TEST REPORT

EUT Description	**Wireless Module installed in Convertible PC**
Brand Name	**Intel®**
Model Name	**BE201D2W**
FCC ID	**PD9BE201D2**
Date of Test Start/End	**2024-12-26/ 2025-01-09**
Date of Issue:	**2025-01-20**
Features	**2x2 Wi-Fi + Bluetooth®** (see section 5)
Description	**Platform: Yoga Book 9 14IAH10 + Luxshare / Speed antennas**

Applicant	**Intel Corporation SAS**
Address	**425 Rue de Goa – Le Cargo B6 – 06600 Antibes, FRANCE**
Contact Person	**Benjamin Lavenant**
Telephone/Fax/ Email	**Benjamin.lavenant@intel.com**

Reference Standards	**FCC 47 CFR Part §2.1093** (see section 1)	
RF Exposure Environment	**Portable devices - General population/uncontrolled exposure**	
	Testing Result	Limit
Maximum Power Density Result & Limit	**9.74 W/m² (4cm²)**	**10 W/m² (4cm²)**
Maximum SAR Result & Limit	**Body: 1.15 W/kg (1g)** **Limbs: 0.60 W/kg (10g)**	**1.6 W/kg (1g)** **4.0 W/kg (10g)**
Min. test separation distance	**0mm to phantom, 3.06 mm to antenna edge (SAR), 2mm to probe tip (PD)**	

Test Report identification	**BL-SZ24A0312-703**
Revision Control	**Rev. 00** **This test report revision replaces any previous test report revision.** (see section 8)

The test results relate only to the samples tested.

ISSUED BY:
Shenzhen BALUN Technology Co., Ltd.

Tested by: Xu Rui | **Checked by:** Zong Liyao | **Approved by:** Tolan Tu (Testing Director)

Xu Rui　　Zong Liyao　　Tolan Tu

Table of Contents

1. Standards, reference documents and applicable test methods

FCC	1. FCC 47 CFR Part §2.1093 – Radiofrequency radiation exposure evaluation: portable devices. 2021-10-01 Edition 2. FCC 47 CFR Part §1.1310 – Radiofrequency radiation exposure limits. Edition October 2021 3. FCC OET KDB 248227 D01 v02r02 - SAR guidance for IEEE 802.11 (Wi-Fi) transmitters. 4. FCC OET KDB 447498 D04 v01 General RF Exposure Guidance v01– RF Exposure Procedures and Equipment Authorization Policies for Mobile and Portable Devices 5. FCC OET KDB 616217 D04 v01r02 - SAR Evaluation Considerations for Laptop, Convertible PC, Netbook and Tablet Computers. 6. FCC OET KDB 865664 D01 v01r04 - SAR Measurement Requirements for 100 MHz to 6 GHz. 7. FCC OET KDB 865664 D02 v01r02 - RF Exposure Compliance Reporting and Documentation Considerations. 8. IEEE Std 1528-2013 - IEEE Recommended Practice Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communication Devices: Measurement Techniques… 9. RF Exposure Policies and Procedures: TCB Workshop – October 2020 10. IEC/IEEE 62209-1528:2020 Measurement procedure for the assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Part 1528: Human models, instrumentation, and procedures (Frequency range of 4 MHz to 10 GHz) 11. 987594 D04 UN6GHZ Pre-Approval Guidance Checklist v01 12. SPEAG Application Note – 5G Compliance Testing with DASY8 (5GModule V1.0Beta) 13. SPEAG Application Note – 5G Compliance Testing with DASY8/8 (5GModule V5.0)

2. General conditions, competences and guarantees

- ✓ Shenzhen BALUN Technology Co., Ltd. (BALUN Lab) is an Accredited Test Firm recognized by the FCC, with Designation Number CN1196.
- ✓ Shenzhen BALUN Technology Co., Ltd. (BALUN Lab) only provides testing services and is committed to providing reliable, unbiased test results and interpretations.
- ✓ Shenzhen BALUN Technology Co., Ltd. (BALUN Lab) guarantees the scientificity, accuracy and impartiality of the test, and is responsible for all the information in the report, except the information provided by the customer. The customer is responsible for the impact of the information provided on the validity of the results.
- ✓ This report is invalid if it is altered, without the signature of the testing and approval personnel, or without the "inspection and testing dedicated stamp" or test report stamp.
- ✓ The test data and results are only valid for the tested samples provided by the customer.
- ✓ This report shall not be partially reproduced without the written permission of the laboratory.
- ✓ Any objection shall be raised to the laboratory within 30 days after receiving the report.

3. Environmental Conditions

✓ At the site where the measurements were performed the following limits were not exceeded during the tests:

Temperature	22.1℃ ~ 22.6℃
Humidity	51.8% ~ 57.2%
Liquid Temperature	21.3℃ ~ 21.7℃

4. Test samples

Sample	Control #	Description	Model	Serial #	Date of receipt	Note
#01	SC-SZ24A0268.S03	Wireless Module installed in Convertible PC	Yoga Book 9 14IAH10	2053631400074	2024-12-12	Speed antenna
#02	SC-SZ24A0268.S04	Wireless Module installed in Convertible PC	Yoga Book 9 14IAH10	2053631400059	2024-12-12	Luxshare antenna

5. EUT Features

The herein information is provided by the customer.

Intel WRF Lab declines any responsibility for the accuracy of the stated customer provided information, especially if it has any impact on the correctness of test results presented in this report.

<table>
<tr><td>Brand Name</td><td>Intel®</td></tr>
<tr><td>Model Name</td><td>BE201D2W</td></tr>
<tr><td>Software Version</td><td>DRTU.06643.23.60.0</td></tr>
<tr><td>Driver Version</td><td>23.60.5.4</td></tr>
<tr><td>Prototype / Production</td><td>Production</td></tr>
<tr><td>Host Identification</td><td>Yoga Book 9 14IAH10</td></tr>
<tr><td>Supported Radios</td><td><table>
<tr><td>802.11b/g/n/ax/be</td><td>2.4GHz (2400.0 – 2483.5 MHz)</td></tr>
<tr><td>802.11a/n/ac/ax/be</td><td>5.2GHz (5150.0 – 5350.0 MHz)
5.6GHz (5470.0 – 5725.0 MHz)
5.8GHz (5725.0 – 5850.0 MHz)
5.9GHz (5850.0 – 5895.0 MHz)</td></tr>
<tr><td>802.11ax/be</td><td>6.0GHz (5925.0 – 7125.0 MHz) *</td></tr>
<tr><td>Bluetooth</td><td>2.4GHz (2400.0 – 2483.5 MHz)</td></tr>
</table></td></tr>
<tr><td>Antenna Information</td><td><table>
<tr><td>Transmitter</td><td>Aux (Ant 1/Tx1)</td><td>Main (Ant 2/Tx2)</td></tr>
<tr><td>Manufacturer</td><td>SPEED</td><td>SPEED</td></tr>
<tr><td>Antenna type</td><td>PIFA</td><td>PIFA</td></tr>
<tr><td>Part number</td><td>DC330027E10</td><td>DC330027E00</td></tr>
</table>
<table>
<tr><td>Transmitter</td><td>Aux (Ant 1/Tx1)</td><td>Main (Ant 2/Tx2)</td></tr>
<tr><td>Manufacturer</td><td>Luxshare</td><td>Luxshare</td></tr>
<tr><td>Antenna type</td><td>PIFA</td><td>PIFA</td></tr>
<tr><td>Part number</td><td>DC330027F10</td><td>DC330027F00</td></tr>
</table>
See Annex G for more details on antennas location.</td></tr>
<tr><td>Simultaneous Transmission Configurations</td><td>WLAN 6GHz Main + BT Aux*
WLAN 6GHz Main + WLAN 6GHz Aux*
WLAN 6GHz Main + WLAN 6GHz Aux + BT Aux*
WLAN 2.4GHz Main + BT Aux
WLAN 2.4GHz Main + WLAN 2.4GHz Aux
WLAN 5GHz Main + BT Aux
WLAN 5GHz Main + WLAN 5GHz Aux
WLAN 5GHz Main + WLAN 5GHz Aux + BT Aux</td></tr>
<tr><td rowspan="3">Additional Information</td><td>No WWAN transmitter is considered in this report</td></tr>
<tr><td>5.60-5.65 GHz band (TDWR) is supported by the device</td></tr>
<tr><td>Band gap is supported by the device</td></tr>
</table>

*Only these combinations are treated on this document since this report is limited to WiFi 6E capabilities

Supported Radios

Mode	Duty Cycle	Modulation	Band	UL Freq Range (MHz)	Measured Max. Conducted Power (dBm)
802.11ax/be	100%	BPSK QPSK 16QAM 64QAM 256QAM 1024QAM 4096QAM	6.2GHz	5955-6415	16.41
802.11ax/be	100%	BPSK QPSK 16QAM 64QAM 256QAM 1024QAM 4096QAM	6.5GHz	6435-6515	16.35
802.11ax/be	100%	BPSK QPSK 16QAM 64QAM 256QAM 1024QAM 4096QAM	6.7GHz	6535-6855	16.07
802.11ax/be	100%	BPSK QPSK 16QAM 64QAM 256QAM 1024QAM 4096QAM	7.0GHz	6875-7125	16.21

NM: Not Measured

Maximum Output power specification + Tune up tolerance limit, specified by the client

Equipment Class	Mode	BW (MHz)	Laptop		Tablet	
			Main (dBm)	Aux (dBm)	Main (dBm)	Aux (dBm)
U-NII-5	802.11/ax20/be	20	15.00	16.50	13.50	12.50
		40	15.00	16.50	13.50	12.50
		80	15.00	16.50	13.50	12.50
		160	15.00	16.50	13.50	12.50
		320	15.00	16.50	13.50	12.50
U-NII-6	802.11/ax20/be	20	15.00	16.50	13.50	12.50
		40	15.00	16.50	13.50	12.50
		80	15.00	16.50	13.50	12.50
		160	15.00	16.50	13.50	12.50
		320	15.00	16.50	13.50	12.50
U-NII-7	802.11/ax20/be	20	15.00	16.50	13.50	12.50
		40	15.00	16.50	13.50	12.50
		80	15.00	16.50	13.50	12.50
		160	15.00	16.50	13.50	12.50
		320	15.00	16.50	13.50	12.50
U-NII-8	802.11/ax20/be	20	15.00	16.50	13.50	12.50
		40	15.00	16.50	13.50	12.50
		80	15.00	16.50	13.50	12.50
		160	15.00	16.50	13.50	12.50
		320	15.00	16.50	13.50	12.50

*The SAR measurement was perfomed at a high-power setting for Notebook mode, which is higher than the actual power settingreported in the technical documentation

6. Remarks and comments

1. This report is limited to WiFi 6E capabilities. For all the modes, DTS, UNII-1, UNII-2A, UNII-2C, UNII-3 and BT refer to: BL-SZA240700-701
2. The conducted values are obtained by applying the available power table to the BE201D2W Intel module installed in the Yoga Book 9 14IAH10 identified in this report, as requested by the customer.
3. Only the plots for the test positions with the highest measured SAR/PD per band/mode are included in Annex C
4. On both samples the same conducted power measurements was used as we swapped the module on the second sample during SAR testing.

7. Test Verdicts summary

The statement of conformity to applicable standards in the table below are based on the measured values, without taking into account the measurement uncertainties.

Standard	Band	Highest Reported PS_{tot} avg [W/m^2] 4cm^2	Verdict
802.11ax/be	6GHz	9.74	P

Standard	Band	Highest Reported SAR [W/kg]		Verdict
		Body	Limbs	
802.11ax/be	6GHz	1.15	0.60	P

P: Pass
F: Fail
NM: Not Measured
NA: Not Applicable

According to the FCC OET KDB 690783 D01, this is the summary of the values for the Grant Listing:

Exposure Condition	Highest Reported SAR (1g) (W/kg)		Highest Reported SAR (10g) (W/kg)	
	Body		Limbs	
	Equipment Class		Equipment Class	
	DSS	UNII	DSS	UNII
Body Worn	0.23	1.15	0.09	0.60
Simultaneous Tx	Sum-SAR:2.22 SPLSR: 0.04		Sum-SAR: 1.18	

Considering the results of the performed test according to FCC 47CFR Part 2.1093 the item under test is IN COMPLIANCE with the requested specifications specified in Section1. Standards, reference documents and applicable test methods

8. Document Revision History

Revision #	Modified by	Revision Details
Rev. 00	Xu Rui	First Issue

Annex A. PD Test & System Description

A.1 Power Density Definition

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

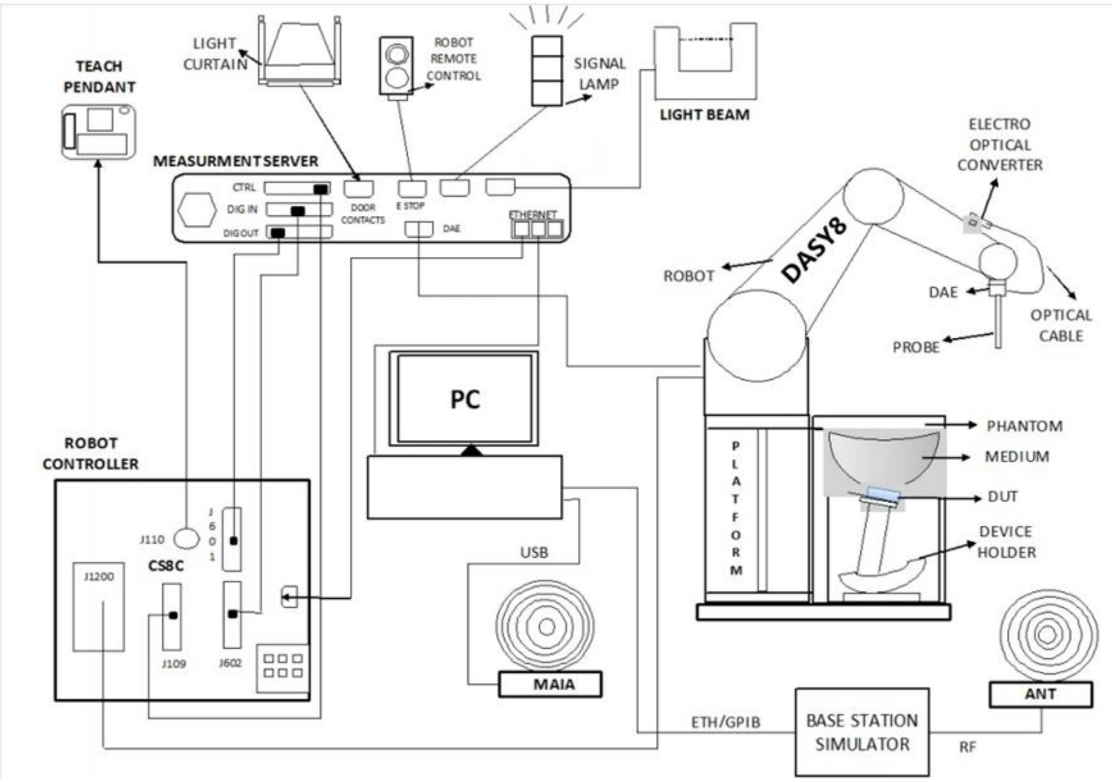
$$\overrightarrow{P_{local}} = \frac{1}{2}\mathrm{Re}\left(\vec{E} \times \vec{H}^{*}\right)$$

Where $\vec{E}$ is the complex electric field peak phasor and $\vec{H}^{*}$ is the complex conjugate magnetic field peak phasor. This power density is also called "single-point" or "spot power density".
Considering that the FCC's Maximum Permissible Exposure (MPE) limit is applicable on the average power density inside 1cm^2 area, the single point power densities in the evaluation plane should be averaged inside the 1cm^2 area.

A.2 SPEAG free space Measurement System

A.2.1 Measurement Setup

The DASY8 system for performing compliance tests consists of the following items:



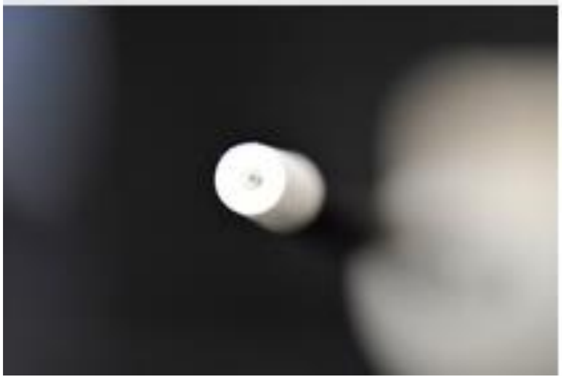
- ✓ A standard high precision 6-axis robot (Staübli TX/RX family) with controller, teach pendant and software. It includes an arm extension for accommodating the data acquisition electronics (DAE)
- ✓ An mm-wave E-field probe optimized and calibrated for the targeted measurements.
- ✓ A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. 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. 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 movements interrupts.
- ✓ The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- ✓ A computer running Windows professional operating system and the cDASY8 software.
- ✓ Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.

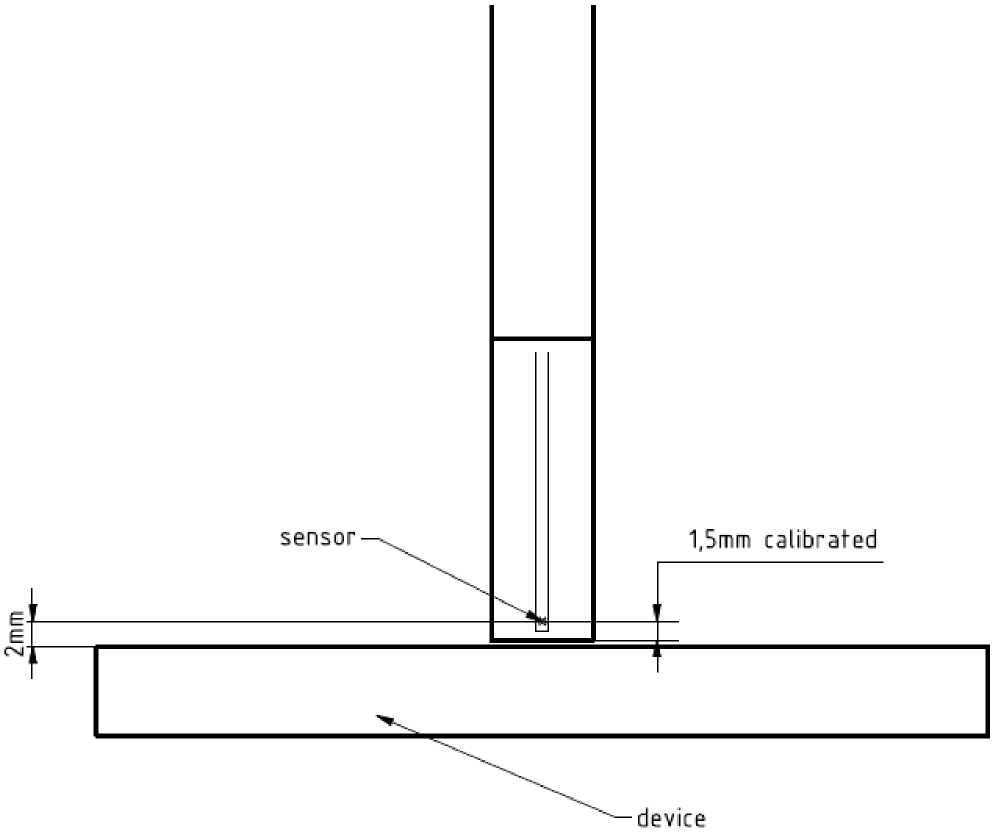
A.2.2 E-Field Measurement Probe

The probe consists of two dipoles (0.8 mm length) optimally arranged with different angles (γ_1 and γ_2) to obtain pseudo-vector information, printed on glass substrate protected by high density foam that allows low perturbation of the measured field.
Three or more measurements are taken for different probe rotational angles, deriving the amplitude and polarization information.

The probe's characteristics are:

Frequency Range	750 MHz – 110 GHz
Length	320 mm
Probe tip external diameter	8 mm
Probe's two dipoles length	0.9mm – Diode loaded
Probe's substrate	Quartz 0.9 x 20 x 0.18mm (εr=3.8)
Distance between diode sensors and probe's tip	1.5 mm
Axial Isotropy	±0.6 dB
Maximum operating E-field	3000 V/m
Lower E-field detection threshold	5 V/m @ 60 GHz
Minimum Mechanical separation between probe tip and a Surface	0.5mm
Calibration reference point	Diode Sensor





A.2.3 Worst Case Linearization Error

For continuously transmitting signals (100% duty cycle), the worst case linearization error is given by the difference between non linearized voltage and linearized voltage using CW parameters. The error is increasing with the voltage levels. In our particular case, the measured voltages averaged over the signal period are below 1mV. We use 1mV in the below calculation to have the worst case condition. The signal PAR (Peak to Average Ratio) is 6dB and the diode compression point 100mV.

The maximum voltage through the diode is given by:

$$\mathrm{vpeak} = \mathrm{vmeas\ avg} \times \mathrm{PARlinear}$$
$$vpeak{=}1{*}4{=}4\ mV$$

The linearized voltage using CW parameter is given by:

$$vlin\ peak = vpeak + \frac{v_{peak}^2}{diode\ compression\ point}$$
$$vlin\ peak = 4 + \frac{4^2}{100} = 4.16\ mV$$

The worst case linearization error is:

$$lin\ error = \frac{vlin\ peak}{v\ peak} = \frac{4.16}{4} = 1.04 = 4\%$$

A.2.4 Data Evaluation

A.2.4.1 Scan

The scan involves the measurement of two planes with three different probe rotations. The grid steps are optimized by the software based on the test frequency. The location of the lowest measurement plane is defined by the distance of first measurement layer from device under test (DUT) entered by the user. The DUT location settings can be used to offset the center of the grid.

A.2.4.2 Total Field and Power Flux Density Reconstruction

Computation of the power density in general requires knowledge of the electric (E-) and magnetic (H-) field amplitudes and phases in the plane of incidence. Reconstruction of these quantities from pseudo-vector E-field measurements is feasible, as they are constrained by Maxwell's equations.
The reconstruction algorithm developed by the system manufacturer, together with the ability of the probe to measure extremely close to the source without perturbing the field, permits reconstruction of the E- and H-fields, as well as of the power density, on measurement planes located as near as 0.5mm away in the frequency band of 60 GHz.

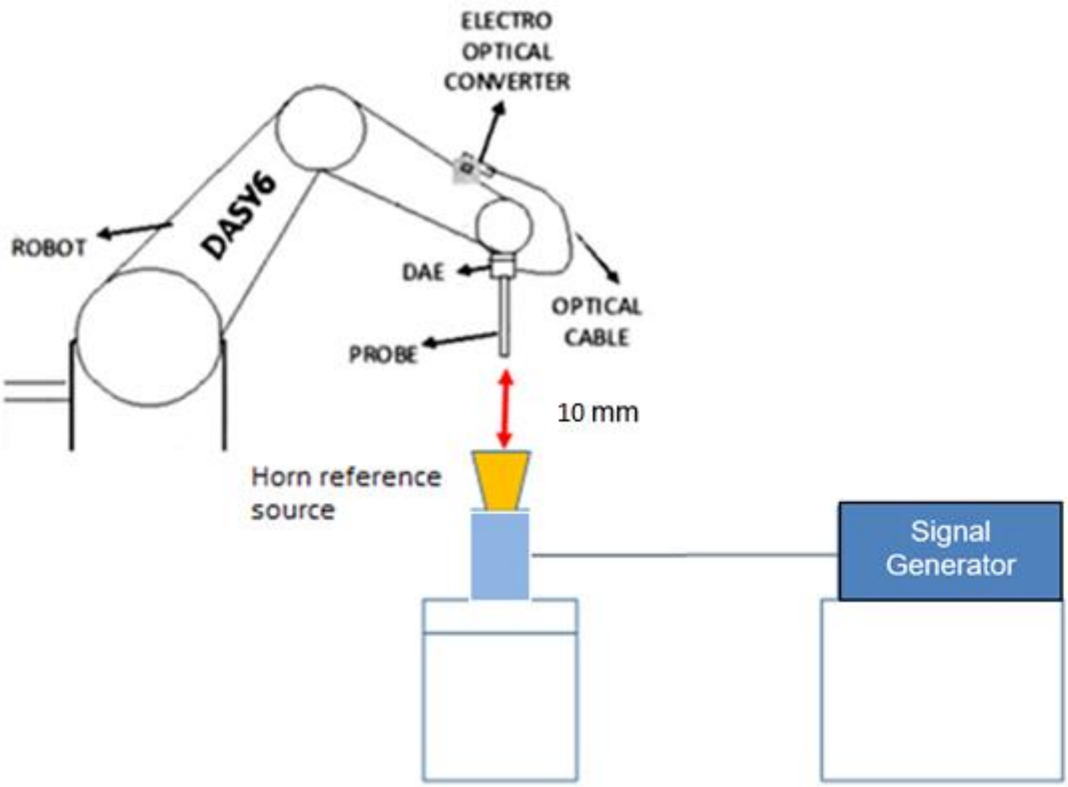
The average of the reconstructed power density is evaluated over a circular area in each measurement plane. The area of the circle is defined by the user; the default is 1 cm^2.

A.3 System Check

The system performance check verifies that the system operates within its specifications. System and operator errors can be detected and corrected. It is recommended that the system performance check be performed prior to any usage of the system in order to guarantee reproducible results. The system performance check uses normal Power Density measurements in a simplified setup with a well characterized source.This setup was selected to give a high sensitivity to all parameters that might fail or vary over time. The system check does not intend to replace the calibration of the components, but indicates situations where the system uncertainty is exceeded due to drift or failure.

Perform a system performance check at 10 GHz. 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.



The output power on the reference source is set to 22.0 dBm (158.49 mW) and the measurement results Avg PD for 4cm^2 are compared with the power density targets on the calibration certificate.

A.4 Test Equipment List

SAR system #4

Device	Type/Model	Serial Number	Manufacturer	Cal. Date	Cal. Due Date
E-Field probe 750MHz-110GHz	EUmmWV4	9607	SPEAG	2024/02/12	2025/02/11
Data Acquisition Electronics	DAE4	1710	SPEAG	2024/01/03	2025/01/02
Data Acquisition Electronics	DAE4	1711	SPEAG	2024/03/18	2025/03/17
6-axis Robot	TX290L Speag	F/21/0032513/A/001	STAÜBLI	N/A	N/A
Robot Controller	CSE9spe-TX2-90	F/21/0032513/C/001	STAÜBLI	N/A	N/A
Measurement Server	DASY8	N/A	SPEAG	N/A	N/A
Light Beam Unit	SE UKS 032 AA	2076	Di-soric	N/A	N/A
5G Phantom	mmWave	NA	SPEAG	N/A	N/A
Measurement Software	DASYmmW v3.2	9-1798AA01_D8	SPEAG	N/A	N/A
Thermometer	RC-4HC	EF7216002985	Elitech	2024/10/31	2025/10/30

Shared equipment

Device	Type/Model	Serial Number	Manufacturer	Cal. Date	Cal. Due Date
PC	N/A	N/A	Dell	N/A	N/A
Verification Source	10GHz	SN: 2010	Speag	2024/06/19	2025/06/18
Signal Generator	SMB100A	177746	R&S	2024/04/24	2025/04/23
Power Meter	NRVD-B2	835843/014	R&S	2024/08/08	2025/08/07
Power Sensor	NRV-Z2	100211	R&S	2024/08/08	2025/08/07
Power Meter	E4418B	GB43313877	Agilent	2024/06/25	2025/06/24
Power Sensor	E9300A	MY41499251	Agilent	2024/03/19	2025/03/18
Power Amplifier	ZVA-183W-S+	932502132	Mini-Circuits	N/A	N/A

A.5 Measurement Uncertainty Evaluation

The system uncertainty evaluation is shown in the table below with a coverage factor of k = 2 to indicate a 95% level of confidence:

DASY8 Uncertainty Budget for PD (avg ≥1 cm2) Evaluation Distances to the Antennas ≥ λ/5 in Compliance with IEC/IEEE 63195							
Error Description		Unc. Value (±dB)	Probab. Distri.	Div.	(c_i)	Std. Unc. (±dB)	(vi) veff
Uncertainty terms dependent on the measurement system							
CAL	Calibration	0.49	N	1	1	0.49	∞
COR	Probe correction	0	R	1.732	1	0	∞
FRS	Frequency response (BW ≤ 1 GHz)	0.2	R	1.732	1	0.12	∞
SCC	Sensor cross coupling	0	R	1.732	1	0	∞
ISO	Isotropy	0.5	R	1.732	1	0.29	∞
LIN	Linearity	0.2	R	1.732	1	0.12	∞
PSC	Probe scattering	0	R	1.732	1	0	∞
PPO	Probe positioning offset	0.3	R	1.732	1	0.17	∞
PPR	Probe positioning repeatability	0.04	R	1.732	1	0.02	∞
SMO	Sensor mechanical offset	0	R	1.732	1	0	∞
PSR	Probe spatial resolution	0	R	1.732	1	0	∞
FLD	Field impedance dependence	0	R	1.732	1	0	∞
APD	Amplitude and phase drift	0	R	1.732	1	0	∞
APN	Amplitude and phase noise	0.04	R	1.732	1	0.02	∞
TR	Measurement area truncation	0	R	1.732	1	0	∞
DAQ	Data acquisition	0.03	N	1	1	0.03	∞
SMP	Sampling	0	R	1.732	1	0	∞
REC	Field reconstruction	0.6	R	1.732	1	0.35	∞
TRA	FTE/MEO	0 (0.7)	R	1.732	1	0 (0.4)	∞
SCA	Power density scaling	–	R	1.732	1	–	∞
SAV	Spatial averaging	0.1	R	1.732	1	0.06	∞
SDL	System detection limit	0.04	R	1.732	1	0.02	∞
Uncertainty terms dependent on the DUT and environmental factors							
PC	Probe coupling with DUT	0	R	1.732	1	0	∞
MOD	Modulation response	0.4	R	1.732	1	0.23	∞
IT	Integration time	0	R	1.732	1	0	∞

RT	Response time	0	R	1.732	1	0	∞
DH	Device holder influence	0.14	R	1.732	1	0.08	∞
DA	DUT alignment	0	R	1.732	1	0	∞
AC	RF ambient conditions	0.04	R	1.732	1	0.02	∞
AR	Ambient reflections	0.04	R	1.732	1	0.02	∞
MSI	Immunity / secondary reception	0	R	1.732	1	0	∞
DRI	Drift of the DUT	–	R	1.732	1	–	∞
Combined Std Uncertainty (w/ FTE/MEO)			–	–	–	0.75	∞
Expanded Std Uncertainty (w/ FTE/MEO)			–	–	–	**1.50 (1.71)**	–

The REC at distance d must be modified as follows:

1

$$unc_{\mathrm{REC}}\mathrm{dB} = \begin{cases} 2.35 - 8.75d/\lambda & \text{for } d = 0.04\ldots0.2\lambda \\ 0.6 & \text{for } d \geq 0.2\lambda \end{cases}$$

The minimal distance is 2mm, and the minimal frequency tested is 6 GHz. This corresponds to an MU value of (2.35-8.75*0.04 =2 dB) -- Ref: Speag, DASY6 Module mmWave Manual, February 2022.

A.6 RF Exposure Limits

Power density assessments have been made in line with the requirements of FCC 47CFR Part 2.1093, in particular chapter 1.1150 specifying the MPE limits, on the limitation of exposure of the general population / uncontrolled exposure for portable devices.

Exposure Type	Power density (S)
Limits for Occupational/Controlled Exposure. 1.5GHz – 100GHz	**50.0 W/m^2**
Limits for General Population/ Uncontrolled Exposure. 1.5GHz – 100GHz	**10.0 W/m^2**

Annex B. SAR Test & System Description

B.1 SAR Definition

Specific Absorption rate is defined as the time derivative of the incremental energy (dW) absorbed by (dissipated in) and incremental mass (dm) contained in a volume element (dV) of a given density (ρ).

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

SAR is expressed in units of watts per kilogram (W/kg). SAR can be related to the electric field at a point by

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

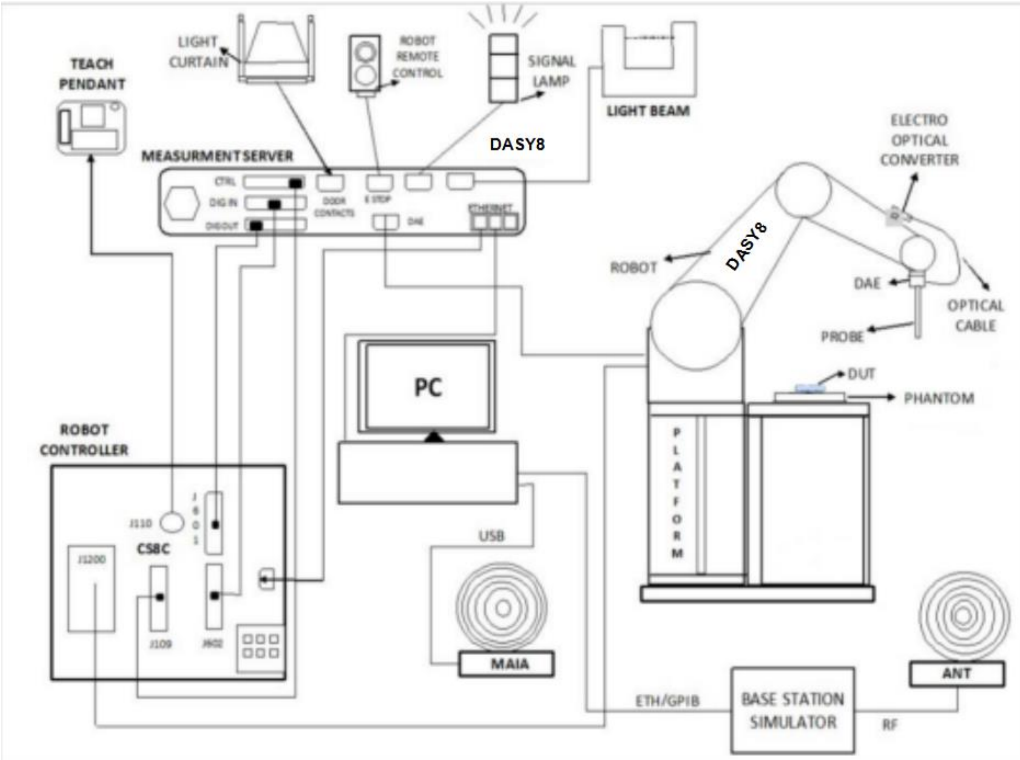
Where:

σ = Conductivity of the tissue (S/m)
ρ = Mass density of the tissue (kg/m3)
E = RMS electric field strength (V/m)

B.2 SPEAG SAR Measurement System

B.2.1 SAR Measurement Setup

The DASY8 system for performing compliance tests consists of the following items:



- ✓ A standard high precision 6-axis robot (Staübli TX/RX family) with controller, teach pendant and software. It includes an arm extension for accommodating the data acquisition electronics (DAE)
- ✓ An isotropic field probe optimized and calibrated for the targeted measurements.
- ✓ A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. 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. 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 movements interrupts.
- ✓ The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- ✓ A computer running Windows professional operating system and the DASY8 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.
- ✓ MAIA is a hardware interface (Antenna) used to evaluate the modulation and audio interference characteristics of RF signals.
- ✓ ANT is an ultra-wideband antenna for use with the base station simulators over 698 MHz to 6GHz for SAR cellular testing (not used for WLAN testing).
- ✓ The base station simulator is an equipment used for SAR cellular tests in order to emulate the cellular signals characteristics and behavior between a regular base station and the equipment under test.
- ✓ Tissue simulating liquid.
- ✓ System Validation dipoles.
- ✓ Network emulator or RF test tool

B.2.2 E-Field Measurement Probe

The probe is constructed using three orthogonal dipole sensors arranged on an interlocking, triangular prism core. The probe has built-in shielding against static charges and is contained within a PEEK cylindrical enclosure material at the tip.

The probe's characteristics are:

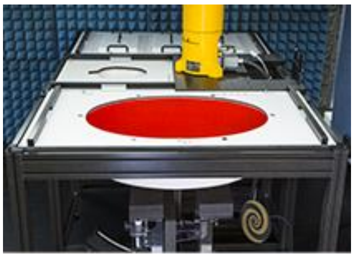
Frequency Range	4MHz – 10GHz
Length	337 mm
Probe tip external diameter	2.5 mm
Typical distance between dipoles and the probe tip	1 mm
Axial Isotropy (in human-equivalent liquids)	±0.3 dB
Hemispherical Isotropy (in human-equivalent liquids)	±0.5 dB
Linearity	±0.2 dB
Maximum operating SAR	100 W/kg
Lower SAR detection threshold	0.001 W/kg

B.2.3 Flat Phantom

Phantom 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.

The phantom's characteristics are:

Material	Vinylester, glass fiber reinforced (VE-GF)
Shell thickness	2 mm ± 0.2 mm
Filling volume	30 Liters approx.
Dimensions	Major axis: 600mm / Minor axis: 400mm



B.2.4 Device Positioner

The SAR in the phantom is approximately inversely proportional to the square of the distance between the source and the liquid surface. For a source at 5 mm distance, a positioning uncertainty of 0.5 mm would produce a SAR uncertainty of 20%. Accurate device positioning is therefore crucial for accurate and repeatable measurements. The positions in which the devices must be measured are defined by the standards.

The DASY device holder is designed to cope with the different positions given in the standard. It has two scales for device rotation (with respect to the body axis) and device inclination (with respect to the line between the ear reference points). The rotation center for both scales is the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.

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

A simple but effective and easy-to-use extension for the Mounting Device; facilitates testing of larger devices according to IEC 62209-2 (e.g., laptops, cameras, etc.); lightweight and fits easily on the upper part of the Mounting Device in place of the phone positioner. The extension is fully compatible with the Twin SAM, ELI and other Flat Phantoms.

B.3 Data Evaluation

- **Power Reference measurement**

The robot measures the E field in a specified reference position that can be either the selected section's grid reference point or a user point in this section at 4mm of the inner surface of the phantom, 2mm for frequencies above 3GHz.

- **Area Scan**

Measurement procedures for evaluating SAR from wireless handsets typically start with a coarse measurement grid to determine the approximate location of the local peak SAR values. This is known as the area-scan procedure. The SAR distribution is scanned along the inside surface of one side of the phantom head, at least for an area larger than the projection of the handset and antenna. The distance between the measured points and phantom surface should be less than 8 mm, and should remain constant (with variation less than ± 1 mm) during the entire scan in order to determine the locations of the local peak SAR with sufficient accuracy. The angle between the probe axis and the surface normal line is recommended but not required to be less than 30°. If this angle is larger than 30° and the closest point on the probe-tip housing to the phantom surface is closer than a probe diameter, the boundary effect may become larger and polarization dependent. This additional uncertainty needs to be analyzed and accounted for. To achieve this, modified test procedures and additional uncertainty analyses not described in this recommended practice may be required. The measurement and interpolation point spacing should be chosen such as to allow identification of the local peak locations to within one-half of the linear dimension of a side of the zoom-scan volume. Because a local peak having specific amplitude and steep gradients may produce a lower peak spatial-average SAR compared to peaks with slightly lower amplitude and less steep gradients, it is necessary to evaluate these other peaks as well. However, since the spatial gradients of local SAR peaks are a function of the wavelength inside the tissue-equivalent liquid and the incident magnetic field strength, it is not necessary to evaluate local peaks that are less than 2 dB or more below the global maximum peak. Two-dimensional spline algorithms (Brishoual et al. 2001; Press et al., 1996) are typically used to determine the peaks and gradients within the scanned area. If a peak is found at a distance from the scan border of less than one-half the edge dimension of the desired 1 g or 10 g cube, the measurement area should be enlarged if possible.

- **Zoom Scan**

To evaluate the peak spatial-average SAR values for 1 g or 10 g cubes, fine resolution volume scans, called zoom scans, are performed at the peak SAR locations identified during the area scan. The minimum zoom scan volume size should extend at least 1.5 times the edge dimension of a 1 g cube in all directions from the center of the scan volume, for both 1 g and 10 g peak spatial-average SAR evaluations. Along the phantom curved surfaces, the front face of the volume facing the tissue/liquid interface conforms to the curved boundary, to ensure that all SAR peaks are captured. The back face should be equally distorted to maintain the correct averaging mass. The flatness and orientation of the four side faces are unchanged from that of a cube whose orientation is within ± 30° of the line normal to the phantom at the center of the cube face next to the phantom surface. The peak local SAR locations that were determined in the area scan (interpolated values) should be used for the centers of the zoom scans. If a scan volume cannot be centered due to proximity of a phantom shape feature, the probe should be tilted to allow scan volume enlargement. If probe tilt is not feasible, the zoom-scan origin may be shifted, but not by more than half of the 1 g or 10 g cube edge dimension.

After the zoom-scan measurement, extrapolations from the closest measured points to the surface, for example along lines parallel to the zoom-scan centerline, and interpolations to a finer resolution between all measured and extrapolated points are performed. Extrapolation algorithm considerations are described in 6.5.3, and 3-D spline methods (Brishoual et al., 2001; Kreyszig, 1983; Press et al., 1996) can be used for interpolation. The peak spatial-average SAR is finally determined by a numerical averaging of the local SAR values in the interpolation grid, using for example a trapezoidal algorithm for the integration (averaging).

In some areas of the phantom, such as the jaw and upper head regions, the angle of the probe with respect to the line normal to the surface may be relatively large, e.g., greater than ± 30º, which could increase the boundary effect error to a larger level. In these cases, during the zoom scan a change in the orientation of the probe, the phantom, or both is recommended but not required for the duration of the zoom scan, so that the angle between the probe axis and the line normal to the surface is within 30º for all measurement points.

- **Power Drift measurement**

The robot re-measures the E-Field in the same reference location measured at the Power Reference. The drift measurement gives the field difference in dB from the first to the last reference reading. This allows a user to monitor the power drift of the device under test that must remain within a maximum variation of ±5%.

- **Post-processing**

The procedure for spatial peak SAR evaluation has been implemented according to the IEEE1528 and IEC 62209-1/2 standards. It can be conducted for 1g and 10g.

The software allows evaluations that combine measured data and robot positions, such as:

- ✓ Maximum search
- ✓ Extrapolation
- ✓ Boundary correction
- ✓ Peak search for averaged SAR

Interpolation between the measured points is performed when the resolution of the grid is not fine enough to compute the average SAR over a given mass.

Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation is determined by the surface detection distance and the probe sensor offset. Several measurements at different distances are necessary for the extrapolation.

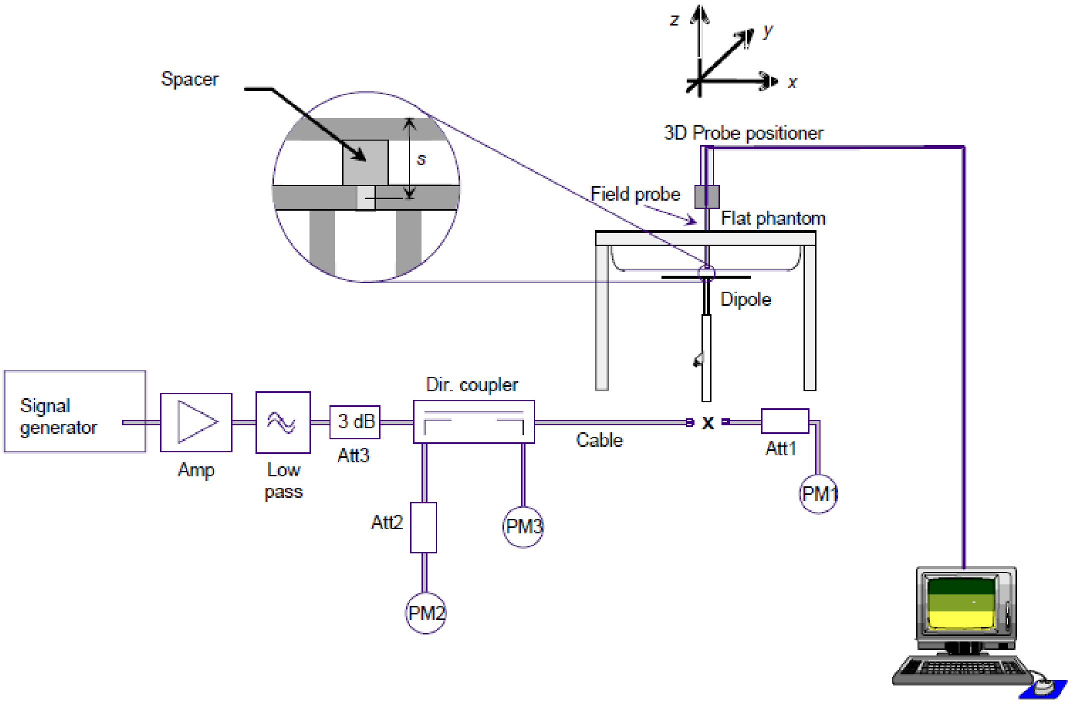
B.4 System and Liquid Check

B.4.1 System Check

The system performance check verifies that the system operates within its specifications. System and operator errors can be detected and corrected. It is recommended that the system performance check be performed prior to any usage of the system in order to guarantee reproducible results.

The system performance check uses normal SAR measurements in a simplified setup with a well characterized source. This setup was selected to give a high sensitivity to all parameters that might fail or vary over time. The system check does not intend to replace the calibration of the components, but indicates situations where the system uncertainty is exceeded due to drift or failure.

In the simplified setup for system check, the EUT is replaced by a calibrated dipole and the power source is replaced by a controlled continuous wave generated by a signal generator. The calibrated dipole must be placed beneath the flat phantom section of the phantom at the correct distance.



The equipment setup is shown below:

- ✓ Signal Generator
- ✓ Amplifier
- ✓ Directional coupler
- ✓ Power meter
- ✓ Calibrated dipole

First, the power meter PM1 (including attenuator Att1) is connected to the cable to measure the forward power at the location of the connector (x) to the system check source. The signal generator is adjusted for the desired forward power at the connector as read by power meter PM1 after attenuation Att1 and also as coupled through Att2 to PM2. After connecting the cable to the source, the signal generator is readjusted for the same reading at power meter PM2.

SAR results are normalized to a forward power of 1W to compare the values with the calibration reports results as described at IEC/IEEE 62209-1528:2020 standards.

B.4.2 Liquid Check

The dielectric parameters check is done prior to the use of the tissue simulating liquid. The verification is made by comparing the relative permittivity and conductivity to the values recommended by the applicable standards.

The liquid verification was performed using the following test setup:

- ✓ VNA (Vector Network Analyzer)
- ✓ Open-Short-Load calibration kit
- ✓ RF Cable
- ✓ Open-Ended Coaxial probe
- ✓ DAK software tool
- ✓ SAR Liquid
- ✓ De-ionized water
- ✓ Thermometer

These are the target dielectric properties of the tissue-equivalent liquid material according to the manufacturer's datasheet:

Frequency	Head Tissue Simulating Media	
(MHz)	ε_r (F/m)	σ (S/m)
6000	35.07	5.48
6500	34.46	6.07
7000	33.88	6.65

(ε_r = relative permittivity, σ = conductivity and ρ = 1000 kg/m3)

The measurement system implements a SAR error compensation algorithm as documented IEC/IEEE 62209-1528:2020 to automatically compensate the measured SAR results for deviations between the measured and required tissue dielectric parameters (applied to only scale up the measured SAR, and not downward) so, according to FCC OET KDB 865664 D01, the tolerance for ε_r and σ may be relaxed to ± 10%.

B.5 Test Equipment List

SAR system #4

Device	Type/Model	Serial Number	Manufacturer	Cal. Date	Cal. Due Date
6-Axis Robot	TX290L Speag	F/21/0032513/A/001	STAÜBLI	NA	NA
Robot Controller	CSE9spe-TX2-90	F/21/0032513/C/001	STAÜBLI	NA	NA
Measurement Server	DASY8 MS	NA	SPEAG	NA	NA
Electro Optical Converter	EOC8-90	1025	SPEAG	NA	NA
Light Beam Unit	LB-85	2076	Di-soric	NA	NA
Oval Flat Phantom	ELI V8.0	2162	SPEAG	NA	NA
Measurement Software	DASY8 v16.2	9-1798AA01_D8	SPEAG	NA	NA
Data Acquisition Electronics	DAE	1710	SPEAG	2024/01/03	2025/01/02
Dosimetric E-Field probe	EX3DV4	7893	SPEAG	2024/09/05	2025/09/04
Thermometer	RC-4HC	EF7216002985	Elitech	2024/10/31	2025/10/30
Thermometer	RC-4HC	EF720B004811	Elitech	2024/10/31	2025/10/30

Shared equipment

Device	Type/Model	Serial Number	Manufacturer	Cal. Date	Cal. Due Date
PC	N/A	N/A	Dell	NA	NA
PC	N/A	N/A	Dell	NA	NA
6.5GHz Validation Dipole	D6.5GHzV2	1037	Speag	2024/05/28	2027/05/27
Signal Generator	SMB100A	177746	R&S	2024/04/24	2025/04/23
Power Meter	NRVD-B2	835843/014	R&S	2024/08/08	2025/08/07
Power Sensor	NRV-Z2	100211	R&S	2024/08/08	2025/08/07
Power Meter	E4418B	GB43313877	Agilent	2024/06/25	2025/06/24
Power Sensor	E9300A	MY41499251	Agilent	2024/03/19	2025/03/18
Network Analyzer	E5071C	MY46103472	Agilent	2024/09/11	2025/09/10
Power Amplifier	932502132	ZVA-183W-S+	Mini-Circuits	N/A	N/A
Dielectric Probe Kit	DAK3.5	SN: 1312	Speag	N/A	N/A
Attenuator	ZA-S1-31	1305003187	COM-MW	N/A	N/A
Directional coupler	AAMCS-UDC	000272	AA-MCS	N/A	N/A

B.5.1 Tissue Simulant Liquid

TSL	Manufacturer / Model	Freq Range (MHz)	Main Ingredients
Head WideBand	SPEAG HBBL600-10000	600-10000	Ethanediol, Sodium petroleum sulfonate, Hexylene Glycol / 2-Methyl-pentane-2.4-diol, Alkoxylated alcohol

B.6 Measurement Uncertainty Evaluation

The system uncertainty evaluation is shown in the table below with a coverage factor of k = 2 to indicate a 95% level of confidence:

DASY8 Uncertainty Budget (Frequency band: 6 GHz–10 GHz range)								
Symbol	Error Description	Uncert. value	Prob.Dist.	Div.	(ci)(1 g)	(ci)(10 g)	Std. Unc. (1 g)	Std. Unc. (10 g)
Measurement System Errors								
CF	Probe Calibration	±18.6%	N	2	1	1	±9.3%	±9.3%
CF_{drift}	Probe Calibration Drift	±1.7%	R	√3	1	1	±1.0%	±1.0%
LIN	Probe Linearity	±4.7%	R	√3	1	1	±2.7%	±2.7%
BBS	Broadband Signal	±2.8%	R	√3	1	1	±1.6%	±1.6%
ISO	Probe Isotropy	±7.6%	R	√3	1	1	±4.4%	±4.4%
DAE	Other Probe+Electronic	±2.4%	N	1	1	1	±2.4%	±2.4%
AMB	RF Ambient	±1.8%	N	1	1	1	±1.8%	±1.8%
Δ_{sys}	Probe Positioning	±0.005 mm	N	1	0.5	0.5	±0.25%	±0.25%
DAT	Data Processing	±3.5%	N	1	1	1	±3.5%	±3.5%
Phantom and Device Errors								
LIQ(σ)	Conductivity (meas.)^{DAK}	±2.5%	N	1	0.78	0.71	±2.0%	±1.8%
LIQ(T_{σ})	Conductivity (temp.)^{BB}	±2.4%	R	√3	0.78	0.71	±1.1%	±1.0%
EPS	Phantom Permittivity	±14.0%	R	√3	0.5	0.5	±4.0%	±4.0%
DIS	Distance DUT – TSL	±2.0%	N	1	2	2	±4.0%	±4.0%
D_{xyz}	Device Positioning	±1.0%	N	1	1	1	±1.0%	±1.0%
H	Device Holder	±3.6%	N	1	1	1	±3.6%	±3.6%
MOD	DUT Modulation^{m}	±2.4%	R	√3	1	1	±1.4%	±1.4%
TAS	Time-average SAR	±1.7%	R	√3	1	1	±1.0%	±1.0%
RF_{drift}	DUT drift	±2.5%	N	1	1	1	±2.5%	±2.5%
VAL	Val Antenna Unc.^{val}	±0.0%	N	1	1	1	±0%	±0%
RF_{in}	Unc. Input Power^{val}	±0.0%	N	1	1	1	±0%	±0%
Correction to the SAR results								
C(ε, σ)	Deviation to Target	±1.9%	N	1	1	0.84	±1.9%	±1.6%
C(R)	SAR scaling^{p}	±0%	R	√3	1	1	±0%	±0%
u(ΔSAR)	Combined Uncertainty						±14.2%	±13.9%
U	**Expanded Uncertainty**						±28.4%	±27.9%

B.7 RF Exposure Limits

SAR assessments have been made in line with the requirements of FCC 47CFR Part 2.1093 on the limitation of exposure of the general population / uncontrolled exposure for portable devices.

Exposure Type	General Population / Uncontrolled Environment
Peak spatial-average SAR (averaged over any 1 gram of tissue)	**1.6 W/kg**
Whole body average SAR	**0.08 W/kg**
Peak spatial-average SAR (extremities) (averaged over any 10 grams of tissue)	**4.0 W/kg**

Annex C. Test Results

The herein test results were performed by:

Test case measurement	Test Personnel
Conducted measurement	Xiong Lining
SAR/PD measurement	Xiong Lining

C.1 Test Conditions

C.1.1 Test positions relative to the phantom

The device under test was an Intel® Wi-Fi 6 BE201D2W card inside an extender host platform (Yoga Book 9 14IAH10) using a set of PIFA antennas. The card was operated utilizing proprietary software (DRTU version DRTU.06643.23.60.0) and each channel was measured using a broadband power meter to determine the maximum average power.

As per the Interim Procedures for UNII 6-7GHz RF Exposure, explained in *RF Exposure Policies and Procedures: TCB Workshop – October 2020*, the testing has been performed on SAR following IEC/IEEE 62209-1528:2020 and then on Power Density for the highest SAR test configurations.

Considering the antenna location diagrams in Annex G and the test exclusions described before, the surfaces/edges to be measured for each antenna are:

Antenna	Aux	Main
Position	• Back Side • Bottom Side • Front Edge • Keyboard Side • Left Edge • Right Edge • Top Edge	• Back Side • Bottom Side • Front Edge • Keyboard Side • Left Edge • Right Edge • Top Edge

See ***G.2** SAR/**PD Test*** **positions** section for more information on the tested positions.

C.1.2 Test signal, Output power and Test Frequencies

For 802.11 transmission modes the device was put into operation by using an own control software to program the test mode required to select the continuous transmission with 100% duty cycle.

The output power of the device was set to transmit at maximum power for all tests.

C.1.3 Evaluation Exclusion and Test Reductions

For FCC:
According with FCC KDB 447498 D04, Appendix B, The SAR-based exemption formula applies for single fixed, mobile, and portable RF sources with available maximum time-averaged power or effective radiated power (ERP), whichever is greater, of less than or equal to the threshold Pth (mW).
This method shall only be used at separation distances from 0.5 cm to 40 cm and at frequencies from 0.3 GHz to 6 GHz (inclusive). The following table shows the power threshold from 5mm to 50mm.

SAR evaluation — Exemption limits for routine evaluation based on frequency and separation distance					
Frequency	Exemption Limits (mW)				
(MHz)	At separation distance of ≤5 mm	At separation distance of 10 mm	At separation distance of 15 mm	At separation distance of 20 mm	At separation distance of 25 mm
300	39 mW	65 mW	88 mW	110 mW	129 mW
450	22 mW	44 mW	67 mW	89 mW	112 mW
835	9 mW	25 mW	44 mW	66 mW	90 mW
1900	3 mW	12 mW	26 mW	44 mW	66 mW
2450	3 mW	10 mW	22 mW	38 mW	59 mW
3600	2 mW	8 mW	18 mW	32 mW	49 mW
5800	1 mW	6 mW	14 mW	25 mW	40 mW
Frequency	Exemption Limits (mW)				
(MHz)	At separation distance of 30 mm	At separation distance of 35 mm	At separation distance of 40 mm	At separation distance of 45 mm	At separation distance of ≥50 mm
300	148 mW	166 mW	184 mW	201 mW	217 mW
450	135 mW	158 mW	180 mW	203 mW	226 mW
835	116 mW	145 mW	175 mW	207 mW	240 mW
1900	92 mW	122 mW	157 mW	195 mW	236 mW
2450	83 mW	111 mW	143 mW	179 mW	219 mW
3600	71 mW	96 mW	125 mW	158 mW	195 mW
5800	58 mW	80 mW	106 mW	136 mW	169 mW

WLAN Antenna	Band Name	Tablet mode Output power		Notebook mode Output power		Bottom Side	Back Side	Left Edge	Right Edge	Top Edge	Bottom Edge	Keyboard Side	Bottom Side	Back Side	Left Edge	Right Edge	Top Edge	Bottom Edge	Keyboard Side
		dBm	mW	dBm	mW														
Aux	U-NII-5	12.5	17.78	16.5	44.67	**<50**	**<50**	**<50**	>50	**<50**	**<50**	**<50**	T	T	T	R	T	T	T
	U-NII-6	12.5	17.78	16.5	44.67	**<50**	**<50**	**<50**	>50	**<50**	**<50**	**<50**	T	T	T	R	T	T	T
	U-NII-7	12.5	17.78	16.5	44.67	**<50**	**<50**	**<50**	>50	**<50**	**<50**	**<50**	T	T	T	R	T	T	T
	U-NII-8	12.5	17.78	16.5	44.67	**<50**	**<50**	**<50**	>50	**<50**	**<50**	**<50**	T	T	T	R	T	T	T
Main	U-NII-5	13.5	22.39	15	31.62	**<50**	**<50**	>50	**<50**	**<50**	**<50**	**<50**	T	T	R	T	T	T	T
	U-NII-6	13.5	22.39	15	31.62	**<50**	**<50**	>50	**<50**	**<50**	**<50**	**<50**	T	T	R	T	T	T	T
	U-NII-7	13.5	22.39	15	31.62	**<50**	**<50**	>50	**<50**	**<50**	**<50**	**<50**	T	T	R	T	T	T	T
	U-NII-8	13.5	22.39	15	31.62	**<50**	**<50**	>50	**<50**	**<50**	**<50**	**<50**	T	T	R	T	T	T	T

T: Tested position
R: Reduced

See Annex *G* for a more detailed explanation of the separation distance related to the platform.

C.2 Conducted Power Measurements

C.2.1 WLAN 6-7GHz (U-NII)

C.2.1.1 6GHz- Notebook mode

Band	Mode	Data Rate	Ch #	Freq (MHz)	Average power (dBm) -Main	Tune-up Pwr (dBm)	Average power (dBm) -Aux	Tune-up Pwr (dBm)	SAR Test?
6GHz	802.11ax20/be	MCS0	1	5955	NR[1]	15.00	NR[1]	16.50	No[2]
			45	6175		15.00		16.50	
			93	6415		15.00		16.50	
			97	6435		15.00		16.50	
			105	6475		15.00		16.50	
			113	6515		15.00		16.50	
			117	6535		15.00		16.50	
			153	6715		15.00		16.50	
			181	6855		15.00		16.50	
			185	6875		15.00		16.50	
			213	7015		15.00		16.50	
			233	7115		15.00		16.50	
	802.11ax40/be		3	5965		15.00		16.50	
			43	6165		15.00		16.50	
			91	6405		15.00		16.50	
			99	6445		15.00		16.50	
			107	6485		15.00		16.50	
			115	6525		15.00		16.50	
			123	6565		15.00		16.50	
			155	6725		15.00		16.50	
			179	6845		15.00		16.50	
			187	6885		15.00		16.50	
			211	7005		15.00		16.50	
			227	7085		15.00		16.50	
	802.11ax80/be		7	5985		15.00		16.50	
			39	6145		15.00		16.50	
			87	6385		15.00		16.50	
			103	6465		15.00		16.50	
			119	6545		15.00		16.50	
			135	6625		15.00		16.50	
			151	6705		15.00		16.50	
			167	6785		15.00		16.50	
			183	6865		15.00		16.50	
			199	6945		15.00		16.50	
			215	7025		15.00		16.50	
	802.11ax160/be		15	6025		15.00		16.50	
			47	6185		15.00		16.50	
			79	6345		15.00		16.50	

			111	6505	14.90	15.00	16.35	16.50	Yes[2]
			143	6665	NR[1]	15.00	NR[1]	16.50	No
			175	6825		15.00		16.50	
			207	6985		15.00		16.50	
	802.11be320		31	6105	14.54	15.00	16.41	16.50	Yes
			63	6265	14.89	15.00	16.38	16.50	
			95	6425	14.61	15.00	16.29	16.50	
			127	6585	14.92	15.00	16.23	16.50	
			159	6745	14.88	15.00	16.07	16.50	
			191	6905	14.87	15.00	16.21	16.50	

Initial test configuration

1. NR: Not Required
2. All bandwidths of 6GHz have the same Tune up, and 6.5GHz has no corresponding channel in 320M bandwidth, so channel 111 in 160M bandwidth is selected for SAR test.

C.2.1.2 6GHz - Tablet mode

Band	Mode	Data Rate	Ch #	Freq (MHz)	Average power (dBm) -Main	Tune-up Pwr (dBm)	Average power (dBm) -Aux	Tune-up Pwr (dBm)	SAR Test?
6GHz	802.11ax20/be	MCS0	1	5955	NR[1]	13.50	NR[1]	12.50	No[2]
			45	6175		13.50		12.50	
			93	6415		13.50		12.50	
			97	6435		13.50		12.50	
			105	6475		13.50		12.50	
			113	6515		13.50		12.50	
			117	6535		13.50		12.50	
			153	6715		13.50		12.50	
			181	6855		13.50		12.50	
			185	6875		13.50		12.50	
			213	7015		13.50		12.50	
			233	7115		13.50		12.50	
	802.11ax40/be		3	5965		13.50		12.50	
			43	6165		13.50		12.50	
			91	6405		13.50		12.50	
			99	6445		13.50		12.50	
			107	6485		13.50		12.50	
			115	6525		13.50		12.50	
			123	6565		13.50		12.50	
			155	6725		13.50		12.50	
			179	6845		13.50		12.50	
			187	6885		13.50		12.50	
			211	7005		13.50		12.50	
			227	7085		13.50		12.50	
	802.11ax80/be		7	5985		13.50		12.50	
			39	6145		13.50		12.50	
			87	6385		13.50		12.50	
			103	6465		13.50		12.50	
			119	6545		13.50		12.50	
			135	6625		13.50		12.50	
			151	6705		13.50		12.50	
			167	6785		13.50		12.50	
			183	6865		13.50		12.50	
			199	6945		13.50		12.50	
			215	7025		13.50		12.50	
	802.11ax160/be		15	6025		13.50		12.50	
			47	6185		13.50		12.50	
			79	6345		13.50		12.50	
			111	6505	13.18	13.50	12.05	12.50	Yes[2]
			143	6665	NR[1]	13.50	NR[1]	12.50	No
			175	6825		13.50		12.50	

			207	6985		13.50		12.50	
	802.11be320		31	6105	13.08	13.50	12.47	12.50	Yes
			63	6265	13.43	13.50	12.38	12.50	
			95	6425	13.07	13.50	12.29	12.50	
			127	6585	13.45	13.50	12.29	12.50	
			159	6745	13.39	13.50	12.15	12.50	
			191	6905	13.41	13.50	12.30	12.50	

Initial test configuration

1. NR: Not Required
2. All bandwidths of 6GHz have the same Tune up, and 6.5GHz has no corresponding channel in 320M bandwidth, so channel 111 in 160M bandwidth is selected for SAR test.

C.3 Tissue Parameters Measurement

Head TSL

Freq. (MHz)	Target Parameters		Measured TSL Parameters		Deviation (%)		Date
	ε' (F/m)	σ (S/m)	ε' (F/m)	σ (S/m)	ε'	σ	
6500.0	34.46	6.07	33.61	6.08	-2.47	0.16	2024-12-26
6500.0	34.46	6.07	33.35	6.10	-3.22	0.49	2024-12-27
6500.0	34.46	6.07	33.26	6.00	-3.48	-1.15	2025-12-28
6500.0	34.46	6.07	33.28	6.08	-3.42	0.16	2024-12-29

See *Annex E* for more details.

C.4 System Check Measurements

C.4.1 E-Field

Frequency	Signal Type	Target E-field (V/m)	Measured E-field Normalized to 22dBm (V/m)	Deviation (dB)	Date
10 GHz	Continuous Wave	296.00	316.4	0.29	2025-01-02
10 GHz	Continuous Wave	296.00	299.6	0.05	2025-01-03
10 GHz	Continuous Wave	296.00	306.3	0.15	2025-01-09

The E-fields presented in the System Check Measurements table are Peak values. The target E-field value is obtained by simulation. The maximum target E-field value at 10 mm with 22.0 dBm (158.49 mW) source power is 296 V/m.

C.4.2 Averaged Power Density

Frequency	Signal Type	Target Spatially Averaged Power Density (W/m2)	Measured Spatially Averaged Power Density Normalized to 22dBm (W/m2)	Deviation (dB)	Date
10 GHz	Continuous Wave	183	191.9	0.21	2025-01-02
10 GHz	Continuous Wave	183	173.9	0.22	2025-01-03
10 GHz	Continuous Wave	183	185.1	0.05	2025-01-09

The Local Power Density presented in the System Check Measurements table are average values. The target Local Power Density value is obtained by calibration certificate. The target Local Power Density value at 10 mm with 22.0 dBm (158.49 mW) source power is 183.0 W/m^2.

See *Annex D* for more details.

C.4.3 SAR

Head Measurements

Frequency (MHz)	Average	Target SAR (W/kg)	Measured SAR Normalized to 1W (W/kg)	Forwarded Power (mW)	Deviation to target (%)	Limit (%)	Date
6500	1g	299.00	286.00	100	-4.35	±10	2024-12-26
6500	1g	299.00	302.00	100	1.00		2024-12-27
6500	1g	299.00	291.00	100	-2.68		2025-12-28
6500	1g	299.00	294.00	100	-1.67		2024-12-29
6500	10g	55.20	52.20	100	-5.43		2024-12-26
6500	10g	55.20	54.50	100	-1.27		2024-12-27
6500	10g	55.20	53.10	100	-3.80		2025-12-28
6500	10g	55.20	53.20	100	-3.62		2024-12-29

C.5 Test Results

C.5.1 SAR - 802.11ax – 6GHz

Antenna Manufacturer	Mode Data rate	BW (MHz)	Channel Number	Freq (MHz)	Test state	Test position	Antenna	Scaling Factor (dB).	Duty cycle Factor	Measured SAR 1g. (W/kg)	Reported SAR 1g (W/kg)	Measured APD (W/m2)	Reported C-APD (W/m2)	No Plot
Body														
Speed	802.11be MCS0	320	31	6105	Laptop	Bottom Side	Aux.	1.021	1.015	0.753	0.780	5.220	5.410	/
Speed			63	6265		Bottom Side	Aux.	1.028	1.015	0.828	0.864	5.650	5.895	/
Speed			95	6425		Bottom Side	Aux.	1.050	1.015	0.691	0.736	4.730	5.041	/
Speed			127	6585		Bottom Side	Aux.	1.064	1.015	0.891	0.962	6.100	6.588	/
Speed			159	6745		Bottom Side	Aux.	1.104	1.015	0.840	0.941	5.770	6.466	/
Speed			191	6905		Bottom Side	Aux.	1.069	1.015	1.060	1.150	7.480	8.116	1
Speed			111	6505		Bottom Side	Aux.	1.000	1.015	1.050	1.066	7.420	7.531	/
ICT			31	6105		Bottom Side	Aux.	1.021	1.015	0.597	0.619	4.020	4.166	/
Speed			31	6105		Front edge	Aux.	1.021	1.015	0.493	0.511	3.430	3.555	/
ICT			31	6105		Front edge	Aux.	1.021	1.015	0.353	0.366	2.500	2.591	/
Speed			31	6105	Tablet	Back Side	Aux.	1.007	1.015	0.749	0.766	4.650	4.753	/
Speed			31	6105		Left Edge	Aux.	1.007	1.015	0.085	0.087	0.671	0.686	/
Speed			31	6105		Top Edge	Aux.	1.007	1.015	0.203	0.207	1.470	1.502	/
ICT			31	6105		Back Side	Aux.	1.007	1.015	0.475	0.485	3.010	3.077	/
ICT			31	6105		Left Edge	Aux.	1.007	1.015	0.040	0.041	0.265	0.271	/
ICT			31	6105		Top Edge	Aux.	1.007	1.015	0.214	0.219	1.240	1.267	/
Speed			127	6585	Laptop	Bottom Side	Main	1.019	1.015	0.919	0.951	6.490	6.713	2
Speed			31	6105	Tablet	Bottom Side	Main	1.102	1.015	0.565	0.632	3.560	3.982	/
Speed			63	6265		Bottom Side	Main	1.016	1.015	0.682	0.703	4.290	4.424	/
Speed			95	6425		Bottom Side	Main	1.084	1.015	0.564	0.621	3.440	3.785	/
Speed			159	6745		Bottom Side	Main	1.026	1.015	0.906	0.943	5.280	5.499	/
Speed			191	6905		Bottom Side	Main	1.021	1.015	0.907	0.940	5.150	5.337	/
Speed			111	6505		Bottom Side	Main	1.000	1.015	0.801	0.813	4.720	4.791	/
ICT			127	6585	Laptop	Bottom Side	Main	1.019	1.015	0.721	0.746	4.700	4.861	/
Speed			127	6585		Front edge	Main	1.019	1.015	0.641	0.663	4.420	4.572	/
ICT			127	6585		Front edge	Main	1.019	1.015	0.402	0.416	2.740	2.834	/

Speed			127	6585	Tablet	Back Side	Main	1.012	1.015	0.815	0.837	4.680	4.807	/
Speed			127	6585		Right Edge	Main	1.012	1.015	0.096	0.099	0.756	0.777	/
Speed			127	6585		Top Edge	Main	1.012	1.015	0.533	0.547	3.420	3.513	/
ICT			127	6585		Back Side	Main	1.012	1.015	0.583	0.599	3.510	3.605	/
ICT			127	6585		Top Edge	Main	1.012	1.015	0.203	0.209	1.300	1.335	/
ICT			127	6585		Right Edge	Main	1.012	1.015	0.041	0.042	0.267	0.274	/

Antenna Manufacturer	Mode Data rate	BW (MHz)	Channel Number	Freq (MHz)	Test state	Test position	Antenna	Scaling Factor (dB).	Duty cycle Factor	Measured SAR 10g. (W/kg)	Reported SAR 1g (W/kg)	Measured APD (W/m2)	Reported C-APD (W/m2)	No Plot
Limbs														
Speed	802.11be MCS0	320	31	6105	Laptop	Keyboard Side	Aux.	1.021	1.015	0.477	0.494	11.200	11.607	/
ICT			31	6105		Keyboard Side	Aux.	1.021	1.015	0.540	0.560	12.600	13.058	/
ICT			63	6265		Keyboard Side	Aux.	1.028	1.015	0.572	0.597	13.400	13.982	3
ICT			95	6425		Keyboard Side	Aux.	1.050	1.015	0.504	0.537	11.800	12.576	/
ICT			127	6585		Keyboard Side	Aux.	1.064	1.015	0.509	0.550	11.900	12.852	/
ICT			159	6745		Keyboard Side	Aux.	1.104	1.015	0.416	0.466	9.760	10.937	/
ICT			191	6905		Keyboard Side	Aux.	1.069	1.015	0.469	0.509	11.100	12.044	/
ICT			111	6105		Keyboard Side	Aux.	1.000	1.015	0.499	0.506	11.600	11.774	4
Speed			31	6105		Left Edge	Aux.	1.021	1.015	0.067	0.069	1.530	1.586	/
ICT			31	6105		Left Edge	Aux.	1.021	1.015	0.062	0.064	1.400	1.451	/
Speed			127	6585		Keyboard Side	Main	1.019	1.015	0.291	0.301	6.860	7.095	/
ICT			127	6585		Keyboard Side	Main	1.019	1.015	0.476	0.492	11.200	11.584	/
ICT			31	6105		Keyboard Side	Main	1.112	1.015	0.393	0.444	9.190	10.373	/
ICT			63	6265		Keyboard Side	Main	1.026	1.015	0.439	0.457	10.300	10.726	/
ICT			95	6425		Keyboard Side	Main	1.094	1.015	0.370	0.411	8.690	9.649	/
ICT			159	6745		Keyboard Side	Main	1.028	1.015	0.241	0.251	5.670	5.916	/
ICT			191	6905		Keyboard Side	Main	1.030	1.015	0.311	0.325	7.350	7.684	/
Speed			127	6585		Right Edge	Main	1.019	1.015	0.039	0.040	0.870	0.900	/

ICT			127	6585		Right Edge	Main	1.019	1.015	0.041	0.042	0.932	0.964	/
ICT			111	6105		Keyboard Side	Main	1.000	1.015	0.334	0.339	7.830	7.947	/

* For reference purposes only, not specifically for compliance, the estimated absorbed (epithelial) power density derived from the measured SAR is shown

Power Density General Note:

1. The reported PD is the measured Total PD value adjusted for maximum tune-up tolerance and duty cycle factor.
   a. Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
   b. For PD testing of WIFI signal with non-100% duty cycle, the measured PD is scaled-up by the duty cycle scaling factor which is equal to "1/(duty cycle)".
2. The most conservative test distance of 2mm was applied to PD measurement.
3. Power density was calculated by repeated E-field measurements on two measurement planes separated by λ/4.
4. 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.
5. Per FCC guidance and equipment manufacturer guidance, power density results were scaled according to IEC 62479:2010 for the portion of the measurement uncertainty > 30%. Total expanded uncertainty of 2.66 dB (84.5%) was used to determine the psPD measurement scaling factor.
6. According to TCBC workshop in October 2018 that 4cm²averaging area may now be considered.
7. The measurement procedure consists of measuring the PDinc at two different distances: 2 mm (compliance distance) and λ/5. The grid extents should be large enough to fully capture the transmitted energy. The grid step should be fine enough to demonstrate that the integrated Power Density iPDn fulfill the criterion described below. Since iPD ratio between the two distances is ≥-1dB, the grid step (0.0625) was sufficient for determining compliance at d = 2mm.

$$10 \cdot log_{10} \frac{iPD_n(2mm)}{iPD_n(\lambda/5)} \geq -1$$

C.5.2 Power Density - 802.11ax – 6GHz

Ant.	Mode Data rate	BW (MHz)	Position	Dist. (mm)	Ch.	Freq. (MHz)	IPDn	IPD ratio (≥-1)
Aux.	802.11be MCS0	320	Bottom Side	2	127	6585	52.1	1.20
Aux.	802.11be MCS0	320	Bottom Side	9.11	127	6585	39.5	

Ant.	Mode Data rate	BW (MHz)	Ch #	Freq (MHz)	Test state	Test position	*Uncertainty Cor. Factor	PStot avg [W/m²] 4cm²	Tune-up Scaling Factor	Duty cycle Factor	Meas. uncertainty Scaling Factor	C-PStot avg [W/m²] 4cm²	Plot #
Aux.	802.11be MCS0	320	31	6105	Laptop	Bottom Side	1.545	4.260	1.012	1.015	1.545	6.761	
Aux.			31	6105	Laptop	Front edge	1.545	3.860	1.096	1.015	1.545	6.634	
Main			127	6585	Laptop	Bottom Side	1.545	5.960	1.042	1.015	1.545	9.739	1
Main			127	6585	Laptop	Front edge	1.545	4.450	1.064	1.015	1.545	7.425	
Main			31	6105	Laptop	Bottom Side	1.545	5.200	1.059	1.015	1.545	8.636	
Main			191	6905	Laptop	Bottom Side	1.545	2.400	1.064	1.015	1.545	4.004	
Main		160	111	6505	Laptop	Bottom Side	1.545	4.160	1.064	1.015	1.545	6.941	
Aux.		320	31	6105	Tablet	Back Side	1.545	2.570	1.012	1.015	1.545	4.079	
Aux.			31	6105	Tablet	Left Edge	1.545	0.578	1.012	1.015	1.545	0.917	
Aux.			31	6105	Tablet	Top Edge	1.545	2.520	1.096	1.015	1.545	4.331	
Main			127	6585	Tablet	Back Side	1.545	3.080	1.042	1.015	1.545	5.033	
Main			127	6585	Tablet	Right Edge	1.545	0.633	1.042	1.015	1.545	1.034	
Main			127	6585	Tablet	Top Edge	1.545	3.270	1.064	1.015	1.545	5.456	

* The correction factor uncertainty in dB corresponds to the difference between the actual uncertainty and the 30% target value, as per the TCB Workshop Oct 20

C.5.3 Measurement Variability

According to FCC OET KDB 865664, SAR Measurement variability is assessed when the maximum initial measured SAR is ≥0.8 W/kg for a certain band/mode. If the measured SAR value of the initial repeated measurement is <1.45 W/kg with <20% variation, only one repeated measurement is required to confirm that the results are not expected to have substantial variations.

A second repeated measurement is required only if the measured results for the initial repeated measurement are within 10% of the SAR limit or vary by more than 20%.

A third repeated measurement is required only if the original, first or second repeated measurement ≥1.5W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurement is > 1.2.

Band / Mode	Position	Ch #	Freq. (MHz)	Measured SAR 1g (W/kg)	1st Repeated SAR 1g (W/kg)	2nd Repeated SAR 1g (W/kg)	Highest Ratio
802.11EHT320	Bottom Side	191	6905	1.06	0.975		1.09

C.5.4 Simultaneous Transmission Evaluation – SAR

According to FCC OET KDB 447498, when the sum of 1g SAR for all simultaneously transmitting antennas in an operating mode and exposure condition combination is within the SAR limit, SAR test exclusion applies to that simultaneous transmission configuration.

All the values stated in the table below are the worst case found for standalone measurement with disregard of the transmission mode or channel where the worst case was found.

Antenna	Position	Highest Reported SAR (1g) (W/kg) Body	
		WLAN 6GHz	Bluetooth*
Main	Bottom Side	0.951	
Aux		1.150	0.140
Main	Front Edge	0.663	
Aux		0.511	0.081
Main	Back Side	0.837	
Aux		0.766	0.169
Main	Left Edge	0.000	
Aux		0.087	0.015
Main	Right Edge	0.099	
Aux		0.000	0.000
Main	Top Edge	0.547	
Aux		0.219	0.087

Antenna	Position	Highest Reported SAR (10g) (W/kg) Limbs	
		WLAN 6GHz	Bluetooth*
Main	Keyboard Side	0.492	
Aux		0.597	0.094
Main	Left Edge	0.000	
Aux		0.069	0.004
Main	Right Edge	0.042	
Aux		0.000	0.000

* For Bluetooth values refer to test report BL-SZ24A0700-701
** CH31 was considered for Back position as the highest standalone measurement on UNII-5 for Aux and Main transmitters for the simultaneous transmission with MIMO power.
***This combination requires SISO value for simultaneous considerations.

Position	Simultaneous Tx Antenna Combination		Σ SAR 1g (W/kg)	Limit (W/kg)
	Main	Aux		
Bottom Side	WLAN 6 GHz	WLAN 6 GHz	**2.101**1#	1.6
	WLAN 6GHz	WLAN 6GHz + BT	**2.241**2#	
Front Edge	WLAN 6 GHz	WLAN 6 GHz	1.174	
	WLAN 6GHz	WLAN 6GHz + BT	1.255	
Back Side	WLAN 6 GHz	WLAN 6 GHz	**1.603**3#	
	WLAN 6GHz	WLAN 6GHz + BT	**1.772**4#	
Left Edge	WLAN 6 GHz	WLAN 6 GHz	0.087	
	WLAN 6GHz	WLAN 6GHz + BT	0.102	
Right Edge	WLAN 6 GHz	WLAN 6 GHz	0.099	
	WLAN 6GHz	WLAN 6GHz + BT	0.099	
Top Edge	WLAN 6 GHz	WLAN 6 GHz	0.766	
	WLAN 6GHz	WLAN 6GHz + BT	0.853	

Position	Simultaneous Tx Antenna Combination		Σ SAR 10g (W/kg)	Limit (W/kg)
	Main	Aux		
Keyboard Side	WLAN 6 GHz	WLAN 6 GHz	1.089	4.0
	WLAN 6GHz	WLAN 6GHz + BT	1.183	
Left Edge	WLAN 6 GHz	WLAN 6 GHz	0.069	
	WLAN 6GHz	WLAN 6GHz + BT	0.073	
Right Edge	WLAN 6 GHz	WLAN 6 GHz	0.042	
	WLAN 6GHz	WLAN 6GHz + BT	0.042	

In case the sum of SAR is larger than the limit, SAR test exclusion is determined by the SAR to peak location separation ratio:

Case No.	Position	Antenna	Reported SAR 1g (W/kg)	Σ SAR 1g (W/kg)	Peak Location (mm) (x,y,z)	SAR to peak location separation ratio	Limit
1#	Bottom Side	Aux WLAN 6GHz	1.150	2.101	(17.1 ;116.8 ;-175.6)	0.01	0.04
		Main WLAN 6GHz	0.951		(-4.6 ;-124.4 ;-175.6)		

Case No.	Position	Antenna	Reported SAR 1g (W/kg)	Σ SAR 1g (W/kg)	Peak Location (mm) (x,y,z)	SAR to peak location separation ratio	Limit
2#	Bottom Side	Aux WLAN 6GHz + BT	1.290	2.241	(17.1 ;116.8 ;-175.6)	0.01	0.04
		Main WLAN 6GHz	0.951		(-4.6 ;-124.4 ;-175.6)		

Case No.	Position	Antenna	Reported SAR 1g (W/kg)	Σ SAR 1g (W/kg)	Peak Location (mm) (x,y,z)	SAR to peak location separation ratio	Limit
3#	Back Side	Aux WLAN 6GHz	0.766	1.603	(-8.6 ;125.3 ;-175.6)	0.01	0.04
		Main WLAN 6GHz	0.837		(5.8 ;-122.7 ;-175.6)		

Case No.	Position	Antenna	Reported SAR 1g (W/kg)	Σ SAR 1g (W/kg)	Peak Location (mm) (x,y,z)	SAR to peak location separation ratio	Limit
4#	Back Side	Aux WLAN 6GHz + BT	0.935	1.772	(-8.6 ;125.3 ;-175.6)	0.01	0.04
		Main WLAN 6GHz	0.837		(5.8 ;-122.7 ;-175.6)		

Considering the results described above and according to the simultaneous transmission evaluation exclusions described in FCC OET KDB 447498, no enlarged zoom scan measurements are required

Annex D. Test System Plots

1. U-NII-8 - 802.11be320, CH191, Aux Antenna –Bottom Side

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity	Ambient Temperature [℃]	Liquid Temperature [℃]
Flat, HSL	EDGE BOTTOM, 0.00	U-NII-8	WLAN, 11026-AAB	6905.0, 191	5.11	6.49	32.3	22.4	21.6

Hardware Setup

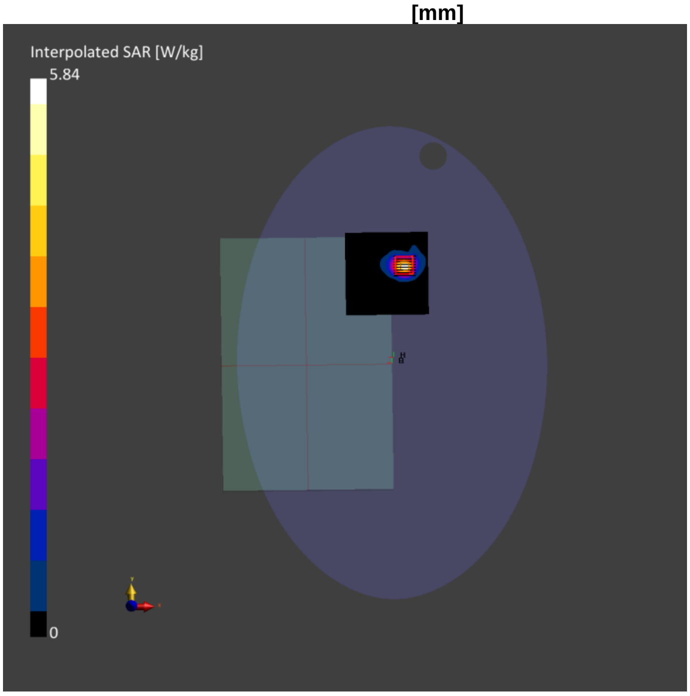
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V8.0 (20deg probe tilt) - 2162	HBBL-600-10000 2024-12-29	EX3DV4 - SN7893, 2024-09-05	DAE4 Sn1710, 2024-01-03

Scan Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	102.0 x 102.0	23.8 x 23.8 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	Y	N/A
Surface Detection	VMS + 6p	VMS + 6p
Scan Method	Measured	Measured

Measurement Results

	Area Scan	Zoom Scan
Date	2024-12-29	2024-12-29
psSAR1g [W/kg]	0.932	1.06
psSAR10g [W/kg]	0.308	0.326
Power Drift [dB]	-0.03	-0.18
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	No correction	No correction
M2/M1 [%]		47.7
Dist 3dB Peak [mm]		6.1



2. U-NII-7 - 802.11be320, CH127, Main Antenna –Bottom Side

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity	Ambient Temperature [℃]	Liquid Temperature [℃]
Flat, HSL	EDGE BOTTOM, 0.00	U-NII-7	WLAN, 11026-AAB	6585.0, 127	5.11	6.08	33.6	22.5	21.3

Hardware Setup

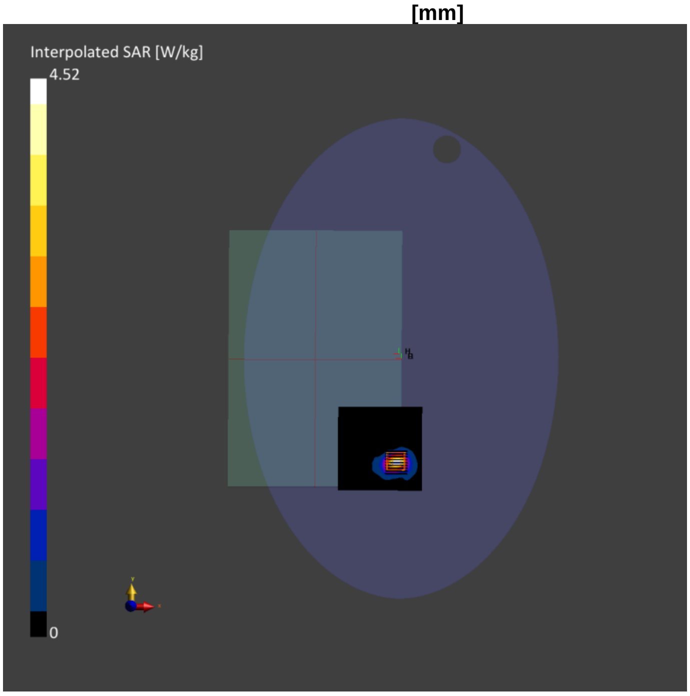
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V8.0 (20deg probe tilt) - 2162	HBBL-600-10000 2024-12-26	EX3DV4 - SN7893, 2024-09-05	DAE4 Sn1710, 2024-01-03

Scan Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	102.0 x 102.0	23.8 x 23.8 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	Y	N/A
Surface Detection	VMS + 6p	VMS + 6p
Scan Method	Measured	Measured

Measurement Results

	Area Scan	Zoom Scan
Date	2024-12-26	2024-12-26
psSAR1g [W/kg]	0.805	0.919
psSAR10g [W/kg]	0.260	0.282
Power Drift [dB]	0.07	0.11
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	No correction	No correction
M2/M1 [%]		49.1
Dist 3dB Peak [mm]		6.8



3. U-NII-5 - 802.11be320, CH63, Aux Antenna –Keyboard Side

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity	Ambient Temperature [℃]	Liquid Temperature [℃]
Flat, HSL	BACK, 0.00	U-NII-5	WLAN, 11026-AAB	6265.0, 63	5.11	5.80	33.9	22.6	21.7

Hardware Setup

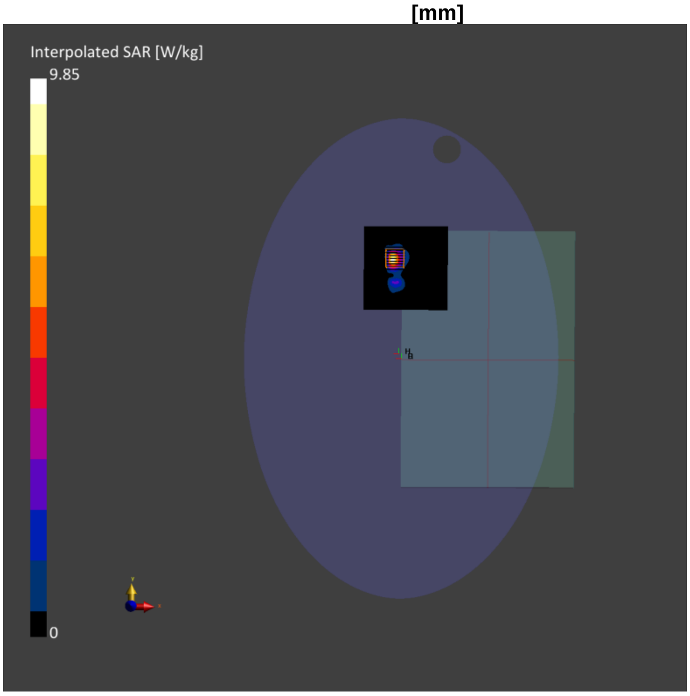
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V8.0 (20deg probe tilt) - 2162	HBBL-600-10000 2024-12-27	EX3DV4 - SN7893, 2024-09-05	DAE4 Sn1710, 2024-01-03

Scan Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	102.0 x 102.0	23.8 x 23.8 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	2024-12-27	2024-12-27
psSAR1g [W/kg]	1.90	2.12
psSAR10g [W/kg]	0.520	0.572
Power Drift [dB]	-0.16	0.00
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	No correction	No correction
M2/M1 [%]		52.6
Dist 3dB Peak [mm]		4.1



4. U-NII-7 - 802.11be320, CH127, Main Antenna –Keyboard Side

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity	Ambient Temperature [℃]	Liquid Temperature [℃]
Flat, HSL	BACK, 0.00	U-NII-7	WLAN, 11026-AAB	6585.0, 127	5.11	6.12	33.4	22.6	21.7

Hardware Setup

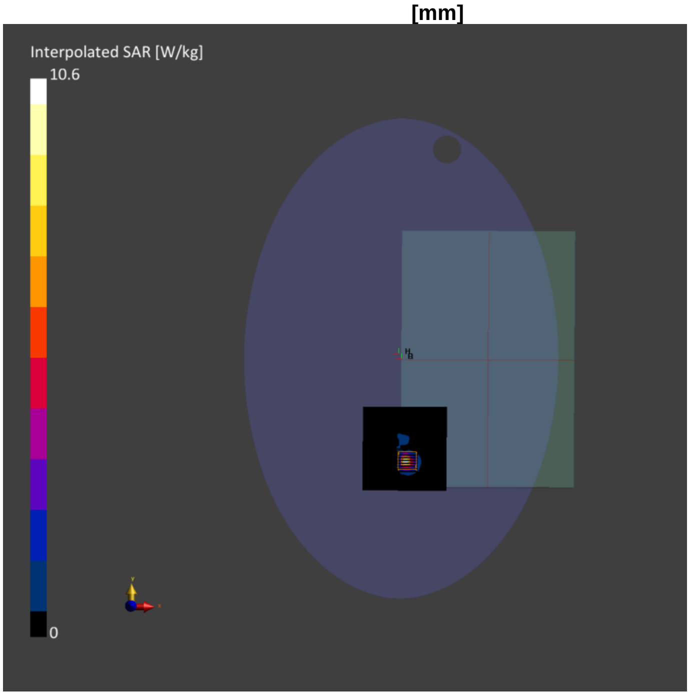
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V8.0 (20deg probe tilt) - 2162	HBBL-600-10000 2024-12-27	EX3DV4 - SN7893, 2024-09-05	DAE4 Sn1710, 2024-01-03

Scan Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	102.0 x 102.0	23.8 x 23.8 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	2024-12-27	2024-12-27
psSAR1g [W/kg]	1.73	1.87
psSAR10g [W/kg]	0.446	0.476
Power Drift [dB]	0.08	-0.06
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	No correction	No correction
M2/M1 [%]		48.7
Dist 3dB Peak [mm]		4.1



5. U-NII-7 - 802.11be320, CH127, Aux Antenna –Bottom Side (PD)

Exposure Conditions

Phantom Section	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor
5G Air	BACK, 2.00	U-NII-7	WLAN, 11026-AAA	6585.0, 127	1.0

Hardware Setup

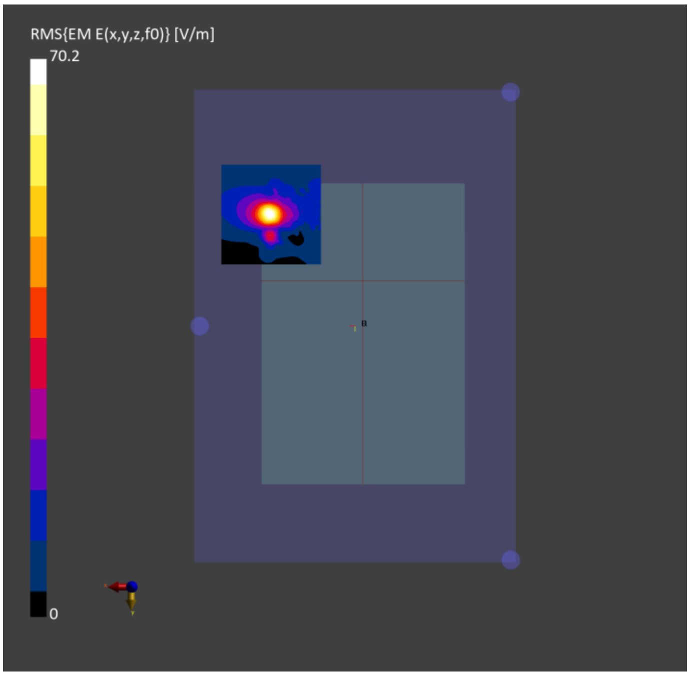
Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave- xxxx	Air---	EUmmWV4 - SN9607_F1-55GHz, 2024-02-12	DAE4 Sn1710, 2024-01-03

Scan Setup

	5G Scan
Grid Extents [mm]	100.0 x 100.0
Grid Steps [lambda]	0.0625 x 0.0625
Sensor Surface [mm]	3.5
MAIA	Y

Measurement Results

	5G Scan
Date	2025-01-02
Avg. Area [cm^2]	4.00
psPDn+ [W/m^2]	4.24
psPDtot+ [W/m^2]	5.96
psPDmod+ [W/m^2]	6.59
E_{max} [V/m]	70.2
Power Drift [dB]	0.05



6. SAR System Check From6500MHz

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity	Ambient Temperature [℃]	Liquid Temperature [℃]
Flat, HSL		Validation band	CW, 0--	6500.0, 6500	5.11	6.08	33.6	22.5	21.3

Hardware Setup

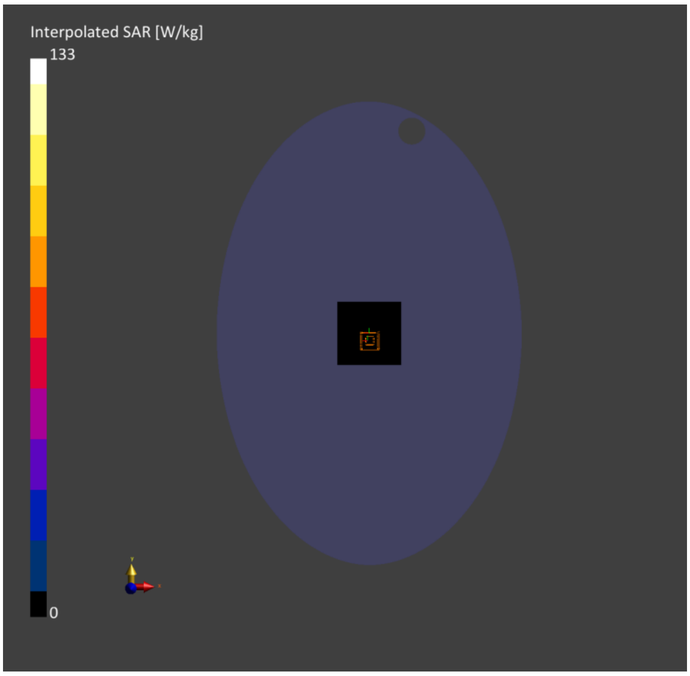
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V8.0 (20deg probe tilt) - 2162	HBBL-600-10000 2024-12-26	EX3DV4 - SN7893, 2024-09-05	DAE4 Sn1710, 2024-01-03

Scan Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	85.0 x 85.0	22.0 x 22.0 x 22.0
Grid Steps [mm]	8.5 x 8.5	3.4 x 3.4 x 1.4
Sensor Surface [mm]	3.0	1.4
Graded Grid	Yes	Yes
Grading Ratio	1.5	1.4
MAIA	N/A	N/A
Surface Detection	All points	All points
Scan Method	Measured	Measured

Measurement Results

	Area Scan	Zoom Scan
Date	2024-12-26	2024-12-26
psSAR1g [W/kg]	27.6	28.6
psSAR10g [W/kg]	4.81	5.22
Power Drift [dB]	0.02	0.02
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	No correction	No correction
M2/M1 [%]		49.2
Dist 3dB Peak [mm]		4.3



7. SAR System Check From6500MHz

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity	Ambient Temperature [℃]	Liquid Temperature [℃]
Flat, HSL		Validation band	CW, 0--	6500.0, 6500	5.11	6.10	33.4	22.6	21.7

Hardware Setup

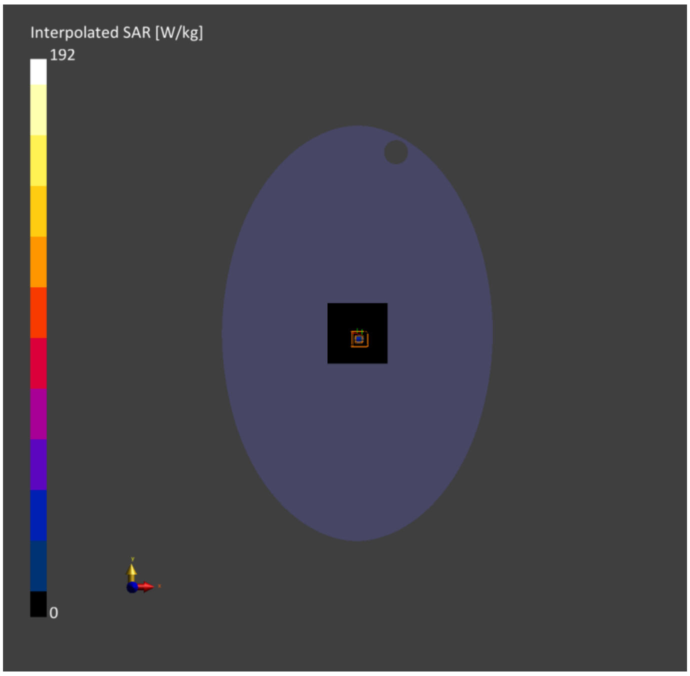
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V8.0 (20deg probe tilt) - 2162	HBBL-600-10000 2024-12-27	EX3DV4 - SN7893, 2024-09-05	DAE4 Sn1710, 2024-01-03

Scan Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	85.0 x 85.0	22.0 x 22.0 x 22.0
Grid Steps [mm]	8.5 x 8.5	3.4 x 3.4 x 1.4
Sensor Surface [mm]	3.0	1.4
Graded Grid	Yes	Yes
Grading Ratio	1.5	1.4
MAIA	N/A	N/A
Surface Detection	All points	All points
Scan Method	Measured	Measured

Measurement Results

	Area Scan	Zoom Scan
Date	2024-12-27	2024-12-27
psSAR1g [W/kg]	29.6	30.2
psSAR10g [W/kg]	5.41	5.45
Power Drift [dB]	-0.01	0.01
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	No correction	No correction
M2/M1 [%]		50.8
Dist 3dB Peak [mm]		5.2



8. SAR System Check From6500MHz

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity	Ambient Temperature [℃]	Liquid Temperature [℃]
Flat, HSL		Validation band	CW, 0--	6500.0, 6500	5.11	6.00	33.3	22.5	21.6

Hardware Setup

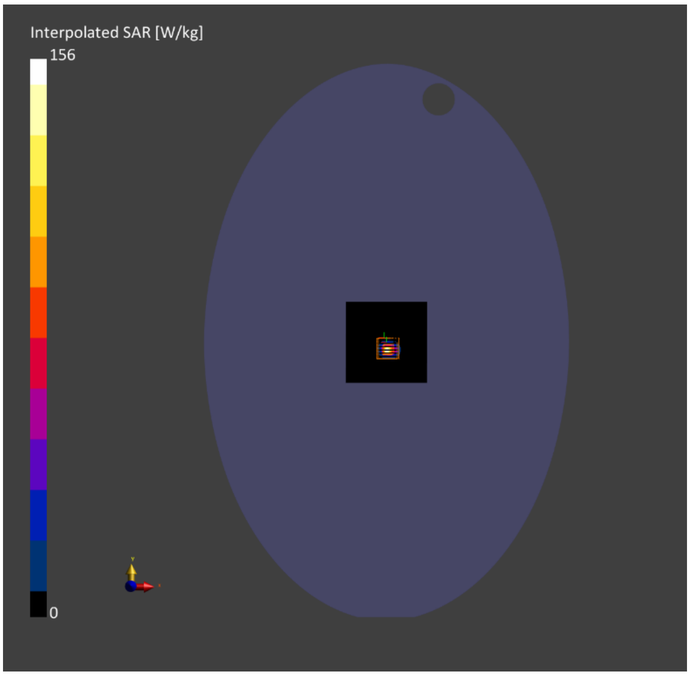
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V8.0 (20deg probe tilt) - 2162	HBBL-600-10000 2024-12-28	EX3DV4 - SN7893, 2024-09-05	DAE4 Sn1711, 2024-03-18

Scan Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	85.0 x 85.0	22.0 x 22.0 x 22.0
Grid Steps [mm]	8.5 x 8.5	3.4 x 3.4 x 1.4
Sensor Surface [mm]	3.0	1.4
Graded Grid	Yes	Yes
Grading Ratio	1.5	1.4
MAIA	N/A	N/A
Surface Detection	All points	All points
Scan Method	Measured	Measured

Measurement Results

	Area Scan	Zoom Scan
Date	2024-12-28	2024-12-28
psSAR1g [W/kg]	19.8	29.1
psSAR10g [W/kg]	4.04	5.31
Power Drift [dB]	0.00	0.02
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	No correction	No correction
M2/M1 [%]		49.5
Dist 3dB Peak [mm]		4.4



9. SAR System Check From6500MHz

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity	Ambient Temperature [℃]	Liquid Temperature [℃]
Flat, HSL		Validation band	CW, 0--	6500.0, 6500	5.11	6.08	33.3	22.4	21.6

Hardware Setup

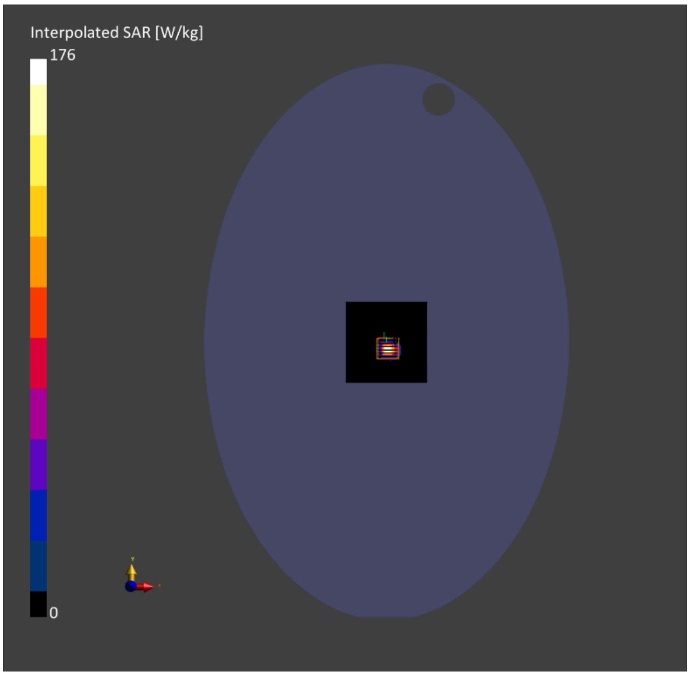
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V8.0 (20deg probe tilt) - 2162	HBBL-600-10000 2024-12-29	EX3DV4 - SN7893, 2024-09-05	DAE4 Sn1710, 2024-01-03

Scan Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	85.0 x 85.0	22.0 x 22.0 x 22.0
Grid Steps [mm]	8.5 x 8.5	3.4 x 3.4 x 1.4
Sensor Surface [mm]	3.0	1.4
Graded Grid	Yes	Yes
Grading Ratio	1.5	1.4
MAIA	N/A	N/A
Surface Detection	All points	All points
Scan Method	Measured	Measured

Measurement Results

	Area Scan	Zoom Scan
Date	2024-12-29	2024-12-29
psSAR1g [W/kg]	28.4	29.4
psSAR10g [W/kg]	5.39	5.32
Power Drift [dB]	-0.01	0.02
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	No correction	No correction
M2/M1 [%]		49.7
Dist 3dB Peak [mm]		4.6



10. Power Density System Check From 10000MHz

Exposure Conditions

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

Hardware Setup

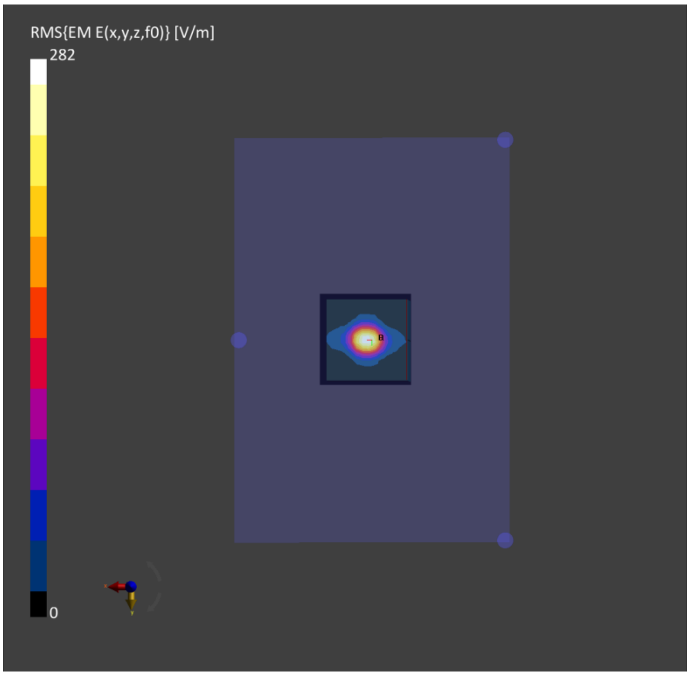
Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave- 1083	Air---	EUmmWV4 - SN9607_F1-55GHz, 2024-02-12	DAE4 Sn1710, 2024-01-03

Scan Setup

	5G Scan
Grid Extents [mm]	25.0 x 25.0
Grid Steps [lambda]	0.25 x 0.25
Sensor Surface [mm]	10.0
MAIA	N/A

Measurement Results

	5G Scan
Date	2025-01-02
Avg. Area [cm^2]	4.00
psPDn+ [W/m^2]	168
psPDtot+ [W/m^2]	171
psPDmod+ [W/m^2]	169
E_{max} [V/m]	282
Power Drift [dB]	0.05



11. Power Density System Check From 10000MHz

Exposure Conditions

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

Hardware Setup

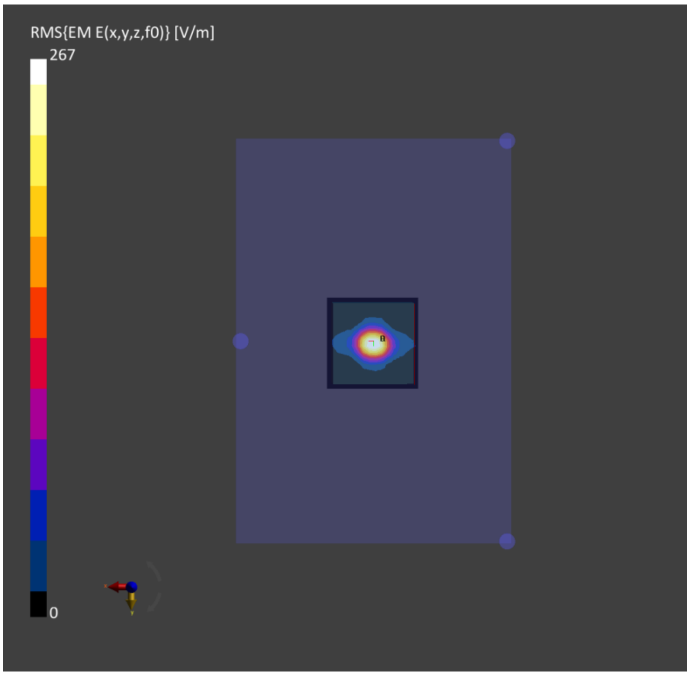
Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave- 1083	Air---	EUmmWV4 - SN9607_F1-55GHz, 2024-02-12	DAE4 Sn1711, 2024-03-18

Scan Setup

	5G Scan
Grid Extents [mm]	25.0 x 25.0
Grid Steps [lambda]	0.25 x 0.25
Sensor Surface [mm]	10.0
MAIA	N/A

Measurement Results

	5G Scan
Date	2025-01-03
Avg. Area [cm^2]	4.00
psPDn+ [W/m^2]	153
psPDtot+ [W/m^2]	155
psPDmod+ [W/m^2]	149
E_{max} [V/m]	267
Power Drift [dB]	-0.06



12. Power Density System Check From 10000MHz

Exposure Conditions

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

Hardware Setup

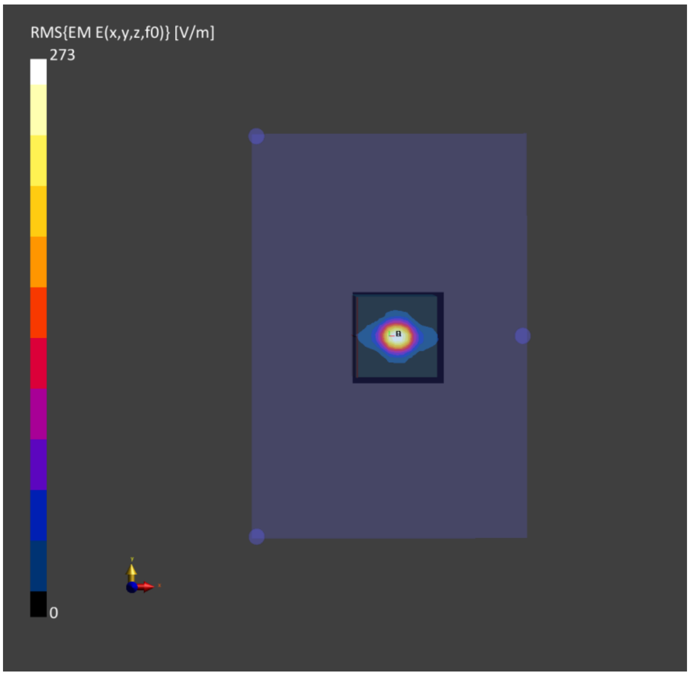
Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave- 1083	Air---	EUmmWV4 - SN9607_F1-55GHz, 2024-02-12	DAE4 Sn1711, 2024-03-18

Scan Setup

	5G Scan
Grid Extents [mm]	25.0 x 25.0
Grid Steps [lambda]	0.25 x 0.25
Sensor Surface [mm]	10.0
MAIA	N/A

Measurement Results

	5G Scan
Date	2025-01-09
Avg. Area [cm^2]	4.00
psPDn+ [W/m^2]	157
psPDtot+ [W/m^2]	165
psPDmod+ [W/m^2]	161
E_{max} [V/m]	273
Power Drift [dB]	0.11



Annex E. TSL Dielectric Parameters

E.1 Head WiFi 6E 6000MHz

Freq.(MHz)	Target		2024-12-26	
	ε'(F/m)	σ(S/m)	ε'1(F/m)	σ1(S/m)
5900	35.18	5.37	34.687	5.419
5950	35.13	5.43	34.539	5.504
6000	35.07	5.48	34.453	5.532
6050	35.01	5.54	34.431	5.594
6100	34.95	5.59	34.355	5.654
6150	34.89	5.65	34.145	5.726
6200	34.83	5.71	34.112	5.766
6250	34.77	5.77	34.089	5.785
6300	34.70	5.83	34.004	5.873
6350	34.64	5.89	33.896	5.900
6400	34.58	5.95	33.848	5.971
6450	34.52	6.01	33.763	6.032
6500	34.46	6.07	33.614	6.079
6550	34.40	6.13	33.470	6.125
6600	34.34	6.19	33.407	6.202
6650	34.29	6.25	33.352	6.272
6700	34.23	6.30	33.160	6.307
6750	34.17	6.36	33.014	6.399
6800	34.11	6.42	32.936	6.470
6850	34.05	6.48	32.835	6.536
6900	33.99	6.53	32.738	6.605
6950	33.94	6.59	32.665	6.625
7000	33.88	6.65	32.547	6.617
7050	33.82	6.71	32.479	6.630
7100	33.76	6.77	32.352	6.649
7150	33.70	6.83	32.233	6.642
7200	33.64	6.89	32.219	6.672

Freq.(MHz)	Target		2024-12-27	
	ε'(F/m)	σ(S/m)	ε'1(F/m)	σ1(S/m)
5900	35.18	5.37	34.737	5.446
5950	35.13	5.43	34.589	5.530
6000	35.07	5.48	34.503	5.584
6050	35.01	5.54	34.481	5.631
6100	34.95	5.59	34.405	5.675
6150	34.89	5.65	34.317	5.735
6200	34.83	5.71	34.218	5.807
6250	34.77	5.77	33.866	5.800
6300	34.70	5.83	33.769	5.860
6350	34.64	5.89	33.669	5.935
6400	34.58	5.95	33.612	5.993
6450	34.52	6.01	33.491	6.052
6500	34.46	6.07	33.354	6.101
6550	34.40	6.13	33.233	6.164
6600	34.34	6.19	33.169	6.226
6650	34.29	6.25	33.098	6.294
6700	34.23	6.30	32.930	6.335
6750	34.17	6.36	32.770	6.421
6800	34.11	6.42	32.696	6.492
6850	34.05	6.48	32.573	6.558
6900	33.99	6.53	32.464	6.627
6950	33.94	6.59	32.411	6.647
7000	33.88	6.65	32.325	6.639
7050	33.82	6.71	32.261	6.652
7100	33.76	6.77	32.116	6.671
7150	33.70	6.83	31.980	6.633
7200	33.64	6.89	31.987	6.650

Freq.(MHz)	Target		2024-12-28	
	ε'(F/m)	σ(S/m)	ε'1(F/m)	σ1(S/m)
5900	35.18	5.37	34.532	5.404
5950	35.13	5.43	34.360	5.539
6000	35.07	5.48	34.244	5.500
6050	35.01	5.54	34.248	5.572
6100	34.95	5.59	34.221	5.648
6150	34.89	5.65	34.120	5.722
6200	34.83	5.71	34.032	5.760
6250	34.77	5.77	33.735	5.711
6300	34.70	5.83	33.589	5.774
6350	34.64	5.89	33.534	5.844
6400	34.58	5.95	33.447	5.921
6450	34.52	6.01	33.350	5.941
6500	34.46	6.07	33.260	5.996
6550	34.40	6.13	33.129	6.075
6600	34.34	6.19	33.042	6.150
6650	34.29	6.25	32.938	6.192
6700	34.23	6.30	32.825	6.233
6750	34.17	6.36	32.651	6.309
6800	34.11	6.42	32.546	6.402
6850	34.05	6.48	32.425	6.447
6900	33.99	6.53	32.335	6.517
6950	33.94	6.59	32.331	6.484
7000	33.88	6.65	32.274	6.485
7050	33.82	6.71	32.206	6.510
7100	33.76	6.77	32.134	6.619
7150	33.70	6.83	32.102	6.657
7200	33.64	6.89	31.980	6.661

Freq.(MHz)	Target		2024-12-29	
	ε'(F/m)	σ(S/m)	ε'1(F/m)	σ1(S/m)
5900	35.18	5.37	34.699	5.446
5950	35.13	5.43	34.570	5.541
6000	35.07	5.48	34.283	5.558
6050	35.01	5.54	34.155	5.618
6100	34.95	5.59	34.099	5.687
6150	34.89	5.65	33.810	5.774
6200	34.83	5.71	33.864	5.797
6250	34.77	5.77	33.782	5.784
6300	34.70	5.83	33.647	5.882
6350	34.64	5.89	33.597	5.907
6400	34.58	5.95	33.516	5.989
6450	34.52	6.01	33.407	6.036
6500	34.46	6.07	33.279	6.076
6550	34.40	6.13	33.154	6.143
6600	34.34	6.19	33.075	6.220
6650	34.29	6.25	33.011	6.281
6700	34.23	6.30	32.862	6.303
6750	34.17	6.36	32.687	6.404
6800	34.11	6.42	32.604	6.484
6850	34.05	6.48	32.491	6.540
6900	33.99	6.53	32.377	6.554
6950	33.94	6.59	32.376	6.509
7000	33.88	6.65	32.291	6.527
7050	33.82	6.71	32.227	6.536
7100	33.76	6.77	32.182	6.604
7150	33.70	6.83	32.036	6.633
7200	33.64	6.89	32.013	6.676