TEST REPORT

Product Name:	Phone watch
FCC ID:	2BKAY-8688
Trademark:	N/A
Model Number:	8688, 8686, 8988, 8588, M01, M02, M03, M04, M05, M06, M07, M08, M09, M10, Y13, Y14, Y15, Y16, Y17, Y18, Y19, Y20, DF55, DF56, DF58, DF59, DF60, DF61, DF62, DF63, DF64, DF65, DF66, DF67, DF68, DF69 DF70, DF89, DF90, DF91, DF92, DF93, DF94, DF95, DF96, DF97, DF98, DF99
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Sample Received Date:	Jun. 20, 2024
Sample tested Date:	Jun. 20, 2024 to Jul. 12, 2024
Issue Date:	Jul. 19, 2024
Report No.:	CTB240719045RH
Test Standards	FCC 47 CFR Part2(2.1093), FCC 47 CFR Part1(1.1310) FCC 47 CFR Part1(1.1307), ANSI/IEEE C95.1-2019 IEEE 1528-2013 & Published RF Exposure KDB Procedures
Test Results	PASS
Remark:	This is SAR test report.

Compiled by:	Reviewed by:	Approved by:
Zhang Mao Cheng	Martin Feng	
Zhang Mao cheng	Martin Feng	Rita Xiao / Director

Note: If there is any objection to the inspection results in this report, please submit a written report to the company within 15 days from the date of receiving the report. The test report is effective only with both signature and specialized stamp. This result(s) shown in this report refer only to the sample(s) tested. Without written approval of Shenzhen CTB Testing Technology Co., Ltd. this report can't be reproduced except in full. The tested sample(s) and the sample information are provided by the client. "*" indicates the testing items were fulfilled by subcontracted lab. "#" indicates the items are not in CNAS accreditation scope.

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1. Version

Report No.	Issue Date	Description	Approved
CTB240719045RH	Jul. 19, 2024	Original	Valid

2. PRODUCT INFORMATION AND TEST SETUP

2.1 Product Information

Model(s):	8688, 8686, 8988, 8588, M01, M02, M03, M04, M05, M06, M07, M08, M09, M10, Y13, Y14, Y15, Y16, Y17, Y18, Y19, Y20, DF55, DF56, DF58, DF59, DF60, DF61, DF62, DF63, DF64, DF65, DF66, DF67, DF68, DF69 DF70, DF89, DF90, DF91, DF92, DF93, DF94, DF95, DF96, DF97, DF98, DF99
Model Description:	All the model are the same circuit and RF module, only the model name, wirstband and color are different. Test sample model: 8688
Bluetooth Version:	Bluetooth V5.0
Wi-Fi Specification:	IEEE 802.11b/g/n
Hardware Version:	V1.0
Software Version:	V1.0
Operation Frequency:	Bluetooth: 2402-2480MHz WiFi: IEEE 802.11b/g/n 20: 2412-2462MHz/ 11 channel WCDMA Band 2: 1850~1910MHz WCDMA Band 5: 824~849MHz FDD-LTE BAND 2: 1850-1910MHz FDD-LTE BAND 4: 1710-1755MHz FDD-LTE BAND 5: 824-849MHz FDD-LTE BAND 12: 699-716MHz
Max. RF output power:	Bluetooth: 1.418dBm WiFi (2.4G): 7.378dBm WCDMA Band 2: 22.40dBm, WCDMA Band 5: 22.74dBm FDD-LTE BAND 2: 22.95dBm FDD-LTE BAND 4: 22.57dBm FDD-LTE BAND 5: 23.72dBm FDD-LTE BAND 12: 23.52dBm
Max.SAR:	0.85 W/Kg 1g Front of face 2.16 W/Kg 10g Wrist-worn
Max Simultaneous SAR	0.98 W/Kg 1g Front of face 2.27 W/Kg 10g Wrist-worn
Type of Modulation:	Bluetooth: GFSK WiFi: DSSS, OFDM GMSK, BPSK QPSK, 16QAM
Antenna installation:	Internal antenna

Antenna Gain:	Bluetooth: 0.34dBi WiFi (2.4G): 0.34dBi WCDMA Band 2: 1.73dBi WCDMA Band 5: 2.21dBi FDD-LTE BAND 2: 1.73dBi FDD-LTE BAND 4: 1.93dBi FDD-LTE BAND 5: -2.21dBi FDD-LTE BAND 12: -5.91dBi
Ratings:	DC 5V charging from adapter DC 3.8V by battery

3 Equipment Used during Test

3.1 Equipment List

Name of Equipment	Manufacturer	Type/Model	Serial Number	Calibration Date	Calibration Due
Data acquisition electronics	SPEAG	DAE4	881	2023/7/14	2024/7/13
Dosimetric E-field Probes	SPEAG	ES3DV3	3089	2023/7/14	2024/7/13
SAR test software	SPEAG	DASY 52	52.10.3.1513	/	/
Dipole	SPEAG	D750V3	1088	2022/9/19	2025/9/18
Dipole	SPEAG	D835V2	4d125	2022/9/20	2025/9/19
Dipole	SPEAG	D1800V2	2d104	2022/9/21	2025/9/20
Dipole	SPEAG	D1900V2	5d145	2022/10/8	2025/10/7
Dipole	SPEAG	D2600V2	1101	2023/1/12	2026/1/11
Communication test set	R&S	CMW500	108058	2024/6/29	2025/6/28
Network analyzer	R&S	ZVB 8	100348	2024/6/29	2025/6/28
Dielectric Assessment Kit	SPEAG	DAK-3.5	1076	/	/
power meter	Agilent	E4419B	N10149	2024/6/29	2025/6/28
MXA signal analyzer	Agilent	N5181A	MY49060920	2024/6/29	2025/6/28
RF Power Meter	Agilent	E9301A	MY41495675	2024/6/29	2025/6/28
Amplifier 300-4200MHz	SHW	SHWPA-00300420P3040-S	22110401	2024/6/29	2025/6/28
thermometers	SMART SENSOR	AR867	/	2024/7/2	2025/7/1

3.2 Test Equipment Calibration

All the test equipments used are valid and calibrated by CEPREI Certification Body that address is No.110 Dongguan Zhuang RD. Guangzhou, P.R.China.

FCC Test Firm Registration Number: 292923

IC Registered No.:25587

CAB identifier: CN0098

4 SAR Introduction

4.1 Introduction

This measurement report shows compliance of the EUT with ANSI/IEEE C95.1-2006 and FCC 47 CFR Part2 (2.1093).The test procedures, as described in IEEE 1528-2013 Standard for IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques(300MHz~6GHz) and Published RF Exposure KDB Procedures

4.2 SAR Definition

- SAR : Specific Absorption Rate
- The SAR characterize the absorption of energy by a quantity of tissue
- This is related to a increase of the temperature of these tissues during a time period.

$$\mathrm{DAS} = \frac{\mathrm{d}}{\mathrm{d}t}\left(\frac{\mathrm{d}W}{\mathrm{d}m}\right) = \frac{\mathrm{d}}{\mathrm{d}t}\left(\frac{\mathrm{d}W}{\rho \mathrm{d}V}\right)$$

$$\mathrm{DAS} = \frac{\sigma E^2}{\rho}$$

$$\mathrm{DAS} = c_{\mathrm{h}} \left.\frac{\mathrm{d}T}{\mathrm{d}t}\right|_{t=0}$$

SAR definition

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

- SAR : Specific Absorption Rate
  - σ : Liquid conductivity
    - $\varepsilon_r = \varepsilon' - j\varepsilon''$ (complex permittivity of liquid)
    - $\sigma = \frac{\varepsilon'' \omega}{\varepsilon_0}$
  - ρ: Liquid density
    - ρ = 1000 g/L = 1000Kg/m³

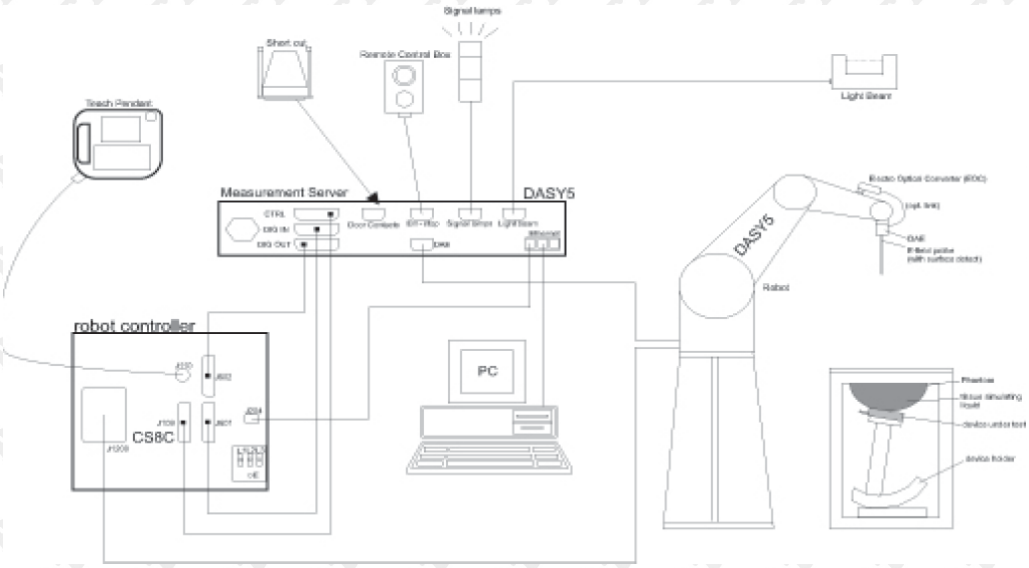
where:

σ = conductivity of the tissue (S/m)
ρ = mass density of the tissue (kg/m3)
E = rms electric field strength (V/m)

5 SAR Measurement Setup

5.1 SAR MEASUREMENT SETUP

The DASY5 system for performing compliance tests consists of the following items:
A standard high precision 6-axis robot (Stäubli RX family) with controller and software. An arm extension for accommodating the data acquisition electronics (DAE).
A dosimetric probe, i.e. an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
A data acquisition electronic (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.
A unit to operate the optical surface detector which is connected to the EOC.
The Electro-Optical Coupler (EOC) performs the conversion from the optical into a digital electric signal of the DAE. The EOC is connected to the DASY5 measurement server.
The DASY5 measurement server, which performs all real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operation. A computer operating Windows 2003.
DASY5 software and SEMCAD data evaluation software.
Remote control with teach panel and additional circuitry for robot safety such as warning lamps, etc. The generic twin phantom enabling the testing of left-hand and right-hand usage.
The device holder for handheld Mobile Phones.
Tissue simulating liquid mixed according to the given recipes.
System validation dipoles allowing to validate the proper functioning of the system.



5.2 DASY5 E-field Probe System

The SAR measurements were conducted with the dosimetric probe EX3DV4 (manufactured by SPEAG), designed in the classical triangular configuration and optimized for dosimetric evaluation.

5.3 Probe Specification

Construction Symmetrical design with triangular core
Interleaved sensors
Built-in shielding against static charges
PEEK enclosure material (resistant to organic solvents, e.g., DGBE)

Calibration ISO/IEC 17025 calibration service available.

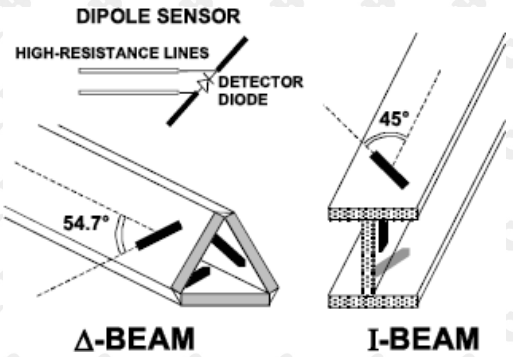
Frequency 4 MHz – 10 GHz
Linearity: ±0.2 dB (30 MHz – 10 GHz)
Directivity ±0.1 dB in TSL (rotation around probe axis)
±0.3 dB in TSL (rotation normal to probe axis)
Dynamic Range 10 µW/g – >100 W/kg
Linearity: ±0.2 dB (noise: typically <1 µW/g)

Dimensions	Overall length: 337 mm (tip: 20 mm) Tip diameter: 2.5 mm (body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm
Application	General dosimetry up to 10 GHz Dosimetry in strong gradient fields Compliance tests of Mobile Phones
Compatibility	DASY3, DASY4, DASY52 SAR and higher, EASY4/MRI

5.4 Isotropic E-Field Probe

The isotropic E-Field probe has been fully calibrated and assessed for isotropicity, and boundary effect within a controlled environment. Depending on the frequency for which the probe is calibrated the method utilized for calibration will change.

The E-Field probe utilizes a triangular sensor arrangement as detailed in the diagram below:



5.5 Phantoms

The phantom used for all tests i.e. for both system checks and device testing, was the twin-headed "SAM Phantom", manufactured by SPEAG. The SAM twin phantom is a fiberglass shell phantom with 2mm shell thickness (except the ear region, where shell thickness increases to 6mm).

System checking was performed using the flat section, whilst Head SAR tests used the left and right head profile sections. Body SAR testing also used the flat section between the head profiles.

SAM Twin Phantom

5.6 Device Holder

The device was placed in the device holder (illustrated below) that is supplied by SPEAG as an integral part of the DASY system.

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

Device holder supplied by SPEAG

6 SAR Test Procedure

6.1 Scanning Procedure

The DASY5 installation includes predefined files with recommended procedures for measurements and validation. They are read-only document files and destined as fully defined but unmeasured masks. All test positions (head or body-worn) are tested with the same configuration of test steps differing only in the grid definition for the different test positions.

The “reference” and “drift” measurements are located at the beginning and end of the batch process. They measure the field drift at one single point in the liquid over the complete procedure. The indicated drift is mainly the variation of the DUT’s output power and should vary max. ± 5 %.

The “surface check” measurement tests the optical surface detection system of the DASY5 system by repeatedly detecting the surface with the optical and mechanical surface detector and comparing the results. The output gives the detecting heights of both systems, the difference between the two systems and the standard deviation of the detection repeatability. Air bubbles or refraction in the liquid due to separation of the sugar-water mixture gives poor repeatability (above ± 0.1mm). To prevent wrong results tests are only executed when the liquid is free of air bubbles. The difference between the optical surface detection and the actual surface depends on the probe and is specified with each probe (It does not depend on the surface reflectivity or the probe angle to the surface within ± 30°.)

Area Scan
The Area Scan is used as a fast scan in two dimensions to find the area of high field values before running a detailed measurement around the hot spot.Before starting the area scan a grid spacing of 15 mm x 15 mm is set. During the scan the distance of the probe to the phantom remains unchanged. After finishing area scan, the field maxima within a range of 2 dB will be ascertained.

Zoom Scan
Zoom Scans are used to estimate the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The default Zoom Scan is done by 7x7x5 points within a cube whose base is centered around the maxima found in the preceding area scan.

Spatial Peak Detection
The procedure for spatial peak SAR evaluation has been implemented and can determine values of masses of 1g and 10g, as well as for user-specific masses.The DASY5 system allows evaluations that combine measured data and robot positions, such as: • maximum search • extrapolation • boundary correction • peak search for averaged SAR During a maximum search, global and local maxima searches are automatically performed in 2-D after each Area Scan measurement with at least 6 measurement points. It is based on the evaluation of the local SAR gradient calculated by the Quadratic Shepard’s method. The algorithm will find the global maximum and all local maxima within -2 dB of the global maxima for all SAR distributions.

Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. Several measurements at different distances are necessary for the extrapolation.
Extrapolation routines require at least 10 measurement points in 3-D space. They are used in the Zoom Scan to obtain SAR values between the lowest measurement points and the inner phantom surface. The routine uses the modified Quadratic Shepard’s method for extrapolation. For a grid using 7x7x5 measurement points with 5mm resolution amounting to 343 measurement points, the uncertainty of the extrapolation routines is less than 1% for 1g and 10g cubes.

A Z-axis scan measures the total SAR value at the x-and y-position of the maximum SAR value found during the cube 7x7x5 scan. The probe is moved away in z-direction from the bottom of the SAM phantom in 5mm steps.

Data Storage and Evaluation

Data Storage

The DASY5 software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension ".DA4". The software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be re-evaluated.

The measured data can be visualized or exported in different units or formats, depending on the selected probe type ([V/m], [A/m], [°C], [W/kg], [mW/cm²], [dBrel], etc.). Some of these units are not available in certain situations or show meaningless results, e.g., a SAR output in a lossless media will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

Data Evaluation

The SEMCAD software automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software:

Probe parameters:	Sensitivity:	Normi, ai0, ai1, ai2
	Conversion factor:	ConvFi
	Diode compression point:	Dcpi
Device parameters:	Frequency:	f
	Crest factor:	cf
Media parameters:	Conductivity:	σ
	Density:	ρ

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY5 components. In the direct measuring mode of the multimeter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics. If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given as:

$$V_i = U_i + U_i^2 \cdot \frac{cf}{dcp_i}$$

Vi: compensated signal of channel (i = x, y, z) Ui: input signal of channel (i = x, y, z)
cf: crest factor of exciting field (DASY parameter) dcpi: diode compression point (DASY parameter)

From the compensated input signals the primary field data for each channel can be evaluated:

$$\text{E} - \text{fieldprobes}: \qquad E_i = \sqrt{\frac{V_i}{Norm_i \cdot ConvF}}$$

$$\text{H} - \text{fieldprobes}: \qquad H_i = \sqrt{V_i} \cdot \frac{a_{i0} + a_{i1} f + a_{i2} f^2}{f}$$

Vi: compensated signal of channel (i = x, y, z) Normi: sensor sensitivity of channel (i = x, y, z), [mV/(V/m)2] for E-field Probes ConvF:sensitivity enhancement in solution
aij: sensor sensitivity factors for H-field probes f: carrier frequency [GHz]
Ei: electric field strength of channel i in V/m Hi: magnetic field strength of channel i in A/m

The RSS value of the field components gives the total field strength (Hermitian magnitude):

$$E_{tot} = \sqrt{E_x^2 + E_y^2 + E_z^2}$$

The primary field data are used to calculate the derived field units.

$$SAR = E_{tot}^2 \cdot \frac{\sigma}{\rho \cdot 1'000}$$

SAR: local specific absorption rate in W/kg Etot: total field strength in V/m
σ: conductivity in [mho/m] or [Siemens/m] ρ: equivalent tissue density in g/cm3

Note that the density is normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid.

6.2 Extrapolation

Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. Several measurements at different distances are necessary for the extrapolation.
They are used in the Cube Scan to obtain SAR values between the lowest measurement points and the inner phantom surface. The routine uses the fourth order least square polynomial method for extrapolation. For a grid using 5x5x7 measurement points with 5mm resolution amounting to 343 measurement points, the uncertainty of the extrapolation routines is less than 1% for 1 g and 10 g cubes.

6.3 Test Position – Body Configurations

6.1.4.10 Limb-worn device

A limb-worn device is a unit whose intended use includes being strapped to the arm or leg of the user while transmitting (except in idle mode). It is similar to a body-worn device. Therefore, the test positions of 6.1.4.4 also apply. The strap shall be opened so that it is divided into two parts as shown in Figure 10. The device shall be positioned directly against the phantom surface with the strap straightened as much as possible and the back of the device towards the phantom.

If the strap cannot normally be opened to allow placing in direct contact with the phantom surface, it may be necessary to break the strap of the device but ensuring to not damage the antenna.

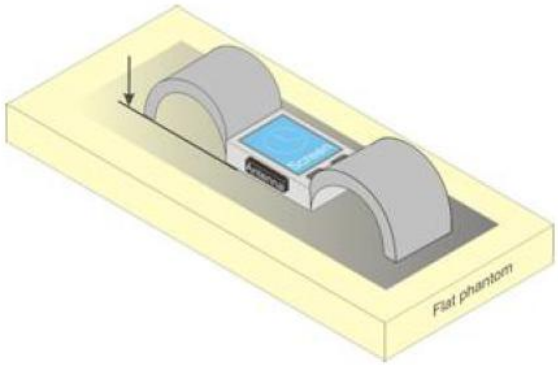


Figure 10 – Test position for limb-worn devices

7 Exposure limit

In order for users to be aware of the body-worn operating requirements for meeting RF exposure compliance, operating instructions and cautions statements are included in the user's manual.

7.1 Uncontrolled Environment

Uncontrolled Environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

7.2 Controlled Environment

Controlled Environments are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation). In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. This exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

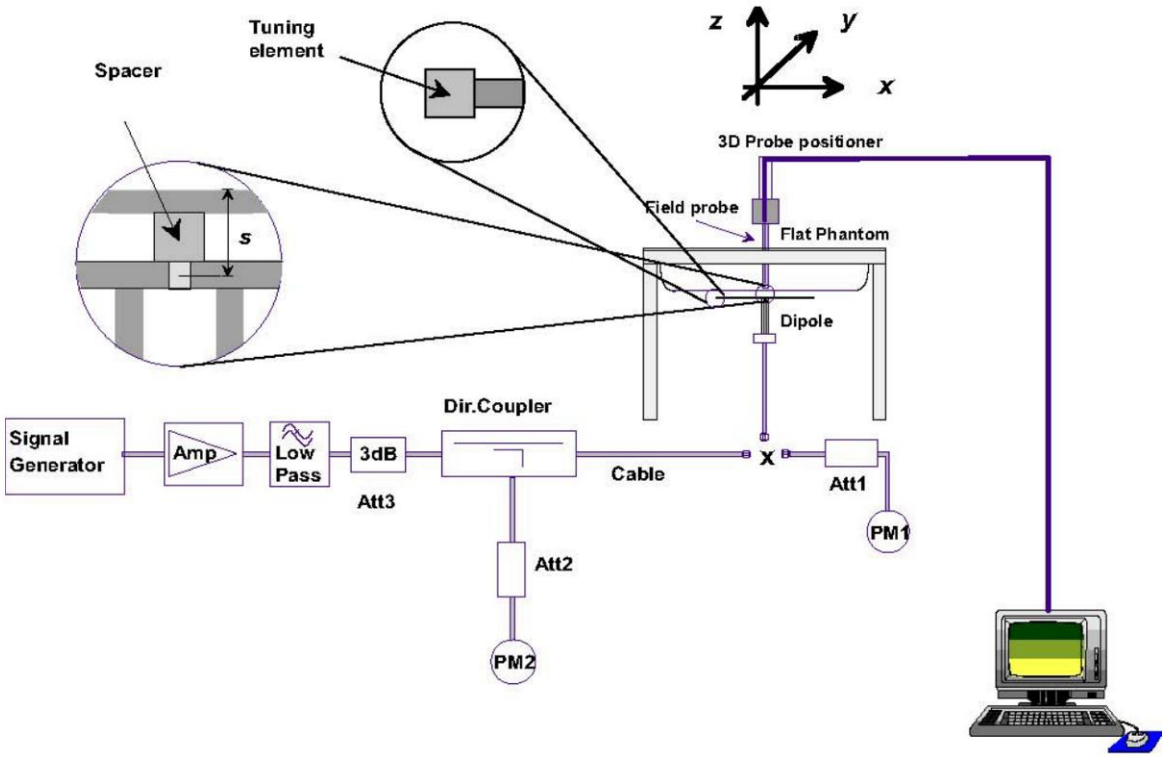
Table 8.1 Human Exposure Limits

	UNCONTROLLED ENVIRONMENT General Population (W/kg) or (mW/g)	CONTROLLED ENVIROMENT Professional Population (W/kg) or (mW/g)
SPATIAL PEAK SAR[1] Brain	1.60	8.00
SPATIAL AVERAGE SAR[2] Whole Body	0.08	0.40
SPATIAL PEAK SAR[3] Hands, Feet, Ankles, Wrists	4.00	20.00

[1] The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.
[2] The Spatial Average value of the SAR averaged over the whole body.
[3] The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

8 System and liquid validation

8.1 System validation



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

In the simplified setup for system evaluation, the DUT is replaced by a calibrated dipole and the power source is replaced by a continuous wave that comes from a signal generator. The calibrated dipole must be placed beneath the flat phantom section of the SAM twin phantom with the correct distance holder. The distance holder should touch the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom. The equipment setup is shown below:

1. Signal Generator
2. Amplifier
3. Directional Coupler
4. Power Meter
5. Calibrated Dipole

The output power on dipole port must be calibrated to 30 dBm (1000 mW) before dipole is connected.

Numerical reference SAR values (W/kg) for reference dipole and flat phantom

Frequency (MHz)	1g SAR	10g SAR	Local SAR at surface(above feed-point)	Local SAR at surface(y = 2 cm offset from feedpoint)
300	3.02	2.04	4.40	2.10
450	4.92	3.28	7.20	3.20
750	8.49	5.55	12.6	4.59
835	9.56	6.22	14.1	4.90
900	10.9	6.99	16.4	5.40
1450	29.0	16.0	50.2	6.50
1800	38.4	20.1	69.5	6.80
1900	39.7	20.5	72.1	6.60
2000	41.1	21.1	74.6	6.50
2450	52.4	24.0	104	7.70
2600	55.3	24.6	113	8.29
3000	63.8	25.7	140	9.50

Table 1: system validation (1g)

Measurement Date	Frequency (MHz)	Liquid Type (head/body)	Target SAR1g (W/kg)	Measured SAR1g (W/kg)	Normalized SAR1g (W/kg)	Deviation (±10%)
2024-7-12	750	head	8.51	2.14	8.56	0.59
2024-7-12	835	head	9.62	2.48	9.92	3.12
2024-7-10	1800	head	38.7	10.6	42.4	9.56
2024-7-11	1900	head	39.6	10.8	43.2	9.09
2024-7-11	2600	head	57.3	14.7	58.8	2.6

Note: system check input power: 250mW, above 5GHz the input power is 100mW .

8.2 liquid validation

The dielectric parameters were checked prior to assessment using the HP85070C dielectric probe kit. The dielectric parameters measured are reported in each correspondent section.

KDB 865664 recommended Tissue Dielectric Parameters

The head and body tissue parameters given in this below table should be used to measure the SAR of transmitters operating in 100 MHz to 6 GHz frequency range. The tissue dielectric parameters of the tissue medium at the test frequency should be within the tolerance required in this document. The dielectric parameters should be linearly interpolated between the closest pair of target frequencies to determine the applicable dielectric parameters corresponding to the device test frequency.

The head tissue dielectric parameters recommended by IEEE Std 1528-2013 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 1528 are derived from tissue dielectric parameters computed from the 4-Cole-Cole equations described above and extrapolated according to the head parameters specified in 1528.

Target Frequency	Head/Body Tissue	
MHz	εr	σ (S/m)
150	52.3	0.76
300	45.3	0.87
450	43.5	0.87
835	41.5	0.90
900	41.5	0.97
915	41.5	0.98
1450	40.5	1.20
1610	40.3	1.29
1800-2000	40.0	1.40
2450	39.2	1.80
2600	39.0	1.96
3000	38.5	2.40
5800	35.3	5.27

8.3 Tissue Dielectric Parameters for Head and Body Phantoms

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 Power drifts 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.

Table 2: Recommended Dielectric Performance of Tissue

Recommended Dielectric Performance of Tissue												
Ingredients (% by weight)	Frequency (MHz)											
	750		835		1800		1900		2450		2600	
Tissue	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	40.52	51.83	41.45	52.4	55.2	70.2	54.9	40.4	62.7	73.2	54.8	68.1
Salt (Nacl)	1.61	1.52	1.45	1.4	0.3	0.4	0.18	0.5	0.5	0.04	0.1	0.01
Sugar	57.67	46.45	56.0	45.0	0.0	0.0	0.0	58.0	0.0	0.0	0.0	0.0
HEC	0.1	0.1	1.0	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0
Bactericide	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Triton x-100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.8	0.0	0.0	0.0
DGBE	0.0	0.0	0.0	0.0	44.5	29.4	44.92	0.0	0.0	26.7	45.1	31.8
Dielectric	40.93	54.32	42.54	56.1	40.0	53.3	39.9	54.0	39.8	52.5	39.0	52.5
Conductivity	0.87	0.95	0.91	0.95	1.40	1.52	1.42	1.45	1.88	1.78	1.96	2.15

Table 3: Dielectric Performance of Head Tissue Simulating Liquid

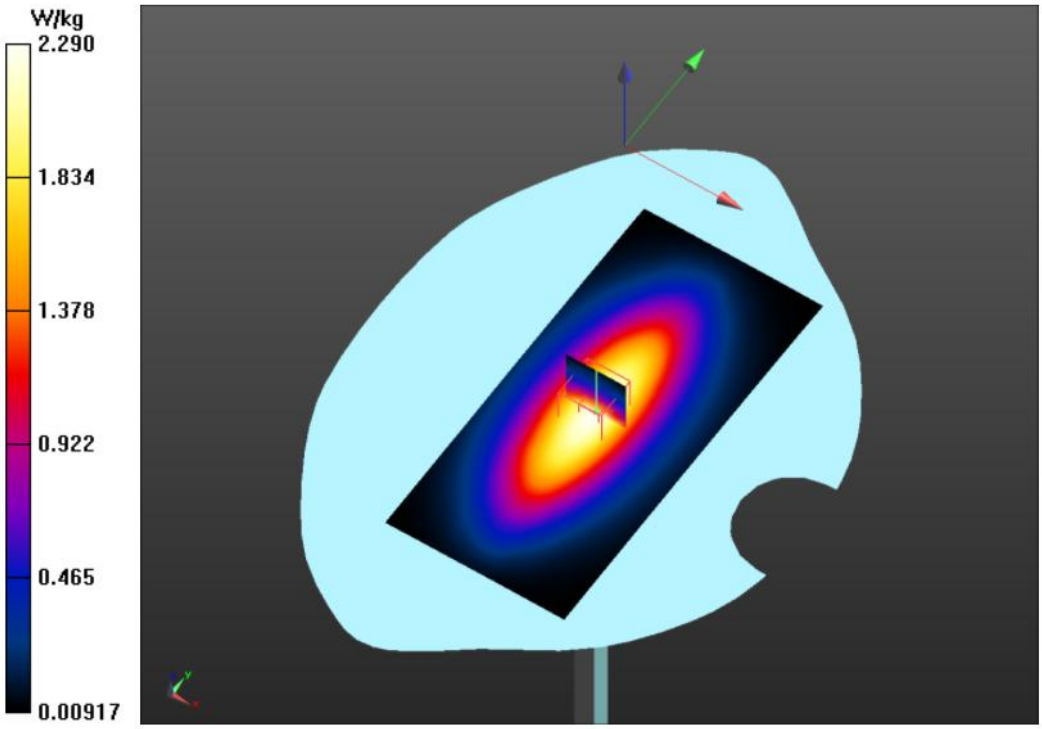
Temperature: 21°C , Relative humidity: 57%				
Frequency(MHz)	**Measured Date**	**Description**	**Dielectric Parameters**	
			εr	**σ(s/m)**
750	2024-7-12	Target Value ±5% window	41.50 39.43 — 43.58	0.90 0.855 — 0.945
		Measurement Value	41.118	0.914
835	2024-7-12	Target Value ±5% window	41.50 39.43 — 43.58	0.90 0.855 — 0.945
		Measurement Value	42.28	0.87
1800	2024-7-10	Target Value ±5% window	40.00 38.00 — 42.00	1.40 1.33 — 1.47
		Measurement Value	40.936	1.351
1900	2024-7-11	Target Value ±5% window	40.00 38.00 — 42.00	1.40 1.33 — 1.47
		Measurement Value	39.75	1.45
2600	2024-7-11	Target Value ±5% window	39.0 37.05 — 40.95	1.96 1.87 — 2.05
		Measurement Value	38.587	2.024

9 System Verification Plots

System Check-750
DUT: Dipole 750 MHz D750V3; Type: D750V3; Serial: D750V3 - SN:xxx
Communication System: UID 0, CW (0); Communication System Band: D750 (750.0 MHz); Frequency: 750 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 750 MHz; σ = 0.914 S/m; ε r = 41.118; ρ = 1000 kg/m3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)
DASY Configuration:
Probe: ES3DV3 - SN3089; ConvF(6.52, 6.52, 6.52) @ 750 MHz; Calibrated: 2023/7/14
Modulation Compensation:
Sensor-Surface: 4mm (Mechanical Surface Detection), z = 2.0, 32.0
Electronics: DAE4 Sn881; Calibrated: 2023/7/14
Phantom: SAM 1; Type: QD000P40CD; Serial: TP:xxxx
DASY52 52.10.3(1513); SEMCAD X 14.6.13(7474)

System Performance Check at 750MHz/d=10mm, Pin=250mW, dist=4.0mm (ES-Probe)/Area Scan (61x131x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 2.29 W/kg

System Performance Check at 750MHz/d=10mm, Pin=250mW, dist=4.0mm (ES-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 50.72 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 3.22 W/kg
SAR(1 g) = 2.14 W/kg; SAR(10 g) = 1.41 W/kg
Ratio of SAR at M2 to SAR at M1 = 67.2%
Maximum value of SAR (measured) = 2.31 W/kg



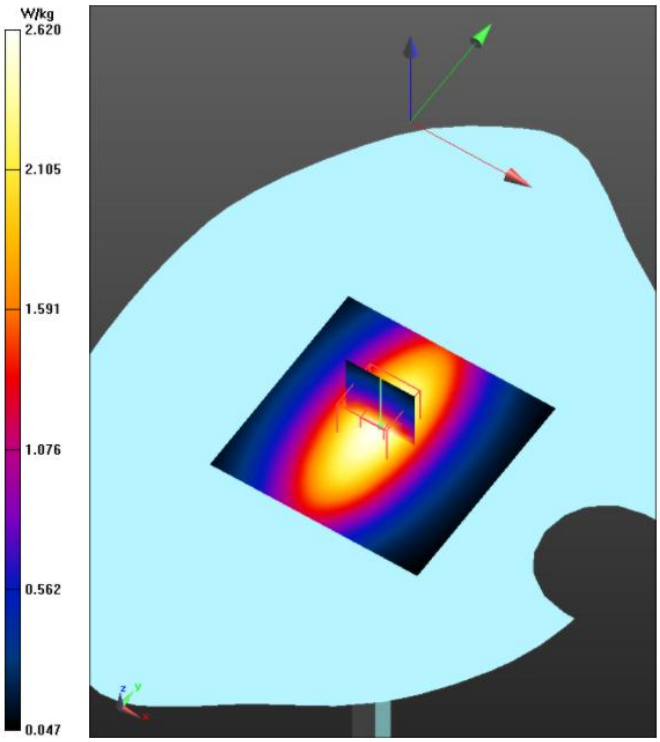
System Check-835
DUT: Dipole 835 MHz D835V2; Type: D835V2; Serial: D835V2 - SN:xxx
Communication System: UID 0, CW (0); Communication System Band: D835 (835.0 MHz); Frequency: 835 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used (interpolated): f = 835 MHz; σ = 0.87 S/m; ε r = 42.28; ρ = 1000 kg/m3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)
DASY Configuration:
Probe: ES3DV3 - SN3089; ConvF(6.28, 6.28, 6.28) @ 835 MHz; Calibrated: 2023/7/14
Modulation Compensation:
Sensor-Surface: 4mm (Mechanical Surface Detection), z = 2.0, 32.0
Electronics: DAE4 Sn881; Calibrated: 2023/7/14
Phantom: SAM 1; Type: QD000P40CD; Serial: TP:xxxx
DASY52 52.10.3(1513); SEMCAD X 14.6.13(7474)

System Performance Check at 835MHz/d=10mm, Pin=250mW, dist=4.0mm (ES-Probe)/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 2.62 W/kg

System Performance Check at 835MHz/d=10mm, Pin=250mW, dist=4.0mm (ES-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.18 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 3.54 W/kg
SAR(1 g) = 2.48 W/kg; SAR(10 g) = 1.69 W/kg
Ratio of SAR at M2 to SAR at M1 = 70.4%

Maximum value of SAR (measured) = 2.67 W/kg

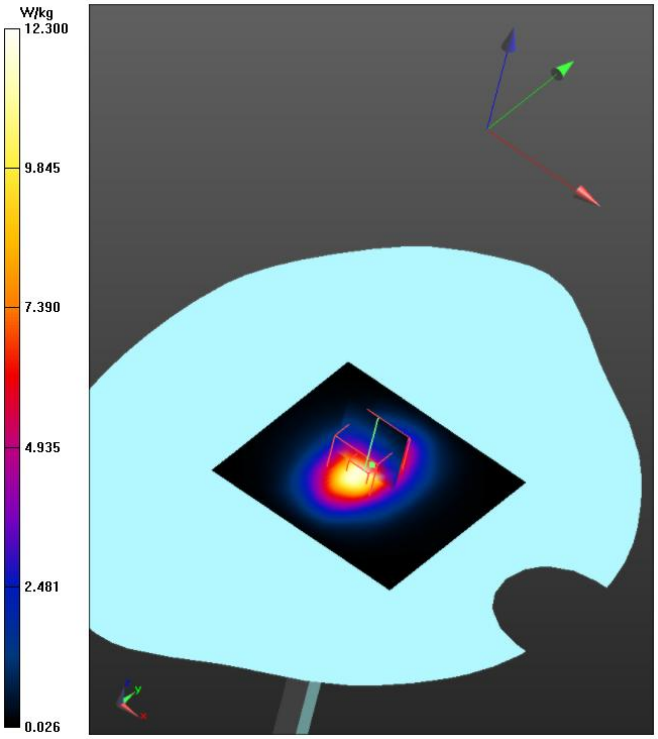


System Check-1800
DUT: Dipole 1800 MHz D1800V2; Type: D1800V2; Serial: D1800V2 - SN:xxx
Communication System: UID 0, CW (0); Communication System Band: D1800 (1800.0 MHz); Frequency: 1800 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 1800 MHz; σ = 1.351 S/m; εr = 40.936; ρ = 1000 kg/m3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)
DASY Configuration:
Probe: ES3DV3 - SN3089; ConvF(5.35, 5.35, 5.35) @ 1800 MHz; Calibrated: 2023/7/14
Modulation Compensation:
Sensor-Surface: 4mm (Mechanical Surface Detection), z = 2.0, 32.0
Electronics: DAE4 Sn881; Calibrated: 2023/7/14
Phantom: SAM 1; Type: QD000P40CD; Serial: TP:xxxx
DASY52 52.10.3(1513); SEMCAD X 14.6.13(7474)

System Performance Check at 1800MHz/d=5mm, Pin=250mW, dist=4.0mm (ES-Probe)/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 12.3 W/kg

System Performance Check at 1800MHz/d=5mm, Pin=250mW, dist=4.0mm (ES-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.08 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 18.9 W/kg
SAR(1 g) = 10.6 W/kg; SAR(10 g) = 5.66 W/kg
Smallest distance from peaks to all points 3 dB below = 10.8 mm
Ratio of SAR at M2 to SAR at M1 = 57.8%

Maximum value of SAR (measured) = 11.9 W/kg



System Check-1900
DUT: Dipole 1900 MHz D1900V2; Type: D1900V2; Serial: D1900V2 - SN:xxx

Communication System: UID 0, CW (0); Communication System Band: D1900 (1900.0 MHz); Frequency: 1900 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 1900 MHz; σ = 1.45 S/m; εr = 39.75; ρ = 1000 kg/m3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

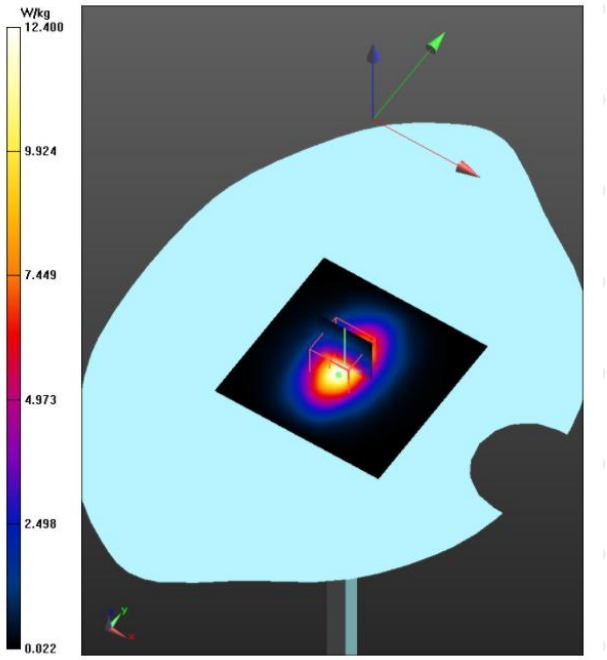
DASY Configuration:

Probe: ES3DV3 - SN3089; ConvF(5.07, 5.07, 5.07) @ 1900 MHz; Calibrated: 2023/7/14
Modulation Compensation:
Sensor-Surface: 4mm (Mechanical Surface Detection), z = 2.0, 32.0
Electronics: DAE4 Sn881; Calibrated: 2023/7/14
Phantom: SAM 1; Type: QD000P40CD; Serial: TP:xxxx
DASY52 52.10.3(1513); SEMCAD X 14.6.13(7474)

System Performance Check at 1900MHz/d=5mm, Pin=250mW, dist=4.0mm (ES-Probe)/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 12.4 W/kg

System Performance Check at 1900MHz/d=5mm, Pin=250mW, dist=4.0mm (ES-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 93.02 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 19.9 W/kg
SAR(1 g) = 10.8 W/kg; SAR(10 g) = 5.59 W/kg
Smallest distance from peaks to all points 3 dB below = 10.5 mm
Ratio of SAR at M2 to SAR at M1 = 55.5%

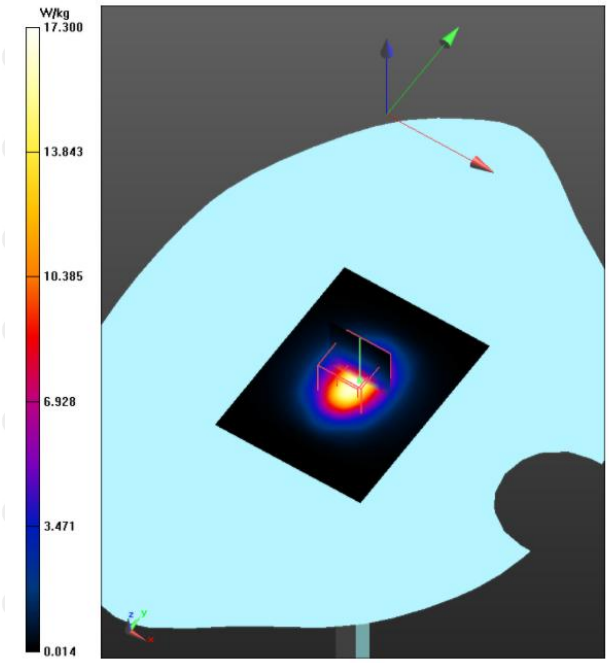
Maximum value of SAR (measured) = 12.1 W/kg



System Check-2600
DUT: Dipole 2600 MHz D2600V2; Type: D2600V2; Serial: D2600V2 - SN:xxx
Communication System: UID 0, CW (0); Communication System Band: D2600 (2600.0 MHz); Frequency: 2600 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 2600 MHz; σ = 2.024 S/m; ε r = 38.587; ρ = 1000 kg/m3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)
DASY Configuration:
Probe: ES3DV3 - SN3089; ConvF(4.57, 4.57, 4.57) @ 2600 MHz; Calibrated: 2023/7/14
Modulation Compensation:
Sensor-Surface: 4mm (Mechanical Surface Detection), z = -1.0, 32.0
Electronics: DAE4 Sn881; Calibrated: 2023/7/14
Phantom: SAM 1; Type: QD000P40CD; Serial: TP:xxxx
DASY52 52.10.3(1513); SEMCAD X 14.6.13(7474)

System Performance Check at 2600MHz/d=5mm, Pin=250mW, dist=4.0mm (ES-Probe)/Area Scan (61x81x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 17.3 W/kg

System Performance Check at 2600MHz/d=5mm, Pin=250mW, dist=4.0mm (ES-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 92.45 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 32.9 W/kg
SAR(1 g) = 14.7 W/kg; SAR(10 g) = 6.47 W/kg
Smallest distance from peaks to all points 3 dB below = 9.8 mm
Ratio of SAR at M2 to SAR at M1 = 46.4%
Maximum value of SAR (measured) = 16.4 W/kg



10 Type a Measurement Uncertainty

The component of uncertainly may generally be categorized according to the methods used to evaluate them. The evaluation of uncertainly by the statistical analysis of a series of observations is termed a Type An evaluation of uncertainty. The evaluation of uncertainty by means other than the statistical analysis of a series of observation is termed a Type B evaluation of uncertainty. Each component of uncertainty, however evaluated, is represented by an estimated standard deviation, termed standard uncertainty, which is determined by the positive square root of the estimated variance

A Type A evaluation of standard uncertainty may be based on any valid statistical method for treating data. This includes calculating the standard deviation of the mean of a series of independent observations; using the method of least squares to fit a curve to the data in order to estimate the parameter of the curve and their standard deviations; or carrying out an analysis of variance in order to identify and quantify random effects in certain kinds of measurement.

A type B evaluation of standard uncertainty is typically based on scientific judgment using all of the relevant information available. These may include previous measurement data, experience and specification, data provided in calibration reports and uncertainties assigned to reference data taken from handbooks. Broadly speaking, the uncertainty is either obtained from an outdoor source or obtained from an assumed distribution, such as the normal distribution, rectangular or triangular distributions indicated in Table below :

Uncertainty Distribution	Normal	Rectangle	Triangular	U Shape
Multi-plying Factor(a)	1/k(b)	1 / √3	1 / √6	1 / √2

(a) standard uncertainty is determined as the product of the multiplying factor and the estimated range of variations in the measured quantity
(b) κ is the coverage factor

Standard Uncertainty for Assumed Distribution

The combined standard uncertainty of the measurement result represents the estimated standard deviation of the result. It is obtained by combining the individual standard uncertainties of both Type A and Type -sum- by taking the positive square root of the estimated variances.

Expanded uncertainty is a measure of uncertainty that defines an interval about the measurement result within which the measured value is confidently believed to lie. It is obtained by multiplying the combined standard uncertainty by a coverage factor. Typically, the coverage factor ranges from 2 to 3. Using a coverage factor allows the true value of a measured quantity to be specified with a defined probability within the specified uncertainty range. For purpose of this document, a coverage factor two is used, which corresponds to confidence interval of about 95 %.

The COMOSAR Uncertainty Budget is show in below table:

DASY5 Uncertainty

Measurement uncertainty for 300MHz to 3GHz averaged over 1 gram/ 10 gram

Error Description	Uncert. value	Prob. Dist.	Div.	(ci) 1g	(ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	(vi) vef f
Measurement System								
Probe Calibration	±6.0 %	N	1	1	1	±6.0 %	±6.0 %	∞
Axial Isotropy	±4.7 %	R	√3	0.7	0.7	±1.9 %	±1.9 %	∞
Hemispherical Isotropy	±9.6 %	R	√3	0.7	0.7	±3.9 %	±3.9 %	∞
Boundary Effects	±1.0 %	R	√3	1	1	±0.6 %	±0.6 %	∞
Linearity	±4.7 %	R	√3	1	1	±2.7 %	±2.7 %	∞
System Detection Limits	±1.0 %	R	√3	1	1	±0.6 %	±0.6 %	∞
Modulation Responsem	±2.4 %	R	√3	1	1	±1.4 %	±1.4 %	∞
Readout Electronics	±0.3 %	N	1	1	1	±0.3 %	±0.3 %	∞
Response Time	±0.8 %	R	√3	1	1	±0.5 %	±0.5 %	∞
Integration Time	±2.6 %	R	√3	1	1	±1.5 %	±1.5 %	∞
RF Ambient Noise	±3.0 %	R	√3	1	1	±1.7 %	±1.7 %	∞
RF Ambient Reflections	±3.0 %	R	√3	1	1	±1.7 %	±1.7 %	∞
Probe Positioner	±0.4 %	R	√3	1	1	±0.2 %	±0.2 %	∞
Probe Positioning	±2.9 %	R	√3	1	1	±1.7 %	±1.7 %	∞
Max. SAR Eval.	±2.0 %	R	√3	1	1	±1.2 %	±1.2 %	∞
Test Sample Related								
Device Positioning	±2.9 %	N	1	1	1	±2.9 %	±2.9 %	145
Device Holder	±3.6 %	N	1	1	1	±3.6 %	±3.6 %	5
Power Drift	±5.0 %	R	√3	1	1	±2.9 %	±2.9 %	∞
Power Scalingp	±0 %	R	√3	1	1	±0.0 %	±0.0 %	∞
Phantom and Setup								
Phantom Uncertainty	±6.1 %	R	√3	1	1	±3.5 %	±3.5 %	∞
SAR correction	±1.9 %	R	√3	1	0.84	±1.1 %	±0.9 %	∞
Liquid Conductivity (mea.)DAK	±2.5 %	R	√3	0.78	0.71	±1.1 %	±1.0 %	∞
Liquid Permittivity (mea.) DAK	±2.5 %	R	√3	0.26	0.26	±0.3 %	±0.4 %	∞
Temp. unc. - Conductivity BB	±3.4 %	R	√3	0.78	0.71	±1.5 %	±1.4 %	∞
Temp. unc. - Permittivity BB	±0.4 %	R	√3	0.23	0.26	±0.1 %	±0.1 %	∞
Combined Std. Uncertainty						±11.2 %	±11.1 %	361
Expanded STD Uncertainty						±22.3 %	±22.2 %	

11 Output Power Verification

11.1 Test Condition:

1. Conducted Measurement
   EUT was set for low, mid, high channel with modulated mode and highest RF output power.
   The base station simulator was connected to the antenna terminal.
2. Conducted Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 40GHz is ±1.5dB.
3. Environmental Conditions

Temperature	23°C
Relative Humidity	53%
Atmospheric Pressure	1019mbar

4. Tested By : Martin Feng

11.2 Test Procedures:

Mobile Phone radio output power measurement

1. The transmitter output port was connected to base station emulator.
2. Establish communication link between emulator and EUT and set EUT to operate at maximum output power all the time.
3. Select lowest, middle, and highest channels for each band and different possible test mode.
4. Measure the conducted peak burst power and conducted average burst power from EUT antenna port.

Other radio output power measurement:

The output power was measured using power meter at low, mid, and high channels.

Source-based Time Averaged Burst Power Calculation:

For TDMA, the following duty cycle factor was used to calculate the source-based time average power

Number of Time slot	1	2	3	4
Duty Cycle	1:8	1:4	1:2.66	1:2
Duty cycle factor	-9.03 dB	-6.02 dB	-4.26 dB	-3.01 dB
Crest Factor	8	4	2.66	2

Remark: *Time slot duty cycle factor = 10 * log (Time Slot Duty Cycle)*
Source based time averaged power = Maximum burst averaged power (1 Uplink) – 9.03 dB
Source based time averaged power = Maximum burst averaged power (2 Uplink) – 6.02 dB
Source based time averaged power = Maximum burst averaged power (3 Uplink) – 4.26 dB
Source based time averaged power = Maximum burst averaged power (4 Uplink) – 3.01 dB

Test Result:

WCDMA - Average Power (dBm)								
Band	**WCDMA Band II**				**WCDMA Band V**			
Channel	**9262**	**9400**	**9538**	**Tune up Power tolerant**	**4132**	**4182**	**4233**	**Tune up Power tolerant**
Frequency (MHz)	1852.4	1880	1907.6	/	826.4	836.4	846.6	/
RMC 12.2k	22.22	22.35	22.40	22±1	22.20	22.48	22.74	22±1
HSDPA Subtest-1	21.89	21.75	21.50	21±1	22.34	22.07	21.98	22±1
HSDPA Subtest-2	21.60	21.45	21.32	21±1	22.03	21.85	21.69	22±1
HSDPA Subtest-3	21.35	21.24	21.03	21±1	21.70	21.49	21.46	21±1
HSDPA Subtest-4	20.06	20.97	20.94	20±1	21.72	21.33	21.23	21±1
HSUPA Subtest-1	21.75	21.31	21.23	21±1	22.32	21.73	21.80	22±1
HSUPA Subtest-2	21.83	21.70	21.46	21±1	22.35	22.07	21.93	22±1
HSUPA Subtest-3	21.66	21.34	21.04	21±1	22.01	21.74	21.30	22±1
HSUPA Subtest-4	21.76	21.69	21.39	21±1	22.28	22.11	21.92	22±1
HSUPA Subtest-5	21.55	21.34	21.19	21±1	22.20	21.91	21.55	22±1

LTE Power Reduction

The following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP TS36.101 specification.

The allowed Maximum Power Reduction (MPR) for the maximum output power due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1 of the 3GPP TS36.101.

Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3

Modulation	Channel bandwidth / Transmission bandwidth (RB)						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2

The allowed A-MPR values specified below in Table 6.2.4.-1 of 3GPP TS36.101 are in addition to the allowed MPR requirements. All the measurements below were performed with A-MPR disabled, by using Network Signalling Value of "NS_01".

Table 6.2.4-1: Additional Maximum Power Reduction (A-MPR)

Network Signalling value	Requirements (sub-clause)	E-UTRA Band	Channel bandwidth (MHz)	Resources Blocks (N_{RB})	A-MPR (dB)
NS_01	6.6.2.1.1	Table 5.5-1	1.4, 3, 5, 10, 15, 20	Table 5.6-1	NA
NS_03	6.6.2.2.1	2, 4,10, 23, 25, 35, 36	3	>5	≤ 1
			5	>6	≤ 1
			10	>6	≤ 1
			15	>8	≤ 1
			20	>10	≤ 1
NS_04	6.6.2.2.2	41	5	>6	≤ 1
			10, 15, 20	See Table 6.2.4-4	
NS_05	6.6.3.3.1	1	10,15,20	≥ 50	≤ 1
NS_06	6.6.2.2.3	12, 13, 14, 17	1.4, 3, 5, 10	Table 5.6-1	n/a
NS_07	6.6.2.2.3 6.6.3.3.2	13	10	Table 6.2.4-2	Table 6.2.4-2
NS_08	6.6.3.3.3	19	10, 15	> 44	≤ 3
NS_09	6.6.3.3.4	21	10, 15	> 40	≤ 1
				> 55	≤ 2
NS_10		20	15, 20	Table 6.2.4-3	Table 6.2.4-3
NS_11	6.6.2.2.1	23[1]	1.4, 3, 5, 10	Table 6.2.4-5	Table 6.2.4-5
..					
NS_32	-	-	-	-	-
Note 1: Applies to the lower block of Band 23, i.e. a carrier placed in the 2000-2010 MHz region.					

LTE Band 2:

BW(MHz)	Ch	Freq(MHz)	Mode	UL RB Allocation	UL RB Offset	Average Power (dbm)	Tune up limited(dBm)	MPR (dB)
1.4MHz	18607	1850.7	QPSK	1	0	23.27	23.0±1	/
				1	2	23.34	23.0±1	/
				1	5	23.34	23.0±1	/
				3	0	23.19	23.0±1	/
				3	2	23.24	23.0±1	/
				6	0	22.23	23.0±1	/
			16QAM	1	0	22.79	23.0±1	/
				1	2	22.85	23.0±1	/
				1	5	22.85	23.0±1	/
				3	0	22.21	23.0±1	/
				3	2	22.20	23.0±1	/
				6	0	21.49	22.0±1	1.0
	18900	1880	QPSK	1	0	23.38	23.0±1	/
				1	2	23.35	23.0±1	/
				1	5	23.38	23.0±1	/
				3	0	23.46	23.0±1	/
				3	1	23.42	23.0±1	/
				6	0	22.49	23.0±1	/
			16QAM	1	0	23.00	23.0±1	/
				1	2	22.99	23.0±1	/
				1	5	23.02	23.0±1	/
				3	0	22.46	23.0±1	/
				3	2	22.42	23.0±1	/
				6	0	21.56	22.0±1	1.0
	19193	1909.3	QPSK	1	0	23.55	23.0±1	/
				1	2	23.54	23.0±1	/
				1	5	23.50	23.0±1	/
				3	0	23.62	23.0±1	/
				3	2	23.58	23.0±1	/
				6	0	22.53	23.0±1	/
			16QAM	1	0	22.24	23.0±1	/
				1	2	22.20	23.0±1	/
				1	5	22.22	23.0±1	/
				3	0	22.52	23.0±1	/
				3	2	22.48	23.0±1	/
				6	0	21.78	22.0±1	1.0

BW(MHz)	Ch	Freq(MHz)	Mode	UL RB Allocation	UL RB Offset	Average Power (dbm)	Tune up limited(dBm)	MPR (dB)
3MHz	18615	1851.5	QPSK	1	0	23.14	23.0±1	/
				1	8	23.14	23.0±1	/
				1	14	23.16	23.0±1	/
				6	0	22.18	23.0±1	/
				6	9	22.23	23.0±1	/
				15	0	22.16	23.0±1	/
			16QAM	1	0	22.15	23.0±1	/
				1	8	22.16	23.0±1	/
				1	14	22.22	23.0±1	/
				6	0	21.34	22.0±1	1.0
				6	9	21.40	22.0±1	1.0
				15	0	21.27	22.0±1	1.0
	18900	1880	QPSK	1	0	23.40	23.0±1	/
				1	8	23.36	23.0±1	/
				1	14	23.42	23.0±1	/
				6	4	22.53	23.0±1	/
				6	9	22.48	23.0±1	/
				15	0	22.51	23.0±1	/
			16QAM	1	0	22.99	23.0±1	/
				1	8	22.99	23.0±1	/
				1	14	22.99	23.0±1	/
				6	0	21.64	22.0±1	1.0
				6	9	21.59	22.0±1	1.0
				15	0	21.51	22.0±1	1.0
	19185	1908.5	QPSK	1	0	23.45	23.0±1	/
				1	8	23.55	23.0±1	/
				1	14	23.54	23.0±1	/
				6	0	22.41	23.0±1	/
				6	9	22.50	23.0±1	/
				15	0	22.56	23.0±1	/
			16QAM	1	0	22.21	23.0±1	/
				1	8	22.23	23.0±1	/
				1	14	22.20	23.0±1	/
				6	0	21.71	22.0±1	1.0
				6	9	21.76	22.0±1	1.0
				15	0	21.61	22.0±1	1.0

BW(MHz)	Ch	Freq(MHz)	Mode	UL RB Allocation	UL RB Offset	Average Power (dbm)	Tune up limited(dBm)	MPR (dB)
5MHz	18625	1852.5	QPSK	1	0	23.19	23.0±1	/
				1	12	23.23	23.0±1	/
				1	24	23.28	23.0±1	/
				12	0	22.31	23.0±1	/
				12	11	22.40	23.0±1	/
				25	0	22.35	23.0±1	/
			16QAM	1	0	21.99	22.0±1	1.0
				1	12	22.01	23.0±1	/
				1	24	22.07	23.0±1	/
				12	0	21.33	22.0±1	1.0
				12	11	21.32	22.0±1	1.0
				25	0	21.41	22.0±1	1.0
	18900	1880	QPSK	1	0	23.60	23.0±1	/
				1	12	23.49	23.0±1	/
				1	24	23.52	23.0±1	/
				12	0	22.63	23.0±1	/
				12	11	22.42	23.0±1	/
				25	0	22.58	23.0±1	/
			16QAM	1	0	22.70	23.0±1	/
				1	12	22.64	23.0±1	/
				1	24	22.63	23.0±1	/
				12	0	21.49	22.0±1	1.0
				12	11	21.47	22.0±1	1.0
				25	0	21.53	22.0±1	1.0
	19175	1907.5	QPSK	1	0	23.41	23.0±1	/
				1	12	23.46	23.0±1	/
				1	24	23.39	23.0±1	/
				12	0	22.55	23.0±1	/
				12	11	22.60	23.0±1	/
				25	0	22.50	23.0±1	/
			16QAM	1	0	22.52	23.0±1	/
				1	12	22.51	23.0±1	/
				1	24	22.44	23.0±1	/
				12	0	21.57	22.0±1	1.0
				12	11	21.56	22.0±1	1.0
				25	0	21.41	22.0±1	1.0

BW(MHz)	Ch	Freq(MHz)	Mode	UL RB Allocation	UL RB Offset	Average Power (dbm)	Tune up limited(dBm)	MPR (dB)
10MHz	18650	1855	QPSK	1	0	23.17	23.0±1	/
				1	24	23.25	23.0±1	/
				1	49	23.38	23.0±1	/
				25	0	22.26	23.0±1	/
				25	24	22.47	23.0±1	/
				50	0	22.35	23.0±1	/
			16QAM	1	0	22.30	23.0±1	/
				1	24	22.36	23.0±1	/
				1	49	22.40	23.0±1	/
				25	0	21.33	22.0±1	1.0
				25	24	21.45	22.0±1	1.0
				50	0	21.49	22.0±1	1.0
	18900	1880	QPSK	1	0	23.55	23.0±1	/
				1	24	23.45	23.0±1	/
				1	49	23.43	23.0±1	/
				25	0	22.45	23.0±1	/
				25	24	22.51	23.0±1	/
				50	0	22.48	23.0±1	/
			16QAM	1	0	22.67	23.0±1	/
				1	24	22.63	23.0±1	/
				1	49	22.58	23.0±1	/
				25	0	21.68	22.0±1	1.0
				25	24	21.65	22.0±1	1.0
				50	0	21.62	22.0±1	1.0
	19150	1905	QPSK	1	0	23.55	23.0±1	/
				1	24	23.52	23.0±1	/
				1	49	23.62	23.0±1	/
				25	0	22.60	23.0±1	/
				25	24	22.53	23.0±1	/
				50	0	22.52	23.0±1	/
			16QAM	1	0	21.92	22.0±1	1.0
				1	24	21.92	22.0±1	1.0
				1	49	21.94	22.0±1	1.0
				25	0	21.61	22.0±1	1.0
				25	24	21.68	22.0±1	1.0
				50	0	21.56	22.0±1	1.0

BW(MHz)	Ch	Freq(MHz)	Mode	UL RB Allocation	UL RB Offset	Average Power (dbm)	Tune up limited(dBm)	MPR (dB)
15MHz	18675	1857.5	QPSK	1	0	23.18	23.0±1	/
				1	37	23.31	23.0±1	/
				1	74	23.50	23.0±1	/
				36	0	22.29	23.0±1	/
				36	35	22.50	23.0±1	/
				75	0	22.37	23.0±1	/
			16QAM	1	0	22.30	23.0±1	/
				1	37	22.37	23.0±1	/
				1	74	22.49	23.0±1	/
				36	0	21.41	22.0±1	1.0
				36	35	21.55	22.0±1	1.0
				75	0	21.43	22.0±1	1.0
	18900	1880	QPSK	1	0	23.44	23.0±1	/
				1	37	23.37	23.0±1	/
				1	74	23.32	23.0±1	/
				36	0	22.48	23.0±1	/
				36	35	22.48	23.0±1	/
				75	0	22.49	23.0±1	/
			16QAM	1	0	23.32	23.0±1	/
				1	37	23.26	23.0±1	/
				1	74	23.18	23.0±1	/
				36	0	21.60	22.0±1	1.0
				36	35	21.53	22.0±1	1.0
				75	0	21.59	22.0±1	1.0
	19125	1902.5	QPSK	1	0	23.47	23.0±1	/
				1	37	23.54	23.0±1	/
				1	74	23.54	23.0±1	/
				36	0	22.42	23.0±1	/
				36	35	22.46	23.0±1	/
				75	0	22.51	23.0±1	/
			16QAM	1	0	22.55	23.0±1	/
				1	37	22.57	23.0±1	/
				1	74	22.60	23.0±1	/
				36	0	21.59	23.0±1	/
				36	35	21.66	22.0±1	1.0
				75	0	21.71	22.0±1	1.0

BW(MHz)	Ch	Freq(MHz)	Mode	UL RB Allocation	UL RB Offset	Average Power (dbm)	Tune up limited(dBm)	MPR (dB)
20MHz	18700	1860	QPSK	1	0	23.29	23.0±1	/
				1	49	23.41	23.0±1	/
				1	99	23.59	23.0±1	/
				50	0	22.21	23.0±1	/
				50	24	22.42	23.0±1	/
				100	0	22.45	23.0±1	/
			16QAM	1	0	22.38	23.0±1	/
				1	49	22.62	23.0±1	/
				1	99	22.76	23.0±1	/
				50	0	21.52	22.0±1	1.0
				50	49	21.65	22.0±1	1.0
				100	0	21.52	22.0±1	1.0
	18900	1880	QPSK	1	0	23.66	23.0±1	/
				1	49	23.58	23.0±1	/
				1	99	23.53	23.0±1	/
				50	0	22.61	22.0±1	1.0
				50	24	22.43	22.0±1	1.0
				100	0	22.63	22.0±1	1.0
			16QAM	1	0	22.33	22.0±1	1.0
				1	49	22.27	22.0±1	1.0
				1	99	22.22	22.0±1	1.0
				50	0	21.64	22.0±1	1.0
				50	24	21.53	22.0±1	1.0
				100	0	21.71	22.0±1	1.0
	19100	1900	QPSK	1	0	23.67	23.0±1	/
				1	49	23.70	23.0±1	/
				1	99	23.74	23.0±1	/
				50	0	22.62	22.0±1	1.0
				50	24	22.51	22.0±1	1.0
				100	0	22.50	22.0±1	1.0
			16QAM	1	0	22.46	22.0±1	1.0
				1	49	22.54	22.0±1	1.0
				1	99	22.56	22.0±1	1.0
				50	0	21.63	22.0±1	1.0
				50	24	21.71	22.0±1	1.0
				100	0	21.72	22.0±1	1.0

LTE Band 4:

BW(MHz)	Ch	Freq(MHz)	Mode	UL RB Allocation	UL RB Offset	Average Power (dbm)	Tune up limited(dBm)	MPR (dB)
1.4MHz	19957	1710.7	QPSK	1	0	22.24	22.0±1	/
				1	2	22.18	22.0±1	/
				1	5	22.18	22.0±1	/
				3	0	22.22	22.0±1	/
				3	1	22.19	22.0±1	/
				6	0	21.19	22.0±1	/
			16QAM	1	0	21.28	22.0±1	/
				1	2	21.33	22.0±1	/
				1	5	21.28	22.0±1	/
				3	0	21.43	22.0±1	/
				3	2	21.41	22.0±1	/
				6	0	20.32	21.0±1	1.0
	20175	1732.5	QPSK	1	0	21.98	22.0±1	/
				1	2	21.96	22.0±1	/
				1	5	21.94	22.0±1	/
				3	0	22.08	22.0±1	/
				3	2	22.07	22.0±1	/
				6	0	21.05	22.0±1	/
			16QAM	1	0	20.68	21.0±1	1.0
				1	2	20.68	21.0±1	1.0
				1	5	20.66	21.0±1	1.0
				3	0	21.05	22.0±1	/
				3	2	21.05	22.0±1	/
				6	0	20.29	21.0±1	1.0
	20393	1754.3	QPSK	1	0	22.18	22.0±1	/
				1	2	22.13	22.0±1	/
				1	5	22.08	22.0±1	/
				3	0	21.92	22.0±1	/
				3	2	21.95	22.0±1	/
				6	0	20.91	22.0±1	/
			16QAM	1	0	21.80	22.0±1	/
				1	2	21.85	22.0±1	/
				1	5	21.82	22.0±1	/
				3	0	20.97	21.0±1	1.0
				3	2	21.08	22.0±1	/
				6	0	21.05	22.0±1	/

BW(MHz)	Ch	Freq(MHz)	Mode	UL RB Allocation	UL RB Offset	Average Power (dbm)	Tune up limited(dBm)	MPR (dB)
3MHz	19965	1711.5	QPSK	1	0	22.13	22.0±1	/
				1	8	22.11	22.0±1	/
				1	14	22.12	22.0±1	/
				8	0	21.17	22.0±1	/
				8	4	21.21	22.0±1	/
				15	0	21.19	22.0±1	/
			16QAM	1	0	21.10	22.0±1	/
				1	8	21.05	22.0±1	/
				1	14	21.02	22.0±1	/
				8	0	20.33	21.0±1	1.0
				8	9	20.26	21.0±1	1.0
				15	0	20.19	21.0±1	1.0
	20175	1732.5	QPSK	1	0	21.90	22.0±1	/
				1	8	22.01	22.0±1	/
				1	14	22.04	22.0±1	/
				8	0	20.97	21.0±1	1.0
				8	4	21.00	22.0±1	/
				15	0	21.02	22.0±1	/
			16QAM	1	0	21.72	22.0±1	/
				1	8	21.75	22.0±1	/
				1	14	21.81	22.0±1	/
				8	0	20.17	21.0±1	1.0
				8	4	20.19	21.0±1	1.0
				15	0	20.15	21.0±1	1.0
	20385	1753.5	QPSK	1	0	22.08	22.0±1	/
				1	8	22.04	22.0±1	/
				1	14	22.05	22.0±1	/
				8	0	20.91	21.0±1	1.0
				8	9	20.85	21.0±1	1.0
				15	0	20.81	21.0±1	1.0
			16QAM	1	0	20.92	21.0±1	1.0
				1	8	20.90	21.0±1	1.0
				1	14	20.85	21.0±1	1.0
				8	0	20.15	21.0±1	1.0
				8	9	20.20	21.0±1	1.0
				15	0	20.07	21.0±1	1.0

BW(MHz)	Ch	Freq(MHz)	Mode	UL RB Allocation	UL RB Offset	Average Power (dbm)	Tune up limited(dBm)	MPR (dB)
5MHz	19975	1712.5	QPSK	1	0	22.13	22.0±1	/
				1	49	22.04	22.0±1	/
				1	99	22.02	22.0±1	/
				12	0	21.18	22.0±1	/
				12	24	21.11	22.0±1	/
				25	0	21.10	22.0±1	/
			16QAM	1	0	20.92	21.0±1	1.0
				1	49	20.89	21.0±1	1.0
				1	99	20.82	21.0±1	1.0
				12	0	20.21	21.0±1	1.0
				12	24	20.17	21.0±1	1.0
				25	0	20.28	21.0±1	1.0
	20175	1732.5	QPSK	1	0	22.04	22.0±1	/
				1	49	22.07	22.0±1	/
				1	99	22.13	22.0±1	/
				12	0	21.02	22.0±1	/
				12	49	21.09	22.0±1	/
				25	0	20.88	21.0±1	1.0
			16QAM	1	0	21.19	22.0±1	/
				1	49	21.18	22.0±1	/
				1	99	21.25	22.0±1	/
				12	0	20.02	21.0±1	1.0
				12	24	20.06	21.0±1	1.0
				25	0	20.03	21.0±1	1.0
	20375	1752.5	QPSK	1	0	21.64	22.0±1	/
				1	49	21.73	22.0±1	/
				1	99	21.68	22.0±1	/
				12	0	20.99	21.0±1	1.0
				12	49	20.89	21.0±1	1.0
				25	0	20.86	21.0±1	1.0
			16QAM	1	0	20.86	21.0±1	1.0
				1	49	20.81	21.0±1	1.0
				1	99	20.82	21.0±1	1.0
				12	0	20.03	21.0±1	1.0
				12	49	20.03	21.0±1	1.0
				25	0	20.01	21.0±1	1.0

BW(MHz)	Ch	Freq(MHz)	Mode	UL RB Allocation	UL RB Offset	Average Power (dbm)	Tune up limited(dBm)	MPR (dB)
10MHz	20000	1715	QPSK	1	0	22.16	22.0±1	/
				1	49	22.01	22.0±1	/
				1	99	21.89	22.0±1	/
				25	0	21.12	22.0±1	/
				25	49	21.11	22.0±1	/
				50	0	20.96	22.0±1	/
			16QAM	1	0	21.21	22.0±1	/
				1	49	21.06	22.0±1	/
				1	99	20.95	21.0±1	1.0
				25	0	20.24	21.0±1	1.0
				25	49	20.07	21.0±1	1.0
				50	0	20.11	21.0±1	1.0
	20175	1732.5	QPSK	1	0	21.99	22.0±1	/
				1	49	22.05	22.0±1	/
				1	99	22.17	22.0±1	/
				25	0	21.06	22.0±1	/
				25	49	21.10	22.0±1	/
				50	0	21.12	22.0±1	/
			16QAM	1	0	21.07	22.0±1	/
				1	49	21.13	22.0±1	/
				1	99	21.23	22.0±1	/
				25	0	20.21	21.0±1	1.0
				25	49	20.26	21.0±1	1.0
				50	0	20.17	21.0±1	1.0
	20350	1750	QPSK	1	0	21.96	22.0±1	/
				1	49	22.15	22.0±1	/
				1	99	22.08	22.0±1	/
				25	0	21.15	22.0±1	/
				25	49	20.88	21.0±1	1.0
				50	0	21.09	22.0±1	/
			16QAM	1	0	20.72	21.0±1	1.0
				1	49	20.68	21.0±1	1.0
				1	99	20.56	21.0±1	1.0
				25	0	20.22	21.0±1	1.0
				25	49	20.17	21.0±1	1.0
				50	0	20.09	21.0±1	1.0

BW(MHz)	Ch	Freq(MHz)	Mode	UL RB Allocation	UL RB Offset	Average Power (dbm)	Tune up limited(dBm)	MPR (dB)
15MHz	20025	1717.5	QPSK	1	0	22.13	22.0±1	/
				1	49	21.94	22.0±1	/
				1	99	21.84	22.0±1	/
				36	0	21.08	22.0±1	/
				36	49	20.86	21.0±1	1.0
				75	0	20.92	21.0±1	1.0
			16QAM	1	0	21.18	22.0±1	/
				1	49	21.01	22.0±1	/
				1	99	20.95	21.0±1	1.0
				36	0	20.13	21.0±1	1.0
				36	49	20.02	21.0±1	1.0
				75	0	20.08	21.0±1	1.0
	20175	1732.5	QPSK	1	0	22.02	22.0±1	/
				1	49	22.07	22.0±1	/
				1	99	22.17	22.0±1	/
				36	0	21.00	22.0±1	/
				36	49	20.95	21.0±1	1.0
				75	0	20.94	21.0±1	1.0
			16QAM	1	0	21.02	22.0±1	/
				1	49	21.12	22.0±1	/
				1	99	21.23	22.0±1	/
				36	0	20.10	21.0±1	1.0
				36	49	20.18	21.0±1	1.0
				75	0	20.10	21.0±1	1.0
	20325	1747.5	QPSK	1	0	22.31	22.0±1	/
				1	49	22.06	22.0±1	/
				1	99	22.13	22.0±1	/
				36	0	21.05	22.0±1	/
				36	49	20.94	21.0±1	1.0
				75	0	20.96	21.0±1	1.0
			16QAM	1	0	21.11	22.0±1	/
				1	49	21.08	22.0±1	/
				1	99	20.95	21.0±1	1.0
				36	0	20.28	21.0±1	1.0
				36	49	20.15	21.0±1	1.0
				75	0	20.22	21.0±1	1.0

BW(MHz)	Ch	Freq(MHz)	Mode	UL RB Allocation	UL RB Offset	Average Power (dbm)	Tune up limited(dBm)	MPR (dB)
20MHz	20050	1720	QPSK	1	0	22.23	22.0±1	/
				1	49	21.93	22.0±1	/
				1	99	22.00	22.0±1	/
				50	0	20.94	21.0±1	1.0
				50	24	20.93	21.0±1	1.0
				100	0	21.00	22.0±1	/
			16QAM	1	0	21.42	22.0±1	/
				1	49	21.14	22.0±1	/
				1	99	21.16	22.0±1	/
				50	0	20.25	21.0±1	1.0
				50	24	20.11	21.0±1	1.0
				100	0	20.03	21.0±1	1.0
	20175	1732.5	QPSK	1	0	22.00	22.0±1	/
				1	49	22.08	22.0±1	/
				1	99	22.19	22.0±1	/
				50	0	20.98	22.0±1	/
				50	24	21.15	22.0±1	/
				100	0	20.96	21.0±1	1.0
			16QAM	1	0	21.03	22.0±1	/
				1	49	21.06	22.0±1	/
				1	99	21.22	22.0±1	/
				50	0	20.11	21.0±1	1.0
				50	49	20.20	21.0±1	1.0
				100	0	20.15	21.0±1	1.0
	20300	1745	QPSK	1	0	22.23	22.0±1	/
				1	49	22.57	22.0±1	/
				1	99	22.11	22.0±1	/
				50	0	21.88	21.0±1	1.0
				50	24	21.08	21.0±1	1.0
				100	0	21.03	22.0±1	/
			16QAM	1	0	20.99	21.0±1	1.0
				1	49	21.01	22.0±1	/
				1	99	20.82	21.0±1	1.0
				50	0	20.27	21.0±1	1.0
				50	49	20.12	21.0±1	1.0
				100	0	20.29	21.0±1	1.0

LTE Band 5:

BW(MHz)	Ch	Freq(MHz)	Mode	UL RB Allocation	UL RB Offset	Average Power (dbm)	Tune up limited(dBm)	MPR (dB)
1.4MHz	20407	824.7	QPSK	1	0	22.87	22.5±1	/
				1	2	22.87	22.5±1	/
				1	5	22.81	22.5±1	/
				3	0	22.94	22.5±1	/
				3	2	22.80	22.5±1	/
				6	0	21.95	22.5±1	/
			16QAM	1	0	22.23	22.5±1	/
				1	2	22.22	22.5±1	/
				1	5	22.24	22.5±1	/
				3	0	21.94	22.5±1	/
				3	2	22.02	22.5±1	/
				6	0	20.98	21.5±1	1.0
	20525	836.5	QPSK	1	0	23.29	22.5±1	/
				1	2	23.24	22.5±1	/
				1	5	23.22	22.5±1	/
				3	0	23.15	22.5±1	/
				3	2	23.24	22.5±1	/
				6	0	22.10	22.5±1	/
			16QAM	1	0	21.70	22.5±1	/
				1	2	21.64	22.5±1	/
				1	5	21.73	22.5±1	/
				3	0	22.30	22.5±1	/
				3	2	22.29	22.5±1	/
				6	0	21.52	22.5±1	/
	20634	848.3	QPSK	1	0	23.45	22.5±1	/
				1	2	23.40	22.5±1	/
				1	5	23.39	22.5±1	/
				3	0	23.47	22.5±1	/
				3	2	23.28	22.5±1	/
				6	0	22.33	22.5±1	/
			16QAM	1	0	22.42	22.5±1	/
				1	2	22.56	22.5±1	/
				1	5	22.46	22.5±1	/
				3	0	22.25	22.5±1	/
				3	2	22.28	22.5±1	/
				6	0	21.68	22.5±1	/

BW(MHz)	Ch	Freq(MHz)	Mode	UL RB Allocation	UL RB Offset	Average Power (dbm)	Tune up limited(dBm)	MPR (dB)
3MHz	20415	825.5	QPSK	1	0	22.77	22.5±1	/
				1	8	22.80	22.5±1	/
				1	14	22.85	22.5±1	/
				8	0	21.80	22.5±1	/
				8	9	21.94	22.5±1	/
				15	0	21.88	22.5±1	/
			16QAM	1	0	21.68	22.5±1	/
				1	8	21.64	22.5±1	/
				1	14	21.75	22.5±1	/
				8	0	21.00	21.5±1	1.0
				8	9	20.96	21.5±1	1.0
				15	0	20.85	21.5±1	1.0
	20525	836.5	QPSK	1	0	23.06	22.5±1	/
				1	8	23.06	22.5±1	/
				1	14	23.10	22.5±1	/
				8	0	22.08	22.5±1	/
				8	9	22.18	22.5±1	/
				15	0	22.18	22.5±1	/
			16QAM	1	0	22.94	22.5±1	/
				1	8	22.99	22.5±1	/
				1	14	23.00	22.5±1	/
				8	0	21.24	21.5±1	1.0
				8	9	21.32	21.5±1	1.0
				15	0	21.29	21.5±1	1.0
	20635	847.5	QPSK	1	0	23.50	22.5±1	/
				1	8	23.45	22.5±1	/
				1	14	23.23	22.5±1	/
				8	0	22.37	22.5±1	/
				8	9	22.45	22.5±1	/
				15	0	22.29	22.5±1	/
			16QAM	1	0	22.05	22.5±1	/
				1	8	21.99	22.5±1	/
				1	14	22.00	22.5±1	/
				8	0	21.52	22.5±1	/
				8	9	21.61	22.5±1	/
				15	0	21.35	21.5±1	1.0

BW(MHz)	Ch	Freq(MHz)	Mode	UL RB Allocation	UL RB Offset	Average Power (dbm)	Tune up limited(dBm)	MPR (dB)
5MHz	20425	826.5	QPSK	1	0	22.81	22.5±1	/
				1	49	22.90	22.5±1	/
				1	99	22.91	22.5±1	/
				12	0	21.88	22.5±1	/
				12	24	21.88	22.5±1	/
				25	0	21.85	22.5±1	/
			16QAM	1	0	21.56	22.5±1	/
				1	49	21.63	22.5±1	/
				1	99	21.58	22.5±1	/
				12	0	20.85	21.5±1	1.0
				12	24	20.85	21.5±1	1.0
				25	0	21.03	21.5±1	1.0
	20525	836.5	QPSK	1	0	23.20	22.5±1	/
				1	49	23.12	22.5±1	/
				1	99	23.35	22.5±1	/
				12	0	22.09	22.5±1	/
				12	24	22.28	22.5±1	/
				25	0	22.06	22.5±1	/
			16QAM	1	0	22.24	22.5±1	/
				1	49	22.33	22.5±1	/
				1	99	22.44	22.5±1	/
				12	0	21.04	21.5±1	1.0
				12	49	21.16	21.5±1	1.0
				25	0	21.20	21.5±1	1.0
	20625	846.5	QPSK	1	0	23.38	22.5±1	/
				1	49	23.22	22.5±1	/
				1	99	23.32	22.5±1	/
				12	0	22.36	22.5±1	/
				12	49	22.40	22.5±1	/
				25	0	22.53	22.5±1	/
			16QAM	1	0	22.33	22.5±1	/
				1	49	22.35	22.5±1	/
				1	99	22.42	22.5±1	/
				12	0	21.36	21.5±1	1.0
				12	49	21.33	21.5±1	1.0
				25	0	21.25	21.5±1	1.0

BW(MHz)	Ch	Freq(MHz)	Mode	UL RB Allocation	UL RB Offset	Average Power (dbm)	Tune up limited(dBm)	MPR (dB)
10MHz	20450	829	QPSK	1	0	22.87	22.5±1	/
				1	49	22.93	22.5±1	/
				1	99	23.06	22.5±1	/
				25	0	22.00	22.5±1	/
				25	49	22.09	22.5±1	/
				50	0	21.90	22.5±1	/
			16QAM	1	0	21.87	22.5±1	/
				1	49	21.98	22.5±1	/
				1	99	22.07	22.5±1	/
				25	0	21.03	21.5±1	1.0
				25	49	21.24	21.5±1	1.0
				50	0	20.99	21.5±1	1.0
	20525	836.5	QPSK	1	0	23.13	22.5±1	/
				1	49	23.16	22.5±1	/
				1	99	23.40	22.5±1	/
				25	0	22.23	22.5±1	/
				25	49	22.33	22.5±1	/
				50	0	22.27	22.5±1	/
			16QAM	1	0	22.15	22.5±1	/
				1	49	22.29	22.5±1	/
				1	99	22.47	22.5±1	/
				25	0	21.24	22.5±1	/
				25	49	21.43	22.5±1	/
				50	0	21.23	22.5±1	/
	20600	844	QPSK	1	0	23.30	22.5±1	/
				1	49	23.41	22.5±1	/
				1	99	23.50	22.5±1	/
				25	0	22.41	21.5±1	1.0
				25	49	22.43	21.5±1	1.0
				50	0	22.39	21.5±1	1.0
			16QAM	1	0	21.73	21.5±1	1.0
				1	49	21.73	21.5±1	1.0
				1	99	21.76	21.5±1	1.0
				25	0	21.45	21.5±1	1.0
				25	49	21.50	21.5±1	1.0
				50	0	21.44	21.5±1	1.0

LTE Band 12:

BW(MHz)	Ch	Freq(MHz)	Mode	UL RB Allocation	UL RB Offset	Average Power (dbm)	Tune up limited(dBm)	MPR (dB)
1.4MHz	23017	699.7	QPSK	1	0	22.95	23.0±1	/
				1	2	22.90	23.0±1	/
				1	5	22.93	23.0±1	/
				3	0	22.89	23.0±1	/
				3	2	22.95	23.0±1	/
				6	0	22.01	23.0±1	/
			16QAM	1	0	22.30	23.0±1	/
				1	2	22.32	23.0±1	/
				1	5	22.40	23.0±1	/
				3	0	21.93	22.0±1	1.0
				3	2	21.90	22.0±1	1.0
				6	0	21.04	22.0±1	1.0
	23095	707.5	QPSK	1	0	22.91	23.0±1	/
				1	2	22.96	23.0±1	/
				1	5	22.95	23.0±1	/
				3	0	23.02	23.0±1	/
				3	2	22.88	23.0±1	/
				6	0	21.95	22.0±1	1.0
			16QAM	1	0	21.45	22.0±1	1.0
				1	2	21.35	22.0±1	1.0
				1	5	21.39	22.0±1	1.0
				3	0	21.95	22.0±1	1.0
				3	2	21.89	22.0±1	1.0
				6	0	21.13	22.0±1	1.0
	23173	715.3	QPSK	1	0	23.05	23.0±1	/
				1	2	23.19	23.0±1	/
				1	5	23.18	23.0±1	/
				3	0	23.09	23.0±1	/
				3	2	23.10	23.0±1	/
				6	0	22.07	23.0±1	/
			16QAM	1	0	22.39	23.0±1	/
				1	2	22.42	23.0±1	/
				1	5	22.43	23.0±1	/
				3	0	21.98	22.0±1	1.0
				3	2	21.95	22.0±1	1.0
				6	0	21.21	22.0±1	1.0

BW(MHz)	Ch	Freq(MHz)	Mode	UL RB Allocation	UL RB Offset	Average Power (dbm)	Tune up limited(dBm)	MPR (dB)
3MHz	23025	700.5	QPSK	1	0	22.92	22.5±1	/
				1	8	22.87	22.5±1	/
				1	14	22.85	22.5±1	/
				8	0	21.94	22.5±1	/
				8	9	22.02	22.5±1	/
				15	0	21.91	22.5±1	/
			16QAM	1	0	21.75	22.5±1	/
				1	8	21.70	22.5±1	/
				1	14	21.75	22.5±1	/
				8	4	21.02	21.5±1	1.0
				8	9	21.10	21.5±1	1.0
				15	0	20.96	21.5±1	1.0
	23095	707.5	QPSK	1	0	22.81	22.5±1	/
				1	8	22.84	22.5±1	/
				1	14	22.76	22.5±1	/
				8	4	21.99	22.5±1	/
				8	9	21.79	22.5±1	/
				15	0	21.88	22.5±1	/
			16QAM	1	0	22.22	22.5±1	/
				1	8	22.03	22.5±1	/
				1	14	22.04	22.5±1	/
				8	4	21.00	21.5±1	1.0
				8	9	20.81	21.5±1	1.0
				15	0	20.79	21.5±1	1.0
	23165	714.5	QPSK	1	0	23.12	22.5±1	/
				1	8	23.15	22.5±1	/
				1	14	23.33	22.5±1	/
				8	0	22.03	22.5±1	/
				8	9	22.00	22.5±1	/
				15	0	21.98	22.5±1	/
			16QAM	1	0	21.58	22.5±1	/
				1	8	21.56	22.5±1	/
				1	14	21.65	22.5±1	/
				8	4	21.12	21.5±1	1.0
				8	9	21.21	21.5±1	1.0
				15	0	20.85	21.5±1	1.0

BW(MHz)	Ch	Freq(MHz)	Mode	UL RB Allocation	UL RB Offset	Average Power (dbm)	Tune up limited(dBm)	MPR (dB)
5MHz	23035	701.5	QPSK	1	0	22.90	22.5±1	/
				1	49	22.83	22.5±1	/
				1	99	22.88	22.5±1	/
				12	0	22.00	22.5±1	/
				12	49	21.85	22.5±1	/
				25	0	21.83	22.5±1	/
			16QAM	1	0	21.54	22.5±1	/
				1	49	21.61	22.5±1	/
				1	99	21.57	22.5±1	/
				12	0	20.93	22.5±1	/
				12	49	21.03	22.5±1	/
				25	0	21.15	22.5±1	/
	23095	707.5	QPSK	1	0	22.79	22.5±1	/
				1	49	22.75	22.5±1	/
				1	99	22.86	22.5±1	/
				12	0	22.05	22.5±1	/
				12	49	21.87	22.5±1	/
				25	0	21.86	22.5±1	/
			16QAM	1	0	21.95	22.5±1	/
				1	49	21.76	22.5±1	/
				1	99	21.87	22.5±1	/
				12	0	20.99	22.5±1	/
				12	49	20.79	22.5±1	/
				25	0	20.86	22.5±1	/
	23155	713.5	QPSK	1	0	22.93	22.5±1	/
				1	49	22.86	22.5±1	/
				1	99	22.99	22.5±1	/
				12	0	21.94	22.5±1	/
				12	49	21.99	22.5±1	/
				25	0	22.07	22.5±1	/
			16QAM	1	0	21.85	22.5±1	/
				1	49	21.94	22.5±1	/
				1	99	22.00	22.5±1	/
				12	0	20.99	22.5±1	/
				12	49	20.93	22.5±1	/
				25	0	20.78	22.5±1	/

BW(MHz)	Ch	Freq(MHz)	Mode	UL RB Allocation	UL RB Offset	Average Power (dbm)	Tune up limited(dBm)	MPR (dB)
10MHz	23060	704	QPSK	1	0	22.86	22.5±1	/
				1	49	22.76	22.5±1	/
				1	99	22.82	22.5±1	/
				25	0	21.97	22.5±1	/
				25	24	22.02	22.5±1	/
				50	0	21.94	22.5±1	/
			16QAM	1	0	22.01	22.5±1	/
				1	49	21.92	22.5±1	/
				1	99	21.91	22.5±1	/
				25	0	21.07	21.5±1	1.0
				25	49	20.99	21.5±1	1.0
				50	0	20.95	21.5±1	1.0
	23095	707.5	QPSK	1	0	22.84	22.5±1	/
				1	49	22.80	22.5±1	/
				1	99	22.91	22.5±1	/
				25	0	21.96	22.5±1	/
				25	49	21.84	22.5±1	/
				50	0	21.86	22.5±1	/
			16QAM	1	0	22.05	22.5±1	/
				1	49	22.07	22.5±1	/
				1	99	22.20	22.5±1	/
				25	0	21.05	21.5±1	1.0
				25	49	20.97	21.5±1	1.0
				50	0	20.90	21.5±1	1.0
	23130	711	QPSK	1	0	23.03	22.5±1	/
				1	49	23.09	22.5±1	/
				1	99	23.50	22.5±1	/
				25	0	21.92	21.5±1	1.0
				25	49	22.45	21.5±1	1.0
				50	0	21.84	21.5±1	1.0
			16QAM	1	0	21.41	21.5±1	1.0
				1	49	21.40	21.5±1	1.0
				1	99	21.52	21.5±1	1.0
				25	0	20.82	21.5±1	1.0
				25	49	20.94	21.5±1	1.0
				50	0	20.94	21.5±1	1.0

WIFI Mode (2.4G)

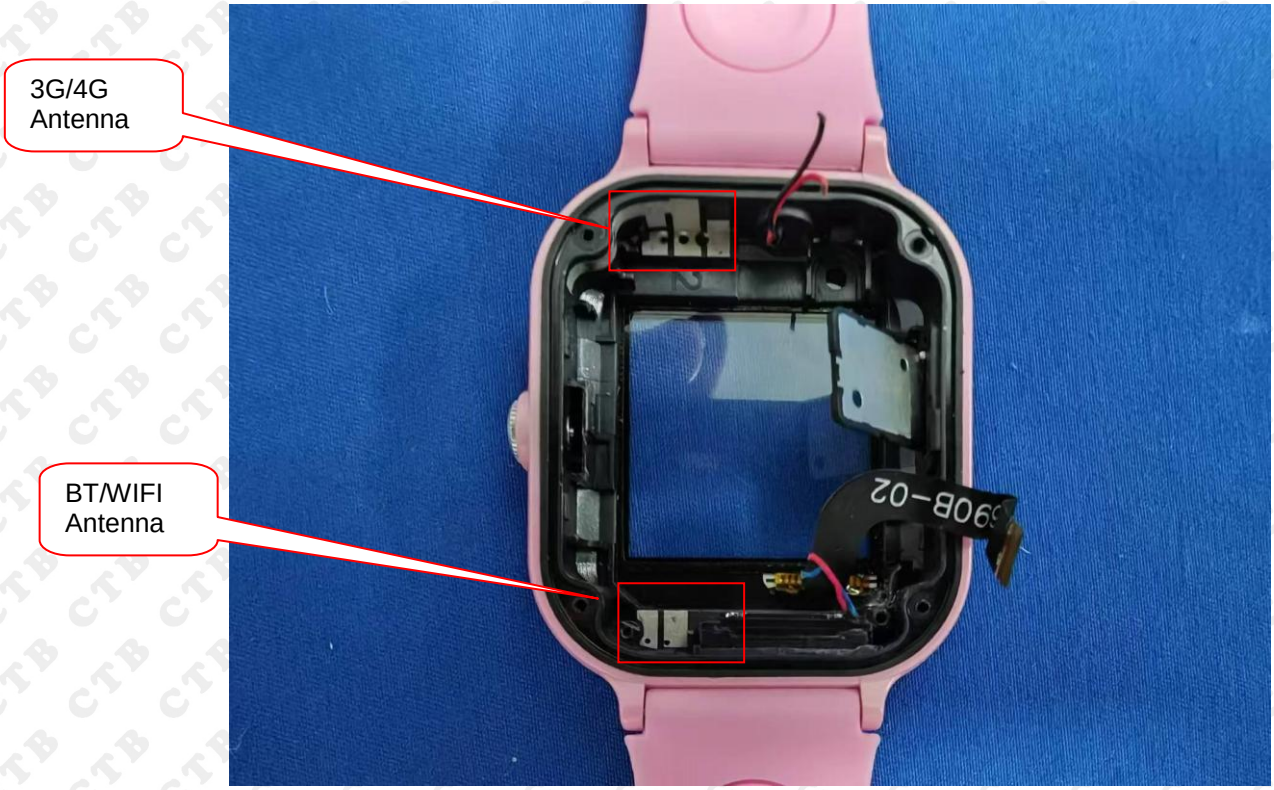
Mode	Channel number	Frequency (MHz)	Data rate(Mbps)	Average Output Power(dBm)	Average Tune up limited(dBm)
802.11b	1	2412	1	7.285	7.0±1
	6	2437	1	6.219	6.0±1
	11	2462	1	6.887	6.0±1
802.11g	1	2412	6	6.251	6.0±1
	6	2437	6	6.7	6.0±1
	11	2462	6	7.378	7.0±1
802.11n(HT20)	1	2412	MCS0	6.823	6.0±1
	6	2437	MCS0	5.832	5.0±1
	11	2462	MCS0	6.586	6.0±1

BLE Measurement Result

Channel number	Frequency (MHz)	Average Output Power(dBm)	Tune up limited(dBm)
0	2402	1.249	1.0±1
19	2440	1.418	1.0±1
39	2480	0.869	0.0±1

12 Exposure Conditions Consideration

EUT antenna location:



Note:

1. Per KDB 447498 D01 General RF Exposure Guidance v06,Transmitters that are built-in within a wrist watch or similar wrist-worn devices typically operate in speaker mode for voice communication, with the device worn on the wrist and positioned next to the mouth.Next to the mounth exposure required 1-g SAR and the wrist-worn condition requried 10-g extremity SAR.

13 RF Exposure

Standard Requirement:

According to §15.247 (i) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at *test separation distances* ≤ 50 mm are determined by:

[(*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)] · [$\sqrt{f_{(GHz)}}$] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR,[16] where

- $f_{(GHz)}$ is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation[17]
- The result is rounded to one decimal place for comparison

The test exclusions are applicable only when the minimum *test separation distance* is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum *test separation distance* is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

Routine SAR evaluation refers to that specifically required by § 2.1093, using measurements or computer simulation. When routine SAR evaluation is not required, portable transmitters with output power greater than the applicable low threshold require SAR evaluation to qualify for TCB approval.

Exclusion Thresholds = $P\sqrt{F}/D$

P= Maximum turn-up power in mW
F= Channel frequency in GHz
D= Minimum test separation distance in mm

Test Distance (10mm)

Mode	MAX Power (dBm)	Tune Up Power (dBm)	Max Tune Up Power (dBm)	Max Tune Up Power (mW)	Exclusion Thresholds	Limit
2.4G WIFI 2462	7.378	7.0±1	8	6.31	0.990	3
BLE 2440	1.418	1.0±1	2	1.58	0.247	3

Extremity SAR Test Distance (5mm)

Mode	MAX Power (dBm)	Tune Up Power (dBm)	Max Tune Up Power (dBm)	Max Tune Up Power (mW)	Exclusion Thresholds	Limit
2.4G WIFI 2462	7.378	7.0±1	8	6.31	1.980	7.5
BLE 2440	1.418	1.0±1	2	1.58	0.494	7.5

Result:BT SAR and 2.4G WIFI SAR measurement are not required.

14 SAR Test Results

14.1 Test Condition:

1. SAR Measurement
   The distance between the EUT and the antenna of the emulator is more than 50 cm and the output power radiated from the emulator antenna is at least 30 dB less than the output power of EUT.

2	Environmental Conditions	Temperature	23°C
		Relative Humidity	57%
		Atmospheric Pressure	1019mbar
3	Tested By : Martin Feng		

14.2 Generally Test Procedures:

1. Establish communication link between EUT and base station emulation by air link.
2. Place the EUT in the selected test position. (Cheek, tilt or flat)
3. Perform SAR testing at middle or highest output power channel under the selected test mode. If the measured 1-g SAR is ≤ 0.8 W/kg, then testing for the other channel will not be performed.
4. When SAR is<0.8W/kg, no repeated SAR measurement is required

For WCDMA test:

1. KDB941225 D01-Body SAR is not required for HSDPA when the average output of each RF channel with HSDPA active is less than 0.25dB higher than measured without HSDPA using 12.2kbps RMC or the maximum SAR for 12.2kbps RMC<75% of the SAR limit.
2. KDB941225 D01-Body SAR is not required for handset with HSPA capabilities when the maximum average output of each RF channel with HSUPA/HSDPA active is less than 0.25dB higher than that measure without HSUPA/HSDPA using 12.2kbps RMC AND THE maximum SAR for 12.2kbps RMC is<75% of the SAR limit

For LTE test:

1. According to FCC KDB 941225 D05v02r05:
   a. Per Section 5.2.1, SAR is required for QPSK 1 RB Allocation for the largest bandwidth
      i. The required channel and offset combination with the highest maximum output power is required for SAR.
      ii. When the reported SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required. Otherwise, SAR is required for the remaining required test channels using the RB offset configuration with highest output power for that channel.
      iii. When the reported SAR for a required test channel is > 1.45 W/kg, SAR is required for all RB offset configurations for that channel.
   b. Per Section 5.2.2, SAR is required for 50% RB allocation using the largest bandwidth following the same procedures outlined in Section 5.2.1.
   c. Per Section 5.2.3, QPSK SAR is not required for the 100% allocation when the highest maximum output power for the 100% allocation is less than the highest maximum output power of the 1 RB and 50% RB allocations and the reported SAR for the 1 RB and 50% RB allocations is < 0.8 W/kg.
   d. Per Section 5.2.4 and 5.3, SAR tests for higher order modulations and lower bandwidths configurations are not required when the conducted power of the required test configurations determined by Sections 5.2.1 through 5.2.3 is less than or equal to ½ dB higher than the equivalent configuration using QPSK modulation and when the QPSK SAR for those configurations is <1.45 W/kg.
   e. A-MPR was disabled for all SAR tests by setting NS=01 on the base station simulator. SAR tests were performed with the same number of RB and RB offsets transmitting on all TTI frames (maximum TTI).

14.3 SAR Summary Test Result:

SAR Values of WCDMA BAND V

Test Plot	Test Mode	Test Positions	Channel	Power(dBm)		SAR 1g(W/Kg), Limit(1.6W/kg for front of face) Limbs SAR 10g(W/Kg), Limit(4.0W/kg for Wrist-worn)		
				Maximum Turn-up Power(dBm)	Measured output power(dBm)	Measured SAR 1g/10g(W/kg)	Scaling Factor	Scaled SAR 1g/10g(W/kg)
--	RMC 12.2kbps	Front of face Distance: 10mm	High	23	22.74	0.502	1.061696	0.53
1	RMC 12.2kbps	Wrist-worn Distance: 0mm	High	23	22.74	0.536	1.061696	0.57

SAR Values of WCDMA BAND Ⅱ

Test Plot	Test Mode	Test Positions	Channel	Power(dBm)		SAR 1g(W/Kg), Limit(1.6W/kg for front of face) Limbs SAR 10g(W/Kg), Limit(4.0W/kg for Wrist-worn)		
				Maximum Turn-up Power(dBm)	Measured output power(dBm)	Measured SAR 1g/10g(W/kg)	Scaling Factor	Scaled SAR 1g/10g(W/kg)
--	RMC 12.2kbps	Front of face Distance: 10mm	High	23	22.40	0.744	1.148154	0.85
2	RMC 12.2kbps	Wrist-worn Distance: 0mm	High	23	22.40	1.878	1.148154	2.16

SAR Values of LTE BAND 2, 20MHz ,QPSK

Test Plot	Test Mode	Test Positions	Channel	Power(dBm)		SAR 1g(W/Kg), Limit(1.6W/kg for front of face) Limbs SAR 10g(W/Kg), Limit(4.0W/kg for Wrist-worn)		
				Maximum Turn-up Power(dBm)	Measured output power(dBm)	Measured SAR 1g/10g(W/kg)	Scaling Factor	Scaled SAR 1g/10g(W/kg)
--	1RB #49	Front of face Distance: 10mm	High	24	23.70	0.741	1.071519	0.79
--	50%RB #0	Front of face Distance: 10mm	High	23	22.62	0.560	1.09144	0.61
3	1RB #49	Wrist-worn Distance: 0mm	High	24	23.70	1.880	1.071519	2.01
--	50%RB #0	Wrist-worn Distance: 0mm	High	23	22.62	1.520	1.09144	1.66

SAR Values of LTE BAND 4, 20MHz ,QPSK

Test Plot	Test Mode	Test Positions	Channel	Power(dBm)		SAR 1g(W/Kg), Limit(1.6W/kg for front of face) Limbs SAR 10g(W/Kg), Limit(4.0W/kg for Wrist-worn)		
				Maximum Turn-up Power(dBm)	Measured output power(dBm)	Measured SAR 1g/10g(W/kg)	Scaling Factor	Scaled SAR 1g/10g(W/kg)
--	1RB #49	Front of face Distance: 10mm	High	23	22.57	0.745	1.104079	0.82
--	50%RB #0	Front of face Distance: 10mm	High	22	21.88	0.452	1.028016	0.46
4	1RB #49	Wrist-worn Distance: 0mm	High	23	22.57	1.830	1.104079	2.02
--	50%RB #0	Wrist-worn Distance: 0mm	High	22	21.88	1.580	1.028016	1.62

SAR Values of LTE BAND 5, 10MHz ,QPSK

Test Plot	Test Mode	Test Positions	Channel	Power(dBm)		SAR 1g(W/Kg), Limit(1.6W/kg for front of face) Limbs SAR 10g(W/Kg), Limit(4.0W/kg for Wrist-worn)		
				Maximum Turn-up Power(dBm)	Measured output power(dBm)	Measured SAR 1g/10g(W/kg)	Scaling Factor	Scaled SAR 1g/10g(W/kg)
--	1RB #99	Front of face Distance: 10mm	High	23.5	23.5	0.425	1	0.43
--	50%RB #49	Front of face Distance: 10mm	High	22.5	22.43	0.255	1.016249	0.26
5	1RB #99	Wrist-worn Distance: 0mm	High	23.5	23.5	0.608	1	0.61
--	50%RB #49	Wrist-worn Distance: 0mm	High	22.5	22.43	0.456	1.016249	0.46

SAR Values of LTE BAND 12, 10MHz ,QPSK

Test Plot	Test Mode	Test Positions	Channel	Power(dBm)		SAR 1g(W/Kg), Limit(1.6W/kg for front of face) Limbs SAR 10g(W/Kg), Limit(4.0W/kg for Wrist-worn)		
				Maximum Turn-up Power(dBm)	Measured output power(dBm)	Measured SAR 1g/10g(W/kg)	Scaling Factor	Scaled SAR 1g/10g(W/kg)
--	1RB #99	Front of face Distance: 10mm	High	23.5	23.5	0.064	1	0.06
--	50%RB #49	Front of face Distance: 10mm	High	22.5	22.45	0.055	1.011579	0.06
6	1RB #99	Wrist-worn Distance: 0mm	High	23.5	23.5	0.093	1	0.09
--	50%RB #49	Wrist-worn Distance: 0mm	High	22.5	22.45	0.080	1.011579	0.08

14.4 Measurement variability consideration

Refer to FCC KDB 248227 section 5.2.1~5.2.2:

According to KDB 865664 D01v01r04 section 2.8.1, repeated measurements are required following the procedures as below:

Repeated measurement is not required when the original highest measured SAR is < 0.80W/kg; steps 2) through 4) do not apply.

When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.

Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).

Perform a third repeated measurement only if the original, first or second repeated measurement is ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

No Repeated SAR

14.5 Simultaneous Transmission SAR Analysis.
List of Mode for Simultaneous Multi-band Transmission:

No.	Configurations	Front of face SAR	Wrist-worn SAR
1	WCDMA (Voice) + WLAN 2.4GHz(Data)	Yes	-
2	WCDMA (Data) + WLAN 2.4GHz(Data)	-	Yes
3	WCDMA (Voice) + Bluetooth(Data)	Yes	-
4	WCDMA (Data) + Bluetooth(Data)	-	Yes
5	LTE (Date) + WLAN 2.4GHz(Data)	Yes	Yes
6	LTE (Date) + Bluetooth(Data)	Yes	Yes

Remark:
1. WCDMA/LTE share the same antenna, and cannot transmit simultaneously.
2. WLAN and Bluetooth share the same antenna, and cannot transmit simultaneously.
3. According to the KDB 447498 D01 v06, when standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:
(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)]·[√f(GHz)/x] W/kg for test separation distances ≤50 mm;
where x = 7.5 for 1-g SAR, and x = 18.75 for 10-g SAR.
For simultaneous transmission analysis, Bluetooth SAR is estimated per KDB 447498 D01 v06 as below:

2.4G WIFI:

Tune-Up Power (dBm)	Max. Power (mW)	Distance (mm)	Frequency (GHz)	X	SAR(1g) 10mm
8.0	6.31	10	2.462	7.5	0.13
Tune-Up Power (dBm)	Max. Power (mW)	Distance (mm)	Frequency (GHz)	X	SAR(10g) 5mm
8.0	6.31	5	2.462	18.75	0.11

Bluetooth:

Tune-Up Power (dBm)	Max. Power (mW)	Distance (mm)	Frequency (GHz)	X	SAR(1g) 10mm
2.0	1.58	10	2.440	7.5	0.03
Tune-Up Power (dBm)	Max. Power (mW)	Distance (mm)	Frequency (GHz)	X	SAR(10g) 5mm
2.0	1.58	5	2.440	18.75	0.03

5. The maximum SAR summation is calculated based on the same configuration and test position

Front of face SAR Simultaneous

WWAN and 2.4G WIFI

Position	WWAN（maximum）		2.4G WIFI	Summed SAR (W/kg)
	Band	Scaled SAR (W/kg)	Scaled SAR (W/kg)	
Front	WCDMA Band II	0.85	0.13	0.98
Front	WCDMA Band V	0.53	0.13	0.66
Front	LTE BAND 2(1RB)	0.79	0.13	0.92
Front	LTE BAND 4(1RB)	0.82	0.13	0.95
Front	LTE BAND 5(1RB)	0.43	0.13	0.56
Front	LTE BAND 12(1RB)	0.06	0.13	0.19

WWAN and BT

Position	WWAN（maximum）		BT	Summed SAR (W/kg)
	Band	Scaled SAR (W/kg)	Scaled SAR (W/kg)	
Front	WCDMA Band II	0.85	0.03	0.88
Front	WCDMA Band V	0.53	0.03	0.56
Front	LTE BAND 2(1RB)	0.79	0.03	0.82
Front	LTE BAND 4(1RB)	0.82	0.03	0.85
Front	LTE BAND 5(1RB)	0.43	0.03	0.46
Front	LTE BAND 12(1RB)	0.06	0.03	0.09

Remark: BT and WIFI the 1g SAR value is not being captured by the measurement system, the 1g-SAR value is conservatively used for simultaneous transmission analysis.

Wrist-worn SAR Simultaneous

WWAN and 2.4G WIFI

Position	WWAN（maximum）		2.4G WIFI	Summed SAR (W/kg)
	Band	Scaled SAR (W/kg)	Scaled SAR (W/kg)	
Back	WCDMA Band II	2.16	0.11	2.27
Back	WCDMA Band V	0.57	0.11	0.68
Back	LTE BAND 2(1RB)	2.01	0.11	2.12
Back	LTE BAND 4(1RB)	2.02	0.11	2.13
Back	LTE BAND 5(1RB)	0.61	0.11	0.72
Back	LTE BAND 12(1RB)	0.09	0.11	0.20

WWAN and BT

Position	WWAN（maximum）		BT	Summed SAR (W/kg)
	Band	Scaled SAR (W/kg)	Scaled SAR (W/kg)	
Back	WCDMA Band II	2.16	0.03	2.19
Back	WCDMA Band V	0.57	0.03	0.60
Back	LTE BAND 2(1RB)	2.01	0.03	2.04
Back	LTE BAND 4(1RB)	2.02	0.03	2.05
Back	LTE BAND 5(1RB)	0.61	0.03	0.64
Back	LTE BAND 12(1RB)	0.09	0.03	0.12

Remark: BT and WIFI the 1g SAR value is not being captured by the measurement system, the 1g-SAR value is conservatively used for simultaneous transmission analysis.

15 SAR Measurement Reference

References

1. **FCC 47 CFR Part 2 "Frequency Allocations and Radio Treaty Matters; General Rules and Regulations"**
2. **IEEE Std. C95.1-2005, "IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3kHz to 300GHz", 2005**
3. **IEEE Std. 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices:Measurement Techniques", June 2013**
4. **IEC 62209-2, "Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices—Human models, instrumentation, and procedures – Part 2: Procedure to determine the specific absorption rate(SAR) for wireless communication devices used in close proximity to the human body(frequency range of 30MHz to 6GHz)", April 2010**
5. **FCC KDB 447498 D01 v06, "Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies", Oct 23th, 2015**
6. **FCC KDB 941225 D01 v03r01, "3G SAR Measurement Procedures", Oct 23th, 2015**
7. **FCC KDB 941225 D05 v02r05, "SAR Evaluation Considerations for LTE Devices", Dec 16th, 2015**
8. **FCC KDB 941225 D06 v02r01, "SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities", Oct 23th, 2015**
9. **FCC KDB865664 D01 v01r04, "SAR Measurement Requirements 100MHz to 6GHz", Aug 7th, 2015**
10. **FCC KDB865664 D02 v01r02, "RF Exposure Compliance Reporting and Documentation Considerations ", Oct 23th", 2015**
11. **FCC KDB648474 D04 v01r03, "SAR Evaluation Considerations for Wireless Handsets", Oct 23th", 2015**

16 Maximum SAR measurement Plots

Plot 1

DUT: DUT Sample; Type: Sample; Serial: Not Specified

Communication System: UID 0, WCDMA (0); Communication System Band: WCDMA BAND5 RMC; Frequency: 846.6 MHz;Communication System PAR: 0 dB; PMF: 1.12202e-005
Medium parameters used (interpolated): f = 846.6 MHz; σ = 0.882 S/m; εr = 41.602; ρ = 1000 kg/m3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

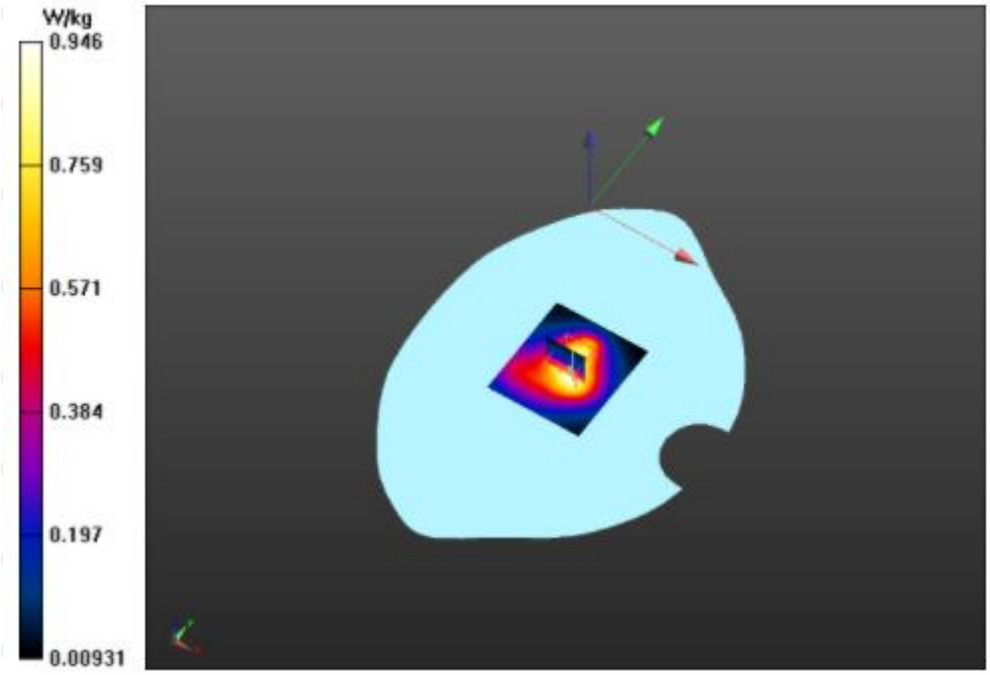
Probe: ES3DV3 - SN3089; ConvF(6.28, 6.28, 6.28) @ 846.6 MHz; Calibrated: 2023/7/14
Modulation Compensation:
Sensor-Surface: 4mm (Mechanical Surface Detection), z = 2.0, 32.0
Electronics: DAE4 Sn881; Calibrated: 2023/7/14
Phantom: SAM 2; Type: QD000P40CD; Serial: TP:xxxx
DASY52 52.10.3(1513); SEMCAD X 14.6.13(7474)

KA240605038X FCC ID smartwatch/Back/Area Scan (71x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.946 W/kg

KA240605038X FCC ID smartwatch/Back/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 32.03 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 1.40 W/kg
SAR(1 g) = 0.866 W/kg; SAR(10 g) = 0.536 W/kg
Smallest distance from peaks to all points 3 dB below = 19.2 mm
Ratio of SAR at M2 to SAR at M1 = 62.3%

Maximum value of SAR (measured) = 0.930 W/kg



Plot 2
DUT: DUT Sample; Type: Sample; Serial: Not Specified

Communication System: UID 0, WCDMA (0); Communication System Band: WCDMA BAND2 RMC;
Frequency: 1907.6 MHz;Communication System PAR: 0 dB; PMF: 1.12202e-005
Medium parameters used: f = 1907.6 MHz; σ = 1.45 S/m; εr = 39.74; ρ = 1000 kg/m3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

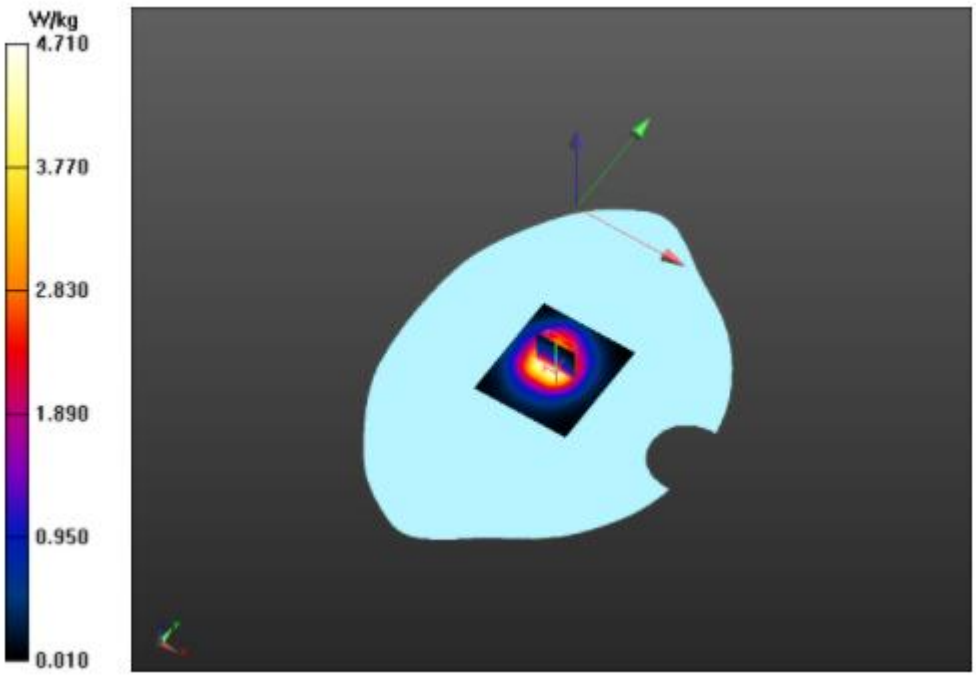
Probe: ES3DV3 - SN3089; ConvF(5.07, 5.07, 5.07) @ 1907.6 MHz; Calibrated: 2023/7/14
Modulation Compensation:
Sensor-Surface: 4mm (Mechanical Surface Detection), z = 2.0, 32.0
Electronics: DAE4 Sn881; Calibrated: 2023/7/14
Phantom: SAM 1; Type: QD000P40CD; Serial: TP:xxxx
DASY52 52.10.3(1513); SEMCAD X 14.6.13(7474)

KA240605038X FCC ID smartwatch/Back/Area Scan (71x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 4.71 W/kg

KA240605038X FCC ID smartwatch/Back/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 48.70 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 9.19 W/kg
SAR(1 g) = 3.569 W/kg; SAR(10 g) = 1.878 W/kg
Smallest distance from peaks to all points 3 dB below = 13.9 mm
Ratio of SAR at M2 to SAR at M1 = 49.6%

Maximum value of SAR (measured) = 4.56 W/kg



Plot 3
DUT: DUT Sample; Type: Sample; Serial: Not Specified

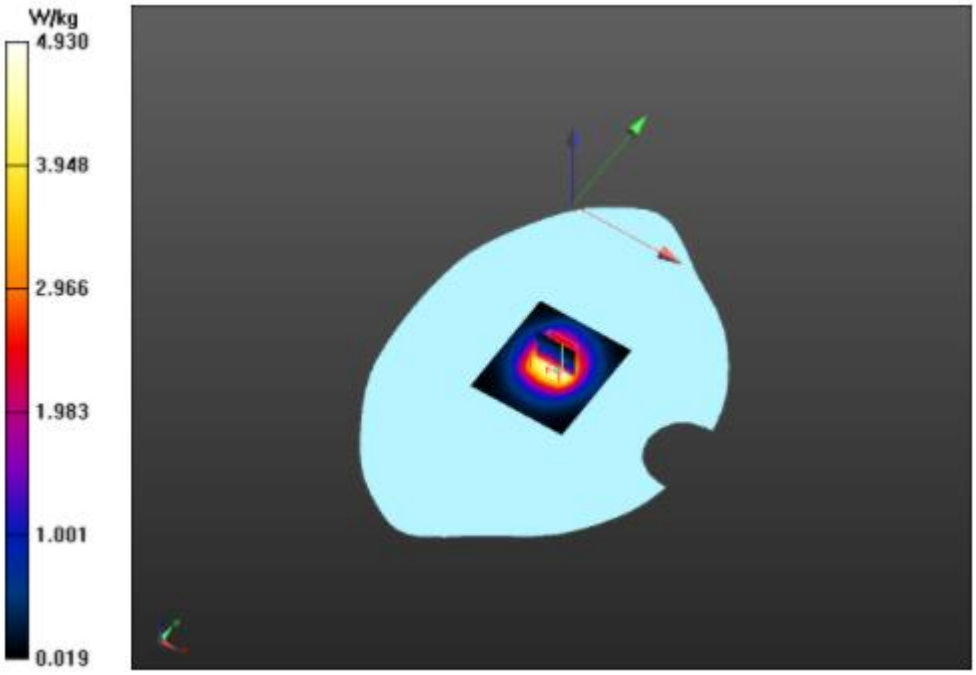
Communication System: UID 0, Generic LTE (0); Communication System Band: Band 2, E-UTRA/FDD (1850.0 - 1910.0 MHz); Frequency: 1900 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 1900 MHz; σ = 1.45 S/m; εr = 39.74; ρ = 1000 kg/m3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

Probe: ES3DV3 - SN3089; ConvF(5.07, 5.07, 5.07) @ 1900 MHz; Calibrated: 2023/7/14
Modulation Compensation:
Sensor-Surface: 4mm (Mechanical Surface Detection), z = 2.0, 32.0
Electronics: DAE4 Sn881; Calibrated: 2023/7/14
Phantom: SAM 1; Type: QD000P40CD; Serial: TP:xxxx
DASY52 52.10.3(1513); SEMCAD X 14.6.13(7474)

KA240605038X FCC ID smartwatch/Back/Area Scan (71x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 4.93 W/kg

KA240605038X FCC ID smartwatch/Back/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 51.10 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 9.30 W/kg
SAR(1 g) = 4.3 W/kg; SAR(10 g) = 1.88 W/kg
Smallest distance from peaks to all points 3 dB below = 12.8 mm
Ratio of SAR at M2 to SAR at M1 = 49.5%
Maximum value of SAR (measured) = 4.66 W/kg



Plot 4
DUT: DUT Sample; Type: Sample; Serial: Not Specified

Communication System: UID 0, Generic LTE (0); Communication System Band: Band 4, E-UTRA/FDD (1710.0 - 1755.0 MHz); Frequency: 1745 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used (interpolated): f = 1745 MHz; σ = 1.363 S/m; εr = 40.136; ρ = 1000 kg/m3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

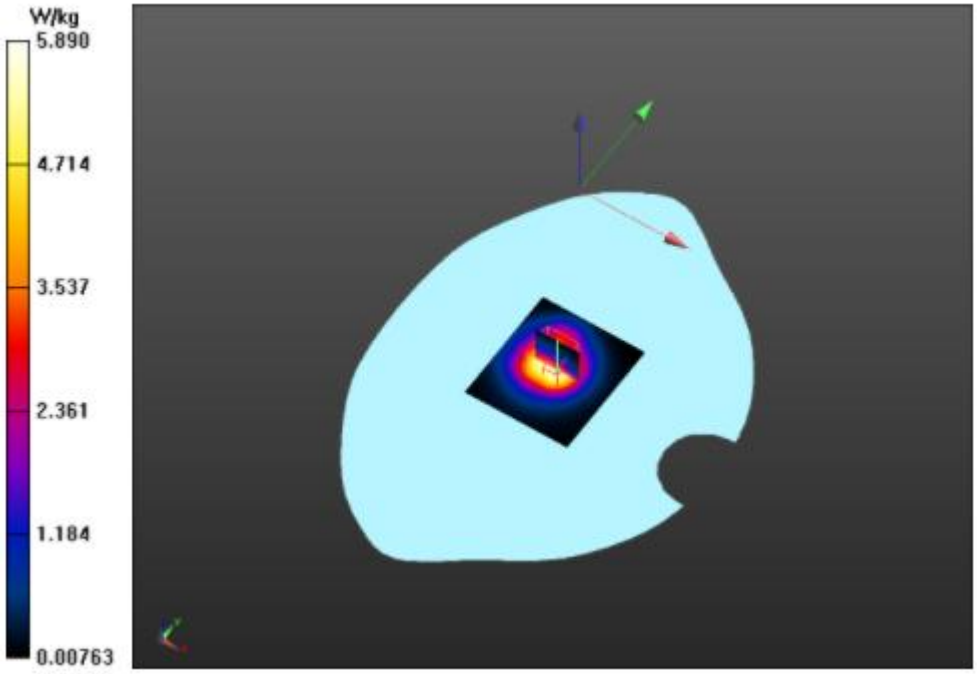
Probe: ES3DV3 - SN3089; ConvF(5.35, 5.35, 5.35) @ 1745 MHz; Calibrated: 2023/7/14
Modulation Compensation:
Sensor-Surface: 4mm (Mechanical Surface Detection), z = 2.0, 32.0
Electronics: DAE4 Sn881; Calibrated: 2023/7/14
Phantom: SAM 1; Type: QD000P40CD; Serial: TP:xxxx
DASY52 52.10.3(1513); SEMCAD X 14.6.13(7474)

KA240605038X FCC ID smartwatch/Back/Area Scan (71x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 5.89 W/kg

KA240605038X FCC ID smartwatch/Back/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.63 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 11.1 W/kg
SAR(1 g) = 4.15 W/kg; SAR(10 g) = 1.83 W/kg
Smallest distance from peaks to all points 3 dB below = 13.3 mm
Ratio of SAR at M2 to SAR at M1 = 52%

Maximum value of SAR (measured) = 5.54 W/kg



Plot 5
DUT: DUT Sample; Type: Sample; Serial: Not Specified

Communication System: UID 0, Generic LTE (0); Communication System Band: Band 5, E-UTRA/FDD (824.0 - 849.0 MHz); Frequency: 844 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used (interpolated): f = 844 MHz; σ = 0.89 S/m; εr = 41.479; ρ = 1000 kg/m3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

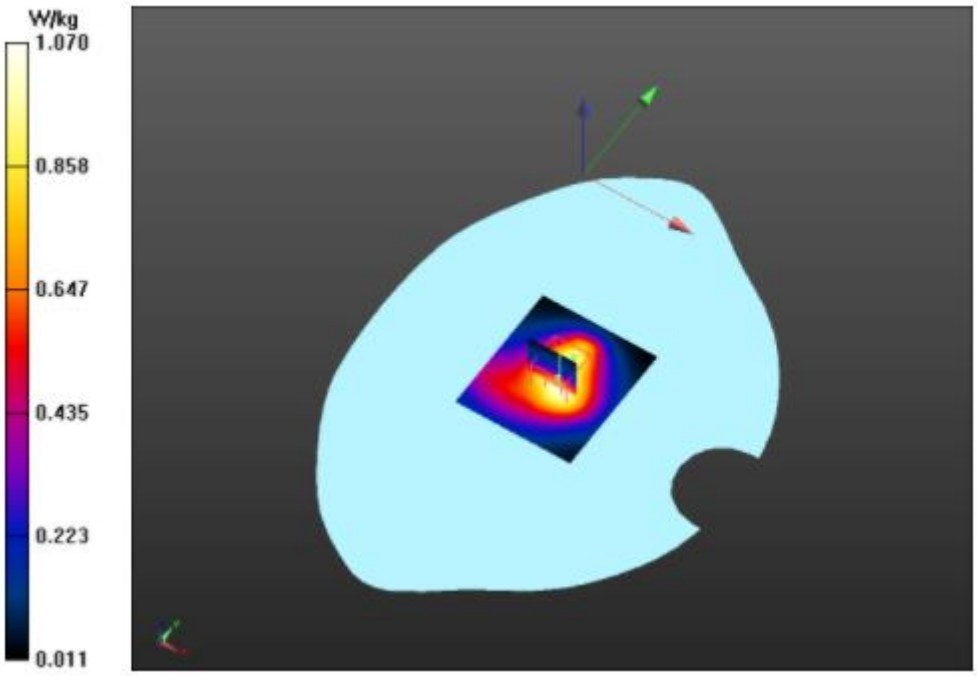
Probe: ES3DV3 - SN3089; ConvF(6.28, 6.28, 6.28) @ 844 MHz; Calibrated: 2023/7/14
Modulation Compensation:
Sensor-Surface: 4mm (Mechanical Surface Detection), z = 2.0, 32.0
Electronics: DAE4 Sn881; Calibrated: 2023/7/14
Phantom: SAM 2; Type: QD000P40CD; Serial: TP:xxxx
DASY52 52.10.3(1513); SEMCAD X 14.6.13(7474)

KA240605038X FCC ID smartwatch/Back/Area Scan (71x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 1.07 W/kg

KA240605038X FCC ID smartwatch/Back/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 34.21 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 1.58 W/kg
SAR(1 g) = 0.984 W/kg; SAR(10 g) = 0.608 W/kg
Smallest distance from peaks to all points 3 dB below = 19.2 mm
Ratio of SAR at M2 to SAR at M1 = 62.7%

Maximum value of SAR (measured) = 1.06 W/kg



Plot 6
DUT: DUT Sample; Type: Sample; Serial: Not Specified

Communication System: UID 0, Generic LTE (0); Communication System Band: Band 12, E-UTRA/FDD (698.0 - 716.0 MHz); Frequency: 711 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used (interpolated): f = 711 MHz; σ = 0.854 S/m; εr = 42.495; ρ = 1000 kg/m3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

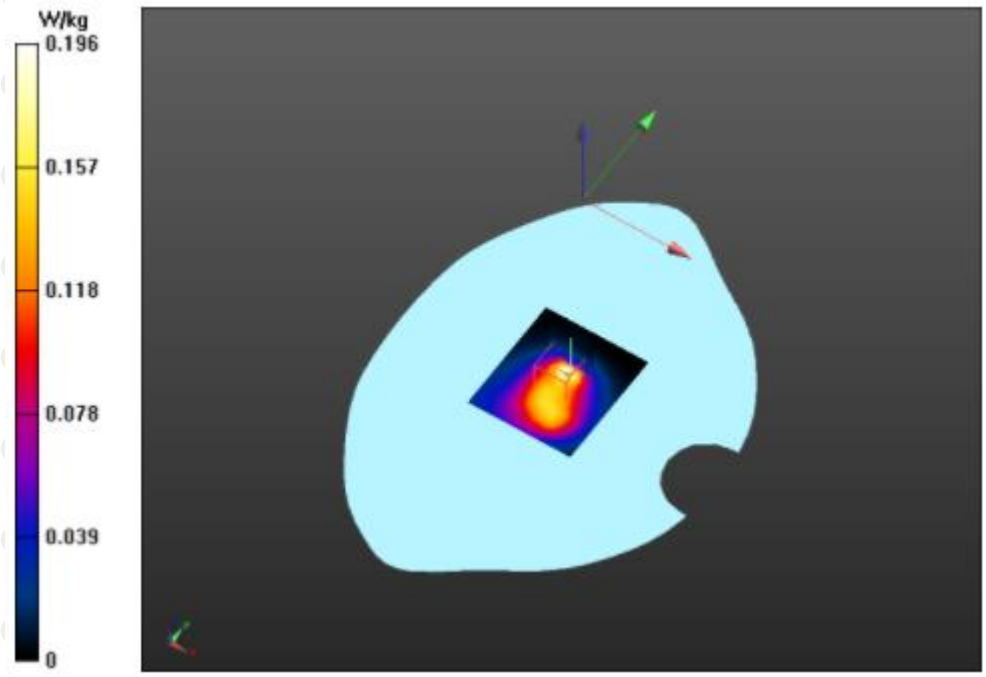
Probe: ES3DV3 - SN3089; ConvF(6.52, 6.52, 6.52) @ 711 MHz; Calibrated: 2023/7/14
Modulation Compensation:
Sensor-Surface: 4mm (Mechanical Surface Detection), z = 2.0, 32.0
Electronics: DAE4 Sn881; Calibrated: 2023/7/14
Phantom: SAM 2; Type: QD000P40CD; Serial: TP:xxxx
DASY52 52.10.3(1513); SEMCAD X 14.6.13(7474)

KA240605038X FCC ID smartwatch/Back/Area Scan (71x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.196 W/kg

KA240605038X FCC ID smartwatch/Back/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.24 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 0.567 W/kg
SAR(1 g) = 0.176 W/kg; SAR(10 g) = 0.093 W/kg
Smallest distance from peaks to all points 3 dB below = 5.8 mm
Ratio of SAR at M2 to SAR at M1 = 38%

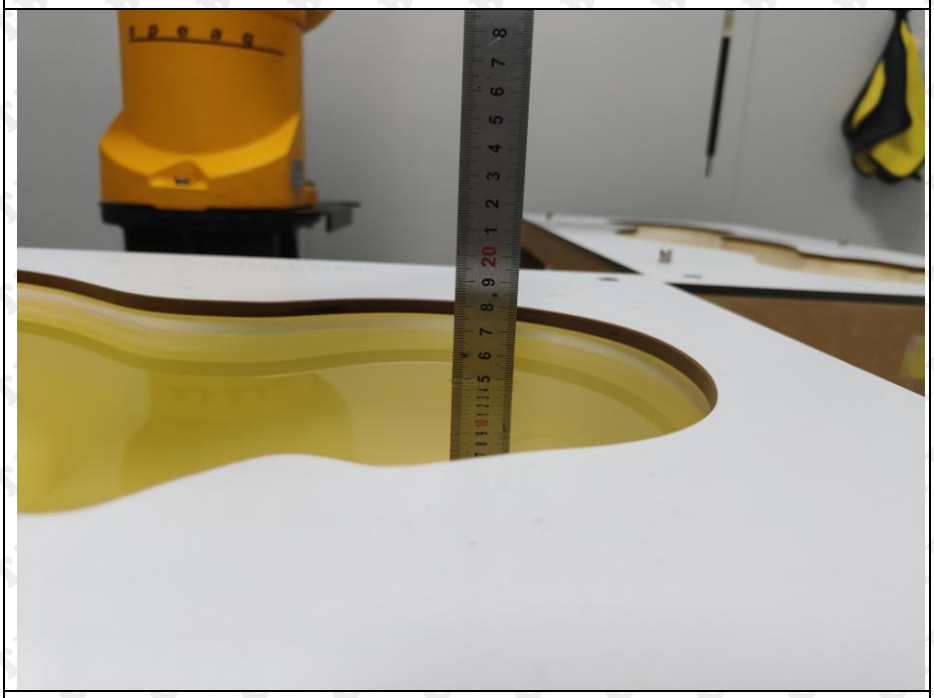
Maximum value of SAR (measured) = 0.204 W/kg



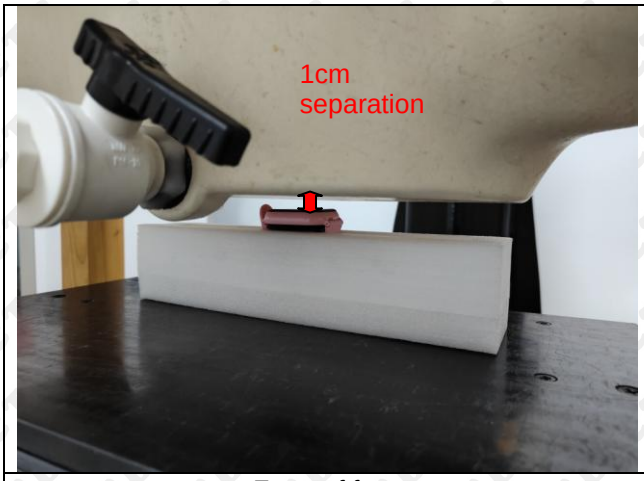
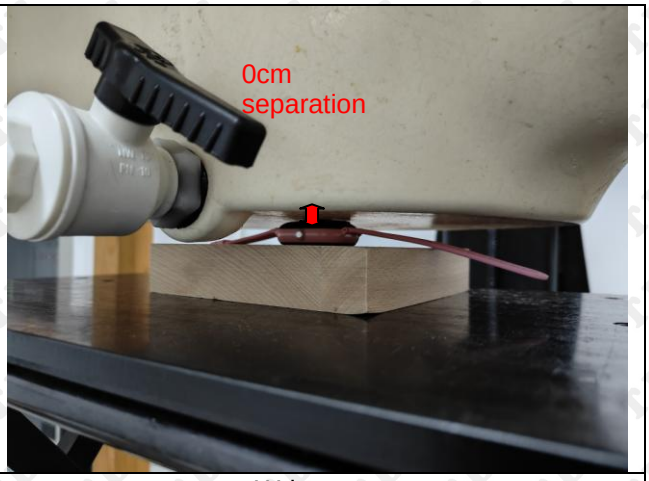
17 Calibration Reports-Probe and Dipole

The Probe, Dipole and DAE calibration please refer to the Attachment.

18 SAR System and Liquid Photos



19 Setup Photo

	
Front of face	Wrist-worn

20 EUT Photos

Front Side

Back Side

======End of report======