S T S LAB

FCC SAR TEST REPORT

Report No.: STS2303343H02

Issued for

Shanghai UniOne Science&Technology CO., Ltd.

Building 4, No.651 Wanfang Road, Pujiang Town, Minhang District, Shanghai, China.

Product Name:	Rugged Windows Tablet
Brand:	N/A
Model Number:	GTW5081
Series Model(s):	N/A
FCC ID:	2A96I-GTW5081
Test Standard:	ANSI/IEEE Std. C95.1
	FCC 47 CFR Part 2 (2.1093)
	IEC/IEEE 62209-1528
Max. Report SAR (1g):	Body: 1.584 W/kg

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Test Report Certification

Applicant's name .....: Shanghai UniOne Science&Technology CO., Ltd.

Address .....: Building 4, No.651 Wanfang Road, Pujiang Town, Minhang District, Shanghai, China.

Manufacture's Name .....: Shanghai UniOne Science&Technology CO., Ltd.

Address .....: Building 4, No.651 Wanfang Road, Pujiang Town, Minhang District, Shanghai, China.

Product description

Product name .....: Rugged Windows Tablet

Brand name .....: N/A

Model name .....: GTW5081

Series Model.....: N/A

Standards .....: ANSI/IEEE Std. C95.1-1992
FCC 47 CFR Part 2 (2.1093)
IEC/IEEE 62209-1528

The device was tested by Shenzhen STS Test Services Co., Ltd. in accordance with the measurement methods and procedures specified in KDB 865664 The test results in this report apply only to the tested sample of the stated device/equipment. Other similar device/equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Date of Test

Date (s) of performance of tests .....: 24 Jul. 2023 ~10 Oct. 2023

Date of Issue.....: 10 Oct. 2023

Test Result.....: **Pass**

Testing Engineer : Shi fan. long

(Shifan. Long)

Technical Manager : Sean She

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Authorized Signatory : Bovey Yang

(Bovey Yang)

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Revision History

Rev.	Issue Date	Report No.	Effect Page	Contents
00	10 Oct. 2023	STS2303343H02	ALL	Initial Issue

1. General Information

Environmental evaluation measurements of specific absorption rate (SAR) distributions in emulated human head and body tissues exposed to radio frequency (RF) radiation from wireless portable devices for compliance with the rules and regulations of the U.S. Federal Communications Commission (FCC).

1.1 EUT Description

Product Name	Rugged Windows Tablet		
Brand Name	N/A		
Model Name	GTW5081		
Series Model	N/A		
Model Difference	N/A		
Battery	Rated Voltage:7.6V Charge Limit Voltage:8.7V Capacity: 4200mAh		
Device Category	Portable		
Product stage	Production unit		
RF Exposure Environment	General Population / Uncontrolled		
Hardware Version	N/A		
Software Version	N/A		
Frequency Range	802.11b/g/n/ax (20MHz): 2412~2462 MHz 802.11n/ax (40MHz):2422~2452MHz 5.2G WLAN 802.11a/n20/n40/ac20/ac40/ac80/ac160/ax20/ax40/ax/80/ax160: 5150 to 5250 MHz 5.3G WLAN 802.11a/n20/n40/ac20/ac40/ac80/ac160/ax20/ax40/ax/80/ax160: 5250 to 5350 MHz 5.6G WLAN 802.11a/n20/n40/ac20/ac40/ac80/ac160/ax20/ax40/ax/80/ax160: 5470 to 5725 MHz 5.8G WLAN 802.11a/n20/n40/ac20/ac40/ac80/ac160/ax20/ax40/ax/80/ax160: 5725 to 5875 MHz Bluetooth: 2402 to 2480 MHz		
Max. Reported SAR(1g): (Limit:1.6W/kg)	Band	Mode	Body Worn and Hotspot(W/Kg)
	DTS	2.4GHz WLAN-ANT-1	0.583
	DTS	2.4GHz WLAN-ANT-2	0.195
	DTS	2.4GHz WLAN-ANT-1+2	0.238
	NII	5.2GHz WLAN-ANT-1	1.076
	NII	5.2GHz WLAN-ANT-2	1.450
	NII	5.2GHz WLAN-ANT-1+2	1.576
	NII	5.3GHz WLAN-ANT-1	0.558
	NII	5.3GHz WLAN-ANT-2	0.563
	NII	5.3GHz WLAN-ANT-1+2	1.192
	NII	5.6GHz WLAN-ANT-1	0.672
	NII	5.6GHz WLAN-ANT-2	0.464
	NII	5.6GHz WLAN-ANT-1+2	1.584

	NII	5.8GHz WLAN-ANT-1	0.744
	NII	5.8GHz WLAN-ANT-2	0.545
	NII	5.8GHz WLAN-ANT-1+2	1.099
	DTS	BT	0.154
FCC Equipment Class	Part 15 Spread Spectrum Transmitter (DSS) Unlicensed National Information Infrastructure TX (NII) Digital Transmission System (DTS)		
Operating Mode	2.4G WLAN:802.11b(DSSS):CCK,DQPSK,DBPSK 802.11g(OFDM):BPSK,QPSK,16-QAM,64-QAM 802.11n(OFDM):BPSK,QPSK,16-QAM,64-QAM BPSK,QPSK,16-QAM,64-QAM,256-QAM 802.11ax(OFDM, OFDMA):BPSK,QPSK, 16-QAM,64-QAM,256-QAM,1024QAM 5G WLAN: 802.11a(OFDM): BPSK,QPSK,16-QAM,64-QAM 802.11n(OFDM): BPSK,QPSK,16-QAM,64-QAM 802.11ac(OFDM): BPSK,QPSK,16-QAM,64-QAM,256-QAM 802.11ax(OFDM, OFDMA):BPSK,QPSK, 16-QAM,64-QAM,256-QAM,1024QAM Bluetooth: GFSK +π/4DQPSK+8DPSK BLE: GFSK		
Antenna Specification	PIFA Antenna		
Hotspot Mode	Not Support		
DTM Mode	Not Support		

Note:
1. Estimated exemption for Bluetooth,
2. The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power
3. The Bluetooth and WLAN can’t simultaneous transmission at the same time.

1.2 Test Environment

Ambient conditions in the SAR laboratory:

Items	Required
Temperature (℃)	18-25
Humidity (%RH)	30-70

1.3 Test Factory

ShenZhen STS Test Services Co.,Ltd.

A 1/F, Building B, Zhuoke Science Park, No.190 Chongqing Road, HepingShequ, Fuyong Sub-District, Bao'an District, Shenzhen, Guang Dong, China

FCC test Firm Registration No.: 625569

IC Registration No.: 12108A

A2LA Certificate No.: 4338.01

2. Test Standards and Limits

No.	Identity	Document Title
1	47 CFR Part 2	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
2	ANSI/IEEE Std. C95.1-1992	IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz
3	IEC/IEEE 62209-1528	Measurement procedure for the assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Part 1528: Human models, instrumentation, and procedures (Frequency range of 4 MHz to 10 GHz)
4	FCC KDB 447498 D01 v06	Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies
5	FCC KDB 865664 D01 v01r04	SAR Measurement 100 MHz to 6 GHz
6	FCC KDB 865664 D02 v01r02	RF Exposure Reporting
7	FCC KDB 648474 D04 v01r03	SAR Evaluation Considerations for Wireless Handsets
8	FCC KDB 248227 D01 Wi-Fi SAR v02r02	SAR Considerations for 802.11 Devices

(A). Limits for Occupational/Controlled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.4	8.0	20.0

(B). Limits for General Population/Uncontrolled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.08	1.6	4.0

NOTE: Whole-Body SAR is averaged over the entire body, partial-body SAR is averaged over any 1 gram of tissue defined as a tissue volume in the shape of a cube. SAR for hands, wrists, feet and ankles is averaged over any 10 grams of tissue defined as a tissue volume in the shape of a cube.

Population/Uncontrolled Environments:

Are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

Occupational/Controlled Environments:

Are defined as locations where there is exposure that may be incurred by people who are aware of the potential for exposure, (i.e. as a result of employment or occupation).

NOTE

GENERAL POPULATION/UNCONTROLLED EXPOSURE

PARTIAL BODY LIMIT

1.6 W/kg

3. SAR Measurement System

3.1 Definition of Specific Absorption Rate (SAR)

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.
The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density (ρ). The equation description is as below:

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

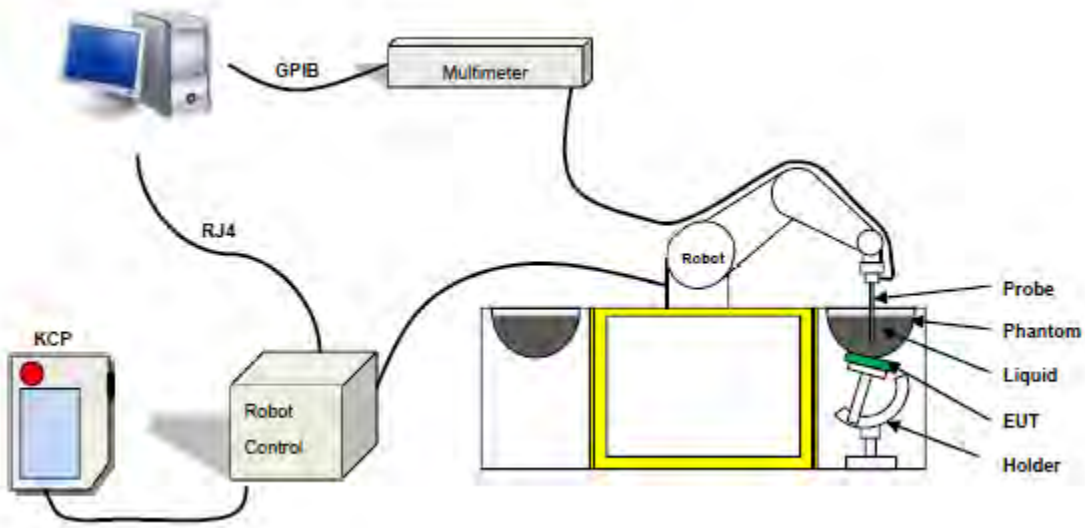
SAR is expressed in units of Watts per kilogram (W/kg) SAR measurement can be related to the electrical field in the tissue by

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

Where: σ is the conductivity of the tissue,
ρ is the mass density of the tissue and E is the RMS electrical field strength.

3.2 SAR System

MVG SAR System Diagram:



COMOSAR is a system that is able to determine the SAR distribution inside a phantom of human being according to different standards. The COMOSAR system consists of the following items:

- Main computer to control all the system
- 6 axis robot
- Data acquisition system
- Miniature E-field probe
- Phone holder
- Head simulating tissue

The following figure shows the system.

The EUT under test operating at the maximum power level is placed in the phone holder, under the phantom, which is filled with head simulating liquid. The E-Field probe measures the electric field inside the phantom. The Open SAR software computes the results to give a SAR value in a 1g or 10g mass.

3.2.1 Probe

For the measurements the Specific Dosimetric E-Field Probe SN 07/21 EPGO352 with following specifications is used

- Probe Length: 330 mm
- Length of Individual Dipoles: 2 mm
- Maximum external diameter: 8 mm
- Probe Tip External Diameter: 2.5 mm
- Distance between dipole/probe extremity: 1 mm
- Dynamic range: 0.01-100 W/kg
- Probe linearity: 3%
- Axial Isotropy: < 0.10 dB
- Spherical Isotropy: < 0.10 dB
- Calibration range: 150 MHz to 6 GHz for head & body simulating liquid.
- Angle between probe axis (evaluation axis) and surface normal line: less than 30°

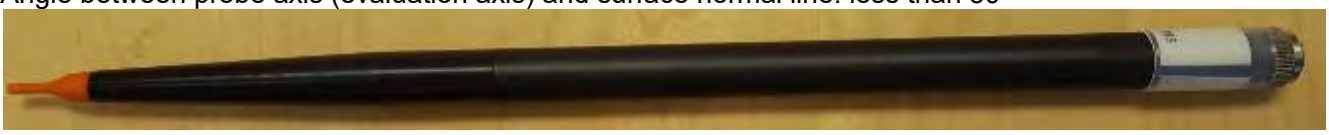


Figure 1-MVG COMOSAR Dosimetric E field Dipole

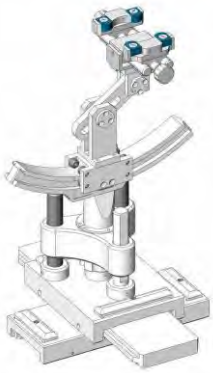
3.2.2 Phantom

For the measurements the Specific Anthropomorphic Mannequin (SAM) defined by the IEEE SCC-34/SC2 group is used. The phantom is a polyurethane shell integrated in a wooden table. The thickness of the phantom amounts to 2mm +/- 0.2mm. It enables the dosimetric evaluation of left and right phone usage and includes an additional flat phantom part for the simplified performance check. The phantom set-up includes a cover, which prevents the evaporation of the liquid.

Figure-SN 32/14 SAM115

Figure-SN 21/21 ELLI48

3.2.3 Device Holder



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

4. Tissue Simulating Liquids

4.1 Simulating Liquids Parameter Check

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in P1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in a human head. Other head and body tissue parameters that have not been specified in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations described in Reference [12] and extrapolated according to the head parameters specified in P1528.

Head Tissue

Frequency (MHz)	cellulose	DGBE	HEC	NaCl	Preventol	Sugar	X100	Water	Conductivity	Permittivity
	%	%	%	%	%	%	%	%	σ	εr
750	0.2	/	/	1.4	0.2	57.0	/	41.1	0.89	41.9
835	0.2	/	/	1.4	0.2	57.9	/	40.3	0.90	41.5
900	0.2	/	/	1.4	0.2	57.9	/	40.3	0.97	41.5
1800	/	44.5	/	0.3	/	/	30.45	55.2	1.4	40.0
1900	/	44.5	/	0.3	/	/	30.45	55.2	1.4	40.0
2000	/	44.5	/	0.3	/	/	/	55.2	1.4	40.0
2450	/	44.9	/	0.1	/	/	/	55.0	1.80	39.2
2600	/	45.0	/	0.1	/	/	/	54.9	1.96	39.0

Body Tissue

Frequency (MHz)	cellulose	DGBE	HEC	NaCl	Preventol	Sugar	X100	Water	Conductivity	Permittivity
	%	%	%	%	%	%	%	%	σ	εr
750	0.2	/	/	0.9	0.1	47.2	/	51.7	0.96	55.5
835	0.2	/	/	0.9	0.1	48.2	/	50.8	0.97	55.2
900	0.2	/	/	0.9	0.1	48.2	/	50.8	1.05	55.0
1800	/	29.4	/	0.4	/	/	30.45	70.2	1.52	53.3
1900	/	29.4	/	0.4	/	/	30.45	70.2	1.52	53.3
2000	/	29.4	/	0.4	/	/	/	70.2	1.52	53.3
2450	/	31.3	/	0.1	/	/	/	68.6	1.95	52.7
2600	/	31.7	/	0.1	/	/	/	68.2	2.16	52.3

Tissue dielectric parameters for head and body phantoms				
Frequency	εr		σ S/m	
	Head	Body	Head	Body
300	45.3	58.2	0.87	0.92
450	43.5	56.7	0.87	0.94
900	41.5	55.0	0.97	1.05
1450	40.5	54.0	1.20	1.30
1800	40.0	53.3	1.40	1.52
2450	39.2	52.7	1.80	1.95
3000	38.5	52.0	2.40	2.73
5800	35.3	48.2	5.27	6.00

LIQUID MEASUREMENT RESULTS

Date	Ambient		Simulating Liquid		Parameters	Target	Measured	Deviation %	Limited %
	Temp. [°C]	Humidity %	Frequency (MHz)	Temp. [°C]					
2023-07-24	22.1	49	2412	21.9	Permittivity	39.27	39.65	0.97	±5
					Conductivity	1.77	1.79	1.35	±5
2023-07-24	22.2	49	2437	21.9	Permittivity	39.22	39.70	1.22	±5
					Conductivity	1.79	1.76	-1.59	±5
2023-07-24	22.2	50	2450	21.9	Permittivity	39.20	40.18	2.50	±5
					Conductivity	1.80	1.79	-0.56	±5
2023-07-25	21.3	59	5190	20.9	Permittivity	36.01	36.97	2.67	±5
					Conductivity	4.65	4.66	0.23	±5
2023-07-25	21.4	59	5200	21.1	Permittivity	36.00	36.23	0.64	±5
					Conductivity	4.66	4.65	-0.21	±5
2023-07-25	21.4	59	5230	21.1	Permittivity	35.97	36.96	2.75	±5
					Conductivity	4.69	4.62	-1.52	±5
2023-07-25	21.5	59	5270	21.2	Permittivity	35.93	35.78	-0.42	±5
					Conductivity	4.73	4.70	-0.71	±5
2023-07-26	22.8	45	5300	22.5	Permittivity	35.90	36.65	2.09	±5
					Conductivity	4.76	4.78	0.42	±5
2023-07-26	22.8	45	5310	22.5	Permittivity	35.89	36.66	2.15	±5
					Conductivity	4.77	4.78	0.21	±5
2023-07-26	21.8	60	5510	21.5	Permittivity	35.66	36.25	1.65	±5
					Conductivity	4.97	4.97	-0.06	±5
2023-07-26	22.8	46	5550	22.5	Permittivity	35.61	36.48	2.44	±5
					Conductivity	5.01	5.04	0.52	±5
2023-07-26	22.8	45	5600	22.4	Permittivity	35.55	36.68	3.18	±5
					Conductivity	5.07	5.12	1.09	±5
2023-07-26	21.8	60	5670	21.5	Permittivity	35.46	35.75	0.81	±5
					Conductivity	5.14	5.19	1.04	±5
2023-07-27	22.9	41	5785	22.6	Permittivity	35.32	36.21	2.53	±5
					Conductivity	5.25	5.21	-0.84	±5
2023-07-27	21.9	60	5795	21.6	Permittivity	35.31	35.54	0.67	±5
					Conductivity	5.26	5.23	-0.66	±5
2023-07-27	22.9	41	5800	22.5	Permittivity	35.30	35.59	0.82	±5
					Conductivity	5.27	5.33	1.14	±5

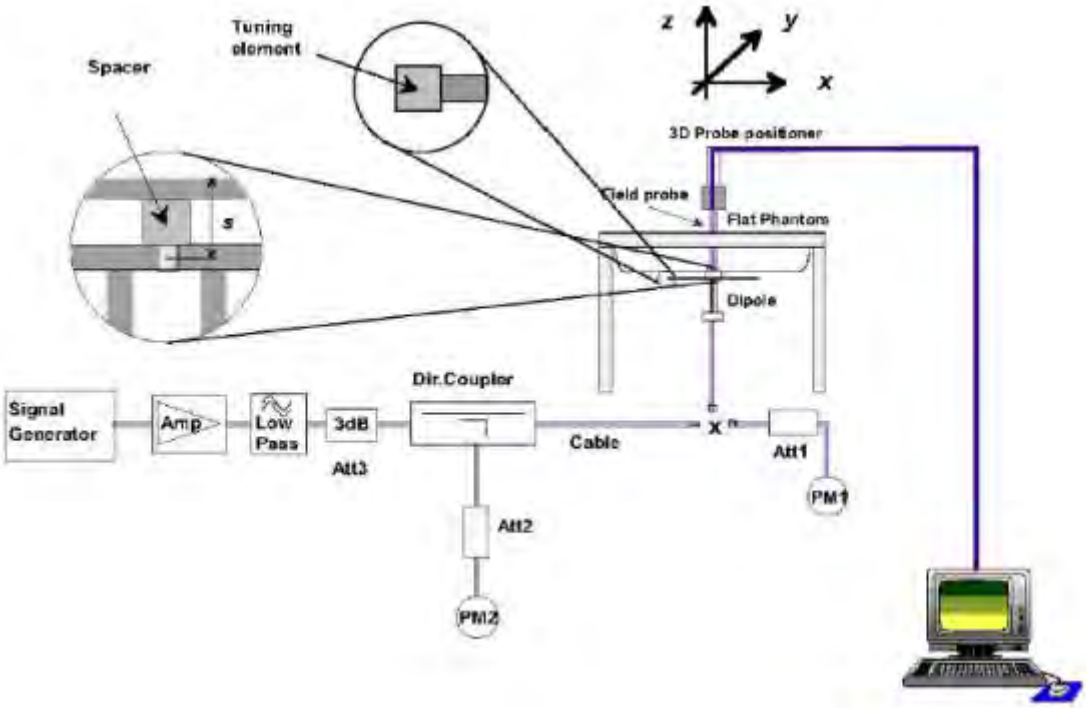
2023-10-09	22.1	49	2412	21.9	Permittivity	39.27	39.48	0.54	±5
					Conductivity	1.77	1.85	4.74	±5
2023-10-09	22.2	49	2450	21.9	Permittivity	39.20	39.48	0.71	±5
					Conductivity	1.80	1.85	2.78	±5
2023-10-09	22.2	50	2480	21.9	Permittivity	39.15	40.53	3.53	±5
					Conductivity	1.83	1.74	-4.74	±5
2023-10-09	21.3	59	5190	20.9	Permittivity	36.01	36.50	1.36	±5
					Conductivity	4.65	4.52	-2.79	±5
2023-10-09	21.4	59	5200	21.1	Permittivity	36.00	36.58	1.61	±5
					Conductivity	4.66	4.48	-3.86	±5
2023-10-09	21.4	59	5270	21.1	Permittivity	35.93	35.85	-0.22	±5
					Conductivity	4.73	4.63	-2.19	±5
2023-10-09	22.8	45	5300	22.5	Permittivity	35.90	35.98	0.22	±5
					Conductivity	4.76	4.75	-0.21	±5
2023-10-09	22.8	45	5310	22.5	Permittivity	35.89	36.47	1.62	±5
					Conductivity	4.77	4.89	2.52	±5
2023-10-10	21.8	60	5510	21.5	Permittivity	35.66	36.21	1.54	±5
					Conductivity	4.97	4.86	-2.27	±5
2023-10-10	22.8	46	5550	22.5	Permittivity	35.61	35.96	0.98	±5
					Conductivity	5.01	5.09	1.52	±5
2023-10-10	22.8	45	5600	22.4	Permittivity	35.55	36.58	2.90	±5
					Conductivity	5.07	5.01	-1.09	±5
2023-10-10	22.9	41	5785	22.6	Permittivity	35.32	35.96	1.83	±5
					Conductivity	5.25	5.18	-1.41	±5
2023-10-10	21.9	60	5795	21.6	Permittivity	35.31	35.41	0.30	±5
					Conductivity	5.26	5.18	-1.61	±5
2023-10-10	22.9	41	5800	22.5	Permittivity	35.30	35.69	1.10	±5
					Conductivity	5.27	5.28	0.19	±5

5. SAR System Validation

5.1 Validation System

Each MVG system is equipped with one or more system validation kits. These units, together with the predefined measurement procedures within the MVG software, enable the user to conduct the system performance check and system validation. System kit includes a dipole, and dipole device holder.

The system check verifies that the system operates within its specifications. It's performed daily or before every SAR measurement. The system check uses normal SAR measurement in the flat section of the phantom with a matched dipole at a specified distance. The system validation setup is shown as below.



5.2 Validation Result

Comparing to the original SAR value provided by MVG, the validation data should be within its specification of 10 %.

Date	Freq.	Power	Tested Value	Normalized SAR	Target SAR	Tolerance	Limit
	(MHz)	(mW)	(W/Kg)	(W/kg)	1g(W/kg)	(%)	(%)
2023-07-24	2450	100	5.397	53.97	54.70	-1.33	10
2023-07-25	5200	100	16.122	161.22	158.49	1.72	10
2023-07-26	5300	100	16.689	166.89	167.20	-0.19	10
2023-07-26	5600	100	16.702	167.02	175.65	-4.91	10
2023-07-27	5800	100	18.475	184.75	183.06	0.92	10
2023-10-09	2450	100	5.567	55.67	54.70	1.77	10
2023-10-09	5200	100	16.068	160.68	158.49	1.38	10
2023-10-09	5300	100	16.365	163.65	167.20	-2.12	10
2023-10-10	5600	100	17.699	176.99	175.65	0.76	10
2023-10-10	5800	100	19.075	190.75	183.06	4.20	10

Note:

1. The tolerance limit of System validation ±10%.
2. The dipole input power (forward power) was 100 mW.
3. The results are normalized to 1 W input power.

6. SAR Evaluation Procedures

The procedure for assessing the average SAR value consists of the following steps:
The following steps are used for each test position
- Establish a call with the maximum output power with a base station simulator. The connection between the mobile and the base station simulator is established via air interface
- Measurement of the local E-field value at a fixed location. This value serves as a reference value for calculating a possible power drift.
- Measurement of the SAR distribution with a grid of 8 to 16mm * 8 to16 mm and a constant distance to the inner surface of the phantom. Since the sensors cannot directly measure at the inner phantom surface, the values between the sensors and the inner phantom surface are extrapolated. With these values the area of the maximum SAR is calculated by an interpolation scheme.
- Around this point, a cube of 30 * 30 * 30 mm or 32 * 32 * 32 mm is assessed by measuring 5 or 8 * 5 or 8*4 or 5 mm. With these data, the peak spatial-average SAR value can be calculated.

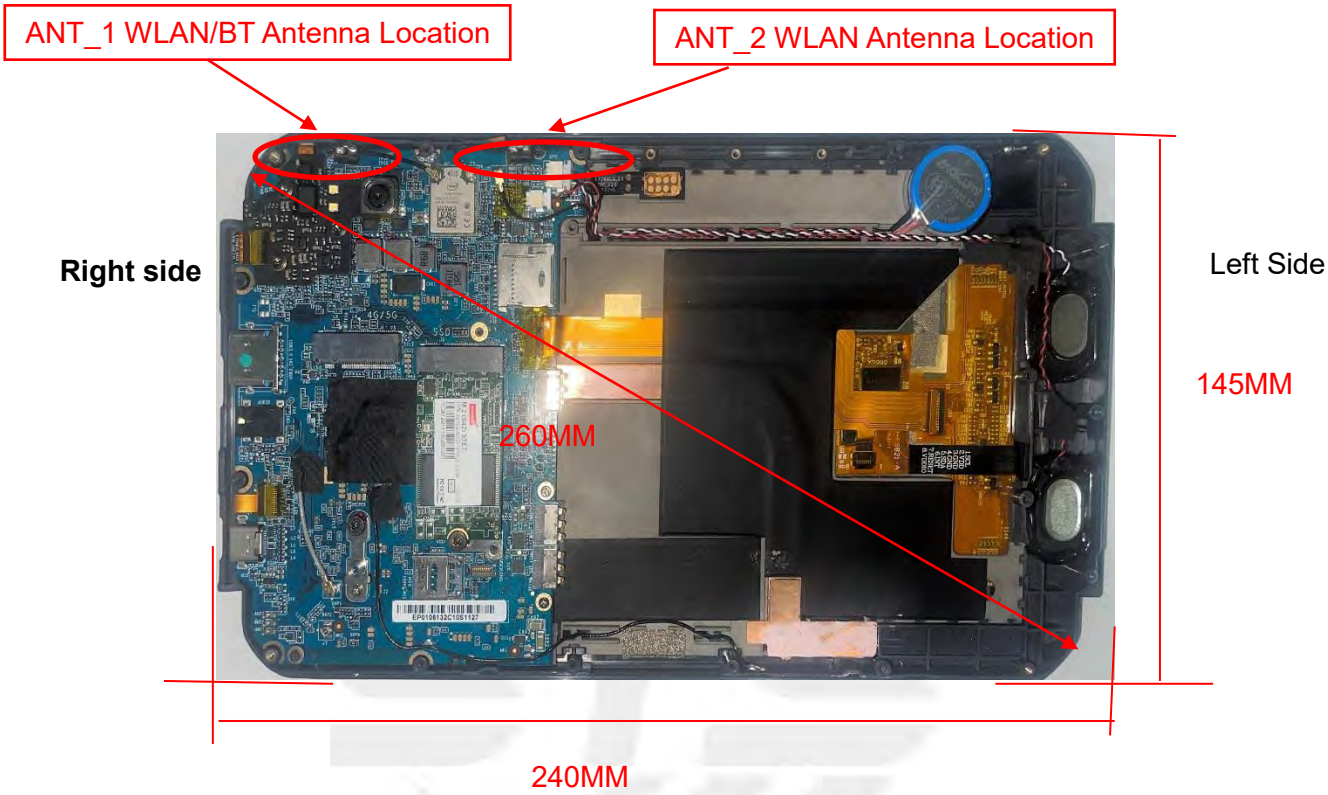
Area Scan& Zoom Scan:

First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR -distribution over 10 g. Area scan and zoom scan resolution setting follows KDB 865664 D01v01r01 quoted below.
When the 1-g SAR of the highest peak is within 2 dB of the SAR limit, additional zoom scans are required for other peaks within 2 dB of the highest peak that have not been included in any zoom scan to ensure there is no increase in SAR.

7. EUT Antenna Location Sketch

It is a Rugged Windows Tablet, support BT/WLAN mode.

Top side



Bottom side
(Back view)

Antenna Separation Distance(cm)					
ANT	Back Side	Left Side	Right Side	Top Side	Bottom Side
WLAN_ANT_1	≤0.5	19.5	1	≤0.5	12.5
WLAN_ANT_2	≤0.5	14.5	6	≤0.5	13.5

Note 1: The antenna information refer the manufacturer provide report, applicable only to the tested sample identified in the report.

7.1 SAR test exclusion consider table

The WLAN/BT SAR evaluation of Maximum power (dBm) summing tolerance.

Exposure Position	Wireless Interface	BT	2.4G WLAN_ ANTA_1	2.4G WLAN_ ANT_2	2.4G WLAN-MIMO_ ANTA_1	2.4G WLAN-MIMO_ ANTA_2
	Calculated Frequency(GHz)	2.48	2.412	2.437	2.412	2.412
	Maximum Turn-up power (dBm)	5.5	13	12	12	12
	Maximum rated power(mW)	3.55	19.95	15.85	15.85	15.85
Back Side	Separation distance (cm)	0.5	0.5	0.5	0.5	0.5
	exclusion threshold(mW)	2.72	2.78	2.76	2.78	2.78
	Testing required?	YES	YES	YES	YES	YES
Left Side	Separation distance (cm)	19.5	19.5	14.5	19.5	14.5
	exclusion threshold(mW)	2915.93	2916.38	1660.44	2916.38	1661.64
	Testing required?	NO	NO	NO	NO	NO
Right Side	Separation distance (cm)	1	1	6	1	6
	exclusion threshold(mW)	10.17	10.36	310.26	10.36	311.10
	Testing required?	NO	YES	NO	YES	NO
Top Side	Separation distance (cm)	0.5	0.5	0.5	0.5	0.5
	exclusion threshold(mW)	2.72	2.78	2.76	2.78	2.78
	Testing required?	YES	YES	YES	YES	YES
Bottom Side	Separation distance (cm)	12.5	12.5	13.5	12.5	13.5
	exclusion threshold(mW)	1250.01	1253.56	1449.53	1253.56	1450.81
	Testing required?	NO	NO	NO	NO	NO

Exposure Position	Wireless Interface	5.2G WLAN_ ANTA_1	5.2G WLAN_ ANTA_2	5.2G WLAN-MIMO_ ANTA_1	5.2G WLAN-MIMO_ ANTA_2
	Calculated Frequency(GHz)	5.19	5.19	5.19	5.19
	Maximum Turn-up power (dBm)	13	13	16	16
	Maximum rated power(mW)	19.95	19.95	39.81	39.81
Back Side	Separation distance (cm)	0.5	0.5	0.5	0.5
	exclusion threshold(mW)	1.50	1.50	1.50	1.50
	Testing required?	YES	YES	YES	YES
Left Side	Separation distance (cm)	19.5	14.5	19.5	14.5
	exclusion threshold(mW)	2904.12	1575.06	2904.12	1575.06
	Testing required?	NO	NO	NO	NO
Right Side	Separation distance (cm)	1	6	1	6
	exclusion threshold(mW)	6.29	254.62	6.29	254.62
	Testing required?	YES	NO	YES	NO
Top Side	Separation distance (cm)	0.5	0.5	0.5	0.5
	exclusion threshold(mW)	1.50	1.50	1.50	1.50
	Testing required?	YES	YES	YES	YES
Bottom Side	Separation distance (cm)	12.5	13.5	12.5	13.5
	exclusion threshold(mW)	1159.26	1358.96	1159.26	1358.96
	Testing required?	NO	NO	NO	NO

Exposure Position	Wireless Interface	5.3G WLAN_ ANTA_1	5.3G WLAN_ ANTA_2	5.3G WLAN-MIMO_ ANTA_1	5.3G WLAN-MIMO_ ANTA_2
	Calculated Frequency(GHz)	5.27	5.31	5.31	5.31
	Maximum Turn-up power (dBm)	13	12.5	15.5	15.5
	Maximum rated power(mW)	19.95	17.78	35.48	35.48
Back Side	Separation distance (cm)	0.5	0.5	0.5	0.5
	exclusion threshold(mW)	1.49	1.48	1.48	1.48
	Testing required?	YES	YES	YES	YES
Left Side	Separation distance (cm)	19.5	14.5	19.5	14.5
	exclusion threshold(mW)	2903.87	1572.55	2903.75	1572.55
	Testing required?	NO	NO	NO	NO
Right Side	Separation distance (cm)	1	6	1	6
	exclusion threshold(mW)	6.23	253.11	6.20	253.11
	Testing required?	YES	NO	YES	NO
Top Side	Separation distance (cm)	0.5	0.5	0.5	0.5
	exclusion threshold(mW)	1.49	1.48	1.48	1.48
	Testing required?	YES	YES	YES	YES
Bottom Side	Separation distance (cm)	12.5	13.5	12.5	13.5
	exclusion threshold(mW)	1157.46	1356.31	1156.56	1356.31
	Testing required?	NO	NO	NO	NO

Exposure Position	Wireless Interface	5.6G WLAN_ ANTA_1	5.6G WLAN_ ANTA_2	5.6G WLAN-MIMO_ ANTA_1	5.6G WLAN-MIMO_ ANTA_2
	Calculated Frequency(GHz)	5.51	5.55	5.55	5.55
	Maximum Turn-up power (dBm)	13.5	13	16	16
	Maximum rated power(mW)	22.39	19.95	39.81	39.81
Back Side	Separation distance (cm)	0.5	0.5	0.5	0.5
	exclusion threshold(mW)	1.43	1.43	1.43	1.43
	Testing required?	YES	YES	YES	YES
Left Side	Separation distance (cm)	19.5	14.5	19.5	14.5
	exclusion threshold(mW)	2903.16	1567.70	2903.05	1567.70
	Testing required?	NO	NO	NO	NO
Right Side	Separation distance (cm)	1	6	1	6
	exclusion threshold(mW)	6.05	250.20	6.02	250.20
	Testing required?	YES	NO	YES	NO
Top Side	Separation distance (cm)	0.5	0.5	0.5	0.5
	exclusion threshold(mW)	1.43	1.43	1.43	1.43
	Testing required?	YES	YES	YES	YES
Bottom Side	Separation distance (cm)	12.5	13.5	12.5	13.5
	exclusion threshold(mW)	1152.21	1351.21	1151.36	1351.21
	Testing required?	NO	NO	NO	NO

Exposure Position	Wireless Interface	5.8G WLAN_ ANTA_1	5.8G WLAN_ ANTA_2	5.8G WLAN-MIMO_ ANTA_1	5.8G WLAN-MIMO_ **ANTA_2**
	Calculated Frequency(GHz)	5.785	5.795	5.795	5.795
	Maximum Turn-up power (dBm)	12	12.5	15	15
	Maximum rated power(mW)	15.85	17.78	31.62	31.62
Back Side	Separation distance (cm)	0.5	0.5	0.5	0.5
	exclusion threshold(mW)	1.38	1.38	1.38	1.38
	Testing required?	YES	YES	YES	YES
Left Side	Separation distance (cm)	19.5	14.5	19.5	14.5
	exclusion threshold(mW)	2902.39	1562.98	2902.36	1562.98
	Testing required?	NO	NO	NO	NO
Right Side	Separation distance (cm)	1	6	1	6
	exclusion threshold(mW)	5.86	247.39	5.86	247.39
	Testing required?	YES	NO	YES	NO
Top Side	Separation distance (cm)	0.5	0.5	0.5	0.5
	exclusion threshold(mW)	1.38	1.38	1.38	1.38
	Testing required?	YES	YES	YES	YES
Bottom Side	Separation distance (cm)	12.5	13.5	12.5	13.5
	exclusion threshold(mW)	1146.49	1346.23	1146.29	1346.23
	Testing required?	NO	NO	NO	NO

Note:

1. maximum power is the source-based time-average power and represents the maximum RF output power among production units.
2. per KDB 447498 D01, for larger devices, the test separation distance of adjacent edge configuration is determined by the closest separation between the antenna and the user.
3. per KDB 447498 D01, standalone SAR test exclusion threshold is applied; if the distance of the antenna to the user is <25mm,25mm is user to determine SAR exclusion threshold

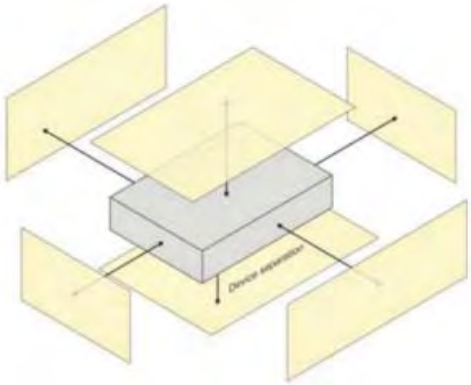
4. per KDB 447498 D01, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distance ≤50mm are determined by:
   [(max.power of channel, including tune-up tolerance, Mw)/(min. test separation distance, mm)]*[√ f(GHZ))≤3.0 for 1-g SAR and≤7.5 for10-g extremity SAR ,f(GHz) is the RF channel transmit frequency in GHz. Power and distance are rounded to the nearest mW and mm before calculation. The result is rounded to one decimal place for comparison
   For <50mm distance, we just calculate mW of the exclusion threshold value(3.0)to do compare
5. per KDB 447498 D01, at 100 MHz to 6GHz and for test separation distances >50mm, the SAR test exclusion threshold is determined according to the following
   a)[threshold at 50mm in step 1]+(test separation distance -50mm)*(f (MHz)/150)]Mw, at 100 MHz to 1500 MHz
   b) [threshold at 50mm in step1]+(test separation distance -50mm) *10]mW at＞1500MHz and≤ 6GHz
6. Per KDB 248227 D01, choose the highest output power channel to test SAR and determine further SAR exclusion 8.for each frequency band ,testing at higher data rates and higher order modulations is not required when the maximum average output power for each of each of these configurations is less than 1/4db higher than those measured at the lower data rate than 11b mode ,thus the SAR can be excluded.
7. Per KDB 616217 D04, SAR evaluation for the front surface of tablet display screens are generally not necessary.

8. EUT Test Position

This EUT was tested in Back Side, Right Side and Top Side.

8.1 Body-worn Position Conditions

Body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in KDB Publication 447498 D01 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. When the same wireless transmission configuration is used for testing body-worn accessory and hotspot mode SAR, respectively, in voice and data mode, SAR results for the most conservative *test separation distance* configuration may be used to support both SAR conditions. When the *reported* SAR for a 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 the body-worn accessory with a headset attached to the handset.



9. Measurement Uncertainty

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in IEEE 1528: 2013.This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Symbol	Uncertainty Component	Prob. Dist.	Unc. $a(x_i)$	Div. q_i	$u(x_i) = a(x_i)/q_i$	C_i	$u(y) = C_i *u(x_i)$	v_i
Measurement system errors								
CF	Probe calibration	N (k = 2)	5.72	2	2.86	1	2.86	∞
CF_{drift}	Probe calibration drift	R	0.15	√3	0.09	1	0.09	∞
LIN	Probe linearity and detection limit	R	1.27	√3	0.73	1	0.73	∞
BBS	Broadband signal	R	0.12	√3	0.07	1	0.07	∞
ISO	Probe isotropy	R	0.16	√3	0.09	1	0.09	∞
DAE	Other probe and data acquisition errors	N	2.4	1	2.40	1	2.40	∞
AMB	RF ambient and noise	N	3.51	1	3.51	1	3.51	∞
Δ_{xyz}	Probe positioning errors	N	1.2	1	1.20	2/δ	1.20	
DAT	Data processing errors	N	2.1	1	2.10	1	2.10	∞
Phantom and device (DUT or validation antenna) errors								
LIQ(σ)	Measurement of phantom conductivity(σ)	N	4.1	1	4.1	c_ε, c_σ	4.10	∞
LIQ(T_c)	Temperature effects (medium)	R	2.7	√3	1.56	c_ε, c_σ	1.56	∞
EPS	Shell permittivity	R	2.1	√3	1.21	See 8.4.2.3	0.30	∞
DIS	Distance between the radiating element of the DUT and the phantom medium	N	0.7	1	0.7	2	1.40	∞
D_{xyz}	Repeatability of positioning the DUT or source against the phantom	N	1.2	1	1.2	1	1.20	5
H	Device holder effects	N	3.8	1	3.8	1	3.80	
MOD	Effect of operating mode on probe sensitivity	R	3.42	√3	1.97	1	1.97	∞
TAS	Time-average SAR	R	1.8	√3	1.04	1	1.04	∞
RF_{drift}	Variation in SAR due to drift in output of DUT	N	4.5	1	4.5	1	4.50	
VAL	Validation antenna uncertainty (validation measurement only)	N	1.4	1	1.4	1	1.40	
P_{in}	Uncertainty in accepted power (validation measurement only)	N	2.4	1	2.4	1	2.40	
Corrections to the SAR result (if applied)								
C(ε′,σ)	Phantom deviation from target (ε′,σ))	N	3.7	1	3.7	1	3.70	
C(R)	SAR scaling	R	1.8	√3	1.04	1	1.04	
u(ΔSAR)	Combined uncertainty						10.84	
U	Expanded uncertainty and effective degrees of freedom					U =	21.68	

10. Conducted Power Measurement

10.1 Test Result

2.4G WLAN

2.4GWIFI					
Mode	Channel Number	Frequency (MHz)	Ant_A Final Average Output Power (dBm)	Ant_B Final Average Output Power (dBm)	Ant_A+B Final Average Output Power (dBm)
802.11b	1	2412	12.66	12.68	N/A
	6	2437	12.62	12.69	N/A
	11	2462	12.32	12.63	N/A
802.11g	1	2412	8.78	8.76	N/A
	6	2437	8.62	8.96	N/A
	11	2462	8.48	8.77	N/A
802.11 n-HT20	1	2412	8.45	8.76	11.62
	6	2437	8.39	8.71	11.56
	11	2462	8.24	8.73	11.50
802.11 n-HT40	3	2422	4.27	7.46	9.16
	6	2437	7.08	7.41	10.26
	9	2452	6.97	7.46	10.23
802.11 ax20	1	2412	8.55	8.51	11.54
	6	2437	8.35	8.48	11.43
	11	2462	8.13	8.45	11.30
802.11 ax40	3	2422	7.02	7.19	10.12
	6	2437	6.85	7.30	10.09
	9	2452	6.66	7.14	9.92

BT

BT				
Mode	Channel Number	Frequency (MHz)	Average Power (dBm)	Output Power (mW)
GFSK(1Mbps)	0	2402	4.76	2.99
	39	2441	4.9	3.09
	78	2480	5.16	3.28
π/4-QPSK(2Mbps)	0	2402	4.64	2.91
	39	2441	4.85	3.05
	78	2480	5.07	3.21
8DPSK(3Mbps)	0	2402	4.71	2.96
	39	2441	4.9	3.09
	78	2480	4.95	3.13

BLE

BLE				
Mode	Channel Number	Frequency (MHz)	Average Power (dBm)	Output Power (mW)
GFSK(1Mbps)	0	2402	3	2.00
	19	2440	2.94	1.97
	39	2480	3.62	2.30
GFSK(2Mbps)	0	2402	2.92	1.96
	19	2440	2.91	1.95
	39	2480	3.6	2.29

5G WLAN

5.2G WLAN					
Mode	Channel Number	Frequency (MHz)	Ant_A Final Average Output Power (dBm)	Ant_B Final Average Output Power (dBm)	Ant_A+B Final Average Output Power (dBm)
802.11a20	36	5180	11.65	11.21	N/A
	40	5200	11.73	11.54	N/A
	48	5240	12.09	11.7	N/A
802.11 n-HT20	36	5180	11.66	11.09	14.39
	40	5200	11.62	11.36	14.5
	48	5240	11.95	11.55	14.76
802.11 n-HT40	38	5190	12.83	12.42	15.64
	46	5230	10.36	9.91	13.15
802.11ac-VHT20	36	5180	11.61	10.98	14.32
	40	5200	11.59	11.4	14.51
	48	5240	11.92	11.67	14.81
802.11ac-VHT40	38	5190	12.8	12.4	15.61
	46	5230	10.39	9.9	13.16
802.11ac-VHT80	42	5210	9.81	9.79	12.81
802.11ac-VHT160	42	5250	10.34	10.37	13.37
802.11ax-VHT20	36	5180	11.3	10.72	14.03
	40	5200	11.33	11.03	14.19
	48	5240	11.63	11.22	14.44
802.11ax-VHT40	38	5190	12.54	12.02	15.3
	46	5230	10.04	9.47	12.77
802.11ax-VHT80	42	5210	9.62	9.66	12.65
802.11ax-VHT160	42	5250	10.09	10.17	13.14

5.3G WLAN					
Mode	Channel Number	Frequency (MHz)	Ant_A Final Average Output Power (dBm)	Ant_B Final Average Output Power (dBm)	Ant_A+B Final Average Output Power (dBm)
802.11a20	52	5260	11.51	10.74	N/A
	60	5300	12.22	11.91	N/A
	64	5320	12.46	11.99	N/A
802.11 n-HT20	52	5260	11.37	10.62	14.02
	60	5300	12.12	11.84	14.99
	64	5320	12.29	11.88	15.1
802.11 n-HT40	54	5270	12.58	11.83	15.23
	62	5310	12.43	12.17	15.31
802.11ac-VHT20	52	5260	11.35	10.68	14.04
	60	5300	12.09	11.82	14.97
	64	5320	12.24	11.92	15.09
802.11ac-VHT40	54	5270	12.6	11.96	15.3
	62	5310	12.5	12.11	15.32
802.11ac-VHT80	58	5290	10.16	10.08	13.13
802.11ax-VHT20	52	5260	10.99	10.44	13.73
	60	5300	11.78	11.65	14.73
	64	5320	11.98	11.63	14.82
802.11ax-VHT40	54	5270	12.33	11.58	14.98
	62	5310	12.3	11.84	15.09
802.11ax-VHT80	58	5290	9.86	9.82	12.85

5.6G WLAN					
Mode	Channel Number	Frequency (MHz)	Ant_A Final Average Output Power (dBm)	Ant_B Final Average Output Power (dBm)	Ant_A+B Final Average Output Power (dBm)
802.11a20	100	5500	12.76	12.32	N/A
	116	5580	12.37	12.43	N/A
	140	5700	11.76	11.37	N/A
802.11 n-HT20	100	5500	12.48	12.26	15.38
	116	5580	12.18	12.33	15.27
	140	5700	11.48	11.19	14.35
802.11 n-HT40	102	5510	12.97	12.44	15.72
	110	5550	12.98	12.63	15.82
	134	5670	12.38	11.88	15.15
802.11ac-VHT20	100	5500	12.47	12.25	15.37
	116	5580	12.2	12.29	15.26
	140	5700	11.56	11.3	14.44
802.11ac-VHT40	102	5510	13.02	12.43	15.75
	110	5550	12.99	12.64	15.83
	134	5670	12.32	11.8	15.08
802.11ac-VHT80	106	5530	10.68	10.52	13.61
	122	5610	10.22	10.7	13.48
802.11ac-VHT160	109	5570	10.69	10.73	13.72
802.11ax-VHT20	100	5500	12.17	11.89	15.04
	116	5580	11.86	11.94	14.91
	140	5700	11.33	10.99	14.17
802.11ax-VHT40	102	5510	12.62	12.14	15.4
	110	5550	12.68	12.31	15.51
	134	5670	11.99	11.53	14.78
802.11axVHT80	106	5530	10.39	10.22	13.32
	122	5610	9.84	10.41	13.14
802.11ax-VHT160	109	5570	10.39	10.52	13.47

5.8G WLAN					
Mode	Channel Number	Frequency (MHz)	Ant_A Final Average Output Power (dBm)	Ant_B Final Average Output Power (dBm)	Ant_A+B Final Average Output Power (dBm)
802.11a20	149	5745	11.02	11.04	N/A
	157	5785	11.36	11.3	N/A
	165	5825	11.16	11.04	N/A
802.11 n-HT20	149	5745	10.76	10.97	13.88
	165	5825	11.39	11.33	14.37
802.11 n-HT40	151	5755	11.61	11.66	14.65
	159	5795	11.69	12	14.86
802.11ac-VHT20	149	5745	11.31	11.45	14.39
	157	5785	11.58	11.55	14.58
	165	5825	11.39	11.29	14.35
802.11ac-VHT40	151	5755	11.73	11.67	14.71
	159	5795	11.78	12.08	14.94
802.11ac-VHT80	155	5775	9.95	9.76	12.87
802.11ax-VHT20	149	5745	11.63	11.12	14.39
	157	5785	11.83	11.32	14.59
	165	5825	11.72	11.15	14.45
802.11ax-VHT40	151	5755	11.69	11.24	14.48
	159	5795	11.79	11.58	14.7
802.11ax-VHT80	155	5775	9.69	9.62	12.67

11. EUT And Test Setup Photo

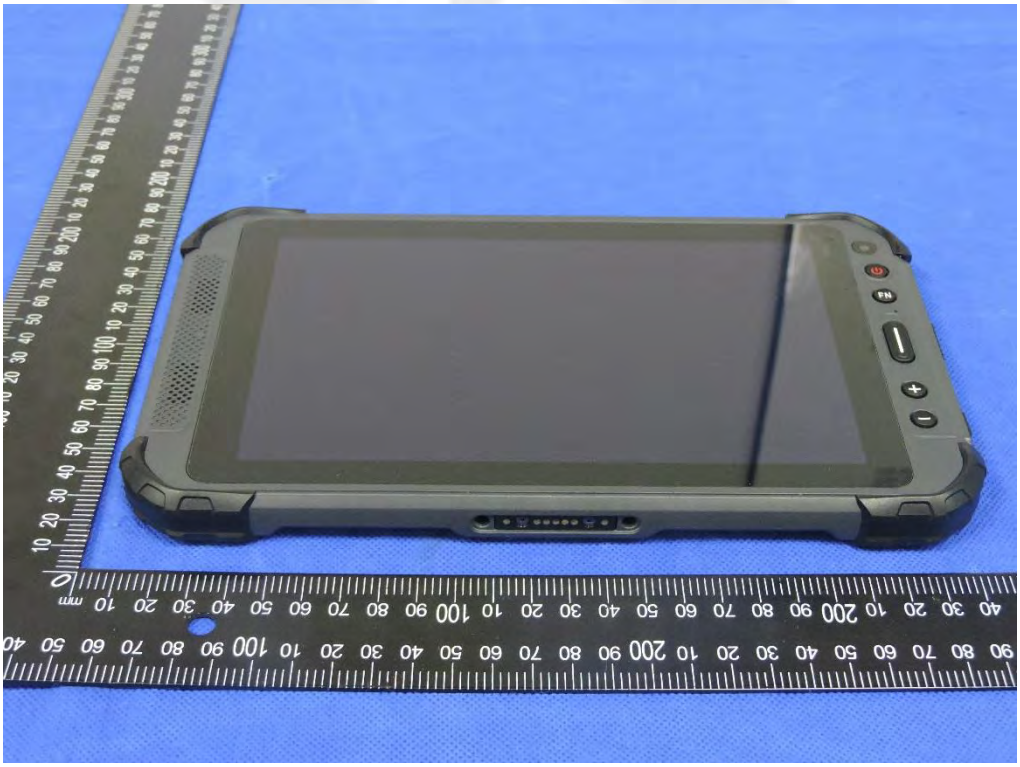
11.1 EUT Photo

Front side

Back side

Top side

Bottom side



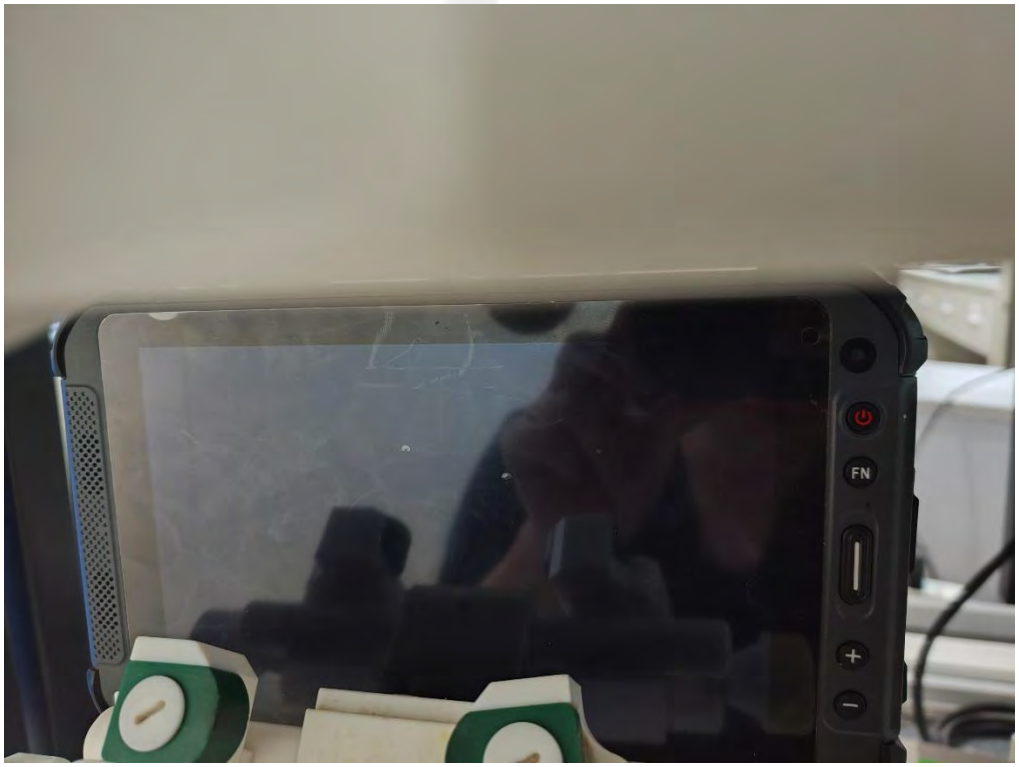
Left side

Right side

11.2 Setup Photo

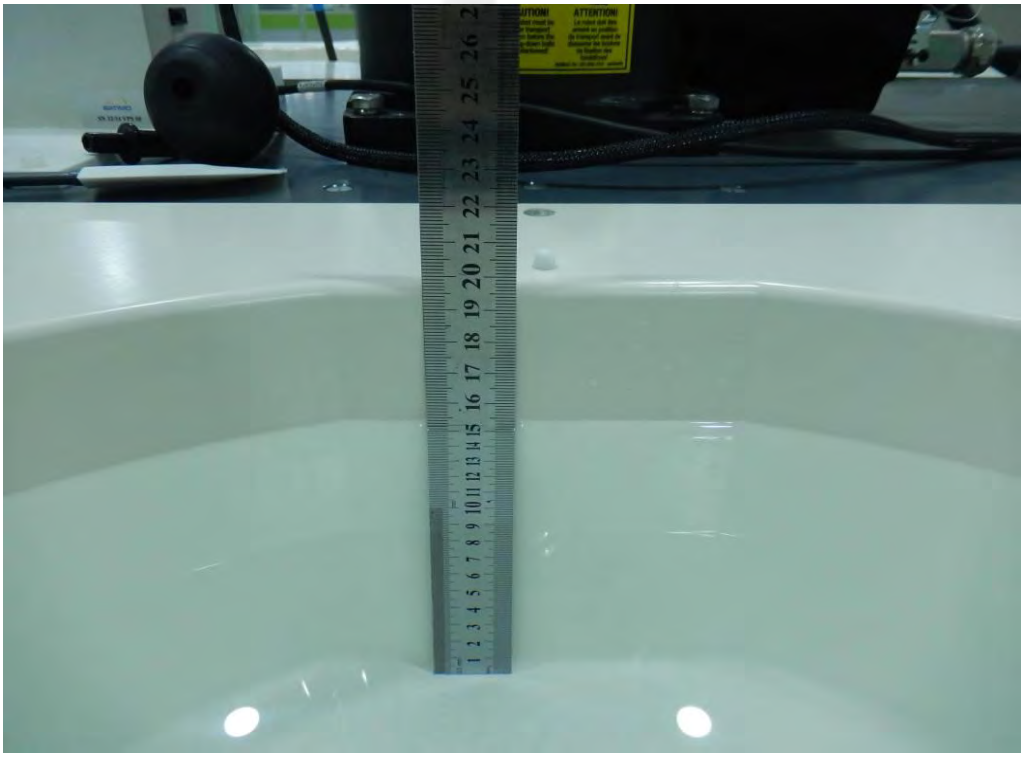
Body Back Side (separation distance is 0mm)

Body Top Side (separation distance is 0mm)



Body Left Edge (separation distance is 0mm)

Liquid depth (15 cm)



12. SAR Result Summary

12.1 Body-worn and Hotspot SAR

Band	Model	Test Position	Freq.	SAR (1g) (W/kg)	Power Drift(%)	Max.Turn-up Power(dBm)	Meas.Output Power(dBm)	Scaled SAR (W/Kg)	Meas. No.
2.4GHz WLAN_ANT_1	802.11b	Back Side	2412	0.129	-2.46	13.00	12.66	0.140	/
		Top Side	2412	0.539	-0.34	13.00	12.66	**0.583**	**1**
		Right Side	2412	0.521	0.26	13.00	12.66	**0.563**	**/**
2.4GHz WLAN_ANT_2	802.11b	Back Side	2437	0.056	-1.37	13.00	12.69	0.060	/
		Top Side	2437	0.182	1.73	13.00	12.69	**0.195**	**2**
2.4GHz WLAN MIMO_ANT_1	802.11 n-HT20	Back Side	2412	0.041	3.41	12.00	11.62	0.045	/
		Top Side	2412	0.101	-1.59	12.00	11.62	**0.110**	**3**
		Right Side	2412	0.085	0.33	12.00	11.62	**0.093**	**/**
2.4GHz WLAN MIMO_ANT_2	802.11 n-HT20	Back Side	2412	0.043	2.96	12.00	11.62	0.047	/
		Top Side	2412	0.117	-2.85	12.00	11.62	**0.128**	**4**
5.2GHz WLAN_ANT_1	802.11 n-HT40	Back Side	5190	0.623	-0.33	13.00	12.83	0.648	/
		Top Side	5190	1.035	0.24	13.00	12.83	**1.076**	**5**
		Top Side	5230	0.886	2.21	10.50	10.36	0.915	/
		Right Side	5190	0.752	0.96	10.50	10.36	0.777	/
5.2GHz WLAN_ANT_2	802.11 n-HT40	Back Side	5190	0.656	3.86	12.50	12.42	0.668	/
		Top Side	5190	1.424	0.29	12.50	12.42	**1.450**	**6**
		Top Side	5190	1.115	-0.02	10.00	9.91	1.138	/
5.2GHz WLAN MIMO_ANT_1	802.11 n-HT40	Back Side	5190	0.324	-0.35	16.00	15.64	0.352	/
		Top Side	5190	0.733	-2.92	16.00	15.64	**0.796**	**7**
		Right Side	5190	0.699	0.63	16.00	15.64	**0.759**	**/**
5.2GHz WLAN MIMO_ANT_2	802.11 n-HT40	Back Side	5190	0.298	2.12	16.00	15.64	0.324	/
		Top Side	5190	0.718	-1.12	16.00	15.64	**0.780**	**8**
5.3GHz WLAN_ANT_1	802.11ac-VHT40	Back Side	5270	0.315	-1.94	13.00	12.60	0.345	/
		Top Side	5270	0.509	1.34	13.00	12.60	**0.558**	**9**
		Right Side	5270	0.456	1.58	13.00	12.60	**0.500**	**/**
5.3GHz WLAN**_ANT_2**	802.11 n-HT40	Back Side	5310	0.330	-3.26	12.50	12.17	0.356	/
		Top Side	5310	0.522	-0.74	12.50	12.17	**0.563**	**10**
5.3GHz WLAN MIMO_ANT_1	802.11ac-VHT40	Back Side	5310	0.225	1.65	15.60	15.32	0.240	/
		Top Side	5310	0.491	3.47	15.60	15.32	**0.524**	**11**
		Right Side	5310	0.412	2.14	15.60	15.32	**0.439**	**/**
5.3GHz WLAN MIMO_ANT_2	802.11ac-VHT40	Back Side	5310	0.368	-2.00	15.60	15.32	0.393	/
		Top Side	5310	0.626	-3.59	15.60	15.32	**0.668**	**12**

5.6GHz WLAN_ANT_1	802.11ac-VHT40	Back Side	5510	0.321	-3.27	13.50	13.02	0.359	/
		Top Side	5510	0.602	0.13	13.50	13.02	**0.672**	**13**
		Right Side	5510	0.512	0.96	13.50	13.02	**0.572**	**/**
5.6GHz WLAN_ANT_2	802.11ac-VHT40	Back Side	5550	0.187	-1.47	13.00	12.64	0.203	/
		Top Side	5550	0.427	-1.41	13.00	12.64	**0.464**	**14**
5.6GHz WLAN MIMO_ANT_1	802.11ac-VHT40	Back Side	5550	0.361	1.79	16.00	15.83	0.375	/
		Top Side	5550	0.705	-3.65	16.00	15.83	**0.733**	**15**
		Right Side	5550	0.625	0.54	16.00	15.83	**0.650**	**/**
5.6GHz WLAN MIMO_ANT_2	802.11ac-VHT40	Back Side	5550	0.442	-1.97	16.00	15.83	0.460	/
		Top Side	5510	0.645	-1.80	16.00	15.75	0.683	/
		Top Side	5550	0.818	-0.56	16.00	15.83	**0.851**	**16**
		Top Side	5670	0.627	3.30	16.00	15.08	0.775	/
5.8GHz WLAN_ANT_1	802.11ax-VHT20	Back Side	5785	0.374	1.28	12.00	11.83	0.389	/
		Top Side	5785	0.715	-0.56	12.00	11.83	**0.744**	**17**
		Right Side	5785	0.658	0.25	12.00	11.83	**0.684**	**/**
5.8GHz WLAN_ANT_2	802.11ac-VHT40	Back Side	5795	0.164	-2.59	12.50	12.08	0.181	/
		Top Side	5795	0.495	-2.33	12.50	12.08	**0.545**	**18**
5.8GHz WLAN MIMO_ANT_1	802.11ac-VHT40	Back Side	5795	0.275	-2.57	15.00	14.94	0.279	/
		Top Side	5795	0.485	3.69	15.00	14.94	**0.492**	**19**
		Right Side	5795	0.352	0.17	15.00	14.94	**0.357**	**/**
5.8GHz WLAN MIMO_ANT_2	802.11ac-VHT40	Back Side	5795	0.302	2.13	15.00	14.94	0.306	/
		Top Side	5795	0.599	3.78	15.00	14.94	**0.607**	**20**
BT	GFSK	Back Side	2480	0.142	0.25	5.50	5.16	**0.154**	**21**
		Top Side	2480	0.110	1.36	5.50	5.16	0.119	/

Band	Position	ANT	Max. 1-g SAR (W/kg)	1-g Sum SAR (W/kg)
2.4GHz WLAN-MIMO	802.11 n-HT20-A+B	ANT-A	0.093	0.220
		ANT-B	0.128	
5.2GHz WLAN-MIMO	802.11 n-HT40-A+B	ANT-A	0.759	1.539
		ANT-B	0.324	
		ANT-B	0.780	
5.3GHz WLAN-MIMO	802.11ac-VHT40-A+B	ANT-A	0.524	1.192
		ANT-B	0.668	
5.6GHz WLAN-MIMO	802.11ac-VHT40-A+B	ANT-A	0.650	1.501
		ANT-B	0.851	
5.8GHz WLAN-MIMO	802.11ac-VHT40-A+B	ANT-A	0.357	0.964
		ANT-B	0.607	

Note:

1. The test separation of all above table is 0mm.
2. The Bluetooth and WLAN can't simultaneous transmission at the same time.
3. Per KDB 447498 D01, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
   a. Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
   b. For WWAN: Scaled SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor
4. Per KDB 248227- When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg. (The highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power was **0.239** W/kg for Body)
5. When the user enables the personal Wireless router functions for the handsets, actual operations include simultaneous transmission of both the Wi-Fi transmitting frequency and thus cannot be evaluated for SAR under actual use conditions. The "Portable Hotspot" feature on the handset was NOT activated, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal.

Repeated SAR

Band	Mode	Test Position	Freq.	Result 1g (W/Kg)	Power Drift(%)	Max.Turn-up Power(dBm)	Meas.Output Power(dBm)	Scaled SAR(W/Kg)	Meas. No.
5.2GHz WLAN ANT-A	802.11 n-HT40	Top Side	5190	1.017	1.28	13	12.83	1.058	-
		Top Side	5230	0.850	-1.61	10.5	10.36	0.878	-
5.2GHz WLAN ANT-B	802.11 n-HT40	Top Side	5190	1.414	-2.25	12.5	12.42	1.440	-
		Top Side	5230	1.077	1.20	10	9.91	1.100	-
5.6GHz WLAN ANT-MIMO-B	802.11 n-HT40	Top Side	5510	0.616	-0.87	16	15.83	0.641	-
		Top Side	5550	0.793	3.08	16	15.75	0.840	-
		Top Side	5670	0.609	2.73	16	15.08	0.753	-

Repeated SAR measurement

Band	Mode	Test Position	Freq.	Original Measured SAR 1g(W/kg)	1 st Repeated SAR 1g	Ratio	Original Measured SAR 1g(W/kg)	2nd Repeated SAR 1g	Ratio
5.2GHz WLAN ANT-A	802.11 n-HT40	Top Side	5190	1.035	1.017	1.018	-	-	-
		Top Side	5230	0.886	0.850	1.042	-	-	-
5.2GHz WLAN ANT-B	802.11 n-HT40	Top Side	5190	1.424	1.414	1.007	-	-	-
		Top Side	5230	1.115	1.077	1.035	-	-	-
5.6GHz WLAN ANT-MIMO-B	802.11 ac-VHT40	Top Side	5510	0.645	0.616	1.047	-	-	-
		Top Side	5550	0.818	0.793	1.032	-	-	-
		Top Side	5670	0.627	0.609	1.030	-	-	-

13. Equipment List

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
2450MHzDipole	MVG	SID2450	SN 30/14 DIP2G450-335	2023.07.04	2026.07.03
Waveguide	MVG	SWG5500	SN 13/14 WGA32	2023.07.04	2026.07.03
E-Field Probe	MVG	SSE2	SN 07/21 EPGO352	2023.02.24	2024.02.23
Dielectric Probe Kit	MVG	SCLMP	SN 32/14 OCPG67	2022.11.15	2023.11.14
Antenna	MVG	ANTA3	SN 07/13 ZNTA52	N/A	N/A
Phantom1	MVG	SAM	SN 32/14 SAM115	N/A	N/A
Phantom3	MVG	SAM	SN 21/21 ELLI48	N/A	N/A
Phone holder	MVG	N/A	SN 32/14 MSH97	N/A	N/A
Laptop holder	MVG	N/A	SN 32/14 LSH29	N/A	N/A
Attenuator	Agilent	99899	DC-18GHz	N/A	N/A
Directional coupler	Narda	4226-20	3305	N/A	N/A
Network Analyzer	Agilent	8753ES	US38432810	2022.09.28	2023.09.27
Multi Meter	Keithley	Multi Meter 2000	4050073	2022.09.29	2023.09.28
Signal Generator	Agilent	N5182A	MY50140530	2022.09.28	2023.09.27
Wireless Communication Test Set	Agilent	8960-E5515C	MY48360751	2022.09.28	2023.09.27
Wireless Communication Test Set	R&S	CMW500	156324	2022.09.29	2023.09.28
Power Amplifier	DESAY	ZHL-42W	9638	2022.10.08	2023.10.07
Power Meter	R&S	NRP	100510	2022.09.28	2023.09.27
Power Sensor	R&S	NRP-Z11	101919	2022.09.28	2023.09.27
Power Sensor	Keysight	U2021XA	MY56280002	2022.09.29	2023.09.28
Temperature hygrometer	SuWei	SW-108	N/A	2022.09.30	2023.09.29
Thermograph	Elitech	RC-4	S/N EF7176501537	2022.09.30	2023.09.29

Note:
Per KDB 865664 D01, Dipole SAR Validation Verification, STS LAB has adopted 3 years calibration intervals. On annual basis, every measurement dipole has been evaluated and is in compliance with the following criteria:
1. There is no physical damage on the dipole
2. System validation with specific dipole is within 10% of calibrated value
Return-loss in within 20% of calibrated measurement

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
2450MHzDipole	MVG	SID2450	SN 30/14 DIP2G450-335	2023.07.04	2026.07.03
Waveguide	MVG	SWG5500	SN 13/14 WGA32	2023.07.04	2026.07.03
E-Field Probe	MVG	SSE2	SN 07/21 EPGO352	2023.02.24	2024.02.23
Dielectric Probe Kit	MVG	SCLMP	SN 32/14 OCPG67	2022.11.15	2023.11.14
Antenna	MVG	ANTA3	SN 07/13 ZNTA52	N/A	N/A
Phantom1	MVG	SAM	SN 32/14 SAM115	N/A	N/A
Phantom3	MVG	SAM	SN 21/21 ELLI48	N/A	N/A
Phone holder	MVG	N/A	SN 32/14 MSH97	N/A	N/A
Laptop holder	MVG	N/A	SN 32/14 LSH29	N/A	N/A
Attenuator	Agilent	99899	DC-18GHz	N/A	N/A
Directional coupler	Narda	4226-20	3305	N/A	N/A
Network Analyzer	Agilent	8753ES	US38432810	2022.09.28	2023.09.27
Multi Meter	Keithley	Multi Meter 2000	4050073	2022.09.29	2023.09.28
Signal Generator	Agilent	N5182A	MY50140530	2022.09.28	2023.09.27
Wireless Communication Test Set	Agilent	8960-E5515C	MY48360751	2022.09.28	2023.09.27
Wireless Communication Test Set	R&S	CMW500	156324	2022.09.29	2023.09.28
Power Amplifier	DESAY	ZHL-42W	9638	2022.10.08	2023.10.07
Power Meter	R&S	NRP	100510	2022.09.28	2023.09.27
Power Sensor	R&S	NRP-Z11	101919	2022.09.28	2023.09.27
Power Sensor	Keysight	U2021XA	MY56280002	2022.09.29	2023.09.28
Temperature hygrometer	SuWei	SW-108	N/A	2022.09.29	2023.09.28
Thermograph	Elitech	RC-4	S/N EF7176501537	2022.09.29	2023.09.28