FCC RF Exposure report

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

Product Name	Portable Computer
Marketing Name	Framework Laptop
Brand Name	Framework
Model No.	FRANBP0000
Company Name	Framework Computer Inc
Company Address	1870 Ogden Dr, Burlingame, CA, 94010
Standards	IEEE/ANSI C95.1-1992, IEEE 1528-2013,
FCC ID	2AZR6–FRANBBAT12
Date of Receipt	Apr. 29, 2021
Date of Test(s)	Jun. 27, 2021 ~ Jul. 01, 2021
Date of Issue	Jul. 26, 2021

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 / Ruby Ou	PM / Jasper Wang	Asst. Manager / John Yeh
Ruby Ou	Jasper Wang	John Yeh

Date: Jul. 26, 2021

Revision History

Report Number	Revision	Description	Issue Date
EN/2021/40017	Rev.00	Initial creation of document	Jul. 26, 2021

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	
1F, No. 8, Alley 15, Lane 120, Sec. 1, NeiHu Road, Neihu District, Taipei City, 11493, Taiwan.	
FCC Designation Number	TW0029
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	Framework Computer Inc
Company Address	1870 Ogden Dr, Burlingame, CA, 94010

1.3 Description of EUT

General Information of Host:

Equipment Under Test	Portable Computer	
Marketing Name	Framework Laptop	
Brand Name	Framework	
Model No.	FRANBP0000	
FCC ID	2AZR6–FRANBBAT12	
Mode of Operation	☒WLAN802.11 a/b/g/n/ac/ax(20M/40M80M/160M) ☒Bluetooth	
Duty Cycle	WLAN802.11 a/b/g/n/ac/ax(20M/40M/80M/160M)	Refer to page 30-35
	Bluetooth	74.7%
TX Frequency Range (MHz)	WLAN802.11 b/g/n/ax(20M)	2412 – 2462
	WLAN802.11 n/ax(40M)	2422 – 2452
	WLAN802.11 a/n/ac/ax(20M) 5.2G	5180 – 5240
	WLAN802.11 n/ac/ax(40M) 5.2G	5190 – 5230
	WLAN802.11 ac/ax(80M) 5.2G	5210
	WLAN802.11 ac/ax(160M) 5.2G	5250
	WLAN802.11 a/n/ac/ax(20M) 5.3G	5260 – 5320
	WLAN802.11 n/ac/ax(40M) 5.3G	5270 – 5310
	WLAN802.11 ac/ax(80M) 5.3G	5290
	WLAN802.11 a/n/ac/ax(20M) 5.6G	5500 – 5720
	WLAN802.11 n/ac/ax(40M) 5.6G	5510 – 5710
	WLAN802.11 ac/ax(80M) 5.6G	5530 – 5690
	WLAN802.11 ac/ax(160M) 5.6G	5570

TX Frequency Range (MHz)	WLAN802.11 a/n/ac/ax(20M) 5.8G	5745	—	5825
	WLAN802.11 n/ac/ax(40M) 5.8G	5755	—	5795
	WLAN802.11 ac/ax(80M) 5.8G	5775		
	WLAN U-NII 5	5925	—	6425
	WLAN U-NII 6	6425	—	6525
	WLAN U-NII 7	6525	—	6875
	WLAN U-NII 8	6875	—	7125
	Bluetooth	2402	—	2480
Channel Number (ARFCN)	WLAN802.11 b/g/n/ax(20M)	1	—	11
	WLAN802.11 n/ax(40M)	3	—	9
	WLAN802.11 a/n/ac/ax(20M) 5.2G	36	—	48
	WLAN802.11 n/ac/ax(40M) 5.2G	38	—	46
	WLAN802.11 ac/ax(80M) 5.2G	42		
	WLAN802.11 ac/ax(160M) 5.2G	50		
	WLAN802.11 a/n/ac/ax(20M) 5.3G	52	—	64
	WLAN802.11 n/ac/ax(40M) 5.3G	54	—	62
	WLAN802.11 ac/ax(80M) 5.3G	58		
	WLAN802.11 a/n/ac/ax(20M) 5.6G	100	—	144
	WLAN802.11 n/ac/ax(40M) 5.6G	102	—	142
	WLAN802.11 ac/ax(80M) 5.6G	106	—	138
	WLAN802.11 ac/ax(160M) 5.6G	114		
	WLAN802.11 a/n/ac/ax(20M) 5.8G	149	—	165
	WLAN802.11 n/ac/ax(40M) 5.8G	151	—	159
	WLAN802.11 ac/ax(80M) 5.8G	155		
	Bluetooth	0	—	78

Max. SAR (1g) (Unit: W/Kg)					
Antenna	Band	Measured	Reported	Channel	Position
Main	WLAN 802.11b	0.24	0.26	11	Bottom surface
	WLAN 802.11ac(80M) 5.2G	0.83	0.89	42	Bottom surface
	WLAN 802.11ax(80M) 5.3G	0.66	0.70	58	Bottom surface
	WLAN 802.11ac(80M) 5.6G	0.98	1.06	138	Bottom surface
	WLAN 802.11ac(80M) 5.8G	0.91	0.99	155	Bottom surface
Aux	WLAN 802.11b	0.32	0.34	11	Bottom surface
	Bluetooth(GFSK)	0.02	0.02	78	Bottom surface
	WLAN 802.11ac(80M) 5.2G	0.65	0.71	42	Bottom surface
	WLAN 802.11ac(80M) 5.3G	0.71	0.77	58	Bottom surface
	WLAN 802.11ac(80M) 5.6G	0.98	1.07	138	Bottom surface
	WLAN 802.11ac(80M) 5.8G	1.00	1.08	155	Bottom surface

Brand & Mode	Tx Frequency	SAR	APD	PD
	MHz	1g Body (W/kg)	Body (mW/cm^2)	psPD (mW/cm^2)
WiFi 6E	5925-7125	0.41	0.34	0.35

WLAN802.11 a/b/g/n/ax/ac(20M/40M)/ac/ax(80M/160M) conducted power table:

Band \ Antenna	SISO		MIMO
	Main	Aux	Main + Aux
WLAN802.11b	V	V	-
WLAN802.11g	V	V	-
WLAN802.11n(20M)	V	V	V
WLAN802.11n(40M)	V	V	V
WLAN802.11ax(20M)	V	V	V
WLAN802.11ax(40M)	V	V	V
WLAN802.11a	V	V	-
WLAN802.11n(20M) 5G	V	V	V
WLAN802.11n(40M) 5G	V	V	V
WLAN802.11ac(20M) 5G	V	V	V
WLAN802.11ac(40M) 5G	V	V	V
WLAN802.11ac(80M) 5G	V	V	V
WLAN802.11ac(160M) 5G	V	V	V
WLAN802.11ax(20M) 5G	V	V	V
WLAN802.11ax(40M) 5G	V	V	V
WLAN802.11ax(80M) 5G	V	V	V
WLAN802.11ax(160M) 5G	V	V	V
WLAN802.11n(20M) 6E	V	V	V
WLAN802.11n(40M) 6E	V	V	V
WLAN802.11ac(20M) 6E	V	V	V
WLAN802.11ac(40M) 6E	V	V	V
WLAN802.11ac(80M) 6E	V	V	V
WLAN802.11ac(160M) 6E	V	V	V
WLAN802.11ax(20M) 6E	V	V	V
WLAN802.11ax(40M) 6E	V	V	V
WLAN802.11ax(80M) 6E	V	V	V
WLAN802.11ax(160M) 6E	V	V	V

Main

Main Antenna						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
2450 MHz	802.11b	1	2412	1Mbps	20.00	19.83
		6	2437		20.00	19.94
		11	2462		20.00	19.86
	802.11g	1	2412	6Mbps	19.00	19.00
		6	2437		20.00	19.63
		11	2462		18.00	17.83
	802.11n20-HT0	1	2412	MCS0	19.00	18.58
		6	2437		20.00	19.83
		11	2462		18.00	18.00
	802.11ax20-HE0	1	2412	MCS0	19.00	18.77
		6	2437		20.00	19.68
		11	2462		18.00	17.27
	802.11n40-HT0	3	2422	MCS0	16.75	16.34
		6	2437		18.00	16.77
		9	2452		17.25	15.66
	802.11ax40-HE0	3	2422	MCS0	16.75	16.19
		6	2437		18.00	16.56
		9	2452		17.25	15.61

Main Antenna						
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	17.81
		40	5200		18.00	17.81
		44	5220		18.00	17.83
		48	5240		18.00	17.69
	802.11n20-HT0	36	5180	MCS0	18.00	17.80
		40	5200		18.00	17.65
		44	5220		18.00	17.58
		48	5240		18.00	17.84
	802.11ac20-VHT0	36	5180	MCS0	18.00	17.76
		40	5200		18.00	17.63
		44	5220		18.00	17.48
		48	5240		18.00	17.75
	802.11ax20-HE0	36	5180	MCS0	18.00	17.84
		40	5200		18.00	17.63
		44	5220		18.00	17.61
		48	5240		18.00	17.65
	802.11n40-HT0	38	5190	MCS0	18.00	17.53
		46	5230		18.00	17.67
	802.11ac40-VHT0	38	5190	MCS0	18.00	17.44
		46	5230		18.00	17.65
	802.11ax40-HE0	38	5190	MCS0	16.75	16.72
		46	5230		18.00	17.63
	802.11ac80-VHT0	42	5210	MCS0	18.00	17.98
	802.11ax80-HE0	42	5210	MCS0	18.00	17.63
	802.11ac160-VHT0	50	5250	MCS0	15.50	15.35
	802.11ax160-HE0	50	5250	MCS0	14.00	14.00

Main Antenna						
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	17.73
		56	5280		18.00	17.69
		60	5300		18.00	17.77
		64	5320		18.00	17.71
	802.11n20-HT0	52	5260	MCS0	18.00	17.82
		56	5280		18.00	17.84
		60	5300		18.00	17.73
		64	5320		18.00	17.79
	802.11ac20-VHT0	52	5260	MCS0	18.00	17.80
		56	5280		18.00	17.75
		60	5300		18.00	17.70
		64	5320		18.00	17.71
	802.11ax20-HE0	52	5260	MCS0	18.00	17.67
		56	5280		18.00	17.58
		60	5300		18.00	17.52
		64	5320		18.00	17.88
	802.11n40-HT0	54	5270	MCS0	18.00	17.74
		62	5310		17.50	17.08
	802.11ac40-VHT0	54	5270	MCS0	18.00	17.69
		62	5310		17.50	17.08
	802.11ax40-HE0	54	5270	MCS0	18.00	17.59
		62	5310		16.75	16.69
	802.11ac80-VHT0	58	5290	MCS0	17.50	17.50
	802.11ax80-HE0	58	5290	MCS0	18.00	17.91

Main Antenna						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
5600 MHz	802.11a	100	5500	6Mbps	18.00	17.68
		104	5520		18.00	17.73
		116	5580		18.00	17.66
		120	5600		18.00	17.90
		136	5680		18.00	17.84
		140	5700		18.00	17.82
		144	5720		18.00	17.78
	802.11n20-HT0	100	5500	MCS0	18.00	17.68
		104	5520		18.00	17.71
		116	5580		18.00	17.62
		120	5600		18.00	17.77
		136	5680		18.00	17.75
		140	5700		18.00	17.78
		144	5720		18.00	17.64
	802.11ac20-VHT0	100	5500	MCS0	18.00	17.68
		104	5520		18.00	17.64
		116	5580		18.00	17.60
		120	5600		18.00	17.69
		136	5680		18.00	17.74
		140	5700		18.00	17.70
		144	5720		18.00	17.58
	802.11ax20-HE0	100	5500	MCS0	18.00	17.82
		104	5520		18.00	17.80
		116	5580		18.00	17.66
		120	5600		18.00	17.63
		136	5680		18.00	17.82
		140	5700		18.00	17.80
		144	5720		18.00	17.68
	802.11n40-HT0	102	5510	MCS0	18.00	17.69
		110	5550		18.00	17.84
		118	5590		18.00	17.82
		134	5670		18.00	17.83
		142	5710		18.00	17.65
	802.11ac40-VHT0	102	5510	MCS0	18.00	17.69
		110	5550		18.00	17.84
		118	5590		18.00	17.73
		134	5670		18.00	17.77
		142	5710		18.00	17.61
	802.11ax40-HE0	102	5510	MCS0	18.00	17.57
		110	5550		18.00	17.71
		118	5590		18.00	17.55
		134	5670		18.00	17.82
		142	5710		18.00	17.78
	802.11ac80-VHT0	106	5530	MCS0	18.00	17.99
		122	5610		18.00	18.00
		138	5690		18.00	17.97
	802.11ax80-HE0	106	5530	MCS0	18.00	17.77
		122	5610		18.00	17.63
		138	5690		18.00	17.56
	802.11ac160-VHT0	114	5570	MCS0	15.50	15.41
	802.11ax160-HE0	114	5570	MCS0	15.50	15.18

Main Antenna						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
5800 MHz	802.11a	149	5745	6Mbps	18.00	17.77
		157	5785		18.00	17.81
		165	5825		18.00	17.82
	802.11n20-HT0	149	5745	MCS0	18.00	17.66
		157	5785		18.00	17.69
		165	5825		18.00	17.74
	802.11ac20-VHT0	149	5745	MCS0	18.00	17.64
		157	5785		18.00	17.69
		165	5825		18.00	17.66
	802.11ax20-HE0	149	5745	MCS0	18.00	17.77
		157	5785		18.00	17.58
		165	5825		18.00	17.56
	802.11n40-HT0	151	5755	MCS0	18.00	17.69
		159	5795		18.00	17.67
	802.11ac40-VHT0	151	5755	MCS0	18.00	17.65
		159	5795		18.00	17.59
	802.11ax40-HE0	151	5755	MCS0	18.00	17.66
		159	5795		18.00	17.71
	802.11ac80-VHT0	155	5775	MCS0	18.00	17.97
	802.11ax80-HE0	155	5775	MCS0	18.00	17.91

Aux

Aux Antenna						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
2450 MHz	802.11b	1	2412	1Mbps	20.00	19.92
		6	2437		20.00	19.96
		11	2462		20.00	19.87
	802.11g	1	2412	6Mbps	19.25	19.25
		6	2437		20.00	19.92
		11	2462		19.00	18.94
	802.11n20-HT0	1	2412	MCS0	19.25	18.92
		6	2437		20.00	19.91
		11	2462		19.00	18.33
	802.11ax20-HE0	1	2412	MCS0	19.25	19.02
		6	2437		20.00	19.70
		11	2462		19.00	17.74
	802.11n40-HT0	3	2422	MCS0	17.75	16.64
		6	2437		18.25	17.30
		9	2452		17.50	16.25
	802.11ax40-HE0	3	2422	MCS0	17.75	17.62
		6	2437		18.25	16.79
		9	2452		17.50	16.18

Aux Antenna						
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	17.95
		40	5200		18.00	17.95
		44	5220		18.00	17.92
		48	5240		18.00	17.94
	802.11n20-HT0	36	5180	MCS0	18.00	17.87
		40	5200		18.00	17.80
		44	5220		18.00	17.74
		48	5240		18.00	17.85
	802.11ac20-VHT0	36	5180	MCS0	18.00	17.83
		40	5200		18.00	17.75
		44	5220		18.00	17.73
		48	5240		18.00	17.83
	802.11ax20-HE0	36	5180	MCS0	18.00	17.86
		40	5200		18.00	17.79
		44	5220		18.00	17.76
		48	5240		18.00	17.73
	802.11n40-HT0	38	5190	MCS0	18.00	17.67
		46	5230		18.00	17.87
	802.11ac40-VHT0	38	5190	MCS0	18.00	17.65
		46	5230		18.00	17.78
	802.11ax40-HE0	38	5190	MCS0	18.00	17.63
		46	5230		18.00	17.79
	802.11ac80-VHT0	42	5210	MCS0	18.00	17.98
	802.11ax80-HE0	42	5210	MCS0	18.00	17.82
	802.11ac160-VHT0	50	5250	MCS0	16.00	15.72
	802.11ax160-HE0	50	5250	MCS0	15.00	15.00

Aux Antenna						
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	17.93
		56	5280		18.00	17.92
		60	5300		18.00	17.88
		64	5320		18.00	17.86
	802.11n20-HT0	52	5260	MCS0	18.00	17.83
		56	5280		18.00	17.85
		60	5300		18.00	17.82
		64	5320		18.00	17.80
	802.11ac20-VHT0	52	5260	MCS0	18.00	17.76
		56	5280		18.00	17.85
		60	5300		18.00	17.81
		64	5320		18.00	17.74
	802.11ax20-HE0	52	5260	MCS0	18.00	17.76
		56	5280		18.00	17.82
		60	5300		18.00	17.91
		64	5320		18.00	17.90
	802.11n40-HT0	54	5270	MCS0	18.00	17.85
		62	5310		18.00	17.78
	802.11ac40-VHT0	54	5270	MCS0	18.00	17.78
		62	5310		18.00	17.74
	802.11ax40-HE0	54	5270	MCS0	18.00	17.77
		62	5310		18.00	17.73
	802.11ac80-VHT0	58	5290	MCS0	18.00	17.96
	802.11ax80-HE0	58	5290	MCS0	18.00	17.53

Aux Antenna						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
5600 MHz	802.11a	100	5500	6Mbps	18.00	17.74
		104	5520		18.00	17.79
		116	5580		18.00	17.82
		120	5600		18.00	17.92
		136	5680		18.00	17.82
		140	5700		18.00	17.92
		144	5720		18.00	17.84
	802.11n20-HT0	100	5500	MCS0	18.00	17.91
		104	5520		18.00	17.94
		116	5580		18.00	17.90
		120	5600		18.00	17.85
		136	5680		18.00	17.86
		140	5700		18.00	17.83
		144	5720		18.00	17.84
	802.11ac20-VHT0	100	5500	MCS0	18.00	17.90
		104	5520		18.00	17.94
		116	5580		18.00	17.89
		120	5600		18.00	17.82
		136	5680		18.00	17.84
		140	5700		18.00	17.83
		144	5720		18.00	17.81
	802.11ax20-HE0	100	5500	MCS0	18.00	17.85
		104	5520		18.00	17.83
		116	5580		18.00	17.88
		120	5600		18.00	17.92
		136	5680		18.00	17.85
		140	5700		18.00	17.90
		144	5720		18.00	17.92
	802.11n40-HT0	102	5510	MCS0	18.00	17.87
		110	5550		18.00	17.89
		118	5590		18.00	17.83
		134	5670		18.00	17.85
		142	5710		18.00	17.83
	802.11ac40-VHT0	102	5510	MCS0	18.00	17.79
		110	5550		18.00	17.82
		118	5590		18.00	17.77
		134	5670		18.00	17.78
		142	5710		18.00	17.81
	802.11ax40-HE0	102	5510	MCS0	18.00	17.71
		110	5550		18.00	17.65
		118	5590		18.00	17.72
		134	5670		18.00	17.94
		142	5710		18.00	17.80
	802.11ac80-VHT0	106	5530	MCS0	18.00	17.97
		122	5610		18.00	17.92
		138	5690		18.00	17.99
	802.11ax80-HE0	106	5530	MCS0	18.00	17.86
		122	5610		18.00	17.87
		138	5690		18.00	17.77
	802.11ac160-VHT0	114	5570	MCS0	16.75	16.12
	802.11ax160-HE0	114	5570	MCS0	16.75	16.54

Aux Antenna						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
5800 MHz	802.11a	149	5745	6Mbps	18.00	17.96
		157	5785		18.00	17.96
		165	5825		18.00	17.88
	802.11n20-HT0	149	5745	MCS0	18.00	17.87
		157	5785		18.00	17.86
		165	5825		18.00	17.77
	802.11ac20-VHT0	149	5745	MCS0	18.00	17.84
		157	5785		18.00	17.80
		165	5825		18.00	17.72
	802.11ax20-HE0	149	5745	MCS0	18.00	17.88
		157	5785		18.00	17.82
		165	5825		18.00	17.80
	802.11n40-HT0	151	5755	MCS0	18.00	17.88
		159	5795		18.00	17.90
	802.11ac40-VHT0	151	5755	MCS0	18.00	17.81
		159	5795		18.00	17.89
	802.11ax40-HE0	151	5755	MCS0	18.00	17.82
		159	5795		18.00	17.73
	802.11ac80-VHT0	155	5775	MCS0	18.00	17.99
	802.11ax80-HE0	155	5775	MCS0	18.00	17.98

WIFI 6E power:

Main Antenna						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
U-NII-5	802.11a	1	5955	6Mbps	6.00	4.57
		45	6175		6.00	4.02
		93	6415		6.00	4.09
	802.11n20-HT0	1	5955	MCS0	6.00	4.80
		45	6175		6.00	4.31
		93	6415		6.00	4.32
	802.11ac20-VHT0	1	5955	MCS0	6.00	4.71
		45	6175		6.00	4.22
		93	6415		6.00	4.25
	802.11ax20-HE0	1	5955	MCS0	6.00	4.80
		45	6175		6.00	4.38
		93	6415		6.00	4.90
	802.11n40-HT0	3	5985	MCS0	9.00	7.43
		43	6165		9.00	7.38
		91	6405		9.00	7.37
	802.11ac40-VHT0	3	5985	MCS0	9.00	7.37
		43	6165		9.00	7.32
		91	6405		9.00	7.33
	802.11ax40-HE0	3	5985	MCS0	9.00	7.72
		43	6165		9.00	7.12
		91	6405		9.00	7.65
	802.11ac80-VHT0	7	5985	MCS0	12.00	10.11
		39	6145		12.00	10.17
		87	6385		12.00	10.41
	802.11ax80-HE0	7	5985	MCS0	12.00	10.07
		39	6145		12.00	10.49
		87	6385		12.00	10.05
	802.11ac160-VHT0	15	6025	MCS0	13.00	12.80
		47	6185		13.00	12.88
		79	6345		13.00	12.76
	802.11ax160-HE0	15	6025	MCS0	13.00	12.80
		47	6185		13.00	12.91
		79	6345		13.00	12.55

Main Antenna						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
U-NII-6	802.11a	97	6435	6Mbps	6.00	4.32
		105	6475		6.00	4.34
		113	6515		6.00	4.36
	802.11n20-HT0	97	6435	MCS0	6.00	4.17
		105	6475		6.00	4.16
		113	6515		6.00	4.28
	802.11ac20-VHT0	97	6435	MCS0	6.00	4.10
		105	6475		6.00	4.12
		113	6515		6.00	4.28
	802.11ax20-HE0	97	6435	MCS0	6.00	4.79
		105	6475		6.00	4.32
		113	6515		6.00	4.37
	802.11n40-HT0	99	6445	MCS0	9.00	7.24
		107	6485		9.00	7.35
	802.11ac40-VHT0	99	6445	MCS0	9.00	7.22
		107	6485		9.00	7.32
	802.11ax40-HE0	99	6445	MCS0	9.00	7.62
		107	6485		9.00	7.72
	802.11ac80-VHT0	103	6465	MCS0	12.00	10.57
		119	6545		12.00	10.32
	802.11ax80-HE0	103	6465	MCS0	12.00	10.06
		119	6545		12.00	10.11
	802.11ac160-VHT0	111	6505	MCS0	13.00	12.73
	802.11ax160-HE0	111	6505	MCS0	13.00	12.52

Main Antenna						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
U-NII-7	802.11a	117	6535	6Mbps	6.00	4.53
		149	6695		6.00	4.46
		181	6855		6.00	4.29
	802.11n20-HT0	117	6535	MCS0	6.00	4.31
		149	6695		6.00	4.17
		181	6855		6.00	4.05
	802.11ac20-VHT0	117	6535	MCS0	6.00	4.26
		149	6695		6.00	4.11
		181	6855		6.00	4.04
	802.11ax20-HE0	117	6535	MCS0	6.00	4.49
		149	6695		6.00	4.27
		181	6855		6.00	4.51
	802.11n40-HT0	115	6525	MCS0	9.00	7.36
		147	6685		9.00	7.19
		179	6845		9.00	7.42
	802.11ac40-VHT0	115	6525	MCS0	9.00	7.27
		147	6685		9.00	7.16
		179	6845		9.00	7.40
	802.11ax40-HE0	115	6525	MCS0	9.00	7.61
		147	6685		9.00	7.76
		179	6845		9.00	7.72
	802.11ac80-VHT0	135	6625	MCS0	12.00	10.61
		151	6705		12.00	11.91
		167	6785		12.00	10.35
	802.11ax80-HE0	135	6625	MCS0	12.00	10.96
		151	6705		12.00	11.87
		167	6785		12.00	10.59
	802.11ac160-VHT0	143	6665	MCS0	13.00	12.78
		175	6825		13.00	12.98
	802.11ax160-HE0	143	6665	MCS0	13.00	12.51
		175	6825		13.00	12.85

Main Antenna						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
U-NII-8	802.11a	185	6875	6Mbps	6.00	4.41
		209	6995		6.00	4.14
	802.11n20-HT0	185	6875	MCS0	6.00	4.54
		209	6995		6.00	4.14
	802.11ac20-VHT0	185	6875	MCS0	6.00	4.52
		209	6995		6.00	4.11
	802.11ax20-HE0	185	6875	MCS0	6.00	4.63
		209	6995		6.00	4.28
	802.11n40-HT0	187	6885	MCS0	9.00	7.59
		227	7085		9.00	7.68
	802.11ac40-VHT0	187	6885	MCS0	9.00	7.56
		227	7085		9.00	7.63
	802.11ax40-HE0	187	6885	MCS0	9.00	7.55
		227	7085		9.00	7.94
	802.11ac80-VHT0	183	6865	MCS0	12.00	10.15
		199	6945		12.00	10.17
		215	7025		12.00	10.75
	802.11ax80-HE0	183	6865	MCS0	12.00	10.05
		199	6945		12.00	10.83
		215	7025		12.00	11.03
	802.11ac160-VHT0	207	6985	MCS0	13.00	12.63
	802.11ax160-HE0	207	6985	MCS0	13.00	12.58

Aux Antenna						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
U-NII-5	802.11a	1	5955	6Mbps	6.00	4.68
		45	6175		6.00	4.36
		93	6415		6.00	4.29
	802.11n20-HT0	1	5955	MCS0	6.00	4.91
		45	6175		6.00	4.45
		93	6415		6.00	4.36
	802.11ac20-VHT0	1	5955	MCS0	6.00	4.90
		45	6175		6.00	4.35
		93	6415		6.00	4.35
	802.11ax20-HE0	1	5955	MCS0	6.00	4.82
		45	6175		6.00	4.49
		93	6415		6.00	4.92
	802.11n40-HT0	3	5985	MCS0	9.00	7.45
		43	6165		9.00	8.00
		91	6405		9.00	7.53
	802.11ac40-VHT0	3	5985	MCS0	9.00	7.45
		43	6165		9.00	7.95
		91	6405		9.00	7.52
	802.11ax40-HE0	3	5985	MCS0	9.00	7.75
		43	6165		9.00	7.80
		91	6405		9.00	8.13
	802.11ac80-VHT0	7	5985	MCS0	12.00	10.67
		39	6145		12.00	10.69
		87	6385		12.00	10.93
	802.11ax80-HE0	7	5985	MCS0	12.00	10.99
		39	6145		12.00	10.96
		87	6385		12.00	10.75
	802.11ac160-VHT0	15	6025	MCS0	13.00	12.86
		47	6185		13.00	12.98
		79	6345		13.00	12.84
	802.11ax160-HE0	15	6025	MCS0	13.00	12.82
		47	6185		13.00	12.99
		79	6345		13.00	12.74

Aux Antenna						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
U-NII-6	802.11a	97	6435	6Mbps	6.00	4.72
		105	6475		6.00	4.62
		113	6515		6.00	4.56
	802.11n20-HT0	97	6435	MCS0	6.00	4.35
		105	6475		6.00	4.68
		113	6515		6.00	4.63
	802.11ac20-VHT0	97	6435	MCS0	6.00	4.34
		105	6475		6.00	4.61
		113	6515		6.00	4.62
	802.11ax20-HE0	97	6435	MCS0	6.00	4.84
		105	6475		6.00	4.82
		113	6515		6.00	4.73
	802.11n40-HT0	99	6445	MCS0	9.00	7.38
		107	6485		9.00	7.38
	802.11ac40-VHT0	99	6445	MCS0	9.00	7.28
		107	6485		9.00	7.31
	802.11ax40-HE0	99	6445	MCS0	9.00	7.93
		107	6485		9.00	7.77
	802.11ac80-VHT0	103	6465	MCS0	12.00	10.65
		119	6545		12.00	10.91
	802.11ax80-HE0	103	6465	MCS0	12.00	10.89
		119	6545		12.00	10.68
	802.11ac160-VHT0	111	6505	MCS0	13.00	12.76
	802.11ax160-HE0	111	6505	MCS0	13.00	12.68

Aux Antenna						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
U-NII-7	802.11a	117	6535	6Mbps	6.00	4.56
		149	6695		6.00	4.40
		181	6855		6.00	4.60
	802.11n20-HT0	117	6535	MCS0	6.00	4.64
		149	6695		6.00	4.61
		181	6855		6.00	4.69
	802.11ac20-VHT0	117	6535	MCS0	6.00	4.60
		149	6695		6.00	4.60
		181	6855		6.00	4.69
	802.11ax20-HE0	117	6535	MCS0	6.00	4.75
		149	6695		6.00	4.17
		181	6855		6.00	4.52
	802.11n40-HT0	115	6525	MCS0	9.00	7.81
		147	6685		9.00	7.76
		179	6845		9.00	7.52
	802.11ac40-VHT0	115	6525	MCS0	9.00	7.71
		147	6685		9.00	7.68
		179	6845		9.00	7.47
	802.11ax40-HE0	115	6525	MCS0	9.00	7.65
		147	6685		9.00	7.79
		179	6845		9.00	7.73
	802.11ac80-VHT0	135	6625	MCS0	12.00	10.66
		151	6705		12.00	11.98
		167	6785		12.00	10.79
	802.11ax80-HE0	135	6625	MCS0	12.00	11.00
		151	6705		12.00	11.73
		167	6785		12.00	11.03
	802.11ac160-VHT0	143	6665	MCS0	13.00	12.82
		175	6825		13.00	12.95
	802.11ax160-HE0	143	6665	MCS0	13.00	12.69
		175	6825		13.00	12.99

Aux Antenna						
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
U-NII-8	802.11a	185	6875	6Mbps	6.00	4.49
		209	6995		6.00	4.57
	802.11n20-HT0	185	6875	MCS0	6.00	4.56
		209	6995		6.00	4.67
	802.11ac20-VHT0	185	6875	MCS0	6.00	4.52
		209	6995		6.00	4.66
	802.11ax20-HE0	185	6875	MCS0	6.00	4.90
		209	6995		6.00	4.76
	802.11n40-HT0	187	6885	MCS0	9.00	7.63
		227	7085		9.00	7.71
	802.11ac40-VHT0	187	6885	MCS0	9.00	7.61
		227	7085		9.00	7.63
	802.11ax40-HE0	187	6885	MCS0	9.00	7.71
		227	7085		9.00	7.98
	802.11ac80-VHT0	183	6865	MCS0	12.00	10.88
		199	6945		12.00	10.72
		215	7025		12.00	10.79
	802.11ax80-HE0	183	6865	MCS0	12.00	10.93
		199	6945		12.00	10.96
		215	7025		12.00	11.07
	802.11ac160-VHT0	207	6985	MCS0	13.00	12.70
	802.11ax160-HE0	207	6985	MCS0	13.00	12.91

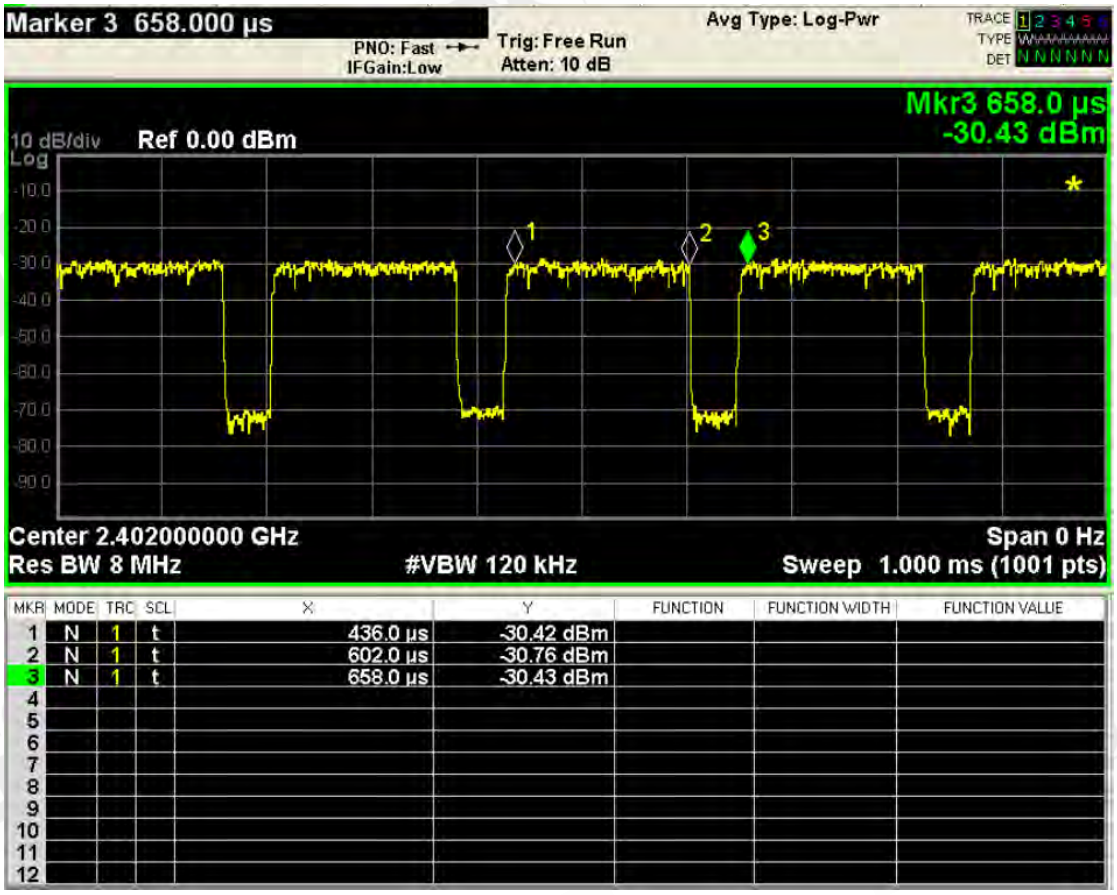
Bluetooth conducted power table:

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	11.50	10.18	11.00	10.11	11.00	10.17
	CH 39	2441		10.98		10.29		10.41
	CH 78	2480		11.32		10.18		10.19

Mode	Channel	Frequency (MHz)	GFSK	
			Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Output Power (dBm)
LE_1Mbps	CH 00	2402	10	9.74
	CH 19	2440		9.70
	CH 39	2480		9.97

Mode	Channel	Frequency (MHz)	GFSK	
			Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Output Power (dBm)
LE_2Mbps	CH 00	2402	10	9.54
	CH 19	2440		9.45
	CH 39	2480		9.83

Bluetooth



MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	t	436.0 µs	-30.42 dBm			
2	N	1	t	602.0 µs	-30.76 dBm			
3	N	1	t	658.0 µs	-30.43 dBm			
4								
5								
6								
7								
8								
9								
10								
11								
12								

Total time
166us
Operating time
222us
Duty cycle
(166/222) =0.747
Duty factor
1/0.747=1.339

2.4G b Main

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	t	6.080 ms	-29.42 dBm			
2	N	1	t	14.18 ms	-29.34 dBm			
3	N	1	t	14.48 ms	-29.28 dBm			
4								
5								
6								
7								
8								
9								
10								
11								
12								

Total time
8.4ms
Operating time
8.1ms
Duty cycle
(8.1/8.4) =0.964
Duty factor
1/0.964=1.037

5G ac 80MHz Main

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	t	6.260 ms	-56.97 dBm			
2	N	1	t	10.00 ms	-56.30 dBm			
3	N	1	t	10.28 ms	-57.03 dBm			
4								
5								
6								
7								
8								
9								
10								
11								
12								

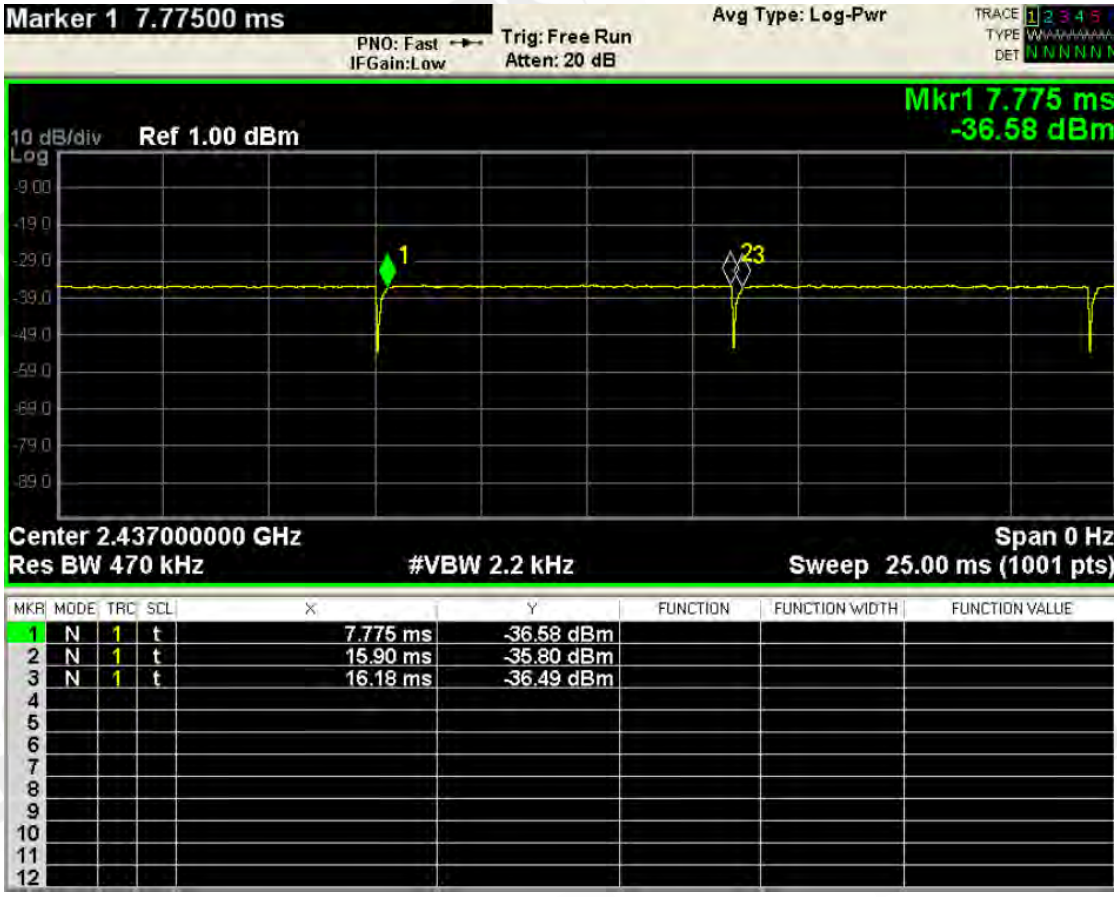
Total time
4.02ms
Operating time
3.74ms
Duty cycle
(3.74/4.02) =0.930
Duty factor
1/0.930=1.075

5G ax 80MHz Main

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	t	7.880 ms	-50.59 dBm			
2	N	1	t	11.74 ms	-49.69 dBm			
3	N	1	t	11.90 ms	-50.28 dBm			
4								
5								
6								
7								
8								
9								
10								
11								
12								

Total time
4.02ms
Operating time
3.86ms
Duty cycle
(3.86/4.02) =0.960
Duty factor
1/0.960=1.042

2.4G b Aux



MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	t	7.775 ms	-36.58 dBm			
2	N	1	t	15.90 ms	-35.80 dBm			
3	N	1	t	16.18 ms	-36.49 dBm			
4								
5								
6								
7								
8								
9								
10								
11								
12								

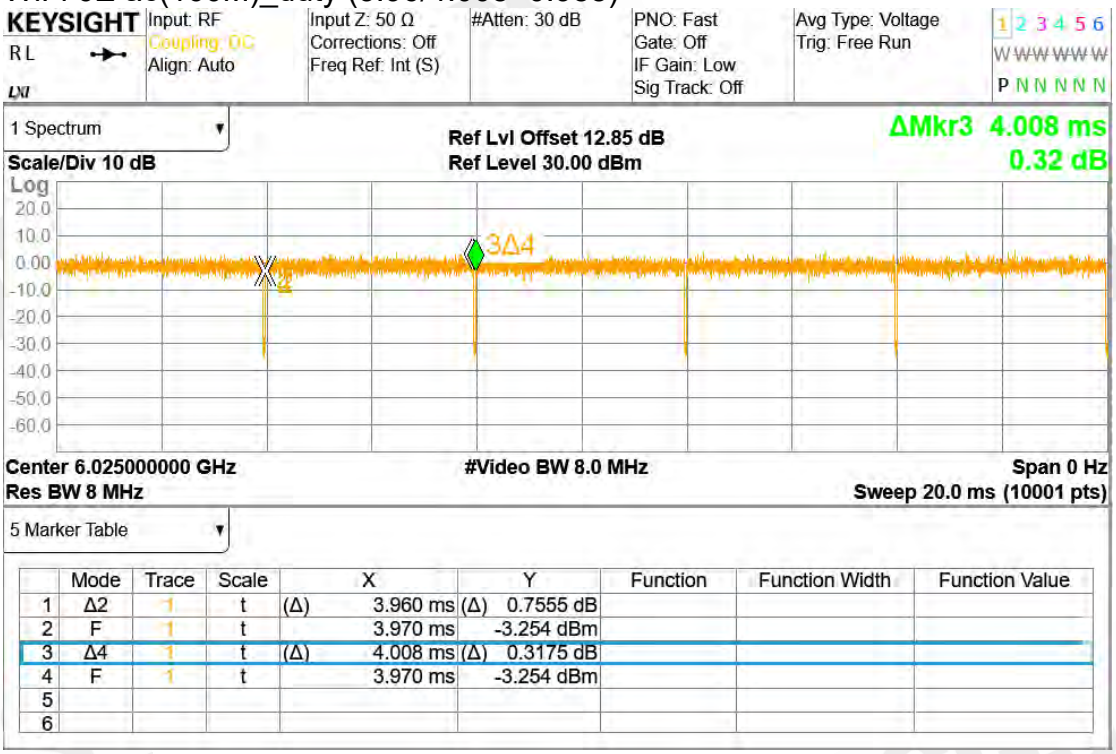
Total time
8.405ms
Operating time
8.125ms
Duty cycle
(8.125/8.405) =0.966
Duty factor
1/0.966=1.035

5G ac 80MHz Aux

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	t	6.360 ms	-46.67 dBm			
2	N	1	t	10.10 ms	-46.24 dBm			
3	N	1	t	10.40 ms	-46.46 dBm			
4								
5								
6								
7								
8								
9								
10								
11								
12								

Total time
4.04ms
Operating time
3.74ms
Duty cycle
(3.74/4.04) =0.925
Duty factor
1/0.925=1.081

WiFi 6E ac(160M)_duty (3.96/4.008=0.988)



	Mode	Trace	Scale	X	Y	Function	Function Width	Function Value
1	Δ2	1	t	(Δ) 3.960 ms	(Δ) 0.7555 dB			
2	F	1	t	3.970 ms	-3.254 dBm			
3	Δ4	1	t	(Δ) 4.008 ms	(Δ) 0.3175 dB			
4	F	1	t	3.970 ms	-3.254 dBm			
5								
6								

Duty cycle
(3.96/4.008) =0.988
Duty factor
1/0.988=1.012

1.4 Test Environment

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

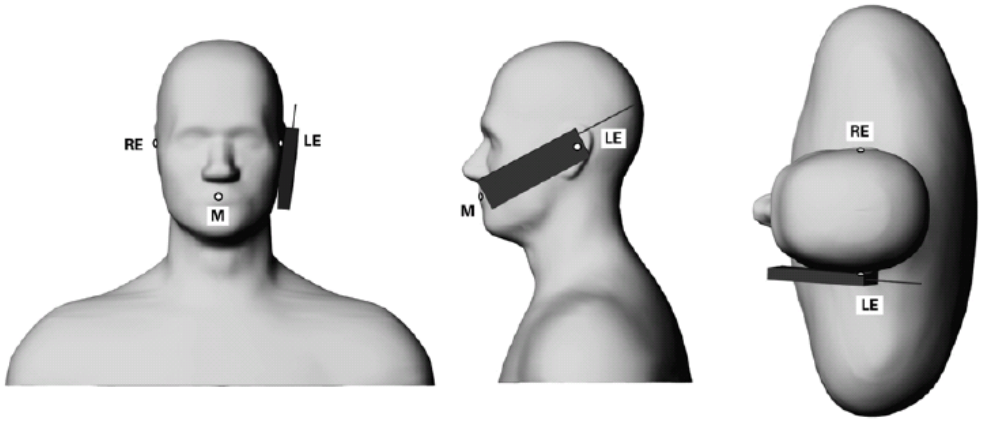
1.5 Operation Description

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.

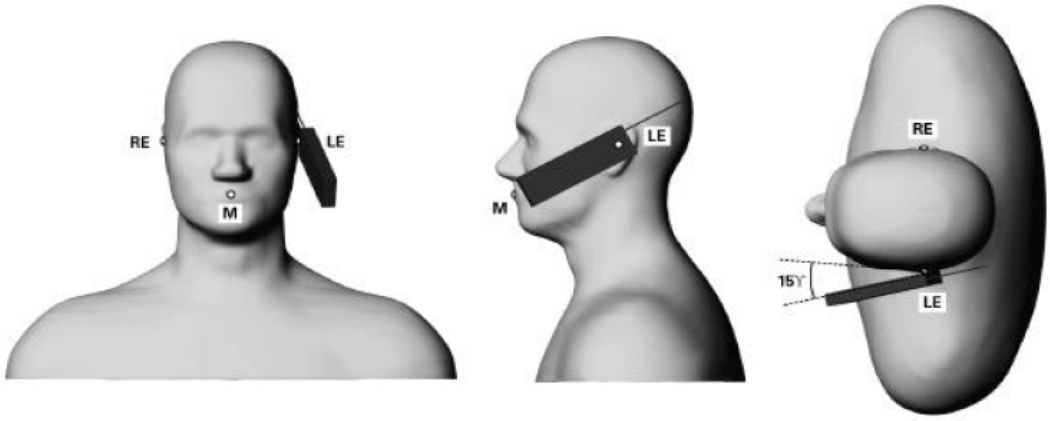
9. WIFI 6E SAR is measured by using 6-7GHz parameters per IEC/IEEE62209-1528:2020 and report also estimated absorbed PD (for reference purposes only, not specifically for compliance).
10. For the highest SAR test configurations also measure incident PD (total) using mmW near-field probe and total-field/power-density reconstruction method.
11. The PD test was performed with a 2 mm separation between probe sensor and EUT bottom surface, and totally five PD test is selected per each antenna. (Select highest SAR configurations to evaluate power density.)
12. Per equipment manufacturer guidance, power density was measured at d=2mm with the grid step (0.0625 λ) for determining compliance at d=2mm.
13. 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.
14. Per FCC guidance, for simultaneous transmission evaluation, using SAR sum and SPLSR for simultaneous transmit exclusion analyses and evaluations.

1.6 Positioning Procedure

Head SAR measurement statement



Phone position 1, “cheek” or “touch” position. The reference points for the right ear (RE), left ear (LE) and mouth (M), which define the reference plane for phone positioning.



Phone position 2, “tilted position.” The reference points for the right ear (RE), left ear (LE) and mouth (M), which define the reference plane for phone positioning.

Cheek/Touch Position:
The handset was brought toward the mouth of the head phantom by pivoting against the ear reference point until any point of the mouthpiece or keypad touched the phantom.
Ear/Tilt Position:
With the phone aligned in the Cheek/Touch position, the handset was tilted away from the mouth with respect to the test device reference point by 15 degrees.

1.7 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.

1.8 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:

1.8.1 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].

1.8.2 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.

1.9 SAR System Description and Setup

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

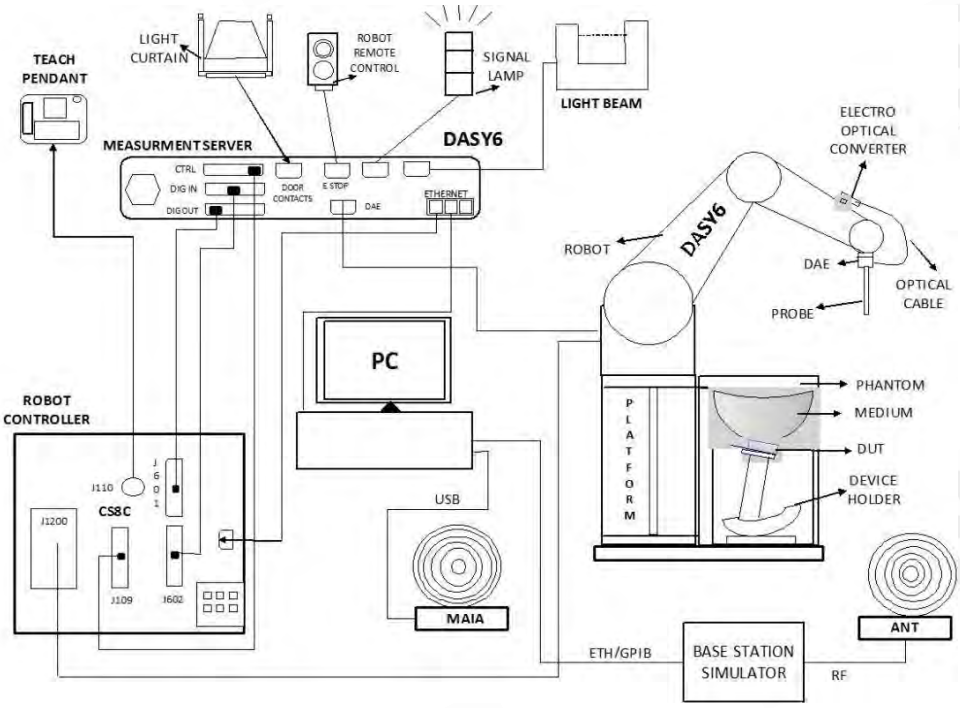


Fig. a A block diagram of the SAR measurement system

- 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.

1.9.1 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.

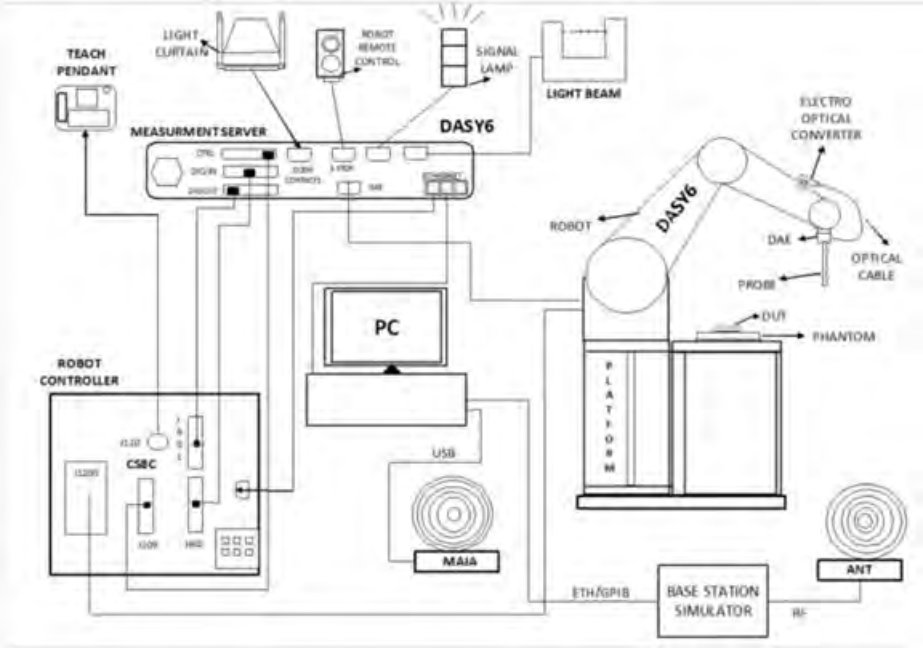
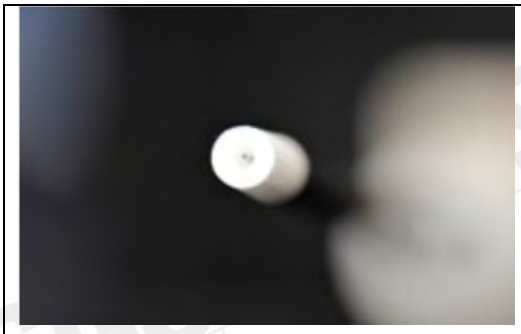
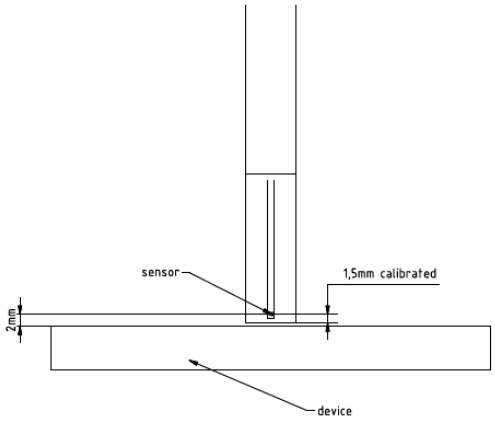


Fig-2.1 SPEAG DASY6 system

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

1.9.2 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 2450/5200/5300/5600/5800/6500/7000 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 (≤3G) or 10 cm (>3G) 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.

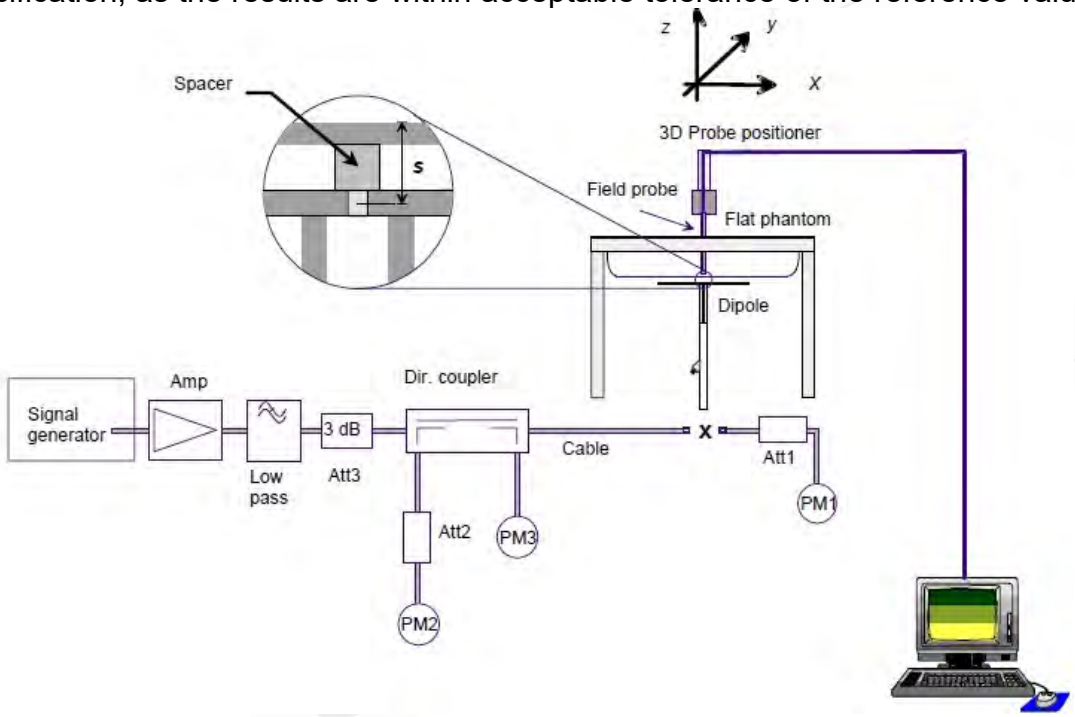


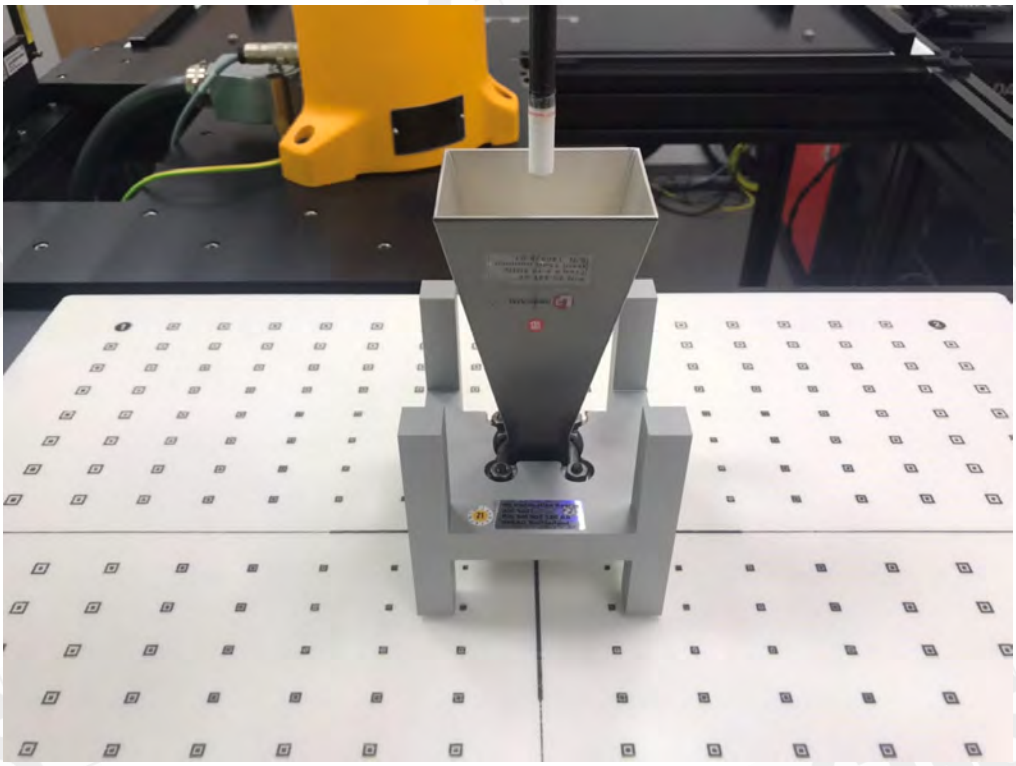
Fig. b The block diagram of system verification

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	13.00	52	-3.53%	Jun. 28, 2021
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	5200	Head	77.9	7.87	78.7	1.03%	Jun. 28, 2021
		5300	Head	80.4	8.10	81	0.75%	Jun. 29, 2021
		5600	Head	83.9	8.55	85.5	1.91%	Jun. 29, 2021
		5800	Head	80.9	8.04	80.4	-0.62%	Jun. 29, 2021
D6.5GHzV2	1006	6500	Head	291	29.90	299	2.75%	Jun. 27, 2021
D7GHzV2	1007	7000	Head	273	28.20	282	3.30%	Jun. 27, 2021

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	9548	877	10	74	41.5	42.3	-0.08	Jun. 28, 2021

1.9.3 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 (Frequency ≤3G) or ≥ 10 cm ± 5 mm (Frequency >3G) 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
Head	Jun, 28. 2021	2402	39.285	1.757	39.221	1.763	-0.16%	0.32%
		2412	39.268	1.766	39.191	1.774	-0.19%	0.44%
		2437	39.223	1.788	39.135	1.795	-0.22%	0.37%
		2441	39.216	1.792	39.127	1.798	-0.23%	0.33%
		2450	39.200	1.800	39.106	1.806	-0.24%	0.33%
		2462	39.185	1.813	39.082	1.816	-0.26%	0.16%
		2480	39.162	1.833	39.036	1.831	-0.32%	-0.09%
		5200	35.986	4.655	35.837	4.591	-0.41%	-1.37%
		5210	35.974	4.665	35.774	4.603	-0.56%	-1.33%
	Jun, 29. 2021	5290	35.883	4.747	35.566	4.717	-0.88%	-0.64%
		5300	35.871	4.758	35.549	4.727	-0.90%	-0.64%
		5530	35.609	4.993	35.036	4.991	-1.61%	-0.05%
		5600	35.529	5.065	34.872	5.077	-1.85%	0.24%
		5610	35.517	5.075	34.844	5.091	-1.90%	0.31%
		5690	35.426	5.157	34.691	5.183	-2.07%	0.50%
		5775	35.329	5.244	34.544	5.285	-2.22%	0.77%
		5800	35.300	5.270	34.513	5.316	-2.23%	0.87%
	Jun, 27. 2021	6025	35.043	5.501	34.474	5.589	-1.62%	1.60%
		6185	34.860	5.665	34.360	5.753	-1.43%	1.55%
		6345	34.677	5.829	34.122	5.909	-1.60%	1.37%
		6500	34.500	5.988	33.897	6.066	-1.75%	1.30%
		6505	34.494	5.993	33.968	6.107	-1.52%	1.90%
		6825	34.129	6.321	33.573	6.419	-1.63%	1.55%
		6985	33.946	6.485	33.290	6.600	-1.93%	1.77%
		7000	33.900	6.650	33.240	6.743	-1.95%	1.40%

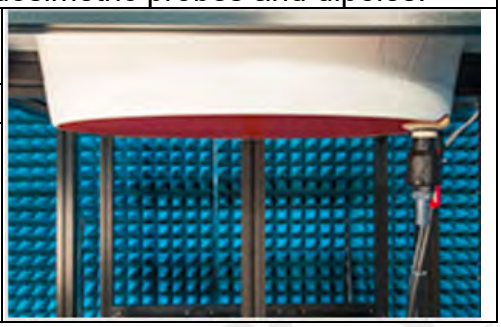
Table 2. Dielectric Parameters of Tissue Simulant Fluid

1.10 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 HSL2450/5200/5300/5600/5800/6500/7000 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

1.11 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

Notebook mode

Antenna	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	
Main	WLAN 802.11b	Bottom surface	0	1	2412	20.00	19.83	1.037	103.99%	0.087	0.094	-
		Bottom surface	0	6	2437	20.00	19.94	1.037	101.39%	0.152	0.160	-
		Bottom surface	0	11	2462	20.00	19.86	1.037	103.28%	0.240	0.257	68
	WLAN 802.11ac(80M) 5.2G	Bottom surface	0	42	5210	18.00	17.98	1.075	100.46%	0.828	0.894	69
		Bottom surface*	0	42	5210	18.00	17.98	1.075	100.46%	0.819	0.885	-
	WLAN 802.11ax(80M) 5.3G	Bottom surface	0	58	5290	18.00	17.91	1.042	102.09%	0.656	0.698	70
	WLAN 802.11ac(80M) 5.6G	Bottom surface	0	106	5530	18.00	17.99	1.075	100.23%	0.739	0.796	-
		Bottom surface	0	122	5610	18.00	18.00	1.075	100.00%	0.852	0.916	-
		Bottom surface	0	138	5690	18.00	17.97	1.075	100.69%	0.979	1.060	71
		Bottom surface*	0	138	5690	18.00	17.97	1.075	100.69%	0.965	1.045	-
	WLAN 802.11ac(80M) 5.8G	Bottom surface	0	155	5775	18.00	17.97	1.075	100.69%	0.910	0.985	72
		Bottom surface*	0	155	5775	18.00	17.97	1.075	100.69%	0.904	0.979	-
Aux	WLAN 802.11b	Bottom surface	0	1	2412	20.00	19.92	1.035	101.86%	0.261	0.275	-
		Bottom surface	0	6	2437	20.00	19.96	1.035	100.93%	0.285	0.298	-
		Bottom surface	0	11	2462	20.00	19.87	1.035	103.04%	0.315	0.336	73
	Bluetooth(GFSK)	Bottom surface	0	78	2480	11.50	11.32	1.339	104.35%	0.015	0.018	74
	WLAN 802.11ac(80M) 5.2G	Bottom surface	0	42	5210	18.00	17.98	1.081	100.46%	0.649	0.705	75
	WLAN 802.11ac(80M) 5.3G	Bottom surface	0	58	5290	18.00	17.96	1.081	100.93%	0.705	0.769	76
	WLAN 802.11ac(80M) 5.6G	Bottom surface	0	106	5530	18.00	17.97	1.081	100.69%	0.734	0.799	-
		Bottom surface	0	138	5690	18.00	17.99	1.081	100.23%	0.983	1.065	77
		Bottom surface*	0	138	5690	18.00	17.99	1.081	100.23%	0.977	1.059	-
	WLAN 802.11ac(80M) 5.8G	Bottom surface	0	155	5775	18.00	17.99	1.081	100.23%	1.000	1.084	78
		Bottom surface*	0	155	5775	18.00	17.99	1.081	100.23%	0.992	1.075	-

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

WIFI 6E 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		
WLAN 6E 802.11ac(160M) U-NII-5	Bottom Surface	0	15	6025	13.00	12.80	1.01	104.71%	0.326	0.346	0.284	79
	Bottom Surface	0	47	6185	13.00	12.88	1.01	102.80%	0.317	0.330	0.264	80
WLAN 6E 802.11ac(160M) U-NII-6	Bottom Surface	0	111	6505	13.00	12.73	1.01	106.41%	0.241	0.260	0.216	81
WLAN 6E 802.11ac(160M) U-NII-7	Bottom Surface	0	175	6825	13.00	12.98	1.01	100.46%	0.402	0.409	0.340	82
WLAN 6E 802.11ac(160M) U-NII-8	Bottom Surface	0	207	6985	13.00	12.63	1.01	108.89%	0.238	0.262	0.218	83

WIFI 6E 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		
WLAN 6E 802.11ac(160M) U-NII-5	Bottom Surface	0	15	6025	13.00	12.86	1.01	103.28%	0.297	0.310	0.248	84
	Bottom Surface	0	47	6185	13.00	12.98	1.01	100.46%	0.274	0.279	0.204	85
WLAN 6E 802.11ac(160M) U-NII-6	Bottom Surface	0	111	6505	13.00	12.76	1.01	105.68%	0.134	0.143	0.114	86
WLAN 6E 802.11ac(160M) U-NII-7	Bottom Surface	0	175	6825	13.00	12.95	1.01	101.16%	0.289	0.296	0.212	87
WLAN 6E 802.11ac(160M) U-NII-8	Bottom Surface	0	207	6985	13.00	12.70	1.01	107.15%	0.163	0.177	0.125	88

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	Duty Factor	Measurement uncertainty	PD result(4cm)				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 802.11ac(160M) U-NII-5	Bottom Surface	2	15	6025	13	12.80	104.71%	0.988	1.012	1.55	0.129	0.212	0.124	0.204	89
	Bottom Surface	2	47	6185	13	12.88	102.80%	0.988	1.012	1.55	0.202	0.326	0.185	0.298	90
WLAN 6E 802.11ac(160M) U-NII-6	Bottom Surface	2	111	6505	13	12.73	106.41%	0.988	1.012	1.55	0.165	0.275	0.154	0.257	91
WLAN 6E 802.11ac(160M) U-NII-7	Bottom Surface	2	175	6825	13	12.98	100.46%	0.988	1.012	1.55	0.219	0.345	0.208	0.328	92
WLAN 6E 802.11ac(160M) U-NII-8	Bottom Surface	2	207	6985	13	12.63	108.89%	0.988	1.012	1.55	0.072	0.123	0.050	0.085	93

Aux

Mode	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Tune-up Scaling	Duty Cycle	Duty Factor	Measurement uncertainty	PD result(4cm)				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 802.11ac(160M) U-NII-5	Bottom Surface	2	15	6025	13	12.86	103.28%	0.988	1.012	1.55	0.173	0.280	0.164	0.266	94
	Bottom Surface	2	47	6185	13	12.98	100.46%	0.988	1.012	1.55	0.209	0.329	0.177	0.279	95
WLAN 6E 802.11ac(160M) U-NII-6	Bottom Surface	2	111	6505	13	12.76	105.68%	0.988	1.012	1.55	0.117	0.194	0.110	0.182	96
WLAN 6E 802.11ac(160M) U-NII-7	Bottom Surface	2	175	6825	13	12.95	101.16%	0.988	1.012	1.55	0.165	0.262	0.156	0.248	97
WLAN 6E 802.11ac(160M) U-NII-8	Bottom Surface	2	207	6985	13	12.70	107.15%	0.988	1.012	1.55	0.136	0.229	0.124	0.208	98

Note:

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

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
2.4GHz WLAN MIMO	Yes
5GHz WLAN MIMO	Yes
6E WLAN MIMO	Yes
BT + 2.4GHz WLAN Main	Yes
BT + 5GHz WLAN Main	Yes
BT + 6E WLAN Main	Yes
BT + 5GHz WLAN MIMO	Yes
BT + 6E WLAN MIMO	Yes

Note:
1. Bluetooth and WLAN Aux share the same antenna path, and BT can transmit with WLAN 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

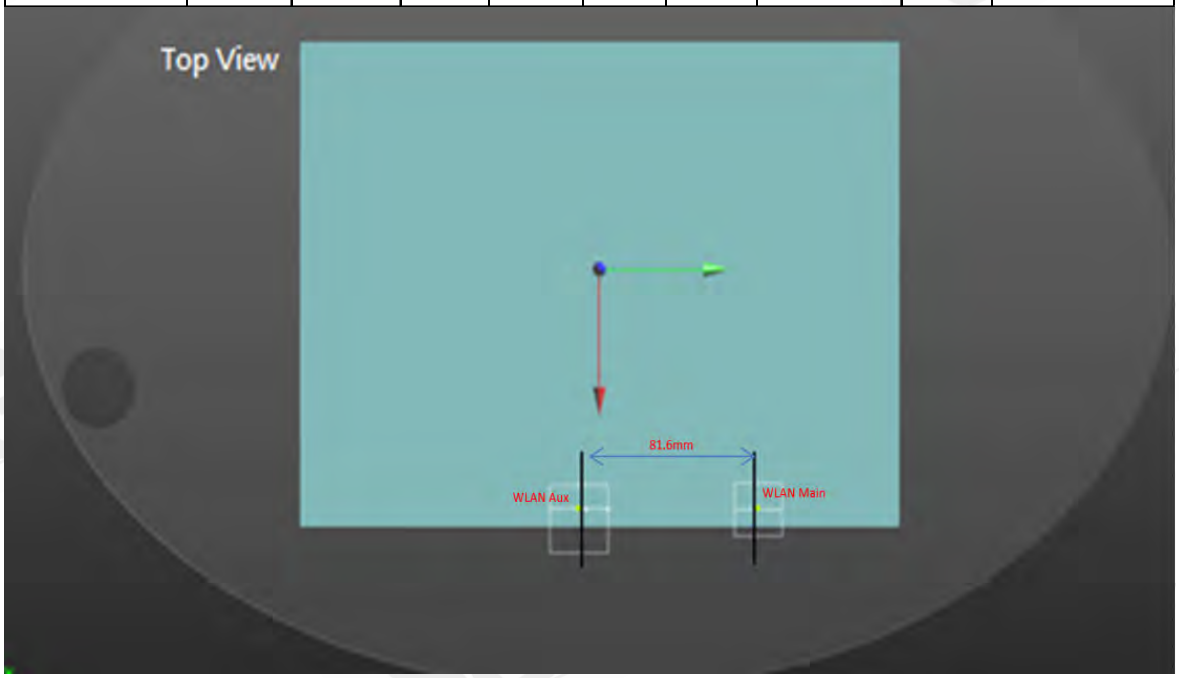
The simultaneous Transmission conditions (Notebook mode)

Exposure position 1g(W/kg)	1	2	3	4	5	6	7
	WLAN 2.4GHz Main	WLAN 2.4GHz Aux	WLAN 5GHz Main	WLAN 5GHz Aux	WLAN 6GHz Main	WLAN 6GHz Aux	BT (Aux)
Bottom Surface	0.257	0.336	1.060	1.084	0.409	0.307	0.018

Exposure position 1g(W/kg)	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8	SPLSR
	1+2 Sum	1+7 Sum	3+4 Sum	3+7 Sum	3+4+7 Sum	5+6 Sum	5+7 Sum	5+6+7 Sum	
Bottom Surface	0.593	0.275	2.144	1.078	2.162	0.716	0.427	0.734	Analyzed as below

WLAN 5Gz MIMO

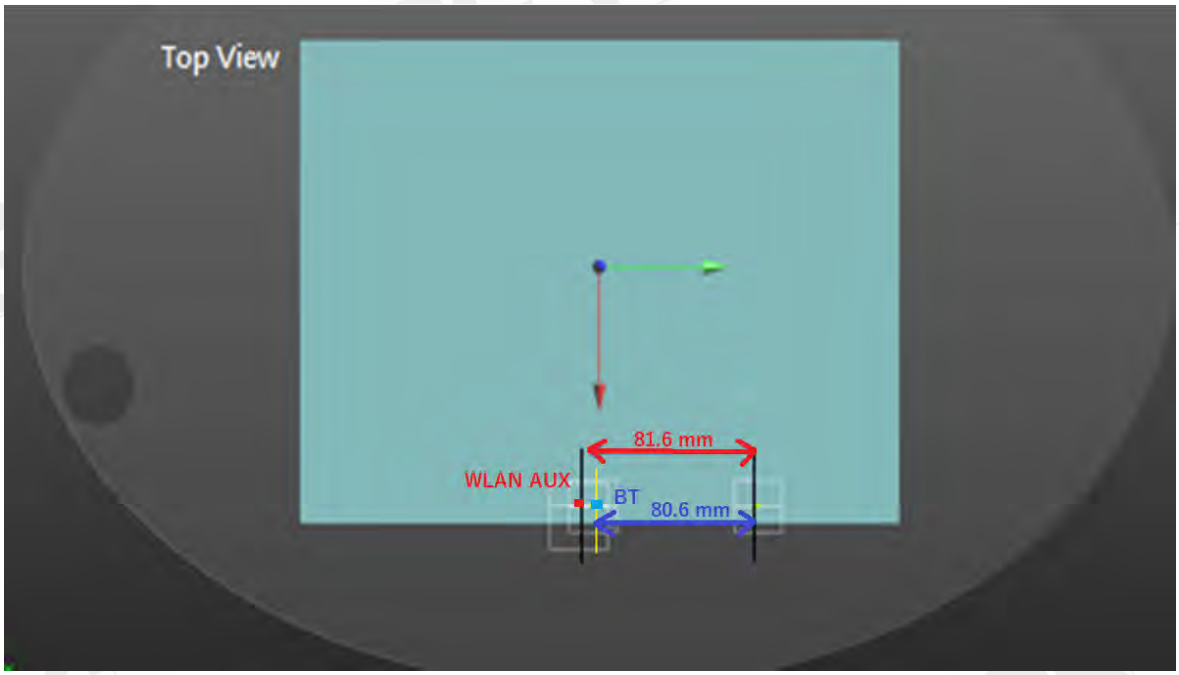
Conditions	Position	SAR Value (W/kg)	Coordinates (cm)			ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission SAR Test
			x	y	z				
WLAN 5G Main	Botttom Surface	1.060	10.82	8.02	-0.39	2.144	81.60	0.038	SPLSR ≤ 0.04, Not required
WLAN 5G Aux		1.084	10.82	-0.14	-0.43				



WLAN 5Gz MIMO + Bluetooth

Conditions	Position	SAR Value (W/kg)	Coordinates (cm)			ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission SAR Test
			x	y	z				
WLAN 5G Main	Botttom Surface	1.060	10.82	8.02	-0.39	2.162	80.61	0.039	SPLSR ≤ 0.04, Not required
WLAN 5G Aux+BT		1.102	10.94	-0.04	-0.43				

*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	7642	Mar.19,2021	Mar.18,2022
		EX3DV4	7466	Jan.29,2021	Jan.28,2022
		EUmmWV4	9548	Jan.28,2021	Jan.27,2022
SPEAG	System Validation Dipole	D2450V2	727	Apr.14,2021	Apr.13,2022
		D5GHzV2	1023	Jan.26.2021	Jan.25.2022
		D6.5GHzV2	1006	Aug.21,2020	Aug.20,2021
		D7GHzV2	1007	Aug.21,2020	Aug.20,2021
		5G-Veri10	1021	Jan.18,2021	Jan.17,2022
SPEAG	Data acquisition Electronics	DAE4	856	Apr.23,2021	Apr.22,2022
			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	1053	Feb.17,2021	Feb.16,2022
Agilent	Dual-directional coupler	772D	MY52180142	Oct.06,2020	Oct.05,2021
		778D	MY52180302	Oct.06,2020	Oct.05,2021
Agilent	Signal Generator	N5181A	MY50145142	Dec.27,2020	Dec.26,2021
Agilent	Power Meter	E4417A	MY52200004	Oct.18,2020	Oct.17,2021
Agilent	Power Sensor	E9301H	MY52240003	Oct.18,2020	Oct.17,2021
			MY52200003	Oct.18,2020	Oct.17,2021
TECPEL	Digital thermometer	DTM-303A	TP190085	Dec.22,2020	Dec.14,2021

Manufacturer	Device	Type	Serial number	Date of last calibration	Date of next calibration
Anritsu	Radio Communication Test	MT8821C	6262044739	Dec.02.2020	Dec.01.2021
R&S	Power Sensor	NRP18S	1429.0029K02-101973-em	Jun.24.2020	Jun.23.2021

5. Measurements

Date: 2021/6/28

Report No. :EN/2021/40017

WLAN 802.11b, Body, Bottom Surface, CH 11, Main, 0mm

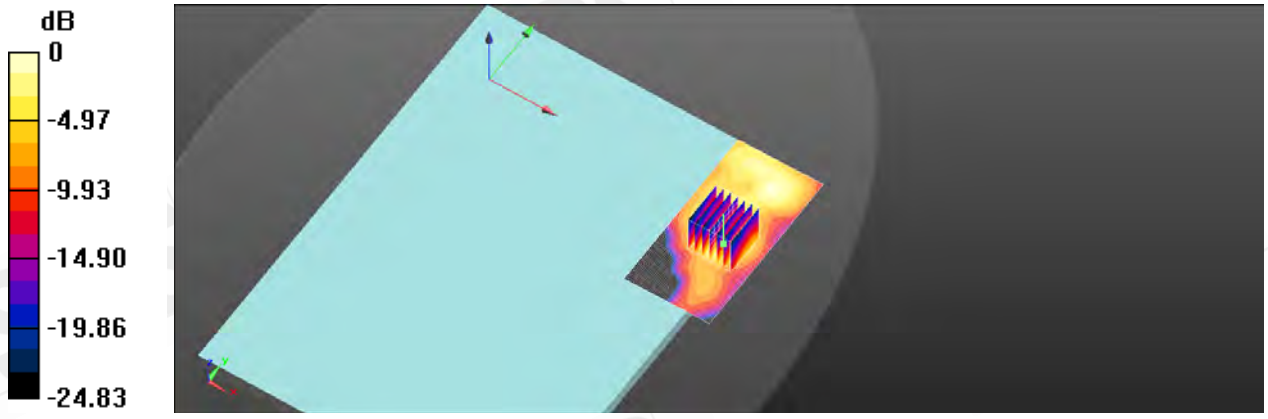
Communication System: WLAN 2.4G; Frequency: 2462 MHz; Duty cycle= 1:1.037
Medium parameters used: f = 2462 MHz; σ = 1.816 S/m; ε_r = 39.082; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 22.0°C; Liquid temperature: 22.2°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7642; ConvF(8.16, 8.16, 8.16) @ 2462 MHz; Calibrated: 2021/3/19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2021/4/23
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (51x101x1): Interpolated grid: dx=12 mm, dy=12 mm
Maximum value of SAR (interpolated) = 0.379 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.884 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.538 W/kg
SAR(1 g) = 0.240 W/kg; SAR(10 g) = 0.107 W/kg
Smallest distance from peaks to all points 3 dB below = 9.2 mm
Ratio of SAR at M2 to SAR at M1 = 45.6%
Maximum value of SAR (measured) = 0.385 W/kg



0 dB = 0.385 W/kg = -4.15 dBW/kg

Date: 2021/6/28

Report No. :EN/2021/40017

WLAN 802.11ac(80M) 5.2G, Body, Bottom Surface, CH 42, Main, 0mm

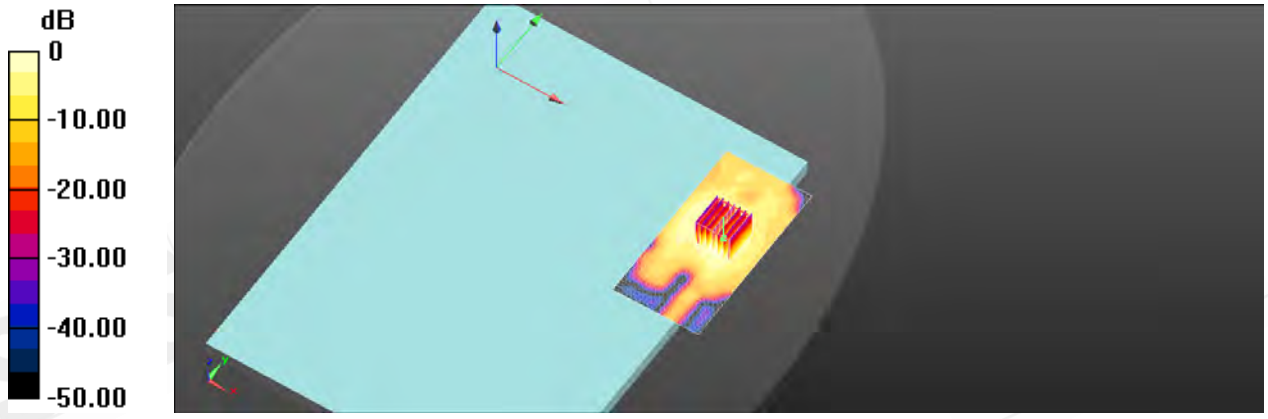
Communication System: WLAN 5G; Frequency: 5210 MHz; Duty cycle= 1:1.075
Medium parameters used: f = 5210 MHz; σ = 4.603 S/m; ε_r = 35.774; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 21.9°C; Liquid temperature: 22.1°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7642; ConvF(5.68, 5.68, 5.68) @ 5210 MHz; Calibrated: 2021/3/19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2021/4/23
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (61x121x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 1.51 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 7.663 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 2.97 W/kg
SAR(1 g) = 0.828 W/kg; SAR(10 g) = 0.287 W/kg
Smallest distance from peaks to all points 3 dB below = 8.4 mm
Ratio of SAR at M2 to SAR at M1 = 56.9%
Maximum value of SAR (measured) = 1.59 W/kg



0 dB = 1.59 W/kg = 2.01 dBW/kg

Date: 2021/6/29

Report No. :EN/2021/40017

WLAN 802.11ax(80M) 5.3G, Body, Bottom Surface, CH 58, Main, 0mm

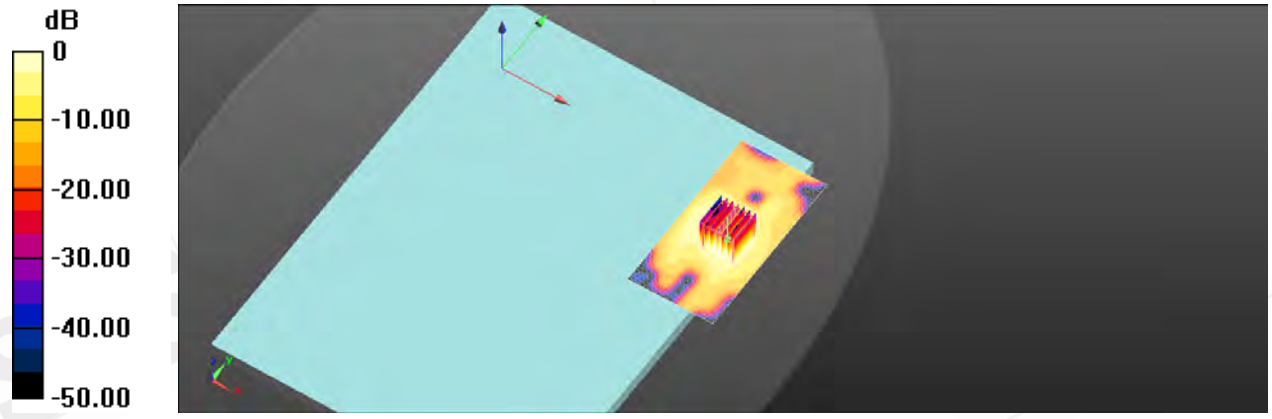
Communication System: WLAN 5G; Frequency: 5290 MHz; Duty cycle= 1:1.042
Medium parameters used: f = 5290 MHz; σ = 4.717 S/m; ε_r = 35.566; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 21.7°C; Liquid temperature: 21.9°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7642; ConvF(5.68, 5.68, 5.68) @ 5290 MHz; Calibrated: 2021/3/19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2021/4/23
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (61x121x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 1.20 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 5.248 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 2.37 W/kg
SAR(1 g) = 0.656 W/kg; SAR(10 g) = 0.230 W/kg
Smallest distance from peaks to all points 3 dB below = 8.8 mm
Ratio of SAR at M2 to SAR at M1 = 56.1%
Maximum value of SAR (measured) = 1.26 W/kg



0 dB = 1.26 W/kg = 1.00 dBW/kg

Date: 2021/6/29

Report No. :EN/2021/40017

WLAN 802.11ac(80M) 5.6G, Body, Bottom Surface, CH 138, Main, 0mm

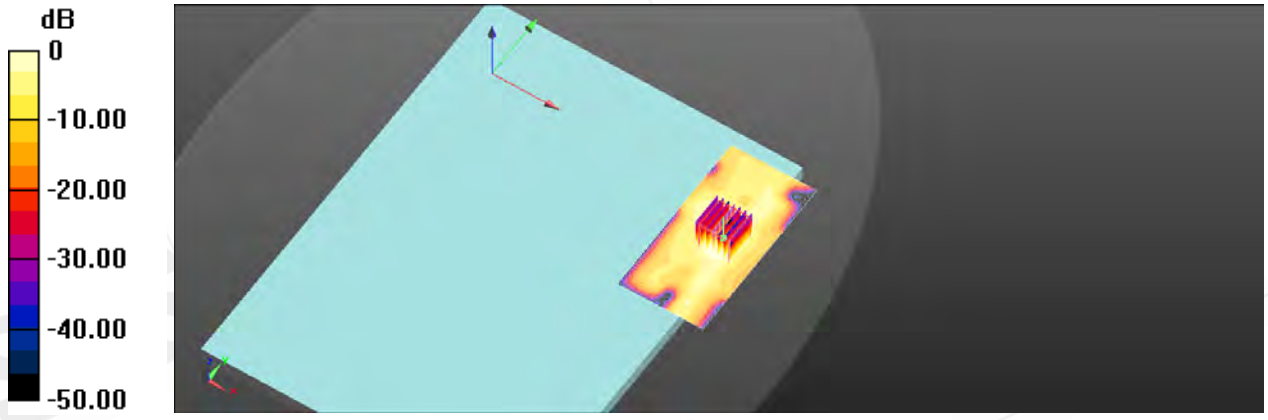
Communication System: WLAN 5G; Frequency: 5690 MHz; Duty cycle= 1:1.075
Medium parameters used: f = 5690 MHz; σ = 5.183 S/m; ε_r = 34.691; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 22.1°C; Liquid temperature: 22.3°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7642; ConvF(5.2, 5.2, 5.2) @ 5690 MHz; Calibrated: 2021/3/19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2021/4/23
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (61x121x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 2.57 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 9.058 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 4.12 W/kg
SAR(1 g) = 0.979 W/kg; SAR(10 g) = 0.323 W/kg
Smallest distance from peaks to all points 3 dB below = 7.2 mm
Ratio of SAR at M2 to SAR at M1 = 52.2%
Maximum value of SAR (measured) = 1.97 W/kg



0 dB = 1.97 W/kg = 2.94 dBW/kg

Date: 2021/6/29

Report No. :EN/2021/40017

WLAN 802.11ac(80M) 5.8G, Body, Bottom Surface, CH 155, Main, 0mm

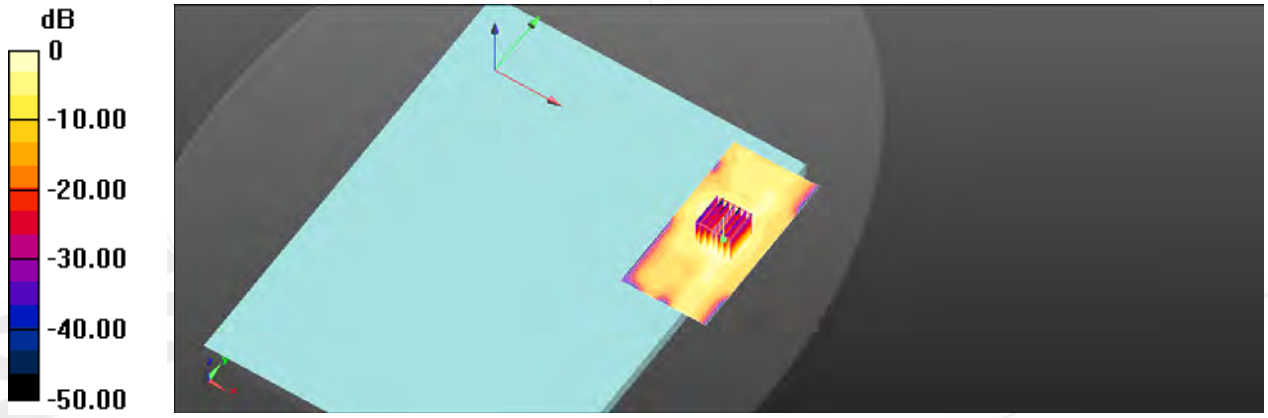
Communication System: WLAN 5G; Frequency: 5775 MHz; Duty cycle= 1:1.075
Medium parameters used: f = 5775 MHz; σ = 5.285 S/m; ε_r = 34.544; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 21.8°C; Liquid temperature: 22.0°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7642; ConvF(5.2, 5.2, 5.2) @ 5775 MHz; Calibrated: 2021/3/19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2021/4/23
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (61x121x1): 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 = 8.067 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 3.81 W/kg
SAR(1 g) = 0.910 W/kg; SAR(10 g) = 0.302 W/kg
Smallest distance from peaks to all points 3 dB below = 8 mm
Ratio of SAR at M2 to SAR at M1 = 51.8%
Maximum value of SAR (measured) = 1.83 W/kg



0 dB = 1.83 W/kg = 2.62 dBW/kg

Date: 2021/6/28

Report No. :EN/2021/40017

WLAN 802.11b, Body, Bottom Surface, CH 11, Aux, 0mm

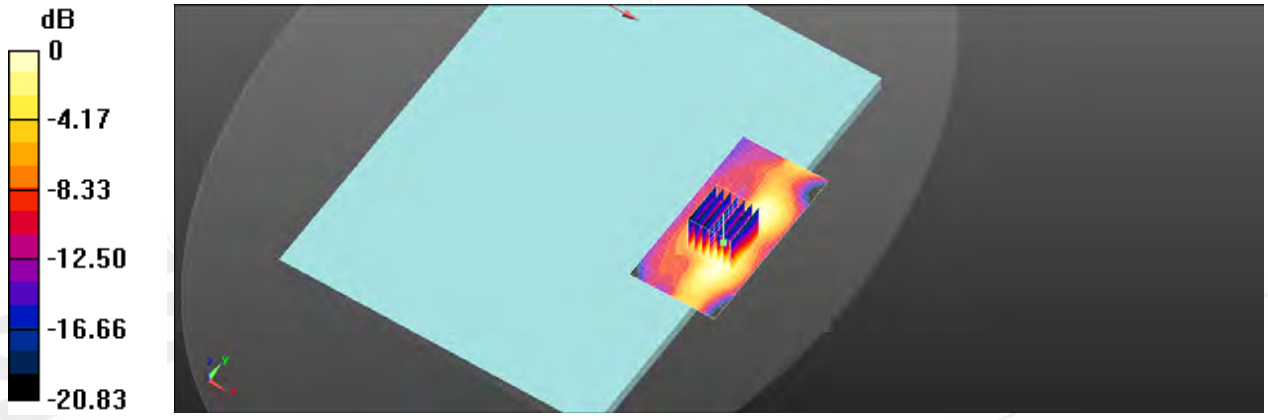
Communication System: WLAN 2.4G; Frequency: 2462 MHz; Duty cycle= 1:1.035
Medium parameters used: f = 2462 MHz; σ = 1.816 S/m; ε_r = 39.082; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 22.0°C; Liquid temperature: 22.2°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7642; ConvF(8.16, 8.16, 8.16) @ 2462 MHz; Calibrated: 2021/3/19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2021/4/23
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (51x101x1): Interpolated grid: dx=12 mm, dy=12 mm
Maximum value of SAR (interpolated) = 0.464 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.924 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 0.721 W/kg
SAR(1 g) = 0.315 W/kg; SAR(10 g) = 0.149 W/kg
Smallest distance from peaks to all points 3 dB below = 10.4 mm
Ratio of SAR at M2 to SAR at M1 = 43.9%
Maximum value of SAR (measured) = 0.497 W/kg



0 dB = 0.497 W/kg = -3.04 dBW/kg

Date: 2021/6/28

Report No. :EN/2021/40017

Bluetooth(GFSK), Body, Bottom Surface, CH 78, 0mm

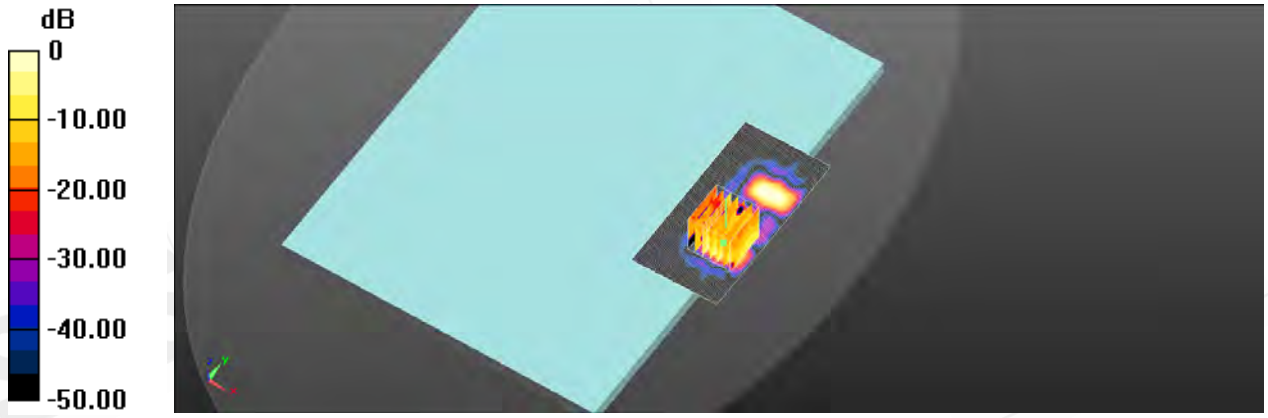
Communication System: Bluetooth; Frequency: 2480 MHz; Duty cycle= 1:1.339
Medium parameters used: f = 2480 MHz; σ = 1.831 S/m; ε_r = 39.036; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 22.0°C; Liquid temperature: 22.2°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7642; ConvF(8.16, 8.16, 8.16) @ 2480 MHz; Calibrated: 2021/3/19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2021/4/23
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (51x101x1): Interpolated grid: dx=12 mm, dy=12 mm
Maximum value of SAR (interpolated) = 0.0411 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.205 V/m; Power Drift = 0.17 dB
Peak SAR (extrapolated) = 0.0830 W/kg
SAR(1 g) = 0.015 W/kg; SAR(10 g) = 0.00487 W/kg
Smallest distance from peaks to all points 3 dB below: Larger than measurement grid
Ratio of SAR at M2 to SAR at M1 = 36.5%
Maximum value of SAR (measured) = 0.0320 W/kg



0 dB = 0.0320 W/kg = -14.95 dBW/kg

Date: 2021/6/28

Report No. :EN/2021/40017

WLAN 802.11ac(80M) 5.2G, Body, Bottom Surface, CH 42, Aux, 0mm

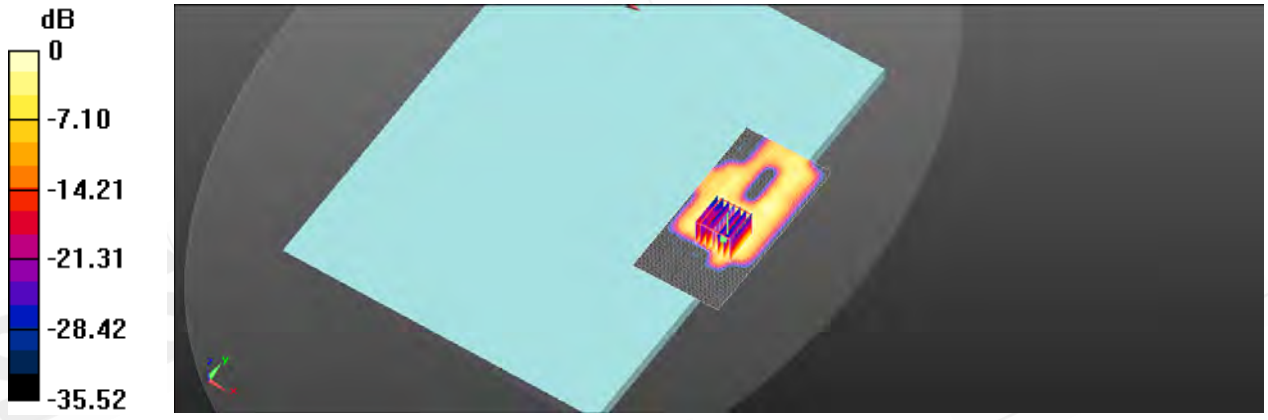
Communication System: WLAN 5G; Frequency: 5210 MHz; Duty cycle= 1:1.081
Medium parameters used: f = 5210 MHz; σ = 4.603 S/m; ε_r = 35.774; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 21.9°C; Liquid temperature: 22.1°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7642; ConvF(5.68, 5.68, 5.68) @ 5210 MHz; Calibrated: 2021/3/19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2021/4/23
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (61x121x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 1.36 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 5.826 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 2.51 W/kg
SAR(1 g) = 0.649 W/kg; SAR(10 g) = 0.200 W/kg
Smallest distance from peaks to all points 3 dB below = 7.9 mm
Ratio of SAR at M2 to SAR at M1 = 54.8%
Maximum value of SAR (measured) = 1.28 W/kg



0 dB = 1.28 W/kg = 1.07 dBW/kg

Date: 2021/6/29

Report No. :EN/2021/40017

WLAN 802.11ac(80M) 5.3G, Body, Bottom Surface, CH 58, Aux, 0mm

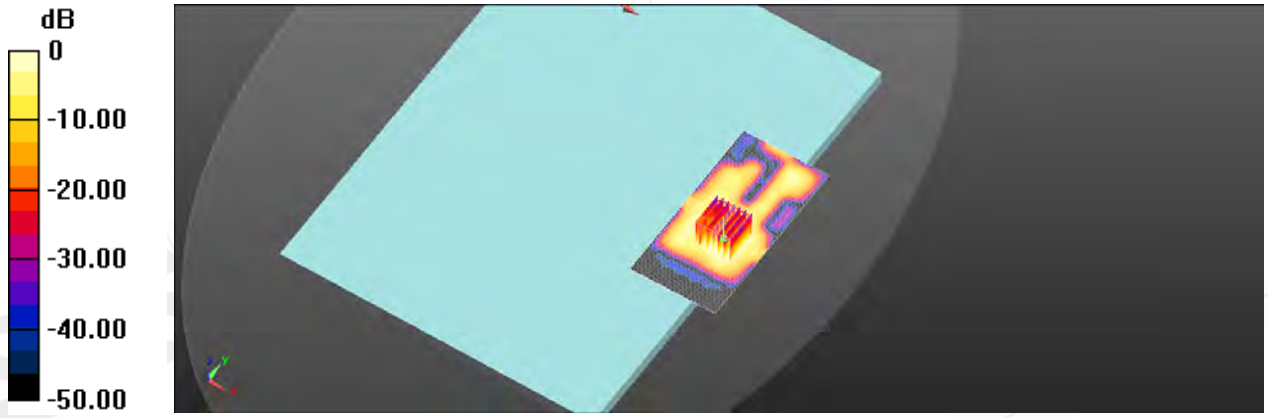
Communication System: WLAN 5G; Frequency: 5290 MHz; Duty cycle= 1:1.081
Medium parameters used: f = 5290 MHz; σ = 4.717 S/m; ε_r = 35.566; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 21.7°C; Liquid temperature: 21.9°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7642; ConvF(5.68, 5.68, 5.68) @ 5290 MHz; Calibrated: 2021/3/19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2021/4/23
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (61x121x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 1.29 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 6.628 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 2.81 W/kg
SAR(1 g) = 0.705 W/kg; SAR(10 g) = 0.225 W/kg
Smallest distance from peaks to all points 3 dB below = 7.6 mm
Ratio of SAR at M2 to SAR at M1 = 53.9%
Maximum value of SAR (measured) = 1.39 W/kg



0 dB = 1.39 W/kg = 1.43 dBW/kg

Date: 2021/6/29

Report No. :EN/2021/40017

WLAN 802.11ac(80M) 5.6G, Body, Bottom Surface, CH 138, Aux, 0mm

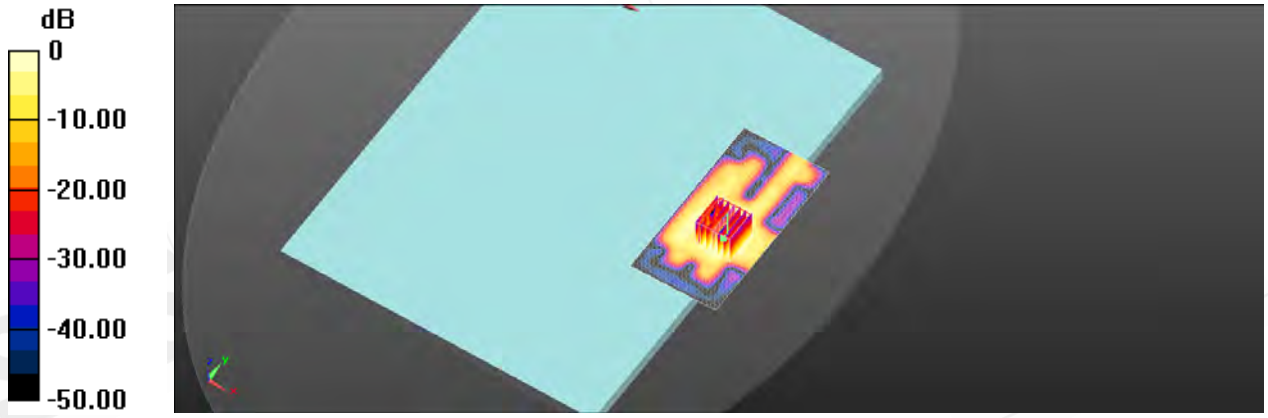
Communication System: WLAN 5G; Frequency: 5690 MHz; Duty cycle= 1:1.081
Medium parameters used: f = 5690 MHz; σ = 5.183 S/m; ε_r = 34.691; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 22.1°C; Liquid temperature: 22.3°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7642; ConvF(5.2, 5.2, 5.2) @ 5690 MHz; Calibrated: 2021/3/19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2021/4/23
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (61x121x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 1.88 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 8.507 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 4.26 W/kg
SAR(1 g) = 0.983 W/kg; SAR(10 g) = 0.321 W/kg
Smallest distance from peaks to all points 3 dB below = 7.4 mm
Ratio of SAR at M2 to SAR at M1 = 51.6%
Maximum value of SAR (measured) = 1.89 W/kg



0 dB = 1.89 W/kg = 2.76 dBW/kg

Date: 2021/6/29

Report No. :EN/2021/40017

WLAN 802.11ac(80M) 5.8G, Body, Bottom Surface, CH 155, Aux, 0mm

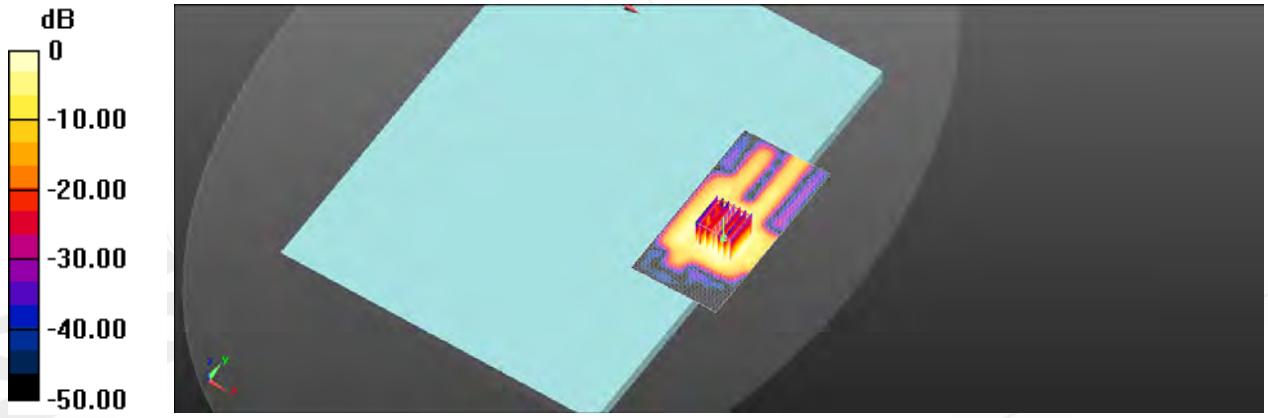
Communication System: WLAN 5G; Frequency: 5775 MHz; Duty cycle= 1:1.081
Medium parameters used: f = 5775 MHz; σ = 5.285 S/m; ε_r = 34.544; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 21.8°C; Liquid temperature: 22.0°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7642; ConvF(5.2, 5.2, 5.2) @ 5775 MHz; Calibrated: 2021/3/19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2021/4/23
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (61x121x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 1.91 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 9.372 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 4.32 W/kg
SAR(1 g) = 1.000 W/kg; SAR(10 g) = 0.326 W/kg
Smallest distance from peaks to all points 3 dB below = 7.4 mm
Ratio of SAR at M2 to SAR at M1 = 51.1%
Maximum value of SAR (measured) = 1.96 W/kg



0 dB = 1.96 W/kg = 2.92 dBW/kg

Report No. :EN/2021/40017
Measurement Report for Device, BACK, U-NII-5, IEEE 802.11ac (160MHz, MCS0, 90pc duty cycle), Channel 15 (6025.0 MHz)_Main

Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Framework,	298.0 x 2350.0 x 13.0		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	BACK, 2.00	U-NII-5	WLAN, 10755-AAC	6025.0, 15	5.7	5.59	34.5

Hardware Setup

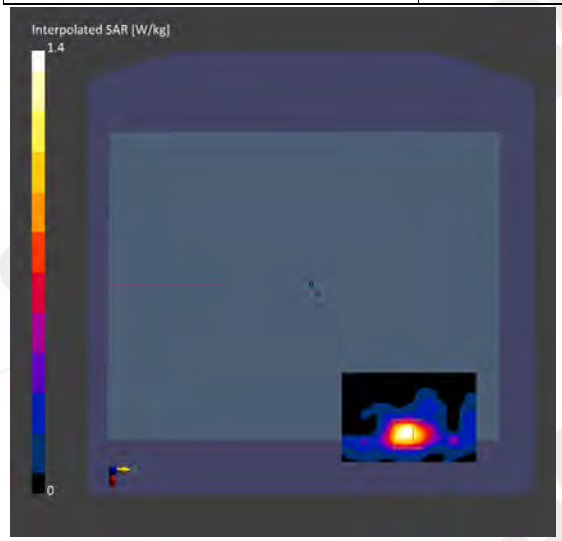
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V5.0 (20deg probe tilt) - 1141	HBBL-600-10000 ,2021-Jun-27	EX3DV4 - SN7466, 2021-01-29	DAE4 Sn877, 2021-03-22

Scans Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	68.0 x 102.0	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	2021-06-27, 10:35	2021-06-27, 10:47
psSAR1g [W/Kg]	0.292	0.326
psSAR10g [W/Kg]	0.101	0.107
Power Drift [dB]	-0.01	0.10
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	No correction	No correction
M2/M1 [%]		54.2
Dist 3dB Peak [mm]		7.8



Report No. :EN/2021/40017
Measurement Report for Device, BACK, U-NII-5, IEEE 802.11ac (160MHz, MCS0, 90pc duty cycle), Channel 47 (6185.0 MHz)_Main

Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Framework,	298.0 x 2350.0 x 13.0		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	BACK, 2.00	U-NII-5	WLAN, 10755-AAC	6185.0, 47	5.7	5.75	34.4

Hardware Setup

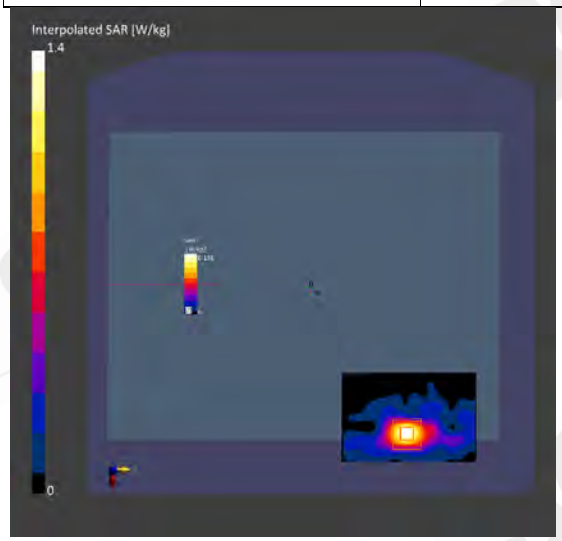
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V5.0 (20deg probe tilt) - 1141	HBBL-600-10000 ,2021-Jun-27	EX3DV4 - SN7466, 2021-01-29	DAE4 Sn877, 2021-03-22

Scans Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	68.0 x 102.0	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	2021-06-27, 11:01	2021-06-27, 11:12
psSAR1g [W/Kg]	0.269	0.317
psSAR10g [W/Kg]	0.090	0.101
Power Drift [dB]	-0.06	-0.08
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	No correction	No correction
M2/M1 [%]		52.7
Dist 3dB Peak [mm]		7.5



Report No. :EN/2021/40017
Measurement Report for Device, BACK, U-NII-6, IEEE 802.11ac (160MHz, MCS0, 90pc duty cycle), Channel 111 (6505.0 MHz)_Main

Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Framework,	298.0 x 2350.0 x 13.0		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	BACK, 2.00	U-NII-6	WLAN, 10755-AAC	6505.0, 111	5.7	6.11	34.0

Hardware Setup

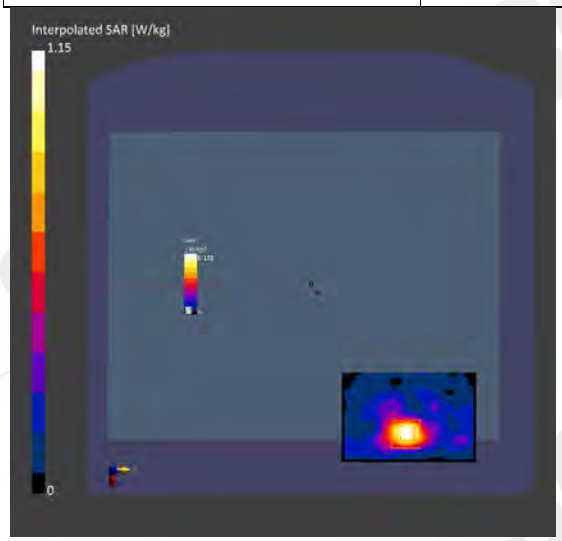
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V5.0 (20deg probe tilt) - 1141	HBBL-600-10000 ,2021-Jun-27	EX3DV4 - SN7466, 2021-01-29	DAE4 Sn877, 2021-03-22

Scans Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	68.0 x 102.0	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	2021-06-27, 11:37	2021-06-27, 11:48
psSAR1g [W/Kg]	0.210	0.241
psSAR10g [W/Kg]	0.072	0.081
Power Drift [dB]	-0.17	0.12
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	No correction	No correction
M2/M1 [%]		51.9
Dist 3dB Peak [mm]		8.2



Report No. :EN/2021/40017
Measurement Report for Device, BACK, U-NII-7, IEEE 802.11ac (160MHz, MCS0, 90pc duty cycle), Channel 175 (6825.0 MHz)_Main

Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Framework,	298.0 x 2350.0 x 13.0		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	BACK, 2.00	U-NII-7	WLAN, 10755-AAC	6825.0, 175	5.7	6.42	33.6

Hardware Setup

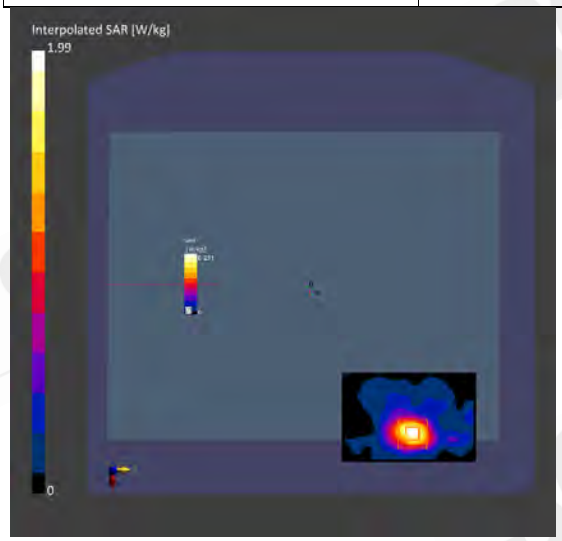
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V5.0 (20deg probe tilt) - 1141	HBBL-600-10000 ,2021-Jun-27	EX3DV4 - SN7466, 2021-01-29	DAE4 Sn877, 2021-03-22

Scans Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	68.0 x 102.0	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	2021-06-27, 12:22	2021-06-27, 12:41
psSAR1g [W/Kg]	0.370	0.402
psSAR10g [W/Kg]	0.125	0.133
Power Drift [dB]	0.04	-0.04
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	No correction	No correction
M2/M1 [%]		50.8
Dist 3dB Peak [mm]		8.4



Report No. :EN/2021/40017
Measurement Report for Device, BACK, U-NII-8, IEEE 802.11ac (160MHz, MCS0, 90pc duty cycle), Channel 207 (6985.0 MHz)_Main

Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Framework,	298.0 x 2350.0 x 13.0		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	BACK, 2.00	U-NII-8	WLAN, 10755-AAC	6985.0, 207	5.85	6.60	33.3

Hardware Setup

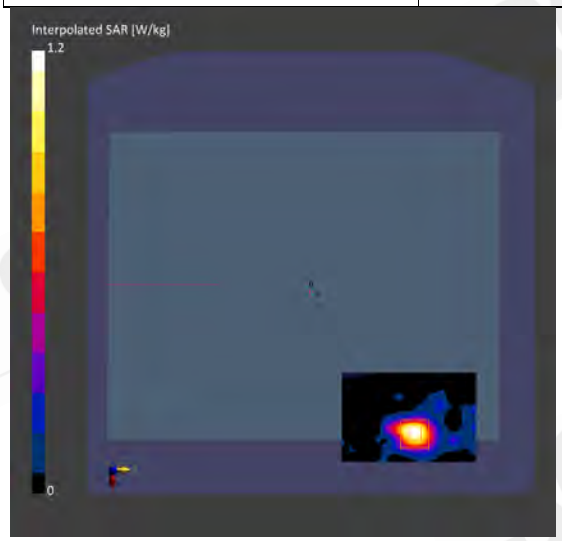
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V5.0 (20deg probe tilt) - 1141	HBBL-600-10000 ,2021-Jun-27	EX3DV4 - SN7466, 2021-01-29	DAE4 Sn877, 2021-03-22

Scans Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	68.0 x 102.0	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	2021-06-27, 13:31	2021-06-27, 13:59
psSAR1g [W/Kg]	0.216	0.238
psSAR10g [W/Kg]	0.073	0.079
Power Drift [dB]	-0.04	-0.15
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	No correction	No correction
M2/M1 [%]		45.6
Dist 3dB Peak [mm]		8.8



Report No. :EN/2021/40017
Measurement Report for Device, BACK, U-NII-5, IEEE 802.11ac (160MHz, MCS0, 90pc duty cycle), Channel 15 (6025.0 MHz)_Aux

Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Framework,	298.0 x 2350.0 x 13.0		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	BACK, 2.00	U-NII-5	WLAN, 10755-AAC	6025.0, 15	5.7	5.59	34.5

Hardware Setup

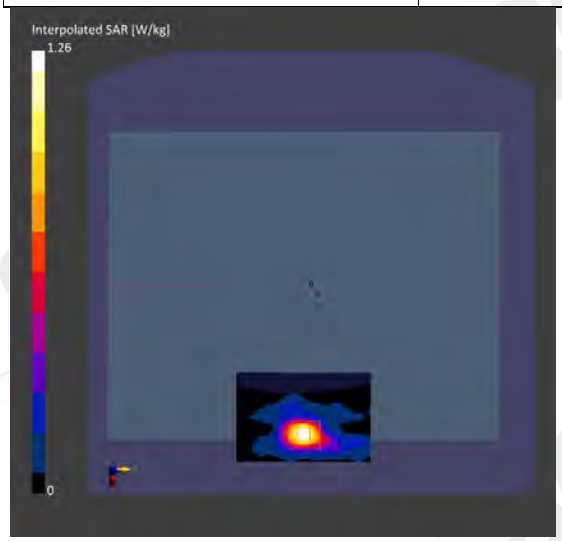
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V5.0 (20deg probe tilt) - 1141	HBBL-600-10000 ,2021-Jun-27	EX3DV4 - SN7466, 2021-01-29	DAE4 Sn877, 2021-03-22

Scans Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	68.0 x 102.0	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	2021-06-27, 14:22	2021-06-27, 14:53
psSAR1g [W/Kg]	0.253	0.297
psSAR10g [W/Kg]	0.086	0.095
Power Drift [dB]	0.08	-0.04
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	No correction	No correction
M2/M1 [%]		53.7
Dist 3dB Peak [mm]		7.1



Report No. :EN/2021/40017
Measurement Report for Device, BACK, U-NII-5, IEEE 802.11ac (160MHz, MCS0, 90pc duty cycle), Channel 47 (6185.0 MHz)_Aux

Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Framework,	298.0 x 2350.0 x 13.0		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	BACK, 2.00	U-NII-5	WLAN, 10755-AAC	6185.0, 47	5.7	5.75	34.4

Hardware Setup

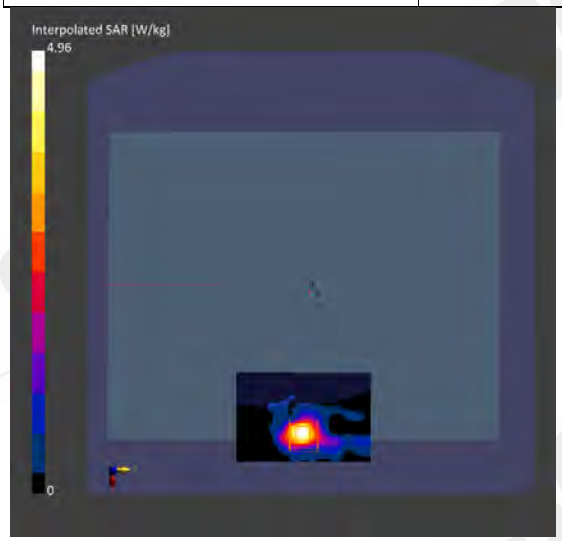
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V5.0 (20deg probe tilt) - 1141	HBBL-600-10000 ,2021-Jun-27	EX3DV4 - SN7466, 2021-01-29	DAE4 Sn877, 2021-03-22

Scans Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	68.0 x 102.0	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	2021-06-27, 15:56	2021-06-27, 16:25
psSAR1g [W/Kg]	0.255	0.274
psSAR10g [W/Kg]	0.083	0.080
Power Drift [dB]	-0.04	-0.04
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	No correction	No correction
M2/M1 [%]		53.0
Dist 3dB Peak [mm]		7.8



Report No. :EN/2021/40017
Measurement Report for Device, BACK, U-NII-6, IEEE 802.11ac (160MHz, MCS0, 90pc duty cycle), Channel 111 (6505.0 MHz)_Aux

Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Framework,	298.0 x 2350.0 x 13.0		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	BACK, 2.00	U-NII-6	WLAN, 10755-AAC	6505.0, 111	5.7	6.11	34.0

Hardware Setup

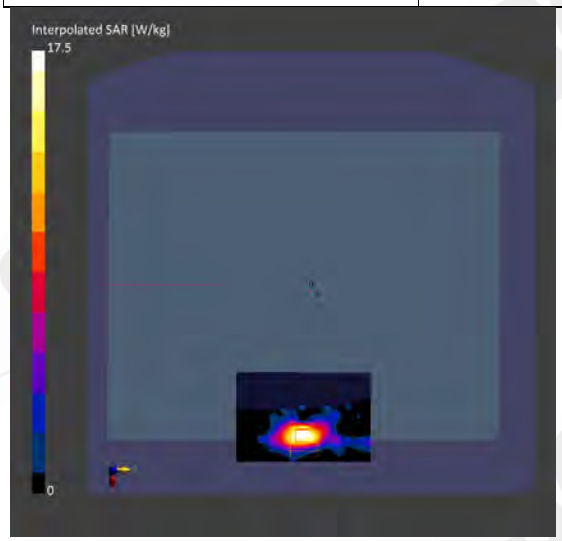
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V5.0 (20deg probe tilt) - 1141	HBBL-600-10000 ,2021-Jun-27	EX3DV4 - SN7466, 2021-01-29	DAE4 Sn877, 2021-03-22

Scans Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	68.0 x 102.0	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	2021-06-27, 17:04	2021-06-27, 17:21
psSAR1g [W/Kg]	0.132	0.134
psSAR10g [W/Kg]	0.044	0.043
Power Drift [dB]	0.15	-0.19
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	No correction	No correction
M2/M1 [%]		39.6
Dist 3dB Peak [mm]		7.3



Report No. :EN/2021/40017
Measurement Report for Device, BACK, U-NII-7, IEEE 802.11ac (160MHz, MCS0, 90pc duty cycle), Channel 175 (6825.0 MHz)_Aux

Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Framework,	298.0 x 2350.0 x 13.0		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	BACK, 2.00	U-NII-7	WLAN, 10755-AAC	6825.0, 175	5.7	6.42	33.6

Hardware Setup

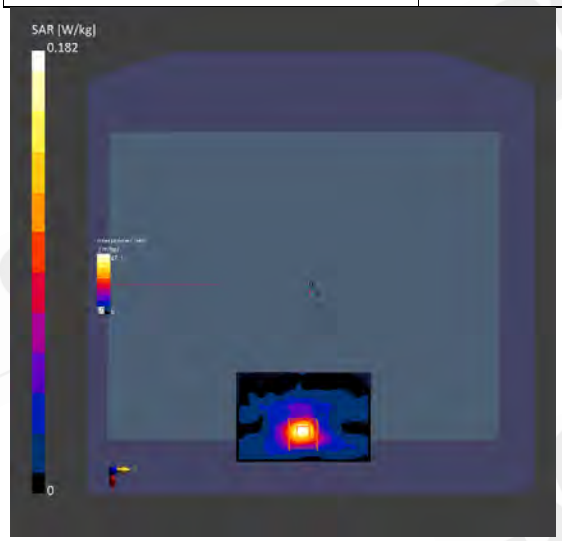
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V5.0 (20deg probe tilt) - 1141	HBBL-600-10000 ,2021-Jun-27	EX3DV4 - SN7466, 2021-01-29	DAE4 Sn877, 2021-03-22

Scans Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	68.0 x 102.0	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	2021-06-27, 18:12	2021-06-27, 18:42
psSAR1g [W/Kg]	0.290	0.289
psSAR10g [W/Kg]	0.092	0.083
Power Drift [dB]	-0.05	0.08
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	No correction	No correction
M2/M1 [%]		50.4
Dist 3dB Peak [mm]		7.5



Report No. :EN/2021/40017
Measurement Report for Device, BACK, U-NII-8, IEEE 802.11ac (160MHz, MCS0, 90pc duty cycle), Channel 207 (6985.0 MHz)_Aux

Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Framework,	298.0 x 2350.0 x 13.0		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	BACK, 2.00	U-NII-8	WLAN, 10755-AAC	6985.0, 207	5.85	6.60	33.3

Hardware Setup

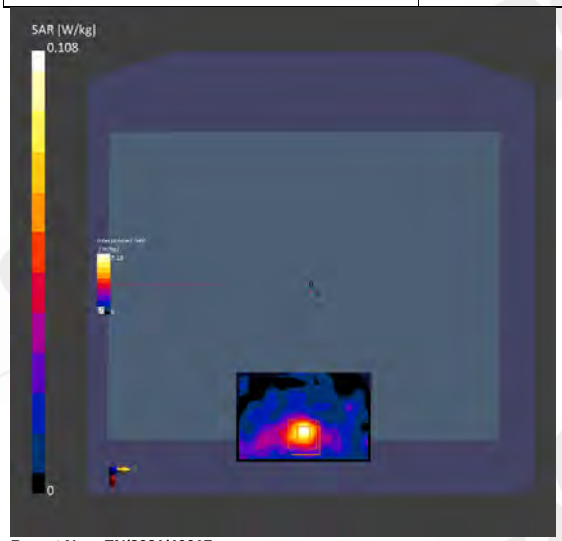
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V5.0 (20deg probe tilt) - 1141	HBBL-600-10000 ,2021-Jun-27	EX3DV4 - SN7466, 2021-01-29	DAE4 Sn877, 2021-03-22

Scans Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	68.0 x 102.0	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	2021-06-27, 19:33	2021-06-27, 20:09
psSAR1g [W/Kg]	0.159	0.163
psSAR10g [W/Kg]	0.050	0.046
Power Drift [dB]	0.17	-0.16
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	No correction	No correction
M2/M1 [%]		48.8
Dist 3dB Peak [mm]		6.8



Report No. : EN/2021/40017

Measurement Report for Framework, Bottom, U-NII-5, IEEE 802.11ac (160MHz, MCS0, 90pc duty cycle), Channel 15 (6025.0 MHz)_Main

Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Framework,	298.0 x 235.0 x 13.0		Laptop

Exposure Conditions

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

Hardware Setup

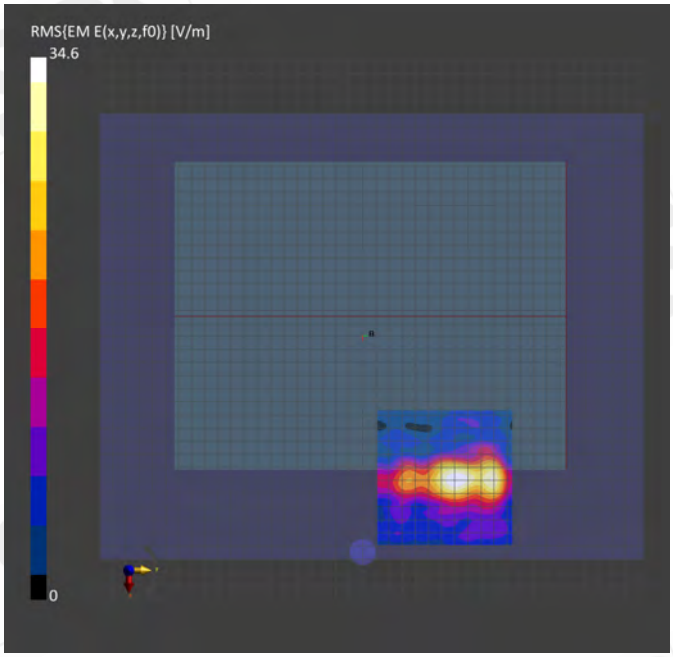
Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave - 1076	Air -	EUmmWV4 - SN9548_F1-55GHz, 2021-04-01	DAE4 Sn877, 2021-03-22

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	2021-06-28, 17:14
Avg. Area [cm²]	4.00
psPDn+ [W/m²]	1.24
psPDtot+ [W/m²]	1.29
psPDmod+ [W/m²]	1.52
E_{max} [V/m]	34.6
Power Drift [dB]	-0.18



Report No. : EN/2021/40017
Measurement Report for Framework, Bottom, U-NII-5, IEEE 802.11ac (160MHz, MCS0, 90pc duty cycle), Channel 47 (6185.0 MHz)_Main

Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Framework,	298.0 x 235.0 x 13.0		Laptop

Exposure Conditions

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

Hardware Setup

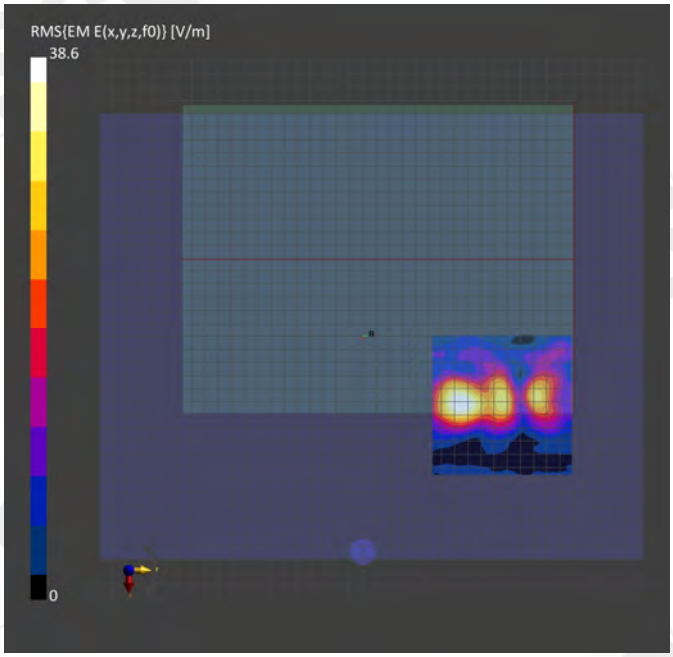
Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave - 1076	Air -	EUmmWV4 - SN9548_F1-55GHz, 2021-04-01	DAE4 Sn877, 2021-03-22

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	2021-06-29, 16:54
Avg. Area [cm²]	4.00
psPDn+ [W/m²]	1.85
psPDtot+ [W/m²]	2.02
psPDmod+ [W/m²]	2.12
E_{max} [V/m]	38.6
Power Drift [dB]	0.01



Report No. : EN/2021/40017
Measurement Report for Framework, Bottom, U-NII-6, IEEE 802.11ac (160MHz, MCS0, 90pc duty cycle), Channel 111 (6505.0 MHz)_Main

Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Framework,	298.0 x 235.0 x 13.0		Laptop

Exposure Conditions

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

Hardware Setup

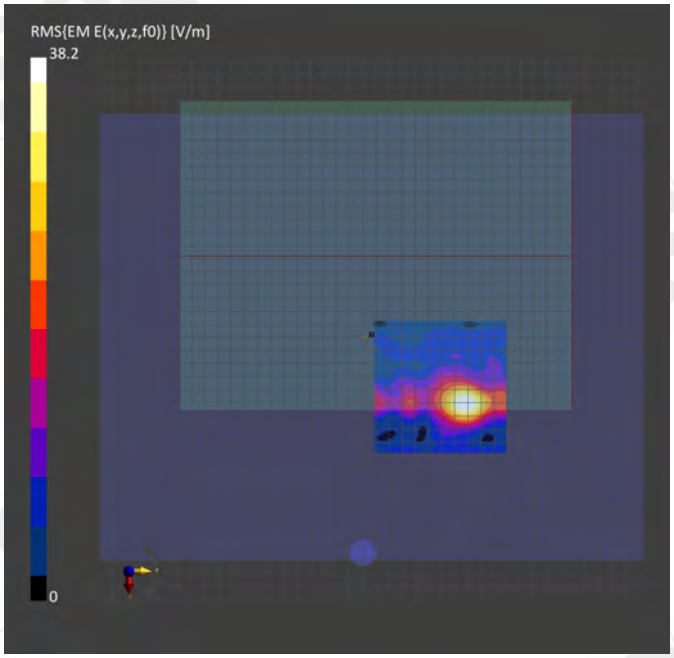
Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave - 1076	Air -	EUmmWV4 - SN9548_F1-55GHz, 2021-04-01	DAE4 Sn877, 2021-03-22

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	2021-06-29, 21:00
Avg. Area [cm²]	4.00
psPDn+ [W/m²]	1.54
psPDtot+ [W/m²]	1.65
psPDmod+ [W/m²]	1.84
E_{max} [V/m]	38.2
Power Drift [dB]	0.11



Report No. : EN/2021/40017
Measurement Report for Framework, Bottom, U-NII-7, IEEE 802.11ac (160MHz, MCS0, 90pc duty cycle), Channel 175 (6825.0 MHz)_Main

Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Framework,	298.0 x 235.0 x 13.0		Laptop

Exposure Conditions

Phantom Section	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor
5G Air	Bottom, 2.00	U-NII-7	WLAN, 10755-AAC	6825.0, 175	1.0

Hardware Setup

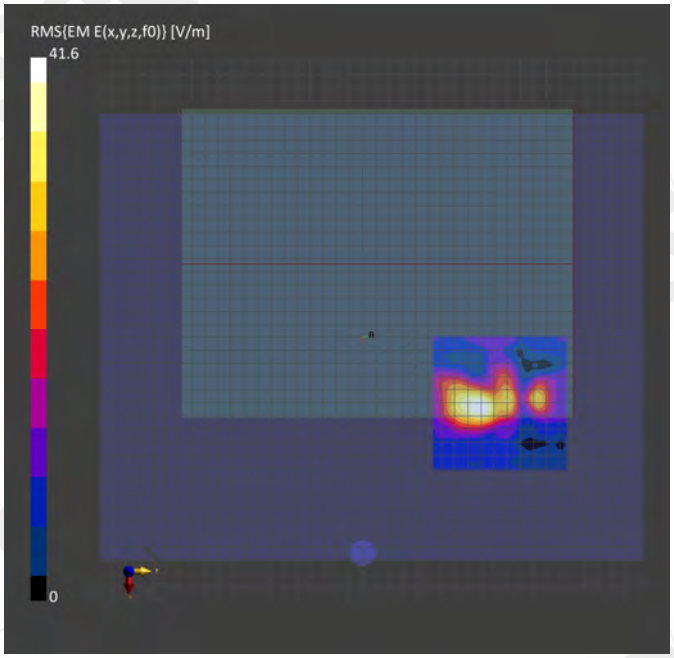
Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave - 1076	Air -	EUmmWV4 - SN9548_F1-55GHz, 2021-04-01	DAE4 Sn877, 2021-03-22

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	2021-06-30, 00:31
Avg. Area [cm²]	4.00
psPDn+ [W/m²]	2.08
psPDtot+ [W/m²]	2.19
psPDmod+ [W/m²]	2.48
E_{max} [V/m]	41.6
Power Drift [dB]	0.19



Report No. : EN/2021/40017
Measurement Report for Framework, Bottom, U-NII-8, IEEE 802.11ac (160MHz, MCS0, 90pc duty cycle), Channel 207 (6985.0 MHz)_Main

Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Framework,	298.0 x 235.0 x 13.0		Laptop

Exposure Conditions

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

Hardware Setup

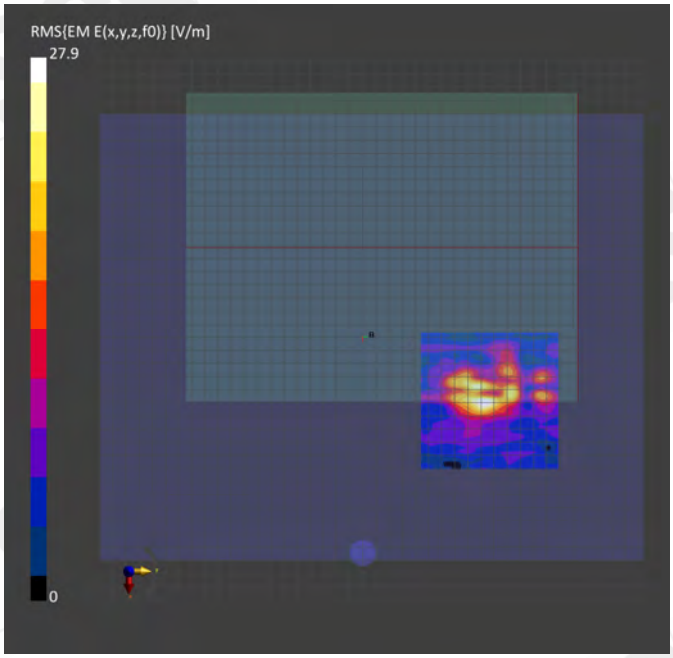
Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave - 1076	Air -	EUmmWV4 - SN9548_F1-55GHz, 2021-04-01	DAE4 Sn877, 2021-03-22

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	2021-06-30, 13:47
Avg. Area [cm²]	4.00
psPDn+ [W/m²]	0.499
psPDtot+ [W/m²]	0.722
psPDmod+ [W/m²]	1.21
E_{max} [V/m]	27.9
Power Drift [dB]	-0.14



Report No. : EN/2021/40017
Measurement Report for Framework, Bottom, U-NII-5, IEEE 802.11ac (160MHz, MCS0, 90pc duty cycle), Channel 15 (6025.0 MHz)_Aux

Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Framework,	298.0 x 235.0 x 13.0		Laptop

Exposure Conditions

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

Hardware Setup

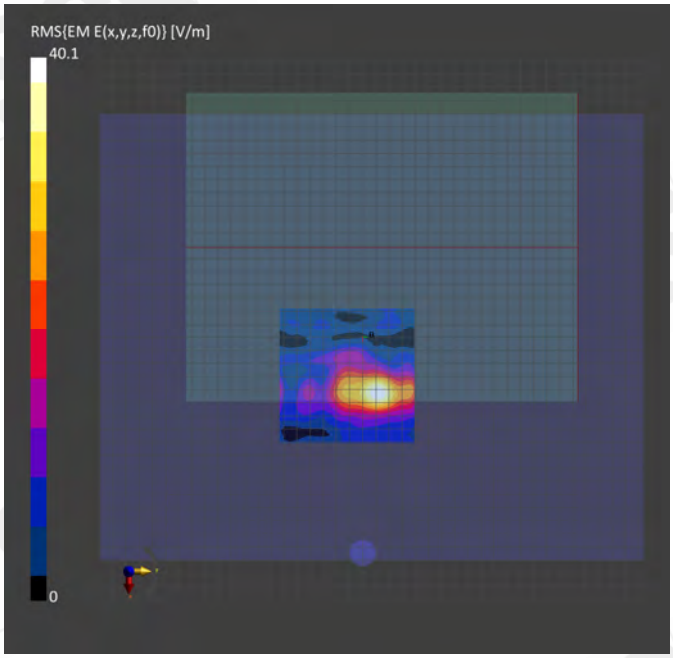
Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave - 1076	Air -	EUmmWV4 - SN9548_F1-55GHz, 2021-04-01	DAE4 Sn877, 2021-03-22

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	2021-06-30, 15:51
Avg. Area [cm²]	4.00
psPDn+ [W/m²]	1.64
psPDtot+ [W/m²]	1.73
psPDmod+ [W/m²]	2.08
E_{max} [V/m]	40.1
Power Drift [dB]	-0.19



Report No. : EN/2021/40017
Measurement Report for Framework, Bottom, U-NII-5, IEEE 802.11ac (160MHz, MCS0, 90pc duty cycle), Channel 47 (6185.0 MHz)_Aux

Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Framework,	298.0 x 235.0 x 13.0		Laptop

Exposure Conditions

Phantom Section	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor
5G Air	Bottom, 2.00	U-NII-5	WLAN, 10755-AAC	6185.0, 15	1.0

Hardware Setup

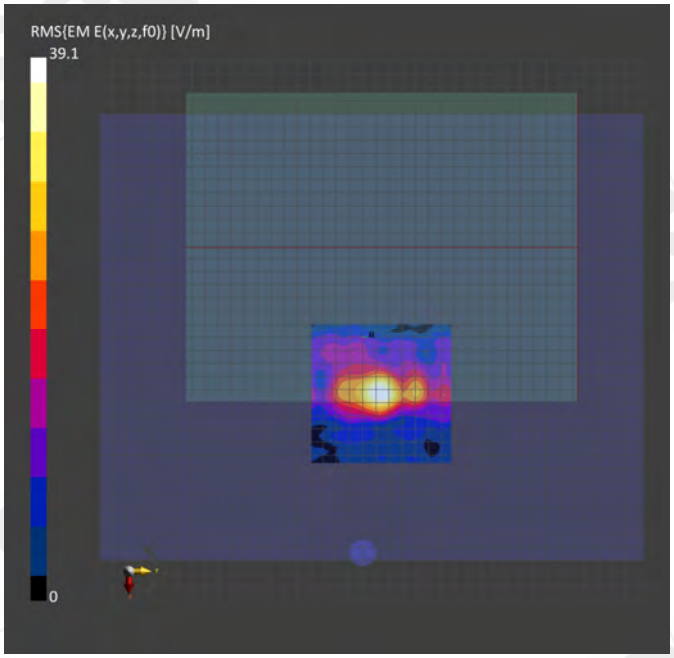
Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave - 1076	Air -	EUmmWV4 - SN9548_F1-55GHz, 2021-04-01	DAE4 Sn877, 2021-03-22

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	2021-06-30, 18:10
Avg. Area [cm²]	4.00
psPDn+ [W/m²]	1.77
psPDtot+ [W/m²]	2.09
psPDmod+ [W/m²]	2.37
E_{max} [V/m]	39.1
Power Drift [dB]	0.10



Report No. : EN/2021/40017
Measurement Report for Framework, Bottom, U-NII-6, IEEE 802.11ac (160MHz, MCS0, 90pc duty cycle), Channel 111 (6505.0 MHz)_Aux

Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Framework,	298.0 x 235.0 x 13.0		Laptop

Exposure Conditions

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

Hardware Setup

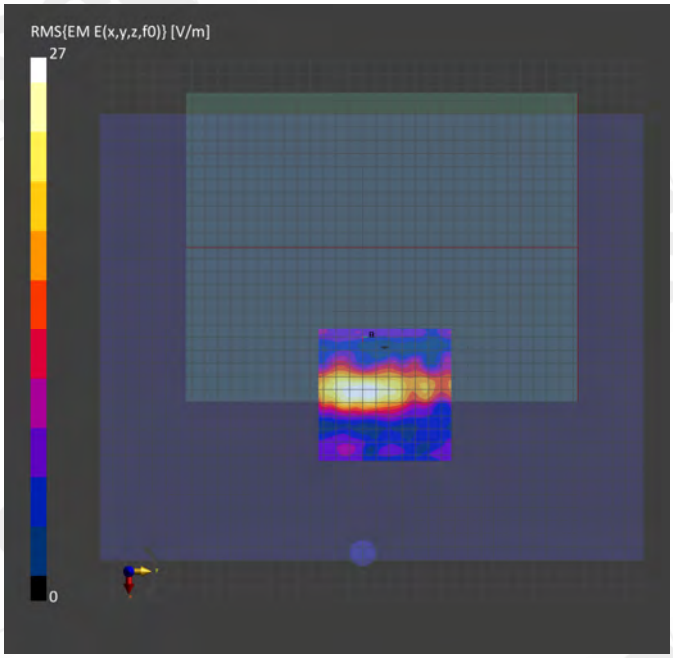
Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave - 1076	Air -	EUmmWV4 - SN9548_F1-55GHz, 2021-04-01	DAE4 Sn877, 2021-03-22

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	2021-06-30, 20:36
Avg. Area [cm²]	4.00
psPDn+ [W/m²]	1.10
psPDtot+ [W/m²]	1.17
psPDmod+ [W/m²]	1.25
E_{max} [V/m]	27.0
Power Drift [dB]	-0.11



Report No. : EN/2021/40017
Measurement Report for Framework, Bottom, U-NII-7, IEEE 802.11ac (160MHz, MCS0, 90pc duty cycle), Channel 175 (6825.0 MHz)_Aux

Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Framework,	298.0 x 235.0 x 13.0		Laptop

Exposure Conditions

Phantom Section	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor
5G Air	Bottom, 2.00	U-NII-7	WLAN, 10755-AAC	6825.0, 175	1.0

Hardware Setup

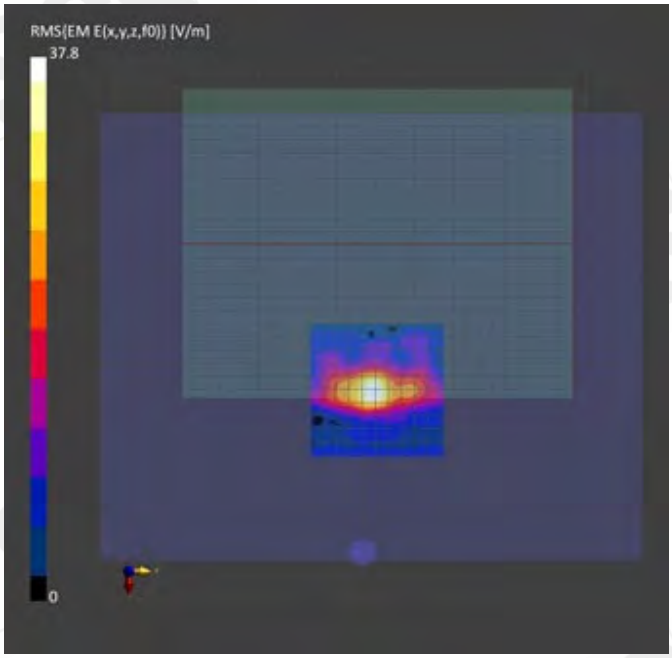
Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave - 1076	Air -	EUmmWV4 - SN9548_F1-55GHz, 2021-04-01	DAE4 Sn877, 2021-03-22

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	2021-07-01, 10:36
Avg. Area [cm²]	4.00
psPDn+ [W/m²]	1.56
psPDtot+ [W/m²]	1.65
psPDmod+ [W/m²]	1.88
E_{max} [V/m]	37.8
Power Drift [dB]	-0.17



Report No. : EN/2021/40017
Measurement Report for Framework, Bottom, U-NII-8, IEEE 802.11ac (160MHz, MCS0, 90pc duty cycle), Channel 207 (6985.0 MHz)_Aux

Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Framework,	298.0 x 235.0 x 13.0		Laptop

Exposure Conditions

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

Hardware Setup

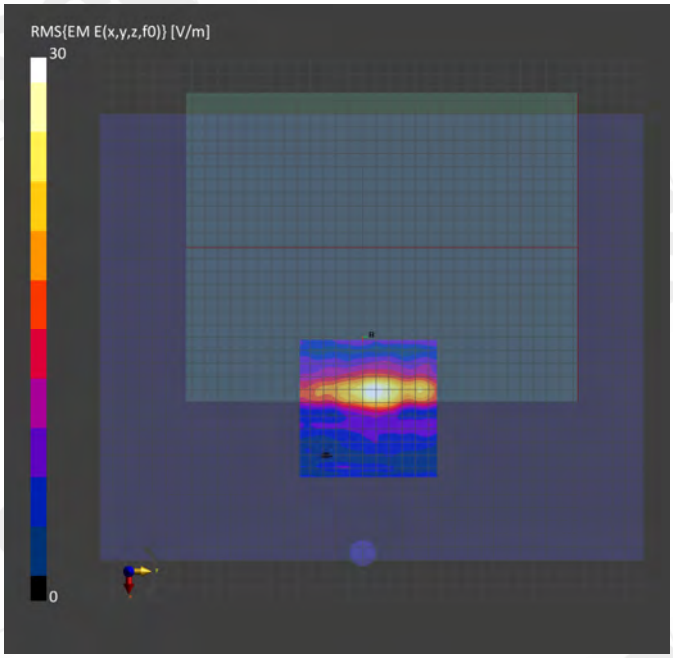
Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave - 1076	Air -	EUmmWV4 - SN9548_F1-55GHz, 2021-04-01	DAE4 Sn877, 2021-03-22

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	2021-06-30, 23:56
Avg. Area [cm²]	4.00
psPDn+ [W/m²]	1.24
psPDtot+ [W/m²]	1.36
psPDmod+ [W/m²]	1.43
E_{max} [V/m]	30.0
Power Drift [dB]	0.15



6. SAR System Performance Verification

Date: 2021/6/28

Report No. :EN/2021/40017

Dipole 2450 MHz, SN:727

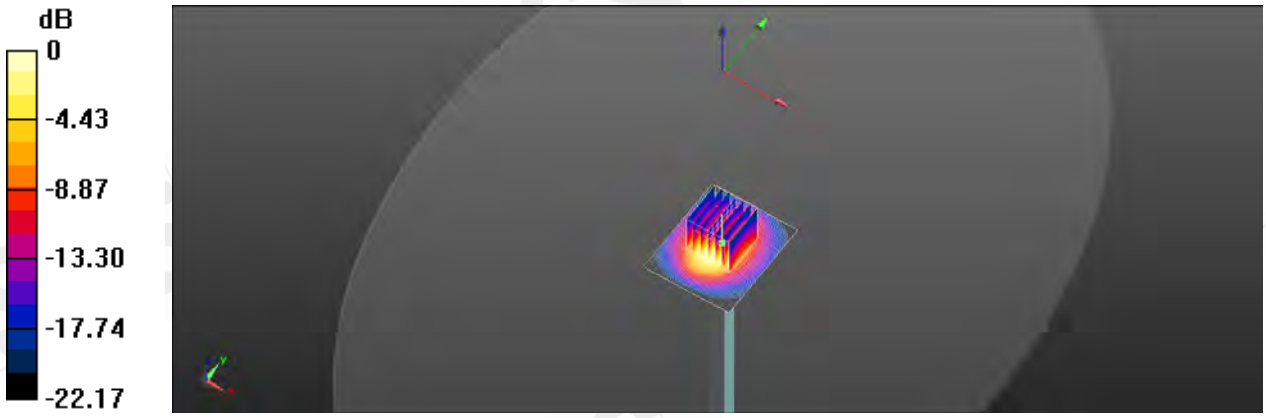
Communication System: CW; Frequency: 2450 MHz; Duty cycle= 1:1
Medium parameters used: f = 2450 MHz; σ = 1.806 S/m; ε_r = 39.106; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 22.0°C; Liquid temperature: 22.2°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7642; ConvF(8.16, 8.16, 8.16) @ 2450 MHz; Calibrated: 2021/3/19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2021/4/23
- 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) = 21.2 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 106.1 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 26.6 W/kg
SAR(1 g) = 13 W/kg; SAR(10 g) = 6.05 W/kg
Smallest distance from peaks to all points 3 dB below = 9 mm
Ratio of SAR at M2 to SAR at M1 = 49.5%
Maximum value of SAR (measured) = 19.7 W/kg



0 dB = 19.7 W/kg = 12.94 dBW/kg

Date: 2021/6/28

Report No. :EN/2021/40017

Dipole 5200 MHz, SN:1023

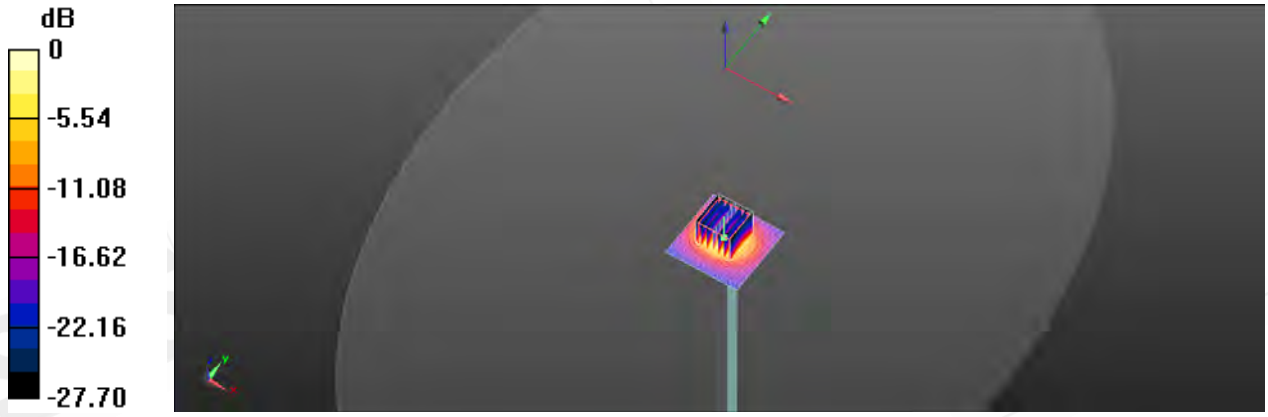
Communication System: CW; Frequency: 5200 MHz; Duty cycle= 1:1
Medium parameters used: f = 5200 MHz; σ = 4.591 S/m; ε_r = 35.837; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 21.9°C; Liquid temperature: 22.1°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7642; ConvF(5.68, 5.68, 5.68) @ 5200 MHz; Calibrated: 2021/3/19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2021/4/23
- 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) = 16.0 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 59.17 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 30.4 W/kg
SAR(1 g) = 7.87 W/kg; SAR(10 g) = 2.26 W/kg
Smallest distance from peaks to all points 3 dB below = 7.4 mm
Ratio of SAR at M2 to SAR at M1 = 56.3%
Maximum value of SAR (measured) = 16.2 W/kg



0 dB = 16.2 W/kg = 12.10 dBW/kg

Date: 2021/6/29

Report No. :EN/2021/40017

Dipole 5300 MHz, SN:1023

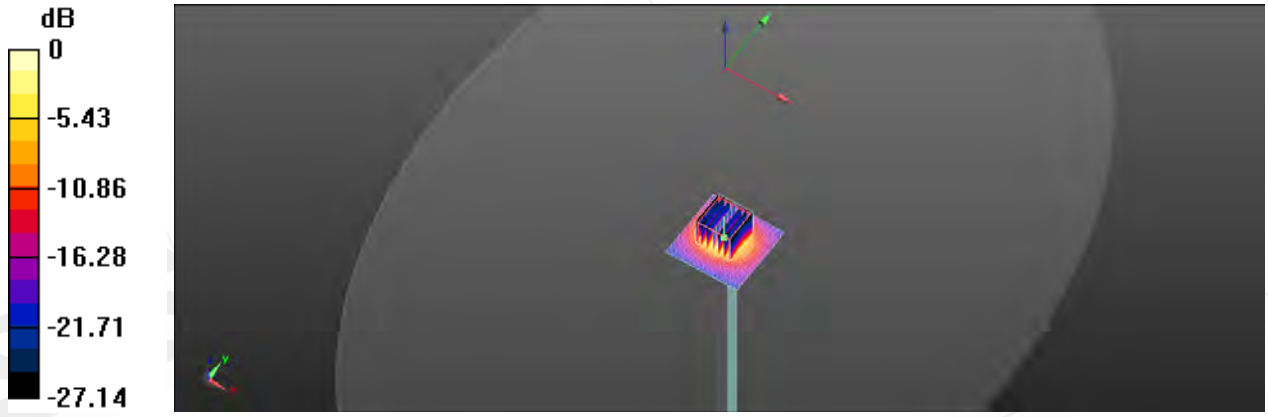
Communication System: CW; Frequency: 5300 MHz; Duty cycle= 1:1
Medium parameters used: f = 5300 MHz; σ = 4.727 S/m; ε_r = 35.549; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 21.7°C; Liquid temperature: 21.9°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7642; ConvF(5.68, 5.68, 5.68) @ 5300 MHz; Calibrated: 2021/3/19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2021/4/23
- 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) = 17.0 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 57.61 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 33.1 W/kg
SAR(1 g) = 8.1 W/kg; SAR(10 g) = 2.31 W/kg
Smallest distance from peaks to all points 3 dB below = 7.4 mm
Ratio of SAR at M2 to SAR at M1 = 55.9%
Maximum value of SAR (measured) = 17.3 W/kg



0 dB = 17.3 W/kg = 12.38 dBW/kg

Date: 2021/6/29

Report No. :EN/2021/40017

Dipole 5600 MHz, SN:1023

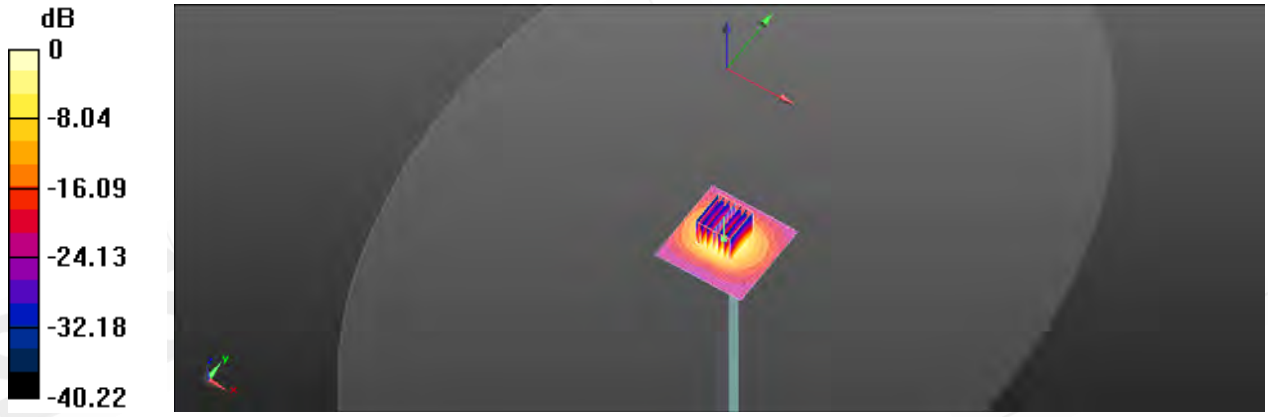
Communication System: CW; Frequency: 5600 MHz; Duty cycle= 1:1
Medium parameters used: f = 5600 MHz; σ = 5.077 S/m; ε_r = 34.872; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 22.1°C; Liquid temperature: 22.3°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7642; ConvF(5.03, 5.03, 5.03) @ 5600 MHz; Calibrated: 2021/3/19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2021/4/23
- Phantom: ELI
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (61x61x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 17.8 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 60.24 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 36.4 W/kg
SAR(1 g) = 8.55 W/kg; SAR(10 g) = 2.45 W/kg
Smallest distance from peaks to all points 3 dB below = 7.4 mm
Ratio of SAR at M2 to SAR at M1 = 52.9%
Maximum value of SAR (measured) = 17.9 W/kg



0 dB = 17.9 W/kg = 12.53 dBW/kg

Date: 2021/6/29

Report No. :EN/2021/40017

Dipole 5800 MHz, SN:1023

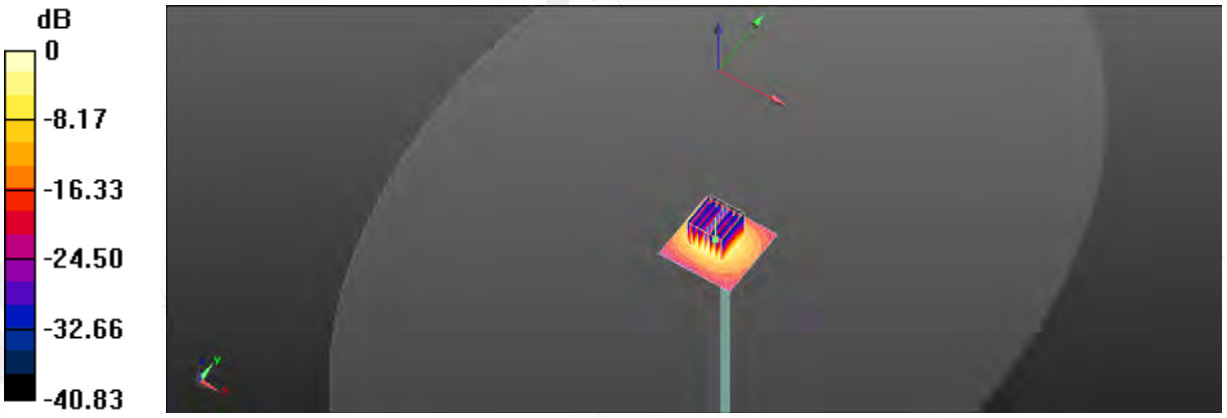
Communication System: CW; Frequency: 5800 MHz; Duty cycle= 1:1
Medium parameters used: f = 5800 MHz; σ = 5.316 S/m; ε_r = 34.513; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 21.8°C; Liquid temperature: 22.0°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7642; ConvF(5.2, 5.2, 5.2) @ 5800 MHz; Calibrated: 2021/3/19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2021/4/23
- 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) = 17.1 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 56.78 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 36.1 W/kg
SAR(1 g) = 8.04 W/kg; SAR(10 g) = 2.25 W/kg
Smallest distance from peaks to all points 3 dB below = 7.5 mm
Ratio of SAR at M2 to SAR at M1 = 50.9%
Maximum value of SAR (measured) = 17.1 W/kg



0 dB = 17.1 W/kg = 12.33 dBW/kg

Report No. :EN/2021/40017
Measurement Report for Device, FRONT, Validation band, CW, Channel 6500 (6500.0 MHz)

Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Dipole 6500 MHz, SN:1006,	16.0 x 6.0 x 300.0		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	5.7	6.07	33.9

Hardware Setup

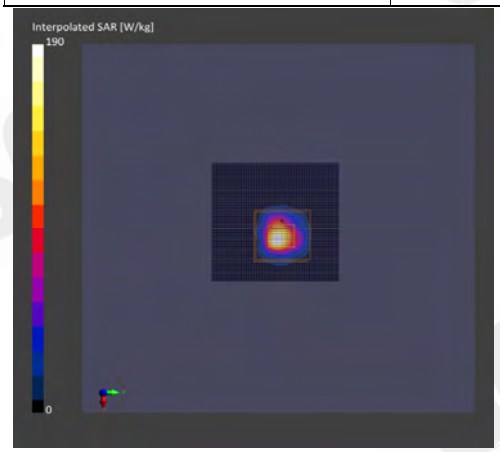
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V5.0 (20deg probe tilt) - 1141	HBBL-600-10000 ,2021-Jun-27	EX3DV4 - SN7466, 2021-01-29	DAE4 Sn877, 2021-03-22

Scans Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	51.0 x 51.0	28.0 x 28.0 x 24.0
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	No	Yes
Grading Ratio	n/a	1.4
MAIA	N/A	N/A
Surface Detection	VMS + 6p	VMS + 6p
Scan Method	Measured	Measured

Measurement Results

	Area Scan	Zoom Scan
Date	2021-06-27, 08:44	2021-06-27, 08:54
psSAR1g [W/Kg]	24.1	29.9
psSAR10g [W/Kg]	5.21	5.42
Power Drift [dB]	-0.07	-0.15
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	No correction	No correction
M2/M1 [%]		51.3
Dist 3dB Peak [mm]		4.6



Report No. :EN/2021/40017
Measurement Report for Device, FRONT, Validation band, CW, Channel 7000 (7000.0 MHz)

Device Under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Dipole 7000 MHz, SN:1007,	14.0 x 6.0 x 297.0		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	5.85	6.74	33.2

Hardware Setup

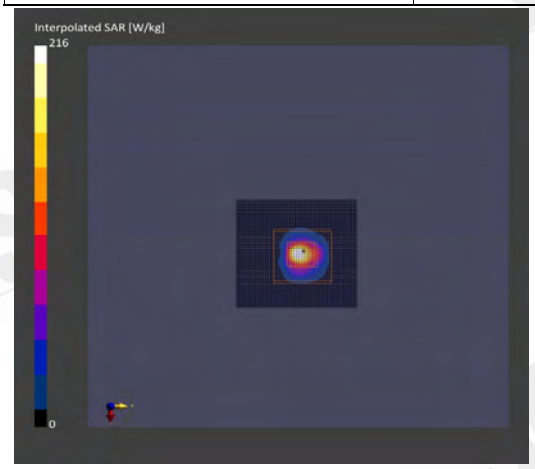
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V5.0 (20deg probe tilt) - 1141	HBBL-600-10000 ,2021-Jun-27	EX3DV4 - SN7466, 2021-01-29	DAE4 Sn877, 2021-03-22

Scans Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	45.0 x 45.0	28.0 x 28.0 x 24.0
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	2021-06-27, 09:14	2021-06-27, 09:24
psSAR1g [W/Kg]	26.2	28.2
psSAR10g [W/Kg]	5.04	4.90
Power Drift [dB]	0.04	0.03
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	No correction	No correction
M2/M1 [%]		47.4
Dist 3dB Peak [mm]		4.6



Report No. : EN/2021/40017
Measurement Report for 10G Source, Bottom, Validation band, CW, Channel 10000 (10000.0 MHz)
Device Under Test Properties

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

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

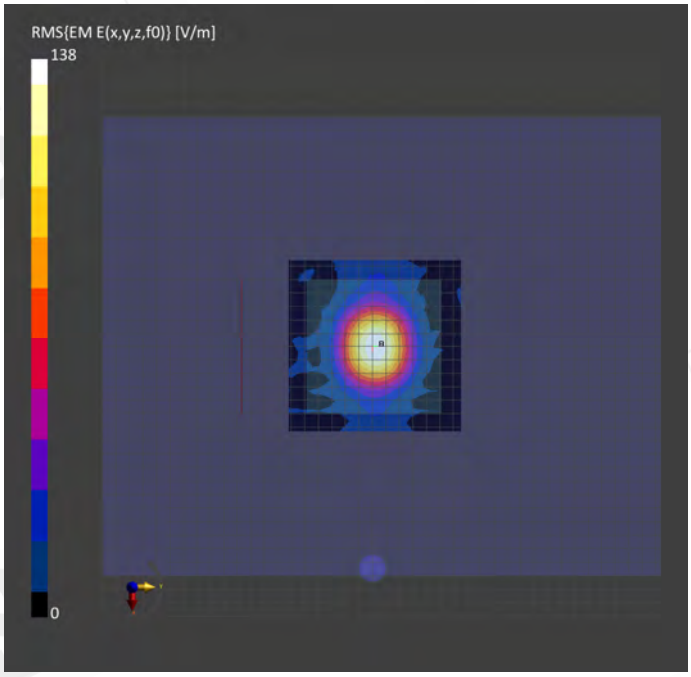
Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave - 1076	Air -	EUmmWV4 - SN9548_F1-55GHz, 2021-04-01	DAE4 Sn877, 2021-03-22

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	2021-06-28, 15:11
Avg. Area [cm^2]	4.00
psPDn+ [W/m^2]	41.3
psPDtot+ [W/m^2]	41.5
psPDmod+ [W/m^2]	41.6
E_{max} [V/m]	136
Power Drift [dB]	0.06



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/ Uncertaint	Probabili ty	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	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.)	2.23%	N	1	1	0.64	0.43	1.43%	0.96%	M
Liquid Conductivity (mea.)	1.37%	N	1	1	0.6	0.49	0.82%	0.67%	M
Combined standard uncertainty		RSS					11.83%	11.77%	
Expant uncertainty (95% confidence							23.66%	23.53%	

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/ Uncertaint	Probability	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	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.)	0.32%	N	1	1	0.64	0.43	0.20%	0.14%	M
Liquid Conductivity (mea.)	0.44%	N	1	1	0.6	0.49	0.26%	0.22%	M
Combined standard uncertainty		RSS					11.42%	11.41%	
Expant uncertainty (95% confidence							22.85%	22.82%	

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	0.409	R	√3	1.732	1	1	0.2	0.2
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.

EN202140017 SAR_Appendix A Photographs

EN202140017 SAR_Appendix B DAE & Probe Cal. Certificate

EN202140017 SAR_Appendix C Phantom Description & Dipole Cal. Certificate

- End of report -