FCC 47 CFR § 2.1093
IEC/IEEE Std 62209-1528 : 2020
IEC TR 63170 : 2018

RF EVALUATION REPORT (Above 6GHz)

FOR

GSM/WCDMA/LTE/5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax, NFC, WPT and UWB

MODEL NUMBER: SM-F946U, SM-F946U1

FCC ID: A3LSMF946U

REPORT NUMBER: 4790748041-S2V2

ISSUE DATE: 5/24/2023

Prepared for
SAMSUNG ELECTRONICS CO., LTD.
129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI,
GYEONGGI-DO, 16677, KOREA

Prepared by

UL Korea, Ltd.

26th floor, 152, Teheran-ro, Gangnam-gu Seoul, 06236, Korea

Suwon Test Site: UL Korea, Ltd. Suwon Laboratory
218 Maeyeong-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16675, Korea
TEL: (031) 337-9902
FAX: (031) 213-5433

IAS ACCREDITED

Testing Laboratory

TL-637

Revision History

Rev.	Date	Revisions	Revised By
V1	5/15/2023	Initial Issue	--
V2	5/24/2023	Revised table in Sec.1	Seungyeon Kim
		-	

This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

Table of Contents

This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

1. Attestation of Test Results

Applicant Name		SAMSUNG ELECTRONICS CO.,LTD.					
FCC ID		A3LSMF946U					
Model Number		SM- F946U, SM-F946U1					
Applicable Standards		FCC 47 CFR § 2.1093 IEC/IEEE Std 62209-1528 : 2020 IEC TR 63170 : 2018 Published RF exposure KDB procedures					
Exposure Category		SAR Limits (W/Kg)		Power Density Limits (mW/cm^2 over $4cm^2$)			
		Peak spatial-average (1g of tissue)	Product Specific 10g (10g of tissue)	APD (Absorbed Power Density)		IPD (Incident Power Density)	
General population / Uncontrolled exposure		1.6	4.0	N/A		1.0	
RF Exposure Conditions		Equipment Class					
		The Highest Reported SAR (W/kg)		APD (mW/cm^2)		IPD (mW/cm^2)	
		6CD	UWB	6CD	UWB	6CD	UWB
Phablet-Head		<0.1	N/A	<0.1	N/A	0.459	0.008
Phablet-Body-worn & Hotspot		0.266	N/A	0.174	N/A		
Phablet-Product Specific 10g		<0.1	<0.1	0.169	<0.1		
UMPC Mini Tablet-Body		0.229	N/A	0.132	N/A	0.251	0.008
UMPC Mini Tablet-Extremity 10g		0.2	<0.1	0.325	<0.1		
Simultaneous TX of Phablet & UMPC Mini Tablet	Head	1.278	N/A				
	Body-worn & Hotspot	1.240	N/A				
	Product Specific 10g	0.089	0.089				
	Body	1.570	N/A				
	Extremity 10g	3.649	3.649				
Date Tested		3/31/2023 to 5/4/2023					
Test Results		Pass					

UL Korea, Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Korea, Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Korea, Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Korea, Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by IAS, any agency of the Federal Government, or any agency of any government.

This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

Approved & Released By:	Prepared By:
	
Justin Park Operations Leader UL Korea, Ltd. Suwon Laboratory	Seungyeon Kim Laboratory Engineer UL Korea, Ltd. Suwon Laboratory

2. Test Specification, Methods and Procedures

The tests documented in this report were performed in accordance with FCC 47 CFR § 2.1093, IEEE Std 1528-2013, IEC TR 63170-2018, IEC 62479:2010, IEC/IEEE 63195-1:2022 the following FCC Published RF exposure KDB procedures:

- 248227 D01 802.11 Wi-Fi SAR v02r02
- 447498 D01 General RF Exposure Guidance v06
- 648474 D04 Handset SAR v01r03
- 865664 D01 SAR measurement 100 MHz to 6 GHz v01r04
- 941225 D07 UMPC Mini Tablet v01r02

In addition to the above, the following information was used:

- TCB workshop April, 2021; RF Exposure Policies (U-NII 6-7 GHz Interim Procedures)
- PEAG, 5G Module Application Note : 5G Compliance Testing
- SPEAG DASY6 Application Note : Interim Procedures for Devices Operating at 6 – 10 GHz

3. Facilities and Accreditation

The test sites and measurement facilities used to collect data are located at

Suwon
SAR 6 Room
SAR 8 Room
SAR 9 Room

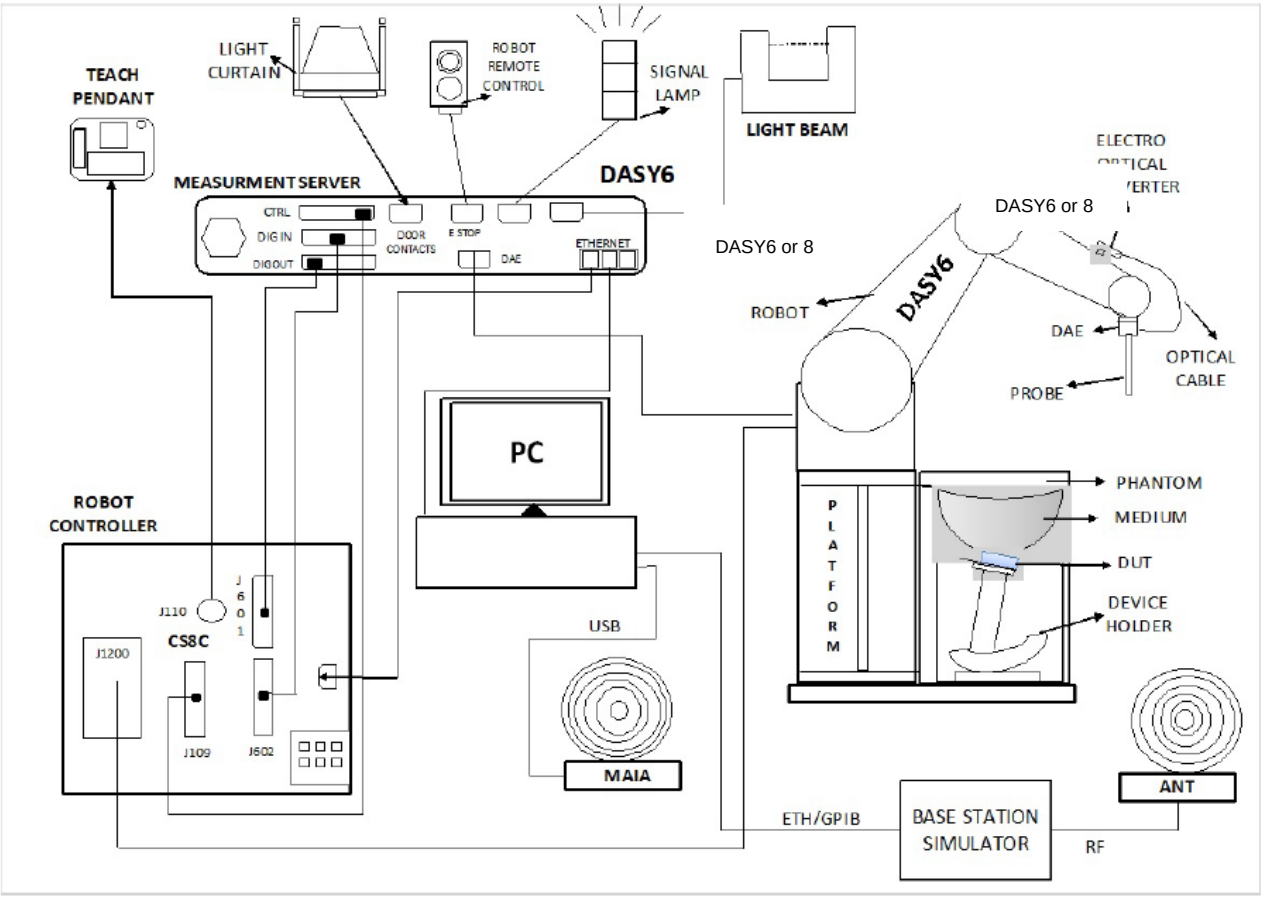
UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-637.
The full scope of accreditation can be viewed at https://www.iasonline.org/wp-content/uploads/2017/05/TL-637-cert-New.pdf.

This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

4. SAR and Power Density Measurement System & Test Equipment

4.1. SAR Measurement System

The DASY6 & 8 system used for performing compliance tests consists of the following items:



- A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic Field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running Win10 and the DASY6 or 8 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.

This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

4.1.1. SAR Scan Procedures

Step 1: Power Reference Measurement
The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. The minimum distance of probe sensors to surface is 2.1 mm. This distance cannot be smaller than the distance of sensor calibration points to probe tip as defined in the probe properties.

Step 2: Area Scan
The Area Scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASY software can find the maximum locations even in relatively coarse grids. When an Area Scan has measured all reachable points, it computes the field maximal found in the scanned area, within a range of the global maximum. The range (in dB) is specified in the standards for compliance testing. For example, a 2 dB range is required in IEC/IEEE Standard 62209-1528, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan). If only one Zoom Scan follows the Area Scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of Zoom Scans has to be increased accordingly.

Area Scan Parameters extracted from IEC/IEEE Standard 62209-1528.

Parameter	DUT transmit frequency being tested	
	$f \leq 3$ GHz	3 GHz < $f \leq 10$ GHz
Maximum distance between the measured points (geometric centre of the sensors) and the inner phantom surface (z_{M1} in Figure 20 in mm)	5 ± 1	$\delta \ln(2)/2 \pm 0{,}5$ [a]
Maximum spacing between adjacent measured points in mm (see O.8.3.1)[b]	20, or half of the corresponding zoom scan length, whichever is smaller	$60/f$, or half of the corresponding zoom scan length, whichever is smaller
Maximum angle between the probe axis and the phantom surface normal (α in Figure 20)[c]	5° (flat phantom only) 30° (other phantoms)	5° (flat phantom only) 20° (other phantoms)
Tolerance in the probe angle	1°	1°

[a] δ is the penetration depth for a plane-wave incident normally on a planar half-space.

[b] See Clause O.8 on how Δx and Δy may be selected for individual area scan requirements.

[c] The probe angle relative to the phantom surface normal is restricted due to the degradation in the measurement accuracy in fields with steep spatial gradients. The measurement accuracy decreases with increasing probe angle and increasing frequency. This is the reason for the tighter probe angle restriction at frequencies above 3 GHz.

This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

Step 3: Zoom Scan

Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The Zoom Scan measures points (refer to table below) within a cube whose base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the Zoom Scan evaluates the averaged SAR for 1 g and 10 g and displays these values next to the job's label.

Zoom Scan Parameters extracted from IEC/IEEE Standard 62209-1528.

Parameter	DUT transmit frequency being tested	
	$f \leq 3$ GHz	3 GHz $< f \leq 10$ GHz
Maximum distance between the closest measured points and the phantom surface (z_{M1} in Figure 20 and Table 3, in mm)	5	$\delta \ln(2)/2$ [a]
Maximum angle between the probe axis and the phantom surface normal (α in Figure 20)	5° (flat phantom only) 30° (other phantoms)	5° (flat phantom only) 20° (other phantoms)
Maximum spacing between measured points in the x- and y-directions (Δx and Δy, in mm)	8	$24/f$ [b]
For uniform grids: Maximum spacing between measured points in the direction normal to the phantom shell (Δz_1 in Figure 20, in mm)	5	$10/(f-1)$
For graded grids: Maximum spacing between the two closest measured points in the direction normal to the phantom shell (Δz_1 in Figure 20, in mm)	4	$12/f$
For graded grids: Maximum incremental increase in the spacing between measured points in the direction normal to the phantom shell ($R_z = \Delta z_2/\Delta z_1$ in Figure 20)	1,5	1,5
Minimum edge length of the zoom scan volume in the x- and y-directions (L_z in O.8.3.2, in mm)	30	22
Minimum edge length of the zoom scan volume in the direction normal to the phantom shell (L_h in O.8.3.2 in mm)	30	22
Tolerance in the probe angle	1°	1°

[a] δ is the penetration depth for a plane-wave incident normally on a planar half-space.

[b] This is the maximum spacing allowed, which might not work for all circumstances.

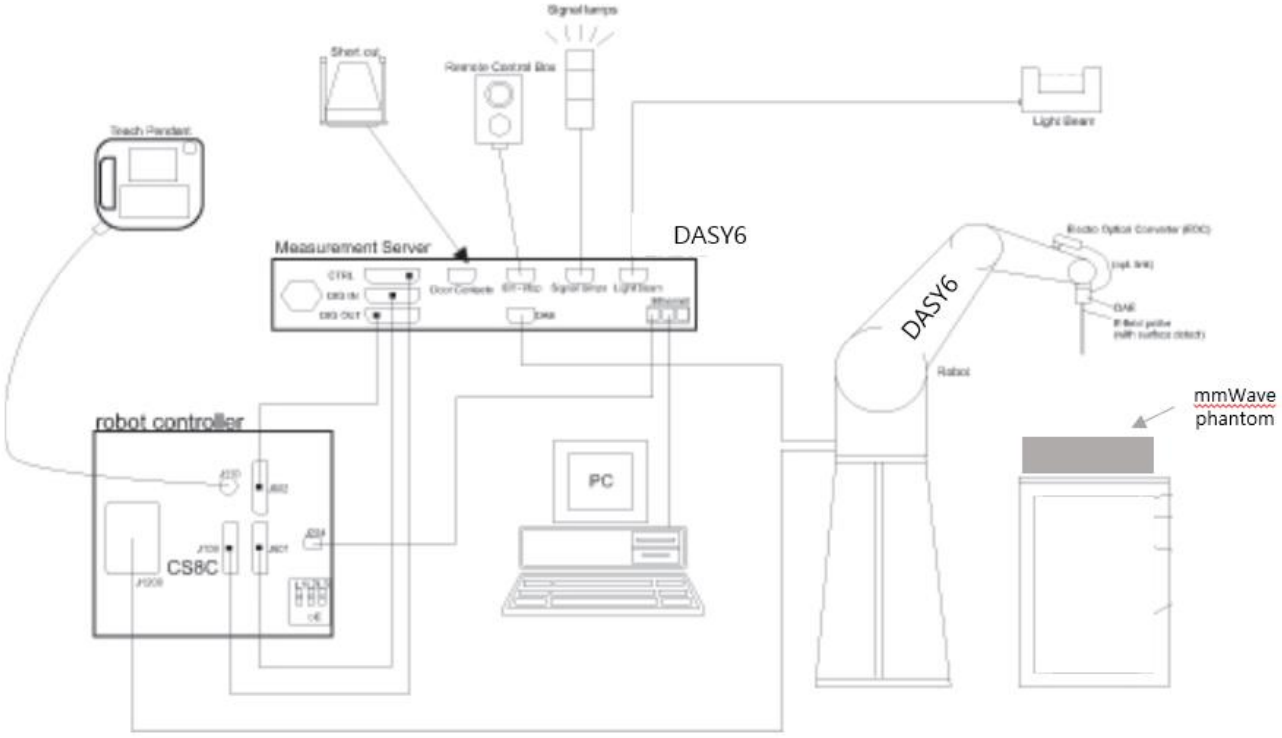
Step 4: Power drift measurement

The Power Drift Measurement measures the field at the same location as the most recent power reference measurement within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the last Power Reference Measurement. This allows a user to monitor the power drift of the device under test within a batch process. The measurement procedure is the same as Step 1.

This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

4.2. Incident Power Density Measurement System

The DASY6 & 8 system used for performing compliance tests consists of the following items:



- A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- The EUmmWVx probe is based on the pseudo-vector probe design, which not only measures the field magnitude but also derives its polarization ellipse.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running Win10 and the DASY6 or 8 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom which is specialized for 5G other accessories according to the targeted measurement.

This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

4.2.1. Power Density Scan Procedures

Step 1: Power Reference Measurement
The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The minimum distance of probe sensors to surface determines the closest measurement point to devise under test.

Step 2: 5G Scan
The steps in the X, Y, and Z directions are specified in terms of fractions of the signal wavelength ,lambda.
Area Scan Parameters extracted from SPEAG, 5G Module V1.2 Application Note.

Recommended settings for measurement of verification sources

Frequency [GHz]	Grid step	Grid extent X/Y [mm]	Measurement points
10	0.125 ($\frac{\lambda}{8}$)	60/60	18 × 18
30	0.25 ($\frac{\lambda}{4}$)	60/60	26 × 26
45	0.25 ($\frac{\lambda}{4}$)	42/42	28 × 28
60	0.25 ($\frac{\lambda}{4}$)	32.5/32.5	28 × 28
90	0.25 ($\frac{\lambda}{4}$)	30/30	38 × 38

The minimum distance of probe sensors to verification source surface, horn antenna, is 10 mm.

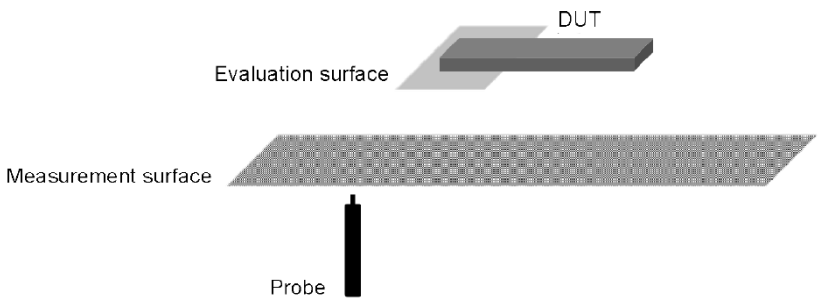
Per equipment manufacturer guidance for 6 – 10GHz, Power density was measured at d=2mm and d=λ/5mm using same grid size and grid step size for some frequencies and surfaces. The integrated power Density (iPD) was calculated based on these measurements. Since iPD ratio between the two distances is < 1dB, the grid step was sufficient for determining compliance at d=2mm.

Step 3: Power drift measurement
The Power Drift Measurement measures the field at the same location as the most recent power reference measurement within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the last Power Reference Measurement. This allows a user to monitor the power drift of the device under test within a batch process. The measurement procedure is the same as Step 1. When the drift is larger than ± 5 %, test is repeated from step1.

4.2.2. Total Field and Power Flux Density Reconstruction(measurement distance)

Reconstruction algorithms are used to project or transform the measured fields from the measurement surface to the evaluation surface (below fig) in order to determine power density or to compute spatial-average and/or local power density with known uncertainty.

Manufacture has developed a reconstruction approach based on the Gerchberg-Saxton algorithm, which benefits from the availability of the E-field polarization ellipse information obtained with the EUmmWVx probe. This reconstruction algorithm, 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.



This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

4.3. Test Equipment

The measuring equipment used to perform the tests documented in this report has been calibrated in accordance with the manufacturers' recommendations, and is traceable to recognized national standards.

4.3.1. SAR Test Equipment

Dielectric Property Measurements

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Network Analyzer	ROHDE & SCHWARZ	ZNB 20	102256	8-5-2023
Dielectric Assessment Kit	SPEAG	DAK-3.5	1196	7-25-2023
Shorting block	SPEAG	DAK-3.5 Short	SM DAK 200 BA	N/A
Thermometer	LKM	DTM3000	3851	8-3-2023
Thermometer	LKM	DTM3000	3862	8-3-2023

System Check

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
MXG Analog Signal Generator	Keysight	N5181B	MY59100587	8-4-2023
Power Sensor	KEYSIGHT	U2000A	MY60180020	8-3-2023
Power Sensor	KEYSIGHT	U2000A	MY61010006	8-3-2023
Power Amplifier	EXODUS	AMP2027ADB	10002	1-6-2024
Directional Coupler	KRYTAR	100318010	215542	1-5-2024
Low Pass Filter	Wainwright Instruments	WLKX10-11000-13640-21000-60TS	1	8-2-2023
Attenuator	KEYSIGHT	8491B/010	MY39272011	8-2-2023
Attenuator	KEYSIGHT	8491B/020	MY39272300	8-2-2023
Attenuator	MINI-CIRCUITS	BW-S3W10+	N/A	1-6-2024
E-Field Probe	SPEAG	EX3DV4	7376	7-27-2023
Data Acquisition Electronics	SPEAG	DAE4	1468	8-18-2023
Data Acquisition Electronics	SPEAG	DAE4	1494	7-18-2023
System Validation Dipole	SPEAG	D6.5GHz	1010	5-27-2023
System Validation Dipole	SPEAG	D8GHzV2	1012	11-1-2023
Thermometer	Lutron	MHB-382SD	AJ.42446	8-9-2023
Thermometer	Lutron	MHB-382SD	AK.12102	8-9-2023
Thermometer	Lutron	MHB-382SD	AK.12103	8-9-2023
Thermometer	Lutron	MHB-382SD	AK.18789	8-9-2023

Note(s):

1. For System Validation Dipole, Calibration interval applied every 2 years according to referencing KDB 865664 guidance.
2. Refer to Appendix F that mentioned about justification for Extended SAR Dipole Calibrations.

4.3.2 Incident Power Density Test Equipment

System Check

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
MXG Analog Signal Generator	Keysight	N5181B	MY59100587	8/4/2023
Power Sensor	KEYSIGHT	U2000A	MY60180020	8/3/2023
Power Sensor	KEYSIGHT	U2000A	MY61010006	8/3/2023
Power Amplifier	EXODUS	AMP2027ADB	10002	1/6/2024
Directional Coupler	KRYTAR	100318010	215542	1/5/2024
Low Pass Filter	Wainwright Instruments	WLKX10-11000-13640-21000-60TS	1	8/2/2023
Attenuator	KEYSIGHT	8491B/010	MY39272011	8/2/2023
Attenuator	KEYSIGHT	8491B/020	MY39272300	8/2/2023
Attenuator	MINI-CIRCUITS	BW-S3W10+	N/A	1/6/2024
5G probe	SPEAG	EummWV4	9536	2/16/2024
Data Acquisition Electronics	SPEAG	DAE4	1670	6/7/2023
Data Acquisition Electronics	SPEAG	DAE4	1668	**4/27/2023**
Verification kit	SPEAG	5G verification source_10GHz	1022	2/20/2024
Thermometer	Lutron	MHB-382SD	AK.12102	8/9/2023

This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

5. Measurement Uncertainty

5.1. SAR Measurement Uncertainty

Measurement uncertainty for 6 GHz to 10 GHz

(According to IEEE 62209-1528)

a	b	c		d	e	f	g	h =	l =	k
					f(d,k)			*c×f/e*	*c×g/e*	
Uncertainty component	Reference	Tol. 1 g (±%)	Tol. 10 g (±%)	Prob. Dist.	Div.	*ci* (1 g)	*ci* (10 g)	1 g *ui* (± %)	10 g *ui* (± %)	vi
Measurement System Errors										
Probe Calibration	8.4.1.1	18.6		Normal	2	1	1	9.3	9.3	∞
Probe Calibration Drift	8.4.1.2	1.7		Rectangular	1.732	1	1	1.0	1.0	∞
Probe Linearity	8.4.1.3	4.7		Rectangular	1.732	1	1	2.7	2.7	∞
Broadband Signal	8.4.1.4	2.8		Rectangular	1.732	1	1	1.6	1.6	∞
Probe Isotropy	8.4.1.5	7.6		Rectangular	1.732	1	1	4.4	4.4	∞
Data Acquisition	8.4.1.6	0.3		Normal	1	1	1	0.3	0.3	∞
RF Ambient	8.4.1.7	1.8		Normal	1	1	1	1.8	1.8	∞
Probe Positioning	8.4.1.8	0.005		Normal	1	0.50	0.50	0.25	0.25	∞
Data Processing	8.4.1.9	3.5		Normal	1	1	1	3.5	3.5	∞
Phantom and Device Errors										
Conductivity (meas.)DAK	8.4.2.1	2.5		Normal	1	0.78	0.71	2.0	1.8	∞
Conductivity (temp.)BB	8.4.2.2	2.4		Rectangular	1.732	0.78	0.71	1.1	1.0	∞
Phantom Permittivity	8.4.2.3	14.0		Rectangular	1.732	0	0	0.0	0.0	∞
Distance DUT -TSL	8.4.2.4	2.0		Normal	1	2	2	4.0	4.0	∞
Device Positioning	8.4.2.5	3.1	4.2	Normal	1	1	1	3.1	4.2	50
Device Holder	8.4.2.6	3.6		Normal	1	1	1	3.6	3.6	∞
DUT Modulation	8.4.2.7	2.4		Rectangular	1.732	1	1	1.4	1.4	∞
Time-average SAR	8.4.2.8	1.7		Rectangular	1.732	1	1	1.0	1.0	∞
DUT drift	8.4.2.9	5.0		Normal	1	1	1	5.0	5.0	∞
Correction to the SAR results										
Deviation to Target	8.4.3.1	1.9		Normal	1	1	0.84	1.9	1.6	∞
Combined Standard Uncertainty Uc(y) =				RSS				14.39	14.61	
Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence =								**28.79**	**29.23**	

5.1.1. Decision rule

Decision rule for statement(s) of conformity is based on Procedures 1, Clause 4.4.2 in IEC Guide 115:2007.

This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

5.2. Incident Power Density Measurement Uncertainty

Measurement Uncertainty for cDASY6 Module mmWave

Error Description	Uncertainty value (±dB)	Probe Dist.	Divisor	(Ci)	Std. Unc. (±dB)	(Vi)
Uncertainty terms dependent on the measurement system						
Calibration	**0.49**	Normal	1	1	0.49	Infinity
Probe correction	**0.00**	Rectangular	1.73	1	0.00	Infinity
Frequency response (BW =< 1 GHz)	**0.20**	Rectangular	1.73	1	0.12	Infinity
Sensor cross coupling	**0.00**	Rectangular	1.73	1	0.00	Infinity
Isotropy	**0.50**	Rectangular	1.73	1	0.29	Infinity
Linearity	**0.20**	Rectangular	1.73	1	0.12	Infinity
Probe scattering	**0.00**	Rectangular	1.73	1	0.00	Infinity
Probe positioning offset	**0.30**	Rectangular	1.73	1	0.17	Infinity
Probe positioning repeatability	**0.04**	Rectangular	1.73	1	0.02	Infinity
Sensor mechanical offset	**0.00**	Rectangular	1.73	1	0.00	Infinity
Probe spatial resolution	**0.00**	Rectangular	1.73	1	0.00	Infinity
Field impedance dependance	**0.00**	Rectangular	1.73	1	0.00	Infinity
Amplitude and phase drift	**0.00**	Rectangular	1.73	1	0.00	Infinity
Amplitude and phase noise	**0.04**	Rectangular	1.73	1	0.02	Infinity
Measurement area truncation	**0.10**	Rectangular	1.73	1	0.06	Infinity
Data acquisition	**0.03**	Normal	1.00	1	0.03	Infinity
Sampling	**0.00**	Rectangular	1.73	1	0.00	Infinity
Field reconstruction	**0.60**	Rectangular	1.73	1	0.35	Infinity
Forward transformation	**0.00**	Rectangular	1.73	1	0.00	Infinity
Power density scaling	**-**	Rectangular	1.73	1	-	Infinity
Spatial averaging	**0.10**	Rectangular	1.73	1	0.06	Infinity
System detection limit	**0.04**	Rectangular	1.73	1	0.02	Infinity
Uncertainty terms dependent on the DUT and environmental factors						
Probe coupling with DUT	**0.00**	Rectangular	1.73	1	0.00	Infinity
Modulation response	**0.40**	Rectangular	1.73	1	0.23	Infinity
Integration time	**0.00**	Rectangular	1.73	1	0.00	Infinity
Response time	**0.00**	Rectangular	1.73	1	0.00	Infinity
Device holder influence	**0.10**	Rectangular	1.73	1	0.06	Infinity
DUT alignment	**0.00**	Rectangular	1.73	1	0.00	Infinity
RF ambient conditions	**0.04**	Rectangular	1.73	1	0.02	Infinity
Ambient reflections	**0.04**	Rectangular	1.73	1	0.02	Infinity
Immunity / secondary reception	**0.00**	Rectangular	1.73	1	0.00	Infinity
Drift of the DUT	**0.22**	Rectangular	1.73	1	0.13	Infinity
Combined Std. Uncertainty					0.76	Infinity
Expanded Standard Uncertainty (95%)					**1.53**	

5.2.1. Decision rule

Decision rule for statement(s) of conformity is based on Procedures 2, Clause 4.4.3 in IEC Guide 115:2007.

This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

6. Device Under Test (DUT) Information

6.1. DUT Description

Device Dimension	Refer to Appendix A.		
Back Cover	☒ The Back Cover is not removable.		
Battery Options	☒ The rechargeable battery is not user accessible		
Test Sample Information	**No.**	**S/N**	**Notes**
	1	723c6c5d0f4d7ece	Conducted
	2	R3CW30K68EB	Radiated
	3	R3CW30K681J	Radiated
	4	72926Ea8974d/ece	Radiated
	5	72a8675c624dnece	Radiated
	6	72a869df44d7ece	Radiated
	7	R3CW20P0NSN	Radiated

6.2. Wireless Technologies of UNII 6E

Wireless technologies	Frequency bands	Operating mode	Duty Cycle used for SAR & PD testing
Wi-Fi_UNII 6e (Above 6GHz)	UNII Band 5 (5925-6425 MHz) UNII Band 6 (6425-6525 MHz) UNII Band 7 (6525-6885 MHz) UNII Band 8 (6885-7125 MHz)	802.11a 802.11ax (HE20) 802.11ax (HE40) 802.11ax (HE80) 802.11ax (HE160)	99.7% (802.11ax (HE160))
UWB	Ch.5 (6489.6 MHz) Ch.9 (7987.2 MHz)	Signal Configurations(0/1/3), PRF modes(BPRF/HPRF)	N/A

Notes:

Duty cycle for Wi-Fi is referenced from the UNII report.

This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

6.3. Nominal Output Power

RF Air interface	Mode	Indoor AP (dBm)														
		Pmax			Plimit											
					DSI=0 (F/O Body)			DSI=1 (F/C Body)			DSI=2 (F/O Head)			DSI=3 (F/C Head)		
		WLAN Ant.1	WLAN Ant.2	MIMO (Ant.1+Ant.2)	WLAN Ant.1	WLAN Ant.2	MIMO (Ant.1+Ant.2)	WLAN Ant.1	WLAN Ant.2	MIMO (Ant.1+Ant.2)	WLAN Ant.1	WLAN Ant.2	MIMO (Ant.1+Ant.2)	WLAN Ant.1	WLAN Ant.2	MIMO (Ant.1+Ant.2)
WiFi 6 GHz (UNII - 5)	802.11a	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0
	802.11ax HE20	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0
	802.11ax HE40	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0
	802.11ax HE80	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0
	802.11ax HE160	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0
WiFi 6 GHz (UNII - 6)	802.11a	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0
	802.11ax HE20	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0
	802.11ax HE40	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0
	802.11ax HE80	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0
	802.11ax HE160	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0
WiFi 6 GHz (UNII - 7)	802.11a	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0
	802.11ax HE20	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0
	802.11ax HE40	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0
	802.11ax HE80	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0
	802.11ax HE160	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0
WiFi 6 GHz (UNII - 8)	802.11a	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0
	802.11ax HE20	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0
	802.11ax HE40	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0
	802.11ax HE80	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0
	802.11ax HE160	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0

RF Air interface	Mode	Standard AP (dBm)														
		Pmax			Plimit											
					DSI=0 (F/O Body)			DSI=1 (F/C Body)			DSI=2 (F/O Head)			DSI=3 (F/C Head)		
		WLAN Ant.1	WLAN Ant.2	MIMO (Ant.1+Ant.2)	WLAN Ant.1	WLAN Ant.2	MIMO (Ant.1+Ant.2)	WLAN Ant.1	WLAN Ant.2	MIMO (Ant.1+Ant.2)	WLAN Ant.1	WLAN Ant.2	MIMO (Ant.1+Ant.2)	WLAN Ant.1	WLAN Ant.2	MIMO (Ant.1+Ant.2)
WiFi 6 GHz (UNII - 5)	802.11a	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0
	802.11ax HE20	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0
	802.11ax HE40	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0
	802.11ax HE80	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0
	802.11ax HE160	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0
WiFi 6 GHz (UNII - 7)	802.11a	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0
	802.11ax HE20	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0
	802.11ax HE40	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0
	802.11ax HE80	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0
	802.11ax HE160	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0	10.0	10.0	13.0

Note(s):.

1. Only MIMO mode supports for UNII 6e Bands.
2. This device has support Dual Client (6CD) in UNII 6-7GHz. So Indoor AP support to UNII 5 – 8, and Standard AP supports to UNII5, 7.

This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

7. RF Exposure Conditions (Test Configurations)

Refer to Appendix A for the specific details of the antenna-to-antenna and antenna-to-edge(s) distances.

Forder Closed configuration

Wireless technologies	RF Exposure Conditions	Antena	DUT-to-User Separation	Test Position	Antenna-to-edge/surface	SAR Required	Note
UNII 6e	Head	WiFi 6G MIMO	0 mm	Left Touch	N/A	Yes	
				Left Tilt (15°)	N/A	Yes	
				Right Touch	N/A	Yes	
				Right Tilt (15°)	N/A	Yes	
	Body-worn & Hotspot		10 mm	Rear	N/A	Yes	
				Front	N/A	Yes	
	Product Specific 10-g		0 mm	Rear	< 25 mm	Yes	
				Front	< 25 mm	Yes	
				Top	< 25 mm	Yes	
				Rear-Left	< 25 mm	Yes	
				Bottom	> 25 mm	No	1
				Rear-Right	< 25 mm	Yes	
UWB	Product Specific 10-g	Antenna 1 (Metal Ant.)	0 mm	Rear	< 25 mm	Yes	
				Front	< 25 mm	Yes	
				Top	< 25 mm	Yes	
				Rear-Left	> 25 mm	No	1
				Bottom	> 25 mm	No	1
				Rear-Right	< 25 mm	Yes	
		Antenna 2 (Patch Ant.)	0 mm	Rear	< 25 mm	Yes	
				Front	< 25 mm	Yes	
				Top	< 25 mm	Yes	
				Rear-Left	> 25 mm	No	1
				Bottom	> 25 mm	No	1
				Rear-Right	< 25 mm	Yes	

Forder Opened configuration

Wireless technologies	RF Exposure Conditions	Antena	DUT-to-User Separation	Test Position	Antenna-to-edge/surface	SAR Required	Note
UNII 6e	Body / Extemity	WiFi 6G MIMO	10 mm	Rear	< 25 mm	Yes	
				Front	< 25 mm	Yes	
				Top	< 25 mm	Yes	
				Rear-Left	< 25 mm	Yes	
				Bottom	> 25 mm	No	1
				Rear-Right	> 25 mm	No	1
			0 mm	Rear	< 25 mm	Yes	
				Front	< 25 mm	Yes	
				Top	< 25 mm	Yes	
				Rear-Left	< 25 mm	Yes	
				Bottom	> 25 mm	No	1
				Rear-Right	> 25 mm	No	1
UWB	Extemity	Antenna 1 (Metal Ant.)	0 mm	Rear	< 25 mm	Yes	
				Front	< 25 mm	Yes	
				Top	< 25 mm	Yes	
				Rear-Left	> 25 mm	No	1
				Bottom	> 25 mm	No	1
				Rear-Right	> 25 mm	No	1
		Antenna 2 (Patch Ant.)	0 mm	Rear	< 25 mm	Yes	
				Front	< 25 mm	Yes	
				Top	< 25 mm	Yes	
				Rear-Left	> 25 mm	No	1
				Bottom	> 25 mm	No	1
				Rear-Right	> 25 mm	No	1

Notes:

1. SAR is not required because the distance from the antenna to the edge is > 25 mm as per KDB 941225 D06 Hot Spot SAR.
2. For Phablet devices: When hotspot mode applies, Product specific 10-g SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg.
3. For Phablet devices: When hotspot mode is not supported, Product specific 10-g SAR is required for all surfaces and edges with an antenna located at ≤ 25mm from that surface or edge in direct contact with a flat phantom, to address interactive hand use exposure conditions.
4. Per manufacturer guide, UWB SAR was considered about only hand held condition (Extremity 10-g).

This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

8. SAR System Check with Dielectric Property Measurements

8.1. Dielectric Property Measurements

The temperature of the tissue-equivalent medium used during measurement must also be within 18°C to 25°C and within ± 2°C of the temperature when the tissue parameters are characterized.

The dielectric parameters must be measured before the tissue-equivalent medium is used in a series of SAR measurements. The parameters should be re-measured after 1 days of use; for example, when the parameters are marginal at the beginning of the measurement series. Tissue dielectric parameters were measured at the low, middle and high frequency of each operating frequency range of the test device.

Tissue Dielectric Parameters

Refer to Table 2 within the IEC/IEEE Std 62209-1528 : 2020

Target Frequency (MHz)	Tissue parameters	
	ε_r	σ (S/m)
5800	35.3	5.27
6000	35.1	5.48
6500	34.5	6.07
7000	33.9	6.65
7500	33.3	7.24
8000	32.7	7.84
8500	32.1	8.46

Dielectric Property Measurements Results:

SAR 6 Room

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
4/20/2023	Head 6000	e'	34.5600	Relative Permittivity (ϵ_r):	34.56	35.10	-1.54	5
		e''	15.6500	Conductivity (σ):	5.22	5.48	-4.72	5
	Head 6200	e'	34.2200	Relative Permittivity (ϵ_r):	34.22	34.86	-1.84	5
		e''	15.7700	Conductivity (σ):	5.44	5.72	-4.89	5
	Head 6500	e'	33.2100	Relative Permittivity (ϵ_r):	33.21	34.50	-3.74	5
		e''	16.3800	Conductivity (σ):	5.92	6.07	-2.47	5
	Head 6600	e'	32.9300	Relative Permittivity (ϵ_r):	32.93	34.38	-4.22	5
		e''	16.5800	Conductivity (σ):	6.08	6.19	-1.64	5
	Head 6800	e'	32.6800	Relative Permittivity (ϵ_r):	32.68	34.14	-4.28	5
		e''	16.6400	Conductivity (σ):	6.29	6.42	-1.97	5
	Head 7000	e'	32.6900	Relative Permittivity (ϵ_r):	32.69	33.90	-3.57	5
		e''	16.4800	Conductivity (σ):	6.41	6.65	-3.54	5
4/20/2023	Head 7000	e'	33.5500	Relative Permittivity (ϵ_r):	33.55	33.90	-1.03	5
		e''	17.1500	Conductivity (σ):	6.68	6.65	0.38	5
	Head 7250	e'	33.0200	Relative Permittivity (ϵ_r):	33.02	33.60	-1.73	5
		e''	17.1700	Conductivity (σ):	6.92	6.95	-0.34	5
	Head 7500	e'	32.1600	Relative Permittivity (ϵ_r):	32.16	33.30	-3.42	5
		e''	17.6600	Conductivity (σ):	7.36	7.24	1.72	5
	Head 7800	e'	31.8900	Relative Permittivity (ϵ_r):	31.89	32.94	-3.19	5
		e''	17.8700	Conductivity (σ):	7.75	7.60	1.98	5
	Head 8000	e'	32.0500	Relative Permittivity (ϵ_r):	32.05	32.70	-1.99	5
		e''	17.5900	Conductivity (σ):	7.82	7.84	-0.20	5
	Head 8100	e'	31.9100	Relative Permittivity (ϵ_r):	31.91	32.58	-2.06	5
		e''	17.5100	Conductivity (σ):	7.89	7.96	-0.98	5
4/21/2023	Head 6000	e'	34.8100	Relative Permittivity (ϵ_r):	34.81	35.10	-0.83	5
		e''	16.0300	Conductivity (σ):	5.35	5.48	-2.41	5
	Head 6200	e'	35.2000	Relative Permittivity (ϵ_r):	35.20	34.86	0.98	5
		e''	16.5700	Conductivity (σ):	5.71	5.72	-0.06	5
	Head 6500	e'	34.8800	Relative Permittivity (ϵ_r):	34.88	34.50	1.10	5
		e''	17.1000	Conductivity (σ):	6.18	6.07	1.82	5
	Head 6600	e'	34.6300	Relative Permittivity (ϵ_r):	34.63	34.38	0.73	5
		e''	17.1300	Conductivity (σ):	6.29	6.19	1.62	5
	Head 6800	e'	34.3800	Relative Permittivity (ϵ_r):	34.38	34.14	0.70	5
		e''	17.4000	Conductivity (σ):	6.58	6.42	2.51	5
	Head 7000	e'	34.2300	Relative Permittivity (ϵ_r):	34.23	33.90	0.97	5
		e''	17.5700	Conductivity (σ):	6.84	6.65	2.84	5

This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

4/21/2023	Head 7000	e'	34.2300	Relative Permittivity (ϵ_r):	34.23	33.90	0.97	5
		e''	17.5700	Conductivity (σ):	6.84	6.65	2.84	5
	Head 7250	e'	33.7600	Relative Permittivity (ϵ_r):	33.76	33.60	0.48	5
		e''	17.7200	Conductivity (σ):	7.14	6.95	2.86	5
	Head 7500	e'	33.2500	Relative Permittivity (ϵ_r):	33.25	33.30	-0.15	5
		e''	17.9600	Conductivity (σ):	7.49	7.24	3.45	5
	Head 7800	e'	32.5200	Relative Permittivity (ϵ_r):	32.52	32.94	-1.28	5
		e''	18.0100	Conductivity (σ):	7.81	7.60	2.78	5
	Head 8000	e'	32.3300	Relative Permittivity (ϵ_r):	32.33	32.70	-1.13	5
		e''	17.9900	Conductivity (σ):	8.00	7.84	2.07	5
	Head 8100	e'	32.2300	Relative Permittivity (ϵ_r):	32.23	32.58	-1.07	5
		e''	17.9800	Conductivity (σ):	8.10	7.96	1.68	5
4/24/2023	Head 6000	e'	36.5000	Relative Permittivity (ϵ_r):	36.50	35.10	3.99	5
		e''	15.9500	Conductivity (σ):	5.32	5.48	-2.90	5
	Head 6200	e'	36.2000	Relative Permittivity (ϵ_r):	36.20	34.86	3.84	5
		e''	16.1300	Conductivity (σ):	5.56	5.72	-2.72	5
	Head 6500	e'	35.6600	Relative Permittivity (ϵ_r):	35.66	34.50	3.36	5
		e''	16.3500	Conductivity (σ):	5.91	6.07	-2.65	5
	Head 6600	e'	35.4700	Relative Permittivity (ϵ_r):	35.47	34.38	3.17	5
		e''	16.4600	Conductivity (σ):	6.04	6.19	-2.35	5
	Head 6800	e'	35.1700	Relative Permittivity (ϵ_r):	35.17	34.14	3.02	5
		e''	16.6300	Conductivity (σ):	6.29	6.42	-2.03	5
	Head 7000	e'	34.9400	Relative Permittivity (ϵ_r):	34.94	33.90	3.07	5
		e''	16.7500	Conductivity (σ):	6.52	6.65	-1.96	5
4/24/2023	Head 7000	e'	34.9400	Relative Permittivity (ϵ_r):	34.94	33.90	3.07	5
		e''	16.7500	Conductivity (σ):	6.52	6.65	-1.96	5
	Head 7250	e'	34.5400	Relative Permittivity (ϵ_r):	34.54	33.60	2.80	5
		e''	16.9100	Conductivity (σ):	6.82	6.95	-1.85	5
	Head 7500	e'	34.1400	Relative Permittivity (ϵ_r):	34.14	33.30	2.52	5
		e''	17.0600	Conductivity (σ):	7.11	7.24	-1.73	5
	Head 7800	e'	33.6600	Relative Permittivity (ϵ_r):	33.66	32.94	2.19	5
		e''	17.2700	Conductivity (σ):	7.49	7.60	-1.45	5
	Head 8000	e'	33.4400	Relative Permittivity (ϵ_r):	33.44	32.70	2.26	5
		e''	17.4200	Conductivity (σ):	7.75	7.84	-1.16	5
	Head 8100	e'	33.2900	Relative Permittivity (ϵ_r):	33.29	32.58	2.18	5
		e''	17.4800	Conductivity (σ):	7.87	7.96	-1.15	5
4/25/2023	Head 6000	e'	36.2500	Relative Permittivity (ϵ_r):	36.25	35.10	3.28	5
		e''	16.3000	Conductivity (σ):	5.44	5.48	-0.77	5
	Head 6200	e'	35.9300	Relative Permittivity (ϵ_r):	35.93	34.86	3.07	5
		e''	16.4200	Conductivity (σ):	5.66	5.72	-0.97	5
	Head 6500	e'	35.3700	Relative Permittivity (ϵ_r):	35.37	34.50	2.52	5
		e''	16.6100	Conductivity (σ):	6.00	6.07	-1.10	5
	Head 6600	e'	35.1400	Relative Permittivity (ϵ_r):	35.14	34.38	2.21	5
		e''	16.7000	Conductivity (σ):	6.13	6.19	-0.93	5
	Head 6800	e'	34.7400	Relative Permittivity (ϵ_r):	34.74	34.14	1.76	5
		e''	16.8600	Conductivity (σ):	6.37	6.42	-0.67	5
	Head 7000	e'	34.4100	Relative Permittivity (ϵ_r):	34.41	33.90	1.50	5
		e''	16.9100	Conductivity (σ):	6.58	6.65	-1.03	5
4/25/2023	Head 7000	e'	34.4100	Relative Permittivity (ϵ_r):	34.41	33.90	1.50	5
		e''	16.9100	Conductivity (σ):	6.58	6.65	-1.03	5
	Head 7250	e'	34.0300	Relative Permittivity (ϵ_r):	34.03	33.60	1.28	5
		e''	17.0300	Conductivity (σ):	6.87	6.95	-1.15	5
	Head 7500	e'	33.6300	Relative Permittivity (ϵ_r):	33.63	33.30	0.99	5
		e''	17.1300	Conductivity (σ):	7.14	7.24	-1.33	5
	Head 7800	e'	33.0000	Relative Permittivity (ϵ_r):	33.00	32.94	0.18	5
		e''	17.2700	Conductivity (σ):	7.49	7.60	-1.45	5
	Head 8000	e'	32.7000	Relative Permittivity (ϵ_r):	32.70	32.70	0.00	5
		e''	17.3300	Conductivity (σ):	7.71	7.84	-1.67	5
	Head 8100	e'	32.5400	Relative Permittivity (ϵ_r):	32.54	32.58	-0.12	5
		e''	17.3800	Conductivity (σ):	7.83	7.96	-1.71	5
5/3/2023	Head 6000	e'	35.6100	Relative Permittivity (ϵ_r):	35.61	35.10	1.45	5
		e''	16.8100	Conductivity (σ):	5.61	5.48	2.34	5
	Head 6200	e'	35.3800	Relative Permittivity (ϵ_r):	35.38	34.86	1.49	5
		e''	16.9400	Conductivity (σ):	5.84	5.72	2.17	5
	Head 6500	e'	35.2200	Relative Permittivity (ϵ_r):	35.22	34.50	2.09	5
		e''	16.9400	Conductivity (σ):	6.12	6.07	0.86	5
	Head 6600	e'	34.9700	Relative Permittivity (ϵ_r):	34.97	34.38	1.72	5
		e''	16.9600	Conductivity (σ):	6.22	6.19	0.61	5
	Head 6800	e'	34.3100	Relative Permittivity (ϵ_r):	34.31	34.14	0.50	5
		e''	17.0200	Conductivity (σ):	6.44	6.42	0.27	5
	Head 7000	e'	33.6700	Relative Permittivity (ϵ_r):	33.67	33.90	-0.68	5
		e''	17.1200	Conductivity (σ):	6.66	6.65	0.20	5

This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

SAR 9 Room

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
4/12/2023	Head 6000	e'	35.1000	Relative Permittivity (ϵ_r):	35.10	35.10	0.00	5
		e''	16.0800	Conductivity (σ):	5.36	5.48	-2.11	5
	Head 6200	e'	35.0000	Relative Permittivity (ϵ_r):	35.00	34.86	0.40	5
		e''	16.3300	Conductivity (σ):	5.63	5.72	-1.51	5
	Head 6500	e'	34.9700	Relative Permittivity (ϵ_r):	34.97	34.50	1.36	5
		e''	16.3400	Conductivity (σ):	5.91	6.07	-2.71	5
	Head 6600	e'	34.7700	Relative Permittivity (ϵ_r):	34.77	34.38	1.13	5
		e''	16.3000	Conductivity (σ):	5.98	6.19	-3.30	5
	Head 6800	e'	34.2100	Relative Permittivity (ϵ_r):	34.21	34.14	0.21	5
		e''	16.2800	Conductivity (σ):	6.16	6.42	-4.09	5
	Head 7000	e'	33.6500	Relative Permittivity (ϵ_r):	33.65	33.90	-0.74	5
		e''	16.4600	Conductivity (σ):	6.41	6.65	-3.66	5
4/13/2023	Head 6000	e'	35.3000	Relative Permittivity (ϵ_r):	35.30	35.10	0.57	5
		e''	16.4500	Conductivity (σ):	5.49	5.48	0.15	5
	Head 6200	e'	35.0600	Relative Permittivity (ϵ_r):	35.06	34.86	0.57	5
		e''	16.6700	Conductivity (σ):	5.75	5.72	0.54	5
	Head 6500	e'	34.5100	Relative Permittivity (ϵ_r):	34.51	34.50	0.03	5
		e''	16.9700	Conductivity (σ):	6.13	6.07	1.04	5
	Head 6600	e'	34.2900	Relative Permittivity (ϵ_r):	34.29	34.38	-0.26	5
		e''	17.0400	Conductivity (σ):	6.25	6.19	1.09	5
	Head 6800	e'	33.9700	Relative Permittivity (ϵ_r):	33.97	34.14	-0.50	5
		e''	17.1200	Conductivity (σ):	6.47	6.42	0.86	5
	Head 7000	e'	33.7300	Relative Permittivity (ϵ_r):	33.73	33.90	-0.50	5
		e''	17.2400	Conductivity (σ):	6.71	6.65	0.91	5
4/14/2023	Head 6000	e'	35.4000	Relative Permittivity (ϵ_r):	35.40	35.10	0.85	5
		e''	16.5600	Conductivity (σ):	5.52	5.48	0.82	5
	Head 6200	e'	35.1900	Relative Permittivity (ϵ_r):	35.19	34.86	0.95	5
		e''	16.7800	Conductivity (σ):	5.78	5.72	1.20	5
	Head 6500	e'	34.6100	Relative Permittivity (ϵ_r):	34.61	34.50	0.32	5
		e''	17.0800	Conductivity (σ):	6.17	6.07	1.70	5
	Head 6600	e'	34.3900	Relative Permittivity (ϵ_r):	34.39	34.38	0.03	5
		e''	17.1500	Conductivity (σ):	6.29	6.19	1.74	5
	Head 6800	e'	34.0700	Relative Permittivity (ϵ_r):	34.07	34.14	-0.21	5
		e''	17.2300	Conductivity (σ):	6.51	6.42	1.51	5
	Head 7000	e'	33.8300	Relative Permittivity (ϵ_r):	33.83	33.90	-0.21	5
		e''	17.3500	Conductivity (σ):	6.75	6.65	1.55	5

8.2. System Check

SAR system verification is required to confirm measurement accuracy, according to the tissue dielectric media, probe calibration points and other system operating parameters required for measuring the SAR of a test device. The system verification must be performed for each frequency band and within the valid range of each probe calibration point required for testing the device. The same SAR probe(s) and tissue-equivalent media combinations used with each specific SAR system for system verification must be used for device testing. When multiple probe calibration points are required to cover substantially large transmission bands, independent system verifications are required for each probe calibration point. A system verification must be performed before each series of SAR measurements using the same probe calibration point and tissue-equivalent medium. Additional system verification should be considered according to the conditions of the tissue-equivalent medium and measured tissue dielectric parameters, typically every days.

System Performance Check Measurement Conditions:

- The measurements were performed in the flat section of the TWIN SAM or ELI phantom, shell thickness: 2.0 ±0.2 mm (bottom plate) filled with Simulating liquid of the following parameters.
- The depth of tissue-equivalent liquid in a phantom must be ≥ 10.0 cm for measurements > 6 GHz.
- The DASY system with an E-Field Probe was used for the measurements.
- The dipole was mounted on the small tripod so that the dipole feed point was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 5 mm (above 6GHz) from dipole center to the simulating liquid surface.
- The dipole input power (forward power) was 100 mW.
- The results are normalized to 1 W input power.

This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

Reference Target SAR Values

The reference SAR values can be obtained from the calibration certificate of system validation dipoles.

System Dipole	Serial No.	Cal. Date	Freq. (MHz)	Target SAR Values (W/kg)	
				1g/10g	Head
D6.5GHzV2	1010	5/27/2022	6500	1g	285.00
				10g	52.90
				APD(4cm^2)	1300.00
D8GHzV2	1012	11/1/2022	8000	1g	267.00
				10g	44.80
				APD(4cm^2)	1100.00

System Check Results

The 1-g and 10-g SAR measured with a reference dipole, using the required tissue-equivalent medium at the test frequency, must be within 10% of the manufacturer calibrated dipole SAR target.

SAR 6 Room

Date Tested	System Dipole		T.S. Liquid		Measured Results		Target (Ref. Value)	Delta ±10 %	Plot No.
	Type	Serial #			Zoom Scan to 100 mW	Normalize to 1 W			
4/20/2023	D6.5GHzV2	1010	Head	1g	27.70	277.0	285.00	-2.81	
				10g	5.26	52.6	52.90	-0.57	
				APD(4cm^2)	128.00	1280.0	1300.00	-1.54	
4/20/2023	D8GHzV2	1012	Head	1g	25.60	256.0	267.00	-4.12	
				10g	4.47	44.7	44.80	-0.22	
				APD(4cm^2)	109.00	1090.0	1100.00	-0.91	
4/21/2023	D6.5GHzV2	1010	Head	1g	27.50	275.0	285.00	-3.51	
				10g	5.22	52.2	52.90	-1.32	
				APD(4cm^2)	127.00	1270.0	1300.00	-2.31	
4/21/2023	D8GHzV2	1012	Head	1g	27.00	270.0	267.00	1.12	
				10g	4.75	47.5	44.80	6.03	
				APD(4cm^2)	116.00	1160.0	1100.00	5.45	
4/24/2023	D6.5GHzV2	1010	Head	1g	28.10	281.0	285.00	-1.40	
				10g	5.29	52.9	52.90	0.00	
				APD(4cm^2)	129.00	1290.0	1300.00	-0.77	
4/24/2023	D8GHzV2	1012	Head	1g	26.10	261.0	267.00	-2.25	
				10g	4.54	45.4	44.80	1.34	
				APD(4cm^2)	111.00	1110.0	1100.00	0.91	
4/25/2023	D6.5GHzV2	1010	Head	1g	26.90	269.0	285.00	-5.61	
				10g	5.14	51.4	52.90	-2.84	1
				APD(4cm^2)	125.00	1250.0	1300.00	-3.85	
4/25/2023	D8GHzV2	1012	Head	1g	24.90	249.0	267.00	-6.74	
				10g	4.34	43.4	44.80	-3.13	2
				APD(4cm^2)	106.00	1060.0	1100.00	-3.64	
5/3/2023	D6.5GHzV2	1010	Head	1g	28.70	287.0	285.00	0.70	
				10g	5.48	54.8	52.90	3.59	
				APD(4cm^2)	133.00	1330.0	1300.00	2.31	

SAR 9 Room

Date Tested	System Dipole		T.S. Liquid		Measured Results		Target (Ref. Value)	Delta ±10 %	Plot No.
	Type	Serial #			Zoom Scan to 100 mW	Normalize to 1 W			
4/12/2023	D6.5GHzV2	1010	Head	1g	28.00	280.0	285.00	-1.75	
				10g	5.43	54.3	52.90	2.65	
				APD(4cm^2)	132.00	1320.0	1300.00	1.54	
4/13/2023	D6.5GHzV2	1010	Head	1g	28.40	284.0	285.00	-0.35	
				10g	5.61	56.1	52.90	6.05	
				APD(4cm^2)	136.00	1360.0	1300.00	4.62	
4/14/2023	D6.5GHzV2	1010	Head	1g	26.50	265.0	285.00	-7.02	
				10g	5.19	51.9	52.90	-1.89	3
				APD(4cm^2)	126.00	1260.0	1300.00	-3.08	

This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

9. IPD(Incident Power Density) System with Dielectric Property

9.1. Dielectric Property

Media is air so Relative Permittivity (ɛr) and Conductivity (σ) is 1.

9.2. System Check

Per Nov 2017,TCB Workshop

System validation is required before a system is deployed for measurement
System check is also required before each series of continuous measurement and, as applicable, repeated at least weekly
Peak and spatially averaged power density at the peak location(s) must be compared to calibrated results according to the defined test conditions

– the same spatial resolution and measurement region used in the waveguide calibration should be applied to system validation and system check
– 4 cm^2 spatial averaging have been used according to FCC requirement.
– power density distribution should also be verified, both spatially (shape) and numerically (level) through visual inspection for noticeable differences
– The Horn antenna input power (forward power) was 100mW.
– The measured results should be within 10% of the calibrated targets

Reference Target PD Values

Per the manufacturer's guide, the target value of the calibration report was converted to a value of 100mW input power.

5G verification Source	Serial No.	Cal. Date	Freq. (MHz)	Averaging area	Prad (mW)	Input power (mW)	Target PD Values (W/m^2)		Note
							1 cm^2	4 cm^2	
10GHz	1022	2/20/2023	100000	Circular	89.1		59.40	54.90	Cal.report target
10GHz	1022	2/20/2023	100000	Circular		100	66.67	61.62	Convert target from Cal.report

SAR 8 Room

Date	Sorce SN	Sorce Cal. Due Data	Input Power (mW)	Measured Results for 1cm^2 (W/m^2)	Target (Ref. Value) (W/m^2)	Delta ±10 %	Measured Total psPD for 4cm^2 (W/m^2)	Target (Ref. Value) (W/m^2)	Delta ±10 %	visual inspection	Plot No.
3/31/2023	1022	3/1/2023	100.0	69.00	66.67	3.49	63.40	61.62	2.89	confirmed	
4/3/2023	1022	3/1/2023	100.0	69.30	66.67	3.94	63.50	61.62	3.05	confirmed	
4/4/2023	1022	3/1/2023	100.0	68.60	66.67	2.89	63.20	61.62	2.56	confirmed	
4/5/2023	1022	3/1/2023	100.0	68.20	66.67	2.29	63.20	61.62	2.56	confirmed	
4/6/2023	1022	3/1/2023	100.0	66.40	66.67	-0.40	61.50	61.62	-0.19	confirmed	
4/7/2023	1022	3/1/2023	100.0	64.00	66.67	-4.00	58.70	61.62	-4.74	confirmed	
4/10/2023	1022	3/1/2023	100.0	64.70	66.67	-2.95	59.10	61.62	-4.09	confirmed	
4/11/2023	1022	3/1/2023	100.0	64.40	66.67	-3.40	59.10	61.62	-4.09	confirmed	
4/12/2023	1022	3/1/2023	100.0	67.60	66.67	1.39	62.70	61.62	1.75	confirmed	
4/20/2023	1022	3/1/2023	100.0	65.80	66.67	-1.30	59.70	61.62	-3.12	confirmed	
4/21/2023	1022	3/1/2023	100.0	64.10	66.67	-3.85	58.50	61.62	-5.06	confirmed	
4/24/2023	1022	3/1/2023	100.0	65.60	66.67	-1.60	59.70	61.62	-3.12	confirmed	
4/25/2023	1022	3/1/2023	100.0	69.40	66.67	4.09	63.20	61.62	2.56	confirmed	
4/26/2023	1022	3/1/2023	100.0	63.80	66.67	-4.30	58.90	61.62	-4.41	confirmed	
4/27/2023	1022	3/1/2023	100.0	68.70	66.67	3.04	63.00	61.62	2.24	confirmed	
4/28/2023	1022	3/1/2023	100.0	70.40	66.67	5.59	64.80	61.62	5.16	confirmed	
5/1/2023	1022	3/1/2023	100.0	67.50	66.67	1.24	62.20	61.62	0.94	confirmed	
5/2/2023	1022	3/1/2023	100.0	67.60	66.67	1.39	60.60	61.62	-1.66	confirmed	
5/3/2023	1022	3/1/2023	100.0	71.30	66.67	6.94	65.00	61.62	5.49	confirmed	4
5/4/2023	1022	3/1/2023	100.0	67.20	66.67	0.79	59.90	61.62	-2.79	confirmed	5

Note(s):
psPD value used the ps_{tot} avg value of test result plot.

This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

9.3. Wi-Fi 6 GHz (U-NII Bands)

Indoor AP / Standard AP

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Pmax (=Plimit) Average Power				SAR Test (Yes/No)
					WLAN MIMO Ant.1		WLAN MIMO Ant.2		
					Avg Pwr (dBm)	Max. Tune-up Limit (dBm)	Avg Pwr (dBm)	Max. Tune-up Limit (dBm)	
UNII 5 (5.925 - 6.425 GHz)	802.11a	6 Mbps	1	5955	9.18	10.00	8.99	10.00	No
			45	6175	9.33		8.22		
			93	6415	9.71		8.11		
	802.11ax (HE20)	7.3 Mbps	1	5935	8.87	10.00	8.83	10.00	No
			45	6175	9.51		8.45		
			93	6415	9.83		8.42		
	802.11ax (HE40)	14.6 Mbps	3	5965	9.16	10.00	9.36	10.00	No
			43	6165	9.49		8.89		
			91	6405	9.76		8.37		
	802.11ax (HE80)	36.0 Mbps	7	5985	9.08	10.00	9.33	10.00	No
			39	6145	9.06		8.90		
			87	6385	9.81		7.78		
	802.11ax (HE160)	72.0 Mbps	15	6025	9.07	10.00	9.06	10.00	Yes
			47	6185	9.46		8.87		
			79	6345	9.62		8.29		
UNII 6 (6.425 - 6.525 GHz)	802.11a	6 Mbps	97	6435	9.67	10.00	8.50	10.00	No
			105	6475	9.01		8.12		
			113	6515	8.88		8.40		
	802.11ax (HE20)	7.3 Mbps	97	6435	9.76	10.00	8.68	10.00	No
			105	6475	9.52		8.67		
			113	6515	9.45		9.10		
	802.11ax (HE40)	14.6 Mbps	99	6445	9.68	10.00	8.56	10.00	No
			115	6525	9.02		8.26		
	802.11ax (HE80)	36.0 Mbps	103	6465	9.76	10.00	8.56	10.00	No
	802.11ax (HE160)	72.0 Mbps	111	6505	9.29	10.00	8.18	10.00	Yes
UNII 7 (6.525 - 6.885 GHz)	802.11a	6 Mbps	117	6535	9.02	10.00	8.34	10.00	No
			149	6695	9.63		8.90		
			185	6875	9.11		8.03		
	802.11ax (HE20)	7.3 Mbps	117	6535	9.42	10.00	8.71	10.00	No
			149	6695	9.56		8.88		
			185	6875	9.42		8.87		
	802.11ax (HE40)	14.6 Mbps	123	6565	9.26	10.00	8.18	10.00	No
			147	6685	9.62		8.82		
			179	6845	9.52		8.36		
	802.11ax (HE80)	36.0 Mbps	119	6545	9.16	10.00	8.36	10.00	No
			151	6705	9.82		9.05		
			183	6865	9.12		8.16		
	802.11ax (HE160)	72.0 Mbps	143	6665	9.18	10.00	8.80	10.00	Yes
			175	6825	9.36		8.16		
UNII 8 (6.885 - 7.125 GHz)	802.11a	6 Mbps	189	5955	9.35	10.00	8.89	10.00	No
			209	6175	9.27		8.82		
			233	6415	9.27		9.09		
	802.11ax (HE20)	7.3 Mbps	189	5955	9.41	10.00	9.03	10.00	No
			209	6175	9.37		8.99		
			233	6415	9.28		9.21		
	802.11ax (HE40)	14.6 Mbps	187	6885	9.33	10.00	8.58	10.00	No
			203	6965	9.26		8.54		
			227	7085	9.26		8.18		
	802.11ax (HE80)	36.0 Mbps	199	6945	9.09	10.00	8.46	10.00	No
			215	7025	9.16		8.68		
	802.11ax (HE160)	72.0 Mbps	207	6985	9.36	10.00	8.74	10.00	Yes

Note(s):

1. Indoor AP for Maximum target power is equal to Standard AP related all RF exposure conditions.
2. Because of Pmax tune-up limit value is the same as Plimit tune-up limit value, Pmax average power is equal to Plimit average power. Refer to Section.6.3.
3. Per TCB workshop April.2021's guide, Channel power verification was performed for UNII 6e (5925MHz-7125MHz). So, 5 test channels of 802.11ax (HE160) were determined for SAR/PD test. Refer to blue box in table.

This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

10. SAR and APD(Absorbed Power Density) Results

SAR Test Reduction criteria are as follows:

- Reported SAR(W/kg) for Wi-Fi = Measured SAR * Tune-up scaling factor * Duty Cycle scaling factor
- Duty Cycle scaling factor = 1 / Duty cycle (%)

KDB 447498 D01 General RF Exposure Guidance:

Testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is:

- ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
- ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
- ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz

KDB 648474 D04 Handset SAR:

With headset attached, when the reported SAR for body-worn accessory, measured without a headset connected to the handset, is > 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a headset attached to the handset.

KDB 648474 D04 Handset SAR (Phablet Only):

For smart phones, with a display diagonal dimension > 15.0 cm or an overall diagonal dimension > 16.0 cm.
When hotspot mode does not apply, 10-g extremity SAR is required for all surfaces and edges with an antenna located at ≤ 25mm From that surface or edge in direct contact with a flat phantom, to address interactive hand use exposure conditions. When hotspot mode applies, 10-g extremity SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg; However, when power reduction applies to hotspot mode the measured SAR must be scaled to the maximum output power, Including tolerance, allowed for phablet modes to compare with the 1.2 W/kg SAR test reduction threshold.

Additional 1-g SAR testing at 5 mm is not required when hotspot mode 10-g extremity SAR is not required for the surfaces and edges; since all 1-g reported SAR < 1.2 W/kg.

This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

10.1. WiFi (UNII Bands-Above 6GHz)

Forder Closed configuration

SAR test results

Antenna	RF Exposure Conditions	Mode	PWR Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Duty Cycle (%)	Power (dBm)		1-g SAR (W/kg)		10-g SAR (W/kg)		Plot No.
									Tune-up limit	Meas.	Meas.	Scaled	Meas.	Scaled	
WLAN MIMO Ant.1	Head	802.11ax HE160 72.0 Mbps	N/A	0	Left Touch	79	6345.0	99.7%	10.00	9.62	0.024	0.026			
					Left Tilt	79	6345.0	99.7%	10.00	9.62					
					Right Touch	15	6025.0	99.7%	10.00	9.07	0.011	0.014			
						79	6345.0	99.7%	10.00	9.62	0.026	0.028			
						111	6505.0	99.7%	10.00	9.29	0.031	0.037			
						143	6665.0	99.7%	10.00	9.18	0.044	0.053			1
						207	6985.0	99.7%	10.00	9.36	0.003	0.003			
					Right Tilt	79	6345.0	99.7%	10.00	9.62					
	Body-worn & Hotspot		N/A	10	Rear	15	6025.0	99.7%	10.00	9.07	0.058	0.072			
						79	6345.0	99.7%	10.00	9.62	0.031	0.034			
						111	6505.0	99.7%	10.00	9.29	0.038	0.045			
						143	6665.0	99.7%	10.00	9.18	0.097	0.118			2
						207	6985.0	99.7%	10.00	9.36	0.229	0.266			
					Front	79	6345.0	99.7%	10.00	9.62	0.004	0.004			
	Product Specific 10-g		N/A	0	Rear	79	6345.0	99.7%	10.00	9.62					
					Front	79	6345.0	99.7%	10.00	9.62			0.007	0.008	
					Top	79	6345.0	99.7%	10.00	9.62			0.003	0.003	
					Rear-Left	15	6025.0	99.7%	10.00	9.07			0.072	0.089	3
						79	6345.0	99.7%	10.00	9.62			0.035	0.038	
						111	6505.0	99.7%	10.00	9.29			0.050	0.059	
						143	6665.0	99.7%	10.00	9.18			0.070	0.085	
						207	6985.0	99.7%	10.00	9.36			0.051	0.059	
					Rear-Right	79	6345.0	99.7%	10.00	9.62					
WLAN MIMO Ant.2	Head	802.11ax HE160 72.0 Mbps	N/A	0	Left Touch	79	6345.0	99.7%	10.00	8.29					
					Left Tilt	79	6345.0	99.7%	10.00	8.29	0.024	0.036			
					Right Touch	15	6025.0	99.7%	10.00	9.06					
						79	6345.0	99.7%	10.00	8.29					
						111	6505.0	99.7%	10.00	8.18					
						143	6665.0	99.7%	10.00	8.80					
						207	6985.0	99.7%	10.00	8.74					
					Right Tilt	79	6345.0	99.7%	10.00	8.29	0.018	0.027			
	Body		N/A	10	Rear	15	6025.0	99.7%	10.00	9.06					
						79	6345.0	99.7%	10.00	8.29					
						111	6505.0	99.7%	10.00	8.18					
						143	6665.0	99.7%	10.00	8.80					
						207	6985.0	99.7%	10.00	8.74					
					Front	79	6345.0	99.7%	10.00	8.29					
	Product Specific 10-g		N/A	0	Rear	79	6345.0	99.7%	10.00	8.29			0.056	0.083	
					Front	79	6345.0	99.7%	10.00	8.29					
					Top	79	6345.0	99.7%	10.00	8.29					
					Rear-Left	15	6025.0	99.7%	10.00	9.06					
						79	6345.0	99.7%	10.00	8.29					
						111	6505.0	99.7%	10.00	8.18					
						143	6665.0	99.7%	10.00	8.80					
						207	6985.0	99.7%	10.00	8.74					
					Rear-Right	79	6345.0	99.7%	10.00	8.29			0.000	0.000	

This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

Forder Opened configuration

SAR test results

Antenna	RF Exposure Conditions	Mode	PWR Back-off	Dist. (mm)	Test Position	Ch #	Freq. (MHz)	Duty Cycle (%)	Power (dBm)		1-g SAR (W/kg)		10-g SAR (W/kg)		Plot No.
									Tune-up limit	Meas.	Meas.	Scaled	Meas.	Scaled	
WLAN MIMO Ant.1	UMPC Body 1g SAR	802.11ax HE160 72.0 Mbps	N/A	10	Rear	15	6025.0	99.7%	10.00	9.07					
						79	6345.0	99.7%	10.00	9.62					
						111	6505.0	99.7%	10.00	9.29					
						143	6665.0	99.7%	10.00	9.18					
						207	6985.0	99.7%	10.00	9.36					
					Front	79	6345.0	99.7%	10.00	9.62	0.018	0.020			
					Top	79	6345.0	99.7%	10.00	9.62					
					Rear-Left	79	6345.0	99.7%	10.00	9.62	0.021	0.023			
	UMPC Extremity 10g SAR		N/A	0	Rear	79	6345.0	99.7%	10.00	9.62					
					Front	15	6025.0	99.7%	10.00	9.07			0.129	0.160	
						79	6345.0	99.7%	10.00	9.62			0.127	0.139	
						111	6505.0	99.7%	10.00	9.29			0.132	0.156	
						143	6665.0	99.7%	10.00	9.18			0.131	0.159	
						207	6985.0	99.7%	10.00	9.36			0.139	0.162	4
					Top	79	6345.0	99.7%	10.00	9.62					
					Rear-Left	79	6345.0	99.7%	10.00	9.62			0.048	0.053	
WLAN MIMO Ant.2	UMPC Body 1g SAR	802.11ax HE160 72.0 Mbps	N/A	10	Rear	15	6025.0	99.7%	10.00	9.06	0.059	0.074			
						79	6345.0	99.7%	10.00	8.29	0.038	0.057			
						111	6505.0	99.7%	10.00	8.18	0.051	0.078			
						143	6665.0	99.7%	10.00	8.80	0.105	0.139			
						207	6985.0	99.7%	10.00	8.74	0.171	0.229			5
					Front	79	6345.0	99.7%	10.00	8.29					
					Top	79	6345.0	99.7%	10.00	8.29	0.033	0.049			
					Rear-Left	79	6345.0	99.7%	10.00	8.29					
	UMPC Extremity 10g SAR		N/A	0	Rear	79	6345.0	99.7%	10.00	8.29			0.042	0.062	
					Front	15	6025.0	99.7%	10.00	9.06					
						79	6345.0	99.7%	10.00	8.29					
						111	6505.0	99.7%	10.00	8.18					
						143	6665.0	99.7%	10.00	8.80					
						207	6985.0	99.7%	10.00	8.74					
					Top	79	6345.0	99.7%	10.00	8.29			0.015	0.022	
					Rear-Left	79	6345.0	99.7%	10.00	8.29					

This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

Forder Closed configuration

APD (Absorbed Power Density) results

Antenna	RF Exposure Conditions	Mode	PWR Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Duty Cycle (%)	Power (dBm)		Measured APD (mW/cm^2 over 4cm^2)	Plot No.
									Tune-up limit	Meas.		
WLAN MIMO Ant.1	Head	802.11ax HE160 72.0 Mbps	N/A	0	Left Touch	79	6345.0	99.7%	10.00	9.62	0.0204	
					Left Tilt	79	6345.0	99.7%	10.00	9.62		
					Right Touch	15	6025.0	99.7%	10.00	9.07	0.0061	
						79	6345.0	99.7%	10.00	9.62	0.0150	
						111	6505.0	99.7%	10.00	9.29	0.0192	
						143	6665.0	99.7%	10.00	9.18	0.0254	1
						207	6985.0	99.7%	10.00	9.36	0.0030	
					Right Tilt	79	6345.0	99.7%	10.00	9.62		
	Body-worn & Hotspot		N/A	10	Rear	15	6025.0	99.7%	10.00	9.07	0.0430	
						79	6345.0	99.7%	10.00	9.62	0.0221	
						111	6505.0	99.7%	10.00	9.29	0.0281	
						143	6665.0	99.7%	10.00	9.18	0.0781	
						207	6985.0	99.7%	10.00	9.36	0.1740	2
					Front	79	6345.0	99.7%	10.00	9.62	0.0033	
	Product Specific 10-g		N/A	0	Rear	79	6345.0	99.7%	10.00	9.62		
					Front	79	6345.0	99.7%	10.00	9.62	0.0149	
					Top	79	6345.0	99.7%	10.00	9.62	0.0080	
					Rear-Left	15	6025.0	99.7%	10.00	9.07	0.1690	3
						79	6345.0	99.7%	10.00	9.62	0.0809	
						111	6505.0	99.7%	10.00	9.29	0.1160	
						143	6665.0	99.7%	10.00	9.18	0.1640	
						207	6985.0	99.7%	10.00	9.36	0.1190	
					Rear-Right	79	6345.0	99.7%	10.00	9.62		
WLAN MIMO Ant.2	Head	802.11ax HE160 72.0 Mbps	N/A	0	Left Touch	79	6345.0	99.7%	10.00	8.29		
					Left Tilt	79	6345.0	99.7%	10.00	8.29	0.0142	
					Right Touch	15	6025.0	99.7%	10.00	9.06		
						79	6345.0	99.7%	10.00	8.29		
						111	6505.0	99.7%	10.00	8.18		
						143	6665.0	99.7%	10.00	8.80		
						207	6985.0	99.7%	10.00	8.74		
					Right Tilt	79	6345.0	99.7%	10.00	8.29	0.0143	
	Body-worn & Hotspot		N/A	10	Rear	15	6025.0	99.7%	10.00	9.06		
						79	6345.0	99.7%	10.00	8.29		
						111	6505.0	99.7%	10.00	8.18		
						143	6665.0	99.7%	10.00	8.80		
						207	6985.0	99.7%	10.00	8.74		
					Front	79	6345.0	99.7%	10.00	8.29		
	Product Specific 10-g		N/A	0	Rear	79	6345.0	99.7%	10.00	8.29	0.1300	
					Front	79	6345.0	99.7%	10.00	8.29		
					Top	79	6345.0	99.7%	10.00	8.29		
					Rear-Left	15	6025.0	99.7%	10.00	9.06		
						79	6345.0	99.7%	10.00	8.29		
						111	6505.0	99.7%	10.00	8.18		
						143	6665.0	99.7%	10.00	8.80		
						207	6985.0	99.7%	10.00	8.74		
					Rear-Right	79	6345.0	99.7%	10.00	8.29	0.0020	

Note(s):

1. APD (Absorbed Power Density) over 4cm^2 averaging area is reported based on SAR measurements.
2. 10 W/m^2 = 1.0 mW/cm^2

This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

Forder Opened configuration

APD (Absorbed Power Density) results

Antenna	RF Exposure Conditions	Mode	PWR Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Duty Cycle (%)	Power (dBm)		Measured APD (mW/cm^2 over 4cm^2)	Plot No.
									Tune-up limit	Meas.		
WLAN MIMO Ant.1	UMPC Body 1g SAR	802.11ax HE160 72.0 Mbps	N/A	10	Rear	15	6025.0	99.7%	10.00	9.07		
						79	6345.0	99.7%	10.00	9.62		
						111	6505.0	99.7%	10.00	9.29		
						143	6665.0	99.7%	10.00	9.18		
						207	6985.0	99.7%	10.00	9.36		
					Front	79	6345.0	99.7%	10.00	9.62	0.0202	
					Top	79	6345.0	99.7%	10.00	9.62		
					Rear-Left	79	6345.0	99.7%	10.00	9.62	0.0164	
	UMPC Extremity 10g SAR		N/A	0	Rear	79	6345.0	99.7%	10.00	9.62		
					Front	15	6025.0	99.7%	10.00	9.07	0.2980	
						79	6345.0	99.7%	10.00	9.62	0.2930	
						111	6505.0	99.7%	10.00	9.29	0.3050	
						143	6665.0	99.7%	10.00	9.18	0.3050	
						207	6985.0	99.7%	10.00	9.36	0.3250	4
					Top	79	6345.0	99.7%	10.00	9.62		
					Rear-Left	79	6345.0	99.7%	10.00	9.62	0.1110	
WLAN MIMO Ant.2	UMPC Body 1g SAR	802.11ax HE160 72.0 Mbps	N/A	10	Rear	15	6025.0	99.7%	10.00	9.06	0.045	
						79	6345.0	99.7%	10.00	8.29	0.027	
						111	6505.0	99.7%	10.00	8.18	0.035	
						143	6665.0	99.7%	10.00	8.80	0.088	
						207	6985.0	99.7%	10.00	8.74	0.132	5
					Front	79	6345.0	99.7%	10.00	8.29		
					Top	79	6345.0	99.7%	10.00	8.29	0.0170	
					Rear-Left	79	6345.0	99.7%	10.00	8.29		
	UMPC Extremity 10g SAR		N/A	0	Rear	79	6345.0	99.7%	10.00	8.29	0.0970	
					Front	15	6025.0	99.7%	10.00	9.06		
						79	6345.0	99.7%	10.00	8.29		
						111	6505.0	99.7%	10.00	8.18		
						143	6665.0	99.7%	10.00	8.80		
						207	6985.0	99.7%	10.00	8.74		
					Top	79	6345.0	99.7%	10.00	8.29	0.0340	
					Rear-Left	79	6345.0	99.7%	10.00	8.29		

Note(s):

1. APD (Absorbed Power Density) over 4cm^2 averaging area is reported based on SAR measurements.
2. 10 W/m^2 = 1.0 mW/cm^2

This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

10.2. UWB

SAR test results

Forder Closed configuration

Antenna	RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	10-g SAR (W/kg) Meas.	Plot No.
UWB Ant.1	Product Specific 10-g	CW	0	Rear	5	6489.6	0.000	6
					9	7987.2	0.000	
				Front	5	6489.6	0.000	
					9	7987.2	0.000	
				Top	5	6489.6	0.000	
					9	7987.2	0.000	
				Rear-Right	5	6489.6	0.000	
					9	7987.2	0.000	
UWB Ant.2	Product Specific 10-g	CW	0	Rear	9	7987.2	0.000	
				Front	9	7987.2	0.000	
				Top	9	7987.2	0.000	
				Rear-Right	9	7987.2	0.000	7

Forder Opened configuration

Antenna	RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	10-g SAR (W/kg) Meas.	Plot No.
UWB Ant.1	UMPC Extremity 10g SAR	CW	0	Rear	5	6489.6	0.001	8
					9	7987.2	0.000	
				Front	5	6489.6	0.000	
					9	7987.2	0.000	
				Top	5	6489.6	0.000	
					9	7987.2	0.000	
UWB Ant.2				Rear	9	7987.2	0.000	
				Front	9	7987.2	0.001	9
				Top	9	7987.2	0.000	

Note(s):

UWB Ant.1 has support to Ch.5 and Ch.9 and UWB Ant.2 has only support to Ch.9.

APD (Absorbed Power Density) results

Forder Closed configuration

Antenna	RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Measured APD (mW/cm^2 over 4cm^2)	Plot No.
UWB Ant.1	Product Specific 10-g	CW	0	Rear	5	6489.6	0.0015	6
					9	7987.2	0.0010	
				Front	5	6489.6	0.0010	
					9	7987.2	0.0012	
				Top	5	6489.6	0.0011	
					9	7987.2	0.0005	
				Rear-Right	5	6489.6	0.0009	
					9	7987.2	0.0006	
UWB Ant.2	Product Specific 10-g	CW	0	Rear	9	7987.2	0.0015	
				Front	9	7987.2	0.0017	
				Top	9	7987.2	0.0015	
				Rear-Right	9	7987.2	0.0019	7

Forder Opened configuration

Antenna	RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Measured APD (mW/cm^2 over 4cm^2)	Plot No.
UWB Ant.1	UMPC Extremity 10g SAR	CW	0	Rear	5	6489.6	0.0025	8
					9	7987.2	0.0003	
				Front	5	6489.6	0.0007	
					9	7987.2	0.0008	
				Top	5	6489.6	0.0011	
					9	7987.2	0.0016	
UWB Ant.2				Rear	9	7987.2	0.0005	
				Front	9	7987.2	0.0025	9
				Top	9	7987.2	0.0019	

Note(s):

1. APD (Absorbed Power Density) over 4cm^2 averaging area is reported based on SAR measurements.
2. 10 W/m^2 = 1.0 mW/cm^2

This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

11. IPD(Incident Power density) Results

11.1. WiFi (UNII Bands-Above 6GHz)

Forder Closed configuration

Antenna	Mode	Test Position	Dist. (mm)	Ch.	Freq. (MHz)	Duty Cycle	Grid Step (Lamda)	iPD Note.4 (mW/cm^2)	Power (dBm)		Measured. Normal psPD	Measured. Total psPD	Reported. Normal psPD Note.3	Reported. Total psPD Note.3	Scailing factor for Measurement Uncertainty per IEC 62479 Note.2	Scaled Normal psPD	Scaled Total psPD	Note.	Plot No.
									Tune-up limit	Meas.	mW/cm^2	mW/cm^2	mW/cm^2	mW/cm^2		mW/cm^2	mW/cm^2		
WLAN MIMO Ant.1	802.11ax HE 160	Rear	2.00	15	6025.0	99.7%	0.041	N/A	10.00	9.07					1.541				
				79	6345.0	99.7%	0.043	N/A	10.00	9.62					1.541				
				111	6505.0	99.7%	0.044	N/A	10.00	9.29					1.541				
				143	6665.0	99.7%	0.045	N/A	10.00	9.18					1.541				
				207	6985.0	99.7%	0.047	N/A	10.00	9.36					1.541				
		Front		79	6345.0	99.7%	0.043	N/A	10.00	9.62	0.0264	0.0301	0.0288	0.0329	1.541	0.0444	0.0507		
		Top		79	6345.0	99.7%	0.043	N/A	10.00	9.62					1.541				
		Rear-Left		79	6345.0	99.7%	0.043	N/A	10.00	9.62	0.1040	0.1130	0.1140	0.1230	1.541	0.1757	0.1895		
		Rear-Right		79	6345.0	99.7%	0.043	N/A	10.00	9.62					1.541				
WLAN MIMO Ant.2	802.11ax HE 160	Rear	2.00	15	6025.0	99.7%	0.041	0.0704	10.00	9.06	0.1380	0.1520	0.1710	0.1890	1.541	0.2635	0.2912	4	
				79	6345.0	99.7%	0.043	N/A	10.00	8.29	0.1040	0.1140	0.1540	0.1690	1.541	0.2373	0.2604		
				111	6505.0	99.7%	0.044	N/A	10.00	8.18	0.0953	0.1050	0.1450	0.1600	1.541	0.2234	0.2466		
				143	6665.0	99.7%	0.045	N/A	10.00	8.80	0.1820	0.2100	0.2400	0.2770	1.541	0.3698	0.4269		
				207	6985.0	99.7%	0.047	N/A	10.00	8.74	0.1750	0.2230	0.2340	0.2980	1.541	0.3606	0.4592		10
		Front		79	6345.0	99.7%	0.043	N/A	10.00	8.29					1.541	0.0000	0.0000		
		Top		79	6345.0	99.7%	0.043	N/A	10.00	8.29	0.0339	0.0382	0.0503	0.0567	1.541	0.0775	0.0874		
		Rear-Left		79	6345.0	99.7%	0.043	N/A	10.00	8.29					1.541	0.0000	0.0000		
		Rear-Right		79	6345.0	99.7%	0.043	N/A	10.00	8.29	0.0200	0.0210	0.0297	0.0312	1.541	0.0458	0.0481		
		Rear	9.96	15	6025.0	99.7%	0.041	0.0830	10.00	9.06	0.0965	0.1040	0.1200	0.1300	1.541	0.1849	0.2003	4	

Forder Opened configuration

Antenna	Mode	Test Position	Dist. (mm)	Ch.	Freq. (MHz)	Duty Cycle	Grid Step (Lamda)	iPD Note.4 (mW/cm^2)	Power (dBm)		Measured. Normal psPD	Measured. Total psPD	Reported. Normal psPD Note.3	Reported. Total psPD Note.3	Scailing factor for Measurement Uncertainty per IEC 62479 Note.2	Scaled Normal psPD	Scaled Total psPD	Note.	Plot No.
									Tune-up limit	Meas.	mW/cm^2	mW/cm^2	mW/cm^2	mW/cm^2		mW/cm^2	mW/cm^2		
WLAN MIMO Ant.1	802.11ax HE 160	Rear	2.00	79	6345.0	99.7%	0.043	N/A	10.00	9.62					1.541				
		Front		15	6025.0	99.7%	0.041	N/A	10.00	9.07	0.0958	0.1120	0.1190	0.1380	1.541	0.1834	0.2127		
				79	6345.0	99.7%	0.043	N/A	10.00	9.62	0.1230	0.1440	0.1340	0.1580	1.541	0.2065	0.2435		
				111	6505.0	99.7%	0.044	N/A	10.00	9.29	0.0728	0.0895	0.0858	0.1050	1.541	0.1322	0.1618		
				143	6665.0	99.7%	0.045	N/A	10.00	9.18	0.0720	0.0831	0.0869	0.1000	1.541	0.1339	0.1541		
				207	6985.0	99.7%	0.047	N/A	10.00	9.36	0.0874	0.0937	0.1010	0.1090	1.541	0.1556	0.1680		
		Top		79	6345.0	99.7%	0.043	N/A	10.00	9.62	0.0370	0.0397	0.0404	0.0434	1.541	0.0623	0.0669		
		Rear-Left		79	6345.0	99.7%	0.043	N/A	10.00	9.62	0.0887	0.0930	0.0968	0.1010	1.541	0.1492	0.1556		
WLAN MIMO Ant.2	802.11ax HE 160	Rear	2.00	79	6345.0	99.7%	0.043	N/A	10.00	8.29	0.1020	0.1100	0.1510	0.1630	1.541	0.2327	0.2512		11
		Front		15	6025.0	99.7%	0.041	N/A	10.00	9.06					1.541				
				79	6345.0	99.7%	0.043	N/A	10.00	8.29					1.541				
				111	6505.0	99.7%	0.044	N/A	10.00	8.18					1.541				
				143	6665.0	99.7%	0.045	N/A	10.00	8.80					1.541				
				207	6985.0	99.7%	0.047	N/A	10.00	8.74					1.541				
		Top		79	6345.0	99.7%	0.043	N/A	10.00	8.29	0.0370	0.0397	0.0549	0.0589	1.541	0.0846	0.0908		
		Rear-Left		79	6345.0	99.7%	0.043	N/A	10.00	8.29					1.541				

Note(s):

1. 10 W/m^2 = 1.0 mW/cm^2
2. Per TCBC workshop guide, Incident power density results were scaled according to IEC 62479:2010 for the portion of the measurement uncertainty > 30%. Total expanded uncertainty of 2.65 dB (84.1%) was used to determine the psPD measurement scailing factor.
3. Power density test data were scaled to tune-up limit using measurement system tool.
4. Grid Step setting were using the automatic grid step function of measurement system tool.
5. Per manufacturer guide, Incident power density was measured at d=2mm and d=Lamda/5mm using the same grid size and grid step size for some frequencies and surfaces. iPD(integrated Power Density) was calculated based on these measurements. Since iPD ratio between the two distance is < 1dB, the grid step was sufficient for determining compliance at d=2mm.

This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

11.2. UWB

Forder Closed configuration

Antenna	Mode	Test Position	Dist. (mm)	Ch.	Freq. (MHz)	Grid Step (Lamda)	Meas. Normal psPD	Meas. Total psPD	Scailing factor for Measurement Uncertainty per IEC 62479 Note.2	Scaled Normal psPD	Scaled Total psPD	Note.	Plot No.
							mW/cm^2	mW/cm^2		mW/cm^2	mW/cm^2		
UWB Ant. 1	CW	Rear	2.00	5	6489.60	0.04	0.0024	0.0029	1.541	0.0037	0.0045		
				9	7987.20	0.04	0.0025	0.0049	1.541	0.0039	0.0076		
		Front		5	6489.60	0.04	0.0020	0.0046	1.541	0.0031	0.0071		
				9	7987.20	0.04	0.0038	0.0039	1.541	0.0059	0.0060		
		Top		5	6489.60	0.04	0.0046	0.0049	1.541	0.0071	0.0076		
				9	7987.20	0.04	0.0040	0.0041	1.541	0.0062	0.0063		
		Rear-Right		5	6489.60	0.04	0.0049	0.0052	1.541	0.0076	0.0080		12
				9	7987.20	0.04	0.0033	0.0034	1.541	0.0051	0.0052		
UWB Ant. 2		Rear		9	7987.20	0.04	0.0006	0.0010	1.541	0.0009	0.0015		
		Front		9	7987.20	0.04	0.0010	0.0018	1.541	0.0015	0.0028		
		Edge 1		9	7987.20	0.04	0.0041	0.0042	1.541	0.0063	0.0065		13
		Rear-Right		9	7987.20	0.04	0.0037	0.0039	1.541	0.0057	0.0060		

Forder Opened configuration

Antenna	Mode	Test Position	Dist. (mm)	Ch.	Freq. (MHz)	Grid Step (Lamda)	Meas. Normal psPD	Meas. Total psPD	Scailing factor for Measurement Uncertainty per IEC 62479 Note.2	Scaled Normal psPD	Scaled Total psPD	Note.	Plot No.
							mW/cm^2	mW/cm^2		mW/cm^2	mW/cm^2		
UWB Ant. 1	CW	Rear	2.00	5	6489.60	0.04	0.0028	0.0031	1.541	0.0043	0.0048		
				9	7987.20	0.04	0.0048	0.0050	1.541	0.0074	0.0077		14
		Front		5	6489.60	0.04	0.0036	0.0048	1.541	0.0055	0.0074		
				9	7987.20	0.04	0.0024	0.0028	1.541	0.0037	0.0043		
		Top		5	6489.60	0.04	0.0044	0.0048	1.541	0.0068	0.0074		
				9	7987.20	0.04	0.0029	0.0031	1.541	0.0045	0.0048		
UWB Ant. 2		Rear		9	7987.20	0.04	0.0032	0.0038	1.541	0.0049	0.0059		
		Front		9	7987.20	0.04	0.0044	0.0044	1.541	0.0068	0.0068		
		Edge 1		9	7987.20	0.04	0.0044	0.0046	1.541	0.0068	0.0071		15

Note(s):

1. 10 W/m^2 = 1.0 mW/cm^2
2. Per TCBC workshop guide, Incident power density results were scaled according to IEC 62479:2010 for the portion of the measurement uncertainty > 30%. Total expanded uncertainty of 2.65 dB (84.1%) was used to determine the psPD measurement scailing factor.
3. IPD verification is not considered in UWB. because the test was conducted with the lowest grid step of WIFI 6e and was verified.

This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

12. Simultaneous Transmission Analysis

Please refer to section.12 in FCC SAR report S1.

Appendixes

Refer to separated files for the following appendixes.

4790748041-S2 FCC Report Above 6GHz_App A_PD Photos & Ant. Locations

4790748041-S2 FCC Report Above 6GHz _App B_Highest SAR and PD Test Plots

4790748041-S2 FCC Report Above 6GHz _App C_System Check Plots

4790748041-S2 FCC Report Above 6GHz _App D_SAR Tissue Ingredients

4790748041-S2 FCC Report Above 6GHz _App E_Probe Cal. Certificates

4790748041-S2 FCC Report Above 6GHz _App F_Dipole and Horn antenna Cal. Certificates

END OF REPORT

This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.