

Appendix A. Plots of System Verification

The plots for system verification are shown as follows.

Plots of System Verification

Measurement Report S01 System Check_H2450_221102 Device under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Dipole	10.0 x 10.0 x 300.0		

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,	,			2450.0,	7.5	1.87	39.1

Hardware Setup

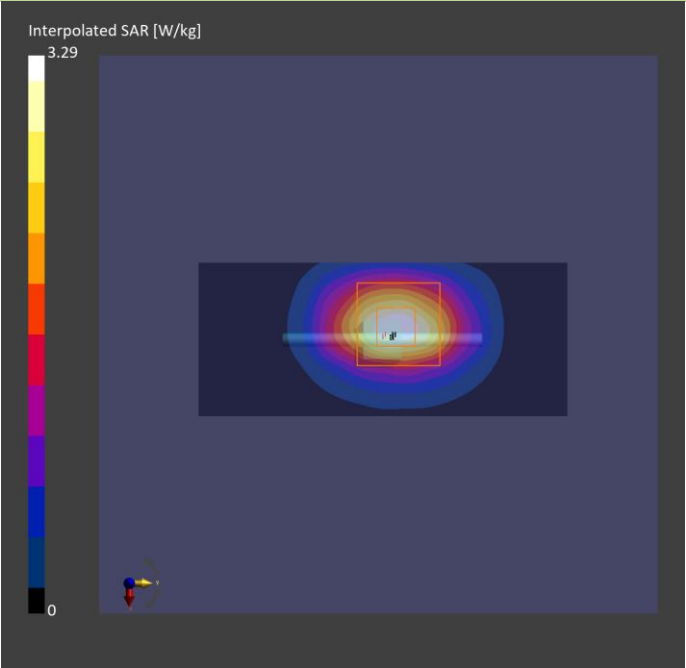
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V8.0 (20deg probe tilt) - 2118	H19T27N1 , 2022-Nov-02	EX3DV4 - SN7554, 2022-07-28	DAE4 Sn1341, 2022-07-19

Scan Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	48.0 x 96.0	30.0 x 30.0 x 30.0
Grid Steps [mm]	12.0 x 12.0	5.0 x 5.0 x 1.5
Sensor Surface [mm]	3.0	1.4

Measurement Results

	Area Scan	Zoom Scan
Date	2022-11-02	2022-11-02
psSAR1g [W/kg]	2.55	2.58
psSAR10g [W/kg]	1.23	1.21
Power Drift [dB]	-0.01	-0.01
M2/M1 [%]		80.9
Dist 3dB Peak [mm]		9.0



Plots of System Verification

Measurement Report S02 System Check_H5250_221104 Device under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Dipole	10.0 x 10.0 x 300.0		

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	,			5250.0,	5.54	4.69	36.2

Hardware Setup

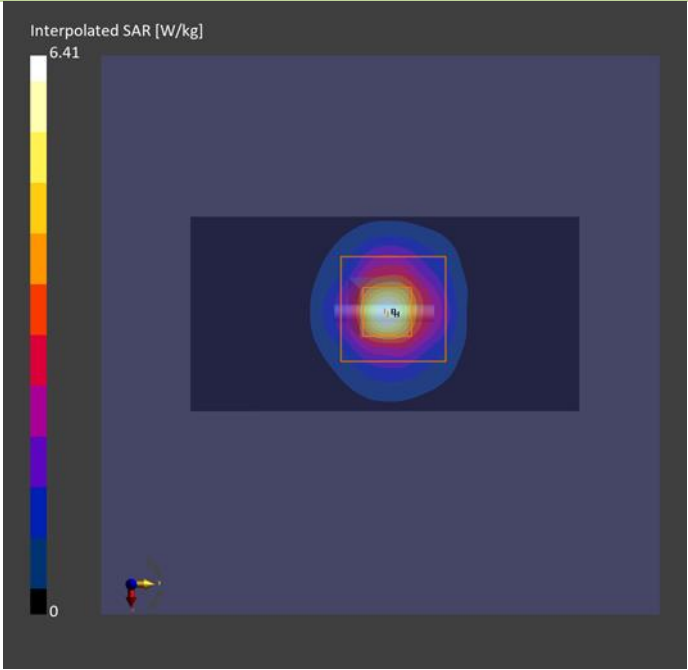
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V5.0 (20deg probe tilt) - 1245	H34T60N1, 2022-Nov-04	EX3DV4 - SN7537, 2022-04-27	DAE4 Sn1585, 2022-04-21

Scan Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	40.0 x 80.0	22.0 x 22.0 x 22.0
Grid Steps [mm]	10.0 x 10.0	4.0 x 4.0 x 1.4
Sensor Surface [mm]	3.0	1.4

Measurement Results

	Area Scan	Zoom Scan
Date	2022-11-04	2022-11-04
psSAR1g [W/kg]	3.93	4.07
psSAR10g [W/kg]	1.11	1.20
Power Drift [dB]	0.05	-0.02
M2/M1 [%]		66.5
Dist 3dB Peak [mm]		7.3



Plots of System Verification

Measurement Report S03 System Check_H5600_221107 Device under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Dipole	10.0 x 10.0 x 300.0		

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	,			5600.0,	4.8	5.00	35.8

Hardware Setup

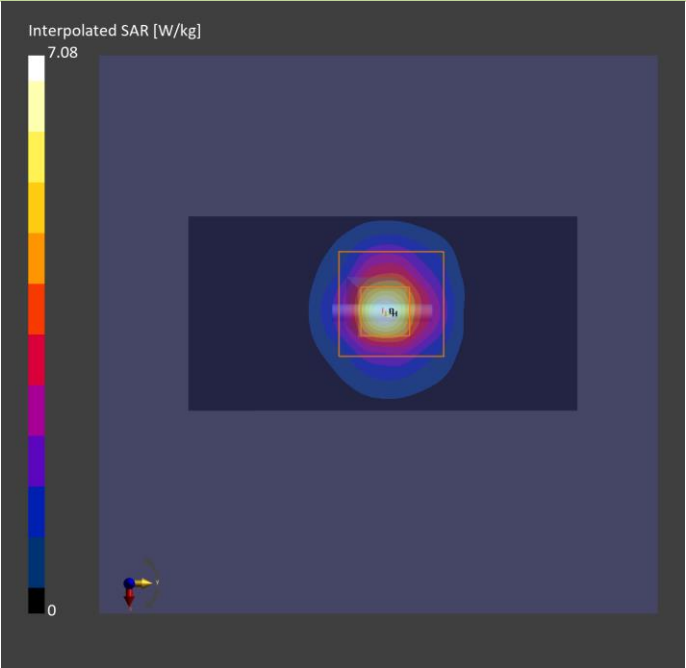
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V5.0 (20deg probe tilt) - 1245	H34T60N1, 2022-Nov-07	EX3DV4 - SN7537, 2022-04-27	DAE4 Sn1585, 2022-04-21

Scan Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	40.0 x 80.0	22.0 x 22.0 x 22.0
Grid Steps [mm]	10.0 x 10.0	4.0 x 4.0 x 1.4
Sensor Surface [mm]	3.0	1.4

Measurement Results

	Area Scan	Zoom Scan
Date	2022-11-07	2022-11-07
psSAR1g [W/kg]	4.41	4.48
psSAR10g [W/kg]	1.25	1.31
Power Drift [dB]	0.01	0.01
M2/M1 [%]		63.3
Dist 3dB Peak [mm]		7.2



Plots of System Verification

Measurement Report S04 System Check_H5750_221107 Device under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Dipole	10.0 x 10.0 x 300.0		

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	,			5750.0,	4.97	5.26	35.5

Hardware Setup

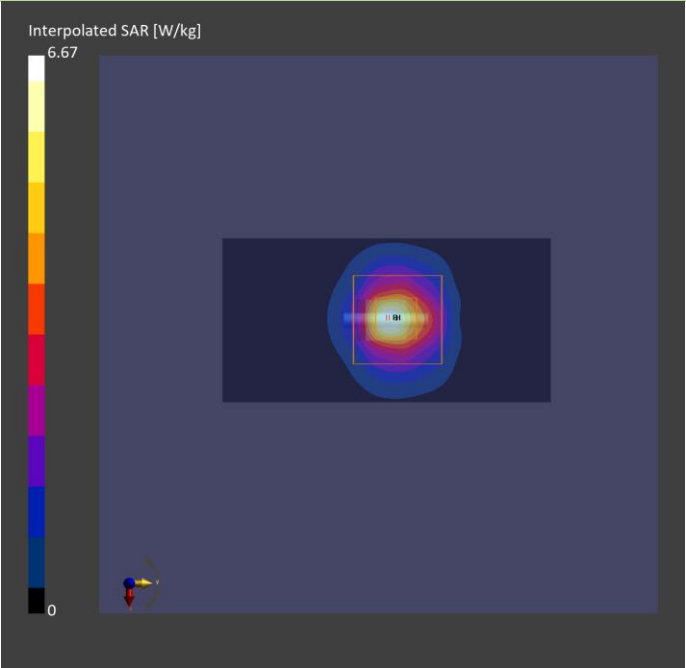
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V5.0 (20deg probe tilt) - 1245	H34T60N1, 2022-Nov-07	EX3DV4 - SN7537, 2022-04-27	DAE4 Sn1585, 2022-04-21

Scan Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	40.0 x 80.0	22.0 x 22.0 x 22.0
Grid Steps [mm]	10.0 x 10.0	4.0 x 4.0 x 1.4
Sensor Surface [mm]	3.0	1.4

Measurement Results

	Area Scan	Zoom Scan
Date	2022-11-07	2022-11-07
psSAR1g [W/kg]	4.26	4.32
psSAR10g [W/kg]	1.22	1.23
Power Drift [dB]	-0.10	-0.01
M2/M1 [%]		61.8
Dist 3dB Peak [mm]		7.2



Plots of System Verification

Measurement Report S05 System Check_H2450_221102 Device under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Dipole	10.0 x 10.0 x 300.0		

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,	,			2450.0,	7.5	1.87	39.1

Hardware Setup

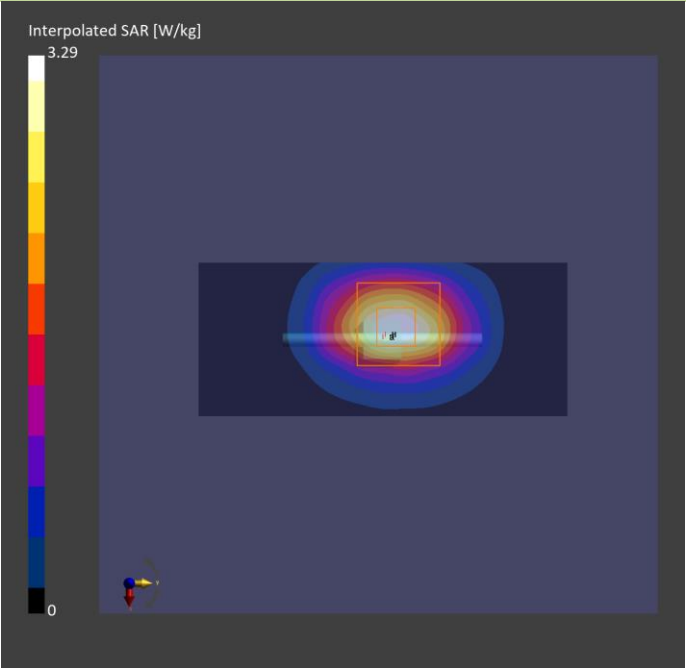
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V8.0 (20deg probe tilt) - 2118	H19T27N1 , 2022-Nov-02	EX3DV4 - SN7554, 2022-07-28	DAE4 Sn1341, 2022-07-19

Scan Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	48.0 x 96.0	30.0 x 30.0 x 30.0
Grid Steps [mm]	12.0 x 12.0	5.0 x 5.0 x 1.5
Sensor Surface [mm]	3.0	1.4

Measurement Results

	Area Scan	Zoom Scan
Date	2022-11-02	2022-11-02
psSAR1g [W/kg]	2.55	2.58
psSAR10g [W/kg]	1.23	1.21
Power Drift [dB]	-0.01	-0.01
M2/M1 [%]		80.9
Dist 3dB Peak [mm]		9.0



Plots of System Verification

Measurement Report S06 System Check_H6500_221107 Device under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
Dipole,	50.0 x 10.0 x 8.0		

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,				6500.0	5.45	6.14	33.7

Hardware Setup

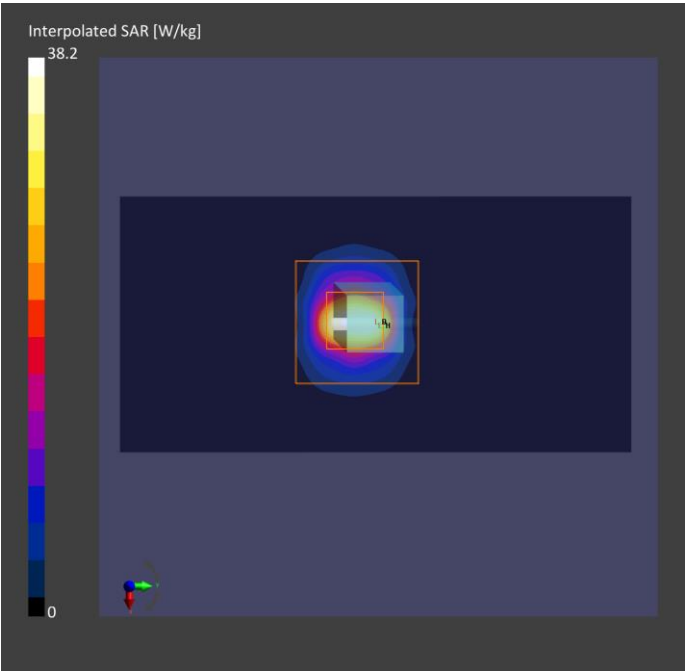
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V5.0 (20deg probe tilt) - 1245	H50T72N1 , 2022-Nov-07	EX3DV4 - SN7537, 2022-04-27	DAE4 Sn1585, 2022-04-21

Scan Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	45.0 x 90.0	22.0 x 22.0 x 22.0
Grid Steps [mm]	7.5 x 7.5	3.4 x 3.4 x 1.4
Sensor Surface [mm]	3.0	1.4

Measurement Results

	Area Scan	Zoom Scan
Date	2022-11-07	2022-11-07
psSAR1g [W/kg]	25.5	29.2
psSAR10g [W/kg]	5.07	5.38
psAPD (1.0cm2, sq) [W/m2]		295
psAPD (4.0cm2, sq) [W/m2]		134
Power Drift [dB]	-0.02	0.03
M2/M1 [%]		54.9
Dist 3dB Peak [mm]		4.9



Plots of System Verification

Test Lab: Bureau Veritas ADT SAR/HAC/PD Testing Lab

Power Density Plot No.:

S06 PD_System Check_10 GHz_2022.11.11

Device under Test Properties

Name, Manufacturer	Dimensions [mm]	IMEI	DUT Type
SPEAG, 5G Verification Source	100.0 x 100.0 x 170.0	SN: 1025	Phone
10 GHz			

Exposure Conditions

Phantom Section	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor
5GAir	FRONT 5.55	Validation band	CW 0	10000.0 10000	1.0

Hardware Setup

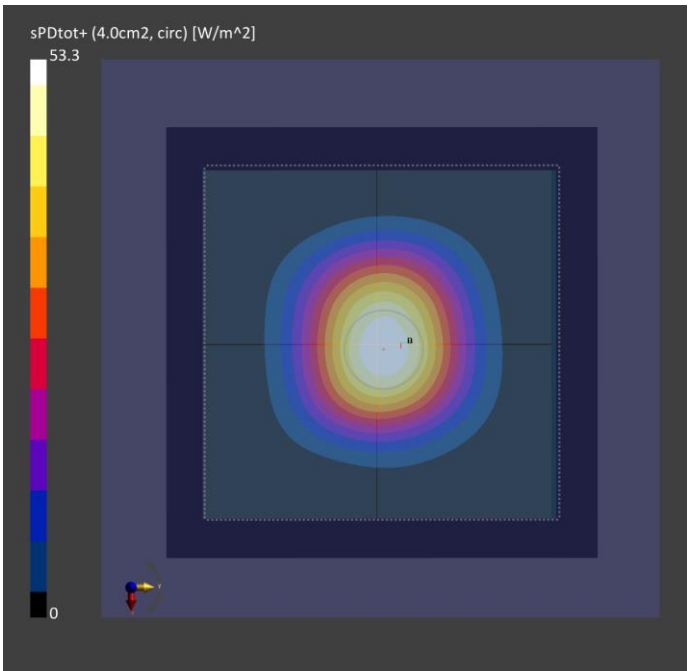
Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave	--Air--	EUmmWV4 - SN9438_F1-55GHz, 2022-07-18	DAE4 Sn1585, 2022-04-21

Scan Setup

	5G Scan
Grid Extents [mm]	120.0 x 120.0
Grid Steps [lambda]	0.25 x 0.25
Sensor Surface [mm]	5.55

Measurement Results

	5G Scan
Date	2022-11-11
Avg. Area [cm ²]	4.00
pStotavg[W/m ²]	53.3
pSnavg [W/m ²]	53.2
E _{peak} [V/m]	148
Power Drift [dB]	0.03



Appendix B. Plots of Measurement

The SAR plots for highest measured SAR in each exposure configuration, wireless mode and frequency band combination are shown as follows.

Plots of Measurement

Measurement Report for Device P01 WLAN2.4G_802.11b_Bottom Side_0mm_Ch11_Tablet_Ant 1_Pulse Device under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
BEQF-WTW-P22100397	356.0 x 250.0 x 18.0		Tablet

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,	Bottom Side, 0.00	WLAN 2.4GHz	WLAN, 10012-CAB	2462.0, 11	7.5	1.88	39.1

Hardware Setup

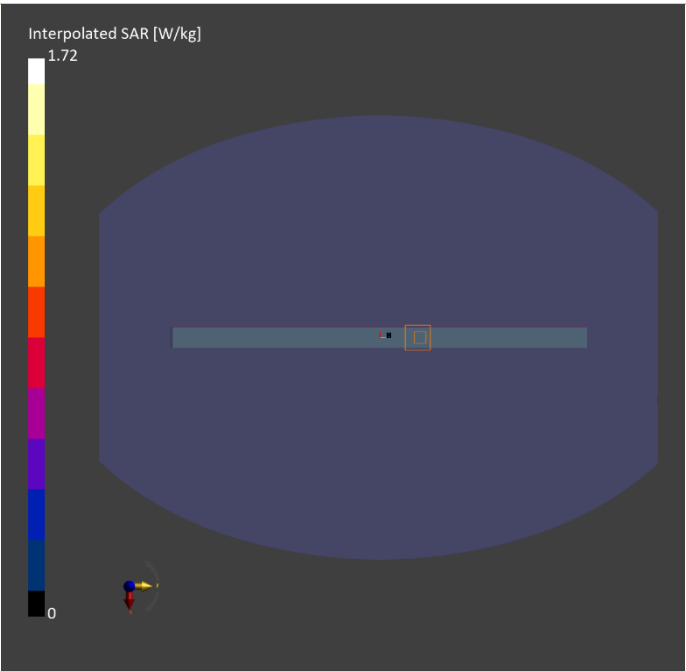
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V8.0 (20deg probe tilt) - 2118	H19T27N1 , 2022-Nov-02	EX3DV4 - SN7554, 2022-07-28	DAE4 Sn1341, 2022-07-19

Scan Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	48.0 x 408.0	30.0 x 30.0 x 30.0
Grid Steps [mm]	12.0 x 12.0	4.5 x 4.5 x 1.5
Sensor Surface [mm]	3.0	1.4

Measurement Results

	Area Scan	Zoom Scan
Date	2022-11-02	2022-11-02
psSAR1g [W/kg]	1.12	1.17
psSAR10g [W/kg]	0.395	0.401
Power Drift [dB]	0.01	-0.01
M2/M1 [%]		69.1
Dist 3dB Peak [mm]		4.1



Plots of Measurement

Measurement Report for Device P02 WLAN5.3G_802.11ac VHT160_Bottom_0mm_Ch50_Laptop_Ant 1_Pulse Device under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
BEQF-WTW-P22100397	356.0 x 250.0 x 18.0		Laptop

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat, HSL	Bottom, 0.00	WLAN 5GHz	WLAN, 10554-AAD	5250.0, 50	5.54	4.70	36.2

Hardware Setup

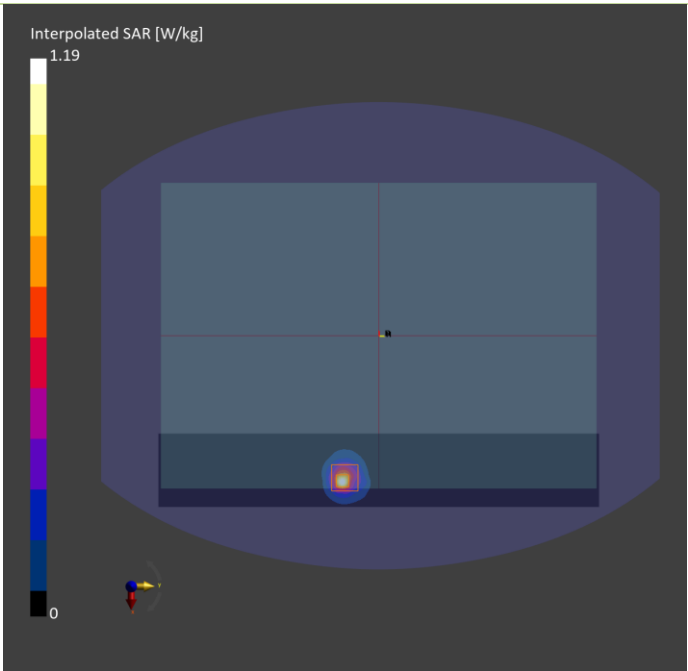
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V5.0 (20deg probe tilt) - 1245	H34T60N1, 2022-Nov-04	EX3DV4 - SN7537, 2022-04-27	DAE4 Sn1585, 2022-04-21

Scan Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	60.0 x 360.0	22.0 x 22.0 x 22.0
Grid Steps [mm]	10.0 x 10.0	4.0 x 4.0 x 1.4
Sensor Surface [mm]	3.0	1.4

Measurement Results

	Area Scan	Zoom Scan
Date	2022-11-04	2022-11-04
psSAR1g [W/kg]	0.713	0.784
psSAR10g [W/kg]	0.220	0.229
Power Drift [dB]	0.03	-0.02
M2/M1 [%]		61.6
Dist 3dB Peak [mm]		5.4



Plots of Measurement

Measurement Report

P03 WLAN5.6G_802.11ac VHT160_Bottom_0mm_Ch114_Laptop_Ant 0+1_Pulse

Device under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
BEQF-WTW-P22100397,	356.0 x 250.0 x 18.0		Laptop

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat, HSL	Bottom, 0.00	WLAN 5GHz	WLAN, 10554-AAD	5570.0, 114	4.8	4.97	36.0

Hardware Setup

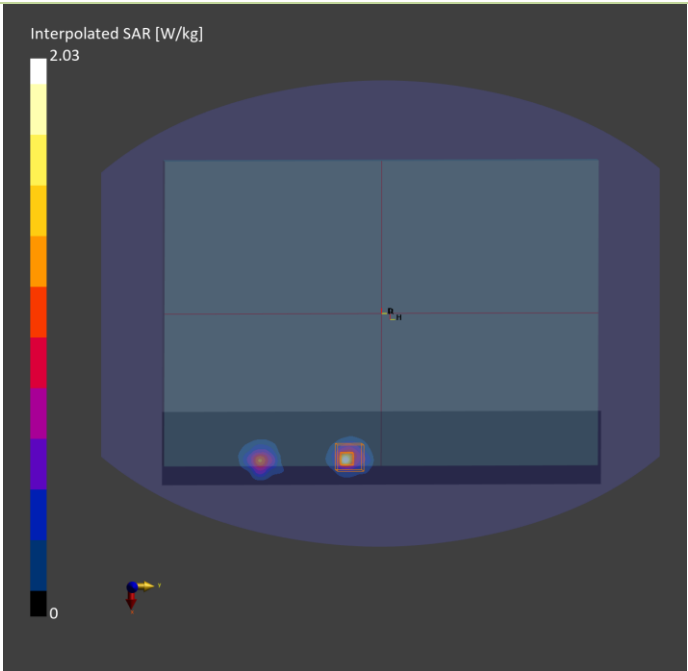
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V5.0 (20deg probe tilt) - 1245	H34T60N1, 2022-Nov-07	EX3DV4 - SN7537, 2022-04-27	DAE4 Sn1585, 2022-04-21

Scan Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	60.0 x 360.0	22.0 x 22.0 x 22.0
Grid Steps [mm]	10.0 x 10.0	3.9 x 3.9 x 1.4
Sensor Surface [mm]	3.0	1.4

Measurement Results

	Area Scan	Zoom Scan
Date	2022-11-07	2022-11-07
psSAR1g [W/kg]	1.17	1.14
psSAR10g [W/kg]	0.329	0.339
Power Drift [dB]	-0.08	-0.04
M2/M1 [%]		57.0
Dist 3dB Peak [mm]		5.0



Plots of Measurement

Measurement Report for Device P04 WLAN5.8G_802.11ac VHT80_Bottom_0mm_Ch155_Laptop_Ant 0+1_Pulse Device under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
BEQF-WTW-P22100397	356.0 x 250.0 x 18.0		Laptop

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat, HSL	Bottom, 0.00	WLAN 5GHz	WLAN, 10544-AAC	5775.0, 155	4.97	5.25	35.4

Hardware Setup

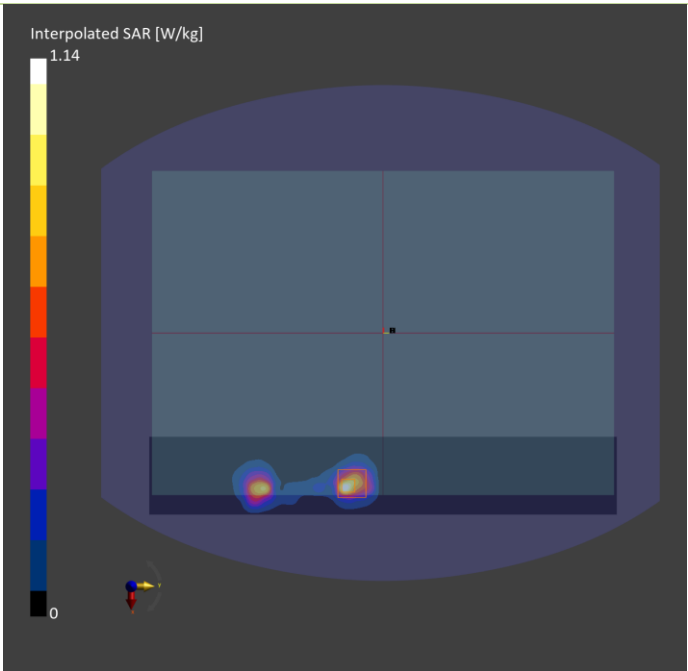
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V5.0 (20deg probe tilt) - 1245	H34T60N1, 2022-Nov-07	EX3DV4 - SN7537, 2022-04-27	DAE4 Sn1585, 2022-04-21

Scan Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	60.0 x 360.0	22.0 x 22.0 x 22.0
Grid Steps [mm]	10.0 x 10.0	4.0 x 4.0 x 1.4
Sensor Surface [mm]	3.0	1.4

Measurement Results

	Area Scan	Zoom Scan
Date	2022-11-07	2022-11-07
psSAR1g [W/kg]	0.736	0.856
psSAR10g [W/kg]	0.247	0.254
Power Drift [dB]	0.07	0.01
M2/M1 [%]		62.1
Dist 3dB Peak [mm]		6.1



Plots of Measurement

Measurement Report for Device P05 BT_BDR_Bottom Side_0mm_Ch78_Tablet_Ant 1_Pulse Device under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
BEQF-WTW-P22100397	356.0 x 250.0 x 18.0		Tablet

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,	Bottom Side, 0.00	ISM 2.4 GHz Band	Bluetooth, 10032-CAA	2480.0, 78	7.5	1.90	39.0

Hardware Setup

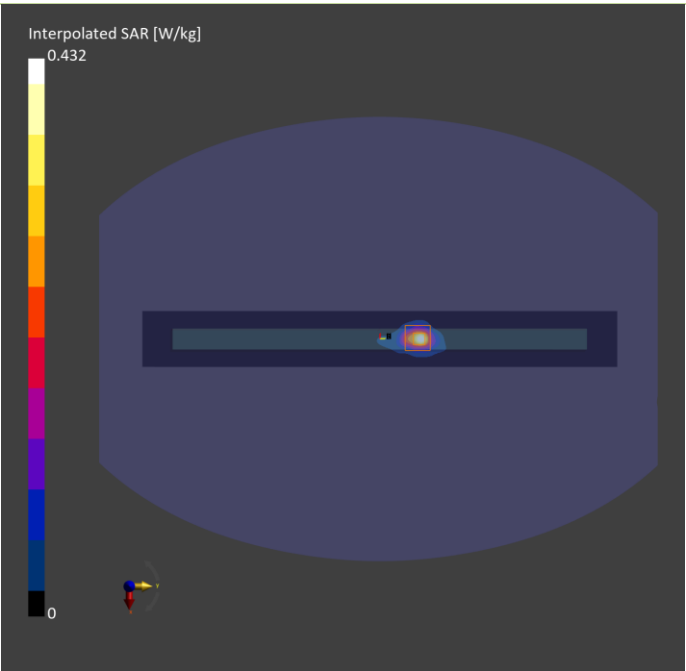
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V8.0 (20deg probe tilt) - 2118	H19T27N1 , 2022-Nov-02	EX3DV4 - SN7554, 2022-07-28	DAE4 Sn1341, 2022-07-19

Scan Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	48.0 x 408.0	30.0 x 30.0 x 30.0
Grid Steps [mm]	12.0 x 12.0	4.4 x 4.4 x 1.5
Sensor Surface [mm]	3.0	1.4

Measurement Results

	Area Scan	Zoom Scan
Date	2022-11-02	2022-11-02
psSAR1g [W/kg]	0.239	0.250
psSAR10g [W/kg]	0.075	0.084
Power Drift [dB]	0.02	0.01
M2/M1 [%]		69.5
Dist 3dB Peak [mm]		4.0



Plots of Measurement

Measurement Report for Device P06 WLAN6G_802.11ax HE160_Bottom_0mm_Ch175_Laptop_Ant 0+1_Pulse Device under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
BEQF-WTW-P22100397	356.0 x 250.0 x 18.0		Laptop

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat, HSL	Bottom, 0.00	U-NII-7	WLAN, 10755-AAC	6825.0, 175	5.45	6.61	33.0

Hardware Setup

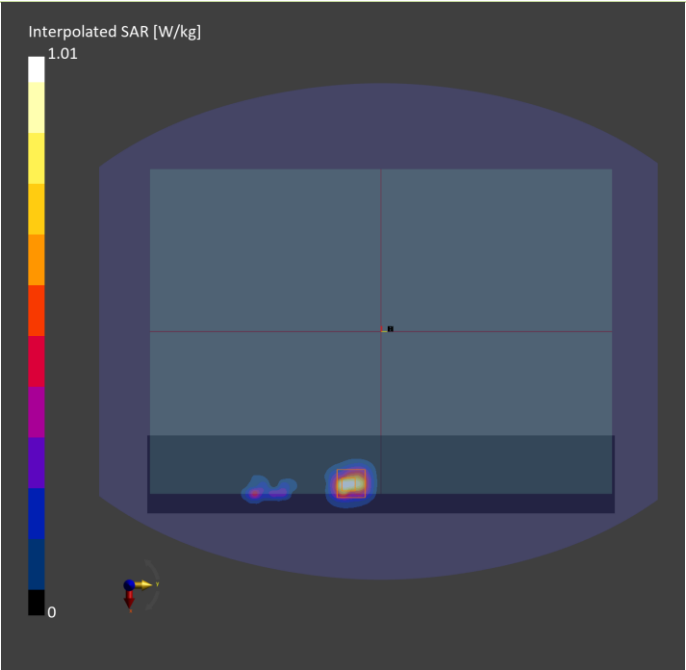
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V5.0 (20deg probe tilt) - 1245	H50T72N1, 2022-Nov-07	EX3DV4 - SN7537, 2022-04-27	DAE4 Sn1585, 2022-04-21

Scan Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	60.0 x 360.0	22.0 x 22.0 x 22.0
Grid Steps [mm]	7.5 x 7.5	3.4 x 3.4 x 1.4
Sensor Surface [mm]	3.0	1.4

Measurement Results

	Area Scan	Zoom Scan
Date	2022-11-07	2022-11-07
psSAR1g [W/kg]	0.769	0.856
psSAR10g [W/kg]	0.253	0.273
psAPD (1.0cm2, sq) [W/m2]		8.56
psAPD (4.0cm2, sq) [W/m2]		6.24
Power Drift [dB]	0.14	0.03
M2/M1 [%]		45.4
Dist 3dB Peak [mm]		5.2



Plots of Measurement

Measurement Report

P06 WLAN6G_802.11ax HE160_Bottom_0mm_Ch175_Laptop_Ant 0+1_Pulse

Device under Test Properties

Model, Manufacturer	Dimensions [mm]	IMEI	DUT Type
, BEQF-WTW-P22100397	356.0 x 252.0 x 18.0		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

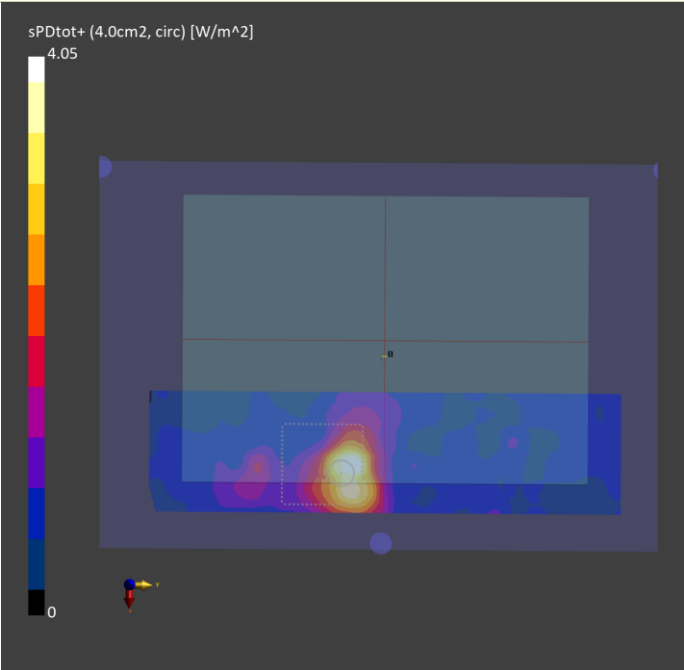
Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave- 1030	--Air--	EUmmWV4 - SN9438_F1-55GHz, 2022-07-18	DAE4 Sn1585, 2022-04-21

Scan Setup

	5G Scan
Grid Extents [mm]	88.0 x 88.0
Grid Steps [lambda]	0.0569 x 0.0569
Sensor Surface [mm]	2.0

Measurement Results

	5G Scan
Date	2022-11-11
Avg. Area [cm ²]	4.00
psPDn+ [W/m ²]	2.76
psPDtot+ [W/m ²]	4.05
psPDmod+ [W/m ²]	4.87
E _{max} [V/m]	67.7
Power Drift [dB]	-0.05



Appendix D. Maximum Target Conducted Power

The maximum conducted average power (Unit: dBm) including tune-up tolerance is shown as below.

Tune-up Power -Laptop Operating Mode

WLAN 2.4GHz

Mode	Channel	Frequency	SISO Ant 0 Max Tune up	SISO Ant 1 Max Tune up	MIMO Ant 0 Tune up	MIMO Ant 1 Tune up	MIMO Ant 0+1 Max Tune up
802.11b	1	2412	19.0	19.0			
	6	2437	19.0	19.0			
	11	2462	19.0	19.0			
	12	2467	14.0	14.0			
	13	2472	12.5	12.5			
802.11g	1	2412	19.0	19.0			
	6	2437	19.0	19.0			
	11	2462	19.0	19.0			
	12	2467	17.5	17.5			
	13	2472	13.5	13.5			
802.11n HT20	1	2412	19.0	19.0	19.0	19.0	22.0
	6	2437	19.0	19.0	19.0	19.0	22.0
	11	2462	17.0	17.0	17.0	17.0	20.0
	12	2467	14.5	14.5	14.5	14.5	17.5
	13	2472	11.5	11.5	11.5	11.5	14.5
802.11n HT40	3	2422	16.5	16.5	16.5	16.5	19.5
	6	2437	19.0	19.0	19.0	19.0	22.0
	9	2452	16.5	16.5	16.5	16.5	19.5
	10	2457	13.5	13.5	13.5	13.5	16.5
	11	2462	11.5	11.5	11.5	11.5	14.5
802.11ax HE20	1	2412	19.0	19.0	19.0	19.0	22.0
	6	2437	19.0	19.0	19.0	19.0	22.0
	11	2462	17.0	17.0	17.0	17.0	20.0
	12	2467	14.5	14.5	14.5	14.5	17.5
	13	2472	11.5	11.5	11.5	11.5	14.5
802.11ax HE40	3	2422	16.5	16.5	16.5	16.5	19.5
	6	2437	19.0	19.0	19.0	19.0	22.0
	9	2452	16.5	16.5	16.5	16.5	19.5
	10	2457	13.5	13.5	13.5	13.5	16.5
	11	2462	11.5	11.5	11.5	11.5	14.5



Tune-up Power -Laptop Operating Mode

Bluetooth

Mode	Channel	Frequency		Ant 1 Max Tune-up	
BR / EDR	0	2402		10.5	
	39	2441		10.5	
	78	2480		10.5	
LE	0	2402		8.5	
	19	2440		8.5	
	39	2480		8.5	

Tune-up Power -Laptop Operating Mode

WLAN 5.2GHz

Mode	Channel	Frequency	SISO Ant 0 Max Tune up	SISO Ant 1 Max Tune up	MIMO Ant 0 Tune up	MIMO Ant 1 Tune up	MIMO Ant 0+1 Max Tune up
802.11a	36	5180	11.5	11.5			
	40	5200	11.5	11.5			
	44	5220	11.5	11.5			
	48	5240	11.5	11.5			
802.11n HT20	36	5180	11.5	11.5	11.5	11.5	14.5
	40	5200	11.5	11.5	11.5	11.5	14.5
	44	5220	11.5	11.5	11.5	11.5	14.5
	48	5240	11.5	11.5	11.5	11.5	14.5
802.11n HT40	38	5190	11.5	11.5	11.5	11.5	14.5
	46	5230	11.5	11.5	11.5	11.5	14.5
802.11ac VHT80	42	5210	11.5	11.5	11.5	11.5	14.5
802.11ax HE20	36	5180	11.5	11.5	11.5	11.5	14.5
	40	5200	11.5	11.5	11.5	11.5	14.5
	44	5220	11.5	11.5	11.5	11.5	14.5
	48	5240	11.5	11.5	11.5	11.5	14.5
802.11ax HE40	38	5190	11.5	11.5	11.5	11.5	14.5
	46	5230	11.5	11.5	11.5	11.5	14.5
802.11ax HE80	42	5210	11.5	11.5	11.5	11.5	14.5

Tune-up Power -Laptop Operating Mode

WLAN 5.3GHz

Mode	Channel	Frequency	SISO Ant 0 Max Tune up	SISO Ant 1 Max Tune up	MIMO Ant 0 Tune up	MIMO Ant 1 Tune up	MIMO Ant 0+1 Max Tune up
802.11a	52	5260	11.5	11.5			
	56	5280	11.5	11.5			
	60	5300	11.5	11.5			
	64	5320	11.5	11.5			
802.11n HT20	52	5260	11.5	11.5	11.5	11.5	14.5
	56	5280	11.5	11.5	11.5	11.5	14.5
	60	5300	11.5	11.5	11.5	11.5	14.5
	64	5320	11.5	11.5	11.5	11.5	14.5
802.11n HT40	54	5270	11.5	11.5	11.5	11.5	14.5
	62	5310	11.5	11.5	11.5	11.5	14.5
802.11ac VHT80	58	5290	11.5	11.5	11.5	11.5	14.5
802.11ac VHT160	50	5250	11.5	11.5	11.5	11.5	14.5
802.11ax HE20	52	5260	11.5	11.5	11.5	11.5	14.5
	56	5280	11.5	11.5	11.5	11.5	14.5
	60	5300	11.5	11.5	11.5	11.5	14.5
	64	5320	11.5	11.5	11.5	11.5	14.5
802.11ax HE40	54	5270	11.5	11.5	11.5	11.5	14.5
	62	5310	11.5	11.5	11.5	11.5	14.5
802.11ax HE80	58	5290	11.5	11.5	11.5	11.5	14.5
802.11ax HE160	50	5250	11.5	11.5	11.5	11.5	14.5

Tune-up Power -Laptop Operating Mode

WLAN 5.6GHz

Mode	Channel	Frequency	SISO Ant 0 Max Tune up	SISO Ant 1 Max Tune up	MIMO Ant 0 Tune up	MIMO Ant 1 Tune up	MIMO Ant 0+1 Max Tune up
802.11a	100	5500	11.5	11.5			
	116	5580	11.5	11.5			
	132	5660	11.5	11.5			
	140	5700	11.5	11.5			
	144	5720	11.5	11.5			
802.11n HT20	100	5500	11.5	11.5	11.5	11.5	14.5
	116	5580	11.5	11.5	11.5	11.5	14.5
	132	5660	11.5	11.5	11.5	11.5	14.5
	140	5700	11.5	11.5	11.5	11.5	14.5
	144	5720	11.5	11.5	11.5	11.5	14.5
802.11n HT40	102	5510	11.5	11.5	11.5	11.5	14.5
	110	5550	11.5	11.5	11.5	11.5	14.5
	134	5670	11.5	11.5	11.5	11.5	14.5
	142	5710	11.5	11.5	11.5	11.5	14.5
802.11ac VHT80	106	5530	11.5	11.5	11.5	11.5	14.5
	122	5610	11.5	11.5	11.5	11.5	14.5
	138	5690	11.5	11.5	11.5	11.5	14.5
802.11ac VHT160	114	5570	11.5	11.5	11.5	11.5	14.5
802.11ax HE20	100	5500	11.5	11.5	11.5	11.5	14.5
	116	5580	11.5	11.5	11.5	11.5	14.5
	132	5660	11.5	11.5	11.5	11.5	14.5
	140	5700	11.5	11.5	11.5	11.5	14.5
	144	5720	11.5	11.5	11.5	11.5	14.5
802.11ax HE40	102	5510	11.5	11.5	11.5	11.5	14.5
	110	5550	11.5	11.5	11.5	11.5	14.5
	134	5670	11.5	11.5	11.5	11.5	14.5
	142	5710	11.5	11.5	11.5	11.5	14.5
802.11ax HE80	106	5530	11.5	11.5	11.5	11.5	14.5
	122	5610	11.5	11.5	11.5	11.5	14.5
	138	5690	11.5	11.5	11.5	11.5	14.5
802.11ax HE160	114	5570	11.5	11.5	11.5	11.5	14.5

Tune-up Power -Laptop Operating Mode

WLAN 5.8GHz

Mode	Channel	Frequency	SISO Ant 0 Max Tune up	SISO Ant 1 Max Tune up	MIMO Ant 0 Tune up	MIMO Ant 1 Tune up	MIMO Ant 0+1 Max Tune up
802.11a	149	5745	11.5	11.5			
	153	5765	11.5	11.5			
	157	5785	11.5	11.5			
	161	5805	11.5	11.5			
	165	5825	11.5	11.5			
802.11n HT20	149	5745	11.5	11.5	11.5	11.5	14.5
	153	5765	11.5	11.5	11.5	11.5	14.5
	157	5785	11.5	11.5	11.5	11.5	14.5
	161	5805	11.5	11.5	11.5	11.5	14.5
	165	5825	11.5	11.5	11.5	11.5	14.5
802.11n HT40	151	5755	11.5	11.5	11.5	11.5	14.5
	159	5795	11.5	11.5	11.5	11.5	14.5
802.11ac VHT80	155	5775	11.5	11.5	11.5	11.5	14.5
802.11ax HE20	149	5745	11.5	11.5	11.5	11.5	14.5
	153	5765	11.5	11.5	11.5	11.5	14.5
	157	5785	11.5	11.5	11.5	11.5	14.5
	161	5805	11.5	11.5	11.5	11.5	14.5
	165	5825	11.5	11.5	11.5	11.5	14.5
802.11ax HE40	151	5755	11.5	11.5	11.5	11.5	14.5
	159	5795	11.5	11.5	11.5	11.5	14.5
802.11ax HE80	155	5775	11.5	11.5	11.5	11.5	14.5

Tune-up Power -Laptop Operating Mode

UNII-5

Mode	Channel	Frequency	SISO Ant 0 Max Tune up	SISO Ant 1 Max Tune up	MIMO Ant 0 Tune up	MIMO Ant 1 Tune up	MIMO Ant 0+1 Max Tune up
802.11ax HE20	1	5955	5.0	5.0	5.0	5.0	8.0
	5	5975	5.0	5.0	5.0	5.0	8.0
	9	5995	5.0	5.0	5.0	5.0	8.0
	13	6015	5.0	5.0	5.0	5.0	8.0
	17	6035	5.0	5.0	5.0	5.0	8.0
	21	6055	5.0	5.0	5.0	5.0	8.0
	25	6075	5.0	5.0	5.0	5.0	8.0
	29	6095	5.0	5.0	5.0	5.0	8.0
	33	6115	5.0	5.0	5.0	5.0	8.0
	37	6135	5.0	5.0	5.0	5.0	8.0
	41	6155	5.0	5.0	5.0	5.0	8.0
	45	6175	5.0	5.0	5.0	5.0	8.0
	49	6195	5.0	5.0	5.0	5.0	8.0
	53	6215	5.0	5.0	5.0	5.0	8.0
	57	6235	5.0	5.0	5.0	5.0	8.0
	61	6255	5.0	5.0	5.0	5.0	8.0
	65	6275	5.0	5.0	5.0	5.0	8.0
	69	6295	5.0	5.0	5.0	5.0	8.0
	73	6315	5.0	5.0	5.0	5.0	8.0
	77	6335	5.0	5.0	5.0	5.0	8.0
	81	6355	5.0	5.0	5.0	5.0	8.0
	85	6375	5.0	5.0	5.0	5.0	8.0
	89	6395	5.0	5.0	5.0	5.0	8.0
	93	6415	5.0	5.0	5.0	5.0	8.0

Tune-up Power -Laptop Operating Mode

UNII-5

Mode	Channel	Frequency	SISO Ant 0 Max Tune up	SISO Ant 1 Max Tune up	MIMO Ant 0 Tune up	MIMO Ant 1 Tune up	MIMO Ant 0+1 Max Tune up
802.11ax HE40	3	5965	8.0	8.0	8.0	8.0	11.0
	11	6005	8.0	8.0	8.0	8.0	11.0
	19	6045	8.0	8.0	8.0	8.0	11.0
	27	6085	8.0	8.0	8.0	8.0	11.0
	35	6125	8.0	8.0	8.0	8.0	11.0
	43	6165	8.0	8.0	8.0	8.0	11.0
	51	6205	8.0	8.0	8.0	8.0	11.0
	59	6245	8.0	8.0	8.0	8.0	11.0
	67	6285	8.0	8.0	8.0	8.0	11.0
	75	6325	8.0	8.0	8.0	8.0	11.0
	83	6365	8.0	8.0	8.0	8.0	11.0
	91	6405	8.0	8.0	8.0	8.0	11.0
802.11ax HE80	7	5985	10.0	10.0	10.0	10.0	13.0
	23	6065	10.0	10.0	10.0	10.0	13.0
	39	6145	10.0	10.0	10.0	10.0	13.0
	55	6225	10.0	10.0	10.0	10.0	13.0
	71	6305	10.0	10.0	10.0	10.0	13.0
	87	6385	10.0	10.0	10.0	10.0	13.0
802.11ax HE160	15	6025	10.0	10.0	10.0	10.0	13.0
	47	6185	10.0	10.0	10.0	10.0	13.0
	79	6345	10.0	10.0	10.0	10.0	13.0

Tune-up Power -Laptop Operating Mode

UNII-6

Mode	Channel	Frequency	SISO Ant 0 Max Tune up	SISO Ant 1 Max Tune up	MIMO Ant 0 Tune up	MIMO Ant 1 Tune up	MIMO Ant 0+1 Max Tune up
802.11ax HE20	97	6435	5.0	5.0	5.0	5.0	8.0
	101	6455	5.0	5.0	5.0	5.0	8.0
	105	6475	5.0	5.0	5.0	5.0	8.0
	109	6495	5.0	5.0	5.0	5.0	8.0
	113	6515	5.0	5.0	5.0	5.0	8.0
	117	6535	5.0	5.0	5.0	5.0	8.0
802.11ax HE40	99	6445	8.0	8.0	8.0	8.0	11.0
	107	6485	8.0	8.0	8.0	8.0	11.0
	115	6525	8.0	8.0	8.0	8.0	11.0
802.11ax HE80	103	6465	10.0	10.0	10.0	10.0	13.0
	119	6545	10.0	10.0	10.0	10.0	13.0
802.11ax HE160	111	6505	10.0	10.0	10.0	10.0	13.0

Tune-up Power -Laptop Operating Mode

UNII-7

Mode	Channel	Frequency	SISO Ant 0 Max Tune up	SISO Ant 1 Max Tune up	MIMO Ant 0 Tune up	MIMO Ant 1 Tune up	MIMO Ant 0+1 Max Tune up
802.11ax HE20	121	6555	5.0	5.0	5.0	5.0	8.0
	125	6575	5.0	5.0	5.0	5.0	8.0
	129	6595	5.0	5.0	5.0	5.0	8.0
	133	6615	5.0	5.0	5.0	5.0	8.0
	137	6635	5.0	5.0	5.0	5.0	8.0
	141	6655	5.0	5.0	5.0	5.0	8.0
	145	6675	5.0	5.0	5.0	5.0	8.0
	149	6695	5.0	5.0	5.0	5.0	8.0
	153	6715	5.0	5.0	5.0	5.0	8.0
	157	6735	5.0	5.0	5.0	5.0	8.0
	161	6755	5.0	5.0	5.0	5.0	8.0
	165	6775	5.0	5.0	5.0	5.0	8.0
	169	6795	5.0	5.0	5.0	5.0	8.0
	173	6815	5.0	5.0	5.0	5.0	8.0
	177	6835	5.0	5.0	5.0	5.0	8.0
	181	6855	5.0	5.0	5.0	5.0	8.0
	185	6875	5.0	5.0	5.0	5.0	8.0
802.11ax HE40	123	6565	8.0	8.0	8.0	8.0	11.0
	131	6605	8.0	8.0	8.0	8.0	11.0
	139	6645	8.0	8.0	8.0	8.0	11.0
	147	6685	8.0	8.0	8.0	8.0	11.0
	155	6725	8.0	8.0	8.0	8.0	11.0
	163	6765	8.0	8.0	8.0	8.0	11.0
	171	6805	8.0	8.0	8.0	8.0	11.0
	179	6845	8.0	8.0	8.0	8.0	11.0
	187	6885	8.0	8.0	8.0	8.0	11.0
802.11ax HE80	135	6625	10.0	10.0	10.0	10.0	13.0
	151	6705	10.0	10.0	10.0	10.0	13.0
	167	6785	10.0	10.0	10.0	10.0	13.0
	183	6865	10.0	10.0	10.0	10.0	13.0
802.11ax HE160	143	6665	10.0	10.0	10.0	10.0	13.0
	175	6825	10.0	10.0	10.0	10.0	13.0

Tune-up Power -Laptop Operating Mode

UNII-8

Mode	Channel	Frequency	SISO Ant 0 Max Tune up	SISO Ant 1 Max Tune up	MIMO Ant 0 Tune up	MIMO Ant 1 Tune up	MIMO Ant 0+1 Max Tune up
802.11ax HE20	189	6895	5.0	5.0	5.0	5.0	8.0
	193	6915	5.0	5.0	5.0	5.0	8.0
	197	6935	5.0	5.0	5.0	5.0	8.0
	201	6955	5.0	5.0	5.0	5.0	8.0
	205	6975	5.0	5.0	5.0	5.0	8.0
	209	6995	5.0	5.0	5.0	5.0	8.0
	213	7015	5.0	5.0	5.0	5.0	8.0
	217	7035	5.0	5.0	5.0	5.0	8.0
	221	7055	5.0	5.0	5.0	5.0	8.0
	225	7075	5.0	5.0	5.0	5.0	8.0
	229	7095	5.0	5.0	5.0	5.0	8.0
	233	7115	2.0	2.0	2.0	2.0	5.0
802.11ax HE40	195	6925	8.0	8.0	8.0	8.0	11.0
	203	6965	8.0	8.0	8.0	8.0	11.0
	211	7005	8.0	8.0	8.0	8.0	11.0
	219	7045	8.0	8.0	8.0	8.0	11.0
	227	7085	8.0	8.0	8.0	8.0	11.0
802.11ax HE80	199	6945	10.0	10.0	10.0	10.0	13.0
	215	7025	10.0	10.0	10.0	10.0	13.0
802.11ax HE160	207	6985	10.0	10.0	10.0	10.0	13.0

Tune-up Power -Tablet Operating Mode

WLAN 2.4GHz

Mode	Channel	Frequency	SISO Ant 0 Max Tune up	SISO Ant 1 Max Tune up	MIMO Ant 0 Tune up	MIMO Ant 1 Tune up	MIMO Ant 0+1 Max Tune up
802.11b	1	2412	14.0	14.0			
	6	2437	14.0	14.0			
	11	2462	14.0	14.0			
	12	2467	14.0	14.0			
	13	2472	12.5	12.5			
802.11g	1	2412	14.0	14.0			
	6	2437	14.0	14.0			
	11	2462	14.0	14.0			
	12	2467	14.0	14.0			
	13	2472	13.5	13.5			
802.11n HT20	1	2412	14.0	14.0	19.0	19.0	17.0
	6	2437	14.0	14.0	19.0	19.0	17.0
	11	2462	14.0	14.0	17.0	17.0	17.0
	12	2467	14.0	14.0	14.5	14.5	17.0
	13	2472	11.5	11.5	11.5	11.5	14.5
802.11n HT40	3	2422	14.0	14.0	16.5	16.5	17.0
	6	2437	14.0	14.0	19.0	19.0	17.0
	9	2452	14.0	14.0	16.5	16.5	17.0
	10	2457	13.5	13.5	13.5	13.5	16.5
	11	2462	11.5	11.5	11.5	11.5	14.5
802.11ax HE20	1	2412	14.0	14.0	19.0	19.0	17.0
	6	2437	14.0	14.0	19.0	19.0	17.0
	11	2462	14.0	14.0	17.0	17.0	17.0
	12	2467	14.0	14.0	14.5	14.5	17.0
	13	2472	11.5	11.5	11.5	11.5	14.5
802.11ax HE40	3	2422	14.0	14.0	16.5	16.5	17.0
	6	2437	14.0	14.0	19.0	19.0	17.0
	9	2452	14.0	14.0	16.5	16.5	17.0
	10	2457	13.5	13.5	13.5	13.5	16.5
	11	2462	11.5	11.5	11.5	11.5	14.5



Tune-up Power -Tablet Operating Mode

Bluetooth

Mode	Channel	Frequency		Ant 1 Max Tune-up	
BR / EDR	0	2402		10.5	
	39	2441		10.5	
	78	2480		10.5	
LE	0	2402		8.5	
	19	2440		8.5	
	39	2480		8.5	

Tune-up Power -Tablet Operating Mode

WLAN 5.2GHz

Mode	Channel	Frequency	SISO Ant 0 Max Tune up	SISO Ant 1 Max Tune up	MIMO Ant 0 Tune up	MIMO Ant 1 Tune up	MIMO Ant 0+1 Max Tune up
802.11a	36	5180	10.5	10.5			
	40	5200	10.5	10.5			
	44	5220	10.5	10.5			
	48	5240	10.5	10.5			
802.11n HT20	36	5180	10.5	10.5	11.5	11.5	13.5
	40	5200	10.5	10.5	11.5	11.5	13.5
	44	5220	10.5	10.5	11.5	11.5	13.5
	48	5240	10.5	10.5	11.5	11.5	13.5
802.11n HT40	38	5190	10.5	10.5	11.5	11.5	13.5
	46	5230	10.5	10.5	11.5	11.5	13.5
802.11ac VHT80	42	5210	10.5	10.5	11.5	11.5	13.5
802.11ax HE20	36	5180	10.5	10.5	11.5	11.5	13.5
	40	5200	10.5	10.5	11.5	11.5	13.5
	44	5220	10.5	10.5	11.5	11.5	13.5
	48	5240	10.5	10.5	11.5	11.5	13.5
802.11ax HE40	38	5190	10.5	10.5	11.5	11.5	13.5
	46	5230	10.5	10.5	11.5	11.5	13.5
802.11ax HE80	42	5210	10.5	10.5	11.5	11.5	13.5

Tune-up Power -Tablet Operating Mode

WLAN 5.3GHz

Mode	Channel	Frequency	SISO Ant 0 Max Tune up	SISO Ant 1 Max Tune up	MIMO Ant 0 Tune up	MIMO Ant 1 Tune up	MIMO Ant 0+1 Max Tune up
802.11a	52	5260	10.5	10.5			
	56	5280	10.5	10.5			
	60	5300	10.5	10.5			
	64	5320	10.5	10.5			
802.11n HT20	52	5260	10.5	10.5	11.5	11.5	13.5
	56	5280	10.5	10.5	11.5	11.5	13.5
	60	5300	10.5	10.5	11.5	11.5	13.5
	64	5320	10.5	10.5	11.5	11.5	13.5
802.11n HT40	54	5270	10.5	10.5	11.5	11.5	13.5
	62	5310	10.5	10.5	11.5	11.5	13.5
802.11ac VHT80	58	5290	10.5	10.5	11.5	11.5	13.5
802.11ac VHT160	50	5250	10.5	10.5	11.5	11.5	13.5
802.11ax HE20	52	5260	10.5	10.5	11.5	11.5	13.5
	56	5280	10.5	10.5	11.5	11.5	13.5
	60	5300	10.5	10.5	11.5	11.5	13.5
	64	5320	10.5	10.5	11.5	11.5	13.5
802.11ax HE40	54	5270	10.5	10.5	11.5	11.5	13.5
	62	5310	10.5	10.5	11.5	11.5	13.5
802.11ax HE80	58	5290	10.5	10.5	11.5	11.5	13.5
802.11ax HE160	50	5250	10.5	10.5	11.5	11.5	13.5

Tune-up Power -Tablet Operating Mode

WLAN 5.6GHz

Mode	Channel	Frequency	SISO Ant 0 Max Tune up	SISO Ant 1 Max Tune up	MIMO Ant 0 Tune up	MIMO Ant 1 Tune up	MIMO Ant 0+1 Max Tune up
802.11a	100	5500	10.5	10.5			
	116	5580	10.5	10.5			
	132	5660	10.5	10.5			
	140	5700	10.5	10.5			
	144	5720	10.5	10.5			
802.11n HT20	100	5500	10.5	10.5	11.5	11.5	13.5
	116	5580	10.5	10.5	11.5	11.5	13.5
	132	5660	10.5	10.5	11.5	11.5	13.5
	140	5700	10.5	10.5	11.5	11.5	13.5
	144	5720	10.5	10.5	11.5	11.5	13.5
802.11n HT40	102	5510	10.5	10.5	11.5	11.5	13.5
	110	5550	10.5	10.5	11.5	11.5	13.5
	134	5670	10.5	10.5	11.5	11.5	13.5
	142	5710	10.5	10.5	11.5	11.5	13.5
802.11ac VHT80	106	5530	10.5	10.5	11.5	11.5	13.5
	122	5610	10.5	10.5	11.5	11.5	13.5
	138	5690	10.5	10.5	11.5	11.5	13.5
802.11ac VHT160	114	5570	10.5	10.5	11.5	11.5	13.5
802.11ax HE20	100	5500	10.5	10.5	11.5	11.5	13.5
	116	5580	10.5	10.5	11.5	11.5	13.5
	132	5660	10.5	10.5	11.5	11.5	13.5
	140	5700	10.5	10.5	11.5	11.5	13.5
	144	5720	10.5	10.5	11.5	11.5	13.5
802.11ax HE40	102	5510	10.5	10.5	11.5	11.5	13.5
	110	5550	10.5	10.5	11.5	11.5	13.5
	134	5670	10.5	10.5	11.5	11.5	13.5
	142	5710	10.5	10.5	11.5	11.5	13.5
802.11ax HE80	106	5530	10.5	10.5	11.5	11.5	13.5
	122	5610	10.5	10.5	11.5	11.5	13.5
	138	5690	10.5	10.5	11.5	11.5	13.5
802.11ax HE160	114	5570	10.5	10.5	11.5	11.5	13.5

Tune-up Power -Tablet Operating Mode

WLAN 5.8GHz

Mode	Channel	Frequency	SISO Ant 0 Max Tune up	SISO Ant 1 Max Tune up	MIMO Ant 0 Tune up	MIMO Ant 1 Tune up	MIMO Ant 0+1 Max Tune up
802.11a	149	5745	10.5	10.5			
	153	5765	10.5	10.5			
	157	5785	10.5	10.5			
	161	5805	10.5	10.5			
	165	5825	10.5	10.5			
802.11n HT20	149	5745	10.5	10.5	11.5	11.5	13.5
	153	5765	10.5	10.5	11.5	11.5	13.5
	157	5785	10.5	10.5	11.5	11.5	13.5
	161	5805	10.5	10.5	11.5	11.5	13.5
	165	5825	10.5	10.5	11.5	11.5	13.5
802.11n HT40	151	5755	10.5	10.5	11.5	11.5	13.5
	159	5795	10.5	10.5	11.5	11.5	13.5
802.11ac VHT80	155	5775	10.5	10.5	11.5	11.5	13.5
802.11ax HE20	149	5745	10.5	10.5	11.5	11.5	13.5
	153	5765	10.5	10.5	11.5	11.5	13.5
	157	5785	10.5	10.5	11.5	11.5	13.5
	161	5805	10.5	10.5	11.5	11.5	13.5
	165	5825	10.5	10.5	11.5	11.5	13.5
802.11ax HE40	151	5755	10.5	10.5	11.5	11.5	13.5
	159	5795	10.5	10.5	11.5	11.5	13.5
802.11ax HE80	155	5775	10.5	10.5	11.5	11.5	13.5

Tune-up Power -Tablet Operating Mode

UNII-5

Mode	Channel	Frequency	SISO Ant 0 Max Tune up	SISO Ant 1 Max Tune up	MIMO Ant 0 Tune up	MIMO Ant 1 Tune up	MIMO Ant 0+1 Max Tune up
802.11ax HE20	1	5955	5.0	5.0	5.0	5.0	8.0
	5	5975	5.0	5.0	5.0	5.0	8.0
	9	5995	5.0	5.0	5.0	5.0	8.0
	13	6015	5.0	5.0	5.0	5.0	8.0
	17	6035	5.0	5.0	5.0	5.0	8.0
	21	6055	5.0	5.0	5.0	5.0	8.0
	25	6075	5.0	5.0	5.0	5.0	8.0
	29	6095	5.0	5.0	5.0	5.0	8.0
	33	6115	5.0	5.0	5.0	5.0	8.0
	37	6135	5.0	5.0	5.0	5.0	8.0
	41	6155	5.0	5.0	5.0	5.0	8.0
	45	6175	5.0	5.0	5.0	5.0	8.0
	49	6195	5.0	5.0	5.0	5.0	8.0
	53	6215	5.0	5.0	5.0	5.0	8.0
	57	6235	5.0	5.0	5.0	5.0	8.0
	61	6255	5.0	5.0	5.0	5.0	8.0
	65	6275	5.0	5.0	5.0	5.0	8.0
	69	6295	5.0	5.0	5.0	5.0	8.0
	73	6315	5.0	5.0	5.0	5.0	8.0
	77	6335	5.0	5.0	5.0	5.0	8.0
	81	6355	5.0	5.0	5.0	5.0	8.0
	85	6375	5.0	5.0	5.0	5.0	8.0
	89	6395	5.0	5.0	5.0	5.0	8.0
	93	6415	5.0	5.0	5.0	5.0	8.0

Tune-up Power -Tablet Operating Mode

UNII-5

Mode	Channel	Frequency	SISO Ant 0 Max Tune up	SISO Ant 1 Max Tune up	MIMO Ant 0 Tune up	MIMO Ant 1 Tune up	MIMO Ant 0+1 Max Tune up
802.11ax HE40	3	5965	8.0	8.0	8.0	8.0	11.0
	11	6005	8.0	8.0	8.0	8.0	11.0
	19	6045	8.0	8.0	8.0	8.0	11.0
	27	6085	8.0	8.0	8.0	8.0	11.0
	35	6125	8.0	8.0	8.0	8.0	11.0
	43	6165	8.0	8.0	8.0	8.0	11.0
	51	6205	8.0	8.0	8.0	8.0	11.0
	59	6245	8.0	8.0	8.0	8.0	11.0
	67	6285	8.0	8.0	8.0	8.0	11.0
	75	6325	8.0	8.0	8.0	8.0	11.0
	83	6365	8.0	8.0	8.0	8.0	11.0
	91	6405	8.0	8.0	8.0	8.0	11.0
802.11ax HE80	7	5985	10.0	10.0	10.0	10.0	13.0
	23	6065	10.0	10.0	10.0	10.0	13.0
	39	6145	10.0	10.0	10.0	10.0	13.0
	55	6225	10.0	10.0	10.0	10.0	13.0
	71	6305	10.0	10.0	10.0	10.0	13.0
	87	6385	10.0	10.0	10.0	10.0	13.0
802.11ax HE160	15	6025	11.5	11.5	10.0	10.0	14.5
	47	6185	11.5	11.5	10.0	10.0	14.5
	79	6345	11.5	11.5	10.0	10.0	14.5

Tune-up Power -Tablet Operating Mode

UNII-6

Mode	Channel	Frequency	SISO Ant 0 Max Tune up	SISO Ant 1 Max Tune up	MIMO Ant 0 Tune up	MIMO Ant 1 Tune up	MIMO Ant 0+1 Max Tune up
802.11ax HE20	97	6435	5.0	5.0	5.0	5.0	8.0
	101	6455	5.0	5.0	5.0	5.0	8.0
	105	6475	5.0	5.0	5.0	5.0	8.0
	109	6495	5.0	5.0	5.0	5.0	8.0
	113	6515	5.0	5.0	5.0	5.0	8.0
	117	6535	5.0	5.0	5.0	5.0	8.0
802.11ax HE40	99	6445	8.0	8.0	8.0	8.0	11.0
	107	6485	8.0	8.0	8.0	8.0	11.0
	115	6525	8.0	8.0	8.0	8.0	11.0
802.11ax HE80	103	6465	10.0	10.0	10.0	10.0	13.0
	119	6545	11.5	11.5	10.0	10.0	14.5
802.11ax HE160	111	6505	11.5	11.5	10.0	10.0	14.5

Tune-up Power -Tablet Operating Mode

UNII-7

Mode	Channel	Frequency	SISO Ant 0 Max Tune up	SISO Ant 1 Max Tune up	MIMO Ant 0 Tune up	MIMO Ant 1 Tune up	MIMO Ant 0+1 Max Tune up
802.11ax HE20	121	6555	5.0	5.0	5.0	5.0	8.0
	125	6575	5.0	5.0	5.0	5.0	8.0
	129	6595	5.0	5.0	5.0	5.0	8.0
	133	6615	5.0	5.0	5.0	5.0	8.0
	137	6635	5.0	5.0	5.0	5.0	8.0
	141	6655	5.0	5.0	5.0	5.0	8.0
	145	6675	5.0	5.0	5.0	5.0	11.0
	149	6695	5.0	5.0	5.0	5.0	11.0
	153	6715	5.0	5.0	5.0	5.0	11.0
	157	6735	5.0	5.0	5.0	5.0	13.0
	161	6755	5.0	5.0	5.0	5.0	14.5
	165	6775	5.0	5.0	5.0	5.0	14.5
	169	6795	5.0	5.0	5.0	5.0	8.0
	173	6815	5.0	5.0	5.0	5.0	8.0
	177	6835	5.0	5.0	5.0	5.0	8.0
	181	6855	5.0	5.0	5.0	5.0	8.0
	185	6875	5.0	5.0	5.0	5.0	8.0
802.11ax HE40	123	6565	8.0	8.0	8.0	8.0	11.0
	131	6605	8.0	8.0	8.0	8.0	11.0
	139	6645	8.0	8.0	8.0	8.0	11.0
	147	6685	8.0	8.0	8.0	8.0	11.0
	155	6725	8.0	8.0	8.0	8.0	11.0
	163	6765	8.0	8.0	8.0	8.0	11.0
	171	6805	8.0	8.0	8.0	8.0	11.0
	179	6845	8.0	8.0	8.0	8.0	11.0
	187	6885	8.0	8.0	8.0	8.0	11.0
802.11ax HE80	135	6625	10.0	10.0	10.0	10.0	13.0
	151	6705	10.0	10.0	10.0	10.0	13.0
	167	6785	10.0	10.0	10.0	10.0	13.0
	183	6865	10.0	10.0	10.0	10.0	13.0
802.11ax HE160	143	6665	11.5	11.5	10.0	10.0	14.5
	175	6825	11.5	11.5	10.0	10.0	14.5

Tune-up Power -Tablet Operating Mode

UNII-8

Mode	Channel	Frequency	SISO Ant 0 Max Tune up	SISO Ant 1 Max Tune up	MIMO Ant 0 Tune up	MIMO Ant 1 Tune up	MIMO Ant 0+1 Max Tune up
802.11ax HE20	189	6895	5.0	5.0	5.0	5.0	8.0
	193	6915	5.0	5.0	5.0	5.0	8.0
	197	6935	5.0	5.0	5.0	5.0	8.0
	201	6955	5.0	5.0	5.0	5.0	8.0
	205	6975	5.0	5.0	5.0	5.0	8.0
	209	6995	5.0	5.0	5.0	5.0	8.0
	213	7015	5.0	5.0	5.0	5.0	8.0
	217	7035	5.0	5.0	5.0	5.0	8.0
	221	7055	5.0	5.0	5.0	5.0	8.0
	225	7075	5.0	5.0	5.0	5.0	8.0
	229	7095	5.0	5.0	5.0	5.0	8.0
	233	7115	2.0	2.0	2.0	2.0	5.0
802.11ax HE40	195	6925	8.0	8.0	8.0	8.0	11.0
	203	6965	8.0	8.0	8.0	8.0	11.0
	211	7005	8.0	8.0	8.0	8.0	11.0
	219	7045	8.0	8.0	8.0	8.0	11.0
	227	7085	8.0	8.0	8.0	8.0	11.0
802.11ax HE80	199	6945	10.0	10.0	10.0	10.0	13.0
	215	7025	10.0	10.0	10.0	10.0	13.0
802.11ax HE160	207	6985	11.5	11.5	10.0	10.0	14.5

Appendix E. Measured Conducted Power Result

The measuring conducted power (Unit: dBm) are shown as below.

Conducted Power - Laptop Operating Mode			
WLAN2.4GHz Ant 0			
Mode	Channel	Frequency	SISO Ant 0 Avg. Power
802.11b	1	2412	18.91
	6	2437	18.97
	11	2462	18.93
	12	2467	13.61
	13	2472	12.13

Conducted Power - Laptop Operating Mode			
WLAN2.4GHz Ant 1			
Mode	Channel	Frequency	SISO Ant 1 Avg. Power
802.11b	1	2412	18.86
	6	2437	18.85
	11	2462	18.72
	12	2467	13.49
	13	2472	11.84

Conducted Power - Laptop Operating Mode					
WLAN2.4GHz Ant 0+1					
Mode	Channel	Frequency	MIMO Ant 0 Avg. Power	MIMO Ant 1 Avg. Power	MIMO Ant 0+1 Avg. Power
802.11n HT40	3	2422	15.98	16.17	19.09
	6	2437	18.28	18.33	21.32
	9	2452	15.93	15.99	18.97
	10	2457	12.89	13.02	15.97
	11	2462	10.85	11.13	14.00

Conducted Power - Laptop Operating Mode			
Bluetooth Ant 1			
Mode	Channel	Frequency	SISO Ant 1 Avg. Power
BR / EDR	0	2402	9.39
	39	2441	9.59
	78	2480	9.81
LE	0	2402	7.93
	19	2440	8.29
	39	2480	8.43

Conducted Power - Laptop Operating Mode			
WLAN 5.3GHz Ant 0			
Mode	Channel	Frequency	SISO Ant 0 Avg. Power
802.11ac VHT160	50	5250	11.47

Conducted Power - Laptop Operating Mode			
WLAN 5.3GHz Ant 1			
Mode	Channel	Frequency	SISO Ant 1 Avg. Power
802.11ac VHT160	50	5250	11.44

Conducted Power - Laptop Operating Mode**WLAN 5.3GHz Ant 0+1**

Mode	Channel	Frequency	MIMO Ant 0 Avg. Power	MIMO Ant 1 Avg. Power	MIMO Ant 0+1 Avg. Power
802.11ac VHT160	50	5250	11.47	11.44	14.47

Conducted Power - Laptop Operating Mode			
WLAN 5.6GHz Ant 0			
Mode	Channel	Frequency	SISO Ant 0 Avg. Power
802.11ac VHT160	114	5570	11.44

Conducted Power - Laptop Operating Mode			
WLAN 5.6GHz Ant 1			
Mode	Channel	Frequency	SISO Ant 1 Avg. Power
802.11ac VHT160	114	5570	11.32

Conducted Power - Laptop Operating Mode**WLAN 5.6GHz Ant 0+1**

Mode	Channel	Frequency	MIMO Ant 0 Avg. Power	MIMO Ant 1 Avg. Power	MIMO Ant 0+1 Avg. Power
802.11ac VHT160	114	5570	11.44	11.32	14.39

Conducted Power - Laptop Operating Mode			
WLAN 5.8GHz Ant 0			
Mode	Channel	Frequency	SISO Ant 0 Avg. Power
802.11ac VHT80	155	5775	11.16

Conducted Power - Laptop Operating Mode			
WLAN 5.8GHz Ant 1			
Mode	Channel	Frequency	SISO Ant 1 Avg. Power
802.11ac VHT80	155	5775	11.26

Conducted Power - Laptop Operating Mode**WLAN 5.8GHz Ant 0+1**

Mode	Channel	Frequency	MIMO Ant 0 Avg. Power	MIMO Ant 1 Avg. Power	MIMO Ant 0+1 Avg. Power
802.11ac VHT80	155	5775	11.16	11.26	14.22

Conducted Power - Laptop Operating Mode			
UNII-5 Ant 0			
Mode	Channel	Frequency	SISO Ant 0 Avg. Power
802.11ax HE160	15	6025	9.97
	47	6185	9.95
	79	6345	9.87

UNII-6 Ant 0			
Mode	Channel	Frequency	SISO Ant 0 Avg. Power
802.11ax HE160	111	6505	9.9

UNII-7 Ant 0			
Mode	Channel	Frequency	SISO Ant 0 Avg. Power
802.11ax HE160	143	6665	9.91
	175	6825	9.89

UNII-8 Ant 0			
Mode	Channel	Frequency	SISO Ant 0 Avg. Power
802.11ax HE160	207	6985	9.93

Conducted Power - Laptop Operating Mode			
UNII-5 Ant 1			
Mode	Channel	Frequency	SISO Ant 1 Avg. Power
802.11ax HE160	15	6025	9.98
	47	6185	9.91
	79	6345	9.88

UNII-6 Ant 1			
Mode	Channel	Frequency	SISO Ant 1 Avg. Power
802.11ax HE160	111	6505	9.87

UNII-7 Ant 1			
Mode	Channel	Frequency	SISO Ant 1 Avg. Power
802.11ax HE160	143	6665	9.95
	175	6825	9.84

UNII-8 Ant 1			
Mode	Channel	Frequency	SISO Ant 1 Avg. Power
802.11ax HE160	207	6985	9.95

Conducted Power - Laptop Operating Mode

UNII-5 Ant 0+1

Mode	Channel	Frequency	MIMO Ant 0 Avg. Power	MIMO Ant 1 Avg. Power	MIMO Ant 0+1 Avg. Power
802.11ax HE160	15	6025	9.97	9.98	12.99
	47	6185	9.95	9.91	12.94
	79	6345	9.87	9.88	12.89

UNII-6 Ant 0+1

Mode	Channel	Frequency	MIMO Ant 0 Avg. Power	MIMO Ant 1 Avg. Power	MIMO Ant 0+1 Avg. Power
802.11ax HE160	111	6505	9.9	9.87	12.9

UNII-7 Ant 0+1

Mode	Channel	Frequency	MIMO Ant 0 Avg. Power	MIMO Ant 1 Avg. Power	MIMO Ant 0+1 Avg. Power
802.11ax HE160	143	6665	9.91	9.95	12.94
	175	6825	9.89	9.84	12.88

UNII-8 Ant 0+1

Mode	Channel	Frequency	MIMO Ant 0 Avg. Power	MIMO Ant 1 Avg. Power	MIMO Ant 0+1 Avg. Power
802.11ax HE160	207	6985	9.93	9.95	12.95

Conducted Power - Tablet Operating Mode			
WLAN2.4GHz Ant 0			
Mode	Channel	Frequency	SISO Ant 0 Avg. Power
802.11b	1	2412	13.88
	6	2437	13.95
	11	2462	13.91
	12	2467	13.61
	13	2472	12.13

Conducted Power - Tablet Operating Mode			
WLAN2.4GHz Ant 1			
Mode	Channel	Frequency	SISO Ant 1 Avg. Power
802.11b	1	2412	13.81
	6	2437	13.97
	11	2462	13.95
	12	2467	13.94
	13	2472	11.84

Conducted Power - Tablet Operating Mode					
WLAN2.4GHz Ant 0+1					
Mode	Channel	Frequency	MIMO Ant 0 Avg. Power	MIMO Ant 1 Avg. Power	MIMO Ant 0+1 Avg. Power
802.11n HT40	3	2422	13.85	13.88	16.88
	6	2437	13.93	13.91	16.93
	9	2452	13.79	13.92	16.87
	10	2457	12.89	13.02	15.97
	11	2462	10.85	11.13	14.00

Conducted Power - Tablet Operating Mode			
Bluetooth Ant 1			
Mode	Channel	Frequency	SISO Ant 1 Avg. Power
BR / EDR	0	2402	9.39
	39	2441	9.59
	78	2480	9.81
LE	0	2402	7.93
	19	2440	8.29
	39	2480	8.43

Conducted Power - Tablet Operating Mode			
WLAN 5.3GHz Ant 0			
Mode	Channel	Frequency	SISO Ant 0 Avg. Power
802.11ac VHT160	50	5250	10.43

Conducted Power - Tablet Operating Mode			
WLAN 5.3GHz Ant 1			
Mode	Channel	Frequency	SISO Ant 1 Avg. Power
802.11ac VHT160	50	5250	10.38

Conducted Power - Tablet Operating Mode					
WLAN 5.3GHz Ant 0+1					
Mode	Channel	Frequency	MIMO Ant 0 Avg. Power	MIMO Ant 1 Avg. Power	MIMO Ant 0+1 Avg. Power
802.11ac VHT160	50	5250	10.43	10.38	13.42



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Conducted Power - Tablet Operating Mode			
WLAN 5.6GHz Ant 0			
Mode	Channel	Frequency	SISO Ant 0 Avg. Power
802.11ac VHT160	114	5570	10.44

Conducted Power - Tablet Operating Mode			
WLAN 5.6GHz Ant 1			
Mode	Channel	Frequency	SISO Ant 1 Avg. Power
802.11ac VHT160	114	5570	10.47

Conducted Power - Tablet Operating Mode**WLAN 5.6GHz Ant 0+1**

Mode	Channel	Frequency	MIMO Ant 0 Avg. Power	MIMO Ant 1 Avg. Power	MIMO Ant 0+1 Avg. Power
802.11ac VHT160	114	5570	10.44	10.47	13.47

Conducted Power - Tablet Operating Mode			
WLAN 5.8GHz Ant 0			
Mode	Channel	Frequency	SISO Ant 0 Avg. Power
802.11ac VHT80	155	5775	10.49

Conducted Power - Tablet Operating Mode			
WLAN 5.8GHz Ant 1			
Mode	Channel	Frequency	SISO Ant 1 Avg. Power
802.11ac VHT80	155	5775	10.48

Conducted Power - Tablet Operating Mode**WLAN 5.8GHz Ant 0+1**

Mode	Channel	Frequency	MIMO Ant 0 Avg. Power	MIMO Ant 1 Avg. Power	MIMO Ant 0+1 Avg. Power
802.11ac VHT80	155	5775	10.49	10.48	13.5

Conducted Power - Tablet Operating Mode			
UNII-5 Ant 0			
Mode	Channel	Frequency	SISO Ant 0 Avg. Power
802.11ax HE160	15	6025	11.3
	47	6185	11.41
	79	6345	11.25
UNII-6 Ant 0			
Mode	Channel	Frequency	SISO Ant 0 Avg. Power
802.11ax HE160	111	6505	11.25
UNII-7 Ant 0			
Mode	Channel	Frequency	SISO Ant 0 Avg. Power
802.11ax HE160	143	6665	11.26
	175	6825	11.27
UNII-8 Ant 0			
Mode	Channel	Frequency	SISO Ant 0 Avg. Power
802.11ax HE160	207	6985	11.42

Conducted Power - Tablet Operating Mode			
UNII-5 Ant 1			
Mode	Channel	Frequency	SISO Ant 1 Avg. Power
802.11ax HE160	15	6025	11.37
	47	6185	11.39
	79	6345	11.45

UNII-6 Ant 1			
Mode	Channel	Frequency	SISO Ant 1 Avg. Power
802.11ax HE160	111	6505	11.44

UNII-7 Ant 1			
Mode	Channel	Frequency	SISO Ant 1 Avg. Power
802.11ax HE160	143	6665	11.29
	175	6825	11.45

UNII-8 Ant 1			
Mode	Channel	Frequency	SISO Ant 1 Avg. Power
802.11ax HE160	207	6985	11.48

Conducted Power - Tablet Operating Mode

UNII-5 Ant 0+1

Mode	Channel	Frequency	MIMO Ant 0 Avg. Power	MIMO Ant 1 Avg. Power	MIMO Ant 0+1 Avg. Power
802.11ax HE160	15	6025	11.3	11.37	14.35
	47	6185	11.41	11.39	14.41
	79	6345	11.25	11.45	14.36

UNII-6 Ant 0+1

Mode	Channel	Frequency	MIMO Ant 0 Avg. Power	MIMO Ant 1 Avg. Power	MIMO Ant 0+1 Avg. Power
802.11ax HE160	111	6505	11.25	11.44	14.36

UNII-7 Ant 0+1

Mode	Channel	Frequency	MIMO Ant 0 Avg. Power	MIMO Ant 1 Avg. Power	MIMO Ant 0+1 Avg. Power
802.11ax HE160	143	6665	11.26	11.29	14.29
	175	6825	11.27	11.45	14.37

UNII-8 Ant 0+1

Mode	Channel	Frequency	MIMO Ant 0 Avg. Power	MIMO Ant 1 Avg. Power	MIMO Ant 0+1 Avg. Power
802.11ax HE160	207	6985	11.42	11.48	14.46

Appendix F. SAR, APD and IPD Test Result

SAR Results for Body Exposure Condition.

Note:

1. SAR testing for WLAN was performed on the maximum power mode.
2. Per KDB 388624 APPENDIX OVER6G, the minimum of 5 channels to perform IPD across U-NII 5,6,7 and 8. and measured results were scaled by factor 1.545 to reported power density when measurement uncertainty exceed 30%.

SAR Test Result

System & Position						DUT Configuration			SAR							
Plot No.	Band	Mode	Test Position	Separation Distance (mm)	Channel	Operating Mode	Ant Status	Antenna Manufacturer	Duty Cycle	Crest Factor	Max. Tune-up Power (dBm)	Measured Conducted Power (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR-1g (W/kg)	Scaled SAR-1g (W/kg)
	WLAN2.4G	802.11b	Bottom	0	6	Laptop	Ant 0	Pulse	99.30	1.01	19.00	18.97	1.01	-0.01	0.767	0.78
	WLAN2.4G	802.11b	Bottom	0	1	Laptop	Ant 1	Pulse	99.30	1.01	19.00	18.86	1.03	0.01	0.698	0.73
	WLAN2.4G	802.11n HT40	Bottom	0	6	Laptop	Ant 0+1	Pulse	98.90	1.01	22.00	21.32	1.17	-0.01	0.67	0.79
	WLAN2.4G	802.11b	Rear Face	0	6	Tablet	Ant 0	Pulse	99.30	1.01	14.00	13.95	1.01	-0.02	0.489	0.50
	WLAN2.4G	802.11b	Left Side	0	6	Tablet	Ant 0	Pulse	99.30	1.01	14.00	13.95	1.01	0	<0.001	0.00
	WLAN2.4G	802.11b	Right Side	0	6	Tablet	Ant 0	Pulse	99.30	1.01	14.00	13.95	1.01	0	<0.001	0.00
	WLAN2.4G	802.11b	Top Side	0	6	Tablet	Ant 0	Pulse	99.30	1.01	14.00	13.95	1.01	0	<0.001	0.00
	WLAN2.4G	802.11b	Bottom Side	0	6	Tablet	Ant 0	Pulse	99.30	1.01	14.00	13.95	1.01	-0.02	0.778	0.79
	WLAN2.4G	802.11b	Rear Face	0	6	Tablet	Ant 1	Pulse	99.10	1.01	14.00	13.97	1.01	0.14	0.507	0.52
	WLAN2.4G	802.11b	Left Side	0	6	Tablet	Ant 1	Pulse	99.10	1.01	14.00	13.97	1.01	0	<0.001	0.00
	WLAN2.4G	802.11b	Right Side	0	6	Tablet	Ant 1	Pulse	99.10	1.01	14.00	13.97	1.01	0	<0.001	0.00
	WLAN2.4G	802.11b	Top Side	0	6	Tablet	Ant 1	Pulse	99.10	1.01	14.00	13.97	1.01	0	<0.001	0.00
	WLAN2.4G	802.11b	Bottom Side	0	6	Tablet	Ant 1	Pulse	99.10	1.01	14.00	13.97	1.01	0.13	0.988	1.01
	WLAN2.4G	802.11n HT40	Rear Face	0	6	Tablet	Ant 0+1	Pulse	98.90	1.01	17.00	16.93	1.02	0.02	0.547	0.56
	WLAN2.4G	802.11n HT40	Left Side	0	6	Tablet	Ant 0+1	Pulse	98.90	1.01	17.00	16.93	1.02	-0.02	0.043	0.04
	WLAN2.4G	802.11n HT40	Right Side	0	6	Tablet	Ant 0+1	Pulse	98.90	1.01	17.00	16.93	1.02	0	<0.001	0.00
	WLAN2.4G	802.11n HT40	Top Side	0	6	Tablet	Ant 0+1	Pulse	98.90	1.01	17.00	16.93	1.02	0	<0.001	0.00
	WLAN2.4G	802.11n HT40	Bottom Side	0	6	Tablet	Ant 0+1	Pulse	98.90	1.01	17.00	16.93	1.02	-0.19	0.931	0.96
	WLAN2.4G	802.11b	Bottom Side	0	1	Tablet	Ant 1	Pulse	99.10	1.01	14.00	13.81	1.04	-0.01	1.11	1.17
1	WLAN2.4G	802.11b	Bottom Side	0	11	Tablet	Ant 1	Pulse	99.10	1.01	14.00	13.95	1.01	-0.01	1.17	1.19
	WLAN2.4G	802.11b	Bottom Side	0	12	Tablet	Ant 1	Pulse	99.10	1.01	14.00	13.94	1.01	-0.19	1.15	1.17
	WLAN2.4G	802.11b	Bottom Side	0	13	Tablet	Ant 1	Pulse	99.10	1.01	12.50	11.84	1.16	-0.04	0.887	1.04
	WLAN2.4G	802.11n HT40	Bottom Side	0	3	Tablet	Ant 0+1	Pulse	98.90	1.01	17.00	16.88	1.03	0.03	0.948	0.99
	WLAN2.4G	802.11n HT40	Bottom Side	0	9	Tablet	Ant 0+1	Pulse	98.90	1.01	17.00	16.87	1.03	0.16	0.951	0.99
	WLAN2.4G	802.11n HT40	Bottom Side	0	10	Tablet	Ant 0+1	Pulse	98.90	1.01	16.50	15.97	1.13	0.02	0.959	1.09
	WLAN2.4G	802.11n HT40	Bottom Side	0	11	Tablet	Ant 0+1	Pulse	98.90	1.01	14.50	14.00	1.12	0.09	0.616	0.70
	WLAN2.4G	802.11b	Bottom Side	0	11	Tablet	Ant 1	Chilisin	99.10	1.01	14.00	13.95	1.01	0.05	1.15	1.17
	WLAN2.4G	802.11b	Bottom Side	0	1	Tablet	Ant 1	Chilisin	99.10	1.01	14.00	13.81	1.01	0.05	1.11	1.13
	WLAN2.4G	802.11b	Bottom Side	0	6	Tablet	Ant 1	Chilisin	99.10	1.01	14.00	13.97	1.01	0.05	1.07	1.09
	WLAN2.4G	802.11b	Bottom Side	0	12	Tablet	Ant 1	Chilisin	99.10	1.01	14.00	13.94	1.01	0.05	1.01	1.03
	WLAN2.4G	802.11b	Bottom Side	0	13	Tablet	Ant 1	Chilisin	99.10	1.01	12.50	11.84	1.01	0.05	0.925	0.94
	WLAN2.4G	802.11b	Bottom Side	0	11	Tablet	Ant 1	Pulse	99.10	1.01	14.00	13.95	1.01	0.07	1.12	1.14

SAR Test Result

[illegible]

SAR Test Result

[illegible]

SAR Test Result

SAR / APD and Power Density Test Result

System & Position						DUT Configuration				SAR								Power Density									
Plot No.	Band	Mode	Test Position	Separation Distance (mm)	Channel	Operating Mode	Ant Status	Antenna Manufacturer	Duty Cycle	Crest Factor	Max. Tune-up Power (dBm)	Measured Conducted Power (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR-1g (W/kg)	Scaled SAR-1g (W/kg)	Measured APD W/m ² (4cm ²)	Scaled APD W/m ² (4cm ²)	Grid Step [λ]	iPD [W/m ²]	Scaling Factor for Measurement Uncertainty	Averaging Area [cm ²]	Power Drift [dB]	Normal psPD [W/m ²]	Scaled Normal psPD [W/m ²]	Total psPD [W/m ²]	Scaled Total psPD [W/m ²]
	WLAN6G	802.11ax HE160	Bottom	0	15	Laptop	Ant 0	Pulse	99.00	1.01	10.00	9.97	1.01	0.13	0.444	0.45	2.95	3.01	0.0502	16.58	1.545	4.00	0.03	1.3	2.03	1.92	3.03
	WLAN6G	802.11ax HE160	Bottom	0	15	Laptop	Ant 1	Pulse	98.90	1.01	10.00	9.98	1.00	0.11	0.721	0.73	4.65	4.7	0.0502	26.13	1.545	4.00	-0.07	2.05	3.2	3.02	4.71
	WLAN6G	802.11ax HE160	Bottom	0	15	Laptop	Ant 0+1	Pulse	98.50	1.02	13.00	12.99	1.00	0.04	0.731	0.75	4.68	4.77	0.0502	29.91	1.545	4.00	-0.05	2.35	3.7	3.45	5.44
	WLAN6G	802.11ax HE160	Rear Face	0	207	Tablet	Ant 0	Pulse	99.00	1.01	11.50	11.42	1.02	0.05	0.113	0.12	0.57	0.59	0.0582	3.2	1.545	4.00	0.06	0.25	0.39	0.37	0.59
	WLAN6G	802.11ax HE160	Left Side	0	207	Tablet	Ant 0	Pulse	99.00	1.01	11.50	11.42	1.02	0	<0.001	0.00	0	0									
	WLAN6G	802.11ax HE160	Right Side	0	207	Tablet	Ant 0	Pulse	99.00	1.01	11.50	11.42	1.02	0	<0.001	0.00	0	0									
	WLAN6G	802.11ax HE160	Top Side	0	207	Tablet	Ant 0	Pulse	99.00	1.01	11.50	11.42	1.02	0	<0.001	0.00	0	0									
	WLAN6G	802.11ax HE160	Bottom Side	0	207	Tablet	Ant 0	Pulse	99.00	1.01	11.50	11.42	1.02	-0.04	0.313	0.32	1.56	1.61	0.0582	8.77	1.545	4.00	0.14	0.69	1.08	1.01	1.61
	WLAN6G	802.11ax HE160	Rear Face	0	207	Tablet	Ant 1	Pulse	98.90	1.01	11.50	11.48	1.00	-0.12	0.119	0.12	0.683	0.69	0.0582	3.84	1.545	4.00	0.11	0.3	0.47	0.44	0.69
	WLAN6G	802.11ax HE160	Left Side	0	207	Tablet	Ant 1	Pulse	98.90	1.01	11.50	11.48	1.00	0	<0.001	0.00	0	0									
	WLAN6G	802.11ax HE160	Right Side	0	207	Tablet	Ant 1	Pulse	98.90	1.01	11.50	11.48	1.00	0	<0.001	0.00	0	0									
	WLAN6G	802.11ax HE160	Top Side	0	207	Tablet	Ant 1	Pulse	98.90	1.01	11.50	11.48	1.00	0	<0.001	0.00	0	0									
	WLAN6G	802.11ax HE160	Bottom Side	0	207	Tablet	Ant 1	Pulse	98.90	1.01	11.50	11.48	1.00	0.05	0.645	0.65	4.06	4.1	0.0582	22.82	1.545	4.00	-0.06	1.79	2.79	2.64	4.12
	WLAN6G	802.11ax HE160	Rear Face	0	207	Tablet	Ant 0+1	Pulse	98.50	1.02	14.50	14.46	1.01	-0.05	0.123	0.13	0.611	0.63	0.0582	3.43	1.545	4.00	0.13	0.27	0.43	0.4	0.64
	WLAN6G	802.11ax HE160	Left Side	0	207	Tablet	Ant 0+1	Pulse	98.50	1.02	14.50	14.46	1.01	0	<0.001	0.00	0	0									
	WLAN6G	802.11ax HE160	Right Side	0	207	Tablet	Ant 0+1	Pulse	98.50	1.02	14.50	14.46	1.01	0	<0.001	0.00	0	0									
	WLAN6G	802.11ax HE160	Top Side	0	207	Tablet	Ant 0+1	Pulse	98.50	1.02	14.50	14.46	1.01	0	<0.001	0.00	0	0									
	WLAN6G	802.11ax HE160	Bottom Side	0	207	Tablet	Ant 0+1	Pulse	98.50	1.02	14.50	14.46	1.01	0.09	0.676	0.70	4.37	4.5	0.0582	30.06	1.545	4.00	-0.17	2.77	4.37	2.98	4.74
	WLAN6G	802.11ax HE160	Bottom	0	47	Laptop	Ant 0+1	Pulse	98.5	1.02	13.00	12.94	1.01	0.08	0.774	0.80	5.08	5.23	0.0515	31.73	1.545	4.00	0.13	2.49	3.92	3.67	5.84
	WLAN6G	802.11ax HE160	Bottom	0	79	Laptop	Ant 0+1	Pulse	98.5	1.02	13.00	12.89	1.03	-0.01	0.762	0.80	5.19	5.45	0.0529	31.24	1.545	4.00	0.02	2.45	3.86	3.58	5.81
	WLAN6G	802.11ax HE160	Bottom	0	111	Laptop	Ant 0+1	Pulse	98.5	1.02	13.00	12.90	1.02	0.07	0.521	0.54	2.85	2.97	0.0542	16.02	1.545	4.00	0.04	1.25	1.97	1.85	2.97
	WLAN6G	802.11ax HE160	Bottom	0	143	Laptop	Ant 0+1	Pulse	98.5	1.02	13.00	12.94	1.01	-0.07	0.751	0.77	5.43	5.59	0.0555	30.85	1.545	4.00	-0.05	2.38	3.75	3.39	5.4
6	WLAN6G	802.11ax HE160	Bottom	0	175	Laptop	Ant 0+1	Pulse	98.5	1.02	13.00	12.88	1.03	0.03	0.856	0.90	6.24	6.56	0.0569	35.1	1.545	4.00	-0.05	2.76	4.35	4.05	6.57
	WLAN6G	802.11ax HE160	Bottom	0	207	Laptop	Ant 0+1	Pulse	98.5	1.02	13.00	12.95	1.01	0.13	0.523	0.54	3.4	3.5	0.0582	19.11	1.545	4.00	-0.01	1.5	2.36	2.21	3.52
	WLAN6G	802.11ax HE160	Bottom	0	175	Laptop	Ant 0+1	Chilisin	98.5	1.02	13.00	12.88	1.03	0.03	0.819	0.86	5.88	6.18	0.0569	33.05	1.545	4.00	-0.05	2.59	4.08	3.82	6.2
	WLAN6G	802.11ax HE160	Bottom	0	15	Laptop	Ant 0+1	Chilisin	98.5	1.02	13.00	12.99	1.00	0.02	0.699	0.71	4.41	4.5	0.0502	24.78	1.545	4.00	0.03	1.94	3.06	2.87	4.52
	WLAN6G	802.11ax HE160	Bottom	0	47	Laptop	Ant 0+1	Chilisin	98.5	1.02	13.00	12.94	1.01	-0.11	0.74	0.76	4.78	4.92	0.0515	26.86	1.545	4.00	0.09	2.1	3.31	3.11	4.95
	WLAN6G	802.11ax HE160	Bottom	0	79	Laptop	Ant 0+1	Chilisin	98.5	1.02	13.00	12.89	1.03	0.08	0.729	0.77	4.89	5.14	0.0529	27.48	1.545	4.00	0.11	2.15	3.39	3.18	5.16
	WLAN6G	802.11ax HE160	Bottom	0	111	Laptop	Ant 0+1	Chilisin	98.5	1.02	13.00	12.90	1.02	0.13	0.498	0.52	2.68	2.79	0.0542	15.06	1.545	4.00	-0.15	1.18	1.86	1.74	2.8
	WLAN6G	802.11ax HE160	Bottom	0	143	Laptop	Ant 0+1	Chilisin	98.5	1.02	13.00	12.94	1.01	-0.18	0.718	0.74	5.11	5.26	0.0555	28.72	1.545	4.00	0.07	2.25	3.55	3.32	5.28
	WLAN6G	802.11ax HE160	Bottom	0	207	Laptop	Ant 0+1	Chilisin	98.5	1.02	13.00	12.95	1.01	0.04	0.811	0.84	5.75	5.92	0.0582	32.32	1.545	4.00	0.04	2.53	3.99	3.74	5.95
	WLAN6G	802.11ax HE160	Bottom	0	175	Laptop	Ant 0+1	Pulse	98.5	1.02	13.00	12.88	1.03	0.03	0.848	0.89	6.15	6.46	0.0569	34.56	1.545	4.00	-0.01	2.71	4.27	4	6.49

The power verified by LCD angle changed are shown as below...

Appendix Z. Calibration Certificate for Probe and Dipole

The SPEAG calibration certificates are shown as follows.



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CALIBRATION LABORATORY



中国认可
国际互认
校准
CALIBRATION
CNAS L0570

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E-mail: cntl@chinattl.com http://www.chinattl.cn

Client

B.V.ADT

Certificate No: **Z21-60284**

CALIBRATION CERTIFICATE

Object

D2450V2 - SN: 737

Calibration Procedure(s)

FF-Z11-003-01

Calibration Procedures for dipole validation kits

Calibration date:

August 26, 2021

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	106277	23-Sep-20 (CTTL, No.J20X08336)	Sep-21
Power sensor NRP8S	104291	23-Sep-20 (CTTL, No.J20X08336)	Sep-21
Reference Probe EX3DV4	SN 7517	03-Feb-21(CTTL-SPEAG,No.Z21-60001)	Feb-22
DAE3	SN 536	06-Nov-20(CTTL-SPEAG,No.Z20-60452)	Nov-21
Secondary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	01-Feb-21 (CTTL, No.J21X00593)	Jan-22
NetworkAnalyzer E5071C	MY46110673	14-Jan-21 (CTTL, No.J21X00232)	Jan-22

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	
Reviewed by:	Lin Hao	SAR Test Engineer	
Approved by:	Qi Dianyuan	SAR Project Leader	

Issued: August 31, 2021

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



In Collaboration with

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Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM _{x,y,z}
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- b) IEC 62209-1, "Measurement procedure for assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices- Part 1: Device used next to the ear (Frequency range of 300MHz to 6GHz)", July 2016
- c) IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
- d) KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

- e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

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



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Measurement Conditions

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

DASY Version	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	40.0 $\pm$ 6 %	1.77 mho/m $\pm$ 6 %
Head TSL temperature change during test	<1.0 °C	---	---

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.0 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	52.6 W/kg $\pm$ 18.8 % (k=2)
SAR averaged over 10 cm³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	5.92 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	23.9 W/kg $\pm$ 18.7 % (k=2)



In Collaboration with

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CALIBRATION LABORATORY

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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.0Ω+ 4.29jΩ
Return Loss	- 25.0dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.067 ns
----------------------------------	----------

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

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

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

Additional EUT Data

Manufactured by	SPEAG
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DASY5 Validation Report for Head TSL

Date: 08.26.2021

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 737

Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.772$ S/m; $\epsilon_r = 40.04$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7517; ConvF(7.34, 7.34, 7.34) @ 2450 MHz; Calibrated: 2021-02-03
- Sensor-Surface: 1.4mm|(Mechanical Surface Detection)
- Electronics: DAE3 Sn536; Calibrated: 2020-11-06
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 108.5 V/m; Power Drift = -0.01 dB

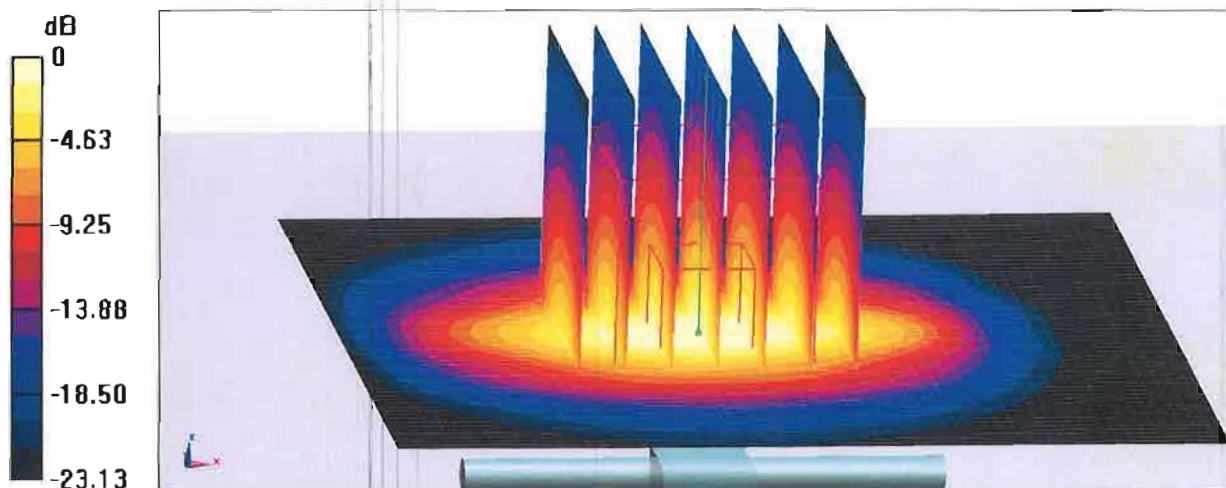
Peak SAR (extrapolated) = 27.8 W/kg

SAR(1 g) = 13 W/kg; SAR(10 g) = 5.92 W/kg

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

Ratio of SAR at M2 to SAR at M1 = 46.7%

Maximum value of SAR (measured) = 22.3 W/kg



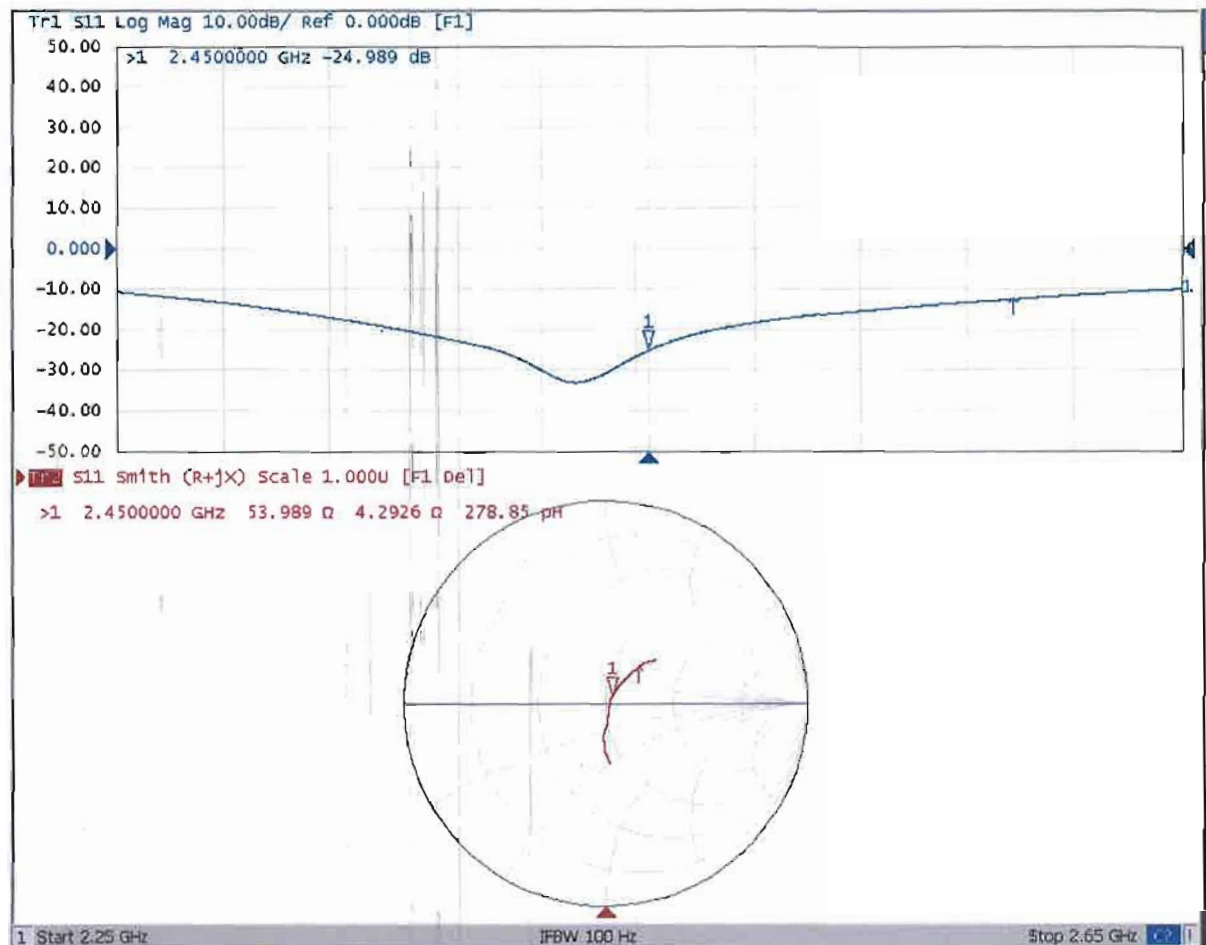
0 dB = 22.3 W/kg = 13.48 dBW/kg



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Impedance Measurement Plot for Head TSL





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Annual Confirmation of SAR Reference Dipole

Model : D2450V2

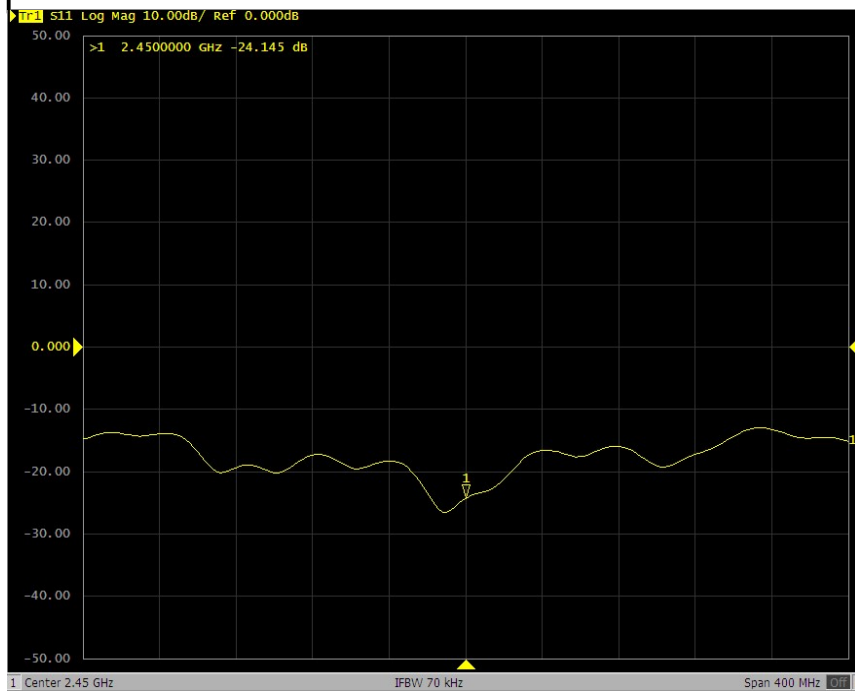
S/N : 737

Measurement Date :

2022/8/25

Frequency (MHz)	Type	Item	Previous Measurement	Annual Check	Deviation	Accepted Tolerance	Result
2450	Free Space	Real Impedance	53.989	51.387	-2.602	$\pm 5\Omega$	PASS
		Imaginary Impedance	4.2926	5.3605	1.07	$\pm 5\Omega$	PASS
		Return Loss	-24.989	-24.145	-3.38%	$\pm 20\%$	PASS

2450 MHz , Free Space





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Client **B.V. ADT (Auden)**

Certificate No: **D5GHzV2-1019_Mar21**

CALIBRATION CERTIFICATE

Object **D5GHzV2 - SN:1019**

Calibration procedure(s) **QA CAL-22.v6
Calibration Procedure for SAR Validation Sources between 3-10 GHz**

Calibration date: **March 19, 2021**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	01-Apr-20 (No. 217-03100/03101)	Apr-21
Power sensor NRP-Z91	SN: 103244	01-Apr-20 (No. 217-03100)	Apr-21
Power sensor NRP-Z91	SN: 103245	01-Apr-20 (No. 217-03101)	Apr-21
Reference 20 dB Attenuator	SN: BH9394 (20k)	31-Mar-20 (No. 217-03106)	Apr-21
Type-N mismatch combination	SN: 310982 / 06327	31-Mar-20 (No. 217-03104)	Apr-21
Reference Probe EX3DV4	SN: 3503	30-Dec-20 (No. EX3-3503_Dec20)	Dec-21
DAE4	SN: 601	02-Nov-20 (No. DAE4-601_Nov20)	Nov-21
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-20)	In house check: Oct-22
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-20)	In house check: Oct-21

Calibrated by: **Claudio Leubler** **Laboratory Technician**

Approved by: **Katja Pokovic** **Technical Manager**

Signature

Issued: March 19, 2021

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



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Accreditation No.: **SCS 0108**

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

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

Measurement Conditions

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

DASY Version	DASY5	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	5250 MHz $\pm$ 1 MHz 5600 MHz $\pm$ 1 MHz 5750 MHz $\pm$ 1 MHz	

Head TSL parameters at 5250 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.9	4.71 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	34.7 $\pm$ 6 %	4.51 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5250 MHz

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.13 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	80.6 W/kg $\pm$ 19.9 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.32 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	23.0 W/kg $\pm$ 19.5 % (k=2)

Head TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.5	5.07 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	34.2 $\pm$ 6 %	4.86 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5600 MHz

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.32 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	82.4 W/kg $\pm$ 19.9 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.36 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	23.3 W/kg $\pm$ 19.5 % (k=2)

Head TSL parameters at 5750 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.4	5.22 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.0 ± 6 %	5.01 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5750 MHz

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.02 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	79.4 W/kg ± 19.9 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.27 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	22.4 W/kg ± 19.5 % (k=2)

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL at 5250 MHz

Impedance, transformed to feed point	54.1 Ω - 6.4 j Ω
Return Loss	- 22.7 dB

Antenna Parameters with Head TSL at 5600 MHz

Impedance, transformed to feed point	57.6 Ω - 2.5 j Ω
Return Loss	- 22.6 dB

Antenna Parameters with Head TSL at 5750 MHz

Impedance, transformed to feed point	57.9 Ω + 3.1 j Ω
Return Loss	- 22.1 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.203 ns
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After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

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

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

Additional EUT Data

Manufactured by	SPEAG
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DASY5 Validation Report for Head TSL

Date: 19.03.2021

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1019

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

Medium parameters used: $f = 5250$ MHz; $\sigma = 4.51$ S/m; $\epsilon_r = 34.7$; $\rho = 1000$ kg/m³

Medium parameters used: $f = 5600$ MHz; $\sigma = 4.86$ S/m; $\epsilon_r = 34.2$; $\rho = 1000$ kg/m³

Medium parameters used: $f = 5750$ MHz; $\sigma = 5.01$ S/m; $\epsilon_r = 34$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.5, 5.5, 5.5) @ 5250 MHz, ConvF(5.1, 5.1, 5.1) @ 5600 MHz, ConvF(5.08, 5.08, 5.08) @ 5750 MHz; Calibrated: 30.12.2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.11.2020
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5250 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 79.20 V/m; Power Drift = -0.00 dB

Peak SAR (extrapolated) = 27.6 W/kg

SAR(1 g) = 8.13 W/kg; SAR(10 g) = 2.32 W/kg

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

Ratio of SAR at M2 to SAR at M1 = 70.7%

Maximum value of SAR (measured) = 18.1 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 77.00 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 31.0 W/kg

SAR(1 g) = 8.32 W/kg; SAR(10 g) = 2.36 W/kg

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

Ratio of SAR at M2 to SAR at M1 = 66.9%

Maximum value of SAR (measured) = 19.6 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 74.22 V/m; Power Drift = -0.08 dB

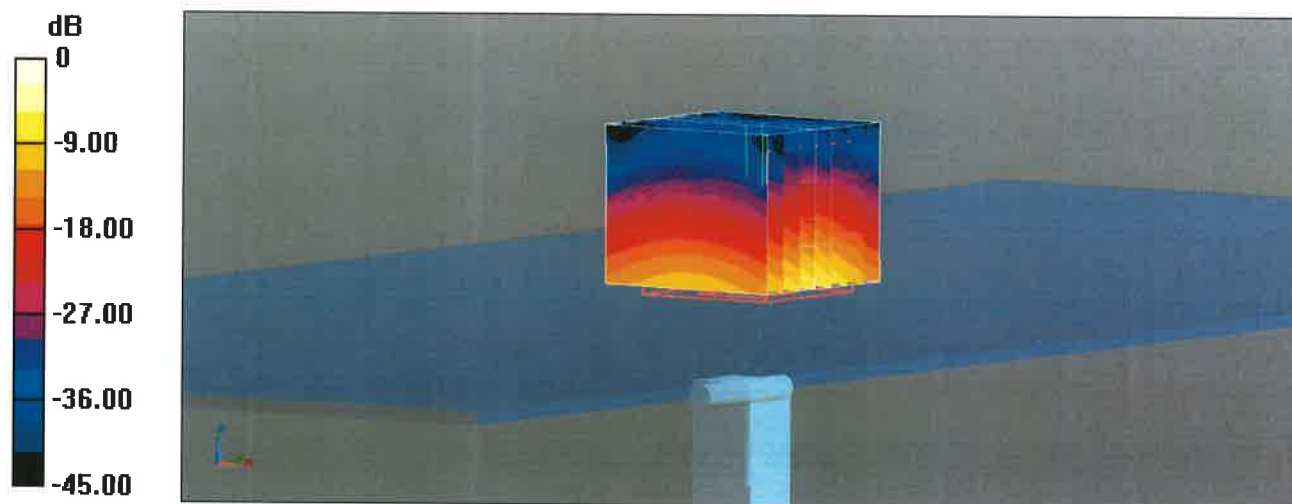
Peak SAR (extrapolated) = 31.6 W/kg

SAR(1 g) = 8.02 W/kg; SAR(10 g) = 2.27 W/kg

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

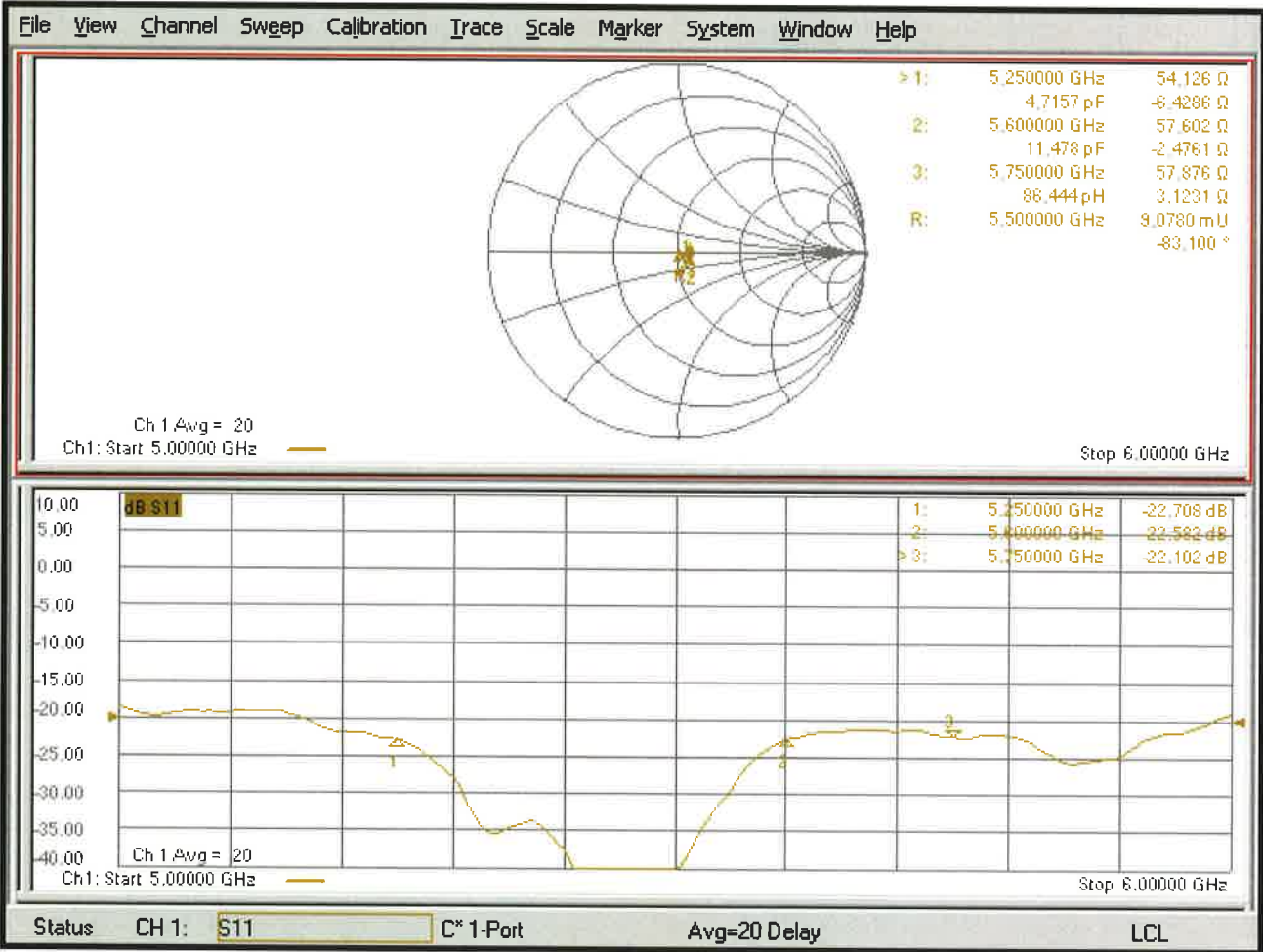
Ratio of SAR at M2 to SAR at M1 = 65%

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



0 dB = 19.6 W/kg = 12.92 dBW/kg

Impedance Measurement Plot for Head TSL





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Annual Confirmation of SAR Reference Dipole

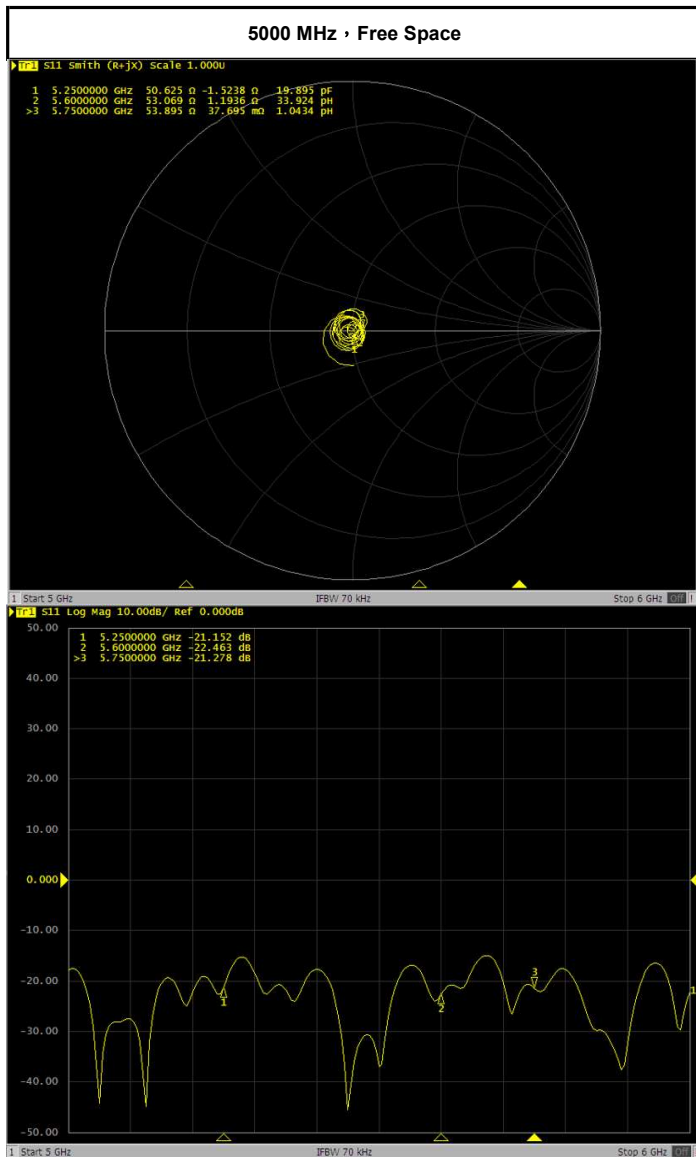
Model : D5000V2

S/N : 1019

Measurement Date :

2022/3/18

Frequency (MHz)	Type	Item	Previous Measurement	Annual Check	Deviation	Accepted Tolerance	Result
5250	Free Space	Real Impedance	54.126	50.625	-3.501	$\pm 5\Omega$	PASS
		Imaginary Impedance	-6.4286	-1.5238	4.905	$\pm 5\Omega$	PASS
		Return Loss	-22.708	-21.152	-6.85%	$\pm 20\%$	PASS
Frequency (MHz)	Type	Item	Previous Measurement	Annual Check	Deviation	Accepted Tolerance	Result
5600	Free Space	Real Impedance	57.602	53.069	-4.533	$\pm 5\Omega$	PASS
		Imaginary Impedance	-2.4761	1.1936	3.670	$\pm 5\Omega$	PASS
		Return Loss	-22.582	-22.463	-0.53%	$\pm 20\%$	PASS
Frequency (MHz)	Type	Item	Previous Measurement	Annual Check	Deviation	Accepted Tolerance	Result
5750	Free Space	Real Impedance	57.876	53.895	-3.981	$\pm 5\Omega$	PASS
		Imaginary Impedance	3.1231	0.0377	-3.085	$\pm 5\Omega$	PASS
		Return Loss	-22.102	-21.278	-3.73%	$\pm 20\%$	PASS





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Client **B.V. ADT (Auden)**

Certificate No: **D6.5GHzV2-1008_Sep21**

CALIBRATION CERTIFICATE

Object **D6.5GHzV2 - SN:1008**

Calibration procedure(s) **QA CAL-22.v6**
Calibration Procedure for SAR Validation Sources between 3-10 GHz

Calibration date: **September 24, 2021**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	09-Apr-21 (No. 217-03291/03292)	Apr-22
Power sensor NRP-Z91	SN: 103244	09-Apr-21 (No. 217-03291)	Apr-22
Power sensor NRP-Z91	SN: 103245	09-Apr-21 (No. 217-03292)	Apr-22
Power sensor R&S NRP33T	SN: 100967	08-Apr-21 (No. 217-03293)	Apr-22
Reference 20 dB Attenuator	SN: BH9394 (20k)	09-Apr-21 (No. 217-03343)	Apr-22
Type-N mismatch combination	SN: 310982 / 06327	09-Apr-21 (No. 217-03344)	Apr-22
Reference Probe EX3DV4	SN: 7405	30-Dec-20 (No. EX3-7405_Dec20)	Dec-21
DAE4	SN: 908	24-Jun-21 (No. DAE4-908_Jun21)	Jun-22
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator Anapico APSIN20G	SN: 669	28-Mar-17 (in house check Dec-18)	In house check: Dec-21
Network Analyzer Keysight E5063A	SN:MY54504221	31-Oct-19 (in house check Oct-19)	In house check: Oct-22

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: September 27, 2021

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Accreditation No.: **SCS 0108**

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- a) IEC/IEEE 62209-1528, "Measurement Procedure For The Assessment Of Specific Absorption Rate Of Human Exposure To Radio Frequency Fields From Hand-Held And Body-Worn Wireless Communication Devices - Part 1528: Human Models, Instrumentation And Procedures (Frequency Range of 4 MHz to 10 GHz)", October 2020.

Additional Documentation:

- b) DASY System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.
- *The absorbed power density (APD):* The absorbed power density is evaluated according to Samaras T, Christ A, Kuster N, "Compliance assessment of the epithelial or absorbed power density above 6 GHz using SAR measurement systems", Bioelectromagnetics, 2021 (submitted). The additional evaluation uncertainty of 0.55 dB (rectangular distribution) is considered.

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

Measurement Conditions

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

DASY Version	DASY6	V16.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	5 mm	with Spacer
Zoom Scan Resolution	dx, dy = 3.4 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	6500 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	34.5	6.07 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	33.6 $\pm$ 6 %	6.11 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	29.1 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	289 W/kg $\pm$ 24.7 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	5.39 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	53.5 W/kg $\pm$ 24.4 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.9 Ω - 7.6 j Ω
Return Loss	- 22.3 dB

APD (Absorbed Power Density)

APD averaged over 1 cm ²	Condition	
APD measured	100 mW input power	289 W/m ²
APD measured	normalized to 1W	2890 W/m² $\pm$ 29.2 % (k=2)

APD averaged over 4 cm ²	condition	
APD measured	100 mW input power	132 W/m ²
APD measured	normalized to 1W	1320 W/m² $\pm$ 28.9 % (k=2)

General Antenna Parameters and Design

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

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

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

Additional EUT Data

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