Testing and Certification

TEST REPORT

6 GHz RF Exposure Test for certification of SC-54E

APPLICANT

Samsung Electronics. Co., Ltd.

REPORT NO.

HCT-SR-2405-FC011

DATE OF ISSUE

May 28, 2024

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TEST REPORT

6-8 GHz RF Exposure Test for certification

REPORT NO.
HCT-SR-2405-FC011

DATE OF ISSUE
May 28, 2024

FCC ID
A3LSMF741JPN

Applicant	SAMSUNG Electronics Co., Ltd 129, Samsung-ro, Yeongtong-gu, Suwon-Si, Gyeonggi-do, 16677, Korea
Product Name	Mobile Phone
Model Name	SC-54E
Additional Model Name	SCG29
Date of Test	May. 07, 2024 ~ May. 14, 2024
Location of Test	■ Permanent Testing Lab ☐ On Site Testing Lab (Address: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383 KOREA)
FCC Rule Part(s)	CFR §2.1093
Test Results	PASS

Equipment Class	Band & Mode	Tx. Frequency	SAR 1g/10g			APD (4 ㎠)			PD 4 ㎠
			Head	Body	Phablet	Head	Body	Phablet	psPD
		(㎒)	1g(W/kg)	1g(W/kg)	10g(W/kg)	(㎽/㎠)	(㎽/㎠)	(㎽/㎠)	(㎽/㎠)
6CD	WIFI 6 GHz	5 925 - 7 115	0.35	<0.10	0.18	0.13	<0.10	0.31	0.80

REVISION HISTORY

The revision history for this test report is shown in table.

Revision No.	Date of Issue	Description
0	May 28, 2024	Initial Release

Notice

Content
The results shown in this test report only apply to the sample(s), as received, provided by the applicant, unless otherwise stated. The test results have only been applied with the test methods required by the standard(s). The laboratory is not accredited for the test results marked *. Information provided by the applicant is marked **. Test results provided by external providers are marked ***. When confirmation of authenticity of this test report is required, please contact www.hct.co.kr The test results in this test report are not associated with the ((KS Q) ISO/IEC 17025) accreditation by KOLAS (Korea Laboratory Accreditation Scheme) / A2LA (American Association for Laboratory Accreditation) that are under the ILAC (International Laboratory Accreditation Cooperation) Mutual Recognition Agreement (MRA).

CONTENTS

1. Test Regulations

FCC RF Exposure evaluation of U-NII 6 -7 GHz Band of this device were measured by referring to the interim procedures in TCB Workshop document of Oct 2020, IEC/IEEE 62209-1528:2020 and also the App Note of SPEAG, the manufacturer of measuring equipment.
SAR Testing was performed using 6.5 GHz SAR Probe calibration factor according to FCC TCBC Document.

November 2017, October 2018, April 2019, November 2019, October 2020, October 2022, TCBC Workshop Notes.
SPEAG DASY6 System Handbook
SPEAG DASY6 Application Note (Interim Procedures for Operating at 6 -10GHz) (ver.9)
IEEE 1528-2013
IEC TR 63170:2018
IEC 62479:2010
IEC/IEEE 63195-1:2022
FCC KDB 865664 D02 RF Exposure Reporting v01r02
FCC KDB 648474 D04 Handset SAR v01r03v01r03
FCC KDB 248227 D01 802 11 Wi-Fi SAR v02r02
FCC KDB 447498 D01 General RF Exposure Guidance v06v06
FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04
FCC KDB 941225 D06 Hotspot Mode v02r01
April 2019 TCB Workshop Note(IEEE 802..11ax)

2. Test Location

2.1 Test Laboratory

Company Name	HCT Co., Ltd.
Address	74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si,Gyeonggi-do, 17383 KOREA
Telephone	031-645-6300
Fax.	031-645-6401

2.2 Test Facilities

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

Korea	National Radio Research Agency (Designation No. KR0032)
	KOLAS (Testing No. KT197)

3. Information of the EUT

3.1 General Information of the EUT

Model Name	SC-54E
Additional Model Name	SCG29
Equipment Type	Mobile Phone
FCC ID	A3LSMF741JPN
Application Type	Certification
Applicant	SAMSUNG Electronics Co., Ltd.

3.2 Device Description

	Device Wireless specification overview	
Band & Mode	Operating Mode	Tx Frequency
U-NII-5	Voice / Data	5 925 ㎒ – 6 425 ㎒
U-NII-6	Voice / Data	6 425 ㎒ – 6 525 ㎒
U-NII-7	Voice / Data	6 525 ㎒ – 6 875 ㎒
U-NII-8	Voice / Data	6 875 ㎒ – 7 115 ㎒

Device Description		
Device Serial Numbers	Mode	Serial Number
	WLAN 6GHz	XDD0068M, XDD0038M
	The manufacturer has confirmed that the devices tested have the same physical, mechanical and thermal characteristics are within operational tolerances expected for production units.	

3.3 Time-Averaging Algorithm for RF Exposure Compliance

The device is enabled with Qualcomm® Smart Transmit (GEN2) feature. This feature performs time averaging algorithm in real time to control and manage transmitting power and ensure the time-averaged RF exposure is in compliance with FCC requirements all the time.

The Smart Transmit algorithm maintains the time-averaged transmit power, in turn, time-averaged RF exposure of SAR_design_target or PD_design_target, below the predefined time-averaged power limit (i.e., Plimit for sub-6 radio, and input.power.limit for 5G mmW NR), for each characterized technology and band (see Part 0 Test Report) .

Plimit values in green indicate Plimit < Pmax			Plimit values in grey indicate Plimit > Pmax					
Plimit corresponding to 1 W/kg (1g) 2.5W/kg(10g) SAR_Design_target								Pmax
SAR Exposure Position			Body-worn	Phablet	Head (RCV ON)	Hotspot (Hotspot on)	Earjack	Maximum Tune-up Output Power
Averaging volume			1g	10g	1g	1g	1g/10g	(Burst Average
separation Distance			10 mm	0mm	0 mm	10/5 mm	10/0 mm	Power)
Mode	Band	Antenna	DSI=0	DSI=1	DSI=2	DSI=3	DSI=4	[dBm]
WLAN	6	ANT F	21.9		15.7	N/A	22.4	10
WLAN	6	ANT H	23.0		18.3	N/A	23.0	10

Smart Transmit allows the device to transmit at higher power instantaneously, as high as Pmax, when needed, but enforces power limiting to maintain time-averaged transmit power to Plimit. Below table shows Plimit settings and maximum tune up output power Pmax configured for this EUT for various transmit conditions (Device State Index DSI). Note that the device uncertainty for WWAN sub-6/WLAN/BT is 1.0dB for this EUT.

*Note all Plimit EFS and maximum tune up output power Pmax levels entered in above Table correspond to average power levels after accounting for duty cycle in the case of OFDM modulation schemes (e.g. WLAN/BT).
*Maximum tune up output power Pmax is used to configure EUT during RF tune up procedure. The maximum allowed output power is equal to maximum Tune up output power + 1dB device design uncertainty. The maximum time-averaged output power (dBm) for any WWAN sub-6/WLAN/BT technology, band, and DSI is the minimum of ("Plimit " and "Maximum tune up output power Pmax") + 1dB device uncertainty. SAR values in this report were scaled to this maximum time-averaged output power to determine compliance per KDB Publication 447498 D01v06.
The purpose of this report is to demonstrate that the EUT meets FCC SAR limits when transmitting in static transmission scenario at maximum allowable time-averaged power levels. Measurement Condition.

4. Nominal and Maximum Output Power Specifications

SAR values were scaled to the maximum allowed power to determine compliance per KDB publication 447498 D01v06.

4.1 Maximum 6 ㎓ WIFI output power

Maximum Power Pmax (Plimit ,Same as Maximum power **DSI=0,1,2,4)**

Frequency (Bandwidth)	Band	SISO (ANT 1)						SISO (ANT2)						MIMO					
		a	b	g	n	ac	ax (SU)	a	b	g	n	ac	ax (SU)	a	b	g	n	ac	ax (SU)
6 GHz_SP/LPI (20MHz)	UNII 5	10					10 Ch2. 7	10					10 Ch2. 7	13					13 Ch2. 10
	UNII 6	10					10	10					10	13					13
	UNII 7	10					10	10					10	13					13
	UNII 8	10					10	10					10	13					13
6 GHz_SP/LPI (40MHz)	UNII 5						10						10						13
	UNII 6						10						10						13
	UNII 7						10						10						13
	UNII 8						10						10						13
6 GHz_SP/LPI (80MHz)	UNII 5						9						9						12
	UNII 6						9						9						12
	UNII 7						9						9						12
	UNII 8						9						9						12
6 GHz_SP/LPI (160MHz)	UNII 5						9						9						12
	UNII 6						9						9						12
	UNII 7						9						9						12
	UNII 8						9						9						12

(Upper tolerance: target+1.0 dB)

11ax RU Tx Power Tables

Maximum Power Pmax, (Plimit ,Same as Maximum power DSI=0,1,2,4)

Tones	SISO (ANT1 & ANT2)			
	6G_SP/LPI /20MHz	6G_SP/LPI /40MHz	6G_SP/LPI /80MHz	6G_SP/LPI /160Hz
26T	5.0 Ch2. 1.5	5.0	5.0	5.0
52T	7.5 Ch2. 5	7.5	7.5	7.5
106T	9.0 Ch2. 6.5	9.0	9.0	9.0
242T	10.0	10.0	9.0	9.0
448T		10.0	9.0	9.0
996T			9.0	9.0
2*996T				9.0

(Upper Tolerance: target +1.0dB)

Tones	MIMO (ALL)			
	6G_SP/LPI /20MHz	6G_SP/LPI /40MHz	6G_SP/LPI /80MHz	6G_SP/LPI /160Hz
26T	8.0 Ch2. 4.5	8.0	8.0	8.0
52T	10.5 Ch2. 8	10.5	10.5	10.5
106T	12.0 Ch2. 9.5	12.0	12.0	12.0
242T	13.0	13.0	12.0	12.0
448T		13.0	12.0	12.0
996T			12.0	12.0
2*996T				12.0

(Upper tolerance: target+1.0 dB)

4.2 DUT Antenna Locations

The dimensions and separation distances of this model are shown in the Technical Descriptions.

Mode	Device Configurations for Testing – Fold Open					
	Rear	Front	Left	Right	Top	Bottom
WIFI 6E Ant 1	Yes	Yes	Yes	No	Yes	No
WIFI 6E Ant 2	Yes	Yes	No	Yes	Yes	No

Mode	Device Configurations for Testing – Fold Close					
	Rear	Front	Left	Right	Top	Bottom
WIFI 6E Ant 1	Yes	Yes	Yes	No	No	Yes
WIFI 6E Ant 2	Yes	Yes	No	Yes	No	Yes

Particular EUT edges were not required to be evaluated for Phablet SAR if the edges were > 25 mm from the transmitting antenna according to FCC KDB 941225 D06v02r01 on Sec.3 and KDB 648474 D04v01r03. Wireless router mode is disabled for all 6GHz WLAN operations. The distance between the transmit antennas and the edges of the device are included in the filing.

- Note: All test configurations are based on front view position.

4.3 Test Considerations

Per Oct. 2020 TCBC Workshop note, SAR was performed using 6.5 GHz SAR probe calibration factors for WIFI 6GHz. FCC KDB 648474, FCC KDB 941225 D07 and FCC KDB 248227 were followed for test positions, distances, and modes. Absorbed power density (APD) using a 4cm2 averaging area is reported based on SAR measurements. Incident power density is evaluated at 2mm ensuring that the resolution is sufficient such that integrated power density(iPD) between d=2mm and d=λ/5mm is ≥ -1dB per equipment manufacturer guidance. Power density results are scaled up for uncertainty above 30%. Per TCB workshop October 2020 notes, 5 channels were tested for WIFI 6GHz.

802.11ax was considered a higher order 802.11 mode when compared to a/b/g/n/ac to apply KDB Publication 248227 D01v02r02 for OFDM mode selection. Therefore, SAR tests were not required for 802.11ax.

DASY8 Module mmWave is optimized for incident Power Density (PD) evaluations EUT at distances as close as 2mm for frequencies in the 6–110 GHz range.
The software Module mmWave V3.0+ features the novel Equivalent Source Reconstruction (ESR) method:
This new method will greatly simplify compliance testing for distances as close as λ/25 (2mm at 6 GHz) from any surface and improve the overall flexibility and precision.
With this method, the reconstruction uncertainty (REC) is below 0.6 dB for d > λ/25, corresponding to a test distance of 2mm at 6 GHz. The above-mentioned REC value is valid if the following conditions on the grid resolution (ℓ_{grid}) and grid extent (ν_{grid}) are met:

$$\ell_{\text{grid}} = \begin{cases} 1.25d & \text{for } d < \lambda/10 \\ \lambda/8 & \text{for } d \geq \lambda/10 \end{cases}.$$

$$\nu_{\text{grid}} \geq 2\lambda$$

In accordance with the October 2020 TCBC document, the novel Equivalent Source Reconstruction (ESR), a post-processing technology of SPEAG's The Module mmWave V3.0+, a source reconstruction method, was used to evaluate the IPD of a portable device in the 6-8.5 GHz band, and the measurement uncertainty was evaluated to be 1.51 dB.

5. Limits

RF Exposure Limits for Frequencies Below 6GHz

HUMAN EXPOSURE	UNCONTROLLED ENVIRONMENT General Population (W/kg)	CONTROLLED ENVIRONMENT Occupational (W/kg)
SPATIAL PEAK SAR * (Partial Body)	1.6	8.0
SPATIAL AVERAGE SAR ** (Whole Body)	0.08	0.4
SPATIAL PEAK SAR *** (Hands / Feet / Ankle / Wrist)	4.0	20.0

NOTES:

* The Spatial Peak value of the SAR averaged over any 1 g of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

** The Spatial Average value of the SAR averaged over the whole-body.

*** The Spatial Peak value of the SAR averaged over any 10 g of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

RF Exposure Limits for Frequencies Above 6GHz

Per §1.1310 (d)(3), the MPE limits are applied for frequencies above 6 GHz. Power Density is expre ssed in units of mW/㎠ or W/㎡.
Peak Spatially Averaged Power Density was evaluated over a circular area of 4 ㎠ per interim.
FCC Guidance for near-field power density evaluations per October 2018 TCB Workshop notes.

HUMAN EXPOSURE	Limits For Occupational / Controlled Environments	Limits For General Population / Uncontrolled Environments
Frequency Range[MHz]	1,500 – 100,000	1,500 – 100,000
Power Density[mW/㎠]	5.0	1.0
Average Time[Minutes]	6	30

NOTES: 1.0 mW/㎠ is 10 W/㎡

6. RF Conducted Powers

6.1 IEEE 802.11ax Maximum Conducted Power

Frequency [㎒]	Channel	IEEE 802.11ax(40 ㎒ BW) (6 GHz) RF Conducted Power [dBm]		
		WIFI Ant 1	WIFI Ant 2	WIFI MIMO
5965	3	9.23	9.48	12.37
6165	43	8.80	9.83	12.36
6255	51	9.53	9.58	12.57
6405	91	9.23	9.48	12.37
6445	99	9.28	9.60	12.45
6485	107	9.42	9.64	12.54
6525	115	9.80	10.08	12.95
6565	123	9.83	9.30	12.58
6685	147	8.91	9.68	12.32
6845	179	8.64	9.75	12.24
6885	187	8.71	9.92	12.37
7005	211	8.69	9.54	12.15
7085	227	9.23	9.48	12.37

Note:

For testing the WIFI 6 GHz of this DUT, the selection of test channels was based on FCC guidance, with five channels selected across the entire WIFI 6 GHz Bands.

Justification for test configurations for WLAN per KDB Publication 248227 D01v02r02:

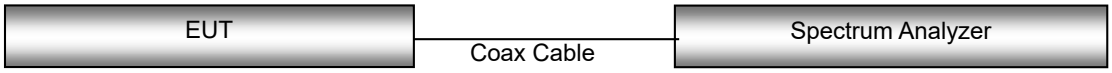
▪ Power measurements were performed for the transmission mode configuration with the highest maximum output power specified for production units.

▪ For transmission mode with the same maximum output power specification, powers were measured for the largest channel bandwidth, lowest order modulation and lowest data rate.

▪ For transmission modes with identical maximum specified output power, channel bandwidth, modulation and data rates, power measurements were required for all identical configurations.

▪ For each transmission mode configuration, powers were measured for the highest and lowest channels; and at the mid-band channel(s) when there were at least 5 channels supported.

Test Configuration



7. System Verification

7.1 Tissue Verification

The Head simulating material is calibrated by HCT using the DAKS 3.5 to determine the conductivity and permittivity.

Table for Head Tissue Verification									
Date of Tests	Tissue Temp. (°C)	Tissue Type	Freq. (MHz)	Measured Conductivity σ (S/m)	Measured Dielectric Constant, ε	Target Conductivity σ (S/m)	Target Dielectric Constant, ε	% dev σ	% dev ε
05/07/2024	21.8	6.5 GHz	5 965	5.48	35.1	5.439	35.11	+ 0.75	- 0.03
			6 000	5.55	35.1	5.475	35.07	+ 1.37	+ 0.09
			6 165	5.70	35.1	5.672	34.87	+ 0.49	+ 0.66
			6 500	6.20	34.5	6.072	34.46	+ 2.11	+ 0.12
			6 525	6.21	34.4	6.101	34.43	+ 1.79	- 0.09
			6 845	6.64	33.9	6.470	34.06	+ 2.63	- 0.47
			7 000	6.82	33.5	6.650	33.88	+ 2.56	- 1.12
			7 085	6.93	33.6	6.750	33.78	+ 2.67	- 0.53
			7 500	7.39	32.9	7.239	33.29	+ 2.09	- 1.17
05/08/2024	23.0	6.5 GHz	5 965	5.57	35.3	5.439	35.11	+ 2.41	+ 0.54
			6 000	5.65	35.2	5.475	35.07	+ 3.20	+ 0.37
			6 165	5.80	35.2	5.672	34.87	+ 2.26	+ 0.95
			6 500	6.30	34.7	6.072	34.46	+ 3.75	+ 0.70
			6 525	6.32	34.6	6.101	34.43	+ 3.59	+ 0.49
			6 845	6.75	34.0	6.470	34.06	+ 4.33	- 0.18
			7 000	6.93	33.7	6.650	33.88	+ 4.21	- 0.53
			7 085	7.05	33.7	6.750	33.78	+ 4.44	- 0.24
			7 500	7.51	33.1	7.239	33.29	+ 3.74	- 0.57

The above measured tissue parameters were used in the DASY software. The DASY software was used to perform interpolation to determine the dielectric parameters at the SAR test device frequencies (per KDB publication 865664 D01v01r04 and IEEE 1528-2013 6.6.1.2). The tissue parameters listed in the SAR test plots may slightly differ from the table above due to significant digit rounding in the software.

The SAR measurement system have implemented the SAR error compensation algorithms documented in IEC 62209-2 to automatically compensate the measured SAR results for deviations between the measured and required tissue dielectric parameters for all frequencies. The test lab has verified that the required SAR error compensation algorithm has been correctly applied to only scale up the measured SAR, not downward.

7.2 System Verification

Input Power: 50 mW

Freq. [MHz]	Date	Probe (S/N)	Dipole (S/N)	Liquid	Amb. Temp. [°C]	Liquid Temp. [°C]	1 W Target SAR_{1g} (SPEAG) [W/kg]	50mW Measured SAR_{1g} [W/kg]	1 W Normalized SAR_{1g} [W/kg]	Deviation [%]	Limit [%]
6500	05/07/2024	7732	1012	Head	21.9	21.8	292	14.0	280.00	-4.11	± 10
6500	05/08/2024	7732	1012	Head	23.0	23.0	292	14.4	288.00	-1.37	± 10

Extremity SAR

Freq. [MHz]	Date	Probe (S/N)	Dipole (S/N)	Liquid	Amb. Temp. [°C]	Liquid Temp. [°C]	1 W Target SAR_{10g} (SPEAG) [W/kg]	50mW Measured SAR_{10g} [W/kg]	1 W Normalized SAR_{10g} [W/kg]	Deviation [%]	Limit [%]
6500	05/07/2024	7732	1012	Head	21.9	21.8	53.8	2.55	51.00	-5.20	± 10
6500	05/08/2024	7732	1012	Head	23.0	23.0	53.8	2.62	52.40	-2.60	± 10

7.3 Power Density Verification for 10GHz

Input Power: 10 mW

Freq. [GHz]	Date	Probe (S/N)	Dipole (S/N)	Amb. Temp. [°C]	Normal psPD (W/m² over 4 cm²)			Deviation [dB]	Total psPD (W/m² over 4 cm²)			Deviation [dB]
					Measured	Normalized	Target		Measured	Normalized	Target	
10	05/13/2024	9464	1018	19.1	6.13	61.3	56.5	+ 0.35	6.29	62.9	57.1	+ 0.47
10	05/14/2024	9464	1018	18.7	5.93	59.3	56.5	+ 0.21	6.09	60.9	57.1	+ 0.33

7.4 System Verification Procedure

For SAR Measurement

SAR measurement was prior to assessment; the system is verified to the ± 10 % of the specifications at each frequency band by using the system verification kit. (Graphic Plots Attached)

- Cabling the system, using the verification kit equipment.
- Generate about 50 mW Input level from the signal generator to the Dipole Antenna.
- Dipole antenna was placed below the flat phantom.
- The measured one-gram SAR at the surface of the phantom above the dipole feed-point should be within 10 % of the target reference value.
- The results are normalized to 1 W input power.

Note;
SAR Verification was performed according to the FCC KDB 865664 D01v01r04.

For Power Density Measurement

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.

8. SAR Test Data Summary

8.1 SAR Measurement Results

6 GHz WLAN Head SAR																
Frequency		Mode	Ant. No.	Band width (MHz)	Data Rate (Mbps)	Tune-Up Limit (dBm)	Meas. Power (dBm)	Power Drift (dB)	Test Position	Ant Config.	Duty Cycle	Meas. 1g SAR (W/kg)	Scaling Factor	Scaling Factor (Duty)	Reported SAR (W/kg)	Plot No.
MHz	Ch.															
6 525	115	802.11ax	1	40	MCS0	11.0	9.42	-0.13	Left Cheek	WIFI1	99.1	0.040	1.439	1.009	0.058	-
6 525	115	802.11ax	1	40	MCS0	11.0	9.42	0.12	Left Tilt	WIFI1	99.1	0.036	1.439	1.009	0.052	-
6 525	115	802.11ax	1	40	MCS0	11.0	9.42	-0.09	Right Cheek	WIFI1	99.1	0.238	1.439	1.009	**0.346**	A1
6 525	115	802.11ax	1	40	MCS0	11.0	9.42	-0.17	Right Tilt	WIFI1	99.1	0.093	1.439	1.009	0.135	-
5 965	3	802.11ax	1	40	MCS0	11.0	9.23	-0.13	Right Cheek	WIFI1	99.1	0.097	1.503	1.009	0.147	-
6 165	43	802.11ax	1	40	MCS0	11.0	8.80	0.11	Right Cheek	WIFI1	99.1	0.066	1.660	1.009	0.111	-
6 845	179	802.11ax	1	40	MCS0	11.0	8.91	-0.05	Right Cheek	WIFI1	99.1	0.061	1.618	1.009	0.100	-
7 085	227	802.11ax	1	40	MCS0	11.0	8.69	-0.14	Right Cheek	WIFI1	99.1	0.103	1.702	1.009	0.177	-
6 525	115	802.11ax	2	40	MCS0	11.0	9.64	0.17	Left Cheek	WIFI2	99.1	0.137	1.368	1.009	0.189	-
6 525	115	802.11ax	2	40	MCS0	11.0	9.64	-0.02	Left Tilt	WIFI2	99.1	0.114	1.368	1.009	0.157	-
6 525	115	802.11ax	2	40	MCS0	11.0	9.64	-0.18	Right Cheek	WIFI2	99.1	0.062	1.368	1.009	0.086	-
6 525	115	802.11ax	2	40	MCS0	11.0	9.64	-0.12	Right Tilt	WIFI2	99.1	0.051	1.368	1.009	0.070	-
5 965	3	802.11ax	2	40	MCS0	11.0	9.48	-0.15	Left Cheek	WIFI2	99.1	0.097	1.419	1.009	0.139	-
6 165	43	802.11ax	2	40	MCS0	11.0	9.83	0.16	Left Cheek	WIFI2	99.1	0.157	1.309	1.009	**0.207**	A2
6 845	179	802.11ax	2	40	MCS0	11.0	9.68	-0.12	Left Cheek	WIFI2	99.1	0.112	1.355	1.009	0.153	-
7 085	227	802.11ax	2	40	MCS0	11.0	9.54	0.09	Left Cheek	WIFI2	99.1	0.091	1.400	1.009	0.129	-
ANSI/ IEEE C95.1 - 2005– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population												Head 1.6 W/kg Averaged over 1 gram				

6 GHz WLAN Body-worn SAR																	
Frequency		Mode	Ant. No.	Form Factor	Band width (MHz)	Data Rate (Mbps)	Tune-Up Limit (dBm)	Meas. Power (dBm)	Power Drift (dB)	Test Position	Ant Config.	Duty Cycle	Distance (mm)	Meas. 1g SAR (W/kg)	Scaling Factor	Scaling Factor (Duty)	Reported SAR (W/kg)	Plot No.
MHz	Ch.																	
6 525	115	802.11ax	1	Open	40	MCS0	11.0	9.42	-0.15	Rear	WIFI1	99.1	10	0.056	1.439	1.009	**0.081**	A3
6 525	115	802.11ax	1	Open	40	MCS0	11.0	9.42	-0.09	Front	WIFI1	99.1	10	0.034	1.439	1.009	0.049	-
6 525	115	802.11ax	1	Close	40	MCS0	11.0	9.42	0.00	Rear	WIFI1	99.1	10	0	1.439	1.009	0.000	-
6 525	115	802.11ax	1	Close	40	MCS0	11.0	9.42	-0.16	Front	WIFI1	99.1	10	0.021	1.439	1.009	0.030	-
6 525	115	802.11ax	2	Open	40	MCS0	11.0	9.64	0.10	Rear	WIFI2	99.1	10	0.031	1.368	1.009	**0.043**	A4
6 525	115	802.11ax	2	Open	40	MCS0	11.0	9.64	-0.17	Front	WIFI2	99.1	10	0.028	1.368	1.009	0.039	-
6 525	115	802.11ax	2	Close	40	MCS0	11.0	9.64	-0.09	Rear	WIFI2	99.1	10	0.003	1.368	1.009	0.004	-
6 525	115	802.11ax	2	Close	40	MCS0	11.0	9.64	0.12	Front	WIFI2	99.1	10	0.025	1.368	1.009	0.035	-
ANSI/ IEEE C95.1 - 2005– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population														Body 1.6 W/kg Averaged over 1 gram				

6 GHz WLAN Phablet SAR 10g																
Frequency		Mode	Ant. No.	Band width (MHz)	Data Rate (Mbps)	Tune-Up Limit (dBm)	Meas. Power (dBm)	Power Drift (dB)	Test Position	Ant Config.	Duty Cycle	Distance (mm)	Meas. 10g SAR (W/kg)	Scaling Factor	Scaling Factor (Duty)	Reported SAR (W/kg)	Plot No.
MHz	Ch.																
6 525	115	802.11ax	1	40	MCS0	11.0	9.42	-0.12	Rear	WIFI1	99.1	0	0.127	1.439	1.009	**0.184**	A5
6 525	115	802.11ax	1	40	MCS0	11.0	9.42	0.14	Front	WIFI1	99.1	0	0.1	1.439	1.009	0.145	-
6 525	115	802.11ax	1	40	MCS0	11.0	9.42	0.11	Left	WIFI1	99.1	0	0.12	1.439	1.009	0.174	-
6 525	115	802.11ax	1	40	MCS0	11.0	9.42	0.13	Top	WIFI1	99.1	0	0.03	1.439	1.009	0.044	-
5 965	3	802.11ax	1	40	MCS0	11.0	9.23	-0.05	Rear	WIFI1	99.1	0	0.062	1.503	1.009	0.094	-
6 165	43	802.11ax	1	40	MCS0	11.0	8.80	0.08	Rear	WIFI1	99.1	0	0.084	1.660	1.009	0.141	-
6 845	179	802.11ax	1	40	MCS0	11.0	8.91	0.18	Rear	WIFI1	99.1	0	0.043	1.618	1.009	0.070	-
7 085	227	802.11ax	1	40	MCS0	11.0	8.69	-0.09	Rear	WIFI1	99.1	0	0.077	1.702	1.009	0.132	-
6 525	115	802.11ax	2	40	MCS0	11.0	9.64	0.19	Rear	WIFI2	99.1	0	0.059	1.368	1.009	0.081	-
6 525	115	802.11ax	2	40	MCS0	11.0	9.64	0.16	Front	WIFI2	99.1	0	0.116	1.368	1.009	**0.160**	A6
6 525	115	802.11ax	2	40	MCS0	11.0	9.64	0.14	Right	WIFI2	99.1	0	0.06	1.368	1.009	0.083	-
6 525	115	802.11ax	2	40	MCS0	11.0	9.64	-0.07	Top	WIFI2	99.1	0	0.081	1.368	1.009	0.112	-
5 965	3	802.11ax	2	40	MCS0	11.0	9.48	-0.12	Front	WIFI2	99.1	0	0.089	1.419	1.009	0.127	-
6 165	43	802.11ax	2	40	MCS0	11.0	9.83	0.13	Front	WIFI2	99.1	0	0.111	1.309	1.009	0.147	-
6 845	179	802.11ax	2	40	MCS0	11.0	9.68	0.12	Front	WIFI2	99.1	0	0.069	1.355	1.009	0.094	-
7 085	227	802.11ax	2	40	MCS0	11.0	9.54	0.07	Front	WIFI2	99.1	0	0.058	1.400	1.009	0.082	-
ANSI/ IEEE C95.1 - 2005– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population													Phablet 4.0 W/kg Averaged over 10 gram				

8.2 Absorbed Power Density Results

6 GHz WLAN Absorbed Power Density Head												
Frequency		Mode	Ant. No.	Band width (MHz)	Data Rate (Mbps)	Tune-Up Limit (dBm)	Meas. Power (dBm)	Power Drift (dB)	Test Position	Ant Config.	Meas. APD 4 ㎠ (mW/cm²)	Plot No.
MHz	Ch.											
6 525	115	802.11ax	1	40	MCS0	11.0	9.42	-0.13	Left Cheek	WIFI1	0.0205	-
6 525	115	802.11ax	1	40	MCS0	11.0	9.42	0.12	Left Tilt	WIFI1	0.019	-
6 525	115	802.11ax	1	40	MCS0	11.0	9.42	-0.09	Right Cheek	WIFI1	**0.125**	A1
6 525	115	802.11ax	1	40	MCS0	11.0	9.42	-0.17	Right Tilt	WIFI1	0.0505	-
5 965	3	802.11ax	1	40	MCS0	11.0	9.23	-0.13	Right Cheek	WIFI1	0.0513	-
6 165	43	802.11ax	1	40	MCS0	11.0	8.80	0.11	Right Cheek	WIFI1	0.0362	-
6 845	179	802.11ax	1	40	MCS0	11.0	8.91	-0.05	Right Cheek	WIFI1	0.0308	-
7 085	227	802.11ax	1	40	MCS0	11.0	8.69	-0.14	Right Cheek	WIFI1	0.0611	-
6 525	115	802.11ax	2	40	MCS0	11.0	9.64	0.17	Left Cheek	WIFI2	0.0907	-
6 525	115	802.11ax	2	40	MCS0	11.0	9.64	-0.02	Left Tilt	WIFI2	0.0666	-
6 525	115	802.11ax	2	40	MCS0	11.0	9.64	-0.18	Right Cheek	WIFI2	0.04	-
6 525	115	802.11ax	2	40	MCS0	11.0	9.64	-0.12	Right Tilt	WIFI2	0.0319	-
5 965	3	802.11ax	2	40	MCS0	11.0	9.48	-0.15	Left Cheek	WIFI2	0.0549	-
6 165	43	802.11ax	2	40	MCS0	11.0	9.83	0.16	Left Cheek	WIFI2	**0.102**	A2
6 845	179	802.11ax	2	40	MCS0	11.0	9.68	-0.12	Left Cheek	WIFI2	0.0728	-
7 085	227	802.11ax	2	40	MCS0	11.0	9.54	0.09	Left Cheek	WIFI2	0.0585	-

6 GHz WLAN Absorbed Power Density Body-worn														
Frequency		Mode	Ant. No.	Form Factor	Band width (MHz)	Data Rate (Mbps)	Tune-Up Limit (dBm)	Meas. Power (dBm)	Power Drift (dB)	Test Position	Ant Config.	Distance (mm)	Meas. APD 4 ㎠ (mW/cm²)	Plot No.
MHz	Ch.													
6 525	115	802.11ax	1	Open	40	MCS0	11.0	9.42	-0.15	Rear	WIFI1	10	**0.0429**	A3
6 525	115	802.11ax	1	Open	40	MCS0	11.0	9.42	-0.09	Front	WIFI1	10	0.0243	-
6 525	115	802.11ax	1	Close	40	MCS0	11.0	9.42	0.00	Rear	WIFI1	10	0	-
6 525	115	802.11ax	1	Close	40	MCS0	11.0	9.42	-0.16	Front	WIFI1	10	0.0138	-
6 525	115	802.11ax	2	Open	40	MCS0	11.0	9.64	0.10	Rear	WIFI2	10	**0.0245**	A4
6 525	115	802.11ax	2	Open	40	MCS0	11.0	9.64	-0.17	Front	WIFI2	10	0.0203	-
6 525	115	802.11ax	2	Close	40	MCS0	11.0	9.64	-0.09	Rear	WIFI2	10	0.0019	-
6 525	115	802.11ax	2	Close	40	MCS0	11.0	9.64	0.12	Front	WIFI2	10	0.0168	-

6 GHz WLAN Absorbed Power Density Phablet													
Frequency		Mode	Ant. No.	Band width (MHz)	Data Rate (Mbps)	Tune-Up Limit (dBm)	Meas. Power (dBm)	Power Drift (dB)	Test Position	Ant Config.	Distance (mm)	Meas. APD 4 ㎠ (mW/cm²)	Plot No.
MHz	Ch.												
6 525	115	802.11ax	1	40	MCS0	11.0	9.42	-0.12	Rear	WIFI1	0	**0.308**	A5
6 525	115	802.11ax	1	40	MCS0	11.0	9.42	0.14	Front	WIFI1	0	0.239	-
6 525	115	802.11ax	1	40	MCS0	11.0	9.42	0.11	Left	WIFI1	0	0.278	
6 525	115	802.11ax	1	40	MCS0	11.0	9.42	0.13	Top	WIFI1	0	0.069	-
5 965	3	802.11ax	1	40	MCS0	11.0	9.23	-0.05	Rear	WIFI1	0	0.155	-
6 165	43	802.11ax	1	40	MCS0	11.0	8.80	0.08	Rear	WIFI1	0	0.205	-
6 845	179	802.11ax	1	40	MCS0	11.0	8.91	0.18	Rear	WIFI1	0	0.104	-
7 085	227	802.11ax	1	40	MCS0	11.0	8.69	-0.09	Rear	WIFI1	0	0.189	-
6 525	115	802.11ax	2	40	MCS0	11.0	9.64	0.19	Rear	WIFI2	0	0.140	-
6 525	115	802.11ax	2	40	MCS0	11.0	9.64	0.16	Front	WIFI2	0	**0.273**	A6
6 525	115	802.11ax	2	40	MCS0	11.0	9.64	0.14	Right	WIFI2	0	0.143	-
6 525	115	802.11ax	2	40	MCS0	11.0	9.64	-0.07	Top	WIFI2	0	0.190	-
5 965	3	802.11ax	2	40	MCS0	11.0	9.48	-0.12	Front	WIFI2	0	0.214	-
6 165	43	802.11ax	2	40	MCS0	11.0	9.83	0.13	Front	WIFI2	0	0.261	-
6 845	179	802.11ax	2	40	MCS0	11.0	9.68	0.12	Front	WIFI2	0	0.164	-
7 085	227	802.11ax	2	40	MCS0	11.0	9.54	0.07	Front	WIFI2	0	0.138	-

8.3 Power Density Results

6 GHz WLAN Power Density Phablet																			
Frequency		Mode	Ant.	Form Factor	Band width (MHz)	Data Rate (Mbps)	Tune-Up Limit (dBm)	Meas. Power (dBm)	Power Drift (dB)	Distance (mm)	Test Position	Ant Config.	Duty Cycle	Grid Step (λ)	Scaling Factor for Measurement Uncertainty per IEC 62479	Normal psPD (mW/㎠)	Scaled Normal psPD (mW/㎠)	Total psPD (mW/㎠)	Reported 4 ㎠ psPD (mW/㎠)	Plot No.
MHz	Ch.																			
6 525	115	802.11ax	1	Open	40	MCS0	11.0	9.42	-0.18	2	Rear	WIFI1	99.1	0.044	1.116	0.285	0.318	0.474	0.529	-
6 525	115	802.11ax	1	Open	40	MCS0	11.0	9.42	0.17	2	Front	WIFI1	99.1	0.044	1.116	0.313	0.349	0.486	0.542	-
6 525	115	802.11ax	1	Open	40	MCS0	11.0	9.42	0.14	2	Left	WIFI1	99.1	0.044	1.116	0.181	0.202	0.234	0.261	-
6 525	115	802.11ax	1	Open	40	MCS0	11.0	9.42	-0.17	2	Top	WIFI1	99.1	0.044	1.116	0.233	0.260	0.349	0.389	-
5 965	3	802.11ax	1	Open	40	MCS0	11.0	9.23	0.16	2	Front	WIFI1	99.1	0.041	1.116	0.295	0.329	0.418	0.466	-
6 165	43	802.11ax	1	Open	40	MCS0	11.0	8.80	0.16	2	Front	WIFI1	99.1	0.042	1.116	0.234	0.261	0.343	0.383	-
6 845	179	802.11ax	1	Open	40	MCS0	11.0	8.91	0.14	2	Front	WIFI1	99.1	0.047	1.116	0.270	0.301	0.445	0.497	-
7 085	227	802.11ax	1	Open	40	MCS0	11.0	8.69	-0.14	2	Front	WIFI1	99.1	0.048	1.116	0.328	0.366	0.572	**0.638**	B1
6 525	115	802.11ax	1	Close	40	MCS0	11.0	8.69	-0.12	2	Front	WIFI1	99.1	0.044	1.116	0.270	0.301	0.389	0.434	-
6 525	115	802.11ax	2	Open	40	MCS0	11.0	9.64	0.19	2	Rear	WIFI2	99.1	0.044	1.116	0.252	0.281	0.329	0.367	-
6 525	115	802.11ax	2	Open	40	MCS0	11.0	9.64	0.02	2	Front	WIFI2	99.1	0.044	1.116	0.188	0.210	0.269	0.300	-
6 525	115	802.11ax	2	Open	40	MCS0	11.0	9.64	0.15	2	Right	WIFI2	99.1	0.044	1.116	0.403	0.450	0.522	0.583	-
6 525	115	802.11ax	2	Open	40	MCS0	11.0	9.64	0.13	2	Top	WIFI2	99.1	0.044	1.116	0.374	0.417	0.603	0.673	-
5 965	3	802.11ax	2	Open	40	MCS0	11.0	9.48	-0.14	2	Top	WIFI2	99.1	0.041	1.116	0.280	0.312	0.449	0.501	-
6 165	43	802.11ax	2	Open	40	MCS0	11.0	9.83	0.18	2	Top	WIFI2	99.1	0.042	1.116	0.368	0.411	0.714	**0.797**	B2
6 845	179	802.11ax	2	Open	40	MCS0	11.0	9.68	0.18	2	Top	WIFI2	99.1	0.047	1.116	0.296	0.330	0.407	0.454	-
7 085	227	802.11ax	2	Open	40	MCS0	11.0	9.54	0.12	2	Top	WIFI2	99.1	0.048	1.116	0.253	0.282	0.352	0.393	-
6 525	115	802.11ax	2	Close	40	MCS0	11.0	9.54	0.08	2	Bottom	WIFI2	99.1	0.044	1.116	0.114	0.127	0.268	0.299	-
6 165	43	802.11ax	1&2	Open	40	MCS0	11.0	9.83	0.14	2	Top	MIMO	99.1	0.042	1.116	0.266	0.297	0.487	0.543	
47 CFR §1.1310 – Safety Limit Spatial Average Uncontrolled Exposure/ General Population																Power Density 1mW/㎠ Averaged over 4 ㎠				

8.4 SAR and Absorbed Power Density Test Notes

General Notes:

1. The test data reported are the worst-case SAR values according to test procedures specified in IEEE 1528-2013, FCC KDB Publication 447498 D01v06
2. Batteries are fully charged at the beginning of the SAR measurements. A standard battery was used for all SAR measurements.
3. Liquid tissue depth was at least 15.0 cm for all frequencies.
4. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.
5. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB 447498 D01v06.
6. This device utilizes power reduction for some wireless mode and technologies, as outlined in sec. 4 The maximum output power allowed for each transmitter and exposure condition was evaluated for SAR compliance based on expected use conditions and simultaneous scenarios.
7. Per FCC guidance SAR was performed using 6.5 GHz SAR probe calibration factors. Per October 2020 TCBC Workshop notes, 5 channels were tested. Absorbed power density(APD) using a 4 ㎠ averaging area is reported based on SAR measurements.

WLAN Notes:

1. WIFI 6 GHz operations are supported by SISO and MIMO both. WLAN Per KDB Publication 248227 D01v02r02, the simultaneous SAR provisions in KDB Publication 447498 D01v06 should be applied to determine simultaneous transmission SAR test exclusion for WIFI MIMO. If the sum of 1g single transmission chain SAR measurements is <1.6 W/kg, no additional SAR measurements for MIMO are required.
2. For testing the WIFI 6 GHz of this DUT, the selection of test channels was based on FCC guidance, with five channels selected across the entire WIFI 6 GHz Bands.
3. The device was configured to transmit continuously at the required data rated, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools. The reported SAR was scaled to the 100% transmission duty factor to determine compliance. Procedures used to measure the duty factor are identical to that in the associated WLAN test reports.

8.5 Power Density General Notes

1. The manufacturer has confirmed that the device tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.

2. Batteries are fully charged at the beginning of the measurements. The DUT was connected to a wall charger for some measurements due to the test duration. It was confirmed that the charger plugged into this DUT did not impact the near-field PD test results.

3. DASY6 Module mmWave is optimized for incident Power Density (PD) evaluations EUT at distances as close as 2mm for frequencies in the 6–110 GHz range.
The software Module mmWave V3.0+ features the novel Equivalent Source Reconstruction (ESR) method: This new method will greatly simplify compliance testing for distances as close as λ/25 (2mm at 6 GHz) from any surface and improve the overall flexibility and precision.
With this method, the reconstruction uncertainty (REC) is below 0.6 dB for d > λ/25, corresponding to a test distance of 2mm at 6 GHz. The above-mentioned REC value is valid if the following conditions on the grid resolution (ℓ_{grid}) and grid extent (ν_{grid}) are met:

$$\ell_{\text{grid}} = \begin{cases} 1.25d & \text{for } d < \lambda/10 \\ \lambda/8 & \text{for } d \geq \lambda/10 \end{cases}.$$

$$\nu_{\text{grid}} \geq 2\lambda$$

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 1.51 dB(41.6%) was used to determine the psPD measurement scaling factor.

9. Measurement Uncertainty

For SAR Measurements

Measurement Uncertainty for handset SAR test

According to IEEE 1528 and IEC 62209-1528

(6 - 10 GHz range)

a	*b*	*c*	*d*	*e*	*f*	*g*	*h* = *c* x *f* / *e*	*i* = *c* x *g* / *e*	*k*
Source of uncertainty	**Simbol**	**Uncertainty ± %**	**Probability distribution**	**Div.**	**ci**	**ci**	**Standard Uncertainty**	**Standard Uncertainty**	**vi or veff**
Description					**(1 g)**	**(10 g)**	**± % (1 g)**	**± % (10 g)**	
Measurement system									
Probe calibration	CF	18.60	N	2	1	1	9.30	9.30	∞
Probe Calibration Drift	CFdrift	1.70	N	1	1	1	1.00	1.00	∞
Probe Linearity	LIN	4.70	R	1.73	1.00	1.00	2.71	2.71	∞
Broadband Signal	BBS	3.00	R	1.73	1.00	1.00	1.73	1.73	∞
Probe Isotropy	ISO	7.60	R	1.73	1	1	4.39	4.39	∞
Data Acquisition	DAE	2.40	N	1	1	1	2.40	2.40	∞
RF Ambient	AMB	1.80	N	1	1	1	1.80	1.80	∞
Probe Positioning	Δsys	0.20	N	1	0.33	0.33	0.07	0.07	∞
Data Processing	DAT	3.50	N	1	1	1	3.50	3.50	∞
Phantom and Device Errors									
Conductivity (meas.)DAK	LIQ(σ)	2.50	N	1	0.78	0.71	1.95	1.78	∞
Conductivity (temp.)BB	LIQ(Tσ)	3.40	R	1.73	0.78	0.71	1.53	1.39	∞
Phantom Permittivity	EPS	14.00	R	1.73	0.25	0.25	2.02	2.02	∞
Distance DUT - TSL	DAS	2.00	N	1	2	2	4.00	4.00	∞
Device Holder	H	3.60	N	1	1	1	3.60	3.60	∞
DUT Modulation	MOD	2.40	R	1.73	1	1	1.39	1.39	∞
DUT drift	RFdrift	2.50	N	1	1	1	2.50	2.50	∞
Deviation to Target	C(ε, σ)	1.90	N	1	1	0.84	1.90	1.60	∞
SAR scaling	C(R)	0.00	R	1.73	1	1	0.00	0.00	∞
Combined standard uncertainty	u(ΔSAR)		RSS				13.72	13.65	
Expanded uncertainty (95% confidence interval)	U		*k = 2*				**27.44**	**27.30**	

For Power Density Measurements:

DASY8 Uncertainty Budget for PD (avg $\geq$1 cm^2)

Evaluation Distances to the Antennas $\geq \lambda/25$

in Compliance with IEC/IEEE 63195

Error Description		Unc. Value (±dB)	Probab. Distri.	Div.	(c_i)	Std. Unc. (±dB)	(v_i) v_{eff}
Uncertainty terms dependent on the measurement system							
CAL	Calibration	0.49	N	1	1	0.49	∞
COR	Probe correction	0	R	$\sqrt{3}$	1	0	∞
FRS	Frequency response (BW $\leq$ 1 GHz)	0.20	R	$\sqrt{3}$	1	0.12	∞
SCC	Sensor cross coupling	0	R	$\sqrt{3}$	1	0	∞
ISO	Isotropy	0.50	R	$\sqrt{3}$	1	0.29	∞
LIN	Linearity	0.20	R	$\sqrt{3}$	1	0.12	∞
PSC	Probe scattering	0	R	$\sqrt{3}$	1	0	∞
PPO	Probe positioning offset	0.30	R	$\sqrt{3}$	1	0.17	∞
PPR	Probe positioning repeatability	0.04	R	$\sqrt{3}$	1	0.02	∞
SMO	Sensor mechanical offset	0	R	$\sqrt{3}$	1	0	∞
PSR	Probe spatial resolution	0	R	$\sqrt{3}$	1	0	∞
FLD	Field impedance dependence	0	R	$\sqrt{3}$	1	0	∞
MED	Measurement drift	0.05	R	$\sqrt{3}$	1	0.03	∞
APN	Amplitude and phase noise	0.04	R	$\sqrt{3}$	1	0.02	∞
TR	Measurement area truncation	0	R	$\sqrt{3}$	1	0	∞
DAQ	Data acquisition	0.03	N	1	1	0.03	∞
SMP	Sampling	0	R	$\sqrt{3}$	1	0	∞
REC	Field reconstruction	0.60	R	$\sqrt{3}$	1	0.35	∞
SNR	Signal-to-Noise Ratio	0	R	$\sqrt{3}$	1	0	∞
TRA	FTE/MEO	0	R	$\sqrt{3}$	1	0 (0)	∞
SCA	Power density scaling	–	R	$\sqrt{3}$	1	–	∞
SAV	Spatial averaging	0.10	R	$\sqrt{3}$	1	0.06	∞
Uncertainty terms dependent on the DUT and environmental factors							
PC	Probe coupling with DUT	0	R	$\sqrt{3}$	1	0	∞
MOD	Modulation response	0.40	R	$\sqrt{3}$	1	0.23	∞
IT	Integration time	0	R	$\sqrt{3}$	1	0	∞
RT	Response time	0	R	$\sqrt{3}$	1	0	∞
DH	Device holder influence	0.10	R	$\sqrt{3}$	1	0.06	∞
DA	DUT alignment	0	R	$\sqrt{3}$	1	0	∞
AC	RF ambient conditions	0.04	R	$\sqrt{3}$	1	0.02	∞
TEM	Laboratory Temperature	0.05	R	$\sqrt{3}$	1	0.03	∞
REF	Laboratory Reflections	0.04	R	$\sqrt{3}$	1	0.02	∞
MSI	Immunity / secondary reception	0	R	$\sqrt{3}$	1	0	∞
DRI	Drift of the DUT	–	R	$\sqrt{3}$	1	–	∞
Combined Std Uncertainty (w/ FTE/MEO)						0.75	∞
Expanded Std Uncertainty (w/ FTE/MEO)						**1.51**	

10. SAR Test Equipment

Manufacturer	Type / Model	S/N	Calib. Date	Calib.Interval	Calib.Due
SPEAG	SAM Phantom	-	N/A	N/A	N/A
SPEAG	cDASY6 5G Module Phantom		N/A	N/A	N/A
HP	SAR System Control PC	-	N/A	N/A	N/A
Staubli	CS8Cspeag-TX90	F08/5AJ0A1/C/01	N/A	N/A	N/A
Staubli	TX90 XLspeag	F08/5AJ0A1/A/01	N/A	N/A	N/A
Staubli	Teach Pendant (Joystick)	S-0008	N/A	N/A	N/A
TESTO	175-H1/Thermometer	40331949309	12/26/2023	Annual	12/26/2024
Staubli	CS8Cspeag-TX60	F/20/0018446/C/001	N/A	N/A	N/A
Staubli	TX60 Lspeag	F/20/0018446/A/001	N/A	N/A	N/A
Staubli	D21142608A	020885	N/A	N/A	N/A
TESTO	175-H1/Thermometer	44606611906	03/20/2024	Annual	03/20/2025
SPEAG	DAE4	504	01/30/2024	Annual	01/30/2025
SPEAG	DAE4	868	09/20/2023	Annual	09/20/2024
SPEAG	E-Field Probe EX3DV4	7732	06/20/2023	Annual	06/20/2024
SPEAG	E-Field Probe EUmmWV4	9464	02/19/2024	Annual	02/19/2025
SPEAG	Dipole D6.5GHzV2	1012	09/21/2023	Annual	09/21/2024
SPEAG	5G Verification source 10GHz	1018	04/17/2024	Annual	04/17/2025
Agilent	Power Meter N1911A	MY45101406	05/26/2023	Annual	05/26/2024
R&S	Power Sensor/NRP8S	104636	07/03/2023	Annual	07/03/2024
Agilent	Power Sensor 8481A	MY41090873	01/17/2024	Annual	01/17/2025
Agilent	Power Sensor N1921A	MY55220026	07/28/2023	Annual	07/28/2024
HP	Attenuator (3dB) 33340A	02427	08/22/2023	Annual	08/22/2024
HP	Attenuator (20dB) 8493C	09271	08/22/2023	Annual	08/22/2024
Narda	DIRECTIONAL COUPLER	07066	01/08/2024	Annual	01/08/2025
SPEAG	DAKS 3.5	1038	01/22/2024	Annual	01/22/2025
SPEAG	DAKS VNA R140	0141013	01/11/2024	Annual	01/11/2025
KEYSIGHT	EXG Vector Signal Generator	MY50350097	03/05/2024	Annual	03/05/2025
Agilent	MXA Signal Analyzer N9020A	MY50510407	06/07/2023	Annual	06/07/2024

*The E-field probe was calibrated by SPEAG, by the waveguide technique procedure. Dipole Verification measurement is performed by HCT Lab. before each test. The brain/body simulating material is calibrated by HCT using the DAKS 3.5 to determine the conductivity and permittivity (dielectric constant) of the brain/body-equivalent material.

11. Conclusion

The SAR and power density measurements indicate that the DUT complies with the RF radiation exposure limits of the FCC, with respect to all parameters subject to this test. These measurements were taken to simulate the RF effects of RF exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests. The results and statements relate only to the item(s) tested.

Please note that the abortion and distribution of electromagnetic energy in the body are very complex phenomena the depend on the mass, shape, and size of the body, the orientation of the body with respect to the field vectors, and the electrical properties of both the body and the environment. Other variables that may play a substantial role in possible biological effects are those that characterize the environment (e.g. ambient temperature, air velocity, relative humidity, and body insulation) and those that characterize the individual (e.g. age, gender, activity level, debilitation, or disease). Because various factors may interact with one another to vary the specific biological outcome of an exposure to electromagnetic fields, any protection guide should consider maximal amplification of biological effects as a result of field-body interactions, environmental conditions, and physiological variables.

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Appendix A. – DUT Ant. Information & SETUP PHOTO

Please refer to test DUT Ant. Information &setup photo file no. as follows:

Report No.
HCT-SR-2405-FC006-P

Appendix B. – SAR Test Plots

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 21.8 °C
Ambient Temperature: 21.9 °C
Test Date: 05/07/2023
Plot No.: A1

Measurement Report for Device, CHEEK, U-NII-6, IEEE 802.11ax (40MHz, MCS0, 99pc duty cycle), Channel 115 (6525.0 MHz)

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
RightHead, HSL	CHEEK, 0.00	U-NII-6	WLAN, 10707-AAC	6525.0, 115	5.65	6.21	34.4

Hardware Setup

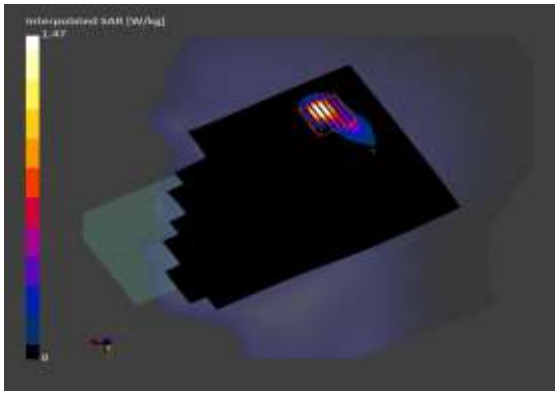
Phantom	Probe, Calibration Date	DAE, Calibration Date
Twin-SAM V8.0 (30deg probe tilt)	EX3DV4 - SN7732, 2023-06-20	DAE4 Sn504, 2024-01-30

Scans Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	120.0 x 200.0	22.0 x 22.0 x 22.0
Grid Steps [mm]	10.0 x 10.0	3.4 x 3.4 x 1.4
Sensor Surface [mm]	3.0	1.4
Grading Ratio	n/a	1.4

Measurement Results

	Area Scan	Zoom Scan
psSAR1g [W/kg]	0.172	0.238
psSAR10g [W/kg]	0.041	0.052
psAPD (1.0cm2, sq) [W/m2]		2.38
psAPD (4.0cm2, sq) [W/m2]		1.25
Power Drift [dB]	-0.13	-0.09



Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 23.0 ℃
Ambient Temperature: 23.0 ℃
Test Date: 05/08/2024
Plot No.: A2

Measurement Report for Device, CHEEK, U-NII-5, IEEE 802.11ax (40MHz, MCS0, 99pc duty cycle), Channel 43 (6165.0 MHz)

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
LeftHead, HSL	CHEEK, 0.00	U-NII-5	WLAN, 10707-AAC	6165.0, 43	5.65	5.80	35.2

Hardware Setup

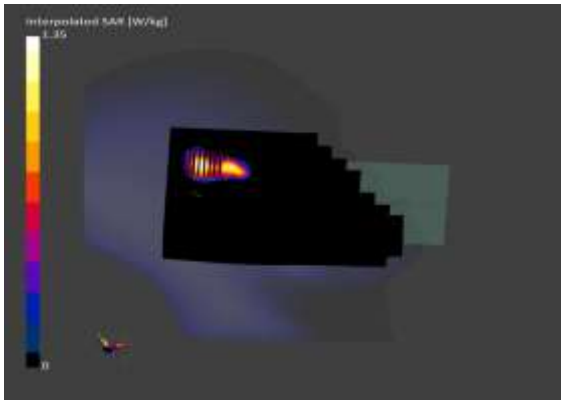
Phantom	Probe, Calibration Date	DAE, Calibration Date
Twin-SAM V8.0 (30deg probe tilt)	EX3DV4 - SN7732, 2023-06-20	DAE4 Sn504, 2024-01-30

Scans Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	120.0 x 200.0	22.0 x 22.0 x 22.0
Grid Steps [mm]	10.0 x 10.0	3.4 x 3.4 x 1.4
Sensor Surface [mm]	3.0	1.4
Grading Ratio	n/a	1.4

Measurement Results

	Area Scan	Zoom Scan
psSAR1g [W/kg]	0.131	0.157
psSAR10g [W/kg]	0.039	0.042
psAPD (1.0cm2, sq) [W/m2]		1.57
psAPD (4.0cm2, sq) [W/m2]		1.02
Power Drift [dB]	-0.18	0.16



Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 21.8 ℃
Ambient Temperature: 21.9 ℃
Test Date: 05/07/2023
Plot No.: A3

Measurement Report for Device, BACK, U-NII-6, IEEE 802.11ax (40MHz, MCS0, 99pc duty cycle), Channel 115 (6525.0 MHz)

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat, HSL	BACK, 10.00	U-NII-6	WLAN, 10707-AAC	6525.0, 115	5.65	6.21	34.4

Hardware Setup

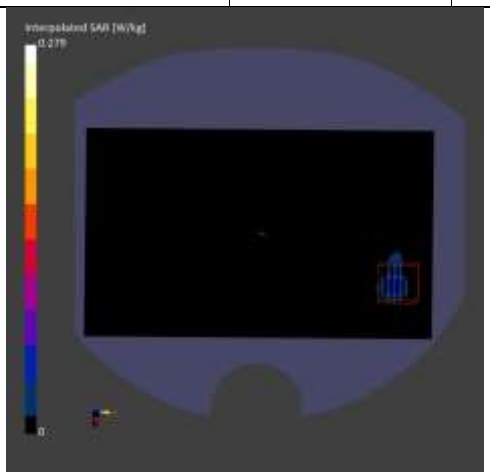
Phantom	Probe, Calibration Date	DAE, Calibration Date
Twin-SAM V8.0 (30deg probe tilt)	EX3DV4 - SN7732, 2023-06-20	DAE4 Sn504, 2024-01-30

Scans Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	120.0 x 200.0	27.2 x 27.2 x 22.0
Grid Steps [mm]	10.0 x 10.0	3.4 x 3.4 x 1.4
Sensor Surface [mm]	3.0	1.4
Grading Ratio	n/a	1.4

Measurement Results

	Area Scan	Zoom Scan
psSAR1g [W/kg]	0.046	0.056
psSAR10g [W/kg]	0.012	0.019
psAPD (1.0cm2, sq) [W/m2]		0.564
psAPD (4.0cm2, sq) [W/m2]		0.429
Power Drift [dB]	0.17	-0.15



Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 23.0 ℃
Ambient Temperature: 23.0 ℃
Test Date: 05/08/2024
Plot No.: A4

Measurement Report for Device, BACK, U-NII-6, IEEE 802.11ax (40MHz, MCS0, 99pc duty cycle), Channel 115 (6525.0 MHz)

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat, HSL	BACK, 10.00	U-NII-6	WLAN, 10707-AAC	6525.0, 115	5.65	6.32	34.6

Hardware Setup

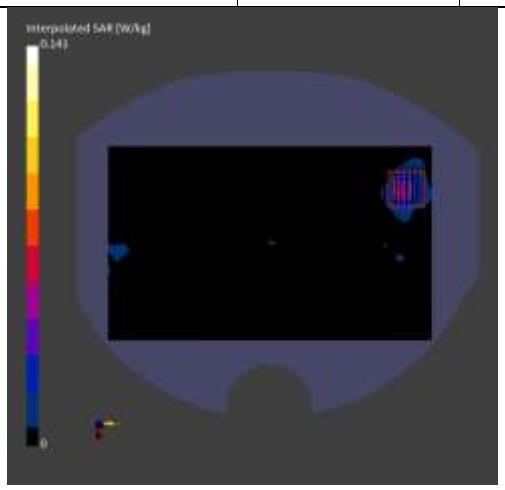
Phantom	Probe, Calibration Date	DAE, Calibration Date
Twin-SAM V8.0 (30deg probe tilt)	EX3DV4 - SN7732, 2023-06-20	DAE4 Sn504, 2024-01-30

Scans Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	120.0 x 200.0	22.0 x 22.0 x 22.0
Grid Steps [mm]	10.0 x 10.0	3.4 x 3.4 x 1.4
Sensor Surface [mm]	3.0	1.4
Grading Ratio	n/a	1.4

Measurement Results

	Area Scan	Zoom Scan
psSAR1g [W/kg]	0.028	0.031
psSAR10g [W/kg]	0.009	0.011
psAPD (1.0cm2, sq) [W/m2]		0.310
psAPD (4.0cm2, sq) [W/m2]		0.245
Power Drift [dB]	0.18	0.10



Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 21.8 °C
Ambient Temperature: 21.9 °C
Test Date: 05/07/2024
Plot No.: A5

Measurement Report for Device, BACK, U-NII-6, IEEE 802.11ax (40MHz, MCS0, 99pc duty cycle), Channel 115 (6525.0 MHz)

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat, HSL	BACK, 0.00	U-NII-6	WLAN, 10707-AAC	6525.0, 115	5.65	6.21	34.4

Hardware Setup

Phantom	Probe, Calibration Date	DAE, Calibration Date
Twin-SAM V8.0 (30deg probe tilt)	EX3DV4 - SN7732, 2023-06-20	DAE4 Sn504, 2024-01-30

Scans Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	120.0 x 200.0	27.2 x 27.2 x 22.0
Grid Steps [mm]	10.0 x 10.0	3.4 x 3.4 x 1.4
Sensor Surface [mm]	3.0	1.4
Grading Ratio	n/a	1.4

Measurement Results

	Area Scan	Zoom Scan
psSAR1g [W/kg]	0.356	0.604
psSAR10g [W/kg]	0.110	0.127
psAPD (1.0cm2, sq) [W/m2]		6.04
psAPD (4.0cm2, sq) [W/m2]		3.08
Power Drift [dB]	0.18	-0.12

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 23.0 ℃
Ambient Temperature: 23.0 ℃
Test Date: 05/08/2024
Plot No.: A6

Measurement Report for Device, BACK, U-NII-6, IEEE 802.11ax (40MHz, MCS0, 99pc duty cycle), Channel 115 (6525.0 MHz)

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat, HSL	BACK, 0.00	U-NII-6	WLAN, 10707-AAC	6525.0, 115	5.65	6.32	34.6

Hardware Setup

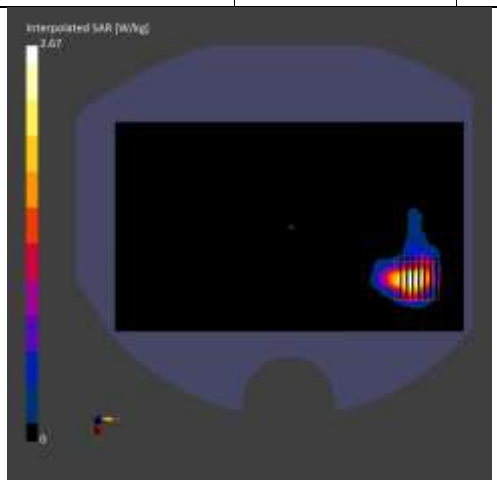
Phantom	Probe, Calibration Date	DAE, Calibration Date
Twin-SAM V8.0 (30deg probe tilt)	EX3DV4 - SN7732, 2023-06-20	DAE4 Sn504, 2024-01-30

Scans Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	120.0 x 200.0	22.0 x 22.0 x 22.0
Grid Steps [mm]	10.0 x 10.0	3.4 x 3.4 x 1.4
Sensor Surface [mm]	3.0	1.4
Grading Ratio	n/a	1.4

Measurement Results

	Area Scan	Zoom Scan
psSAR1g [W/kg]	0.381	0.452
psSAR10g [W/kg]	0.119	0.116
psAPD (1.0cm2, sq) [W/m2]		4.52
psAPD (4.0cm2, sq) [W/m2]		2.73
Power Drift [dB]	-0.15	0.16



Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Ambient Temperature: 19.1 °C
Test Date: 05/13/2024
Plot No.: B1

Measurement Report for Device, FRONT, U-NII-8, IEEE 802.11ax (40MHz, MCS0, 99pc duty cycle), Channel 227 (7085.0 MHz)

Exposure Conditions

Phantom Section	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor
5G	FRONT, 2.00	U-NII-8	WLAN, 10707-AAC	7085.0, 227	1.0

Hardware Setup

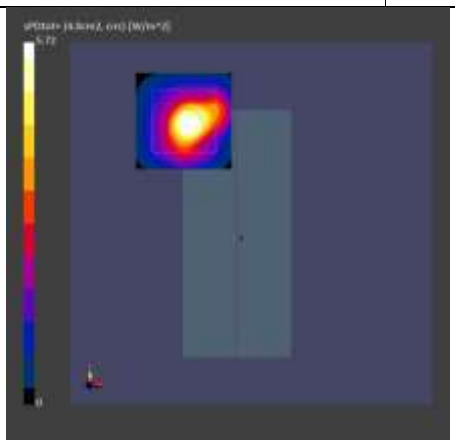
Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave	Air -	EUmmWV4 - SN9464_F1-55GHz, 2024-02-19	DAE4 Sn868, 2023-09-20

Scans Setup

Scan Type	5G Scan
Grid Extents [mm]	60.0 x 60.0
Grid Steps [lambda]	0.04824069219807507 x 0.04824069219807507
Sensor Surface [mm]	2.0
MAIA	Y

Measurement Results

Scan Type	5G Scan
Avg. Area [cm^2]	4.00
psPDn+ [W/m^2]	3.28
psPDtot+ [W/m^2]	5.72
E_{max} [V/m]	62.3
Power Drift [dB]	-0.14



Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Ambient Temperature: 18.7 ℃
Test Date: 05/14/2024
Plot No.: B2

Measurement Report for Device, EDGE TOP, U-NII-5, IEEE 802.11ax (40MHz, MCS0, 99pc duty cycle), Channel 43 (6165.0 MHz)

Exposure Conditions

Phantom Section	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor
5G	EDGE TOP, 2.00	U-NII-5	WLAN, 10707-AAC	6165.0, 43	1.0

Hardware Setup

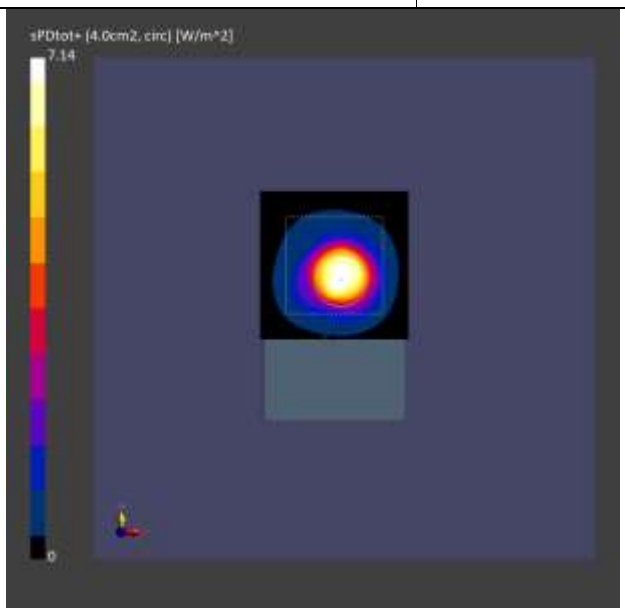
Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave	Air -	EUmmWV4 - SN9464_F1-55GHz, 2024-02-19	DAE4 Sn868, 2023-09-20

Scans Setup

Scan Type	5G Scan
Grid Extents [mm]	60.0 x 60.0
Grid Steps [lambda]	0.04197655150333562 x 0.04197655150333562
Sensor Surface [mm]	2.0

Measurement Results

Scan Type	5G Scan
Avg. Area [cm^2]	4.00
psPDn+ [W/m^2]	3.68
psPDtot+ [W/m^2]	7.14
E_{max} [V/m]	119
Power Drift [dB]	0.18



Appendix C. – Dipole Verification Plots

■Verification Data (6 500 ㎒ Head)

Test Laboratory: HCT CO., LTD
Input Power 50 mW
Liquid Temp: 21.8 ℃
Test Date: 05/07/2023
Measurement Report for Device, , , CW, Channel 0 (6500.0 MHz)

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	,		CW, 0- -	6500.0, 0	5.65	6.20	34.5

Hardware Setup

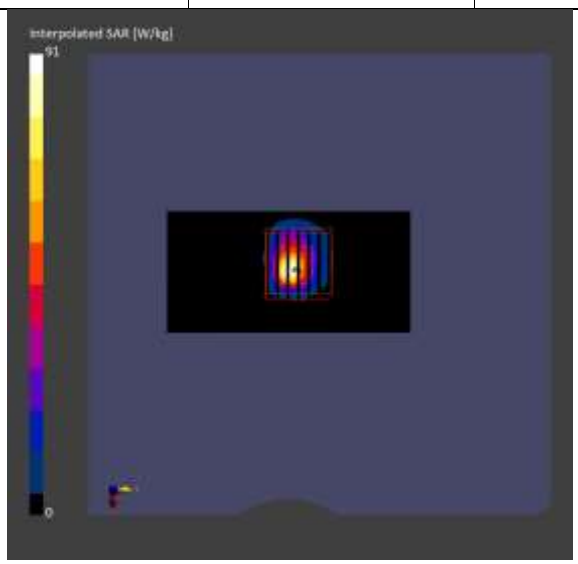
Phantom	Probe, Calibration Date	DAE, Calibration Date
Twin-SAM V8.0 (30deg probe tilt)	EX3DV4 - SN7732, 2023-06-20	DAE4 Sn504, 2024-01-30

Scans 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	3.4 x 3.4 x 1.4
Sensor Surface [mm]	3.0	1.4
Grading Ratio	n/a	1.4

Measurement Results

	Area Scan	Zoom Scan
psSAR1g [W/Kg]	8.54	14.0
psSAR10g [W/Kg]	1.93	2.55
Power Drift [dB]	0.03	0.08



■Verification Data (6 500 ㎒ Head)

Test Laboratory: HCT CO., LTD
Input Power 50 mW
Liquid Temp: 23.0℃
Test Date: 05/08/2024
Measurement Report for Device, , , CW, Channel 0 (6500.0 MHz)

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	,		CW, 0- -	6500.0, 0	5.65	6.30	34.7

Hardware Setup

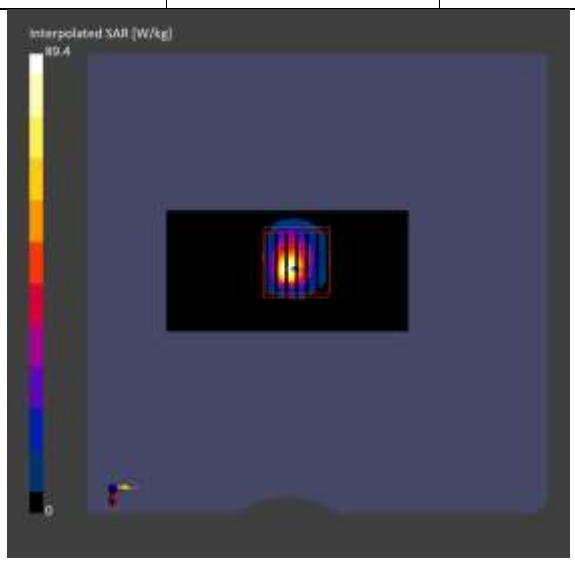
Phantom	Probe, Calibration Date	DAE, Calibration Date
Twin-SAM V8.0 (30deg probe tilt)	EX3DV4 - SN7732, 2023-06-20	DAE4 Sn504, 2024-01-30

Scans 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	3.4 x 3.4 x 1.4
Sensor Surface [mm]	3.0	1.4
Grading Ratio	n/a	1.4

Measurement Results

	Area Scan	Zoom Scan
psSAR1g [W/Kg]	8.97	14.4
psSAR10g [W/Kg]	2.01	2.62
Power Drift [dB]	0.02	0.15



■Verification Data (10 000 ㎒ Head)

Test Laboratory: HCT CO., LTD
Input Power 10 mW
Test Date: 05/13/2024
Measurement Report for Device, FRONT, Validation band, CW, Channel 10000 (10000.0 MHz)

Exposure Conditions

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

Hardware Setup

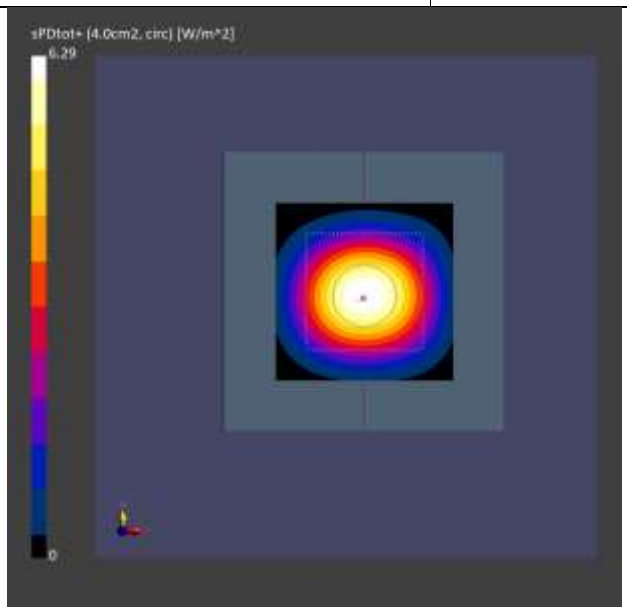
Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave	Air -	EUmmWV4 - SN9464_F1-55GHz, 2024-02-19	DAE4 Sn868, 2023-09-20

Scans Setup

Scan Type	5G Scan
Grid Extents [mm]	60.0 x 60.0
Grid Steps [lambda]	0.125 x 0.125
Sensor Surface [mm]	10.0

Measurement Results

Scan Type	5G Scan
Avg. Area [cm^2]	4.00
psPDn+ [W/m^2]	6.13
psPDtot+ [W/m^2]	6.29
E_{max} [V/m]	50.2
Power Drift [dB]	0.11



■Verification Data (10 000 ㎒ Head)

Test Laboratory: HCT CO., LTD
Input Power 10 mW
Test Date: 05/14/2023
Measurement Report for Device, FRONT, Validation band, CW, Channel 10000 (10000.0 MHz)

Exposure Conditions

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

Hardware Setup

Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave - xxxx	Air -	EUmmWV4 - SN9464_F1-55GHz, 2024-02-19	DAE4 Sn868, 2023-09-20

Scans Setup

Scan Type	5G Scan
Grid Extents [mm]	60.0 x 60.0
Grid Steps [lambda]	0.125 x 0.125
Sensor Surface [mm]	10.0

Measurement Results

Scan Type	5G Scan
Avg. Area [cm^2]	4.00
psPDn+ [W/m^2]	5.93
psPDtot+ [W/m^2]	6.09
E_{max} [V/m]	50.1
Power Drift [dB]	0.16