TEST REPORT

For SAR

Report No. .... :	**CHTW24090013** Report verification:
Project No....................................... :	**SHT2407108401W**
FCC ID .... :	**2ATTZ-SUNBEAM-F1**
Applicant's name .... :	**Basic,Inc.**
Address...:	17688 County Road 558,Memphis, Missouri, 63555,United States
Test item description .... :	**Basic Feature Phone**
Trade Mark ....:	Sunbeam
Model/Type reference.......................:	F1
Listed Model(s) ....:	-
Standard .... :	**FCC 47 CFR Part2.1093** **IEEE Std C95.1: 1999 Edition** **IEEE Std 1528: 2013**
Date of receipt of test sample..........:	Aug. 01, 2024
Date of testing................................:	Aug. 13, 2024- Aug. 14, 2024
Date of issue...................................:	Sep. 05, 2024
Result................. ....:	**PASS**

Compiled by (position+printedname+signature)...:	File administrators Xiaodong Zhao	Xiaodong Zhao
Supervised by (position+printedname+signature)...:	Project Engineer Xiaodong Zhao	Xiaodong Zhao
Approved by (position+printedname+signature)...:	RF Manager Xu Yang	Xu Yang

Testing Laboratory Name .... :	**Shenzhen Huatongwei International Inspection Co., Ltd**
Address...:	Building 7, Baiwang Idea Factory, No.1051, Songbai Road, Yangguang Community, Xili Subdistrict, Nanshan District, Shenzhen, Guangdong, China

The test report merely correspond to the test sample.

Contents

1 . Statement of Compliance

Maximum Reported SAR (W/kg @1g)					
Type	Test setting	PCE	DTS	NII	Simultaneous TX
Head	Cheek	0.118	0.098	0.515	0.633
Body-worn	Dist.= 10mm	0.854	0.038	0.220	1.074
Hotspot	Dist.= 10mm	0.854	0.038	N/A	0.892

Note:

1. This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg@1g) specified in FCC 47 CFR part 2 (2.1093) and IEEE Std C95.1,
2. This device had been tested in accordance with the measurement methods and procedures specified in IEEE 1528 and FCC KDB publications.

2 . Test Standards and Report version

2.1. Test Standards

The tests were performed according to following standards:

FCC 47 Part 2.1093: Radiofrequency radiation exposure evaluation: portable devices.
IEEE Std C95.1, 1999 Edition: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz
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.

FCC published RF exposure KDB procedures:
865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04: SAR Measurement Requirements for 100 MHz to 6 GHz
865664 D02 RF Exposure Reporting v01r02: RF Exposure Compliance Reporting and Documentation Considerations
447498 D04 Interim General RF Exposure Guidance v01: Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies
648474 D04 Handset SAR v01r03: SAR Evaluation Considerations for Wireless Handsets
941225 D01 3G SAR Procedures v03r01: SAR Measurement Procedures for 3G Devices
941225 D05 SAR for LTE Devices v02r05: SAR Evaluation Considerations for LTE Devices
941225 D06 Hotspot Mode v02r01: SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities

TCB workshop April, 2019; Page 19, Tissue Simulating Liquids (TSL)

2.2. Report version

Revision No.	Date of issue	Description
N/A	2024-09-05	Original

3. Summary

3.1. Client Information

Applicant:	Basic,Inc.
Address:	17688 County Road 558,Memphis, Missouri, 63555,United States
Manufacturer:	Basic,Inc.
Address:	17688 County Road 558,Memphis, Missouri, 63555,United States

3.2. Product Description

Main unit		
Name of EUT:	Basic Feature Phone	
Trade Mark:	Sunbeam	
Model No.:	F1	
Listed Model(s):	-	
Power supply:	DC 3.8V from Battery	
Hardware version:	QS3912_MAINPCB_V1.0	
Software version:	Sunbeam_F1_Pro_V1.0	
Device Dimension:	Length x Width x Thickness (mm):	110.7 x59.5 x23.4
Device Category:	Portable	
Product stage:	Production unit	
RF Exposure Environment:	General Population/Uncontrolled	
HTW test sample No.:	SHT2407108401W	
Support SIM card quantity:[#1]	☒ Single card	☐ Double card

Note:
#1: The Test EUT support two SIM card, so all the tests are performed at each SIM card mode, the datum recorded is the worst case for all the mode at SIM1 Card mode.

3.3. RF Specification Description

WCDMA				
Operation Band:	☐ Band II	☒ Band IV	☐ Band V	
Support type:	☒ UMTS Rel. 99 (Voice & Data)		☒ HSDPA	☒ HSUPA
Modulation type:	☒ QPSK			
Power Class:	Class 3			
LTE				
Operation Band:	☒ Band 71			
Support type:	☒Single Carrier	☐ CA-UL	☐ CA-DL	☐ MIMO-UL
Modulation type:	☒ QPSK	☒ 16QAM		
Power Class:	☒ Class 3	☐ Class 2		
Note: *This device doesn't support SV-LTE (1xRTT-LTE).*				

3.4. Testing Laboratory Information

<table>
<tr><td>Laboratory Name</td><td colspan="2">Shenzhen Huatongwei International Inspection Co., Ltd.</td></tr>
<tr><td>Laboratory Location</td><td colspan="2">Building 7, Baiwang Idea Factory, No.1051, Songbai Road, Yangguang Community, Xili Subdistrict, Nanshan District, Shenzhen, Guangdong, China</td></tr>
<tr><td>Contact information:</td><td colspan="2">Phone: 86-755-26715499
E-mail: cs@szhtw.com.cn
http://www.szhtw.com.cn</td></tr>
<tr><td rowspan="3">Qualifications</td><td>Type</td><td>Accreditation Number</td></tr>
<tr><td>FCC Registration Number</td><td>762235</td></tr>
<tr><td>FCC Designation Number</td><td>CN1181</td></tr>
</table>

3.5. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Ambient temperature	18 °C to 25 °C
Ambient humidity	30%RH to 70%RH
Air Pressure	950-1050mbar

4. Equipments Used during the Test

Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Cal. date (YY-MM-DD)	Due date (YY-MM-DD)
●	Data Acquisition Electronics DAEx	SPEAG	HTWE0313-05	DAE4	1549	2024/04/16	2025/04/15
●	E-field Probe	SPEAG	HTWE0313-06	EX3DV4	7494	2024/06/07	2025/06/06
●	Phantoms	SPEAG	HTWE0313-12	SAM-Twin V8.0	1947	N/A	N/A
●	Head TSL	-	-	HBBL600-10000	-	N/A	N/A
●	Temperature & humidity	MIAO XIN	HTWE0319	TH20R-EX	-	2024/03/18	2025/03/17
●	Universal Radio Communication Tester	R&S	HTWE0323	CMW500	137681	2024/03/14	2025/03/13
Tissue-equivalent liquids Validation							
●	Dielectric Assessment Kit	SPEAG	HTWE0315-02	DAK-3.5	1267	N/A	N/A
●	Network analyzer	Keysight	HTWE0331	E5071C	MY46733048	2023/08/18	2024/08/17
●	Thermometer	LKM	HTWE0317	DTM3000	3693	2024/03/18	2025/03/17
System Validation							
●	System Validation Dipole	SPEAG	HTWE0314-03	D750V3	1180	2023/12/07	2026/12/06
●	System Validation Dipole	SPEAG	HTWE0314-05	D1750V2	1164	2023/12/08	2026/12/07
●	Signal Generator	R&S	HTWE0276	SMB100A	114360	2023/08/26	2024/08/25
●	Power Viewer for Windows	R&S		N/A	N/A	N/A	N/A
●	Power sensor	R&S	HTWE0278	NRP18A	101010	2024/03/14	2025/03/13
●	Power sensor	R&S	HTWE0389	NRP18A	101386	2024/03/14	2025/03/13
●	Power Amplifier	BONN	HTWE0336	BLWA 0160-2M	1811887	2023/11/09	2024/11/08
●	Dual Directional Coupler	Mini-Circuits	HTWE0335	ZHDC-10-62-S+	F975001814	2023/11/09	2024/11/08
●	Attenuator	Mini-Circuits	HTWE0333	VAT-3W2+	1819	2023/11/09	2024/11/08
●	Attenuator	Mini-Circuits	HTWE0334	VAT-10W2+	1741	2023/11/09	2024/11/08

Note:

1. *The Probe,Dipole and DAE calibration reference to the Appendix E and F.*
2. *Referring to KDB865664 D01, the dipole calibration interval can be extended to 3 years with justifcatio. The dipole are also not physically damaged or repaired during the interval.*

5. Measurement Uncertainty

Per KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg and the measured 10-g SAR within a frequency band is < 3.75 W/kg.
The expanded SAR measurement uncertainty must be ≤ 30%, for a confidence interval of k = 2. If these conditions are met, extensive SAR measurement uncertainty analysis described in IEEE Std 1528 is not required in SAR reports submitted for equipment approval.

Therefore, the measurement uncertainty is not required.

6. SAR Measurement System Configuration

6.1. SAR Measurement Set-up

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.

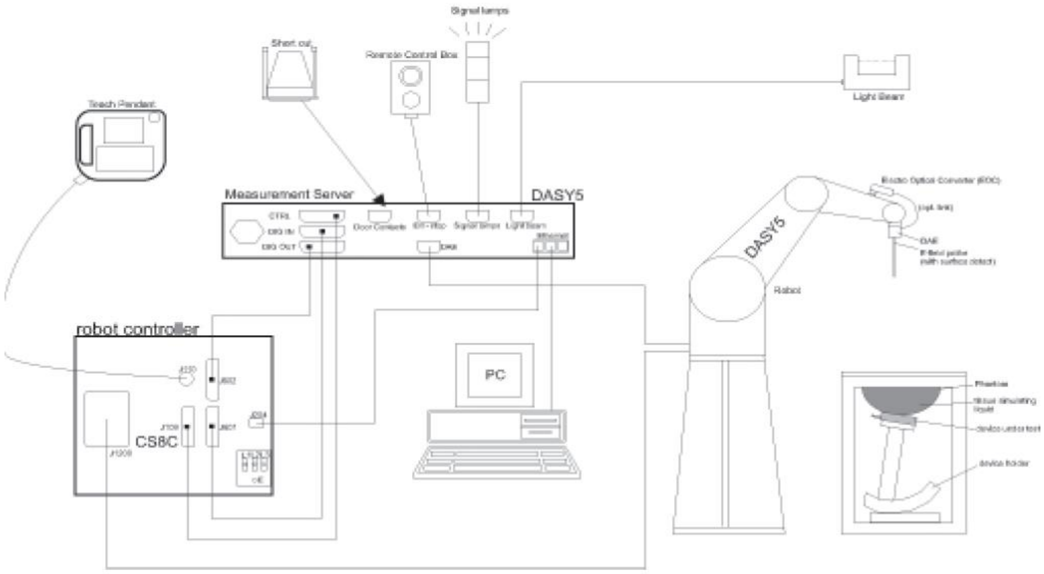
Remote control with teach panel and additional circuitry for robot safety such as warning lamps, etc.

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.



6.2. 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.

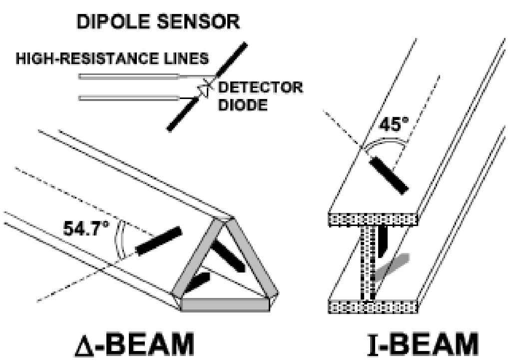
- **Probe Specification**

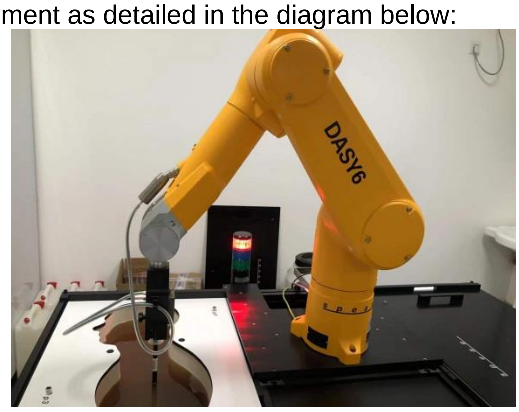
Construction	Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	ISO/IEC 17025 calibration service available.
Frequency	4 MHz to 10 GHz; Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)
Dynamic Range	10 µW/g to > 100 W/kg; Linearity: ± 0.2 dB
Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Distance from probe tip to dipole centers: 1.0 mm
Application	General dosimetry up to 6 GHz Dosimetry in strong gradient fields Compliance tests of Mobile Phones
Compatibility	DASY3, DASY4, DASY52 SAR and higher, EASY4/MRI

- **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.

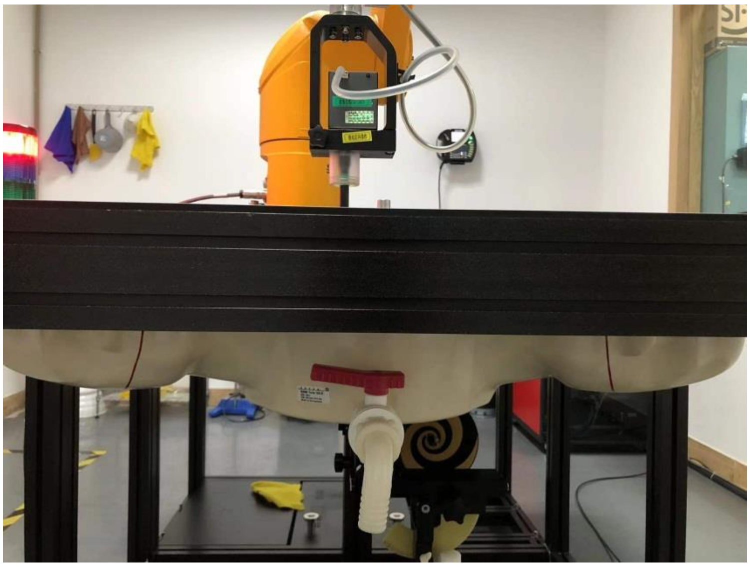
The E-Field probe utilizes a triangular sensor arrangement as detailed in the diagram below:





6.3. 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

6.4. 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

7. SAR Test Procedure

7.1. Scanning Procedure

Step 1: Power Reference Measurement

The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. Measure the local SAR at a test point within 8 mm of the phantom inner surface that is closest to the DUT. This distance cannot be smaller than the distance of sensor calibration points to probe tip as defined in the probe properties.

Step 2: Area Scan

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

Area Scan Resolutions per FCC KDB Publication 865664 D01v04

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 mm ± 1 mm	$\frac{1}{2} \cdot \delta \cdot \ln(2)$ mm ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}	≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
	When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	

Step 3: Zoom Scan

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

Zoom Scan Resolutions per FCC KDB Publication 865664 D01v04

Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$ mm	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm

Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see IEEE Std 1528-2013 for details.

* When zoom scan is required and the *reported* SAR from the *area scan based 1-g SAR estimation* procedures of KDB Publication 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.

Step 4: Power drift measurement

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

7.2. 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),s 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:

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

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

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.

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

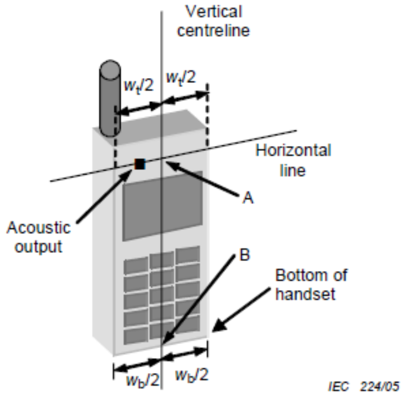
SAR: local specific absorption rate in W/kg
Etot: total field strength in V/m
σ: conductivity in [mho/m] or [Siemens/m]
ρ: equivalent tissue density in g/cm3

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.

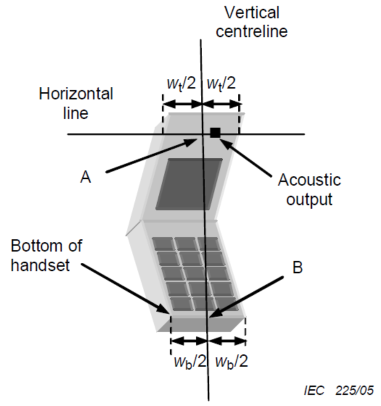
8. Position of the wireless device in relation to the phantom

8.1. Head Position

The wireless device define two imaginary lines on the handset, the vertical centreline and the horizontal line, for the handset in vertical orientation as shown in Figures 5a and 5b.
The vertical centreline passes through two points on the front side of the handset: the midpoint of the width W_t of the handset at the level of the acoustic output (point A in Figures 5a and 5b), and the midpoint of the width W_b of the bottom of the handset (point B).
The horizontal line is perpendicular to the vertical centreline and passes through the centre of the acoustic output (see Figures 5a and 5b). The two lines intersect at point A.
Note that for many handsets, point A coincides with the centre of the acoustic output. However, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical centreline is not necessarily parallel to the front face of the handset (see Figure 5b), especially for clam-shell handsets, handsets with flip cover pieces, and other irregularly shaped handsets.



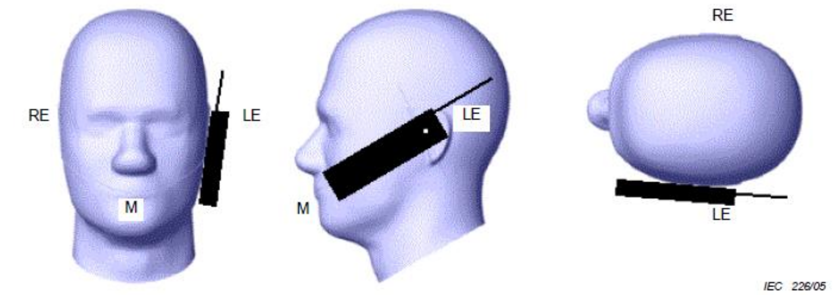
Figures 5a



Figures 5b

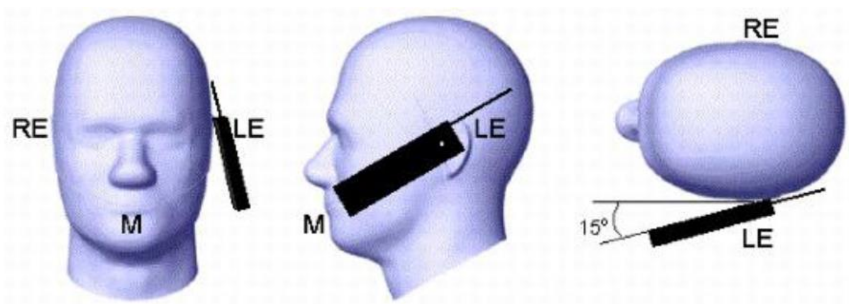
W_t	Width of the handset at the level of the acoustic
W_b	Width of the bottom of the handset
A	Midpoint of the widthwt of the handset at the level of the acoustic output
B	Midpoint of the width wb of the bottom of the handset

Cheek position



Picture 2 Cheek position of the wireless device on the left side of SAM

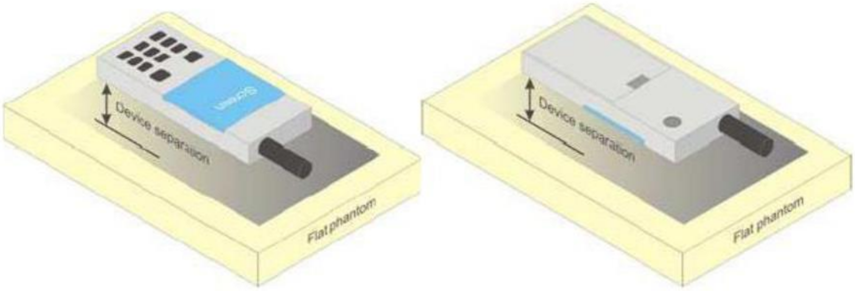
Tilt position



Picture 3 Tilt position of the wireless device on the left side of SAM

8.2. Body Position

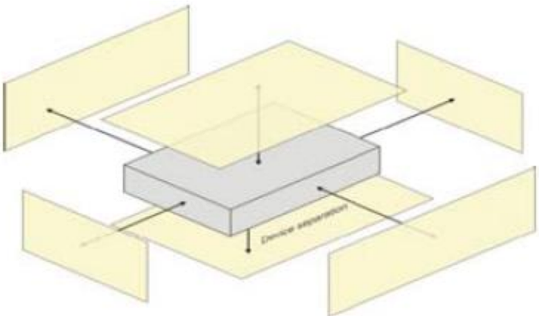
Devices that support transmission while used with body-worn accessories must be tested for body-worn accessory SAR compliance, typically according to the smallest test separation distance required for the group of body-worn accessories with similar operating and exposure characteristics.
Devices that are designed to operate on the body of users using lanyards and straps or without requiring additional body-worn accessories must be tested for SAR compliance using a conservative minimum test separation distance ≤ 5mm to support compliance.



Picture 4 Test positions for body-worn devices

8.3. Hotspot Mode Exposure conditions

The hotspot mode and body-worn accessory SAR test configurations may overlap for handsets. When the same wireless mode transmission configurations for voice and data are required for SAR measurements, the more conservative configuration with a smaller separation distance should be tested for the overlapping SAR configurations. This typically applies to the back and front surfaces of a handset when SAR is required for both hotspot mode and body-worn accessory exposure conditions. Depending on the form factor and dimensions of a device, the test separation distance used for hotspot mode SAR measurement is either 10 mm or that used in the body-worn accessory configuration, whichever is less for devices with dimension > 9 cm x 5 cm. For smaller devices with dimensions ≤ 9 cm x 5 cm because of a greater potential for next to body use a test separation of ≤ 5 mm must be used.



Picture 5 Test positions for Hotspot Mode

9. Dielectric Property Measurements & System Check

9.1. Tissue Dielectric Parameters

The temperature of the tissue-equivalent medium used during measurement must also be within 18℃ to 25℃ and within ± 2℃ of the temperature when the tissue parameters are characterized.
The dielectric parameters must be measured before the tissue-equivalent medium is used in a series of SAR measurements. The parameters should be re-measured after each 3-4 days of use; or earlier if the dielectric parameters can become out of tolerance; for example, when the parameters are marginal at the beginning of the measurement series.
The dielectric constant (ε_r) and conductivity (σ) of typical tissue-equivalent media recipes are expected to be within ± 5% of the required target values; but for SAR measurement systems that have implemented the SAR error compensation algorithms documented in IEEE Std 1528, to automatically compensate the measured SAR results for deviations between the measured and required tissue dielectric parameters, the tolerance for ε_r and σ may be relaxed to ± 10%. This is limited to frequencies ≤ 3 GHz.

Tissue Dielectric Parameters
FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz

Tissue dielectric parameters for Head		
Target Frequency (MHz)	Head	
	ε_r	σ(S/m)
750	41.9	0.89
835	41.5	0.90
1750	40.1	1.37
1800-2000	40.0	1.40
2450	39.2	1.80
2600	39.0	1.96
5200	36.0	4.66
5300	35.9	4.76
5500	35.6	4.96
5600	35.5	5.07
5800	35.3	5.27

Measurement Results:

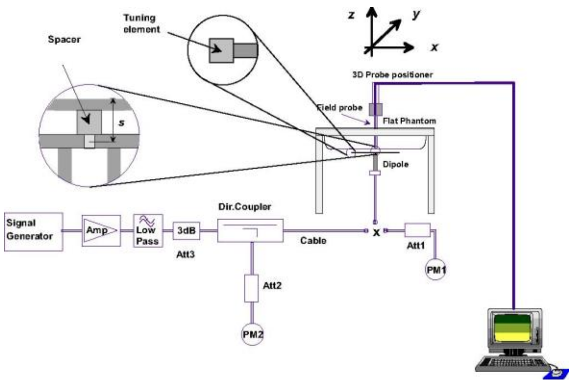
Dielectric performance of Head tissue simulating liquid									
Frequency (MHz)	ε_r		σ(S/m)		Delta (ε_r)	Delta (σ)	Limit	Temp (℃)	Date
	Target	Measured	Target	Measured					
750	41.90	42.65	0.890	0.896	1.78%	0.67%	±5%	22.0	2024/8/13
1750	40.10	40.26	1.370	1.364	0.41%	-0.44%	±5%	22.0	2024/8/14

9.2. System Check

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

System Performance Check Measurement Conditions:

- The measurements were performed in the flat section of the TWIN SAM or ELI phantom, shell thickness: 2.0±0.2 mm (bottom plate) filled with Body or Head simulating liquid of the following parameters.
- The depth of tissue-equivalent liquid in a phantom must be ≥ 15.0 cm for SAR measurements ≤ 3 GHz and ≥10.0 cm for measurements > 3 GHz.
- The DASY system with an E-Field Probe was used for the measurements.
- The dipole was mounted on the small tripod so that the dipole feed point was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10 mm (above 1 GHz) and 15 mm (below 1 GHz) from dipole center to the simulating liquid surface.
- The coarse grid with a grid spacing of 15 mm was aligned with the dipole.
  For 5 GHz band - The coarse grid with a grid spacing of 10 mm was aligned with the dipole.
- Special 7x7x7 (below 3 GHz) and/or 8x8x7 (above 3 GHz) fine cube was chosen for the cube.
- The results are normalized to 1 W input power.



System Performance Check Setup

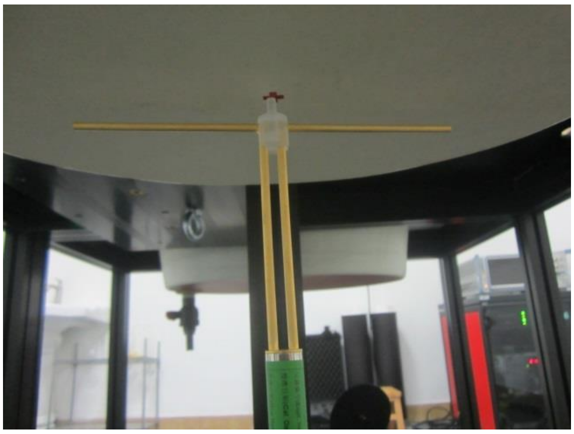


Photo of Dipole Setup

Measurement Results:

Head											
Frequency (MHz)	1g SAR			10g SAR			Delta (1g)	Delta (10g)	Limit	Temp (℃)	Date
	Target 1W	Normalize to 1W	Measured 250mW	Target 1W	Normalize to 1W	Measured 250mW					
750	8.32	8.76	2.19	5.48	5.80	1.45	5.29%	5.84%	±10%	22.5	2024/8/13
1750	36.50	37.24	9.31	19.40	20.00	5.00	2.03%	3.09%	±10%	22.5	2024/8/14

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

Plots of System Performance Check

Test Laboratory: Huatongwei International Inspection Co., Ltd.,SAR Lab Date: 8/13/2024

SystemPerformanceCheck-Head 750MHz

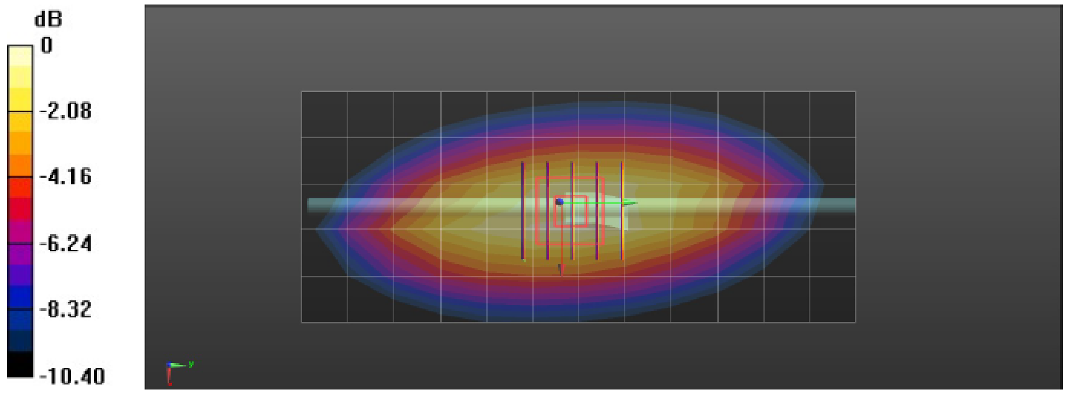
Communication System: UID 0, A-CW (0); Frequency: 750 MHz; Duty Cycle: 1:1
Medium parameters used: f = 750 MHz; σ = 0.896 S/m; ε_r = 42.645; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient Temperature:22.5℃;Liquid Temperature:22.0℃

DASY Configuration:

- Probe: EX3DV4 - SN7494; ConvF(10.74, 10.74, 10.74) @ 750 MHz; Calibrated: 6/7/2024
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1549; Calibrated: 4/16/2024
- Phantom: Twin-SAM V8.0 ; Type: QD 000 P41 AA; Serial: 1974
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

Head/d=15mm, Pin=250mW/Area Scan (6x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.68 W/kg

Head/d=15mm, Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 59.20 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 3.45 W/kg
SAR(1 g) = 2.19 W/kg; SAR(10 g) = 1.45 W/kg
Maximum value of SAR (measured) = 2.99 W/kg



0 dB = 2.99 W/kg = 4.76 dBW/kg

Test Laboratory: Huatongwei International Inspection Co., Ltd.,SAR Lab Date: 8/14/2024

SystemPerformanceCheck-Head 1750MHz

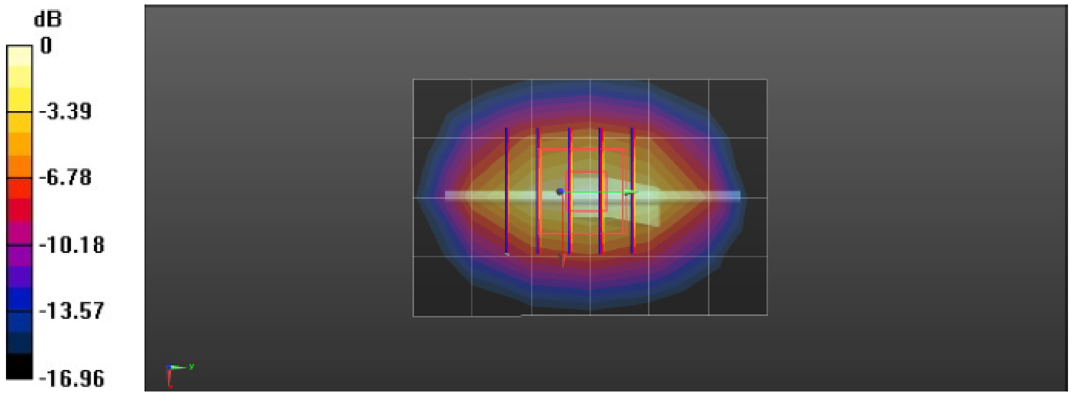
Communication System: UID 0, CW (0); Frequency: 1750 MHz; Duty Cycle: 1:1
Medium parameters used: f = 1750 MHz; σ = 1.364 S/m; ε_r = 40.264; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient Temperature:22.5°C;Liquid Temperature:22.0°C

DASY Configuration:

- Probe: EX3DV4 - SN7494; ConvF(8.94, 8.94, 8.94) @ 1750 MHz; Calibrated: 6/7/2024
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1549; Calibrated: 4/16/2024
- Phantom: Twin-SAM V8.0 ; Type: QD 000 P41 AA; Serial: 1974
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

Head/d=10mm,Pin=250mW/Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 13.9 W/kg

Head/d=10mm,Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 103.9 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 16.9 W/kg
SAR(1 g) = 9.31 W/kg; SAR(10 g) = 5 W/kg
Maximum value of SAR (measured) = 14.1 W/kg



0 dB = 14.1 W/kg = 11.49 dBW/kg

10. SAR Exposure Limits

SAR assessments have been made in line with the requirements of FCC 47 CFR § 2.1093.

Type Exposure	Limit (W/kg)	
	General Population/ Uncontrolled Exposure Environment	Occupational/ Controlled Exposure Environment
Spatial Average SAR (whole body)	0.08	0.4
Spatial Peak SAR (1g cube tissue for head and trunk)	**1.6**	8.0
Spatial Peak SAR (10g for limb)	4.0	20.0

Note:

1. *Population/Uncontrolled Environments: are defined as locations where there is the exposure of individual who have no knowledge or control of their exposure.*
2. *Occupational/Controlled Environments: are defined as locations where there is exposure that may be incurred by people who are aware of the potential for exposure (i.e. as a result of employment or occupation).*

11. Conducted Power Measurement Results and Tune-up

Please refer to appendix report

Note:

WCDMA

1. *The following tests were conducted according to the test requirements outlines in 3GPP TS34.121 specification.*
2. *The procedures in KDB 941225 D01 are applied for 3GPP Rel. 6 HSPA to configure the device in the required sub-test mode to determine SAR test exclusion*

A summary of thest setting are illustrated belowe:

HSDPA Setup Configureation:

a) *The EUT was connected to base station RS CMU200 referred to the setup configuration*
b) *The RF path losses were compensated into the measurements*
c) *A call was established between EUT and base station with following setting:*
   i. *Set Gain Factors (βc and βd) and parameters were set according to each specific sub-test in the following table, C10.1.4, Quoted from the TS 34.121*
   ii. *Set RMC 12.2Kbps + HSDPA mode*
   iii. *Set Cell Power=-86dBm*
   iv. *Set HS-DSCH Configuration Type to FRC (H-set 1, QPSK)*
   v. *Select HSDPA uplink parameters*
   vi. *Set Delta ACK, Delta NACK and Delta CQI=8*
   vii. *Set Ack-Nack repetition Factor to 3*
   viii. *Set CQI Feedback Cycle (K) to 4ms*
   ix. *Set CQI repetition factor to 2*
   x. *Power ctrl mode= all up bits*
d) *The transmitter maximum output power waw recorded.*

Table C.10.1.4: β values for transmitter characteristics tests with HS-DPCCH

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note1, Note 2)	CM (dB) (Note 3)	MPR (dB) (Note 3)
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15 (Note 4)	15/15 (Note 4)	64	12/15 (Note 4)	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c.

Note 2: For the HS-DPCCH power mask requirement test in clause 5.2C, 5.7A, and the Error Vector Magnitude (EVM) with HS-DPCCH test in clause 5.13.1A, and HSDPA EVM with phase discontinuity in clause 5.13.1AA, Δ_{ACK} and Δ_{NACK} = 30/15 with β_{hs} = 30/15 * β_c, and Δ_{CQI} = 24/15 with β_{hs} = 24/15 * β_c.

Note 3: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.

Note 4: For subtest 2 the β_c/β_d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 11/15 and β_d = 15/15.

Setup Configuration

HSUPA Setup Configureation:

a) *The EUT was connected to base station RS CMU200 referred to the setup configuration*
b) *The RF path losses were compensated into the measurements*
c) *A call was established between EUT and base station with following setting:*
   i. *Call configs = 5.2b, 5.9b, 5.10b, and 5.13.2B with QPSK*
   ii. *Set Gain Factors (βc and βd) and parameters (AG index) were set according to each specific sub-test in the following table, C11.1.3, Quoted from the TS 34.121*
   iii. *Set Cell Power=-86dBm*
   iv. *Set channel type= 12.2Kbps + HSPA mode*
   v. *Set UE Target power*
   vi. *Set Ctrl mode=Alternating bits*
   vii. *Set and observe the E-TFCI*
   viii. *Confirm that E-TFCI is equal the target E-TFCI of 75 for Sub-test 1, and other subtest's E-TFCI*

d) The transmitter maximum output power waw recorded.

Table C.11.1.3: β values for transmitter characteristics tests with HS-DPCCH and E-DCH

Sub-test	β_c	β_d	β_d *(SF)*	β_c/β_d	β_{HS} *(Note 1)*	β_{ec}	β_{ed} *(Note 5) (Note 6)*	β_{ed} *(SF)*	β_{ed} *(Codes)*	CM (dB) *(Note 2)*	MPR (dB) *(Note 2)*	AG Index *(Note 6)*	E-TFCI
1	11/15 *(Note 3)*	15/15 *(Note 3)*	64	11/15 *(Note 3)*	22/15	209/225	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed}1: 47/15 β_{ed}2: 47/15	4 4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15 *(Note 4)*	15/15 *(Note 4)*	64	15/15 *(Note 4)*	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c .

Note 2: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH, HS- DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.

Note 3: For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 10/15 and β_d = 15/15.

Note 4: For subtest 5 the β_c/β_d ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 14/15 and β_d = 15/15.

Note 5: In case of testing by UE using E-DPDCH Physical Layer category 1, Sub-test 3 is omitted according to TS25.306 Table 5.1g.

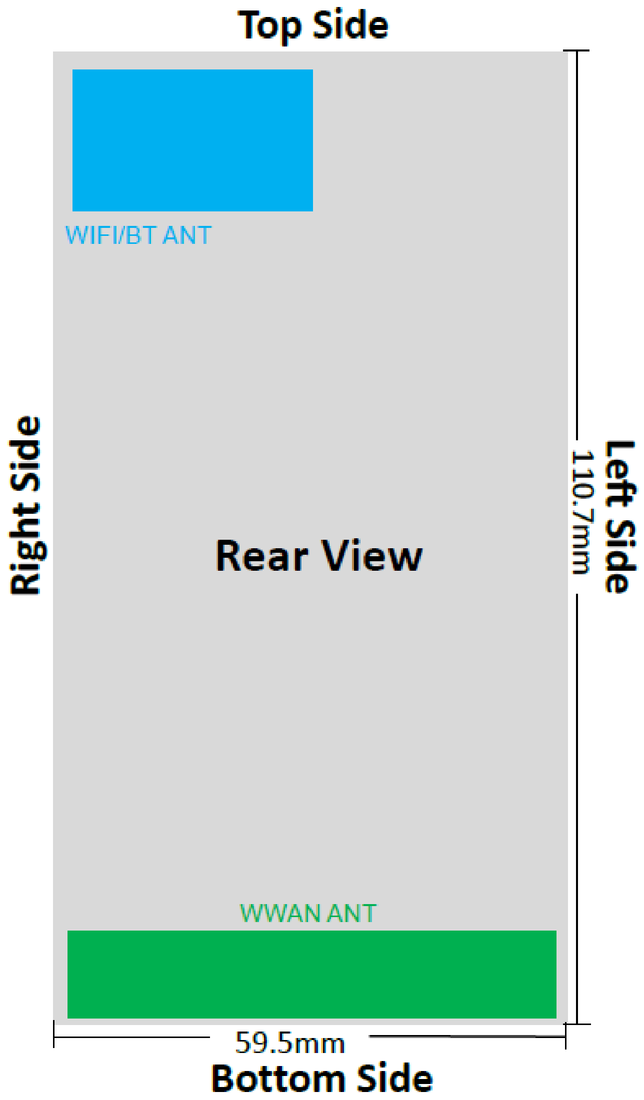
Note 6: β_{ed} can not be set directly, it is set by Absolute Grant Value.

LTE

General:

1. *CMW500 base station simulator was used to setup the connection with EUT; the frequency band, channel,bandwidth, RB allocation configuration, modulation type are set in the base station simulator to configure EUTtransmitting at maximum power and at different configurations which are requested to be reported to FCC, forconducted power measurement and SAR testing.*
2. *Per KDB 941225 D05v02r03, when a properly configured base station simulator is used for the SAR and powermeasurements, spectrum plots for each RB allocation and offset configuration is not required.*
3. *Per KDB 941225 D05v02r03, start with the largest channel bandwidth and measure SAR for QPSK with 1 RBallocation, using the RB offset and required test channel combination with the highest maximum output power for RBoffsets at the upper edge, middle and lower edge of each required test channel.*
4. *Per KDB 941225 D05v02r03, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.*

12. Antenna Location



Distance of the Antenna to the EUT surface/edge(mm)						
Antenna	Rear	Front	Top side	Bottom side	Right side	Left side
WWAN	5	5	105	5	5	5

Positions for SAR tests; Hotspot mode						
Antenna	Rear	Front	Top side	Bottom side	Right side	Left side
WWAN	Yes	Yes	No	Yes	Yes	Yes

Note:
Referring to KDB941225 D06, when the overall device length and width are >9cm*5cm, the test distance is 10mm. SAR must be measured for all sides and surfaces with a transmitting antenna located within 25mm from that surface or edge.

13. Measured and Reported SAR Results

Measurement Results:
Please refer to appendix report

Measurement data plots:
Please refer to appendix D

Note:
SAR Test Reduction criteria are as follows:

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

KDB 447498 D04 Interim General RF Exposure Guidance v01:
Testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is:

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

KDB 648474 D04 Handset SAR:
With headset attached, when the reported SAR for body-worn accessory, measured without a headset connected to the handset, is > 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a headset attached to the handset. Additional 1-g SAR testing at 5 mm is not required when hotspot mode 10-g extremity SAR is not required for the surfaces and edges; since all 1-g reported SAR < 1.2 W/kg.

KDB 941225 D01 SAR test for 3G SAR Test Reduction Procedure:
When the maximum output power and tune-up tolerance specified for production units in a secondary mode is ≤ ¼ dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode.

W-CDMA Guidance
SAR for next to the ear head exposure is measured using a 12.2 kbps RMC with TPC bits configured to all "1's". The 3G SAR test reduction procedure is applied to AMR configurations with 12.2 kbps RMC (Head) and other spreading codes and multiple DPDCHn configurations supported by the handset with 12.2 kbps RMC (Body-Worn Accessory) as the primary mode.
Per KDB 941225 D01 RMC12.2Kbps setting is used to evaluate SAR. If the maximum output power and Tune-up tolerance specified for production units in HSDPA/HSUPA is ≦1/4dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio fo specified maximum output power and tune-up tolerance of HSDPA / HSUPA to RMC 12.2Kbps and the adjusted SAR is ≦1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA.

KDB 941225 D05 SAR for LTE Devices:
SAR test reduction is applied using the following criteria:

- *Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB, and 50% RB allocation, using the RB offset and required test channel combination with the highest maximum output power among RB offsets at the upper edge, middle and lower edge of each required test channel.*
- *When the reported SAR is > 0.8 W/kg, testing for other Channels is performed at the highest output power level for 1RB, and 50% RB configuration for that channel.*
- *Testing for 100% RB configuration is performed at the highest output power level for 100% RB configuration across the Low, Mid and High Channel when the highest reported SAR for 1 RB and 50% RB are > 0.8 W/kg. Testing for the remaining required channels is not needed because the reported SAR*

for 100% RB Allocation < 1.45 W/kg.

- *Testing for 16-QAM and 64-QAM modulation is not required because the reported SAR for QPSK is < 1.45 W/Kg and its output power is not more than 0.5 dB higher than that of QPSK.*
- *Testing for the other channel bandwidths is not required because the reported SAR for the highest channel bandwidth is < 1.45 W/Kg and its output power is not more than 0.5 dB higher than that of the highest channel bandwidth.*

14. Simultaneous Transmission analysis

No.	Simultaneous Transmission Configurations	Head	Body-worn	Hotspot	Note
7	WCDMA (data) + Bluetooth (data)	Yes	Yes	NA	
8	WCDMA (data) + WLAN (data)	Yes	Yes	Yes	
9	LTE + Bluetooth (data)	Yes	Yes	NA	
10	LTE + WLAN (data)	Yes	Yes	Yes	

General note:

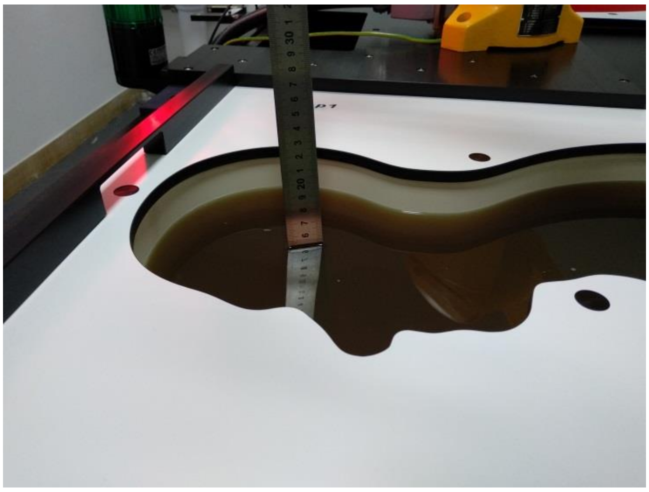
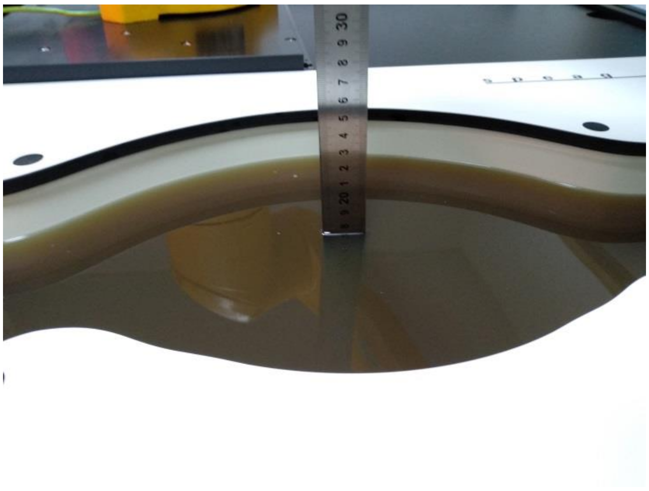
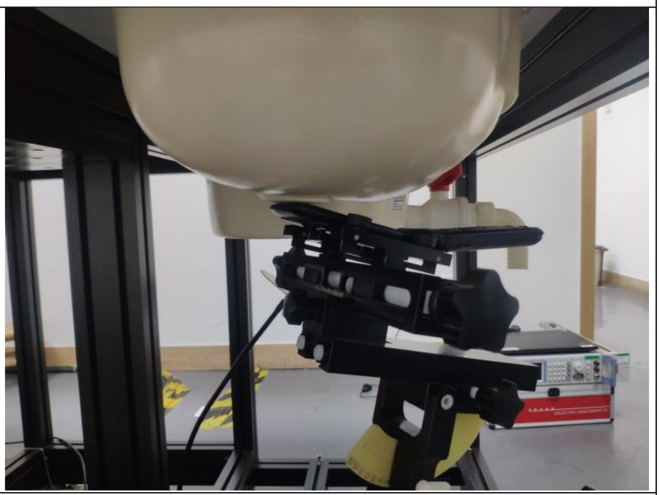
1. WLAN and Bluetooth share the same antenna, and cannot transmit simultaneously.
2. EUT will choose either WCDMA, LTE according to the network signal condition; therefore, they will not operate simultaneously at any moment.
3. The reported SAR summation is calculated based on the same configuration and test position

Simultaneous Transmission data:

Please refer to appendix report

Note: The SAR values of WIFI and BT refer to the report CHTEW23020077R1.

15. Test Setup Photos

	
Liquid depth in the Head phantom	Liquid depth in the Body phantom
	
Left Head Touch	Right Head Touch
	
Left Head Tilt (15°)	Right Head Tilt (15°)

Body-worn Front (10mm)

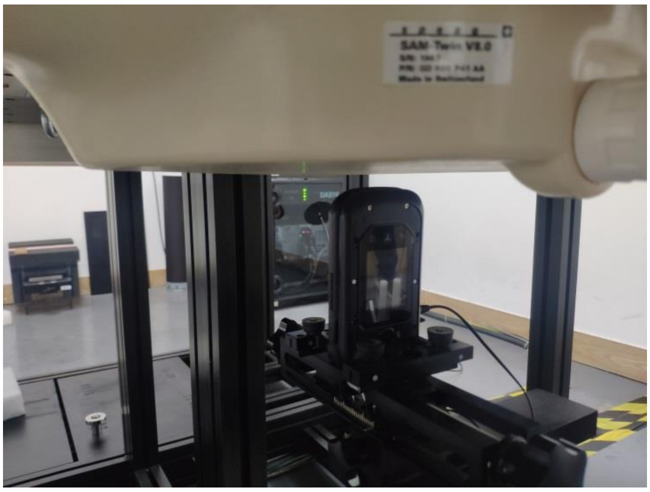
Body-worn Rear(10mm)

Front (10mm)

Rear (10mm)

Left Side (10mm)

Right Side (10mm)



Bottom Side (10mm)

16. External and Internal Photos of the EUT

Please reference to the report No.: CHTW24090011

---------End of Report----------

Project No.	SHT2407108401W		
Test sample No.	YPHT24071084001	Model No.	F1
Start test date	2024/8/13	Finish date	2024/8/14
Temperature	22.5°C	Humidity	57%
Test Engineer	Xiaodong Zhao	Auditor	Lu. Yong

Appendix clause	Test Item	Result
A	Conducted Power Measurement Results	PASS
B	SAR Measurement Results	PASS
C	Simultaneous Transmission analysis	PASS

Appendix A:Conducted Power Measurement Results-WCDMA

WCDMA Band IV		Conducted Power (dBm)			Tune-up limit (dBm)
		CH1312	CH1413	CH1513	
		1712.4MHz	1732.6MHz	1752.6MHz	
AMR 12.2K		22.55	22.24	22.61	23.00
RMC 12.2K		22.58	22.27	22.64	23.00
HSDPA	Subtest-1	21.49	22.14	22.54	23.00
	Subtest-2	21.99	21.64	22.01	22.50
	Subtest-3	21.95	21.57	21.97	22.00
	Subtest-4	21.12	21.66	22.00	22.50
HSUPA	Subtest-1	21.13	21.20	21.61	22.00
	Subtest-2	21.64	21.20	21.62	22.00
	Subtest-3	21.55	21.48	21.61	22.00
	Subtest-4	21.37	21.44	21.51	22.00
	Subtest-5	21.96	21.99	21.89	22.00

Appendix A:Conducted Power Measurement Results-LTE

LTE-FDD Band 71				Conducted Power (dBm)			Tune-up Limit(dBm)
Band-width(MHz)	Modulation	RB allocation	RB offset	Low	Middle	High	
5	QPSK	1	0	22.64	22.78	22.77	23.00
			12	22.81	22.91	22.95	
			24	22.70	22.80	22.82	
		12	0	21.62	21.72	21.75	22.00
			6	21.61	21.70	21.71	
			13	21.74	21.86	21.82	
		25	0	21.74	21.83	21.87	22.00
	16QAM	1	0	21.69	21.69	21.69	22.00
			12	21.95	21.79	21.84	
			24	21.80	21.74	21.70	
		12	0	20.76	20.78	20.80	21.00
			6	20.75	20.74	20.80	
			13	20.86	20.89	20.83	
		25	0	20.74	20.86	20.91	21.00
10	QPSK	1	0	22.82	22.91	22.95	23.50
			24	23.02	23.16	23.10	
			49	22.86	22.97	22.96	
		25	0	21.93	21.92	22.06	22.50
			12	21.95	21.89	22.06	
			25	21.89	22.16	22.14	
		50	0	21.96	22.06	22.12	22.50
	16QAM	1	0	21.61	21.98	21.95	22.50
			24	21.82	22.10	22.09	
			49	21.59	21.96	21.94	
		25	0	21.02	20.98	21.10	21.50
			12	20.94	20.99	21.09	
			25	20.92	21.18	21.09	
		50	0	20.99	21.13	21.08	21.50
15	QPSK	1	0	22.60	22.76	22.77	23.00
			38	22.78	22.99	22.97	
			74	22.59	22.84	22.81	
		38	0	21.81	21.79	21.76	22.50
			18	21.98	22.05	21.95	
			37	21.80	21.82	21.83	
		75	0	21.87	21.97	21.91	22.00
	16QAM	1	0	21.75	21.76	21.72	22.50
			38	21.97	22.02	21.99	
			74	21.80	21.85	21.79	
		38	0	21.77	21.82	21.76	22.50
			18	21.96	22.00	21.99	
			37	21.81	21.81	21.82	
		75	0	20.91	20.97	20.93	21.00
20	QPSK	1	0	22.52	22.51	22.58	23.50
			49	22.94	22.96	23.00	
			99	22.59	22.66	22.64	
		50	0	22.09	21.88	21.83	22.50
			25	22.08	21.86	21.83	
			50	22.04	22.07	22.03	
		100	0	22.04	21.96	21.91	22.50
	16QAM	1	0	21.74	21.08	21.45	22.50
			49	22.18	21.86	21.91	
			99	21.75	21.62	21.60	
		50	0	21.18	20.86	20.92	21.50
			25	21.14	20.71	20.92	
			50	21.12	21.13	21.11	
		100	0	21.10	21.03	20.99	21.50

Appendix B:SAR Measurement Results-Head

WCDMA Band IV										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune-up limit (dBm)	Tune-up scaling factor	Power Drift(dB)	Measured SAR(1g)	Report SAR(1g)	Plot No.
		CH	MHz					(W/kg)	(W/kg)	
RMC 12.2Kbps	Left Touch	1312	1712.4	22.58	23.00	1.102	-	-	-	-
		1413	1732.6	22.27	23.00	1.183	-	-	-	-
		1513	1752.6	22.64	23.00	1.086	-0.19	0.109	0.118	1
	Left Tilt	1312	1712.4	22.58	23.00	1.102	-	-	-	-
		1413	1732.6	22.27	23.00	1.183	-	-	-	-
		1513	1752.6	22.64	23.00	1.086	-0.12	0.081	0.088	-
	Right Touch	1312	1712.4	22.58	23.00	1.102	-	-	-	-
		1413	1732.6	22.27	23.00	1.183	-	-	-	-
		1513	1752.6	22.64	23.00	1.086	0.06	0.101	0.110	-
	Right Tilt	1312	1712.4	22.58	23.00	1.102	-	-	-	-
		1413	1732.6	22.27	23.00	1.183	-	-	-	-
		1513	1752.6	22.64	23.00	1.086	-0.09	0.074	0.080	-

LTE Band 71										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune-up limit (dBm)	Tune-up scaling factor	Power Drift(dB)	Measured SAR(1g)	Report SAR(1g)	Plot No.
		CH	MHz					(W/kg)	(W/kg)	
20M QPSK 1RB	Left Touch	133222	673.0	22.94	23.50	1.138	-	-	-	-
		133322	683.0	22.96	23.50	1.132	-	-	-	-
		133372	688.0	23.00	23.50	1.122	-0.15	0.058	0.065	2
	Left Tilt	133222	673.0	22.94	23.50	1.138	-	-	-	-
		133322	683.0	22.96	23.50	1.132	-	-	-	-
		133372	688.0	23.00	23.50	1.122	0.02	0.039	0.044	-
	Right Touch	133222	673.0	22.94	23.50	1.138	-	-	-	-
		133322	683.0	22.96	23.50	1.132	-	-	-	-
		133372	688.0	23.00	23.50	1.122	-0.09	0.053	0.059	-
	Right Tilt	133222	673.0	22.94	23.50	1.138	-	-	-	-
		133322	683.0	22.96	23.50	1.132	-	-	-	-
		133372	688.0	23.00	23.50	1.122	0.06	0.035	0.039	-
20M QPSK 50RB	Left Touch	133222	673.0	22.09	22.50	1.099	-0.17	0.050	0.055	-
		133322	683.0	21.88	22.50	1.153	-	-	-	-
		133372	688.0	21.83	22.50	1.167	-	-	-	-
	Left Tilt	133222	673.0	22.09	22.50	1.099	-0.06	0.032	0.035	-
		133322	683.0	21.88	22.50	1.153	-	-	-	-
		133372	688.0	21.83	22.50	1.167	-	-	-	-
	Right Touch	133222	673.0	22.09	22.50	1.099	-0.05	0.045	0.049	-
		133322	683.0	21.88	22.50	1.153	-	-	-	-
		133372	688.0	21.83	22.50	1.167	-	-	-	-
	Right Tilt	133222	673.0	22.09	22.50	1.099	-0.12	0.028	0.031	-
		133322	683.0	21.88	22.50	1.153	-	-	-	-
		133372	688.0	21.83	22.50	1.167	-	-	-	-

Appendix B:SAR Measurement Results-Body

WCDMA Band IV										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune-up limit (dBm)	Tune-up scaling factor	Power Drift(dB)	Measured SAR(1g)	Report SAR(1g)	Plot No.
		CH	MHz					(W/kg)	(W/kg)	
RMC 12.2Kbps	Front	1312	1712.4	22.58	23.00	1.102	-	-	-	-
		1413	1732.6	22.27	23.00	1.183	-	-	-	-
		1513	1752.6	22.64	23.00	1.086	0.18	0.533	0.579	-
	Rear	1312	1712.4	22.58	23.00	1.102	0.11	0.742	0.817	-
		1413	1732.6	22.27	23.00	1.183	0.05	0.719	0.851	-
		1513	1752.6	22.64	23.00	1.086	-0.14	0.786	0.854	3

LTE Band 71										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune-up limit (dBm)	Tune-up scaling factor	Power Drift(dB)	Measured SAR(1g)	Report SAR(1g)	Plot No.
		CH	MHz					(W/kg)	(W/kg)	
20M QPSK 1RB	Front	133222	673.0	22.94	23.50	1.138	-	-	-	-
		133322	683.0	22.96	23.50	1.132	-	-	-	-
		133372	688.0	23.00	23.50	1.122	-0.06	0.175	0.196	-
	Rear	133222	673.0	22.94	23.50	1.138	-	-	-	-
		133322	683.0	22.96	23.50	1.132	-	-	-	-
		133372	688.0	23.00	23.50	1.122	-0.11	0.241	0.270	4
20M QPSK 50RB	Front	133222	673.0	22.09	22.50	1.099	0.16	0.138	0.152	-
		133322	683.0	21.88	22.50	1.153	-	-	-	-
		133372	688.0	21.83	22.50	1.167	-	-	-	-
	Rear	133222	673.0	22.09	22.50	1.099	-0.05	0.197	0.217	-
		133322	683.0	21.88	22.50	1.153	-	-	-	-
		133372	688.0	21.83	22.50	1.167	-	-	-	-

Appendix B:SAR Measurement Results-Hotspot

WCDMA Band IV										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune-up limit (dBm)	Tune-up scaling factor	Power Drift(dB)	Measured SAR(1g)	Report SAR(1g)	Plot No.
		CH	MHz					(W/kg)	(W/kg)	
RMC 12.2Kbps	Front	1312	1712.4	22.58	23.00	1.102	-	-	-	-
		1413	1732.6	22.27	23.00	1.183	-	-	-	-
		1513	1752.6	22.64	23.00	1.086	0.18	0.533	0.579	-
	Rear	1312	1712.4	22.58	23.00	1.102	0.11	0.742	0.817	-
		1413	1732.6	22.27	23.00	1.183	0.05	0.719	0.851	-
		1513	1752.6	22.64	23.00	1.086	-0.14	0.786	0.854	3
	Left	1312	1712.4	22.58	23.00	1.102	-	-	-	-
		1413	1732.6	22.27	23.00	1.183	-	-	-	-
		1513	1752.6	22.64	23.00	1.086	0.02	0.508	0.552	-
	Right	1312	1712.4	22.58	23.00	1.102	-	-	-	-
		1413	1732.6	22.27	23.00	1.183	-	-	-	-
		1513	1752.6	22.64	23.00	1.086	0.14	0.517	0.562	-
	Top	1312	1712.4	22.58	23.00	1.102	-	-	-	-
		1413	1732.6	22.27	23.00	1.183	-	-	-	-
		1513	1752.6	22.64	23.00	1.086	-	-	-	-
	Bottom	1312	1712.4	22.58	23.00	1.102	-	-	-	-
		1413	1732.6	22.27	23.00	1.183	-	-	-	-
		1513	1752.6	22.64	23.00	1.086	-0.06	0.719	0.781	-

LTE Band 71										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune-up limit (dBm)	Tune-up scaling factor	Power Drift(dB)	Measured SAR(1g)	Report SAR(1g)	Plot No.
		CH	MHz					(W/kg)	(W/kg)	
20M QPSK 1RB	Front	133222	673.0	22.94	23.50	1.138	-	-	-	-
		133322	683.0	22.96	23.50	1.132	-	-	-	-
		133372	688.0	23.00	23.50	1.122	-0.06	0.175	0.196	-
	Rear	133222	673.0	22.94	23.50	1.138	-	-	-	-
		133322	683.0	22.96	23.50	1.132	-	-	-	-
		133372	688.0	23.00	23.50	1.122	-0.11	0.241	0.270	4
	Left	133222	673.0	22.94	23.50	1.138	-	-	-	-
		133322	683.0	22.96	23.50	1.132	-	-	-	-
		133372	688.0	23.00	23.50	1.122	-0.11	0.148	0.166	-
	Right	133222	673.0	22.94	23.50	1.138	-	-	-	-
		133322	683.0	22.96	23.50	1.132	-	-	-	-
		133372	688.0	23.00	23.50	1.122	0.06	0.145	0.163	-
	Top	133222	673.0	22.94	23.50	1.138	-	-	-	-
		133322	683.0	22.96	23.50	1.132	-	-	-	-
		133372	688.0	23.00	23.50	1.122	-	-	-	-
	Bottom	133222	673.0	22.94	23.50	1.138	-	-	-	-
		133322	683.0	22.96	23.50	1.132	-	-	-	-
		133372	688.0	23.00	23.50	1.122	-0.15	0.186	0.209	-
20M QPSK 50RB	Front	133222	673.0	22.09	22.50	1.099	0.16	0.138	0.152	-
		133322	683.0	21.88	22.50	1.153	-	-	-	-
		133372	688.0	21.83	22.50	1.167	-	-	-	-
	Rear	133222	673.0	22.09	22.50	1.099	-0.05	0.197	0.217	-
		133322	683.0	21.88	22.50	1.153	-	-	-	-
		133372	688.0	21.83	22.50	1.167	-	-	-	-
	Left	133222	673.0	22.09	22.50	1.099	-0.06	0.121	0.133	-
		133322	683.0	21.88	22.50	1.153	-	-	-	-
		133372	688.0	21.83	22.50	1.167	-	-	-	-
	Right	133222	673.0	22.09	22.50	1.099	-0.14	0.119	0.131	-
		133322	683.0	21.88	22.50	1.153	-	-	-	-
		133372	688.0	21.83	22.50	1.167	-	-	-	-
	Top	133222	673.0	22.09	22.50	1.099	-	-	-	-
		133322	683.0	21.88	22.50	1.153	-	-	-	-
		133372	688.0	21.83	22.50	1.167	-	-	-	-
	Bottom	133222	673.0	22.09	22.50	1.099	0.05	0.163	0.179	-
		133322	683.0	21.88	22.50	1.153	-	-	-	-
		133372	688.0	21.83	22.50	1.167	-	-	-	-

Appendix C: Simultaneous Transmission analysis-Head

WWAN + WIFI 2.4G					
WWAN Band		Exposure Position	Max SAR (W/kg)		Summed SAR
			WWAN	WIFI 2.4G	(W/kg)
WCDMA	Band IV	Left Touch	0.118	0.098	0.216
		Left Tilt	0.088	0.079	0.167
		Right Touch	0.110	0.087	0.197
		Right Tilt	0.080	0.062	0.142
LTE	Band 71	Left Touch	0.065	0.098	0.163
		Left Tilt	0.044	0.079	0.123
		Right Touch	0.059	0.087	0.146
		Right Tilt	0.039	0.062	0.101

WWAN + WIFI 5G					
WWAN Band		Exposure Position	Max SAR (W/kg)		Summed SAR
			WWAN	WIFI 5G	(W/kg)
WCDMA	Band IV	Left Touch	0.118	0.515	0.633
		Left Tilt	0.088	0.347	0.435
		Right Touch	0.110	0.464	0.574
		Right Tilt	0.080	0.313	0.393
LTE	Band 71	Left Touch	0.065	0.515	0.580
		Left Tilt	0.044	0.347	0.391
		Right Touch	0.059	0.464	0.523
		Right Tilt	0.039	0.313	0.352

WWAN + BT					
WWAN Band		Exposure Position	Max SAR (W/kg)		Summed SAR
			WWAN	BT	(W/kg)
WCDMA	Band IV	Left Touch	0.118	0.074	0.192
		Left Tilt	0.088	0.074	0.162
		Right Touch	0.110	0.074	0.184
		Right Tilt	0.080	0.074	0.154
LTE	Band 71	Left Touch	0.065	0.074	0.139
		Left Tilt	0.044	0.074	0.118
		Right Touch	0.059	0.074	0.133
		Right Tilt	0.039	0.074	0.113

Appendix C: Simultaneous Transmission analysis-Body

WWAN + WIFI 2.4G					
WWAN Band		Exposure Position	Max SAR (W/kg)		Summed SAR
			WWAN	WIFI 2.4G	(W/kg)
WCDMA	Band IV	Front	0.579	0.019	0.598
		Rear	0.854	0.038	0.892
LTE	Band 71	Front	0.196	0.019	0.215
		Rear	0.270	0.038	0.308

WWAN + WIFI 5G					
WWAN Band		Exposure Position	Max SAR (W/kg)		Summed SAR
			WWAN	WIFI 5G	(W/kg)
WCDMA	Band IV	Front	0.579	0.171	0.750
		Rear	0.854	0.220	1.074
LTE	Band 71	Front	0.196	0.171	0.367
		Rear	0.270	0.220	0.490

WWAN + BT					
WWAN Band		Exposure Position	Max SAR (W/kg)		Summed SAR
			WWAN	BT	(W/kg)
WCDMA	Band IV	Front	0.579	0.037	0.616
		Rear	0.854	0.037	0.891
LTE	Band 71	Front	0.196	0.037	0.233
		Rear	0.270	0.037	0.307

Appendix C: Simultaneous Transmission analysis-Hotspot

WWAN + WIFI 2.4G					
WWAN Band		Exposure Position	Max SAR (W/kg)		Summed SAR
			WWAN	WIFI 2.4G	(W/kg)
WCDMA	Band IV	Front	0.579	0.019	0.598
		Rear	0.854	0.038	0.892
		Left side	0.552	-	0.552
		Right side	0.562	0.012	0.574
		Top side	-	0.030	0.030
		Bottom side	0.781	-	0.781
LTE	Band 71	Front	0.196	0.019	0.215
		Rear	0.270	0.038	0.308
		Left side	0.166	-	0.166
		Right side	0.163	0.012	0.175
		Top side	-	0.030	0.030
		Bottom side	0.209	-	0.209

Test Laboratory: Huatongwei International Inspection Co., Ltd.,SAR Lab   Date: 8/14/2024

WCDMA Band IV Head

Communication System: UID 0, Generic UMTS (0); Frequency: 1752.6 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1752.6 MHz; σ = 1.366 S/m; ε_r = 40.256; ρ = 1000 kg/m^3

Phantom section: Left Section
Ambient Temperature:22.5°C;Liquid Temperature:22.0°C

DASY Configuration:

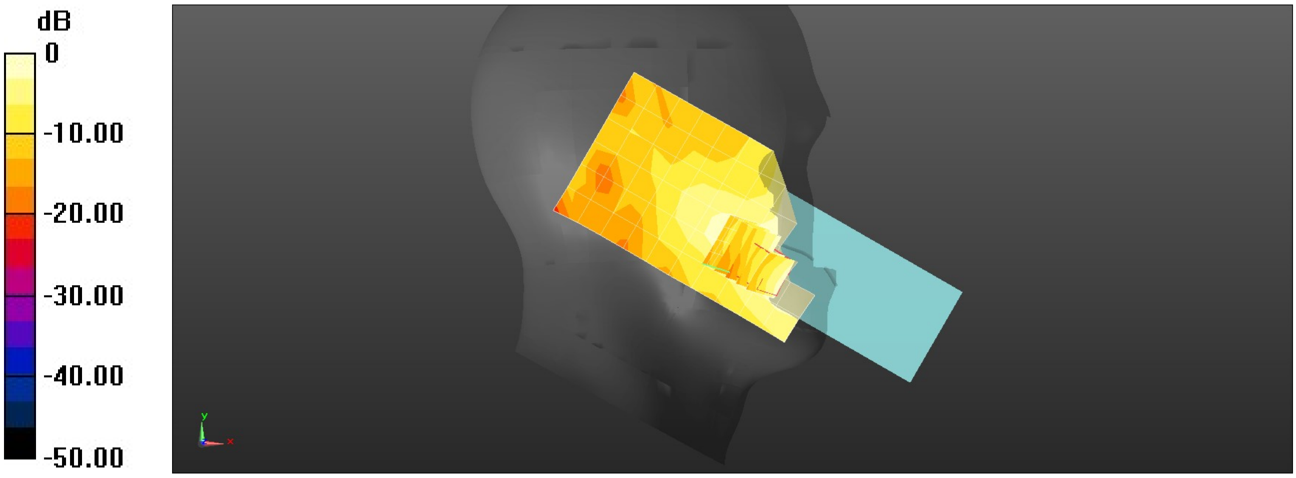
- Probe: EX3DV4 - SN7494; ConvF(8.94, 8.94, 8.94) @ 1752.6 MHz; Calibrated: 6/7/2024
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1549; Calibrated: 4/16/2024
- Phantom: Twin-SAM V8.0 ; Type: QD 000 P41 AA; Serial: 1974
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

Left Touch Check/CH1513/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.102 W/kg

Left Touch Check/CH1513/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.347 V/m; Power Drift = -0.19 dB
Peak SAR (extrapolated) = 0.182 W/kg
SAR(1 g) = 0.109 W/kg; SAR(10 g) = 0.058 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.146 W/kg



0 dB = 0.102 W/kg = -9.94 dBW/kg

Test Laboratory: Huatongwei International Inspection Co., Ltd.,SAR Lab   Date: 8/13/2024

LTE Band 71 Head

Communication System: UID 0, Generic LTE-FDD (0); Frequency: 688 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): f = 688 MHz; σ = 0.89 S/m; ε_r = 42.842; ρ = 1000 kg/m^3
Phantom section: Left Section
Ambient Temperature:22.5℃;Liquid Temperature:22.0℃

DASY Configuration:

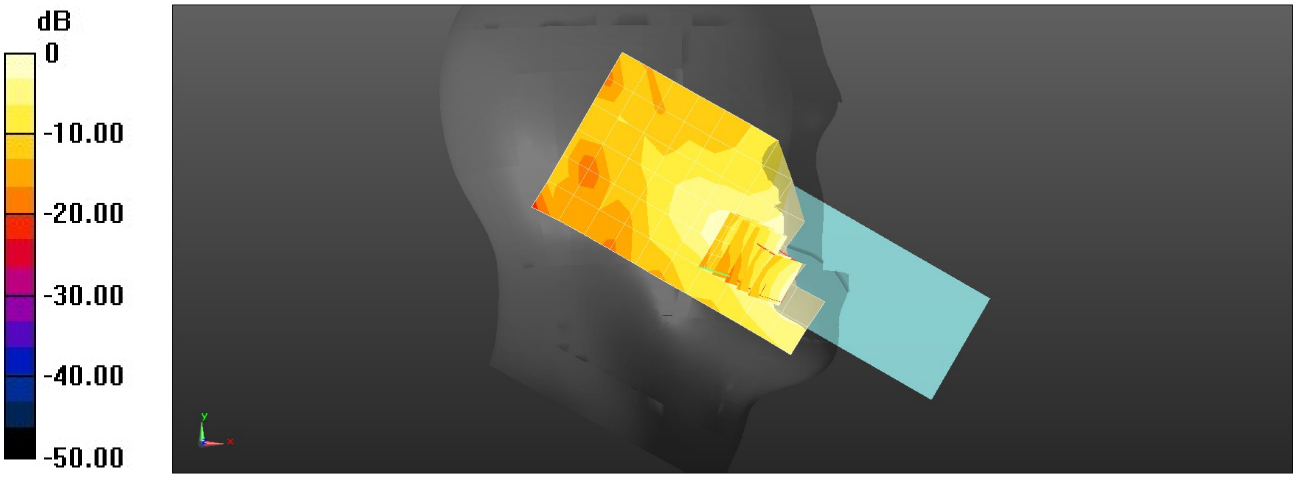
- Probe: EX3DV4 - SN7494; ConvF(10.74, 10.74, 10.74) @ 688 MHz; Calibrated: 6/7/2024
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1549; Calibrated: 4/16/2024
- Phantom: Twin-SAM V8.0 ; Type: QD 000 P41 AA; Serial: 1974
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

Left Touch Check/CH133372/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.0542 W/kg

Left Touch Check/CH133372/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.119 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 0.0970 W/kg
SAR(1 g) = 0.058 W/kg; SAR(10 g) = 0.031 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.0778 W/kg



0 dB = 0.0542 W/kg = -12.66 dBW/kg

Test Laboratory: Huatongwei International Inspection Co., Ltd.,SAR Lab Date: 8/14/2024

WCDMA Band IV Body-worn&Hotspot

Communication System: UID 0, Generic UMTS (0); Frequency: 1752.6 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1752.6 MHz; σ = 1.366 S/m; ε_r = 40.256; ρ = 1000 kg/m^3

Phantom section: Flat Section
Ambient Temperature:22.5°C;Liquid Temperature:22.0°C

DASY Configuration:

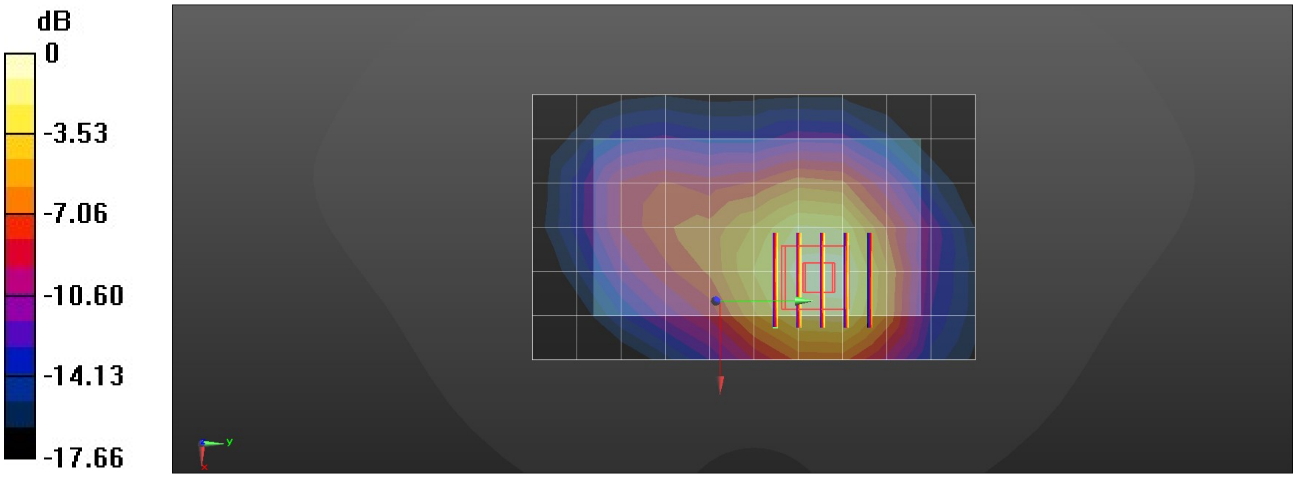
- Probe: EX3DV4 - SN7494; ConvF(8.94, 8.94, 8.94) @ 1752.6 MHz; Calibrated: 6/7/2024
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1549; Calibrated: 4/16/2024
- Phantom: Twin-SAM V8.0 ; Type: QD 000 P41 AA; Serial: 1974
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

Rear 10mm/CH1513/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.00 W/kg

Rear 10mm/CH1513/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.77 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 1.33 W/kg
SAR(1 g) = 0.786 W/kg; SAR(10 g) = 0.462 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.12 W/kg



0 dB = 1.12 W/kg = 0.49 dBW/kg

Test Laboratory: Huatongwei International Inspection Co., Ltd.,SAR Lab Date: 8/13/2024

LTE Band 71 Body-worn&Hotspot

Communication System: UID 0, Generic LTE-FDD (0); Frequency: 688 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): f = 688 MHz; σ = 0.89 S/m; ε_r = 42.842; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient Temperature:22.5℃;Liquid Temperature:22.0℃

DASY Configuration:

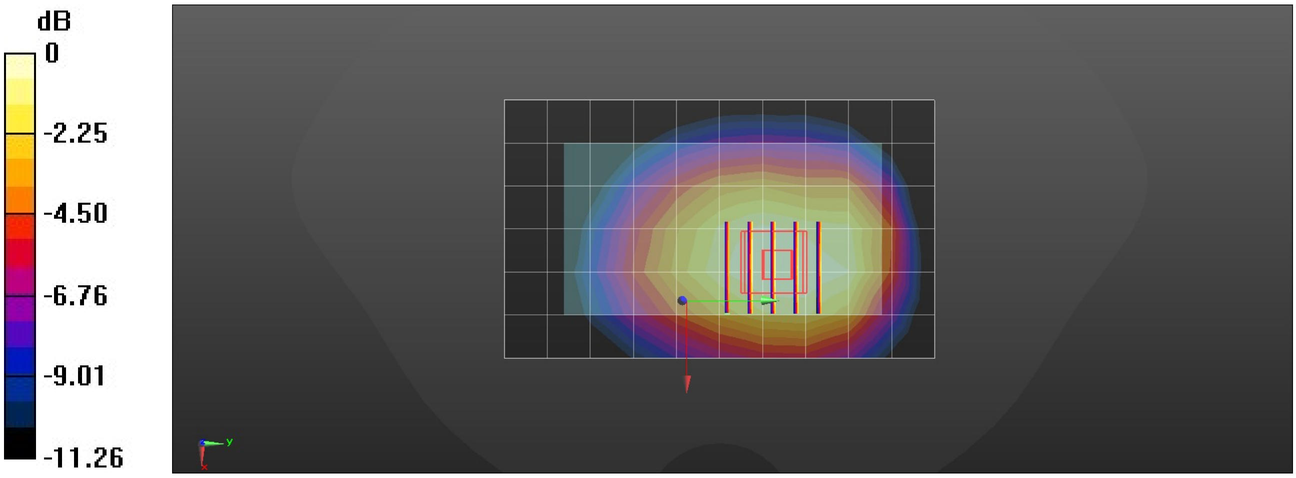
- Probe: EX3DV4 - SN7494; ConvF(10.74, 10.74, 10.74) @ 688 MHz; Calibrated: 6/7/2024
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1549; Calibrated: 4/16/2024
- Phantom: Twin-SAM V8.0 ; Type: QD 000 P41 AA; Serial: 1974
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

Rear 10mm/CH133372/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.337 W/kg

Rear 10mm/CH133372/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.53 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 0.370 W/kg
SAR(1 g) = 0.241 W/kg; SAR(10 g) = 0.165 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.320 W/kg



0 dB = 0.320 W/kg = -4.95 dBW/kg

1.1.1. DAE4 Calibration Certificate

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Client ： HTW

Certificate No: 24J02Z000320

CALIBRATION CERTIFICATE

Object	DAE4 - SN: 1549
Calibration Procedure(s)	FF-Z11-002-01 Calibration Procedure for the Data Acquisition Electronics (DAEx)
Calibration date:	April 16, 2024

This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)℃ and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Process Calibrator 753	1971018	12-Jun-23 (CTTL, No.J23X05436)	Jun-24

	Name	Function	Signature
Calibrated by:	Yu Zongying	SAR Test Engineer	
Reviewed by:	Lin Jun	SAR Test Engineer	
Approved by:	Qi Dianyuan	SAR Project Leader	

Issued: April 17, 2024

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Certificate No: 24J02Z000320 Page 1 of 3

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Glossary:

DAE	data acquisition electronics
Connector angle	information used in DASY system to align probe sensor X to the robot coordinate system.

Methods Applied and Interpretation of Parameters:

- *DC Voltage Measurement*: Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.

- *Connector angle*: The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.

- The report provide only calibration results for DAE, it does not contain other performance test results.

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DC Voltage Measurement

A/D - Converter Resolution nominal

High Range: 1LSB = 6.1μV , full range = -100...+300 mV

Low Range: 1LSB = 61nV , full range = -1.......+3mV

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Calibration Factors	X	Y	Z
High Range	406.369 ± 0.15% (k=2)	406.051 ± 0.15% (k=2)	406.200 ± 0.15% (k=2)
Low Range	3.98561 ± 0.7% (k=2)	3.99305 ± 0.7% (k=2)	3.99389 ± 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	17.5° ± 1 °

Certificate No: 24J02Z000320 Page 3 of 3

1.2. Probe Calibration Certificate

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Client **HTW** **Certificate No: 24J02Z000321**

CALIBRATION CERTIFICATE

Object: EX3DV4 - SN : 7494

Calibration Procedure(s): FF-Z11-004-02
Calibration Procedures for Dosimetric E-field Probes

Calibration date: June 07, 2024

This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)℃ and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	106277	19-Oct-23(CTTL, No.J23X11026)	Oct-24
Power sensor NRP8S	104291	19-Oct-23(CTTL, No.J23X11026)	Oct-24
Power sensor NRP8S	104292	19-Oct-23(CTTL, No.J23X11026)	Oct-24
Reference 10dBAttenuator	18N50W-10dB	19-Jan-23(CTTL, No.J23X00212)	Jan-25
Reference 20dBAttenuator	18N50W-20dB	19-Jan-23(CTTL, No.J23X00211)	Jan-25
Reference Probe EX3DV4	SN 7464	22-Jan-24(SPEAG, No.EX-7464_Jan24)	Jan-25
DAE4	SN 1555	24-Aug-23(SPEAG, No.DAE4-1555_Aug23)	Aug-24
Secondary Standards	**ID #**	**Cal Date(Calibrated by, Certificate No.)**	**Scheduled Calibration**
SignalGenerator MG3700A	6201052605	12-Jun-23(CTTL, No.J23X05434)	Jun-24
SignalGenerator APSIN26G	181-33A6D0700-1959	26-Mar-24(CTTL, No.24J02X002468)	Mar-25
Network Analyzer E5071C	MY46110673	25-Dec-23(CTTL, No.J23X13425)	Dec-24
Reference 10dBAttenuator	BT0520	11-May-23(CTTL, No.J23X04061)	May-25
Reference 20dBAttenuator	BT0267	11-May-23(CTTL, No.J23X04062)	May-25
OCP DAK-12	SN 1174	25-Oct-23(SPEAG, No.OCP-DAK12-1174_Oct23)	Oct-24

	Name	Function	Signature
Calibrated by:	Yu Zongying	SAR Test Engineer	
Reviewed by:	Lin Jun	SAR Test Engineer	
Approved by:	Qi Dianyuan	SAR Project Leader	

Issued: June 14, 2024

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Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A,B,C,D	modulation dependent linearization parameters
Polarization Φ	Φ rotation around probe axis
Polarization θ	θ rotation around an axis that is in the plane normal to probe axis (at measurement center), i θ=0 is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013

b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016

c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010

d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization θ=0 (f≤900MHz in TEM-cell; f>1800MHz: waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not effect the E^2-field uncertainty inside TSL (see below ConvF).
- *NORM(f)x,y,z = NORMx,y,z* frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- PAR: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics.
- *Ax,y,z; Bx,y,z; Cx,y,z;VRx,y,z:*A,B,C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f≤800MHz) and inside waveguide using analytical field distributions based on power measurements for f >800MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty valued are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORMx,y,z* ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from±50MHz to±100MHz.
- *Spherical isotropy (3D deviation from isotropy):* in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset:* The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- *Connector Angle:* The angle is assessed using the information gained by determining the *NORMx* (no uncertainty required).

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DASY/EASY – Parameters of Probe: EX3DV4 – SN:7494

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (*k*=2)
Norm(μV/(V/m)²)[A]	0.40	0.47	0.41	±10.0%
DCP(mV)[B]	99.9	100.2	100.1	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Unc[E] (*k*=2)
0	CW	X	0.0	0.0	1.0	0.00	156.2	±2.0%
		Y	0.0	0.0	1.0		169.5	
		Z	0.0	0.0	1.0		158.4	

The reported uncertainty of measurement is stated as the standard uncertainty of Measurement multiplied by the coverage factor *k*=2, which for a normal distribution Corresponds to a coverage probability of approximately 95%.

[A] The uncertainties of Norm X, Y, Z do not affect the E^2-field uncertainty inside TSL (see Page 4).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainly is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.