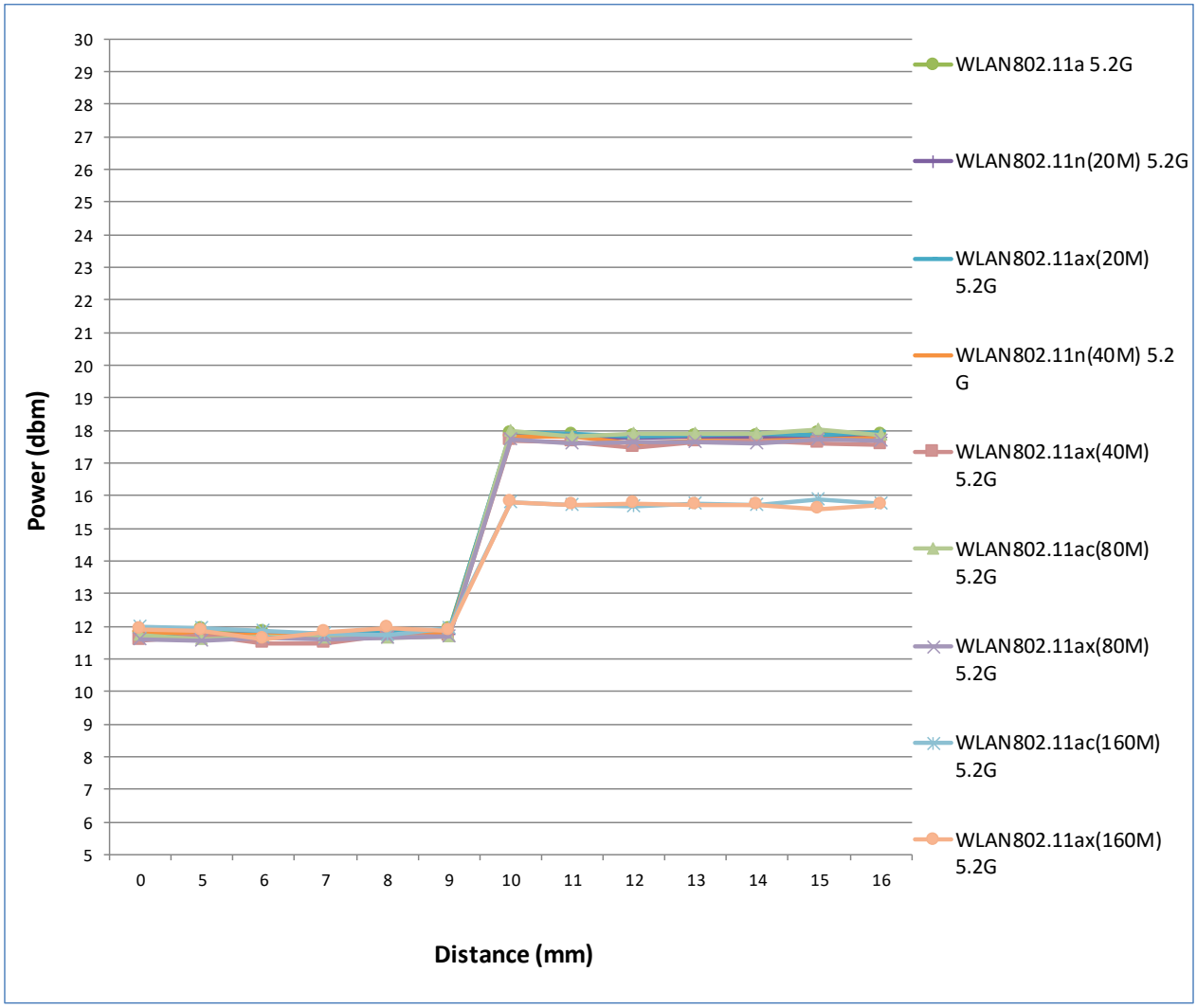


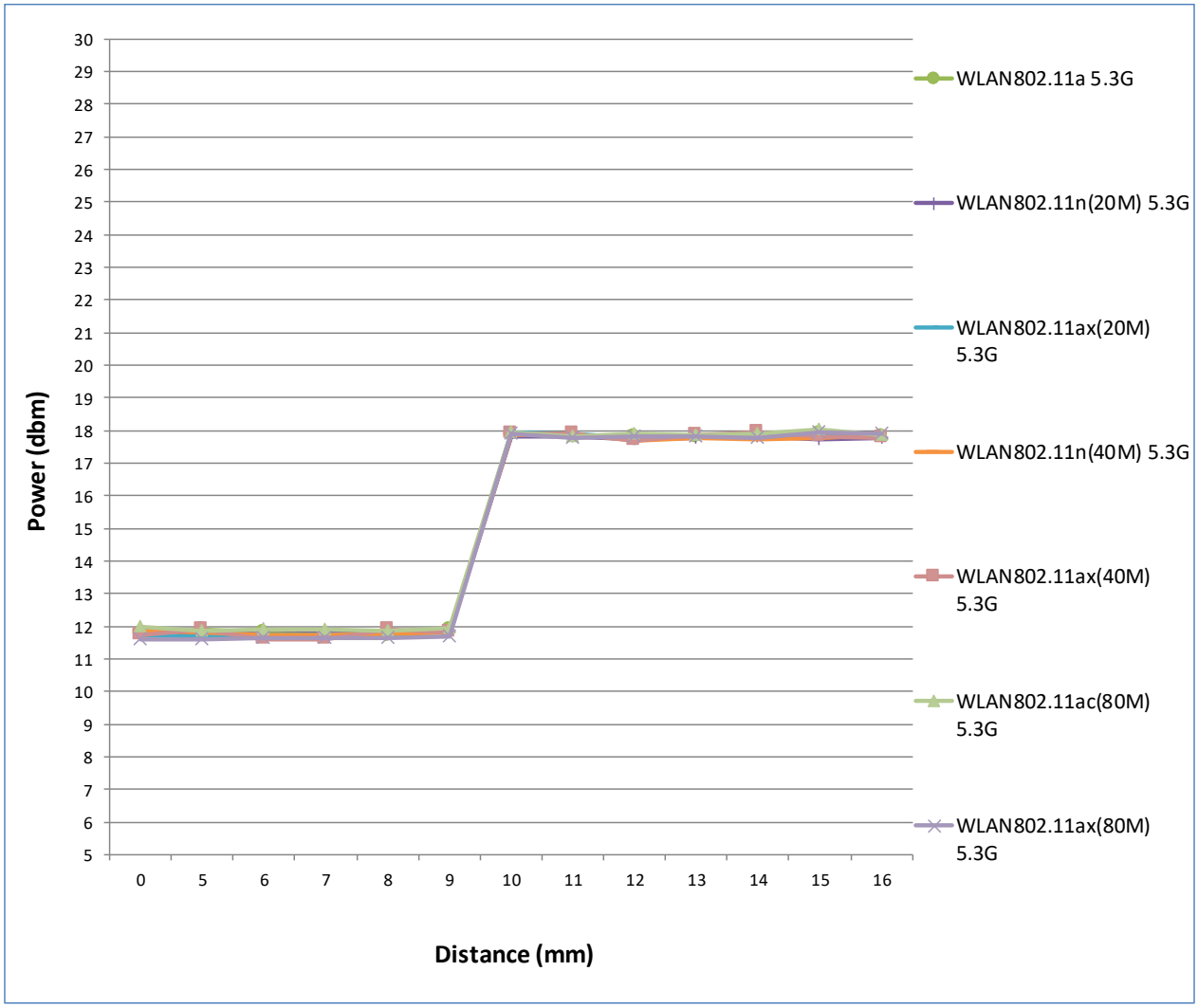


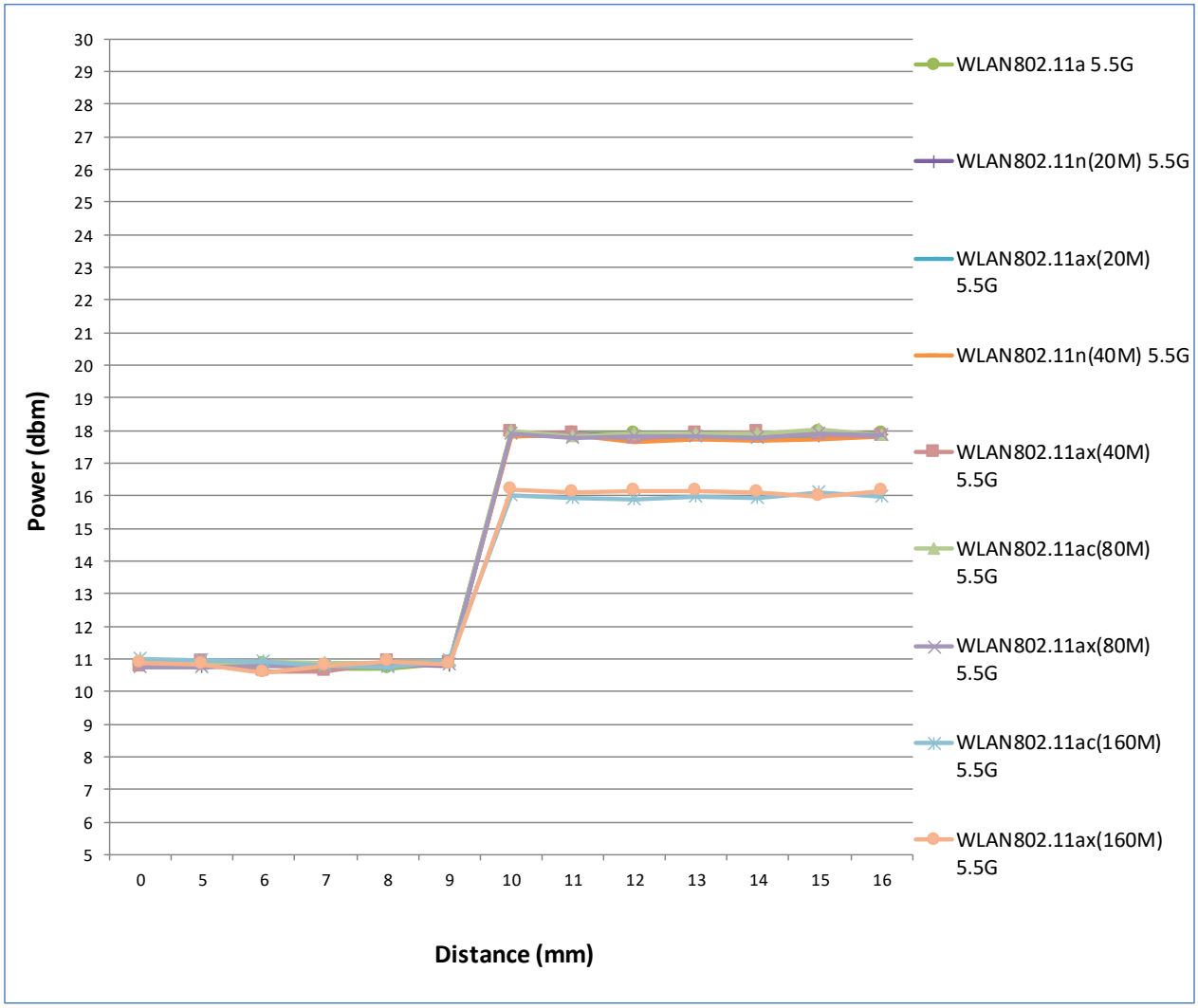
Moving device away from the phantom

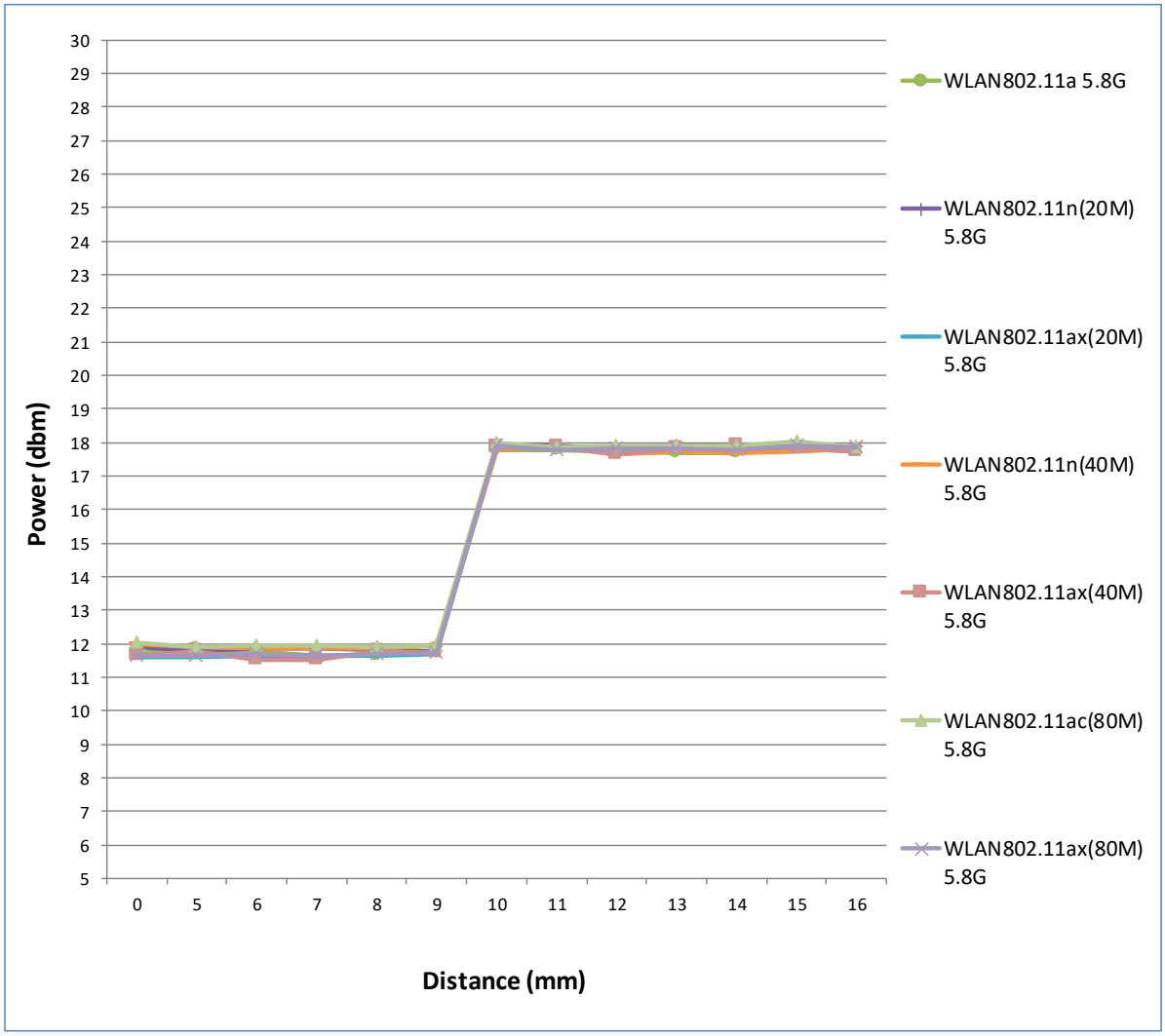
Aux antenna

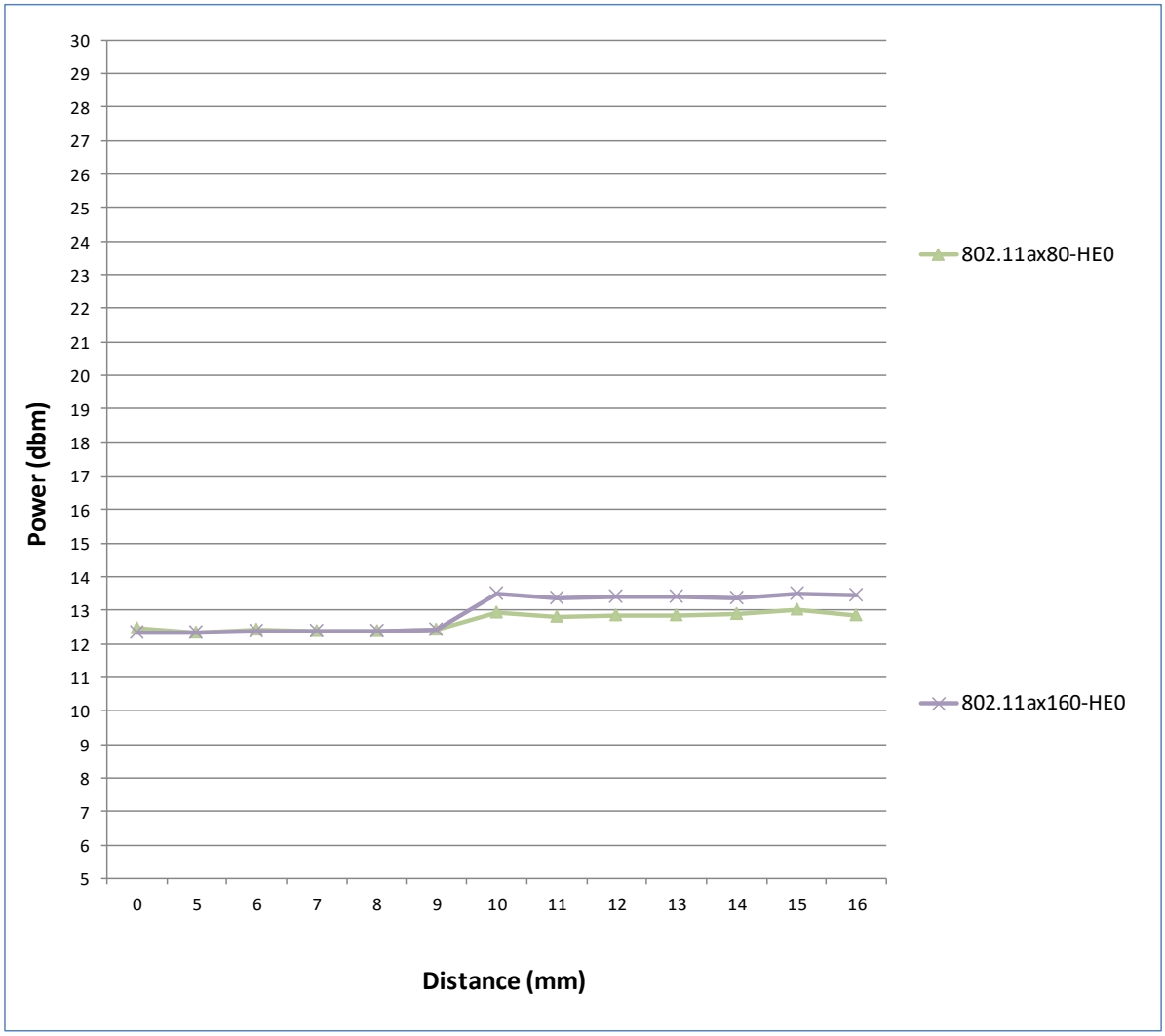




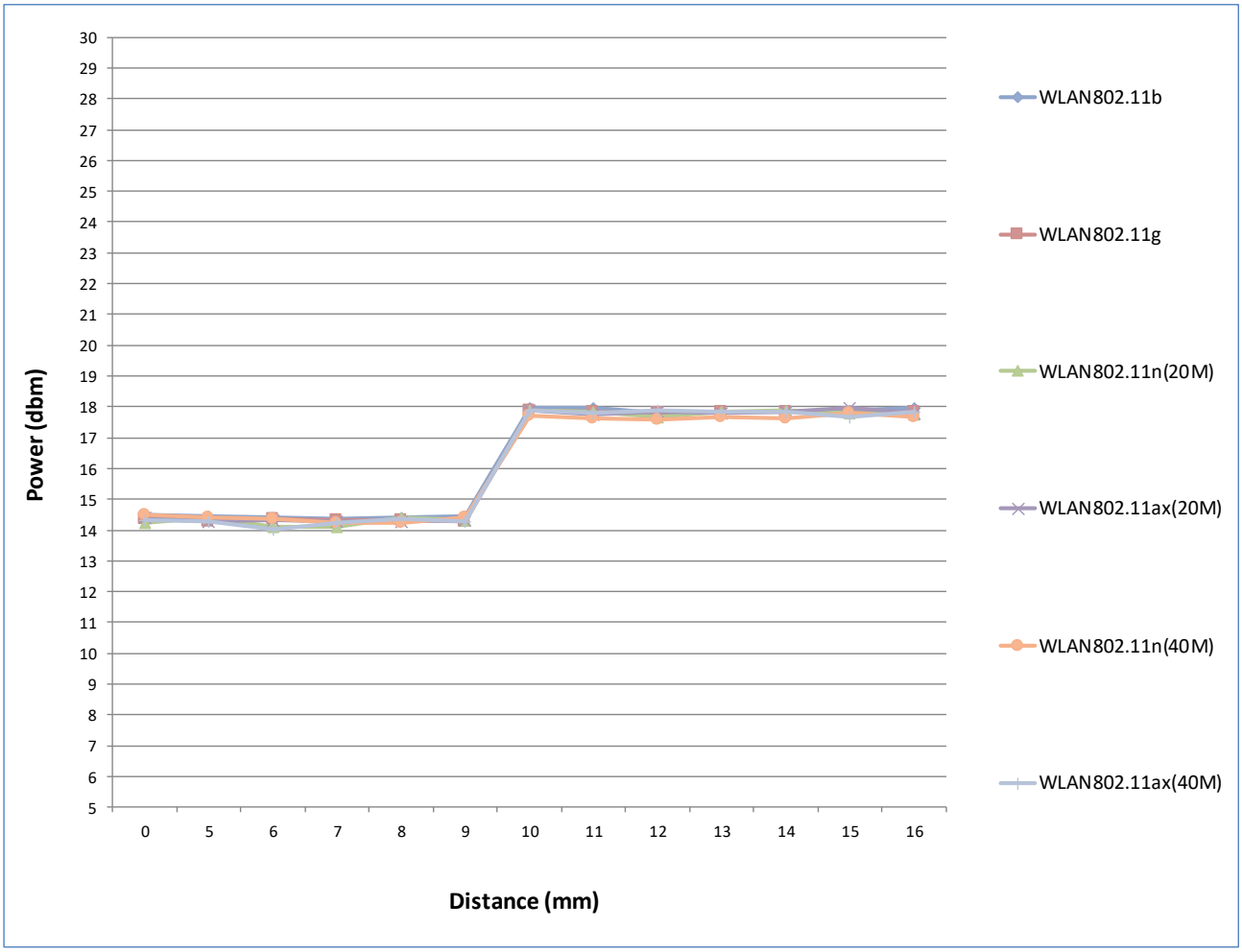


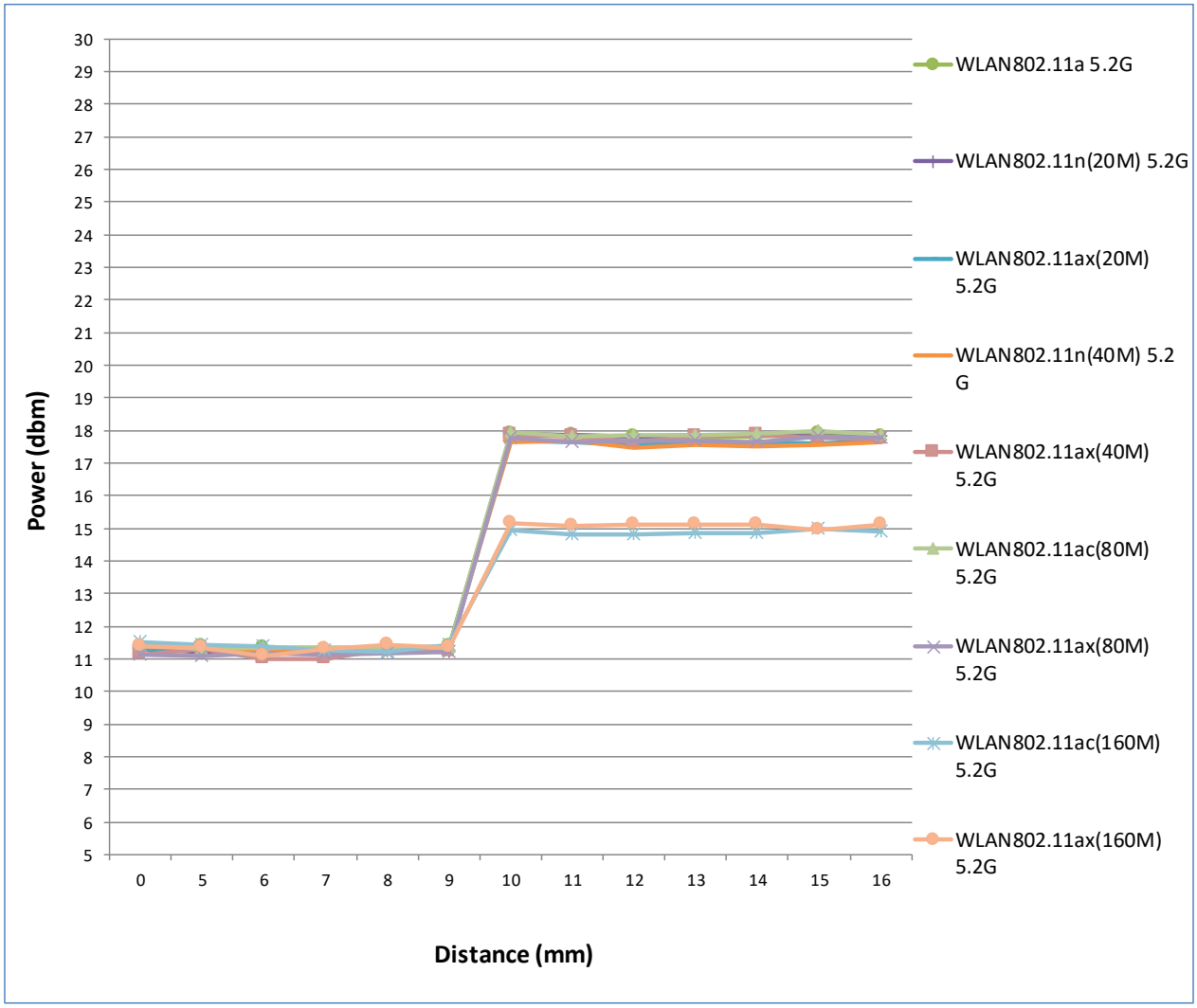


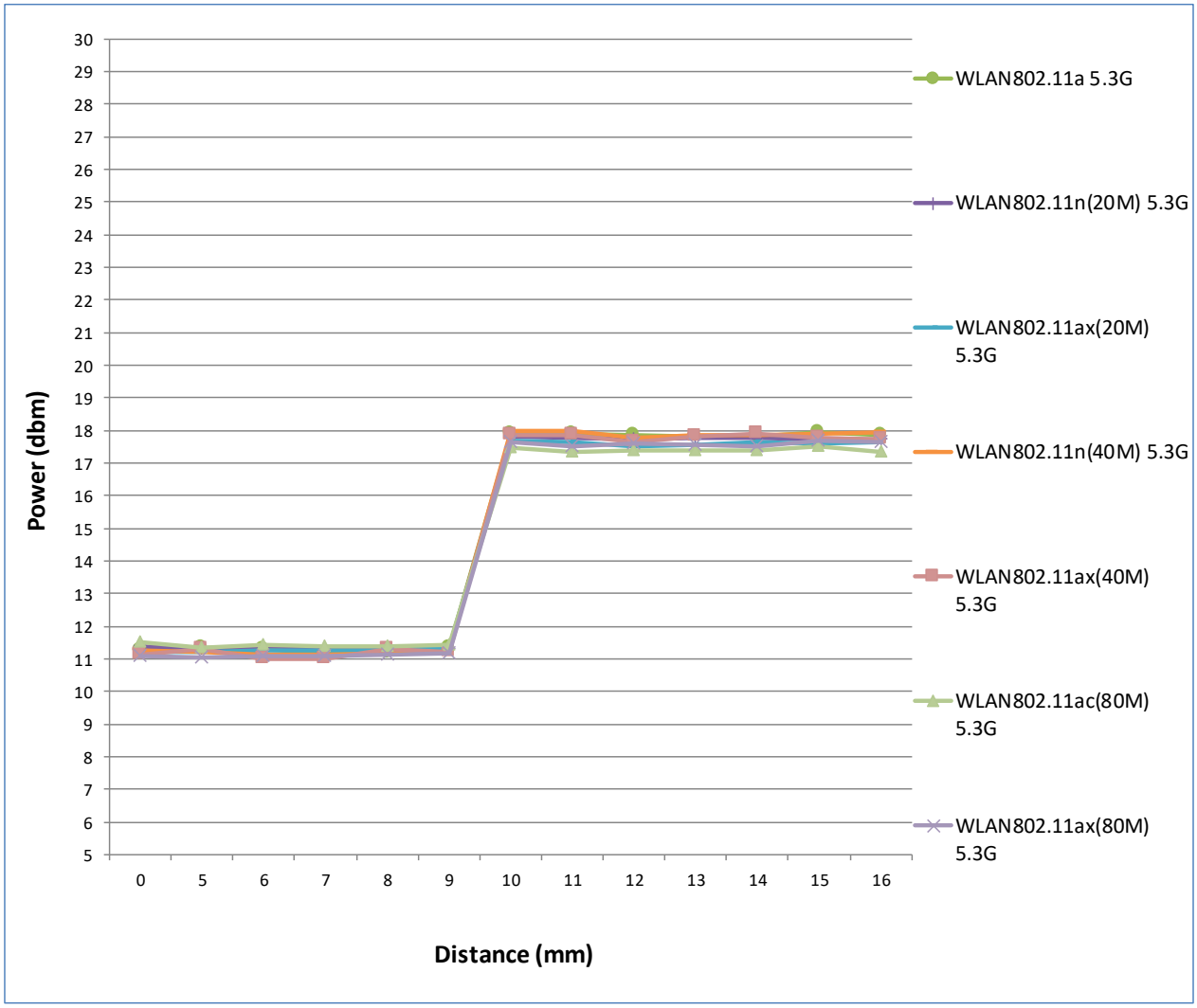


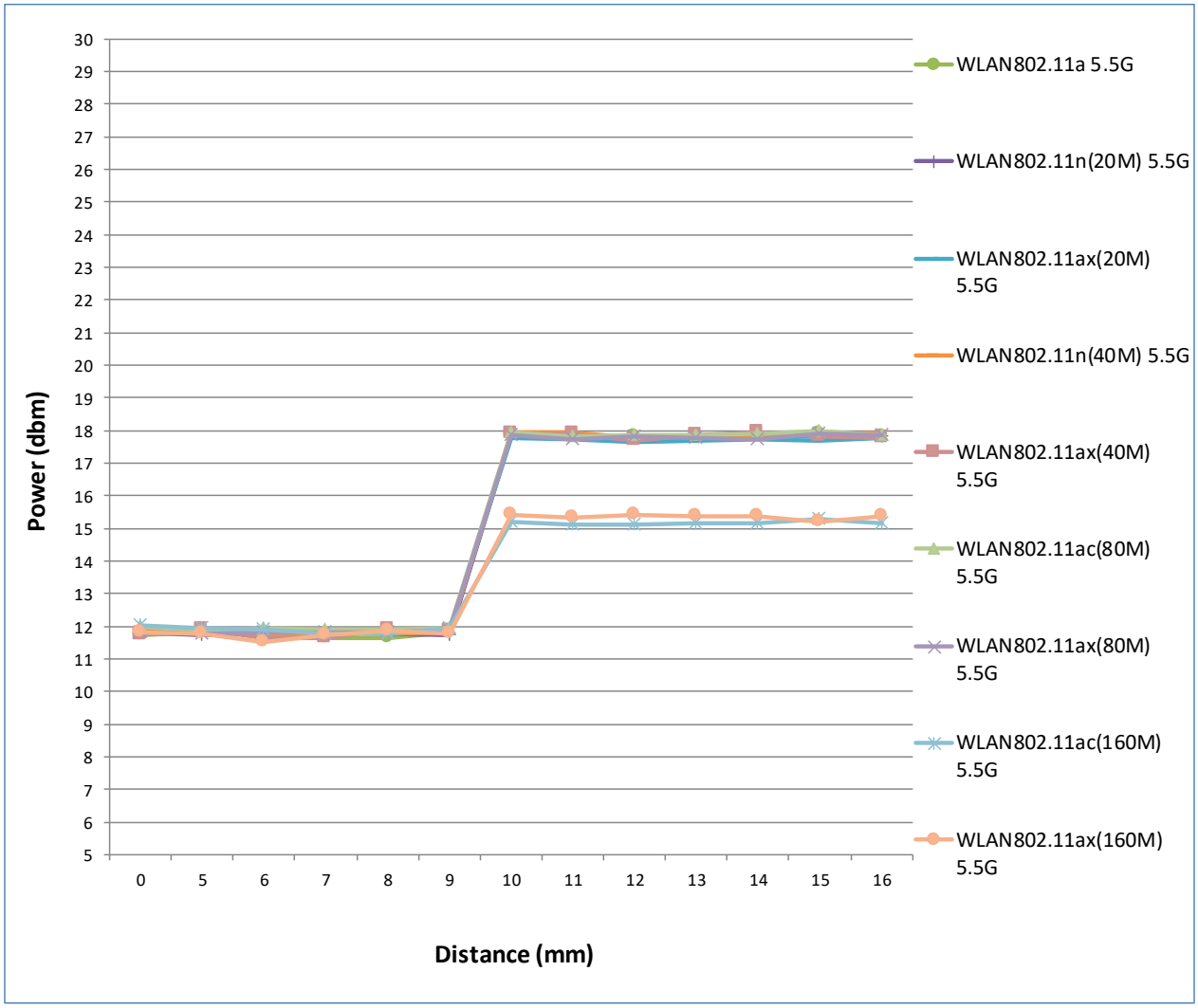


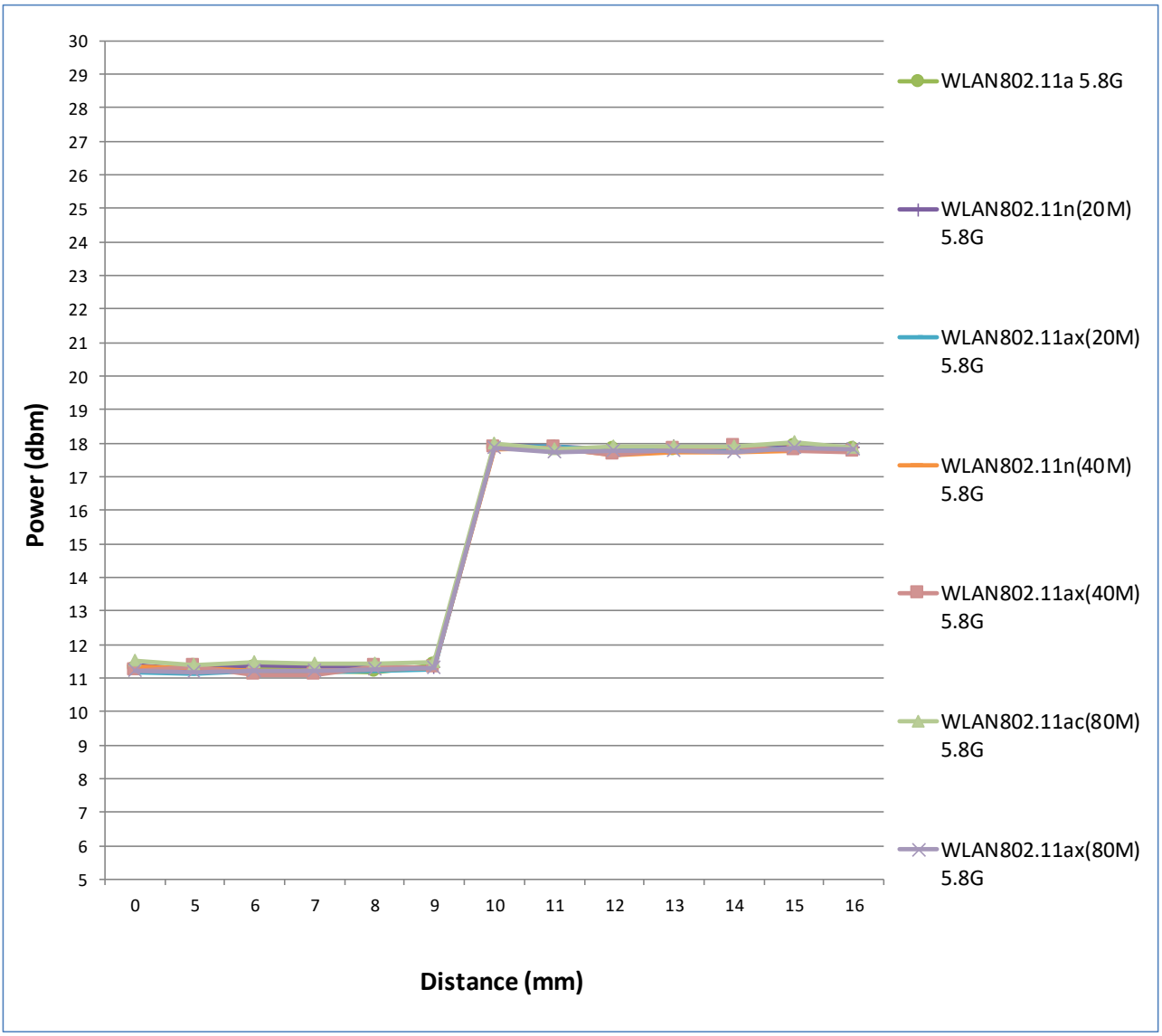
Main antenna

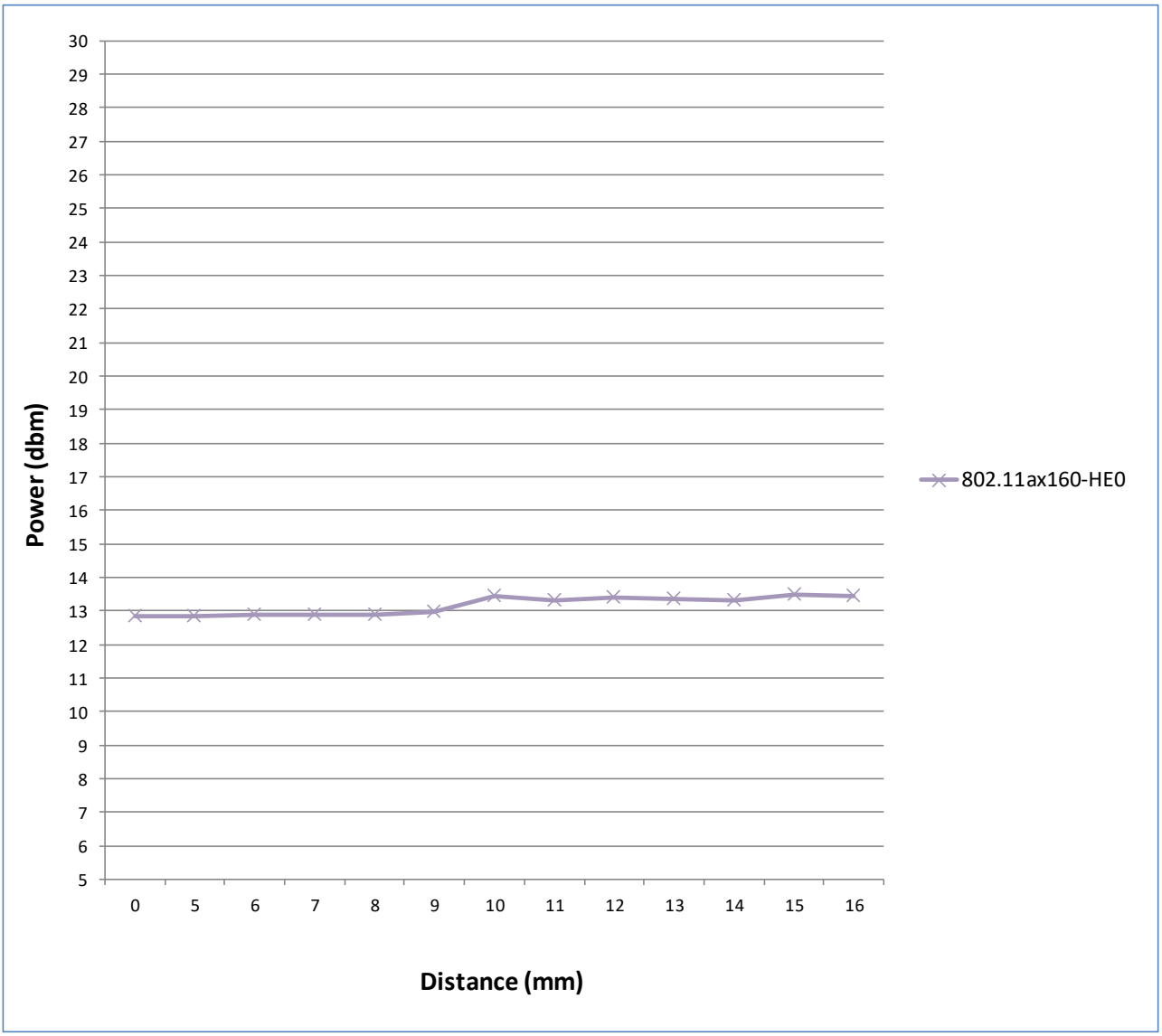












For bottom surface, the worst trigger distance of proximity sensor is 9mm, and we test bottom surface SAR in 8mm with full power and 0mm with reduced power.

Note:

1. The triggering variations and hysteresis effect has been evaluated separately according to the tissue-equivalent medium required for each frequency band, and sensor triggering does not change with different tissue-equivalent media.

2. Conducted power is monitored qualitatively to identify the general triggering characteristics and recorded quantitatively, versus spacing.

1.7.6 Operation description for P-sensor

Power Reduction Design Specification (for P-sensor)

The mechanism of power reduction is used for WLAN. The reduced power for each technology/band is defined in Table1-1. With P-sensor mechanism, please refer to WLAN reduced power table in section 1.3 to be the WLAN default power when P-sensor failure or malfunction.

Table1-1：The power reduction scenario table

Transmission mode	Band	Power Reduction
Body	WLAN	YES

1.8 Evaluation Procedures

The entire evaluation of the spatial peak values is performed within the Post-processing engine (SEMCAD). The system always gives the maximum values for the 1 g and 10 g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

1. The extraction of the measured data (grid and values) from the Zoom Scan.
2. The calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters).
3. The generation of a high-resolution mesh within the measured volume.
4. The interpolation of all measured values from the measurement grid to the high-resolution grid.
5. The extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface.
6. The calculation of the averaged SAR within masses of 1g and 10g.

The probe is calibrated at the center of the dipole sensors that is located 1 to 2.7mm away from the probe tip. During measurements, the probe stops shortly above the phantom surface, depending on the probe and the surface detecting system. Both distances are included as parameters in the probe configuration file. The software always knows exactly how far away the measured point is from the surface. As the probe cannot directly measure at the surface, the values between the deepest measured point and the surface must be extrapolated. The angle between the probe axis and the surface normal line is less than 30 degree.

In the Area Scan, the gradient of the interpolation function is evaluated to find all the extreme of the SAR distribution. The uncertainty on the locations of the extreme is less than 1/20 of the grid size. Only local maximum within –2 dB of the global maximum are searched and passed for the Cube Scan measurement. In the Cube Scan, the interpolation function is used to extrapolate the Peak SAR from the lowest measurement points to the inner phantom surface (the extrapolation distance). The uncertainty increases with the extrapolation distance. To keep the uncertainty within 1% for the 1 g and 10 g cubes, the extrapolation distance should not be larger than 5mm.

The maximum search is automatically performed after each area scan measurement. It is based on splines in two or three dimensions. The procedure can find the maximum for most SAR distributions even with relatively large grid spacing. After the area scanning measurement, the probe is automatically moved to a position at the interpolated maximum. The following scan can directly use this position for reference, e.g., for a finer resolution grid or the cube evaluations. The 1g and 10g peak evaluations are only available for the predefined cube 7x7x7 scans.

The routines are verified and optimized for the grid dimensions used in these cube measurements. The measured volume of 30x30x30mm contains about 30g of tissue. The first procedure is an extrapolation (incl. Boundary correction) to get the points between the lowest measured plane and the surface. The next step uses 3D interpolation to get all points within the measured volume. In the last step, a 1g cube is placed numerically into the volume and its averaged SAR is calculated. This cube is

the moved around until the highest averaged SAR is found.
If the highest SAR is found at the edge of the measured volume, the system will issue a warning: higher SAR values might be found outside of the measured volume. In that case the cube measurement can be repeated, using the new interpolated maximum as the center.

1.9 Probe Calibration Procedures

For the calibration of E-field probes in lossy liquids, an electric field with an accurately known field strength must be produced within the measured liquid. For standardization purposes it would be desirable if all measurements which are necessary to assess the correct field strength would be traceable to standardized measurement procedures. In the following two different calibration techniques are summarized:

1.9.1 Transfer Calibration with Temperature Probes

In lossy liquids the specific absorption rate (SAR) is related both to the electric field (E) and the temperature gradient ($\delta T / \delta t$) in the liquid.

$$SAR = C\frac{\delta T}{\delta t},$$

Whereby σ is the conductivity, ρ the density and c the heat capacity of the liquid.

Hence, the electric field in lossy liquid can be measured indirectly by measuring the temperature gradient in the liquid. Non-disturbing temperature probes (optical probes or thermistor probes with resistive lines) with high spatial resolution (<1-2 mm) and fast reaction time (<1 s) are available and can be easily calibrated with high precision [1]. The setup and the exciting source have no influence on the calibration; only the relative positioning uncertainties of the standard temperature probe and the E-field probe to be calibrated must be considered. However, several problems limit the available accuracy of probe calibrations with temperature probes:

1. The temperature gradient is not directly measurable but must be evaluated from temperature measurements at different time steps. Special precaution is necessary to avoid measurement errors caused by temperature gradients due to energy equalizing effects or convection currents in the liquid. Such effects cannot be completely avoided, as the measured field itself destroys the thermal equilibrium in the liquid. With a careful setup these errors can be kept small.
2. The measured volume around the temperature probe is not well defined. It is

difficult to calculate the energy transfer from a surrounding gradient temperature field into the probe. These effects must be considered, since temperature probes are calibrated in liquid with homogeneous temperatures. There is no traceable standard for temperature rise measurements.

3. The calibration depends on the assessment of the specific density, the heat capacity and the conductivity of the medium. While the specific density and heat capacity can be measured accurately with standardized procedures (~ 2% for c; much better for ρ), there is no standard for the measurement of the conductivity. Depending on the method and liquid, the error can well exceed ±5%.
4. Temperature rise measurements are not very sensitive and therefore are often performed at a higher power level than the E-field measurements. The nonlinearities in the system (e.g., power measurements, different components, etc.) must be considered.

Considering these problems, the possible accuracy of the calibration of E-field probes with temperature gradient measurements in a carefully designed setup is about ±10% (RSS) [2]. Recently, a setup which is a combination of the waveguide techniques and the thermal measurements was presented in [3]. The estimated uncertainty of the setup is ±5% (RSS) when the same liquid is used for the calibration and for actual measurements and ±7-9% (RSS) when not, which is in good agreement with the estimates given in [2].

1.9.2 Calibration with Analytical Fields

In this method a technical setup is used in which the field can be calculated analytically from measurements of other physical magnitudes (e.g., input power). This corresponds to the standard field method for probe calibration in air; however, there is no standard defined for fields in lossy liquids.

When using calculated fields in lossy liquids for probe calibration, several points must be considered in the assessment of the uncertainty:

1. The setup must enable accurate determination of the incident power.
2. The accuracy of the calculated field strength will depend on the assessment of the dielectric parameters of the liquid.
3. Due to the small wavelength in liquids with high permittivity, even small setups might be above the resonant cutoff frequencies. The field distribution in the setup must be carefully checked for conformity with the theoretical field distribution.

References

(1) N. Kuster, Q. Balzano, and J.C. Lin, Eds., *Mobile Communications Safety*, Chapman & Hall, London, 1997.

(2) K. Meier, M. Burkhardt, T. Schmid, and N. Kuster, \Broadband calibration of E-field probes in lossy media", *IEEE Transactions on Microwave Theory and Techniques*, vol. 44, no. 10, pp. 1954{1962, Oct. 1996.

(3) K. Jokela, P. Hyysalo, and L. Puranen, \Calibration of specific absorption rate (SAR) probes in waveguide at 900 MHz", *IEEE Transactions on Instrumentation and Measurements*, vol. 47, no. 2, pp. 432{438, Apr. 1998.

1.10 SAR System Description and Setup

The DASY system used for performing compliance tests consists of the following items:

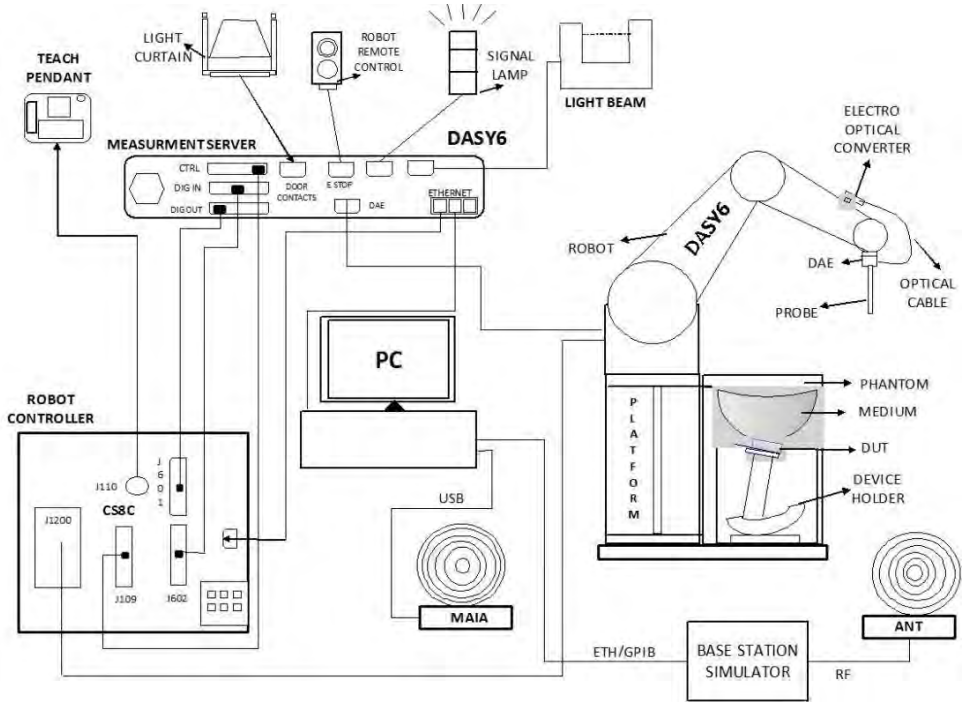


Fig. a A block diagram of the SAR measurement system

- A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic Field probe optimized and calibrated for the targeted measurement.
- 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.
- 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.
- The function of the measurement server is to perform the time critical tasks such

as signal filtering, control of the robot operation and fast movement interrupts.

- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running Windows 10 and the DASY6 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

1.10.1 Power density measurement system

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.

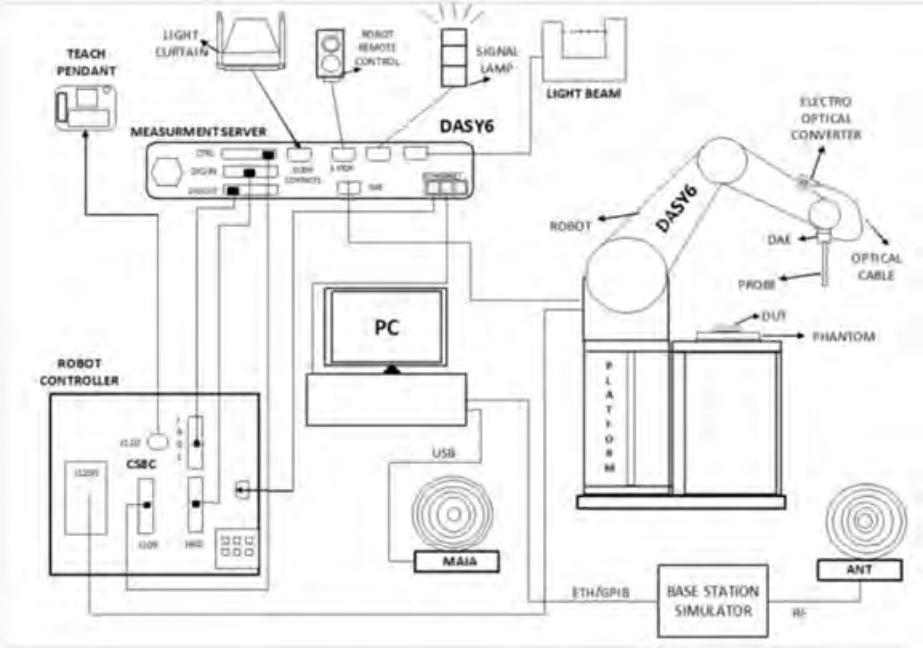
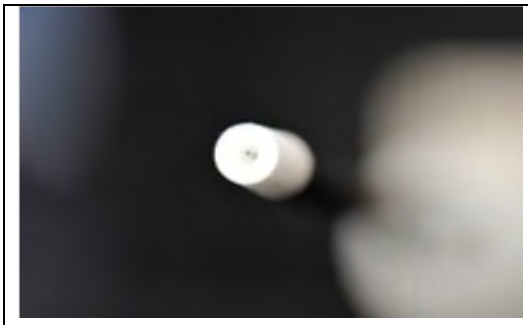
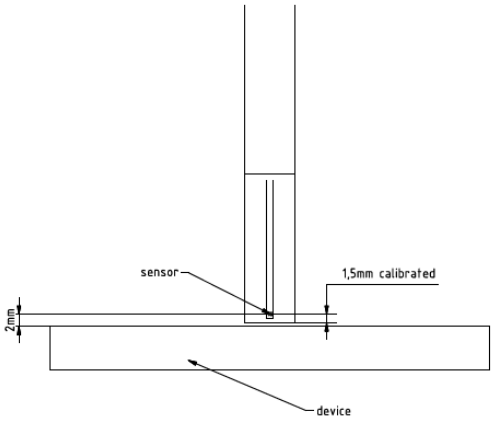


Fig-2.1 SPEAG DASY6 system

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 small 0.8mm dipole sensors mechanically protected by high-density foam, printed on both sides of a 0.9mm 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.

	Two dipoles optimally arranged to obtain pseudo-vector information.Minimum 3 measurements/ point, 120º rotated around probe axis. Sensors (0.8mm 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 (DASY6)
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 	E-field measurements of 5G devices and other mm-wave transmitters operating above 10GHz in < 2 mm distance from device (free-space).Power density, H-field and far-field analysis using total field reconstruction (cDASY6 5G module required)
Compatibility	cDASY6 + 5G-Module SW1.0 and higher

1.10.2 SAR System Performance Check Results

The microwave circuit arrangement for system verification is sketched in Fig. b. The daily system accuracy verification occurs within the flat section of the SAM phantom. A SAR measurement was performed to see if the measured SAR was within +/- 10% (according to KDB865664D01) from the target SAR values.

These tests were done at 2450/5250/5600/5750/6500/7000 MHz. The tests were conducted on the same days as the measurement of the DUT. The obtained results from the system accuracy verification are displayed in the table 1. During the tests, the liquid depth above the ear reference points was above 15 cm in all the cases. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values.

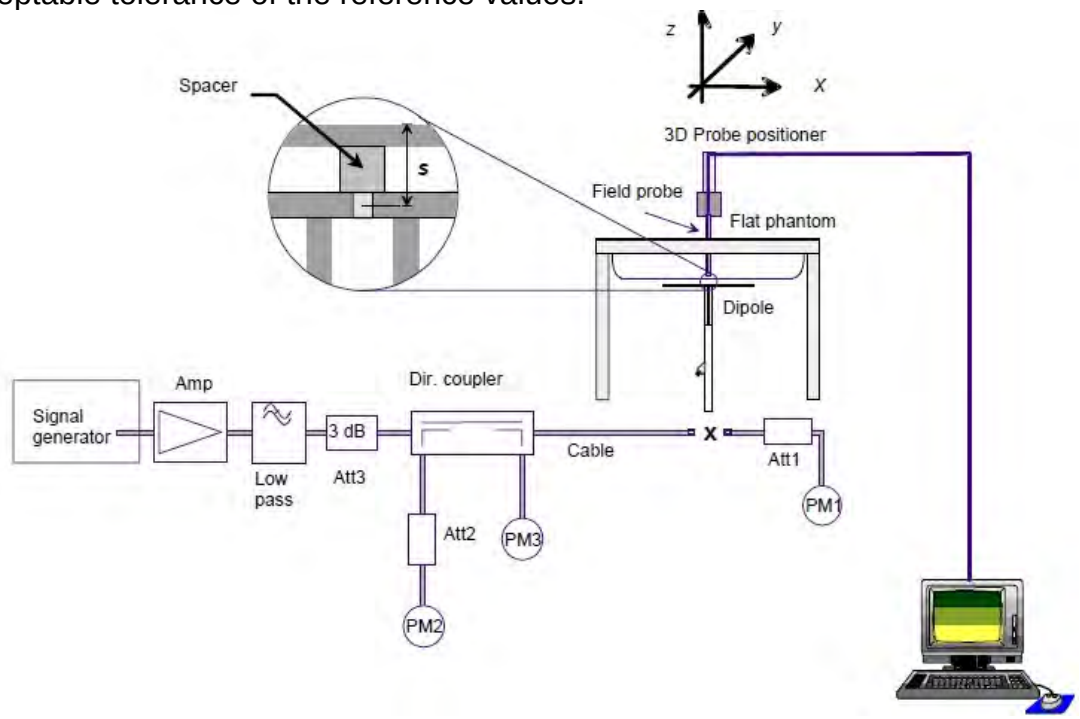


Fig. b The block diagram of system verification

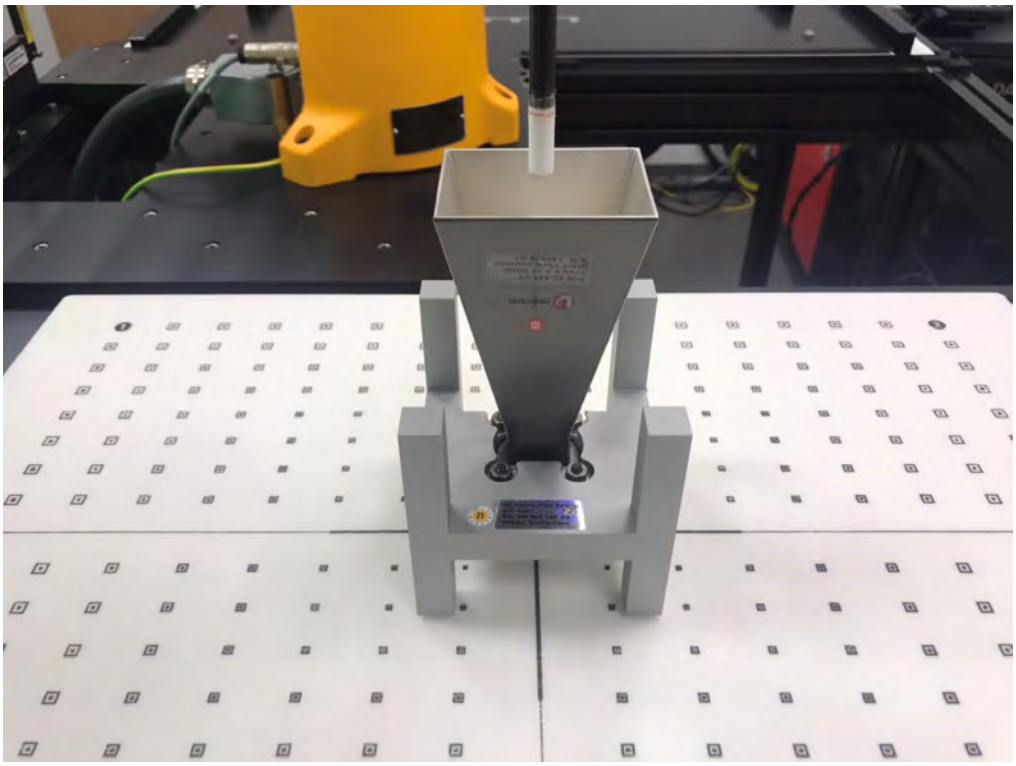
Validation Kit	S/N	Frequency (MHz)		1W Target SAR-1g (mW/g)	pin=250mW Measured SAR-1g (mW/g)	Measured SAR-1g normalized to 1W (mW/g)	Deviation (%)	Measured Date
D2450V2	727	2450	Head	53.9	13.50	54	0.19%	Mar. 07, 2022

Validation Kit	S/N	Frequency (MHz)		1W Target SAR-1g (mW/g)	Pin=100mW Measured SAR-1g (mW/g)	Measured SAR-1g normalized to 1W (mW/g)	Deviation (%)	Measured Date
D5GHzV2	1023	5250	Head	81	8.17	81.7	0.86%	Mar. 08, 2022
		5250	Head	81	8.15	81.5	0.62%	Mar. 09, 2022
		5600	Head	84.4	8.19	81.9	-2.96%	Mar. 10, 2022
		5750	Head	81	8.21	82.1	1.36%	Mar. 11, 2022
D6.5GHzV2	1006	6500	Head	291	31.30	313	7.56%	Mar. 12, 2022
D7GHzV2	1007	7000	Head	275	28.40	284	3.27%	Mar. 12, 2022

Power Density Test System Verification

The system was verified to be within ±0.66 dB of the power density targets on the calibration certificate according to the test system specification in the user's manual and calibration facility recommendation. The 0.66 dB deviation threshold represents the expanded uncertainty for system performance checks using SPEAG's mmWave verification sources. The same spatial resolution and measurement region used in the source calibration was applied during the system check.

The measured power density distribution of verification source was also confirmed through visual inspection to have no noticeable differences, both spatially (shape) and numerically (level) from the distribution provided by the manufacturer, per November 2017 TCBC Workshop Notes.



System Verification Setup Photo

PD System Verification Results

The system was verified to be within ±0.66 dB of the power density targets on the calibration certificate according to the test system specification in the user's manual and calibration facility recommendation. The 0.66 dB deviation threshold represents the expanded uncertainty for system performance checks using SPEAG's mmWave verification sources. The same spatial resolution and measurement region used in the source calibration was applied during the system check. The measured power density distribution of verification source was also confirmed through visual inspection to have no noticeable differences, both spatially (shape) and numerically (level) from the distribution provided by the manufacturer, per November 2017 TCBC Workshop Notes.

Frequency (GHz)	PD Verification Source	Probe S/N	DAE S/N	Distance (mm)	Prad (mW)	Measured 4cm^2 (W/m^2)	Target 4cm^2 (W/m^2)	Deviation (dB)	Date
10G	10G	9399	877	10	86.1	45.5	51.7	-0.55	Mar. 14, 2022

1.10.3 SAR Tissue Verification

The dielectric properties for this Head-simulant fluid were measured by using the SPEAG Dielectric Assessment Kit (DAKS-3.5)

All dielectric parameters of tissue simulates were measured within 24 hours of SAR measurements. The measured conductivity and permittivity are all within ± 5% of the target values.

The depth of the tissue simulant in the flat section of the phantom was ≥ 15 cm ± 5 mm during all tests. (Fig. 2)

Tissue Type	Measurement Date	Measured Frequency (MHz)	Target Dielectric Constant, εr	Target Conductivity, σ (S/m)	Measured Dielectric Constant, εr	Measured Conductivity, σ (S/m)	% dev εr	% dev σ	Ambient temprature	liquid tempature	Use Equipment
Head	Mar. 07, 2022	2412	39.268	1.766	38.777	1.747	-1.25%	-1.09%	22.5	22.6	SAR 3 DAE : 877 Probe : 7686
		2437	39.223	1.788	38.745	1.769	-1.22%	-1.09%			
		2450	39.200	1.800	38.710	1.781	-1.25%	-1.06%			
		2462	39.185	1.813	38.695	1.794	-1.25%	-1.05%			
		2480	39.162	1.833	38.676	1.812	-1.24%	-1.13%			
	Mar. 08, 2022	5210	35.974	4.665	35.618	4.626	-0.99%	-0.84%	22.4	22.9	
		5250	35.929	4.706	35.573	4.667	-0.99%	-0.83%			
	Mar. 09, 2022	5250	35.929	4.706	35.569	4.670	-1.00%	-0.77%	22.5	22.7	
		5270	35.906	4.727	35.532	4.688	-1.04%	-0.82%			
		5290	35.883	4.747	35.510	4.711	-1.04%	-0.76%			
		5310	35.860	4.768	35.491	4.731	-1.03%	-0.77%			
	Mar. 10, 2022	5530	35.609	4.993	35.245	4.953	-1.02%	-0.81%	22.5	22.9	
		5570	35.563	5.034	35.193	4.994	-1.04%	-0.80%			
		5600	35.500	5.070	35.167	5.027	-0.94%	-0.85%			
		5610	35.517	5.075	35.158	5.034	-1.01%	-0.81%			
		5690	35.426	5.157	35.082	5.115	-0.97%	-0.82%			
	Mar. 11, 2022	5750	35.357	5.219	35.021	5.177	-0.95%	-0.80%	22.4	22.8	
		5775	35.329	5.244	34.961	5.203	-1.04%	-0.79%			
	Mar. 12, 2022	6025	35.070	5.510	34.810	5.478	-0.74%	-0.57%	22.6	22.6	
		6185	34.878	5.698	34.641	5.666	-0.68%	-0.57%			
		6500	34.500	6.070	34.279	6.037	-0.64%	-0.54%			
		6505	34.494	6.076	34.270	6.042	-0.65%	-0.56%			
		6665	34.302	6.261	34.055	6.221	-0.72%	-0.65%			
		6825	34.110	6.447	33.871	6.411	-0.70%	-0.56%			
		6985	33.918	6.633	33.681	6.591	-0.70%	-0.63%	22.6	22.8	
		7000	33.900	6.650	33.663	6.608	-0.70%	-0.63%			

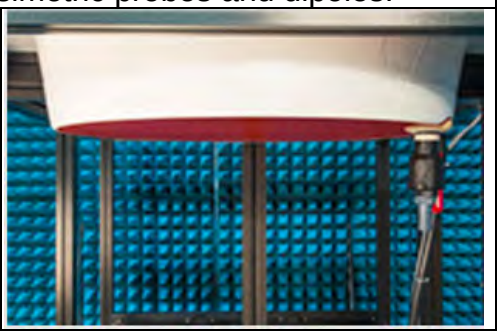
Table 2. Dielectric Parameters of Tissue Simulant Fluid

1.11 System Components

EX3DV4 E-Field Probe

Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Calibration	Basic Broad Band Calibration in air Conversion Factors (CF) for HSL2450/5250/5600/5750/6500/7000 MHz Additional CF for other liquids and frequencies upon request	
Frequency	10 MHz to > 6 GHz, Linearity: ± 0.6 dB	
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)	
Dynamic Range	10 µW/g to > 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 µW/g)	
Dimensions	Tip diameter: 2.5 mm	
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%.	

PHANTOM

Model	ELI	
Construction	The ELI phantom is used for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI is fully compatible with the IEC 62209-2 standard and all known tissue simulating liquids. ELI has been optimized regarding its performance and can be integrated into our standard phantom tables. A cover prevents evaporation of the liquid. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points. The phantom is compatible with all SPEAG dosimetric probes and dipoles.	
Shell Thickness	2 ± 0.2 mm	
Filling Volume	Approx. 30 liters	
Dimensions	Major axis: 600 mm Minor axis: 400 mm	

DEVICE HOLDER

Construction	The device holder (Supporter) for Notebook is made by POM (polyoxymethylene resin) , which is non-metal and non-conductive. The height can be adjusted to fit varies kind of notebooks.	 Device Holder

1.12 Test Standards and Limits

According to FCC 47CFR §2.1093(d) The limits to be used for evaluation are based generally on criteria published by the American National Standards Institute (ANSI) for localized specific absorption rate (‘‘SAR’’) in Section 4.2 of ‘‘IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz,’’ ANSI/IEEE C95.1, By the Institute of Electrical and Electronics Engineers, Inc., New York, New York 10017.
These criteria for SAR evaluation are similar to those recommended by the National Council on Radiation Protection and Measurements (NCRP) in ‘‘Biological Effects and Exposure Criteria for Radio frequency Electromagnetic Fields,’’ NCRP Report No. 86, Section 17.4.5. Copyright NCRP, 1986, Bethesda, Maryland 20814.
SAR is a measure of the rate of energy absorption due to exposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards. The criteria to be used are specified in paragraphs (d)(1) and (d)(2) of this section and shall apply for portable devices transmitting in the frequency range from 100 kHz to 6 GHz. Portable devices that transmit at frequencies above 6 GHz are to be evaluated in terms of the MPE limits specified in § 1.1310 of this chapter.
Measurements and calculations to demonstrate compliance with MPE field strength or power density limits for devices operating above 6 GHz should be made at a minimum distance of 5 cm from the radiating source.

1. Limits for Occupational/Controlled exposure: 0.4 W/kg as averaged over the whole-body and spatial peak SAR not exceeding 8 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the hands, wrists, feet and ankles where the spatial peak SAR shall not exceed 20 W/kg, as averaged over a 10 grams of tissue (defined as a tissue volume in the shape of a cube).

Occupational/Controlled limits apply when persons are exposed as a consequence of their employment provided these persons are fully aware of and exercise control over their exposure. Awareness of exposure can be accomplished by use of warning labels or by specific training or education through appropriate means, such as an RF safety program in a work environment.

2. Limits for General Population/Uncontrolled exposure: 0.08 W/kg as averaged over the whole-body and spatial peak SAR not exceeding 1.6 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube).

Exceptions are the hands, wrists, feet and ankles where the spatial peak SAR shall not exceed 4 W/kg, as averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube).
General Population/Uncontrolled limits apply when the general public may be exposed, or when persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or do not exercise control over their exposure.
Warning labels placed on consumer devices such as cellular telephones will not be sufficient reason to allow these devices to be evaluated subject to limits for occupational/controlled exposure in paragraph (d)(1) of this section.(Table .6)

Human Exposure	Uncontrolled Environment General Population	Controlled Environment Occupational
Spatial Peak SAR (Brain)	1.60 W/kg	8.00 W/kg
Spatial Average SAR (Whole Body)	0.08 W/kg	0.40 W/kg
Spatial Peak SAR (Hands/Feet/Ankle/Wrist)	4.00 W/kg	20.00 W/kg

RF Exposure limit for above 6GHz

According to ANSI/IEEE C95.1-1992, the criteria listed in the following Table shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310.
Peak Spatially Averaged Power Density was evaluated over a circular area of 4cm2 per interim FCC Guidance for near-field power density evaluations per October 2018 TCB Workshop notes

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f2)	6
30-300	61.4	0.163	1.0	6
300-1500			f/300	6
1500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f2)	30
30-300	27.5	0.073	0.2	30
300-1500			f/1500	30
1500-100,000			1.0	30

Table. RF exposure limits

Notes:

1. Uncontrolled environments are defined as locations where there is potential exposure of individuals who have no knowledge or control of their potential exposure.
2. Controlled environments are defined as locations where there is potential exposure of individuals who have knowledge of their potential exposure and can exercise control over their exposure.

2. Summary of Results

2.1 Decision rules

Reported measurement data comply with IEEE 1528-2013 and IEC/IEEE 62209-1528:2020:
Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.2 Summary of SAR Results

Main

Mode	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Duty cycle scaling	Power scaling	Averaged SAR over 1g (W/kg)		Plot page
									Measured	Reported	
WLAN 802.11b	Bottom Surface	8	1	2412	18.00	17.91	1.010	102.09%	0.727	0.750	-
	Bottom Surface	8	6	2437	18.00	17.97	1.010	100.69%	0.790	0.803	98
	Bottom Surface	8	11	2462	18.00	17.93	1.010	101.62%	0.754	0.774	-
	Bottom Surface	0	1	2412	14.50	14.42	1.010	101.86%	0.755	0.777	-
	Bottom Surface	0	6	2437	14.50	14.46	1.010	100.93%	0.746	0.760	-
	Bottom Surface	0	11	2462	14.50	14.47	1.010	100.69%	0.785	0.798	99

Main

Mode	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Duty cycle scaling	Power scaling	Averaged SAR over 1g (W/kg)		Plot page
									Measured	Reported	
WLAN 802.11ac (80M) 5.2G	Bottom Surface	8	42	5210	18.00	17.96	1.020	100.93%	1.140	1.174	100
Repeat	Bottom Surface	8	42	5210	18.00	17.96	1.020	100.93%	1.080	1.112	-
WLAN 802.11ac (160M) 5.2G	Bottom Surface	0	50	5250	11.50	11.46	1.012	100.93%	0.912	0.931	101

Main

Mode	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Duty cycle scaling	Power scaling	Averaged SAR over 1g (W/kg)		Plot page
									Measured	Reported	
WLAN 802.11n (40M) 5.3G	Bottom Surface	8	54	5270	18.00	17.98	1.022	100.46%	1.040	1.068	102
	Bottom Surface	8	62	5310	17.00	16.92	1.022	101.86%	0.988	1.029	-
WLAN 802.11ac (80M) 5.3G	Bottom Surface	0	58	5290	11.50	11.46	1.020	100.93%	0.901	0.928	103
Repeat	Bottom Surface	8	54	5270	18.00	17.98	1.022	100.46%	0.981	1.007	-

Main

Mode	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Duty cycle scaling	Power scaling	Averaged SAR over 1g (W/kg)		Plot page
									Measured	Reported	
WLAN 802.11ac (80M) 5.6G	Bottom Surface	8	106	5530	18.00	17.87	1.020	103.04%	1.010	1.062	-
	Bottom Surface	8	122	5610	18.00	17.93	1.020	101.62%	1.020	1.057	-
	Bottom Surface	8	138	5690	18.00	17.96	1.020	100.93%	1.110	1.143	104
WLAN 802.11ac (160M) 5.6G	Bottom Surface	0	114	5570	12.00	11.98	1.012	100.46%	0.908	0.923	105
Repeat	Bottom Surface	8	138	5690	18.00	17.96	1.020	100.93%	1.060	1.091	-

Main

Mode	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Duty cycle scaling	Power scaling	Averaged SAR over 1g (W/kg)		Plot page
									Measured	Reported	
WLAN 802.11ac (80M) 5.8G	Bottom Surface	8	155	5775	18.00	17.98	1.020	100.46%	1.150	1.178	106
	Bottom Surface	0	155	5775	11.50	11.49	1.020	100.23%	0.771	0.788	107
Repeat	Bottom Surface	8	155	5775	18.00	17.98	1.020	100.46%	1.120	1.148	-

* - repeated at the highest SAR measurement according to the KDB 865664 D01

Aux

Mode	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Duty cycle scaling	Power scaling	Averaged SAR over 1g (W/kg)		Plot page
									Measured	Reported	
WLAN 802.11b	Bottom Surface	8	1	2412	18.00	17.90	1.010	102.33%	0.311	0.321	-
	Bottom Surface	8	6	2437	18.00	17.96	1.010	100.93%	0.340	0.347	108
	Bottom Surface	8	11	2462	18.00	17.91	1.010	102.09%	0.326	0.336	-
	Bottom Surface	0	1	2412	14.00	13.91	1.010	102.09%	0.921	0.950	-
	Bottom Surface	0	6	2437	14.00	13.97	1.010	100.69%	0.949	0.965	109
	Bottom Surface	0	11	2462	14.00	13.95	1.010	101.16%	0.902	0.922	-
Repeat	Bottom Surface	0	6	2437	14.00	13.97	1.010	100.69%	0.912	0.928	-

Aux

Mode	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Duty cycle scaling	Power scaling	Averaged SAR over 1g (W/kg)		PKot page
									Measured	Reported	
Bluetooth	Bottom Surface	0	78	2480	10.50	9.08	1.297	138.68%	0.235	0.423	110

Aux

Mode	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Duty cycle scaling	Power scaling	Averaged SAR over 1g (W/kg)		Plot page
									Measured	Reported	
WLAN 802.11ac (80M) 5.2G	Bottom Surface	8	42	5210	18.00	17.98	1.020	100.46%	1.090	1.117	111
Repeat	Bottom Surface	8	42	5210	18.00	17.98	1.020	100.46%	1.020	1.045	-
WLAN 802.11ac (160M) 5.2G	Bottom Surface	0	50	5250	12.00	11.96	1.012	100.93%	0.963	0.984	112

Aux

Mode	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Duty cycle scaling	Power scaling	Averaged SAR over 1g (W/kg)		Plot page
									Measured	Reported	
WLAN 802.11ac (80M) 5.3G	Bottom Surface	8	58	5290	18.00	17.97	1.020	100.69%	0.835	0.858	113
WLAN 802.11ac (80M) 5.3G	Bottom Surface	0	58	5290	12.00	11.94	1.020	101.39%	0.896	0.927	114
Repeat	Bottom Surface	0	58	5290	12.00	11.94	1.020	101.39%	0.869	0.899	-

Aux

Mode	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Duty cycle scaling	Power scaling	Averaged SAR over 1g (W/kg)		Plot page
									Measured	Reported	
WLAN 802.11ac (80M) 5.6G	Bottom Surface	8	106	5530	18.00	17.91	1.020	102.09%	0.875	0.911	-
	Bottom Surface	8	122	5610	18.00	17.87	1.020	103.04%	0.852	0.895	-
	Bottom Surface	8	138	5690	18.00	17.98	1.020	100.46%	0.975	0.999	115
WLAN 802.11ac (160M) 5.6G	Bottom Surface	0	114	5570	11.00	10.98	1.012	100.46%	0.941	0.957	116
Repeat	Bottom Surface	8	138	5690	18.00	17.98	1.020	100.46%	0.958	0.982	-

Aux

Mode	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Duty cycle scaling	Power scaling	Averaged SAR over 1g (W/kg)		Plot page
									Measured	Reported	
WLAN 802.11ac (80M) 5.8G	Bottom Surface	8	155	5775	18.00	17.99	1.020	100.23%	1.130	1.155	117
	Bottom Surface	0	155	5775	12.00	11.98	1.020	100.46%	0.705	0.722	118
Repeat	Bottom Surface	8	155	5775	18.00	17.99	1.020	100.23%	1.080	1.104	-

* - repeated at the highest SAR measurement according to the KDB 865664 D01

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Main

Mode	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Duty cycle scaling	Power scaling	Averaged SAR over 1g (W/kg)		Estimated APD mW/cm^2 (4cm^2)	Plot page
									Measured	Reported		
U-NII-5 6.2GHz 802.11ax (160M)	Bottom Surface	8	15	6025	13.50	13.47	1.012	100.69%	0.347	0.354	0.277	119
	Bottom Surface	0	15	6025	13.00	12.98	1.012	100.46%	0.879	0.894	0.609	120
	Bottom Surface	0	47	6185	13.00	12.97	1.012	100.69%	0.749	0.763	0.514	-
Repeat	Bottom Surface	0	15	6025	13.00	12.98	1.012	100.46%	0.843	0.857	0.541	-

Main

Mode	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Duty cycle scaling	Power scaling	Averaged SAR over 1g (W/kg)		Estimated APD mW/cm^2 (4cm^2)	Plot page
									Measured	Reported		
U-NII-6 6.5GHz 802.11ax (160M)	Bottom Surface	0	111	6505	13.50	13.48	1.012	100.46%	1.080	1.098	0.752	121
Repeat	Bottom Surface	0	111	6505	13.50	13.48	1.012	100.46%	1.010	1.027	0.721	-

Main

Mode	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Duty cycle scaling	Power scaling	Averaged SAR over 1g (W/kg)		Estimated APD mW/cm^2 (4cm^2)	Plot page
									Measured	Reported		
U-NII-7 6.7GHz 802.11ax (160M)	Bottom Surface	0	143	6665	13.50	13.49	1.012	100.23%	1.080	1.095	0.764	122
	Bottom Surface	0	175	6825	13.50	13.46	1.012	100.93%	0.959	0.979	0.701	-
Repeat	Bottom Surface	0	143	6665	13.50	13.49	1.012	100.23%	1.020	1.035	0.741	-

Main

Mode	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Duty cycle scaling	Power scaling	Averaged SAR over 1g (W/kg)		Estimated APD mW/cm^2 (4cm^2)	Plot page
									Measured	Reported		
U-NII-8 7.0GHz 802.11ax (160M)	Bottom Surface	0	207	6985	13.50	13.46	1.010	100.93%	0.964	0.983	0.75	123
Repeat	Bottom Surface	0	207	6985	13.50	13.46	1.010	100.93%	0.931	0.949	0.731	-

Aux

Mode	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Duty cycle scaling	Power scaling	Averaged SAR over 1g (W/kg)		Estimated APD mW/cm^2 (4cm^2)	Plot page
									Measured	Reported		
U-NII-5 6.2GHz 802.11ax (160M)	Bottom Surface	0	15	6025	13.50	13.47	1.012	100.69%	0.695	0.708	0.529	-
	Bottom Surface	0	47	6185	13.50	13.48	1.012	100.46%	0.744	0.756	0.567	124

Aux

Mode	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Duty cycle scaling	Power scaling	Averaged SAR over 1g (W/kg)		Estimated APD mW/cm^2 (4cm^2)	Plot page
									Measured	Reported		
U-NII-6 6.5GHz 802.11ax (160M)	Bottom Surface	0	111	6505	13.50	13.45	1.012	101.16%	0.943	0.965	0.691	125
Repeat	Bottom Surface	0	111	6505	13.50	13.45	1.012	101.16%	0.912	0.934	0.673	-

Aux

Mode	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Duty cycle scaling	Power scaling	Averaged SAR over 1g (W/kg)		Estimated APD mW/cm^2 (4cm^2)	Plot page
									Measured	Reported		
U-NII-7 6.7GHz 802.11ax	Bottom Surface	8	175	6825	13.50	13.48	1.012	100.46%	0.436	0.443	0.389	126
	Bottom Surface	0	143	6665	12.50	12.46	1.012	100.93%	0.963	0.984	0.702	127
	Bottom Surface	0	175	6825	12.50	12.45	1.012	101.16%	0.822	0.841	0.663	-
Repeat	Bottom Surface	0	143	6665	12.50	12.46	1.012	100.93%	0.928	0.948	0.685	-

Aux

Mode	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Duty cycle scaling	Power scaling	Averaged SAR over 1g (W/kg)		Estimated APD mW/cm^2 (4cm^2)	Plot page
									Measured	Reported		
U-NII-8 7.0GHz 802.11ax (160M)	Bottom Surface	0	207	6985	13.50	13.47	1.010	100.69%	0.814	0.828	0.657	128
Repeat	Bottom Surface	0	207	6985	13.50	13.47	1.010	100.69%	0.785	0.798	0.621	-

* - repeated at the highest SAR measurement according to the KDB 865664 D01

2.3 Summary of PD Results

Main

Mode	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Tune-up Scaling	Duty cycle scaling	Measurement uncertainty	PD result(4cm^2)				Plot page
										Measured Total psPD (mW/cm^2)	Reported Total psPD (mW/cm^2)	Measured Normal psPD (mW/cm^2)	Reported Normal psPD (mW/cm^2)	
WLAN 6E 802.11ax(160M) U-NII-5	Bottom Surface	2	15	6025	13.00	12.98	100.46%	1.012	1.55	0.429	0.676	0.390	0.615	129
WLAN 6E 802.11ax(160M) U-NII-5	Bottom Surface	2	47	6185	13.00	12.97	100.69%	1.012	1.55	0.236	0.373	0.220	0.347	130
WLAN 6E 802.11ax(160M) U-NII-6	Bottom Surface	2	111	6505	13.50	13.48	100.46%	1.012	1.55	0.481	0.758	0.448	0.706	131
WLAN 6E 802.11ax(160M) U-NII-7	Bottom Surface	2	143	6665	13.50	13.49	100.23%	1.012	1.55	0.537	0.844	0.508	0.799	132
WLAN 6E 802.11ax(160M) U-NII-8	Bottom Surface	2	207	6985	13.50	13.46	100.93%	1.012	1.55	0.511	0.809	0.479	0.758	133

Aux

Mode	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Tune-up Scaling	Duty cycle scaling	Measurement uncertainty	PD result(4cm^2)				Plot page
										Measured Total psPD (mW/cm^2)	Reported Total psPD (mW/cm^2)	Measured Normal psPD (mW/cm^2)	Reported Normal psPD (mW/cm^2)	
WLAN 6E 802.11ax(160M) U-NII-5	Bottom Surface	2	15	6025	13.50	13.47	100.69%	1.012	1.55	0.515	0.813	0.483	0.763	134
WLAN 6E 802.11ax(160M) U-NII-5	Bottom Surface	2	47	6185	13.50	13.48	100.46%	1.012	1.55	0.618	0.974	0.599	0.944	135
WLAN 6E 802.11ax(160M) U-NII-6	Bottom Surface	2	111	6505	13.50	13.45	101.16%	1.012	1.55	0.629	0.998	0.565	0.897	136
WLAN 6E 802.11ax(160M) U-NII-7	Bottom Surface	2	143	6665	12.50	12.46	100.93%	1.012	1.55	0.549	0.869	0.540	0.855	137
WLAN 6E 802.11ax(160M) U-NII-8	Bottom Surface	2	207	6985	13.50	13.47	100.69%	1.012	1.55	0.623	0.984	0.578	0.913	138

Note:

Scaling = $\frac{\text{reported SAR}}{\text{measured SAR}} = \frac{\text{P2(mW)}}{\text{P1(mW)}} = 10^{\left(\frac{\text{P2}-\text{P1}}{10}\right)(\text{dBm})}$

Reported SAR = measured SAR * (scaling)

Where P2 is maximum specified power, P1 is measured conducted power

2.4 Reporting statements of conformity

The conformity statement in this report is based solely on the test results, measurement uncertainty is excluded.

3. Simultaneous Transmission Analysis

Simultaneous Transmission Scenarios:

Simultaneous Transmit Configurations	Body
WLAN 2.4GHz Main + WLAN 2.4GHz Aux	Yes
WLAN 5GHz Main + WLAN 5GHz Aux	Yes
WLAN 2.4GHz Main + BT Aux	Yes
WLAN 5GHz Main + BT Aux	Yes
WLAN 5GHz Main + WLAN 5GHz Aux + BT Aux	Yes
WLAN 6E Main + BT Aux	Yes
WLAN 6E Main + WLAN 6E Aux	Yes
WLAN 6E Main + WLAN 6E Aux + BT Aux	Yes

Note:
1. Bluetooth and Aux share the same antenna path, and BT can transmit with Main simultaneously.
2. For 2.4/5/6GHz WLAN Main and Aux antennas, the maximum output power of each antenna during simultaneous transmission is the same with (or less than) that used in standalone transmission, and we used the sum of 1-g SAR provision in KDB447498D01 to exclude the simultaneous transmitted SAR measurement.

3.1 Estimated SAR calculation

According to KDB447498 D01v06 – When standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:

$$\text{Estimated SAR} = \frac{\text{Max. tune up power (mW)}}{\text{Min. test separation distance(mm)}} \times \frac{\sqrt{\text{f(GHz)}}}{7.5}$$

If the minimum test separation distance is < 5mm, a distance of 5mm is used for estimated SAR calculation. When the test separation distance is >50mm, the 0.4W/kg is used for SAR-1g.

3.2 SPLSR evaluation and analysis

Per KDB447498D01, when the sum of SAR is larger than the limit, SAR test exclusion is determined by the SAR sum to peak location separation ratio(SPLSR).

The simultaneous transmitting antennas in each operating mode and exposure condition combination must be considered one pair at a time to determine the SAR to peak location separation ratio to qualify for test exclusion.

The ratio is determined by **(SAR1 + SAR2)^1.5/Ri**, rounded to two decimal digits, and must be **≤ 0.04** for all antenna pairs in the configuration to qualify for 1-g SAR test exclusion.

SAR1 and SAR2 are the highest reported or estimated SAR for each antenna in the pair, and Ri is the separation distance between the peak SAR locations for the antenna pair in mm.

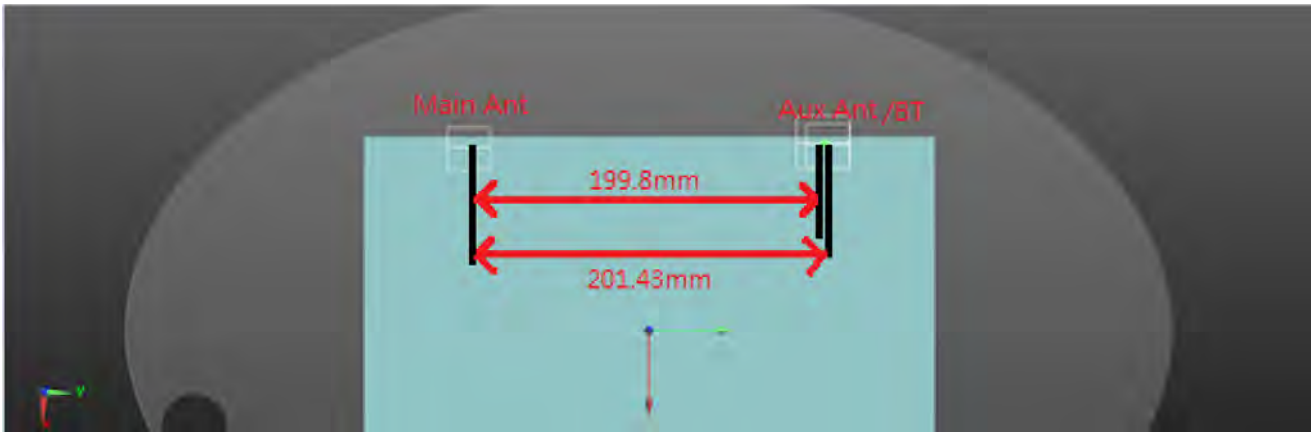
When standalone test exclusion applies, SAR is estimated; the peak location is assumed to be at the feed-point or geometric center of the antenna.

Simultaneous Transmission Combination

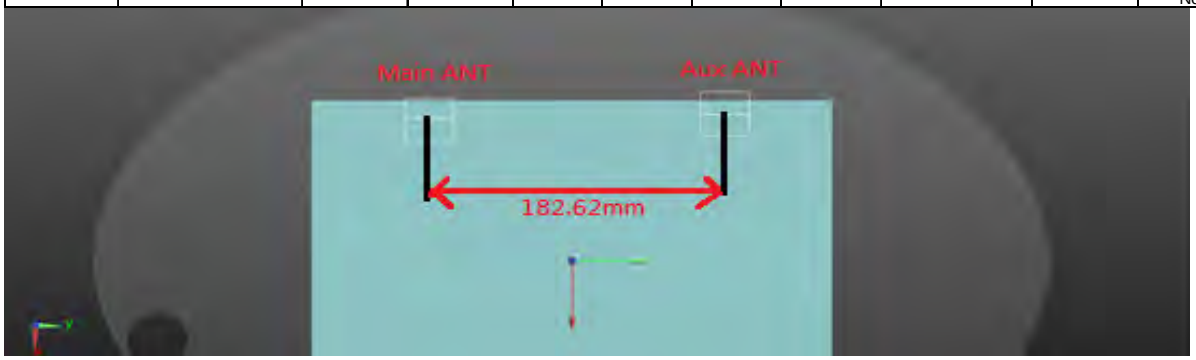
Exposure Position		Reported SAR							Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8
		2	3	4	5	7	8	9	2+3 Summed 1g SAR (W/kg)	4+5 Summed 1g SAR (W/kg)	2+7 Summed 1g SAR (W/kg)	4+7 Summed 1g SAR (W/kg)	4+5+7 Summed 1g SAR (W/kg)	7+8 Summed 1g SAR (W/kg)	8+9 Summed 1g SAR (W/kg)	7+8+9 Summed 1g SAR (W/kg)
		2.4GHz WLAN Main	2.4GHz WLAN Aux	5GHz WLAN Main	5GHz WLAN Aux	Bluetooth Aux	6GHz WLAN Main	6GHz WLAN Aux								
		1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)								
Bottom Surface	8	0.803	0.347	1.178	1.155	0.423	0.354	0.443	1.150	2.333	1.226	1.601	2.756	0.777	0.797	1.220
Bottom Surface	0	0.798	0.965	0.931	0.984	0.423	1.098	0.984	1.763	1.915	1.221	1.354	2.338	1.521	2.082	2.505

Scenario 2&5										
Position	Conditions	Gap (mm)	SAR Value (W/kg)	Coordinates (mm)			ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission SAR Test
				x	y	z				
Bottom Surface	WLAN 5G Main	8.000	1.178	-105.00	-101.20	0.58	-	-	-	-
	WLAN 5G Aux+BT	8.000	1.578	-105.40	98.60	0.46	2.756	199.80	0.023	SPLSR ≤ 0.04, Not required

*For peak SAR location of WLAN Aux + BT, using the peak SAR location with smallest separation distance between WLAN Main - WLAN Aux pair and WLAN Main - BT pair to be the worst case condition.

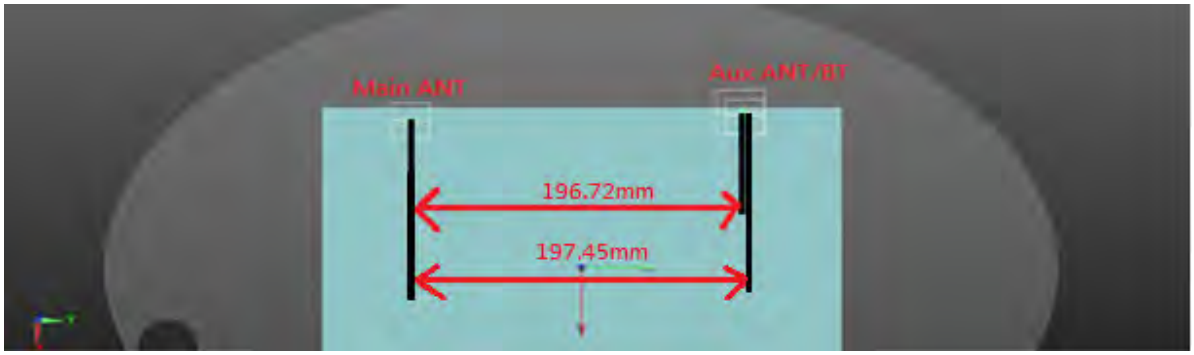


Scenario 1										
Position	Conditions	Gap (mm)	SAR Value (W/kg)	Coordinates (mm)			ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission SAR Test
				x	y	z				
Bottom Surface	WLAN 2.4G Main	0.000	0.798	-97.00	-88.60	-3.02	-	-	-	-
	WLAN 2.4G Aux	0.000	0.965	-99.40	94.00	-2.92	1.763	182.62	0.013	SPLSR ≤ 0.04, Not required



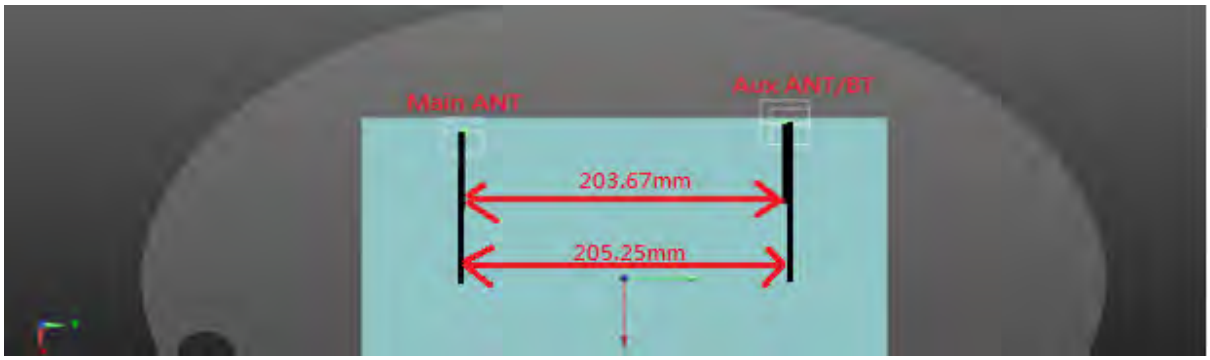
Scenario 2&5										
Position	Conditions	Gap (mm)	SAR Value (W/kg)	Coordinates (mm)			ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission SAR Test
				x	y	z				
Bottom Surface	WLAN 5G Main	0.000	0.931	-99.40	-98.00	-2.87	-	-	-	-
	WLAN 5G Aux+BT	0.000	1.407	-105.40	98.60	0.46	2.338	196.72	0.018	SPLSR ≤ 0.04, Not required

*For peak SAR location of WLAN Aux + BT, using the peak SAR location with smallest separation distance between WLAN Main - WLAN Aux pair and WLAN Main - BT pair to be the worst case condition.



Scenario 6&7&8										
Position	Conditions	Gap (mm)	SAR Value (W/kg)	Coordinates (mm)			ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission SAR Test
				x	y	z				
Bottom Surface	WLAN 6G Main	0.000	1.098	-100.00	-105.00	0.81	-	-	-	-
	WLAN 6G Aux+BT	0.000	1.407	-105.40	98.60	0.46	2.505	203.67	0.019	SPLSR ≤ 0.04, Not required

*For peak SAR location of WLAN Aux + BT, using the peak SAR location with smallest separation distance between WLAN Main - WLAN Aux pair and WLAN Main - BT pair to be the worst case condition.



4. Instruments List

Manufacturer	Device	Type	Serial number	Date of last calibration	Date of next calibration
SPEAG	Dosimetric E-Field Probe	EX3DV4	7686	Oct.05,2021	Oct.04,2022
		EUmmWV3	9399	Jan.26,2022	Jan.25,2023
SPEAG	System Validation Dipole	D2450V2	727	Apr.14,2021	Apr.13,2022
		D5GHzV2	1023	Jan.27,2022	Jan.26,2023
		D6.5GHzV2	1006	Aug.26,2021	Aug.25,2022
		D7GHzV2	1007	Aug.26,2021	Aug.25,2022
		5G-Veri10	1021	Jan.24,2022	Jan.23,2023
SPEAG	Data acquisition Electronics	DAE4	877	Mar.22,2021	Mar.21,2022
SPEAG	Software	DASY 52 V52.10.4	N/A	Calibration not required	Calibration not required
SPEAG	Phantom	ELI	N/A	Calibration not required	Calibration not required
		mmWave			
SPEAG	Dielectric Assessment Kit	DAKS-3.5	1001	Jan.26,2022	Jan.25,2023
Agilent	Dual-directional coupler	772D	MY46151242	Aug.16.2021	Aug.15.2022
		778D	MY48220468	Aug.16.2021	Aug.15.2022
Agilent	Signal Generator	N5181A	MY50141235	May.30,2021	May.29,2022
Agilent	Power Meter	E4417A	MY51410006	Mar.23,2021	Mar.22,2022
Agilent	Power Sensor	E9301H	MY51470001	Mar.23,2021	Mar.22,2022
			MY51470002	Mar.23,2021	Mar.22,2022
TECPEL	Digital thermometer	DTM-303A	TP130074	Apr.26,2021	Apr.25,2022
R&S	Power Sensor	NRP18S	101974	Oct.12.2021	Oct.11.2022

5. Measurements

Date: 2022/3/7

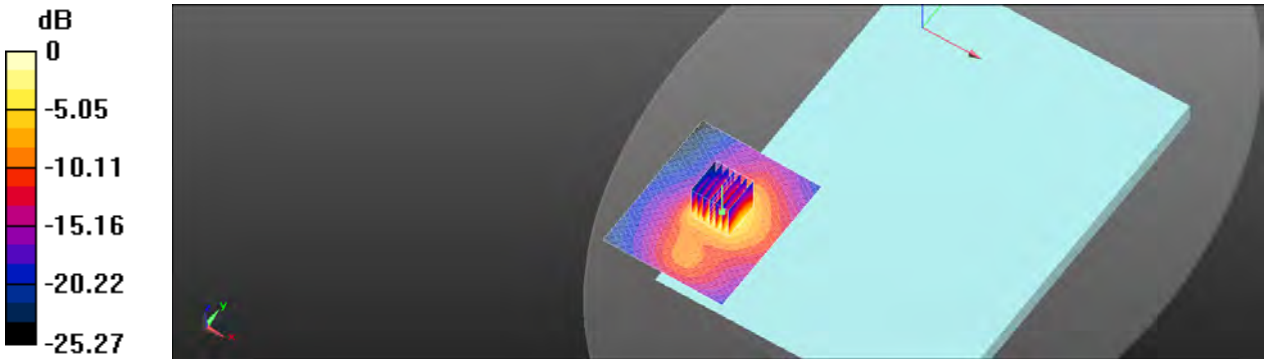
Report No. :ES/2022/20003
WLAN 802.11b_Body_Bottom Surface_CH 6_8mm_Main
Communication System: WLAN; Frequency: 2437 MHz; Duty Cycle: 1:1.01
Medium parameters used: f = 2437 MHz; σ = 1.769 S/m; ε_r = 38.745; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 22.5°C; Liquid temperature: 22.6°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7686; ConvF(8.32, 8.32, 8.32); Calibrated: 2021/10/05
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn877; Calibrated: 2021/03/22
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (81x101x1): Interpolated grid: dx=12 mm, dy=12 mm
Maximum value of SAR (interpolated) = 1.26 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.504 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 1.77 W/kg
SAR(1 g) = 0.790 W/kg; SAR(10 g) = 0.339 W/kg
Smallest distance from peaks to all points 3 dB below = 8 mm
Ratio of SAR at M2 to SAR at M1 = 46.5%
Maximum value of SAR (measured) = 1.27 W/kg



0 dB = 1.27 W/kg = 1.04 dBW/kg

Date: 2022/3/7

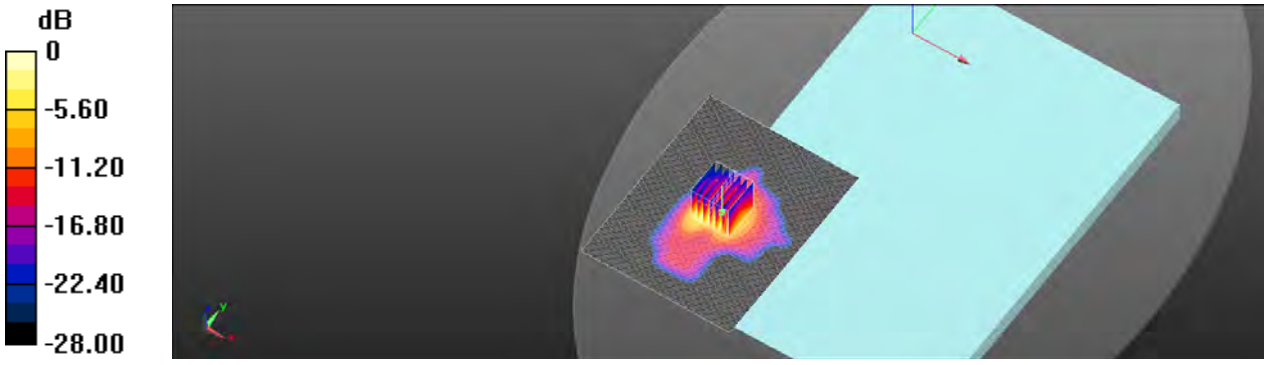
Report No. :ES/2022/20003
WLAN 802.11b_Body_Bottom Surface_CH 11_0mm_Main
Communication System: WLAN; Frequency: 2462 MHz; Duty Cycle: 1:1.01
Medium parameters used: f = 2462 MHz; σ = 1.794 S/m; ε_r = 38.695; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 22.5°C; Liquid temperature: 22.6°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7686; ConvF(8.32, 8.32, 8.32); Calibrated: 2021/10/05
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn877; Calibrated: 2021/03/22
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (101x131x1): Interpolated grid: dx=12 mm, dy=12 mm
Maximum value of SAR (interpolated) = 1.20 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.168 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 1.97 W/kg
SAR(1 g) = 0.785 W/kg; SAR(10 g) = 0.299 W/kg
Smallest distance from peaks to all points 3 dB below = 6.4 mm
Ratio of SAR at M2 to SAR at M1 = 44.5%
Maximum value of SAR (measured) = 1.30 W/kg



0 dB = 1.30 W/kg = 1.14 dBW/kg

Date: 2022/3/8

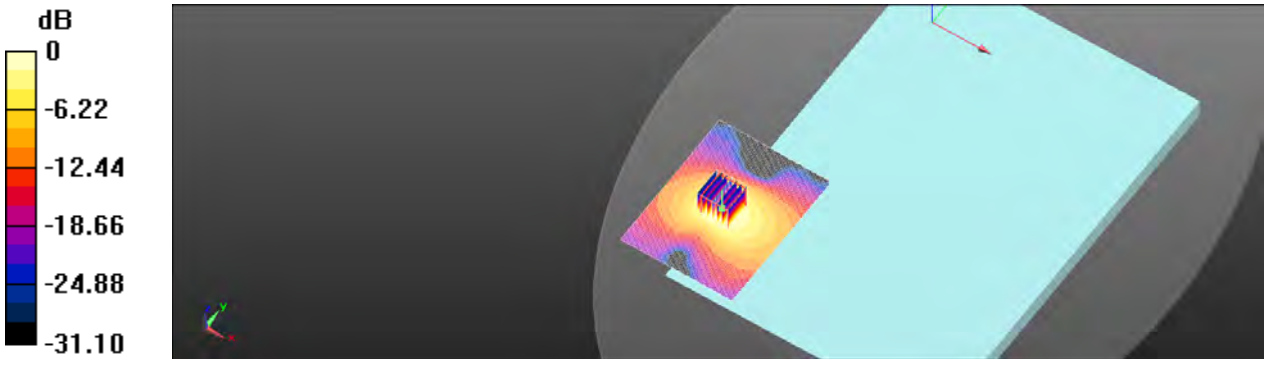
Report No. :ES/2022/20003
WLAN 802.11ac(80M) 5.2G_Body_Bottom Surface_CH 42_8mm_Main
Communication System: WLAN; Frequency: 5210 MHz; Duty Cycle: 1:1.02
Medium parameters used: f = 5210 MHz; σ = 4.626 S/m; ε_r = 35.618; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 22.4°C; Liquid temperature: 22.9°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7686; ConvF(5.81, 5.81, 5.81); Calibrated: 2021/10/05
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn877; Calibrated: 2021/03/22
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (91x121x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 2.13 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 2.809 V/m; Power Drift = 0.17 dB
Peak SAR (extrapolated) = 3.77 W/kg
SAR(1 g) = 1.14 W/kg; SAR(10 g) = 0.441 W/kg
Smallest distance from peaks to all points 3 dB below = 11.5 mm
Ratio of SAR at M2 to SAR at M1 = 57.8%
Maximum value of SAR (measured) = 2.09 W/kg



0 dB = 2.09 W/kg = 3.21 dBW/kg

Date: 2022/3/8

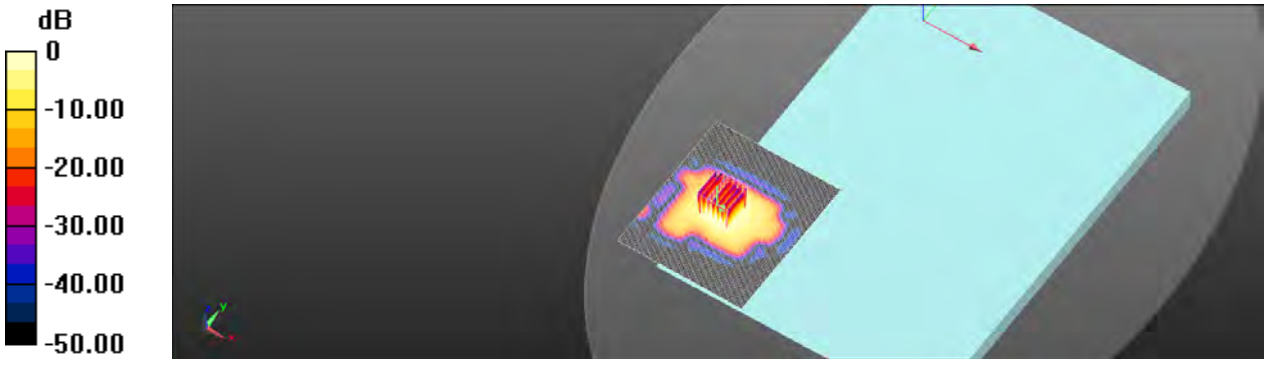
Report No. :ES/2022/20003
WLAN 802.11ac(160M) 5.2G_Body_Bottom Surface_CH 50_0mm_Main
Communication System: WLAN; Frequency: 5250 MHz; Duty Cycle: 1:1.012
Medium parameters used: f = 5250 MHz; σ = 4.667 S/m; ε_r = 35.573; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 22.4°C; Liquid temperature: 22.9°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7686; ConvF(5.81, 5.81, 5.81); Calibrated: 2021/10/05
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn877; Calibrated: 2021/03/22
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (101x121x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 1.86 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 4.689 V/m; Power Drift = 0.15 dB
Peak SAR (extrapolated) = 3.12 W/kg
SAR(1 g) = 0.912 W/kg; SAR(10 g) = 0.333 W/kg
Smallest distance from peaks to all points 3 dB below = 8 mm
Ratio of SAR at M2 to SAR at M1 = 57.8%
Maximum value of SAR (measured) = 1.66 W/kg



0 dB = 1.66 W/kg = 2.21 dBW/kg

Date: 2022/3/9

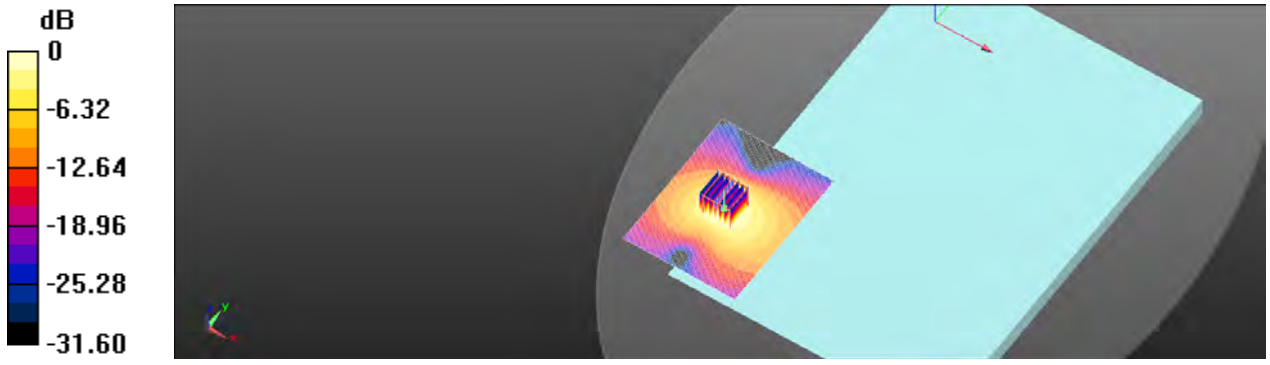
Report No. :ES/2022/20003
WLAN 802.11n(40M) 5.3G_Body_Bottom Surface_CH 54_8mm_Main
Communication System: WLAN; Frequency: 5270 MHz; Duty Cycle: 1:1.022
Medium parameters used: f = 5270 MHz; σ = 4.688 S/m; ε_r = 35.532; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 22.5°C; Liquid temperature: 22.7°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7686; ConvF(5.81, 5.81, 5.81); Calibrated: 2021/10/05
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn877; Calibrated: 2021/03/22
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (91x121x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 1.92 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 3.196 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 3.51 W/kg
SAR(1 g) = 1.04 W/kg; SAR(10 g) = 0.405 W/kg
Smallest distance from peaks to all points 3 dB below = 11.8 mm
Ratio of SAR at M2 to SAR at M1 = 56.9%
Maximum value of SAR (measured) = 1.92 W/kg



0 dB = 1.92 W/kg = 2.83 dBW/kg

Date: 2022/3/9

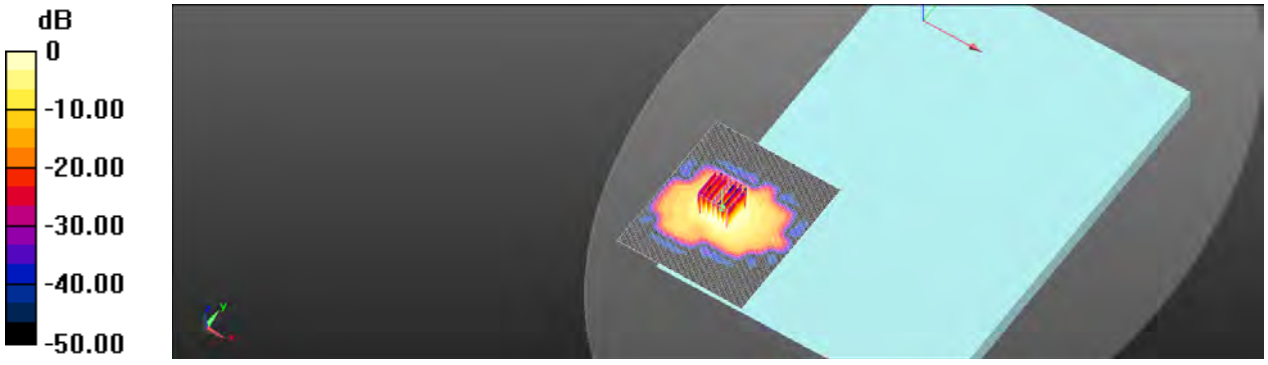
Report No. :ES/2022/20003
WLAN 802.11ac(80M) 5.3G_Body_Bottom Surface_CH 58_0mm_Main
Communication System: WLAN; Frequency: 5290 MHz; Duty Cycle: 1:1.02
Medium parameters used: f = 5290 MHz; σ = 4.711 S/m; ε_r = 35.51; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 22.5°C; Liquid temperature: 22.7°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7686; ConvF(5.81, 5.81, 5.81); Calibrated: 2021/10/05
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn877; Calibrated: 2021/03/22
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (101x121x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 1.79 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 1.186 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 3.05 W/kg
SAR(1 g) = 0.901 W/kg; SAR(10 g) = 0.322 W/kg
Smallest distance from peaks to all points 3 dB below = 8.8 mm
Ratio of SAR at M2 to SAR at M1 = 57%
Maximum value of SAR (measured) = 1.62 W/kg



0 dB = 1.62 W/kg = 2.10 dBW/kg

Date: 2022/3/10

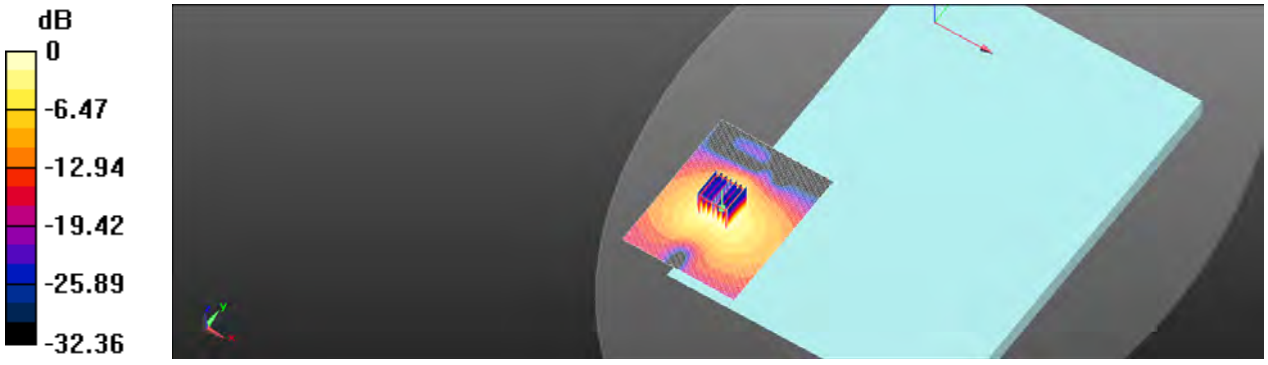
Report No. :ES/2022/20003
WLAN 802.11ac(80M) 5.6G_Body_Bottom Surface_CH 138_8mm_Main
Communication System: WLAN; Frequency: 5690 MHz; Duty Cycle: 1:1.02
Medium parameters used: f = 5690 MHz; σ = 5.115 S/m; ε_r = 35.082; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 22.5°C; Liquid temperature: 22.9°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7686; ConvF(5.16, 5.16, 5.16); Calibrated: 2021/10/05
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn877; Calibrated: 2021/03/22
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (91x121x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 2.09 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 3.681 V/m; Power Drift = 0.15 dB
Peak SAR (extrapolated) = 4.15 W/kg
SAR(1 g) = 1.11 W/kg; SAR(10 g) = 0.414 W/kg
Smallest distance from peaks to all points 3 dB below = 10.7 mm
Ratio of SAR at M2 to SAR at M1 = 53.8%
Maximum value of SAR (measured) = 2.11 W/kg



0 dB = 2.11 W/kg = 3.23 dBW/kg

Date: 2022/3/10

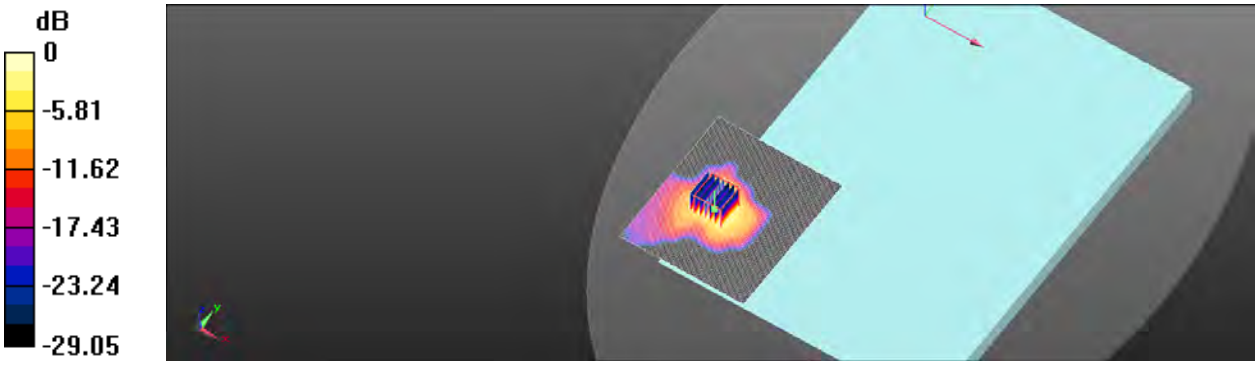
Report No. :ES/2022/20003
WLAN 802.11ac(160M) 5.6G_Body_Bottom Surface_CH 114_0mm_Main
Communication System: WLAN; Frequency: 5570 MHz; Duty Cycle: 1:1.012
Medium parameters used: f = 5570 MHz; σ = 4.994 S/m; ε_r = 35.193; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 22.5°C; Liquid temperature: 22.9°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7686; ConvF(5.16, 5.16, 5.16); Calibrated: 2021/10/05
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn877; Calibrated: 2021/03/22
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (101x121x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 1.87 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 1.193 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 3.53 W/kg
SAR(1 g) = 0.908 W/kg; SAR(10 g) = 0.325 W/kg
Smallest distance from peaks to all points 3 dB below = 8.6 mm
Ratio of SAR at M2 to SAR at M1 = 54.2%
Maximum value of SAR (measured) = 1.79 W/kg



0 dB = 1.79 W/kg = 2.53 dBW/kg

Date: 2022/3/11

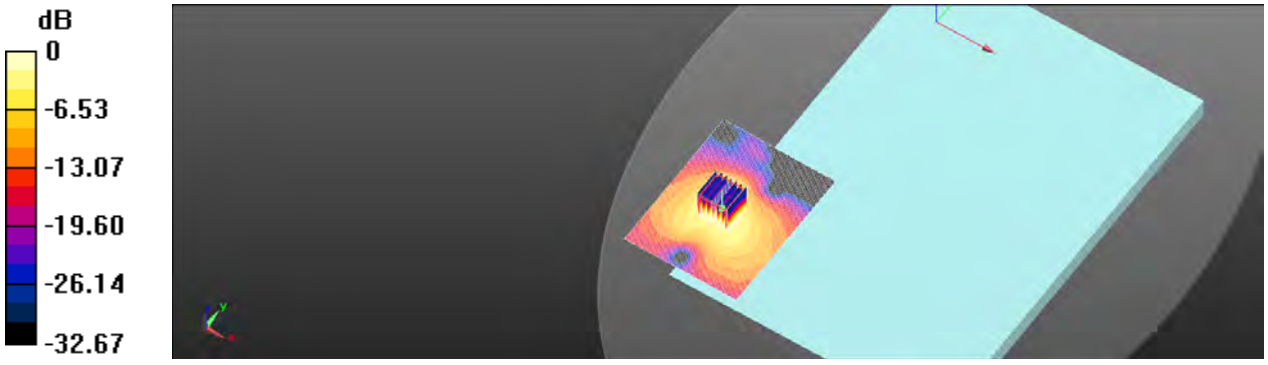
Report No. :ES/2022/20003
WLAN 802.11ac(80M) 5.8G_Body_Bottom Surface_CH 155_8mm_Main
Communication System: WLAN; Frequency: 5775 MHz; Duty Cycle: 1:1.02
Medium parameters used: f = 5775 MHz; σ = 5.203 S/m; ε_r = 34.961; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 22.4°C; Liquid temperature: 22.8°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7686; ConvF(5.3, 5.3, 5.3); Calibrated: 2021/10/05
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn877; Calibrated: 2021/03/22
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (91x121x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 2.24 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 4.048 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 4.35 W/kg
SAR(1 g) = 1.15 W/kg; SAR(10 g) = 0.422 W/kg
Smallest distance from peaks to all points 3 dB below = 10.4 mm
Ratio of SAR at M2 to SAR at M1 = 53.3%
Maximum value of SAR (measured) = 2.21 W/kg



0 dB = 2.21 W/kg = 3.44 dBW/kg

Date: 2022/3/11

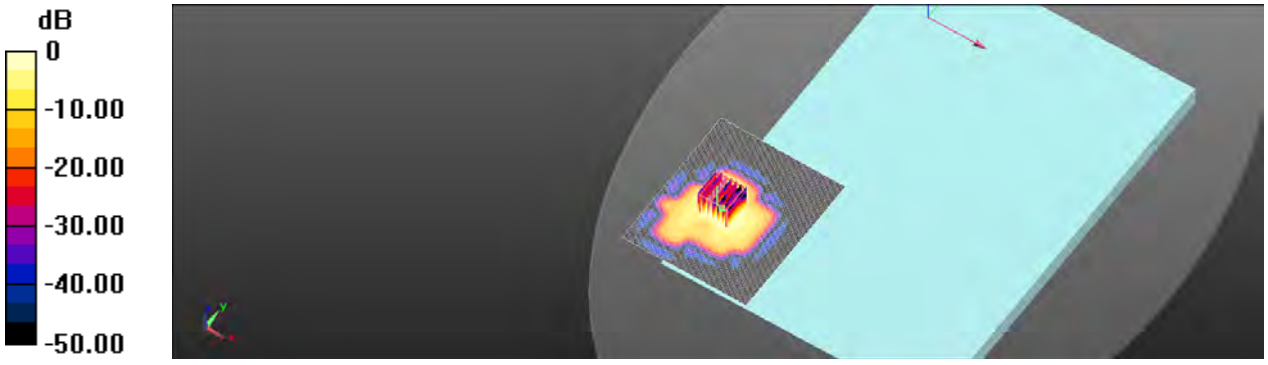
Report No. :ES/2022/20003
WLAN 802.11ac(80M) 5.8G_Body_Bottom Surface_CH 155_0mm_Main
Communication System: WLAN; Frequency: 5775 MHz; Duty Cycle: 1:1.02
Medium parameters used: f = 5775 MHz; σ = 5.203 S/m; ε_r = 34.961; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 22.4°C; Liquid temperature: 22.8°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7686; ConvF(5.3, 5.3, 5.3); Calibrated: 2021/10/05
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn877; Calibrated: 2021/03/22
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (101x121x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 1.54 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 1.136 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 2.98 W/kg
SAR(1 g) = 0.771 W/kg; SAR(10 g) = 0.255 W/kg
Smallest distance from peaks to all points 3 dB below = 8 mm
Ratio of SAR at M2 to SAR at M1 = 53.6%
Maximum value of SAR (measured) = 1.45 W/kg



0 dB = 1.45 W/kg = 1.62 dBW/kg

Date: 2022/3/7

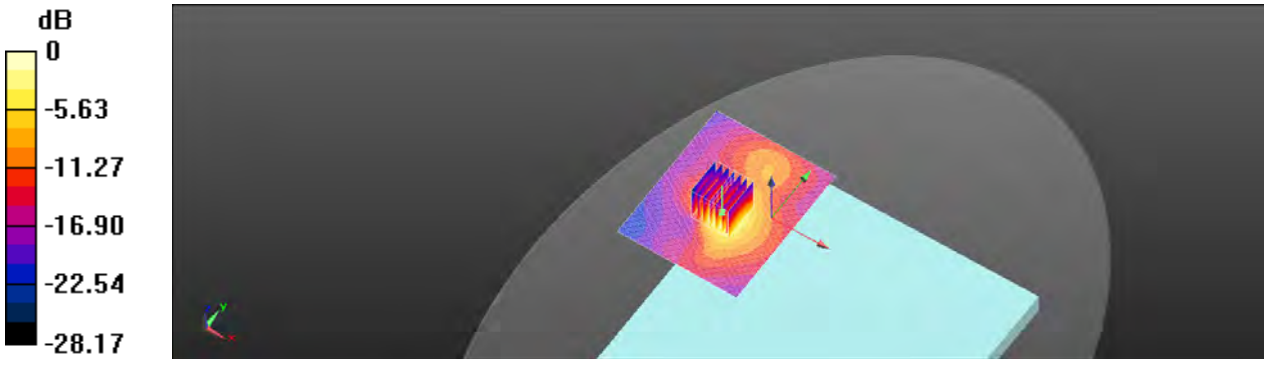
Report No. :ES/2022/20003
WLAN 802.11b_Body_Bottom Surface_CH 6_8mm_Aux
Communication System: WLAN; Frequency: 2437 MHz; Duty Cycle: 1:1.01
Medium parameters used: f = 2437 MHz; σ = 1.769 S/m; ε_r = 38.745; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 22.5°C; Liquid temperature: 22.6°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7686; ConvF(8.32, 8.32, 8.32); Calibrated: 2021/10/05
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn877; Calibrated: 2021/03/22
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (81x101x1): Interpolated grid: dx=12 mm, dy=12 mm
Maximum value of SAR (interpolated) = 0.537 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 0.6912 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.754 W/kg
SAR(1 g) = 0.340 W/kg; SAR(10 g) = 0.144 W/kg
Smallest distance from peaks to all points 3 dB below = 8.5 mm
Ratio of SAR at M2 to SAR at M1 = 47.1%
Maximum value of SAR (measured) = 0.545 W/kg



0 dB = 0.545 W/kg = -2.64 dBW/kg

Date: 2022/3/7

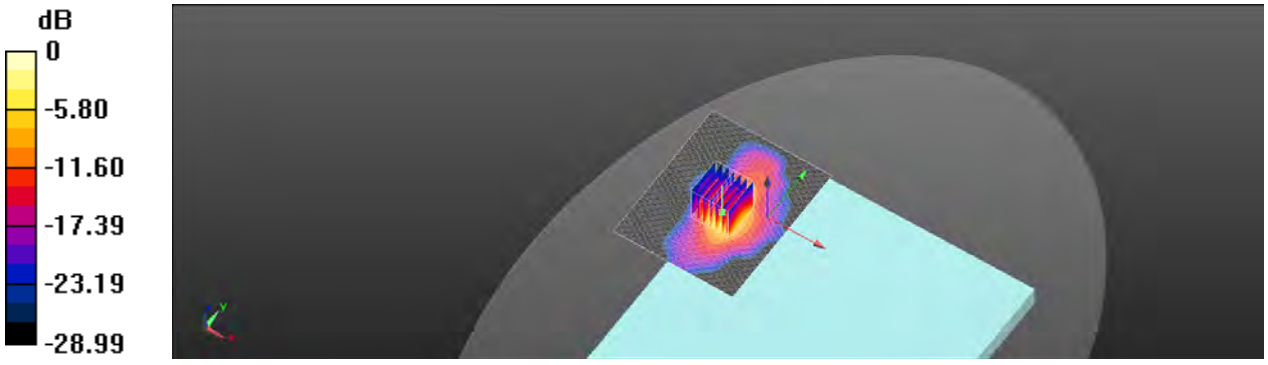
Report No. :ES/2022/20003
WLAN 802.11b_Body_Bottom Surface_CH 6_0mm_Aux
Communication System: WLAN; Frequency: 2437 MHz; Duty Cycle: 1:1.01
Medium parameters used: f = 2437 MHz; σ = 1.769 S/m; ε_r = 38.745; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 22.5°C; Liquid temperature: 22.6°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7686; ConvF(8.32, 8.32, 8.32); Calibrated: 2021/10/05
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn877; Calibrated: 2021/03/22
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (81x101x1): Interpolated grid: dx=12 mm, dy=12 mm
Maximum value of SAR (interpolated) = 1.46 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.208 V/m; Power Drift = 0.16 dB
Peak SAR (extrapolated) = 2.44 W/kg
SAR(1 g) = 0.949 W/kg; SAR(10 g) = 0.340 W/kg
Smallest distance from peaks to all points 3 dB below = 6.3 mm
Ratio of SAR at M2 to SAR at M1 = 42.6%
Maximum value of SAR (measured) = 1.68 W/kg



0 dB = 1.68 W/kg = 2.26 dBW/kg

Date: 2022/3/7

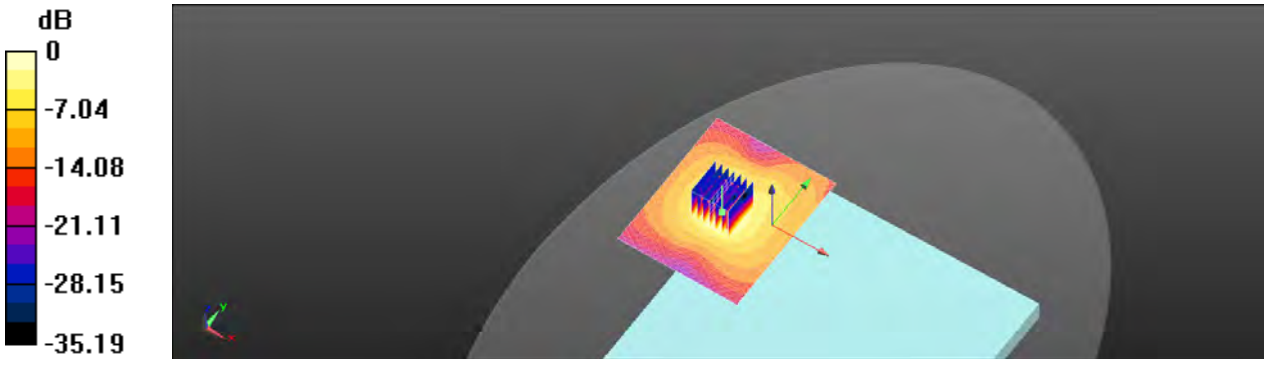
Report No. :ES/2022/20003
Bluetooth(GFSK)_Body_Bottom Surface_CH 78_0mm_Aux
Communication System: Bluetooth; Frequency: 2480 MHz; Duty Cycle: 1:1.297
Medium parameters used: f = 2480 MHz; σ = 1.812 S/m; ε_r = 38.676; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 22.5°C; Liquid temperature: 22.6°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7686; ConvF(8.32, 8.32, 8.32); Calibrated: 2021/10/05
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn877; Calibrated: 2021/03/22
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (81x101x1): Interpolated grid: dx=12 mm, dy=12 mm
Maximum value of SAR (interpolated) = 0.423 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.341 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 1.03 W/kg
SAR(1 g) = 0.235 W/kg; SAR(10 g) = 0.091 W/kg
Smallest distance from peaks to all points 3 dB below = 12.2 mm
Ratio of SAR at M2 to SAR at M1 = 49.2%
Maximum value of SAR (measured) = 0.432 W/kg



0 dB = 0.432 W/kg = -3.65 dBW/kg

Date: 2022/3/8

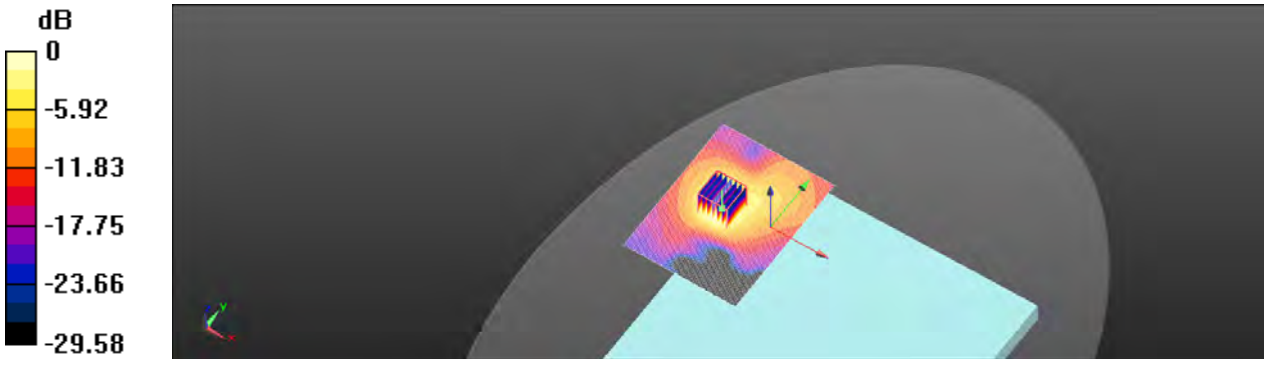
Report No. :ES/2022/20003
WLAN 802.11ac(80M) 5.2G_Body_Bottom Surface_CH 42_8mm_Aux
Communication System: WLAN; Frequency: 5210 MHz; Duty Cycle: 1:1.02
Medium parameters used: f = 5210 MHz; σ = 4.626 S/m; ε_r = 35.618; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 22.4°C; Liquid temperature: 22.9°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7686; ConvF(5.81, 5.81, 5.81); Calibrated: 2021/10/05
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn877; Calibrated: 2021/03/22
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (91x121x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 2.26 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 1.883 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 4.14 W/kg
SAR(1 g) = 1.09 W/kg; SAR(10 g) = 0.382 W/kg
Smallest distance from peaks to all points 3 dB below = 10.5 mm
Ratio of SAR at M2 to SAR at M1 = 56.6%
Maximum value of SAR (measured) = 2.23 W/kg



0 dB = 2.23 W/kg = 3.47 dBW/kg

Date: 2022/3/8

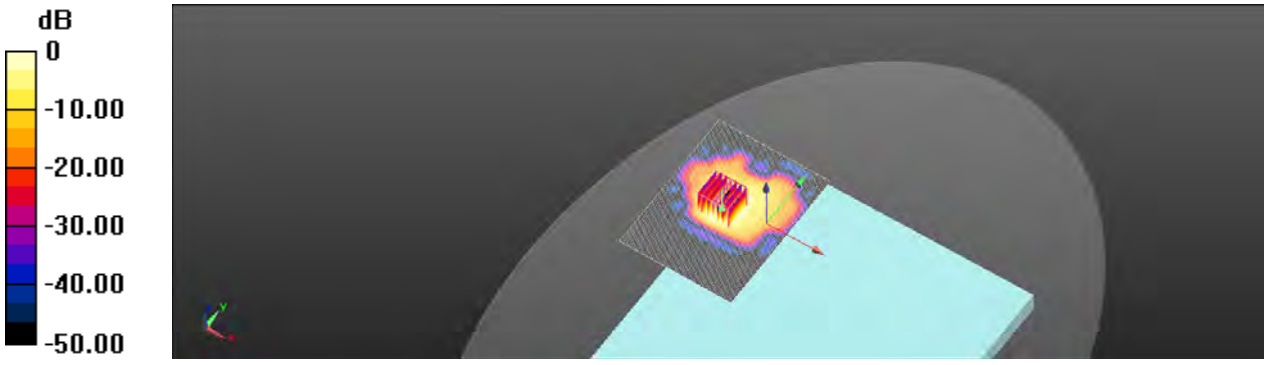
Report No. :ES/2022/20003
WLAN 802.11ac(160M) 5.2G_Body_Bottom Surface_CH 50_0mm_Aux
Communication System: WLAN; Frequency: 5250 MHz; Duty Cycle: 1:1.012
Medium parameters used: f = 5250 MHz; σ = 4.667 S/m; ε_r = 35.573; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 22.4°C; Liquid temperature: 22.9°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7686; ConvF(5.81, 5.81, 5.81); Calibrated: 2021/10/05
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn877; Calibrated: 2021/03/22
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (91x121x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 2.17 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 0.2821 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 3.85 W/kg
SAR(1 g) = 0.963 W/kg; SAR(10 g) = 0.289 W/kg
Smallest distance from peaks to all points 3 dB below = 5.6 mm
Ratio of SAR at M2 to SAR at M1 = 56.7%
Maximum value of SAR (measured) = 1.93 W/kg



0 dB = 1.93 W/kg = 2.85 dBW/kg

Date: 2022/3/9

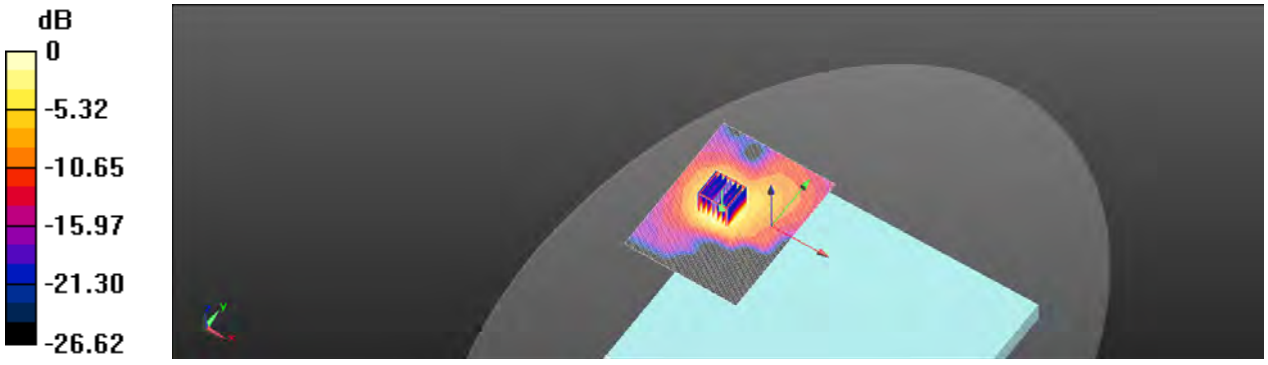
Report No. :ES/2022/20003
WLAN 802.11ac(80M) 5.3G_Body_Bottom Surface_CH 58_8mm_Aux
Communication System: WLAN; Frequency: 5290 MHz; Duty Cycle: 1:1.02
Medium parameters used: f = 5290 MHz; σ = 4.711 S/m; ε_r = 35.51; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 22.5°C; Liquid temperature: 22.7°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7686; ConvF(5.81, 5.81, 5.81); Calibrated: 2021/10/05
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn877; Calibrated: 2021/03/22
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (91x121x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 1.56 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 1.303 V/m; Power Drift = -0.18 dB
Peak SAR (extrapolated) = 3.03 W/kg
SAR(1 g) = 0.835 W/kg; SAR(10 g) = 0.301 W/kg
Smallest distance from peaks to all points 3 dB below = 10.7 mm
Ratio of SAR at M2 to SAR at M1 = 56.5%
Maximum value of SAR (measured) = 1.57 W/kg



0 dB = 1.57 W/kg = 1.95 dBW/kg

Date: 2022/3/9

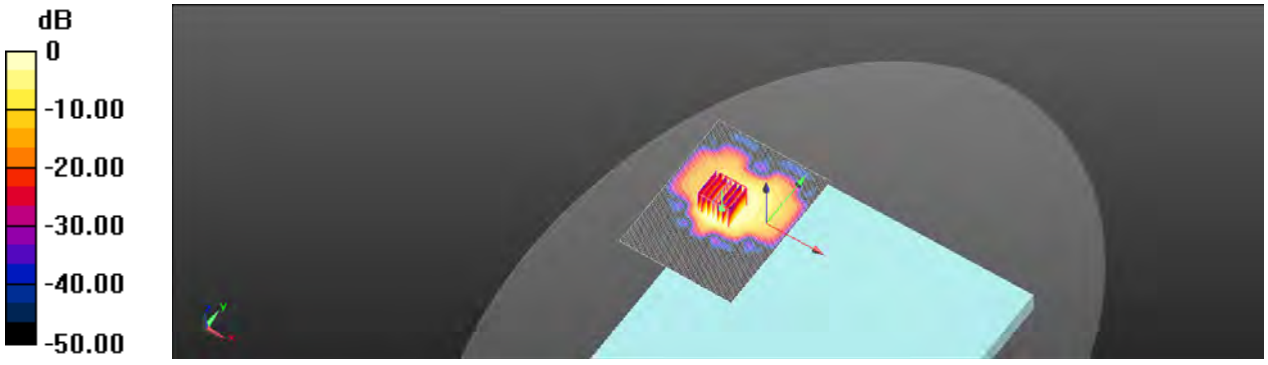
Report No. :ES/2022/20003
WLAN 802.11ac(80M) 5.3G_Body_Bottom Surface_CH 58_0mm_Aux
Communication System: WLAN; Frequency: 5290 MHz; Duty Cycle: 1:1.02
Medium parameters used: f = 5290 MHz; σ = 4.711 S/m; ε_r = 35.51; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 22.5°C; Liquid temperature: 22.7°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7686; ConvF(5.81, 5.81, 5.81); Calibrated: 2021/10/05
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn877; Calibrated: 2021/03/22
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (91x121x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 2.75 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 1.164 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 3.35 W/kg
SAR(1 g) = 0.896 W/kg; SAR(10 g) = 0.277 W/kg
Smallest distance from peaks to all points 3 dB below = 6.6 mm
Ratio of SAR at M2 to SAR at M1 = 57.9%
Maximum value of SAR (measured) = 1.72 W/kg



0 dB = 1.72 W/kg = 2.34 dBW/kg

Date: 2022/3/10

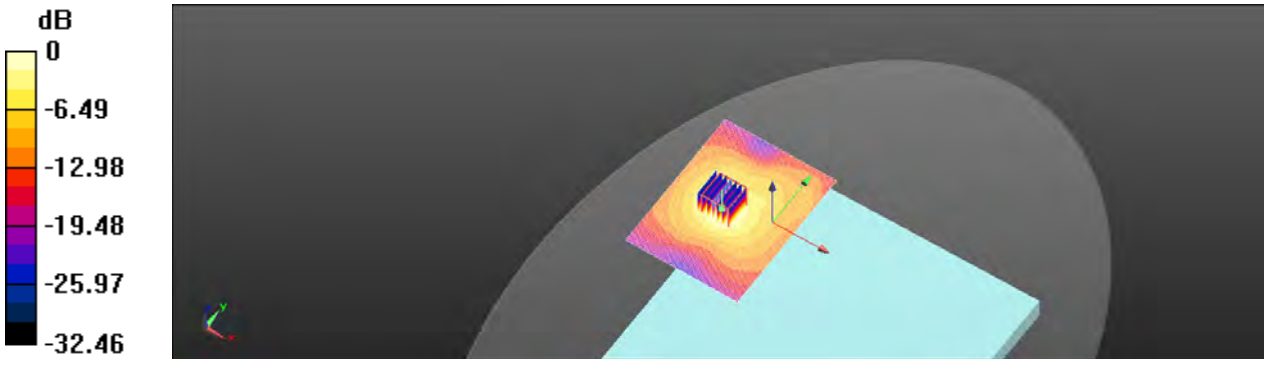
Report No. :ES/2022/20003
WLAN 802.11ac(80M) 5.6G_Body_Bottom Surface_CH 138_8mm_Aux
Communication System: WLAN; Frequency: 5690 MHz; Duty Cycle: 1:1.02
Medium parameters used: f = 5690 MHz; σ = 5.115 S/m; ε_r = 35.082; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 22.5°C; Liquid temperature: 22.9°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7686; ConvF(5.16, 5.16, 5.16); Calibrated: 2021/10/05
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn877; Calibrated: 2021/03/22
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (91x121x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 1.80 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 2.676 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 3.79 W/kg
SAR(1 g) = 0.975 W/kg; SAR(10 g) = 0.374 W/kg
Smallest distance from peaks to all points 3 dB below = 11.8 mm
Ratio of SAR at M2 to SAR at M1 = 52.5%
Maximum value of SAR (measured) = 1.84 W/kg



0 dB = 1.84 W/kg = 2.66 dBW/kg

Date: 2022/3/10

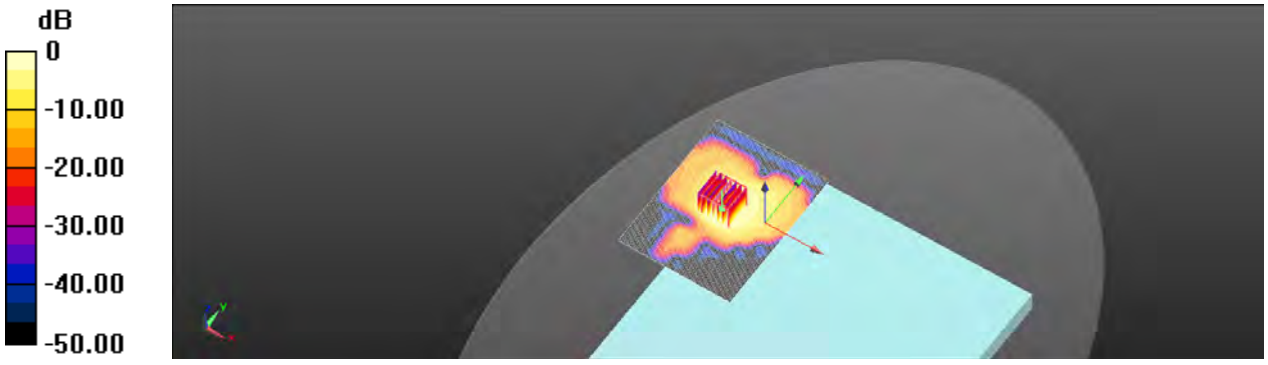
Report No. :ES/2022/20003
WLAN 802.11ac(160M) 5.6G_Body_Bottom Surface_CH 114_0mm_Aux
Communication System: WLAN; Frequency: 5570 MHz; Duty Cycle: 1:1.012
Medium parameters used: f = 5570 MHz; σ = 4.994 S/m; ε_r = 35.193; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 22.5°C; Liquid temperature: 22.9°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7686; ConvF(5.16, 5.16, 5.16); Calibrated: 2021/10/05
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn877; Calibrated: 2021/03/22
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (91x121x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 1.95 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 1.224 V/m; Power Drift = 0.15 dB
Peak SAR (extrapolated) = 3.67 W/kg
SAR(1 g) = 0.941 W/kg; SAR(10 g) = 0.321 W/kg
Smallest distance from peaks to all points 3 dB below = 7.6 mm
Ratio of SAR at M2 to SAR at M1 = 54.4%
Maximum value of SAR (measured) = 1.79 W/kg



0 dB = 1.79 W/kg = 2.53 dBW/kg

Date: 2022/3/11

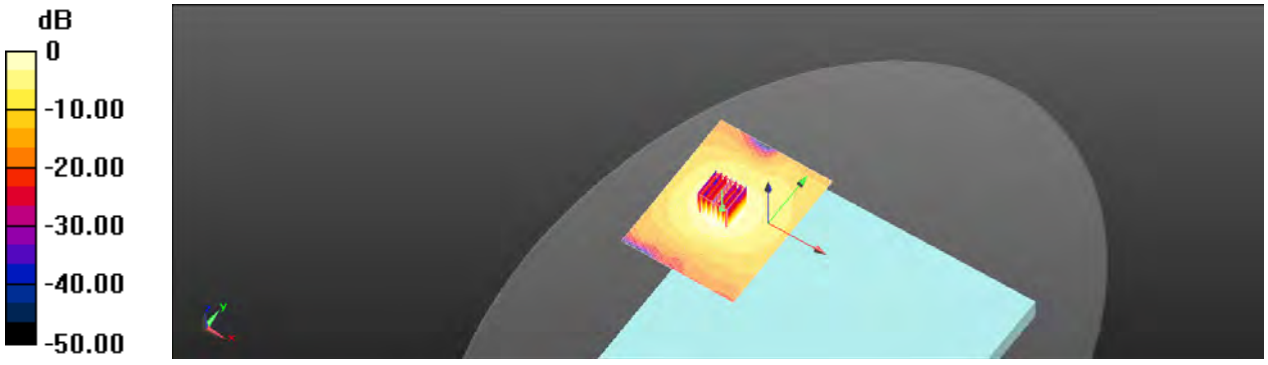
Report No. :ES/2022/20003
WLAN 802.11ac(80M) 5.8G_Body_Bottom Surface_CH 155_8mm_Aux
Communication System: WLAN; Frequency: 5775 MHz; Duty Cycle: 1:1.02
Medium parameters used: f = 5775 MHz; σ = 5.203 S/m; ε_r = 34.961; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 22.4°C; Liquid temperature: 22.8°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7686; ConvF(5.3, 5.3, 5.3); Calibrated: 2021/10/05
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn877; Calibrated: 2021/03/22
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (91x121x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 2.08 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 1.401 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 4.38 W/kg
SAR(1 g) = 1.13 W/kg; SAR(10 g) = 0.440 W/kg
Smallest distance from peaks to all points 3 dB below = 13 mm
Ratio of SAR at M2 to SAR at M1 = 52.6%
Maximum value of SAR (measured) = 2.08 W/kg



0 dB = 2.08 W/kg = 3.17 dBW/kg

Date: 2022/3/11

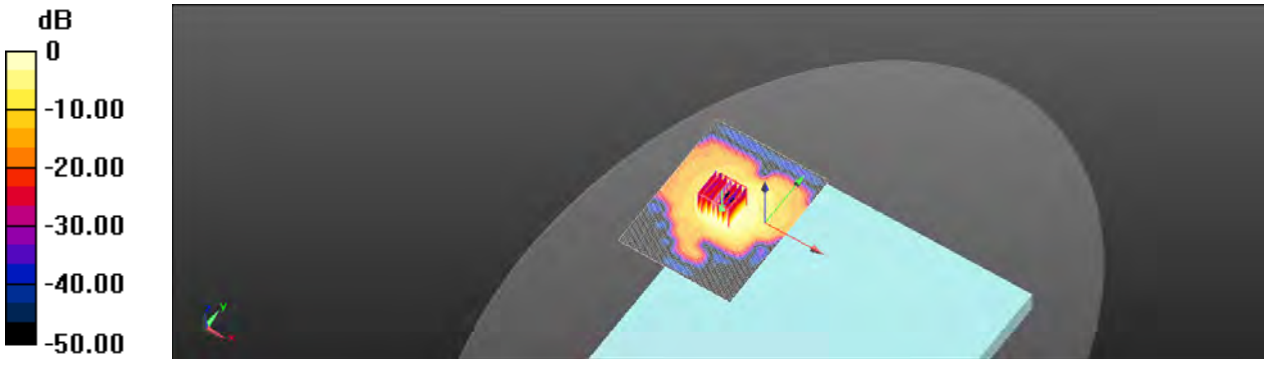
Report No. :ES/2022/20003
WLAN 802.11ac(80M) 5.8G_Body_Bottom Surface_CH 155_0mm_Aux
Communication System: WLAN; Frequency: 5775 MHz; Duty Cycle: 1:1.02
Medium parameters used: f = 5775 MHz; σ = 5.203 S/m; ε_r = 34.961; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 22.4°C; Liquid temperature: 22.8°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7686; ConvF(5.3, 5.3, 5.3); Calibrated: 2021/10/05
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn877; Calibrated: 2021/03/22
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (91x121x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 1.31 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 0.5815 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 2.93 W/kg
SAR(1 g) = 0.705 W/kg; SAR(10 g) = 0.250 W/kg
Smallest distance from peaks to all points 3 dB below = 8.9 mm
Ratio of SAR at M2 to SAR at M1 = 51.5%
Maximum value of SAR (measured) = 1.33 W/kg



0 dB = 1.33 W/kg = 1.24 dBW/kg

Report No. :ES/2022/20003
Measurement Report for Device, BOTTOM SURFACE, U-NII-5, IEEE 802.11ax (160MHz), Channel 15 (6025.0 MHz)_Main
Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Device,	320.0 x 218.0 x 16.0		Laptop

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat, HSL	BOTTOM SURFACE, 8.00	U-NII-5	WLAN,10755-AAC	6025.0,15	6.2	5.478	34.81

Hardware Setup

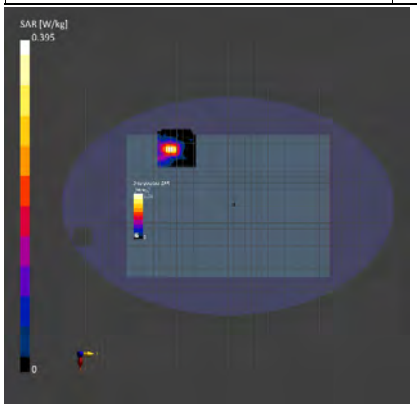
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V5.0 (20deg probe tilt) - 1141	HBBL-600-10000 ,2022-Mar-12	EX3DV4 - SN7686, 2021-10-05	DAE4 Sn877, 2021-03-22

Scans Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	68.0 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
Graded Grid	Yes	Yes
Grading Ratio	1.5	1.4
MAIA	N/A	N/A
Surface Detection	VMS + 6p	VMS + 6p
Scan Method	Measured	Measured

Measurement Results

	Area Scan	Zoom Scan
Date	2022-03-12, 07:20	2022-03-12, 07:46
psSAR1g [W/Kg]	0.327	0.347
psSAR10g [W/Kg]	0.118	0.122
psPDab (1.0cm2, sq) [W/m2]		3.47
psPDab (4.0cm2, sq) [W/m2]		2.77
Power Drift [dB]	0.00	-0.15
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	No correction	No correction
M2/M1 [%]		57.8
Dist 3dB Peak [mm]		8.8



Report No. :ES/2022/20003
Measurement Report for Device, BOTTOM SURFACE, U-NII-5, IEEE 802.11ax (160MHz), Channel 15 (6025.0 MHz)_Main
Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Device,	320.0 x 218.0 x 16.0		Laptop

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat, HSL	BOTTOM SURFACE, 0.00	U-NII-5	WLAN,10755-AAC	6025.0,15	6.2	5.478	34.81

Hardware Setup

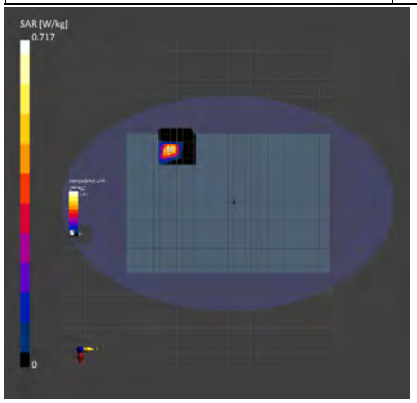
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V5.0 (20deg probe tilt) - 1141	HBBL-600-10000 ,2022-Mar-12	EX3DV4 - SN7686, 2021-10-05	DAE4 Sn877, 2021-03-22

Scans Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	68.0 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
Graded Grid	Yes	Yes
Grading Ratio	1.5	1.4
MAIA	N/A	N/A
Surface Detection	All points	All points
Scan Method	Measured	Measured

Measurement Results

	Area Scan	Zoom Scan
Date	2022-03-12, 00:52	2022-03-12, 01:13
psSAR1g [W/Kg]	0.783	0.879
psSAR10g [W/Kg]	0.269	0.257
psPDab (1.0cm2, sq) [W/m2]		8.79
psPDab (4.0cm2, sq) [W/m2]		6.09
Power Drift [dB]	-0.03	-0.08
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	No correction	No correction
M2/M1 [%]		56.6
Dist 3dB Peak [mm]		5.8



Report No. :ES/2022/20003
Measurement Report for Device, BOTTOM SURFACE, U-NII-6, IEEE 802.11ax (160MHz), Channel 111 (6505.0 MHz)_Main
Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Device,	320.0 x 218.0 x 16.0		Laptop

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat, HSL	BOTTOM SURFACE, 0.00	U-NII-6	WLAN, 10755-AAC	6505.0, 111	6.2	6.042	34.27

Hardware Setup

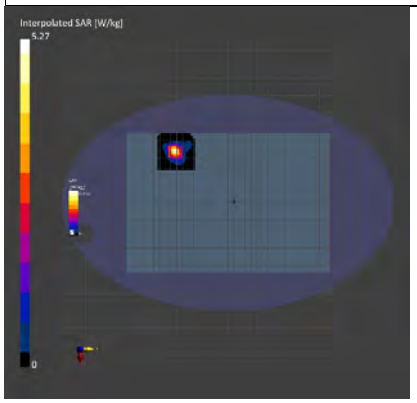
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V5.0 (20deg probe tilt) - 1141	HBBL-600-10000 ,2022-Mar-12	EX3DV4 - SN7686, 2021-10-05	DAE4 Sn877, 2021-03-22

Scans Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	68.0 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
Graded Grid	Yes	Yes
Grading Ratio	1.5	1.4
MAIA	N/A	N/A
Surface Detection	All points	All points
Scan Method	Measured	Measured

Measurement Results

	Area Scan	Zoom Scan
Date	2022-03-12, 01:32	2022-03-12, 01:53
psSAR1g [W/Kg]	0.996	1.08
psSAR10g [W/Kg]	0.312	0.325
psPDab (1.0cm2, sq) [W/m2]		10.8
psPDab (4.0cm2, sq) [W/m2]		7.52
Power Drift [dB]	-0.02	0.08
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	No correction	No correction
M2/M1 [%]		50.9
Dist 3dB Peak [mm]		7.5



Report No. :ES/2022/20003
Measurement Report for Device, BOTTOM SURFACE, U-NII-7, IEEE 802.11ax (160MHz), Channel 143 (6665.0 MHz)_Main
Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Device,	320.0 x 218.0 x 16.0		Laptop

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat, HSL	BOTTOM SURFACE, 0.00	U-NII-7	WLAN, 10755-AAC	6665.0, 143	6.2	6.221	34.055

Hardware Setup

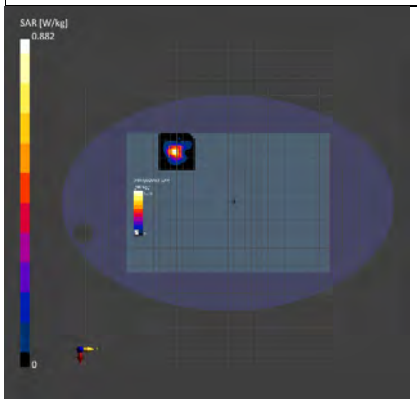
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V5.0 (20deg probe tilt) - 1141	HBBL-600-10000 ,2022-Mar-12	EX3DV4 - SN7686, 2021-10-05	DAE4 Sn877, 2021-03-22

Scans Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	68.0 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
Graded Grid	Yes	Yes
Grading Ratio	1.5	1.4
MAIA	N/A	N/A
Surface Detection	VMS + 6p	VMS + 6p
Scan Method	Measured	Measured

Measurement Results

	Area Scan	Zoom Scan
Date	2022-03-12, 02:24	2022-03-12, 02:39
psSAR1g [W/Kg]	1.00	1.08
psSAR10g [W/Kg]	0.317	0.332
psPDab (1.0cm2, sq) [W/m2]		10.8
psPDab (4.0cm2, sq) [W/m2]		7.64
Power Drift [dB]	0.10	-0.05
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	No correction	No correction
M2/M1 [%]		50.2
Dist 3dB Peak [mm]		7.9



Report No. :ES/2022/20003
Measurement Report for Device, BOTTOM SURFACE, U-NII-8, IEEE 802.11ax (160MHz), Channel 207 (6985.0 MHz)_Main
Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Device,	320.0 x 218.0 x 16.0		Laptop

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat, HSL	BOTTOM SURFACE, 0.00	U-NII-8	WLAN, 10755-AAC	6985.0, 207	6.14	6.591	33.681

Hardware Setup

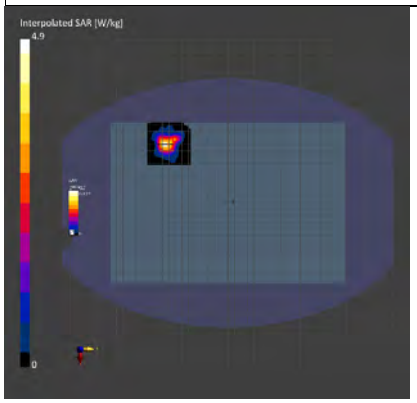
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V5.0 (20deg probe tilt) - 1141	HBBL-600-10000 ,2022-Mar-12	EX3DV4 - SN7686, 2021-10-05	DAE4 Sn877, 2021-03-22

Scans Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	68.0 x 85.0	22.0 x 22.0 x 22.0
Grid Steps [mm]	8.5 x 8.5	3.2 x 3.2 x 1.2
Sensor Surface [mm]	3.0	1.4
Graded Grid	Yes	Yes
Grading Ratio	1.5	1.2
MAIA	N/A	N/A
Surface Detection	VMS + 6p	VMS + 6p
Scan Method	Measured	Measured

Measurement Results

	Area Scan	Zoom Scan
Date	2022-03-12, 02:57	2022-03-12, 03:16
psSAR1g [W/Kg]	0.970	0.964
psSAR10g [W/Kg]	0.335	0.330
psPDab (1.0cm2, sq) [W/m2]		9.64
psPDab (4.0cm2, sq) [W/m2]		7.50
Power Drift [dB]	-0.06	0.05
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	No correction	No correction
M2/M1 [%]		49.1
Dist 3dB Peak [mm]		8.4



Report No. :ES/2022/20003
Measurement Report for Device, BOTTOM SURFACE, U-NII-5, IEEE 802.11ax (160MHz), Channel 47 (6185.0 MHz)_Aux
Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Device,	320.0 x 218.0 x 16.0		Laptop

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat, HSL	BOTTOM SURFACE, 0.00	U-NII-5	WLAN, 10755-AAC	6185.0, 47	6.2	5.666	34.641

Hardware Setup

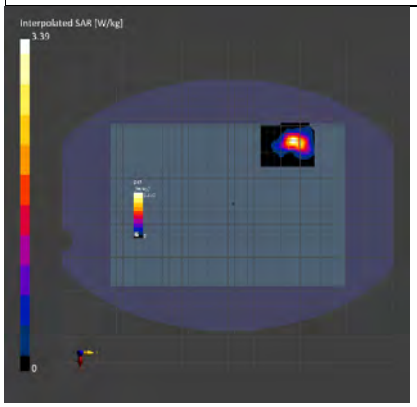
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V5.0 (20deg probe tilt) - 1141	HBBL-600-10000 ,2022-Mar-12	EX3DV4 - SN7686, 2021-10-05	DAE4 Sn877, 2021-03-22

Scans Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	68.0 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
Graded Grid	Yes	Yes
Grading Ratio	1.5	1.4
MAIA	N/A	N/A
Surface Detection	VMS + 6p	VMS + 6p
Scan Method	Measured	Measured

Measurement Results

	Area Scan	Zoom Scan
Date	2022-03-12, 03:29	2022-03-12, 04:53
psSAR1g [W/Kg]	0.679	0.744
psSAR10g [W/Kg]	0.248	0.250
psPDab (1.0cm2, sq) [W/m2]		7.44
psPDab (4.0cm2, sq) [W/m2]		5.67
Power Drift [dB]	0.07	0.08
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	No correction	No correction
M2/M1 [%]		52.1
Dist 3dB Peak [mm]		6.3



Report No. :ES/2022/20003
Measurement Report for Device, BOTTOM SURFACE, U-NII-6, IEEE 802.11ax (160MHz), Channel 111 (6505.0 MHz)_Aux
Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Device,	320.0 x 218.0 x 16.0		Laptop

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat, HSL	BOTTOM SURFACE, 0.00	U-NII-6	WLAN, 10755-AAC	6505.0, 111	6.2	6.042	34.27

Hardware Setup

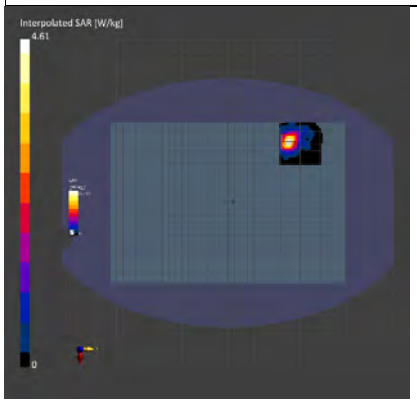
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V5.0 (20deg probe tilt) - 1141	HBBL-600-10000 ,2022-Mar-12	EX3DV4 - SN7686, 2021-10-05	DAE4 Sn877, 2021-03-22

Scans Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	68.0 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
Graded Grid	Yes	Yes
Grading Ratio	1.5	1.4
MAIA	N/A	N/A
Surface Detection	VMS + 6p	VMS + 6p
Scan Method	Measured	Measured

Measurement Results

	Area Scan	Zoom Scan
Date	2022-03-12, 05:11	2022-03-12, 05:36
psSAR1g [W/Kg]	0.836	0.943
psSAR10g [W/Kg]	0.277	0.302
psPDab (1.0cm2, sq) [W/m2]		9.43
psPDab (4.0cm2, sq) [W/m2]		6.91
Power Drift [dB]	-0.01	-0.07
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	No correction	No correction
M2/M1 [%]		50.1
Dist 3dB Peak [mm]		7.0



Report No. :ES/2022/20003
Measurement Report for Device, BOTTOM SURFACE, U-NII-7, IEEE 802.11ax (160MHz), Channel 175 (6825.0 MHz)_Aux
Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Device,	320.0 x 218.0 x 16.0		Laptop

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat, HSL	BOTTOM SURFACE, 8.00	U-NII-7	WLAN, 10755-AAC	6825.0, 175	6.2	6.411	33.871

Hardware Setup

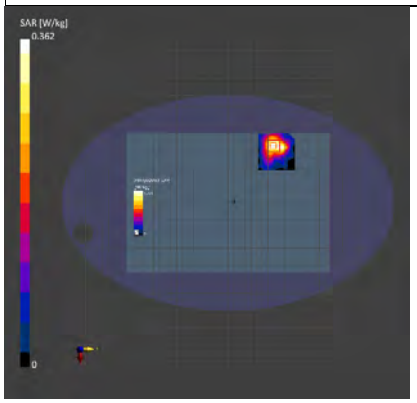
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V5.0 (20deg probe tilt) - 1141	HBBL-600-10000 ,2022-Mar-12	EX3DV4 - SN7686, 2021-10-05	DAE4 Sn877, 2021-03-22

Scans Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	68.0 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
Graded Grid	Yes	Yes
Grading Ratio	1.5	1.4
MAIA	N/A	N/A
Surface Detection	VMS + 6p	VMS + 6p
Scan Method	Measured	Measured

Measurement Results

	Area Scan	Zoom Scan
Date	2022-03-12, 07:55	2022-03-12, 08:17
psSAR1g [W/Kg]	0.437	0.436
psSAR10g [W/Kg]	0.182	0.175
psPDab (1.0cm2, sq) [W/m2]		4.36
psPDab (4.0cm2, sq) [W/m2]		3.89
Power Drift [dB]	-0.15	-0.11
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	No correction	No correction
M2/M1 [%]		51.2
Dist 3dB Peak [mm]		13.1



Report No. :ES/2022/20003
Measurement Report for Device, BOTTOM SURFACE, U-NII-7, IEEE 802.11ax (160MHz), Channel 143 (6665.0 MHz)_Aux
Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Device,	320.0 x 218.0 x 16.0		Laptop

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat, HSL	BOTTOM SURFACE, 0.00	U-NII-7	WLAN, 10755-AAC	6665.0, 143	6.2	6.221	34.055

Hardware Setup

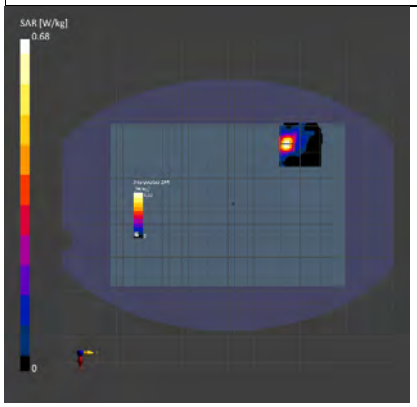
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V5.0 (20deg probe tilt) - 1141	HBBL-600-10000 ,2022-Mar-12	EX3DV4 - SN7686, 2021-10-05	DAE4 Sn877, 2021-03-22

Scans Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	68.0 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
Graded Grid	Yes	Yes
Grading Ratio	1.5	1.4
MAIA	N/A	N/A
Surface Detection	VMS + 6p	VMS + 6p
Scan Method	Measured	Measured

Measurement Results

	Area Scan	Zoom Scan
Date	2022-03-12, 05:51	2022-03-12, 06:22
psSAR1g [W/Kg]	0.870	0.963
psSAR10g [W/Kg]	0.292	0.308
psPDab (1.0cm2, sq) [W/m2]		9.63
psPDab (4.0cm2, sq) [W/m2]		7.02
Power Drift [dB]	0.01	-0.02
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	No correction	No correction
M2/M1 [%]		48.6
Dist 3dB Peak [mm]		7.7



Report No. :ES/2022/20003
Measurement Report for Device, BOTTOM SURFACE, U-NII-8, IEEE 802.11ax (160MHz), Channel 207 (6985.0 MHz)_Aux
Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Device,	320.0 x 218.0 x 16.0		Laptop

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat, HSL	BOTTOM SURFACE, 0.00	U-NII-8	WLAN, 10755-AAC	6985.0, 207	6.14	6.591	33.681

Hardware Setup

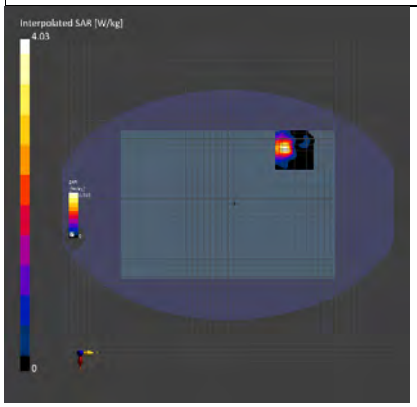
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V5.0 (20deg probe tilt) - 1141	HBBL-600-10000 ,2022-Mar-12	EX3DV4 - SN7686, 2021-10-05	DAE4 Sn877, 2021-03-22

Scans Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	68.0 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
Graded Grid	Yes	Yes
Grading Ratio	1.5	1.4
MAIA	N/A	N/A
Surface Detection	VMS + 6p	VMS + 6p
Scan Method	Measured	Measured

Measurement Results

	Area Scan	Zoom Scan
Date	2022-03-12, 06:43	2022-03-12, 06:59
psSAR1g [W/Kg]	0.790	0.814
psSAR10g [W/Kg]	0.296	0.287
psPDab (1.0cm2, sq) [W/m2]		8.14
psPDab (4.0cm2, sq) [W/m2]		6.57
Power Drift [dB]	0.06	0.05
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	No correction	No correction
M2/M1 [%]		47.9
Dist 3dB Peak [mm]		8.3



Report No. : ES/2022/20003
Measurement Report for Device, BOTTOM SURFACE, U-NII-5, IEEE 802.11ax (160MHz), Channel 15 (6025.0 MHz)_Main
Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Device	320.0 x 218.0 x 16.0		Laptop

Exposure Conditions

Phantom Section	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor
5G Air	BOTTOM SURFACE, 2.00	U-NII-5	WLAN, 10755-AAC	6025.0, 15	1.0

Hardware Setup

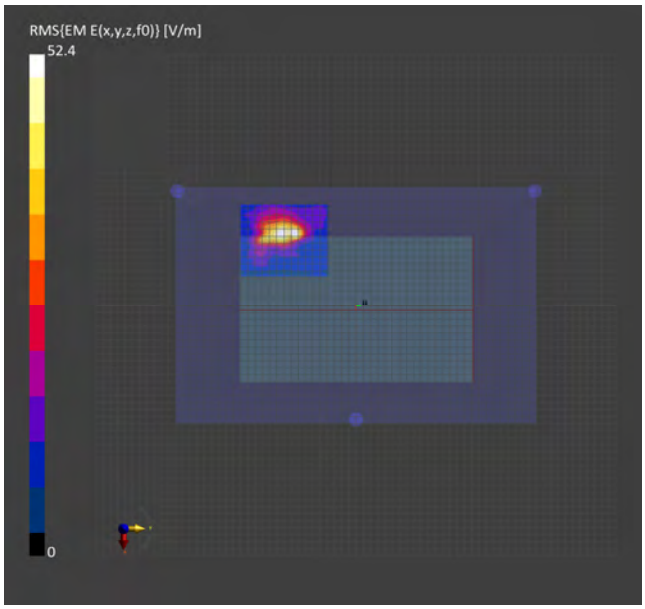
Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave - 1076	Air -	EUmmWV3 - SN9399_F1-78GHz, 2022-01-26	DAE4 Sn877, 2021-03-22

Scans Setup

Scan Type	5G Scan
Grid Extents [mm]	100.0 x 120.0
Grid Steps [lambda]	0.0625 x 0.0625
Sensor Surface [mm]	2.0
MAIA	N/A

Measurement Results

Scan Type	5G Scan
Date	2022-03-15, 15:49
Avg. Area [cm2]	4.00
psPDn+ [W/m2]	3.90
psPDtot+ [W/m2]	4.29
psPDmod+ [W/m2]	4.43
Emax [V/m]	52.4
Power Drift [dB]	-0.13



Report No. : ES/2022/20003
Measurement Report for Device, BOTTOM SURFACE, U-NII-5, IEEE 802.11ax (160MHz), Channel 47 (6185.0 MHz)_Main
Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Device	320.0 x 218.0 x 16.0		Laptop

Exposure Conditions

Phantom Section	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor
5G Air	BOTTOM SURFACE, 2.00	U-NII-5	WLAN, 10755-AAC	6185.0, 47	1.0

Hardware Setup

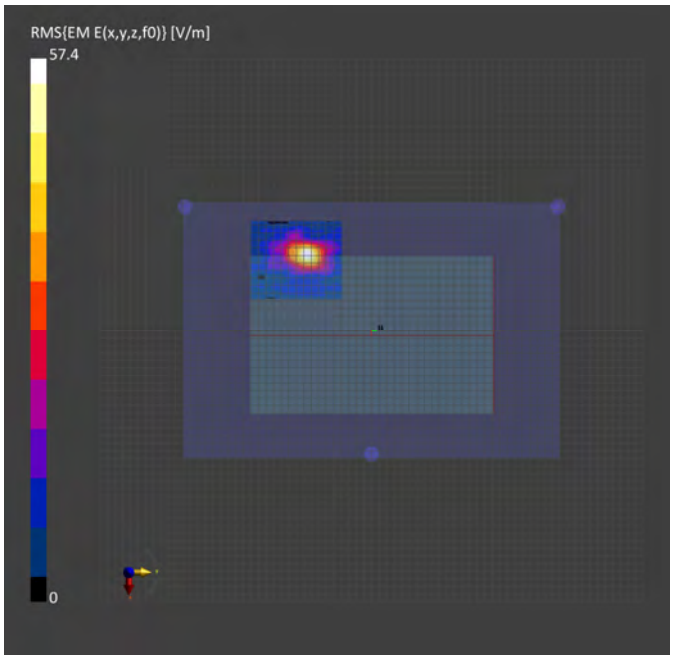
Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave - 1076	Air -	EUmmWV3 - SN9399_F1-78GHz, 2022-01-26	DAE4 Sn877, 2021-03-22

Scans Setup

Scan Type	5G Scan
Grid Extents [mm]	100.0 x 120.0
Grid Steps [lambda]	0.0625 x 0.0625
Sensor Surface [mm]	2.0
MAIA	N/A

Measurement Results

Scan Type	5G Scan
Date	2022-03-15, 14:03
Avg. Area [cm2]	4.00
psPDn+ [W/m2]	2.20
psPDtot+ [W/m2]	2.36
psPDmod+ [W/m2]	3.47
Emax [V/m]	57.4
Power Drift [dB]	-0.12



Report No. : ES/2022/20003
Measurement Report for Device, BOTTOM SURFACE, U-NII-6, IEEE 802.11ax (160MHz), Channel 111 (6505.0 MHz)_Main
Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Device	320.0 x 218.0 x 16.0		Laptop

Exposure Conditions

Phantom Section	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor
5G Air	BOTTOM SURFACE, 2.00	U-NII-6	WLAN, 10755-AAC	6505.0, 111	1.0

Hardware Setup

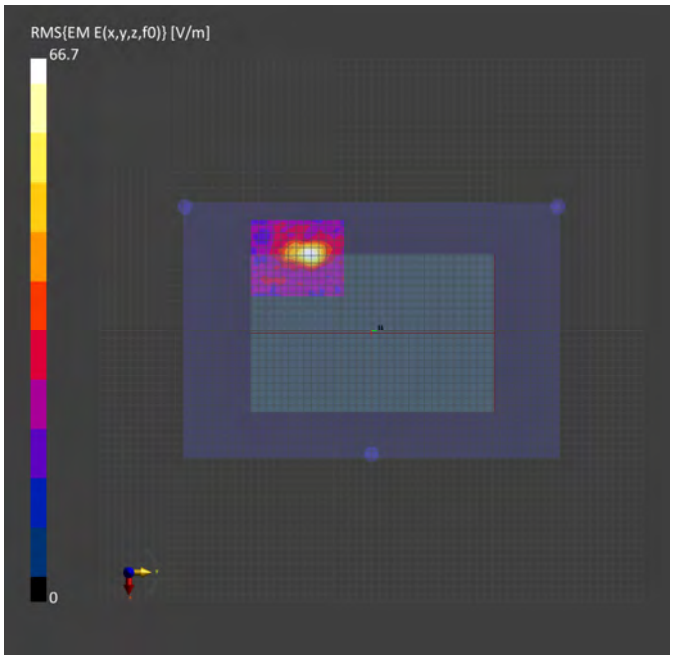
Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave - 1076	Air -	EUmmWV3 - SN9399_F1-78GHz, 2022-01-26	DAE4 Sn877, 2021-03-22

Scans Setup

Scan Type	5G Scan
Grid Extents [mm]	100.0 x 120.0
Grid Steps [lambda]	0.0625 x 0.0625
Sensor Surface [mm]	2.0
MAIA	N/A

Measurement Results

Scan Type	5G Scan
Date	2022-03-15, 12:58
Avg. Area [cm2]	4.00
psPDn+ [W/m2]	4.48
psPDtot+ [W/m2]	4.81
psPDmod+ [W/m2]	5.78
Emax [V/m]	66.7
Power Drift [dB]	0.18



Report No. : ES/2022/20003
Measurement Report for Device, BOTTOM SURFACE, U-NII-7, IEEE 802.11ax (160MHz), Channel 143 (6665.0 MHz)_Main
Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Device	320.0 x 218.0 x 16.0		Laptop

Exposure Conditions

Phantom Section	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor
5G Air	BOTTOM SURFACE, 2.00	U-NII-7	WLAN, 10755-AAC	6665.0, 143	1.0

Hardware Setup

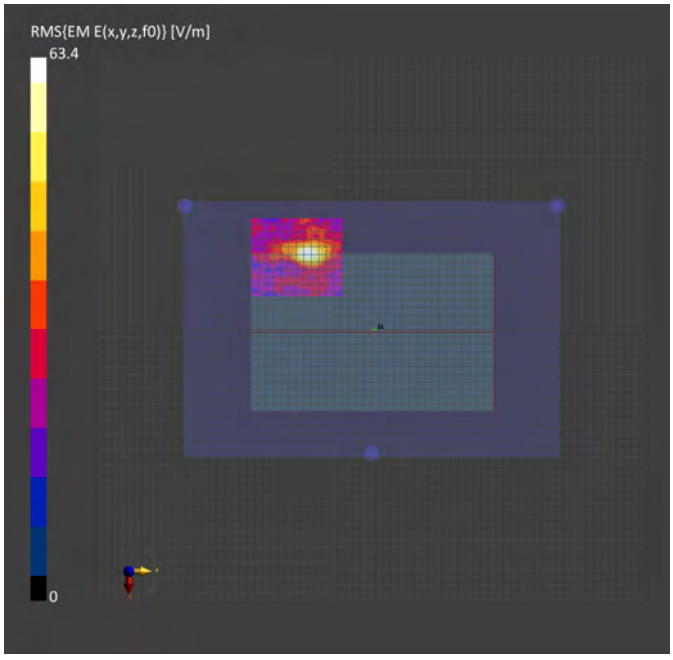
Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave - 1076	Air -	EUmmWV3 - SN9399_F1-78GHz, 2022-01-26	DAE4 Sn877, 2021-03-22

Scans Setup

Scan Type	5G Scan
Grid Extents [mm]	100.0 x 120.0
Grid Steps [lambda]	0.0625 x 0.0625
Sensor Surface [mm]	2.0
MAIA	N/A

Measurement Results

Scan Type	5G Scan
Date	2022-03-15, 11:15
Avg. Area [cm2]	4.00
psPDn+ [W/m2]	5.08
psPDtot+ [W/m2]	5.37
psPDmod+ [W/m2]	5.89
Emax [V/m]	63.4
Power Drift [dB]	-0.03



Report No. : ES/2022/20003
Measurement Report for Device, BOTTOM SURFACE, U-NII-8, IEEE 802.11ax (160MHz), Channel 207 (6985.0 MHz)_Main
Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Device	320.0 x 218.0 x 16.0		Laptop

Exposure Conditions

Phantom Section	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor
5G Air	BOTTOM SURFACE, 2.00	U-NII-8	WLAN, 10755-AAC	6985.0, 207	1.0

Hardware Setup

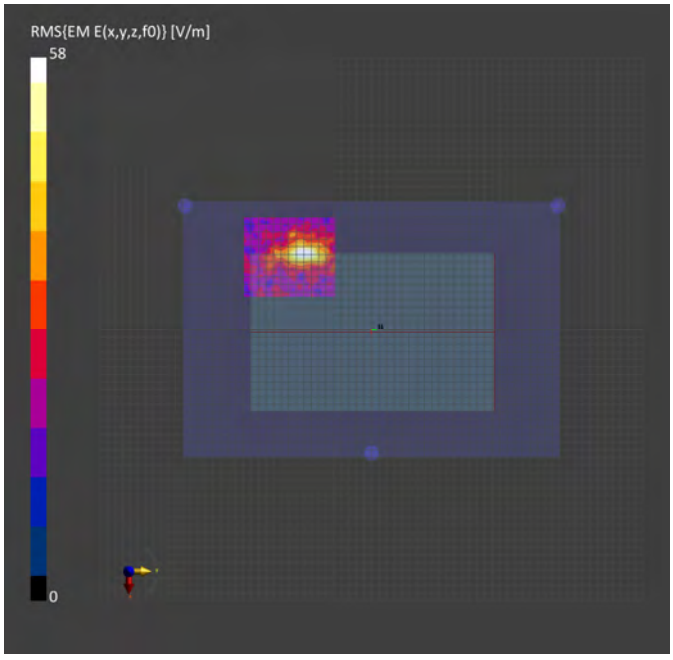
Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave - 1076	Air -	EUmmWV3 - SN9399_F1-78GHz, 2022-01-26	DAE4 Sn877, 2021-03-22

Scans Setup

Scan Type	5G Scan
Grid Extents [mm]	100.0 x 120.0
Grid Steps [lambda]	0.0625 x 0.0625
Sensor Surface [mm]	2.0
MAIA	N/A

Measurement Results

Scan Type	5G Scan
Date	2022-03-15, 09:16
Avg. Area [cm2]	4.00
psPDn+ [W/m2]	4.79
psPDtot+ [W/m2]	5.11
psPDmod+ [W/m2]	5.65
Emax [V/m]	58.0
Power Drift [dB]	0.12



Report No. : ES/2022/20003
Measurement Report for Device, BOTTOM SURFACE, U-NII-5, IEEE 802.11ax (160MHz), Channel 15 (6025.0 MHz)_Aux
Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Device	320.0 x 218.0 x 16.0		Laptop

Exposure Conditions

Phantom Section	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor
5G Air	BOTTOM SURFACE, 2.00	U-NII-5	WLAN, 10755-AAC	6025.0, 15	1.0

Hardware Setup

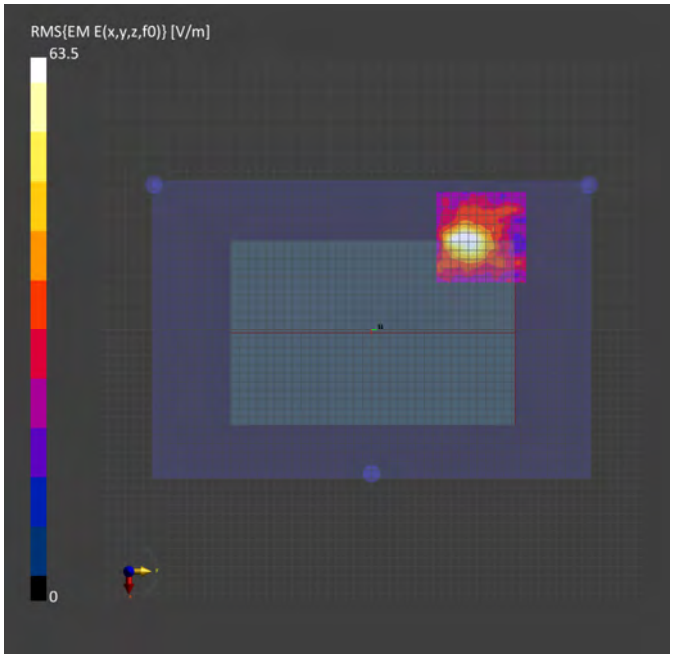
Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave - 1076	Air -	EUmmWV3 - SN9399_F1-78GHz, 2022-01-26	DAE4 Sn877, 2021-03-22

Scans Setup

Scan Type	5G Scan
Grid Extents [mm]	100.0 x 100.0
Grid Steps [lambda]	0.0625 x 0.0625
Sensor Surface [mm]	2.0
MAIA	N/A

Measurement Results

Scan Type	5G Scan
Date	2022-03-15, 07:44
Avg. Area [cm2]	4.00
psPDn+ [W/m2]	4.83
psPDtot+ [W/m2]	5.15
psPDmod+ [W/m2]	6.58
Emax [V/m]	63.5
Power Drift [dB]	0.13



Report No. : ES/2022/20003
Measurement Report for Device, BOTTOM SURFACE, U-NII-5, IEEE 802.11ax (160MHz), Channel 47 (6185.0 MHz)_Aux
Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Device	320.0 x 218.0 x 16.0		Laptop

Exposure Conditions

Phantom Section	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor
5G Air	BOTTOM SURFACE, 2.00	U-NII-5	WLAN, 10755-AAC	6185.0, 47	1.0

Hardware Setup

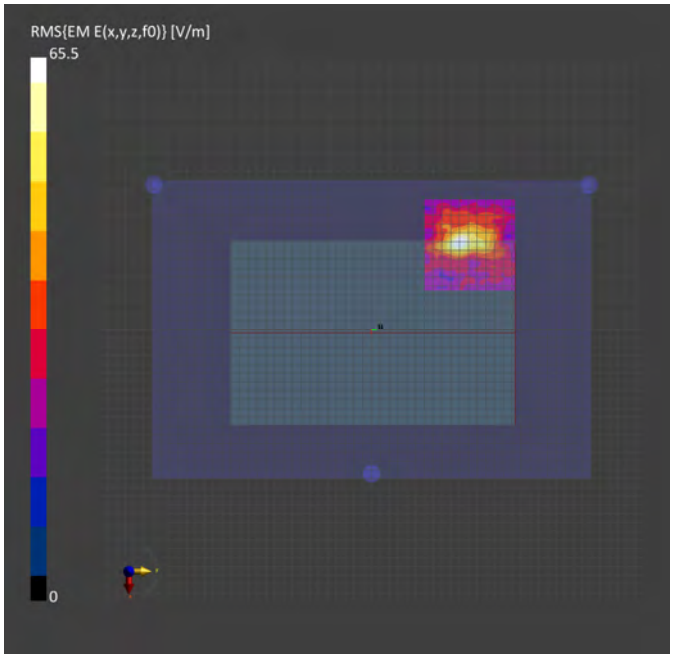
Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave - 1076	Air -	EUmmWV3 - SN9399_F1-78GHz, 2022-01-26	DAE4 Sn877, 2021-03-22

Scans Setup

Scan Type	5G Scan
Grid Extents [mm]	100.0 x 100.0
Grid Steps [lambda]	0.0625 x 0.0625
Sensor Surface [mm]	2.0
MAIA	N/A

Measurement Results

Scan Type	5G Scan
Date	2022-03-15, 06:15
Avg. Area [cm2]	4.00
psPDn+ [W/m2]	5.99
psPDtot+ [W/m2]	6.18
psPDmod+ [W/m2]	6.66
Emax [V/m]	65.5
Power Drift [dB]	0.04



Report No. : ES/2022/20003
Measurement Report for Device, BOTTOM SURFACE, U-NII-6, IEEE 802.11ax (160MH), Channel 111 (6505.0 MHz)_Aux
Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Device	320.0 x 218.0 x 16.0		Laptop

Exposure Conditions

Phantom Section	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor
5G Air	BOTTOM SURFACE, 2.00	U-NII-6	WLAN, 10755-AAC	6505.0, 111	1.0

Hardware Setup

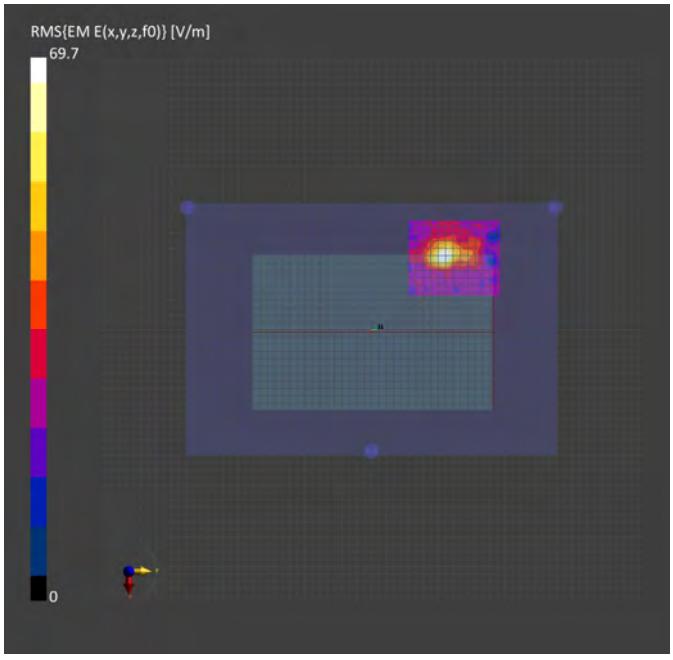
Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave - 1076	Air -	EUmmWV3 - SN9399_F1-78GHz, 2022-01-26	DAE4 Sn877, 2021-03-22

Scans Setup

Scan Type	5G Scan
Grid Extents [mm]	100.0 x 120.0
Grid Steps [lambda]	0.0625 x 0.0625
Sensor Surface [mm]	2.0
MAIA	N/A

Measurement Results

Scan Type	5G Scan
Date	2022-03-15, 04:57
Avg. Area [cm2]	4.00
psPDn+ [W/m2]	5.65
psPDtot+ [W/m2]	6.29
psPDmod+ [W/m2]	7.28
Emax [V/m]	69.7
Power Drift [dB]	0.09



Report No. : ES/2022/20003
Measurement Report for Device, BOTTOM SURFACE, U-NII-7, IEEE 802.11ax (160MHz), Channel 143 (6665.0 MHz)_Aux
Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Device	320.0 x 218.0 x 16.0		Laptop

Exposure Conditions

Phantom Section	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor
5G Air	BOTTOM SURFACE, 2.00	U-NII-7	WLAN, 10755-AAC	6665.0, 143	1.0

Hardware Setup

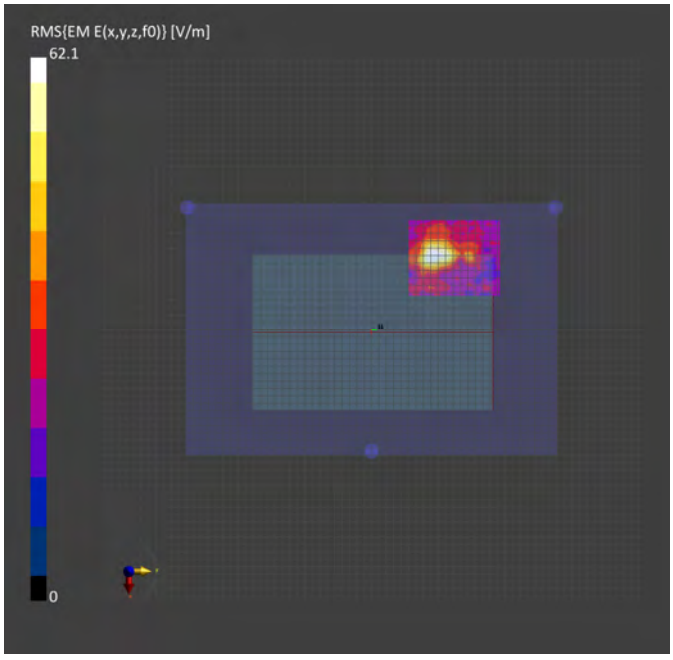
Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave - 1076	Air -	EUmmWV3 - SN9399_F1-78GHz, 2022-01-26	DAE4 Sn877, 2021-03-22

Scans Setup

Scan Type	5G Scan
Grid Extents [mm]	100.0 x 120.0
Grid Steps [lambda]	0.0625 x 0.0625
Sensor Surface [mm]	2.0
MAIA	N/A

Measurement Results

Scan Type	5G Scan
Date	2022-03-15, 03:56
Avg. Area [cm2]	4.00
psPDn+ [W/m2]	5.40
psPDtot+ [W/m2]	5.49
psPDmod+ [W/m2]	5.96
Emax [V/m]	62.1
Power Drift [dB]	0.01



Report No. : ES/2022/20003
Measurement Report for Device, BOTTOM SURFACE, U-NII-8, IEEE 802.11ax (160MHz), Channel 207 (6985.0 MHz)_Aux
Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Device	320.0 x 218.0 x 16.0		Laptop

Exposure Conditions

Phantom Section	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor
5G Air	BOTTOM SURFACE, 2.00	U-NII-8	WLAN, 10755-AAC	6985.0, 207	1.0

Hardware Setup

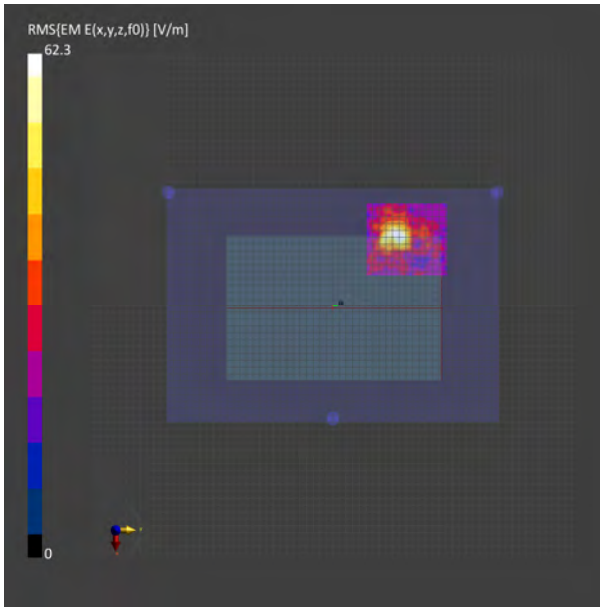
Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave - 1076	Air -	EUmmWV3 - SN9399_F1-78GHz, 2022-01-26	DAE4 Sn877, 2021-03-22

Scans Setup

Scan Type	5G Scan
Grid Extents [mm]	100.0 x 120.0
Grid Steps [lambda]	0.0625 x 0.0625
Sensor Surface [mm]	2.0
MAIA	N/A

Measurement Results

Scan Type	5G Scan
Date	2022-03-15, 02:13
Avg. Area [cm2]	4.00
psPDn+ [W/m2]	5.78
psPDtot+ [W/m2]	6.23
psPDmod+ [W/m2]	6.57
Emax [V/m]	62.3
Power Drift [dB]	-0.09



6. SAR System Performance Verification

Date: 2022/3/7

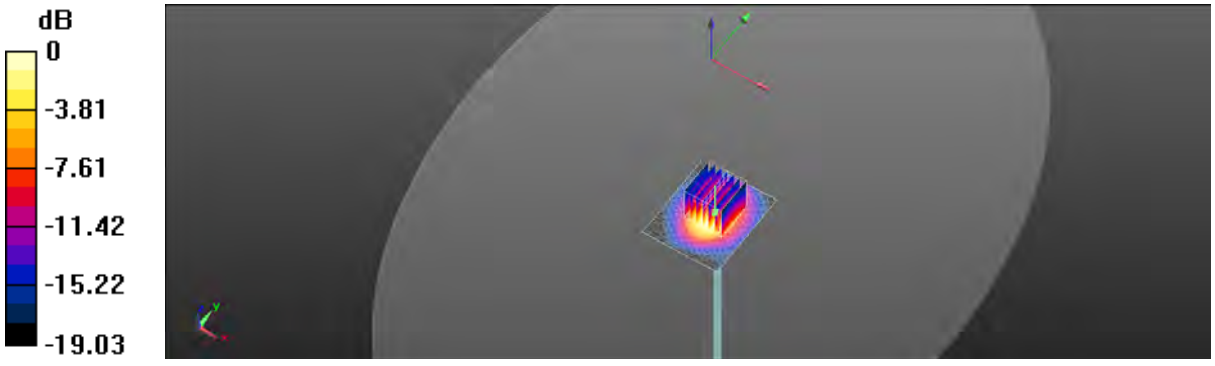
Report No. :ES/2022/20003
Dipole 2450 MHz_SN:727
Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.781 S/m; ε_r = 38.71; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 22.5°C; Liquid temperature: 22.6°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7686; ConvF(8.32, 8.32, 8.32); Calibrated: 2021/10/05
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn877; Calibrated: 2021/03/22
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (51x61x1): Interpolated grid: dx=12 mm, dy=12 mm
Maximum value of SAR (interpolated) = 26.1 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 103.7 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 33.3 W/kg
SAR(1 g) = 13.5 W/kg; SAR(10 g) = 6.35 W/kg
Smallest distance from peaks to all points 3 dB below = 9.7 mm
Ratio of SAR at M2 to SAR at M1 = 52.6%
Maximum value of SAR (measured) = 23.8 W/kg



0 dB = 23.8 W/kg = 14.25 dBW/kg

Date: 2022/3/8

Report No. :ES/2022/20003
Dipole 5250 MHz_SN:1023

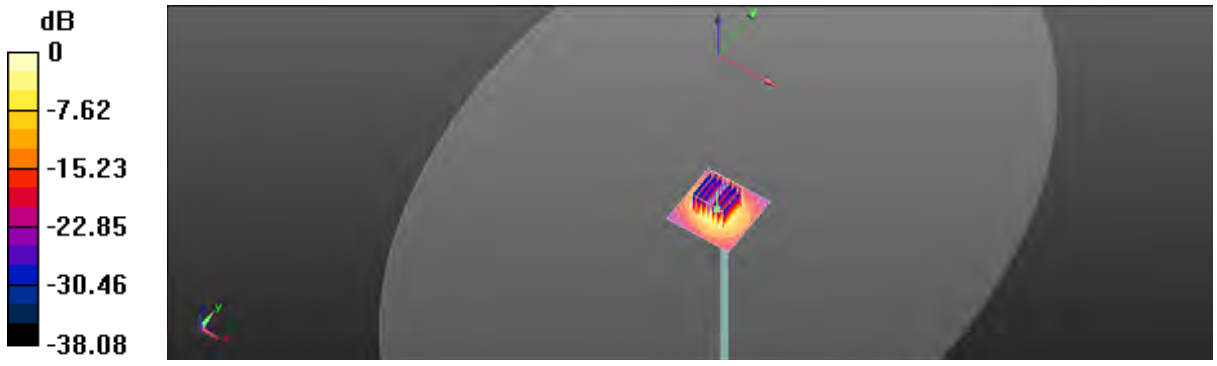
Communication System: CW; Frequency: 5250 MHz; Duty Cycle: 1:1
Medium parameters used: f = 5250 MHz; σ = 4.667 S/m; ε_r = 35.573; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 22.4°C; Liquid temperature: 22.9°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7686; ConvF(5.81, 5.81, 5.81); Calibrated: 2021/10/05
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn877; Calibrated: 2021/03/22
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (51x51x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 17.4 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 64.23 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 31.0 W/kg
SAR(1 g) = 8.17 W/kg; SAR(10 g) = 2.29 W/kg
Smallest distance from peaks to all points 3 dB below = 7.2 mm
Ratio of SAR at M2 to SAR at M1 = 55.5%
Maximum value of SAR (measured) = 17.1 W/kg



0 dB = 17.1 W/kg = 12.44 dBW/kg

Date: 2022/3/9

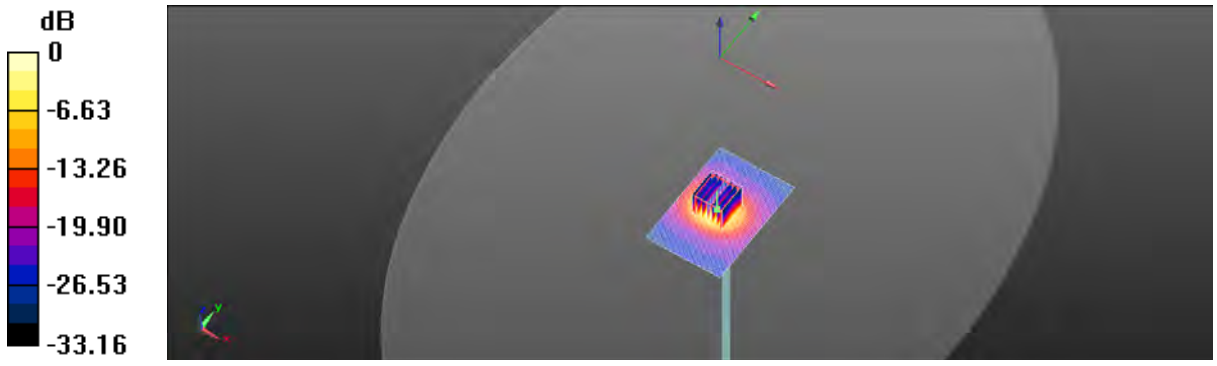
Report No. :ES/2022/20003
Dipole 5250 MHz_SN:1023
Communication System: CW; Frequency: 5250 MHz; Duty Cycle: 1:1
Medium parameters used: f = 5250 MHz; σ = 4.67 S/m; ε_r = 35.569; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 22.5°C; Liquid temperature: 22.7°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7686; ConvF(5.81, 5.81, 5.81); Calibrated: 2021/10/05
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn877; Calibrated: 2021/03/22
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (61x91x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 17.2 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 59.22 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 31.1 W/kg
SAR(1 g) = 8.15 W/kg; SAR(10 g) = 2.28 W/kg
Smallest distance from peaks to all points 3 dB below = 7.2 mm
Ratio of SAR at M2 to SAR at M1 = 54.3%
Maximum value of SAR (measured) = 17.2 W/kg



0 dB = 17.2 W/kg = 12.36 dBW/kg

Date: 2022/3/10

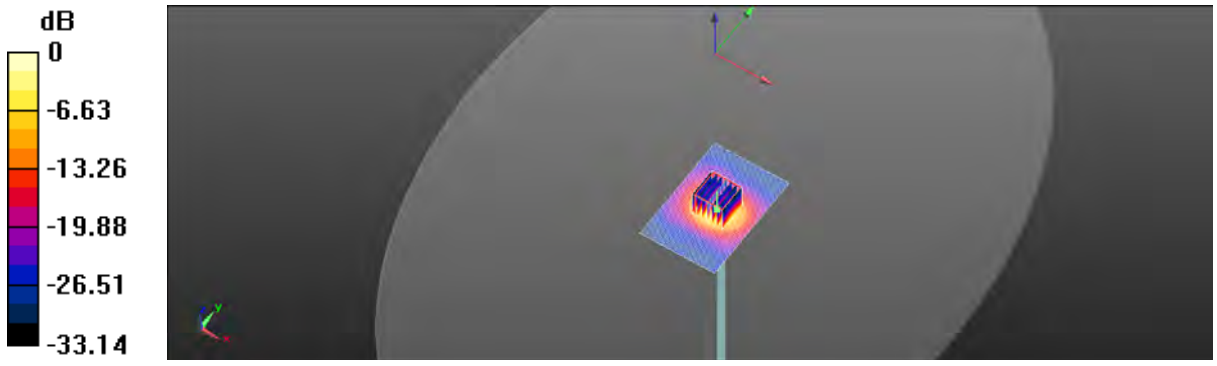
Report No. :ES/2022/20003
Dipole 5600 MHz_SN:1023
Communication System: CW; Frequency: 5600 MHz; Duty Cycle: 1:1
Medium parameters used: f = 5600 MHz; σ = 5.027 S/m; ε_r = 35.167; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 22.5°C; Liquid temperature: 22.9°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7686; ConvF(5.16, 5.16, 5.16); Calibrated: 2021/10/05
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn877; Calibrated: 2021/03/22
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (61x91x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 18.7 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 59.90 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 24.6 W/kg
SAR(1 g) = 8.19 W/kg; SAR(10 g) = 2.34 W/kg
Smallest distance from peaks to all points 3 dB below = 7.2 mm
Ratio of SAR at M2 to SAR at M1 = 51.8%
Maximum value of SAR (measured) = 18.3 W/kg



0 dB = 18.3 W/kg = 12.62 dBW/kg

Date: 2022/3/11

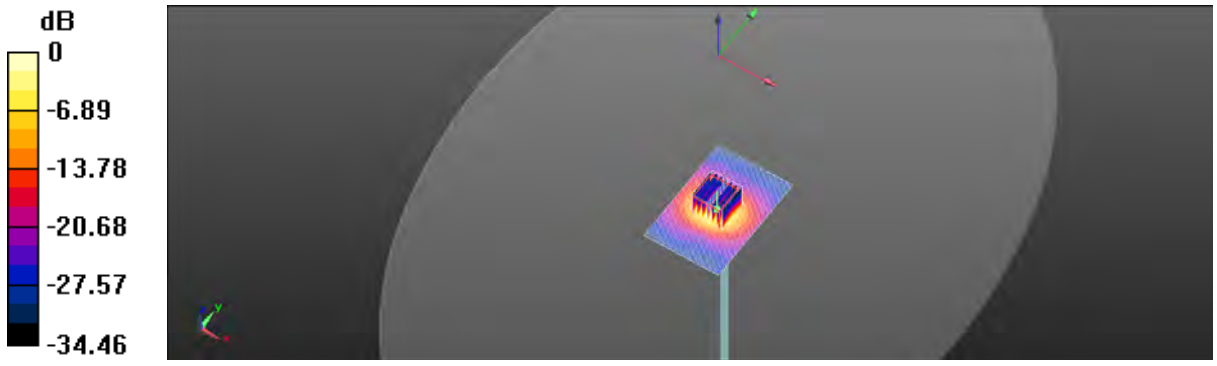
Report No. :ES/2022/20003
Dipole 5750 MHz_SN:1023
Communication System: CW; Frequency: 5750 MHz; Duty Cycle: 1:1
Medium parameters used: f = 5750 MHz; σ = 5.177 S/m; ε_r = 35.021; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 22.4°C; Liquid temperature: 22.8°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7686; ConvF(5.3, 5.3, 5.3); Calibrated: 2021/10/05
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn877; Calibrated: 2021/03/22
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (61x91x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 18.9 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 62.24 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 28.3 W/kg
SAR(1 g) = 8.21 W/kg; SAR(10 g) = 2.29 W/kg
Smallest distance from peaks to all points 3 dB below = 7.6 mm
Ratio of SAR at M2 to SAR at M1 = 53.4%
Maximum value of SAR (measured) = 17.5 W/kg



0 dB = 17.5 W/kg = 12.42 dBW/kg

Report No. :ES/2022/20003
Measurement Report for Device, FRONT, Validation band, CW, Channel 6500 (6500.0 MHz)
Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Device,	16.0 x 6.0 x 300.0	SN:1006	Dipole

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat, HSL	FRONT, 5.00	Validation band	CW, 0--	6500.0, 6500	6.2	6.037	34.279

Hardware Setup

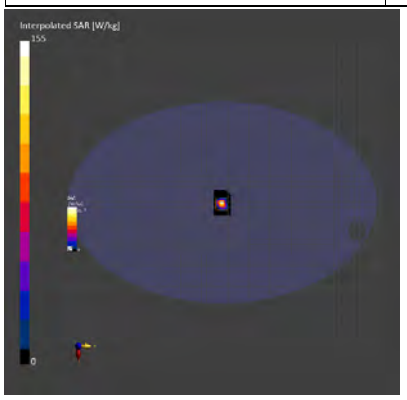
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V5.0 (20deg probe tilt) - 1141	HBBL-600-10000 ,2022-Mar-12	EX3DV4 - SN7686, 2021-10-05	DAE4 Sn877, 2021-03-22

Scans Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	51.0 x 36.0	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
Graded Grid	Yes	Yes
Grading Ratio	1.5	1.4
MAIA	N/A	N/A
Surface Detection	VMS + 6p	VMS + 6p
Scan Method	Measured	Measured

Measurement Results

	Area Scan	Zoom Scan
Date	2022-03-12, 00:05	2022-03-12, 00:23
psSAR1g [W/Kg]	28.5	31.3
psSAR10g [W/Kg]	5.13	5.48
Power Drift [dB]	0.07	0.04
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	No correction	No correction
M2/M1 [%]		56.2
Dist 3dB Peak [mm]		6.1



Report No. :ES/2022/20003
Measurement Report for Device, FRONT, Validation band, CW, Channel 7000 (7000.0 MHz)
Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Device,	14.0 x 6.0 x 297.0	SN:1007	Dipole

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat, HSL	FRONT, 5.00	Validation band	CW, 0--	7000.0, 7000	6.14	6.608	33.663

Hardware Setup

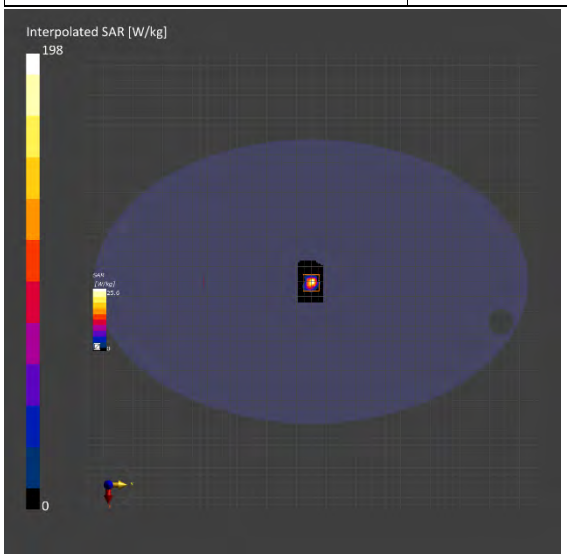
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V5.0 (20deg probe tilt) - 1141	HBBL-600-10000 ,2022-Mar-12	EX3DV4 - SN7686, 2021-10-05	DAE4 Sn877, 2021-03-22

Scans Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	60.0 x 45.0	22.0 x 22.0 x 22.0
Grid Steps [mm]	7.5 x 7.5	3.4 x 3.4 x 1.4
Sensor Surface [mm]	3.0	1.4
Graded Grid	Yes	Yes
Grading Ratio	1.5	1.4
MAIA	N/A	N/A
Surface Detection	VMS + 6p	VMS + 6p
Scan Method	Measured	Measured

Measurement Results

	Area Scan	Zoom Scan
Date	2022-03-12, 00:47	2022-03-12, 01:03
psSAR1g [W/Kg]	26.5	28.4
psSAR10g [W/Kg]	4.45	4.81
Power Drift [dB]	0.03	0.01
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	No correction	No correction
M2/M1 [%]		49.6
Dist 3dB Peak [mm]		4.6



Report No. : ES/2022/20003
Measurement Report for 10G Source, Front, Validation band, CW, Channel 10000 (10000.0 MHz)
Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
5G Verification Source 10 GHz,	100.0 x 100.0 x 172.0	SN: 1021	-

Exposure Conditions

Phantom Section	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor
5G Air	Front, 10.00	Validation band	CW, 0--	10000.0, 10000	1.0

Hardware Setup

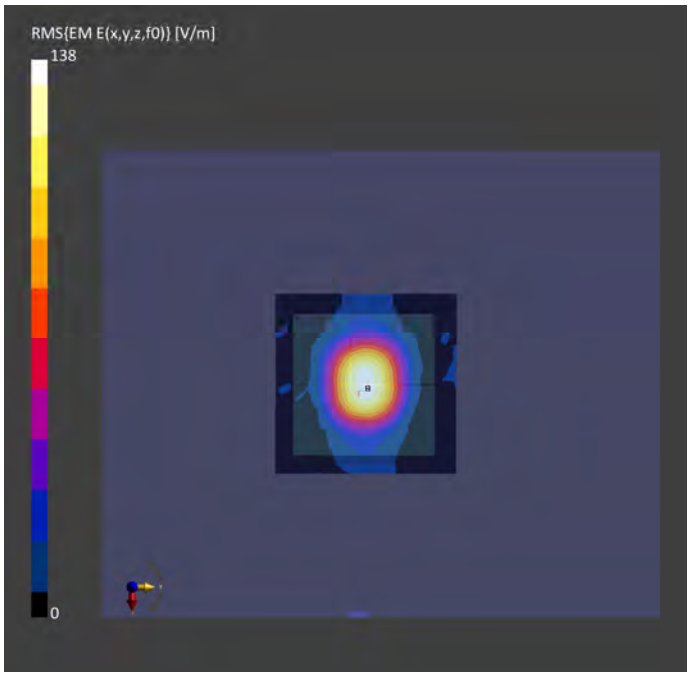
Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave - 1076	Air -	EUmmWV3 - SN9399_F1-78GHz, 2022-01-26	DAE4 Sn877, 2021-03-22

Scans Setup

Scan Type	5G Scan
Grid Extents [mm]	120.0 x 120.0
Grid Steps [lambda]	0.25 x 0.25
Sensor Surface [mm]	10.0
MAIA	N/A

Measurement Results

Scan Type	5G Scan
Date	2022-03-14, 01:20
Avg. Area [cm²]	4.00
psPDn+ [W/m²]	45.4
psPDtot+ [W/m²]	45.5
psPDmod+ [W/m²]	45.7
E_{max} [V/m]	134
Power Drift [dB]	-0.01



7.Uncertainty Budget

Measurement Uncertainty evaluation template for DUT SAR test (3-6G)

A	c	D	e		f	g	h=c * f / e	i=c * g / e	k
Source of Uncertainty	Tolerance/ Uncertainty	Probability Distributio	Div	Div Value	ci (1g)	ci (10g)	Standard uncertainty	Standard uncertainty	vi, or Veff
Measurement system									
Probe calibration	6.55%	N	1	1	1	1	6.55%	6.55%	∞
Isotropy , Axial	3.50%	R	√3	1.732	1	1	2.02%	2.02%	∞
Isotropy, Hemispherical	9.60%	R	√3	1.732	1	1	5.54%	5.54%	∞
Modulation Response	2.40%	R	√3	1.732	1	1	1.40%	1.40%	∞
Boundary Effect	1.00%	R	√3	1.732	1	1	0.58%	0.58%	∞
Linearity	4.70%	R	√3	1.732	1	1	2.71%	2.71%	∞
Detection Limits	1.00%	R	√3	1.732	1	1	0.58%	0.58%	∞
Readout Electronics	0.30%	N	1	1	1	1	0.30%	0.30%	∞
Response time	0.80%	R	√3	1.732	1	1	0.46%	0.46%	∞
Integration Time	2.60%	R	√3	1.732	1	1	1.50%	1.50%	∞
Measurement drift (class A evaluation)	1.75%	R	√3	1.732	1	1	1.01%	1.01%	∞
RF ambient condition - noise	3.00%	R	√3	1.732	1	1	1.73%	1.73%	∞
RF ambient conditions - reflections	3.00%	R	√3	1.732	1	1	1.73%	1.73%	∞
Probe positioner Mechanical restrictions	0.40%	R	√3	1.732	1	1	0.23%	0.23%	∞
Probe Positioning with respect to phantom shell	2.90%	R	√3	1.732	1	1	1.67%	1.67%	∞
Post-processing	1.00%	R	√3	1.732	1	1	0.58%	0.58%	∞
Max SAR Eval	1.00%	R	√3	1.732	1	1	0.58%	0.58%	∞
Test Sample related									
Test sample positioning	2.90%	N	1	1	1	1	2.90%	2.90%	M-1
Device Holder Uncertainty	3.60%	N	1	1	1	1	3.60%	3.60%	M-1
Drift of output power	5.00%	R	√3	1.732	1	1	2.89%	2.89%	∞
Phantom and Setup									
Phantom Uncertainty	4.00%	R	√3	1.732	1	1	2.31%	2.31%	∞
Liquid permittivity (mea.)	1.04%	N	1	1	0.64	0.43	0.67%	0.45%	M
Liquid Conductivity (mea.)	0.85%	N	1	1	0.6	0.49	0.51%	0.42%	M
Combined standard uncertainty		RSS					11.75%	11.72%	
Expant uncertainty (95% confidence interval), K=2							23.49%	23.45%	

Measurement Uncertainty evaluation template for DUT SAR test (0.3-3G)

A	c	D	e		f	g	h=c * f / e	i=c * g / e	k
Source of Uncertainty	Tolerance/ Uncertainty	Probability Distributio	Div	Div Value	ci (1g)	ci (10g)	Standard uncertainty	Standard uncertainty	vi, or Veff
Measurement system									
Probe calibration	6.00%	N	1	1	1	1	6.00%	6.00%	∞
Isotropy , Axial	3.50%	R	√3	1.732	1	1	2.02%	2.02%	∞
Isotropy, Hemispherical	9.60%	R	√3	1.732	1	1	5.54%	5.54%	∞
Modulation Response	2.40%	R	√3	1.732	1	1	1.40%	1.40%	∞
Boundary Effect	1.00%	R	√3	1.732	1	1	0.58%	0.58%	∞
Linearity	4.70%	R	√3	1.732	1	1	2.71%	2.71%	∞
Detection Limits	1.00%	R	√3	1.732	1	1	0.58%	0.58%	∞
Readout Electronics	0.30%	N	1	1	1	1	0.30%	0.30%	∞
Response time	0.80%	R	√3	1.732	1	1	0.46%	0.46%	∞
Integration Time	2.60%	R	√3	1.732	1	1	1.50%	1.50%	∞
Measurement drift (class A evaluation)	1.75%	R	√3	1.732	1	1	1.01%	1.01%	∞
RF ambient condition - noise	3.00%	R	√3	1.732	1	1	1.73%	1.73%	∞
RF ambient conditions - reflections	3.00%	R	√3	1.732	1	1	1.73%	1.73%	∞
Probe positioner Mechanical restrictions	0.40%	R	√3	1.732	1	1	0.23%	0.23%	∞
Probe Positioning with respect to phantom shell	2.90%	R	√3	1.732	1	1	1.67%	1.67%	∞
Post-processing	1.00%	R	√3	1.732	1	1	0.58%	0.58%	∞
Max SAR Eval	1.00%	R	√3	1.732	1	1	0.58%	0.58%	∞
Test Sample related									
Test sample positioning	2.90%	N	1	1	1	1	2.90%	2.90%	M-1
Device Holder Uncertainty	3.60%	N	1	1	1	1	3.60%	3.60%	M-1
Drift of output power	5.00%	R	√3	1.732	1	1	2.89%	2.89%	∞
Phantom and Setup									
Phantom Uncertainty	4.00%	R	√3	1.732	1	1	2.31%	2.31%	∞
Liquid permittivity (mea.)	1.25%	N	1	1	0.64	0.43	0.80%	0.54%	M
Liquid Conductivity (mea.)	1.13%	N	1	1	0.6	0.49	0.68%	0.55%	M
Combined standard uncertainty		RSS					11.47%	11.43%	
Expant uncertainty (95% confidence interval), K=2							22.93%	22.87%	

DASY6 Uncertainty Budget
According to IEC/IEEE 62209-1528
(Frequency band: 6GHz - 10GHz range)

a	b	c	d		e	e	f=b * e / d	f=b * e / d
Source of Uncertainty	Uncertainty Value (±%)	Probability Distributioin	Div.	Div. Value	(ci) 1g	(ci) 10g	Std. uncertainty (1g) (±%)	Std. uncertainty (10g) (±%)
Measurement system errors								
Probe calibration	18.6	N	2	2	1	1	9.3	9.3
Probe Calibration Drift	1.7	R	√3	1.732	1	1	1.0	1.0
Probe Linearity	4.7	R	√3	1.732	1	1	2.7	2.7
Broadband Signal	2.8	R	√3	1.732	1	1	1.6	1.6
Probe Isotropy	7.6	R	√3	1.732	1	1	4.4	4.4
Data Acquisition	0.3	N	1	1	1	1	0.3	0.3
RF Ambient	1.8	N	1	1	1	1	1.8	1.8
Probe positioning	0.2	N	1	1	0.67	0.67	0.1	0.1
Data Processing	3.5	N	1	1	1	1	3.5	3.5
Phantom and device errors								
Conductivity (meas.)DAK	2.5	N	1	1	0.78	0.71	2.0	1.8
Conductivity (temp.)BB	2.4	R	√3	1.732	0.78	0.71	1.1	1.0
Phantom Permittivity	14.0	R	√3	1.732	0.5	0.5	4.0	4.0
Distance DUT - TSL	2.0	N	1	1	2	2	4.0	4.0
Device Positioning (±0.5mm)	1.0	N	1	1	1	1	1.0	1.0
Device Holder	3.6	N	1	1	1	1	3.6	3.6
DUT Modulationm	2.4	R	√3	1.732	1	1	1.4	1.4
Time-average SAR	0.0	R	√3	1.732	1	1	0.0	0.0
DUT drift	2.5	N	1	1	1	1	2.5	2.5
Val Antenna Unc.	0.0	N	1	1	1	1	0.0	0.0
Unc. Input Power	0.0	N	1	1	1	1	0.0	0.0
Correction to the SAR results								
Deviation to Target	1.90	N	1	1	1	0.84	1.9	1.6
SAR scaling	1.098	R	√3	1.732	1	1	0.6	0.6
Combined Std. uncertainty							14.0	13.9
Expanded Std. uncertainty (95% confidence interval), K=2							28.0	27.8

cDASY6 Module mmWave Uncertainty Budget for PD
Evaluation Distances to the Antennas ≧ λ / 5
In Compliance with IEC/IEEE 63195

a	b	c	d		e	f=b * e / d	g
Source of Uncertainty	Uncertainty Value (+-dB)	Probability Distributioin	Div.	Div. Value	ci	Std. uncertainty (+-dB)	(vi) Veff
Uncertainty terms dependent on the measurement system							
Probe calibration	0.49	N	1	1	1	0.49	∞
Probe correction	0.00	R	√3	1.732	1	0.00	∞
Frequency response (BW≦1GHz)	0.20	R	√3	1.732	1	0.12	∞
Sensor cross coupling	0.00	R	√3	1.732	1	0.00	∞
Isotropy	0.50	R	√3	1.732	1	0.29	∞
Linearity	0.20	R	√3	1.732	1	0.12	∞
Probe scattering	0.00	R	√3	1.732	1	0.00	∞
Probe positioning offset	0.30	R	√3	1.732	1	0.17	∞
Probe positioning repeatability	0.04	R	√3	1.732	1	0.02	∞
Sensor mechanical offset	0.00	R	√3	1.732	1	0.00	∞
Probe spatial resolution	0.00	R	√3	1.732	1	0.00	∞
Field impedance dependance	0.00	R	√3	1.732	1	0.00	∞
Amplitude and phase drift	0.00	R	√3	1.732	1	0.00	∞
Amplitude and phase noise	0.04	R	√3	1.732	1	0.02	∞
Measurement area truncation	0.00	R	√3	1.732	1	0.00	∞
Data acquisition	0.03	N	1	1	1	0.03	∞
Sampling	0.00	R	√3	1	1	0.00	∞
Field reconstruction	2.00	R	√3	1.732	1	1.15	∞
Forward transformation	0.00	R	√3	1.732	1	0.00	∞
Power density scaling	-	R	√3	1.732	1	-	∞
Spatial averaging	0.10	R	√3	1.732	1	0.06	∞
System detection limit	0.04	R	√3	1.732	1	0.02	∞
Uncertainty terms dependent on the DUT and environmental factors							
Probe coupling with DUT	0.00	R	√3	1.732	1	0.00	∞
Modulation response	0.40	R	√3	1.732	1	0.23	∞
Integration time	0.00	R	√3	1.732	1	0.00	∞
Response time	0.00	R	√3	1.732	1	0.00	∞
Device holder influence	0.10	R	√3	1.732	1	0.06	∞
DUT alignment	0.00	R	√3	1.732	1	0.00	∞
RF ambient conditions	0.04	R	√3	1.732	1	0.02	∞
Ambient reflections	0.04	R	√3	1.732	1	0.02	∞
Immunity / secondary reception	0.00	R	√3	1.732	1	0.00	∞
Drift of the DUT	-	R	√3	1.732	1	-	∞
Combined Std. uncertainty						1.33	
Expanded Std. uncertainty (95% confidence interval), K=2						2.67	

Appendixes

Refer to separated files for the following appendixes.

ES202220003 SAR_Appendix A Photographs

ES202220003 SAR_Appendix B DAE & Probe Cal. Certificate

ES202220003 SAR_Appendix C Phantom Description & Dipole Cal. Certificate

- End of report -