

# FCC SAR TEST REPORT

**Application No.:** SZCR2306001888AT  
**Applicant:** Vanstone Electronic (Beijing) Co., Ltd.  
**Address of Applicant:** 3F No.2 Building, Aisino Corporation Park 18A, Xingshikou Road, Haidian District, Beijing, China 100195  
**Manufacturer:** Vanstone Electronic (Beijing) Co., Ltd.  
**Address of Manufacturer:** 3F No.2 Building, Aisino Corporation Park 18A, Xingshikou Road, Haidian District, Beijing, China 100195  
**Product Name:** Android POS Terminal  
**Model No.(EUT):** A99  
**Trade mark:** Aisino  
**FCC ID:** OWLA99  
**Standard(s) :** FCC 47CFR §2.1093  
**Date of Receipt:** 2023-07-06  
**Date of Test:** 2023-07-07 to 2023-07-23  
**Date of Issue:** 2023-07-25

<b>Test Result:</b>	<b>Pass*</b>
---------------------	--------------

\* In the configuration tested, the EUT complied with the standards specified above.

Keny Xu

Keny Xu  
EMC Laboratory Manager



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SZSAR-TRF-01-A01 Rev. A/0 May15,2023

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Revision Record			
Version	Description	Date	Remark
00	Original	2023-07-25	/

Authorized for issue by:				
		Owen Xiao		
		Owen Xiao / Project Engineer		
		Eric Fu		
		Eric Fu / Reviewer		



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Shenzhen Branch Inspection & Testing Laboratory

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## TEST SUMMARY

Frequency Band	Maximum Reported SAR(W/kg)
	Extremity
GSM850	0.821
GSM1900	1.179
WCDMA Band II	2.219
WCDMA Band IV	1.992
WCDMA Band V	0.824
LTE Band 2	1.861
LTE Band 4	1.379
LTE Band 5	0.74
LTE Band 7	2.321
LTE Band 38	1.321
Bluetooth	0.19
WI-FI (2.4GHz)	0.29
WI-FI (5GHz)	0.702
SAR Limited(W/kg)	4
Maximum Simultaneous Transmission SAR (W/kg)	
Scenario	Extremity
Sum SAR	2.375
SPLSR	N/A
SPLSR Limited	0.1



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## 1 General Information

### 1.1 General Description of EUT

Product Phase:	Production unit		
Device Type :	Portable device		
Exposure Category:	Uncontrolled environment / general population		
SN:	00062000087		
Hardware Version:	V1.00		
Software Version:	V1.00		
Antenna Gain:	(Provided by Manufacturer)		
Antenna Type:	PIFA antenna		
Device Operating Configurations:			
Modulation Mode:	GSM:GMSK,8PSK;WCDMA:QPSK LTE:QPSK,16QAM; WIFI:DSSS,OFDM;BT: GFSK, $\pi/4$ DQPSK,8DPSK		
GPRS Multi-slots Class:	12	EGPRS Multi-slots Class:	12
HSDPA UE Category:	14	HSUPA UE Category	6
Power Class:	1,tested with power level 5(GSM850)		
	2,tested with power level 0(GSM1900)		
	3,tested with power control “all 1”(WCDMA Band II/IV/V)		
	4, tested with power control Max Power(LTE Band 2/4/5/7/38/40)		
Frequency Bands:	Band	Tx (MHz)	Rx (MHz)
	GSM850	824-849	869-894
	GSM1900	1850-1910	1930-1990
	WCDMA Band II	1850-1910	1930-1990
	WCDMA Band IV	1710-1755	2110- 2155
	WCDMA Band V	824-849	869-894
	LTE Band 2	1850-1910	1930-1990
	LTE Band 4	1710-1755	2110- 2155
	LTE Band 5	824-849	869-894
	LTE Band 7	2500-2570	2620- 2690
	LTE Band 38	2570~2620	2570~2620
	WIFI2.4G	2412-2462	2412-2462
	BT	2402-2480	2402-2480
	WIFI(U-NII-1)	5150~5250	5150~5250
	WIFI(U-NII-2A)	5250~5350	5250~5350
	WIFI(U-NII-2C)	5470~5725	5470~5725
	WIFI(U-NII-3)	5725~5850	5725~5850
Battery Information:	Model:	BT-991	
	Normal Voltage:	DC7.6V	
	Rated capacity:	2600mAh	
	Battery Type:	Rechargeable Li-ion Battery	
	Manufacturer:	Zhuhai Greaton Electronic Technology Co.,Ltd.	



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### 1.1.1 DUT Antenna Locations

Please see the Appendix D



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## 1.2 Test Specification

Identity	Document Title
FCC 47CFR §2.1093	Radio frequency Radiation Exposure Evaluation: Portable Devices
IEEE Std C95.1 – 1992	IEEE Standard for Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz to 300 GHz
IEEE Std 1528-2013	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
KDB 447498 D04v01	RF Exposure Procedures and Equipment Authorization Policies for Mobile and Portable Devices
KDB 248227 D01 v02r02	SAR GUIDANCE FOR IEEE 802.11 (Wi-Fi) TRANSMITTERS
KDB 941225 D05 v02r05	SAR EVALUATION CONSIDERATIONS FOR LTE DEVICES
KDB 941225 D06 v02r01	SAR EVALUATION PROCEDURES FOR PORTABLE DEVICES WITH WIRELESS ROUTER CAPABILITIES
KDB 865664 D01 v01r04	SAR Measurement Requirements for 100 MHz to 6 GHz
KDB 865664 D01 v01r02	RF Exposure Compliance Reporting and Documentation Considerations



### 1.3 RF exposure limits

Human Exposure	Uncontrolled Environment General Population	Controlled Environment Occupational
<b>Spatial Peak SAR*</b> (Brain*Trunk)	1.60 W/kg	8.00 W/kg
<b>Spatial Average SAR**</b> (Whole Body)	0.08 W/kg	0.40 W/kg
<b>Spatial Peak SAR***</b> (Hands/Feet/Ankle/Wrist)	4.00 W/kg	20.00 W/kg

#### Notes:

\* 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

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

\*\*\* 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.

**Uncontrolled Environments** are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

**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.)

## 1.4 Test Location

All tests were performed at:

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No tests were sub-contracted.

## 1.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

### • A2LA (Certificate No. 3816.01)

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

### • VCCI (Member No. 1937)

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen EMC laboratory have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

### • FCC –Designation Number: CN1336

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1336. Test Firm Registration Number: 787754.

### • Innovation, Science and Economic Development Canada

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.



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## 2 Laboratory Environment

Temperature	Min. = 18°C, Max. = 25 °C
Relative humidity	Min. = 30%, Max. = 70%
Ground system resistance	< 0.5 Ω
Ambient noise is checked and found very low and in compliance with requirement of standards. Reflection of surrounding objects is minimized and in compliance with requirement of standards.	



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### 3 SAR Measurements System Configuration

#### 3.1 The SAR Measurement System

This SAR Measurement System uses a Computer-controlled 3-D stepper motor system (SPEAG DASY5 professional system). A E-field probe is used to determine the internal electric fields. The SAR can be obtained from the equation  $SAR = \sigma (|E|^2) / \rho$  where  $\sigma$  and  $\rho$  are the conductivity and mass density of the tissue-Simulate.

The DASY5 system for performing compliance tests consists of the following items:

A standard high precision 6-axis robot (Stabile RX family) with controller, teach pendant and software .An arm extension for accommodation 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 electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.

The Electro-optical converter (EOC) performs the conversion between optical and electrical of the signals for the digital communication to DAE and for the analog signal from the optical surface detection. The EOC is connected to the measurement server.

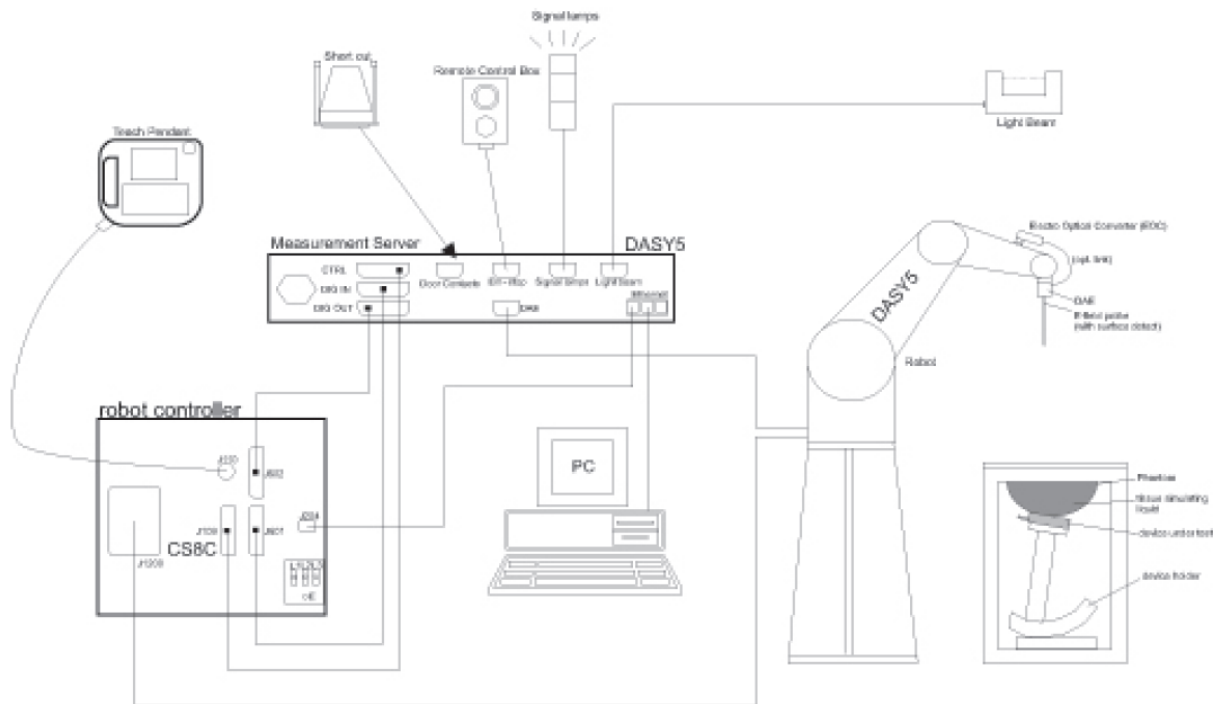


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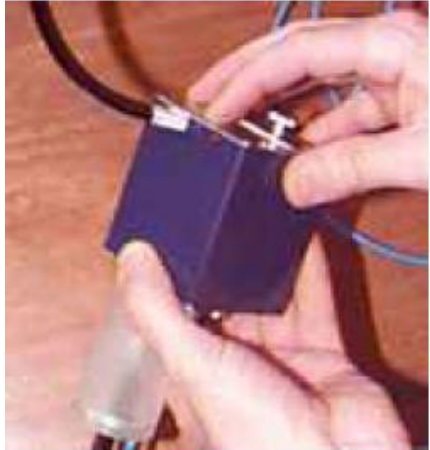
F-1. SAR Measurement System Configuration

- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- A computer operating Windows 7.
- DASY5 software.
- Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom enabling testing left-hand, right-hand and Body Worn usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- Validation dipole kits allowing to validate the proper functioning of the system.


### 3.2 Isotropic E-field Probe EX3DV4

	<p>Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)</p>
<b>Calibration</b>	ISO/IEC 17025 <a href="#">calibration service</a> available.
<b>Frequency</b>	10 MHz to > 6 GHz Linearity: $\pm 0.2$ dB (30 MHz to 6 GHz)
<b>Directivity</b>	$\pm 0.3$ dB in TSL (rotation around probe axis) $\pm 0.5$ dB in TSL (rotation normal to probe axis)
<b>Dynamic Range</b>	10 $\mu$ W/g to > 100 mW/g Linearity: $\pm 0.2$ dB (noise: typically < 1 $\mu$ W/g)
<b>Dimensions</b>	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
<b>Application</b>	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields); the only probe that enables compliance testing for frequencies up to 6 GHz with precision of better 30%.
<b>Compatibility</b>	DASY3, DASY4, DASY52 SAR and higher, EASY4/MRI

### 3.3 Data Acquisition Electronics (DAE)

<b>Model</b>	DAE4	
<b>Construction</b>	Signal amplifier, multiplexer, A/D converter and control logic. Serial optical link for communication with DASY4/5 embedded system (fully remote controlled). Two step probe touch detector for mechanical surface detection and emergency robot stop.	
<b>Measurement Range</b>	-100 to +300 mV (16 bit resolution and two range settings: 4mV,400mV)	
<b>Input Offset Voltage</b>	< 5μV (with auto zero)	
<b>Input Bias Current</b>	< 50 f A	
<b>Dimensions</b>	60 x 60 x 68 mm	

### 3.4 SAM Twin Phantom

<b>Material</b>	Vinylester, glass fiber reinforced (VE-GF)	
<b>Liquid Compatibility</b>	Compatible with all SPEAG tissue simulating liquids (incl. DGBE type)	
<b>Shell Thickness</b>	2 ± 0.2 mm (6 ± 0.2 mm at ear point)	
<b>Dimensions (incl. Wooden Support)</b>	Length: 1000 mm Width: 500 mm Height: adjustable feet	
<b>Filling Volume</b>	approx. 25 liters	
<b>Wooden Support</b>	SPEAG standard phantom table	

The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528 and IEC 62209-1. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by teaching three points with the robot.

Twin SAM V5.0 has the same shell geometry and is manufactured from the same material as Twin SAM V4.0, but has reinforced top structure.

### 3.5 ELI Phantom

<b>Material</b>	Vinylester, glass fiber reinforced (VE-GF)
<b>Liquid Compatibility</b>	Compatible with all SPEAG tissue simulating liquids (incl. DGBE type)
<b>Shell Thickness</b>	2.0 ± 0.2 mm (bottom plate)
<b>Dimensions</b>	Major axis: 600 mm Minor axis: 400 mm
<b>Filling Volume</b>	approx. 30 liters
<b>Wooden Support</b>	SPEAG standard phantom table



Phantom for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI is fully compatible with the IEC 62209-2 standard and all known tissue simulating liquids. ELI has been optimized regarding its performance and can be integrated into our standard phantom tables. A cover prevents evaporation of the liquid. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points. The phantom is compatible with all SPEAG dosimetric probes and dipoles.

ELI V5.0 has the same shell geometry and is manufactured from the same material as ELI4, but has reinforced top structure.

### 3.6 Device Holder for Transmitters



F-2. Device Holder for Transmitters

- The DASY device holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation centres for both scales are the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.
- The DASY device holder has been made out of low-loss POM material having the following dielectric parameters: relative permittivity  $\epsilon=3$  and loss tangent  $\delta=0.02$ . The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.

## 3.7 Measurement procedure

### 3.7.1 Scanning procedure

#### Step 1: Power reference measurement

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.

#### Step 2: Area scan

The SAR distribution at the exposed side of the head was measured at a distance of 4mm from the inner surface of the shell. The area covered the entire dimension of the head and the horizontal grid spacing was 15mm\*15mm or 12mm\*12mm or 10mm\*10mm. Based on the area scan data, the area of the maximum absorption was determined by spline interpolation.

#### Step 3: Zoom scan

Around this point, a volume of 30mm\*30mm\*30mm (fine resolution volume scan, zoom scan) was assessed by measuring 5x5x7 points ( $\leq 2\text{GHz}$ ) and 7x7x7 points ( $\geq 2\text{GHz}$ ). On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure:

The data at the surface was extrapolated, since the centre of the dipoles is 2.0mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.2mm. (This can be variable. Refer to the probe specification). The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip. The maximum interpolated value was searched with a straight-forward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1g or 10g) were computed using the 3D-Spline interpolation algorithm. The volume was integrated with the trapezoidal algorithm. One thousand points were interpolated to calculate the average. All neighbouring volumes were evaluated until no neighboring volume with a higher average value was found.

The area and zoom scan resolutions specified in the table below must be applied to the SAR measurements. Probe boundary effect error compensation is required for measurements with the probe tip closer than half a probe tip diameter to the phantom surface. Both the probe tip diameter and sensor offset distance must satisfy measurement protocols; to ensure probe boundary effect errors are minimized and the higher fields closest to the phantom surface can be correctly measured and extrapolated to the phantom surface for computing 1-g SAR. Tolerances of the post-processing algorithms must be verified by the test laboratory for the scan resolutions used in the SAR measurements, according to the reference distribution functions specified in IEEE Std. 1528-2013.



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		≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface		5 ± 1 mm	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5 \text{ mm}$
Maximum probe angle from probe axis to phantom surface normal at the measurement location		30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: $\Delta x_{\text{Area}}, \Delta y_{\text{Area}}$		$\leq 2 \text{ GHz: } \leq 15 \text{ mm}$ $2 - 3 \text{ GHz: } \leq 12 \text{ mm}$	$3 - 4 \text{ GHz: } \leq 12 \text{ mm}$ $4 - 6 \text{ GHz: } \leq 10 \text{ mm}$
		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.	
Maximum zoom scan spatial resolution: $\Delta x_{\text{Zoom}}, \Delta y_{\text{Zoom}}$		$\leq 2 \text{ GHz: } \leq 8 \text{ mm}$ $2 - 3 \text{ GHz: } \leq 5 \text{ mm}^*$	$3 - 4 \text{ GHz: } \leq 5 \text{ mm}^*$ $4 - 6 \text{ GHz: } \leq 4 \text{ mm}^*$
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{\text{Zoom}}(n)$	≤ 5 mm	$3 - 4 \text{ GHz: } \leq 4 \text{ mm}$ $4 - 5 \text{ GHz: } \leq 3 \text{ mm}$ $5 - 6 \text{ GHz: } \leq 2 \text{ mm}$
	graded grid $\Delta z_{\text{Zoom}}(1)$ : between 1 <sup>st</sup> two points closest to phantom surface	≤ 4 mm	$3 - 4 \text{ GHz: } \leq 3 \text{ mm}$ $4 - 5 \text{ GHz: } \leq 2.5 \text{ mm}$ $5 - 6 \text{ GHz: } \leq 2 \text{ mm}$
	$\Delta z_{\text{Zoom}}(n>1)$ : between subsequent points	≤ 1.5 · $\Delta z_{\text{Zoom}}(n-1)$	
Minimum zoom scan volume	x, y, z	≥ 30 mm	$3 - 4 \text{ GHz: } \geq 28 \text{ mm}$ $4 - 5 \text{ GHz: } \geq 25 \text{ mm}$ $5 - 6 \text{ GHz: } \geq 22 \text{ mm}$
<p>Note: <math>\delta</math> is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.</p> <p>* When zoom scan is required and the <u>reported</u> SAR from the <u>area scan based 1-g SAR estimation</u> procedures of KDB 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.</p>			

### Step 4: Power reference measurement (drift)

The Power Drift Measurement job measures the field at the same location as the most recent power reference measurement job within the same procedure, and with the same settings. The indicated drift is mainly the variation of the DUT's output power and should vary max. ± 5 %



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## 3.7.2 Data Storage

The DASY 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 “.DAE3”. 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], [m W/g], [m W/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.

## 3.7.3 Data Evaluation by SEMCAD

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	ε
- 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 DASY 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:

$$V_i = U_i + U_i^2 \cdot cf / dcpi$$

With  $V_i$  = compensated signal of channel i (i = x, y, z)



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$U_i$  = input signal of channel  $i$  ( $i = x, y, z$ )

$cf$  = crest factor of exciting field (DASY parameter)

$dcp_i$  = diode compression point (DASY parameter)

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

E-field probes:

$$E_i = (V_i / Norm_i \cdot ConvF)^{1/2}$$

H-field probes:

$$H_i = (V_i)^{1/2} \cdot (a_{i0} + a_{i1}f + a_{i2}f^2) / f$$

With  $V_i$  = compensated signal of channel  $i$  ( $i = x, y, z$ )

$Norm_i$  = sensor sensitivity of channel  $i$  ( $i = x, y, z$ )

[mV/(V/m)<sup>2</sup>] for E-field Probes

$ConvF$  = sensitivity enhancement in solution

$a_{ij}$  = sensor sensitivity factors for H-field probes

$f$  = carrier frequency [GHz]

$E_i$  = electric field strength of channel  $i$  in V/m

$H_i$  = magnetic field strength of channel  $i$  in A/m

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

$$E_{tot} = (E_x^2 + E_y^2 + E_z^2)^{1/2}$$

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

$$SAR = (E_{tot}^2 \cdot \sigma) / (\epsilon \cdot 1000)$$

With  $SAR$  = local specific absorption rate in mW/g

$E_{tot}$  = total field strength in V/m

$\sigma$  = conductivity in [mho/m] or [Siemens/m]

$\epsilon$  = equivalent tissue density in g/cm<sup>3</sup>

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. The power flow density is calculated assuming the excitation field to be a free space field.

$$P_{pwe} = E_{tot}^2 / 3770 \quad \text{or} \quad P_{pwe} = H_{tot}^2 \cdot 37.7$$

with  $P_{pwe}$  = equivalent power density of a plane wave in mW/cm<sup>2</sup>

$E_{tot}$  = total electric field strength in V/m

$H_{tot}$  = total magnetic field strength in A/m



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## 4 SAR measurement variability and uncertainty

### 4.1 SAR measurement variability

Per KDB865664 D01 SAR measurement 100 MHz to 6 GHz v01r04, SAR measurement variability must be assessed for each frequency band, which is determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. The additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

- 1) Repeated measurement is not required when the original highest measured SAR is  $< 0.80$  W/kg; steps 2) through 4) do not apply.
- 2) When the original highest measured SAR is  $\geq 0.80$  W/kg, repeat that measurement once.
- 3) 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  $\geq 1.45$  W/kg ( $\sim 10\%$  from the 1-g SAR limit).
- 4) Perform a third repeated measurement only if the original, first or second repeated measurement is  $\geq 1.5$  W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is  $> 1.20$ .

The same procedures should be adapted for measurements according to extremity and occupational exposure limits by applying a factor of 2.5 for extremity exposure and a factor of 5 for occupational exposure to the corresponding SAR thresholds.



## 4.2 SAR measurement uncertainty

Per KDB865664 D01 SAR Measurement 100 MHz to 6 GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg, the extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval. The equivalent ratio (1.5/1.6) is applied to extremity and occupational exposure conditions.



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## 5 Description of Test Position

### 5.1 Extremity exposure conditions

Devices that are designed or intended for use on extremities, or mainly operated in extremity only exposure conditions, i.e., hands, wrists, feet and ankles, may require extremity SAR evaluation. When the device also operates in close proximity to the user's body, SAR compliance for the body is also required. The 1-g body and 10-g extremity SAR Test Exclusion Thresholds in 8.2 should be applied to determine SAR test requirements. When extremity SAR testing is required, a flat phantom must be used if the exposure condition is more conservative than the actual use conditions; otherwise, a KDB inquiry is required to determine the phantom and test requirements. Body SAR compliance is also tested with a flat phantom. For devices with irregular shapes or form factors that do not conform to a flat phantom, and/or unusual operating configurations and exposure conditions, a KDB inquiry is also required to determine the appropriate SAR measurement procedures. Unless it is specified differently in the published RF exposure KDB procedures, when simultaneous transmission applies to extremity exposure, the simultaneous transmission SAR test exclusion provisions should be applied. When simultaneous transmission SAR measurement is required, the enlarged zoom scan and volume scan post-processing procedures in KDB Publication 865664 D01 should be applied.

SAR can test the sides near the antenna, the surface of the device should be tested for SAR compliance with the device touching the phantom. The SAR Exclusion Threshold in KDB 447498 D04 can be applied to determine SAR test exclusion for adjacent edge configurations. The closest distance from the antenna to an adjacent device surface is used to determine if SAR testing is required for the adjacent surfaces, with the adjacent surface positioned against the phantom and the surface containing the antenna positioned perpendicular to the phantom.



## 6 SAR System Verification Procedure

### 6.1 Tissue Simulate Liquid

#### 6.1.1 Recipes for Tissue Simulate Liquid

The following tables give the recipes for tissue simulating liquids to be used in different frequency bands:

Ingredients (% by weight)	Frequency (MHz)									
	450		835		915		1900		2450	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	41.45	52.4	41.05	56.0	54.9	40.4	62.7	73.2
Salt (NaCl)	3.95	1.49	1.45	1.4	1.35	0.76	0.18	0.5	0.5	0.04
Sugar	56.32	46.78	56.0	45.0	56.5	41.76	0.0	58.0	0.0	0.0
HEC	0.98	0.52	1.0	1.0	1.0	1.21	0.0	1.0	0.0	0.0
Bactericide	0.19	0.05	0.1	0.1	0.1	0.27	0.0	0.1	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
DGBE	0.0	0.0	0.0	0.0	0.0	0.0	44.92	0.0	0.0	26.7
Dielectric Constant	43.42	58.0	42.54	56.1	42.0	56.8	39.9	54.0	39.8	52.5
Conductivity (S/m)	0.85	0.83	0.91	0.95	1.0	1.07	1.42	1.45	1.88	1.78

HSL5GHz is composed of the following ingredients:

Water: 50-65%

Mineral oil: 10-30%

Emulsifiers: 8-25%

Sodium salt: 0-1.5%

MSL5GHz is composed of the following ingredients:

Water: 64-78%

Mineral oil: 11-18%

Emulsifiers: 9-15%

Sodium salt: 2-3%

## 6.1.2 Test Liquids Confirmation

### Simulated tissue liquid parameter confirmation

The dielectric parameters were checked prior to assessment using the SPEAG DAK3.5 dielectric probe kit. The dielectric parameters measured are reported in each correspondent section.

### IEEE SCC-34/SC-2 P1528 recommended tissue dielectric parameters

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

Target Frequency (MHz)	Head		Body	
	$\epsilon_r$	$\sigma$ (S/m)	$\epsilon_r$	$\sigma$ (S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800-2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95
3000	38.5	2.40	52.0	2.73
5800	35.3	5.27	48.2	6.00

( $\epsilon_r$  = relative permittivity,  $\sigma$  = conductivity and  $\rho = 1000 \text{ kg/m}^3$ )

## 6.1.3 Measurement for Tissue Simulate Liquid

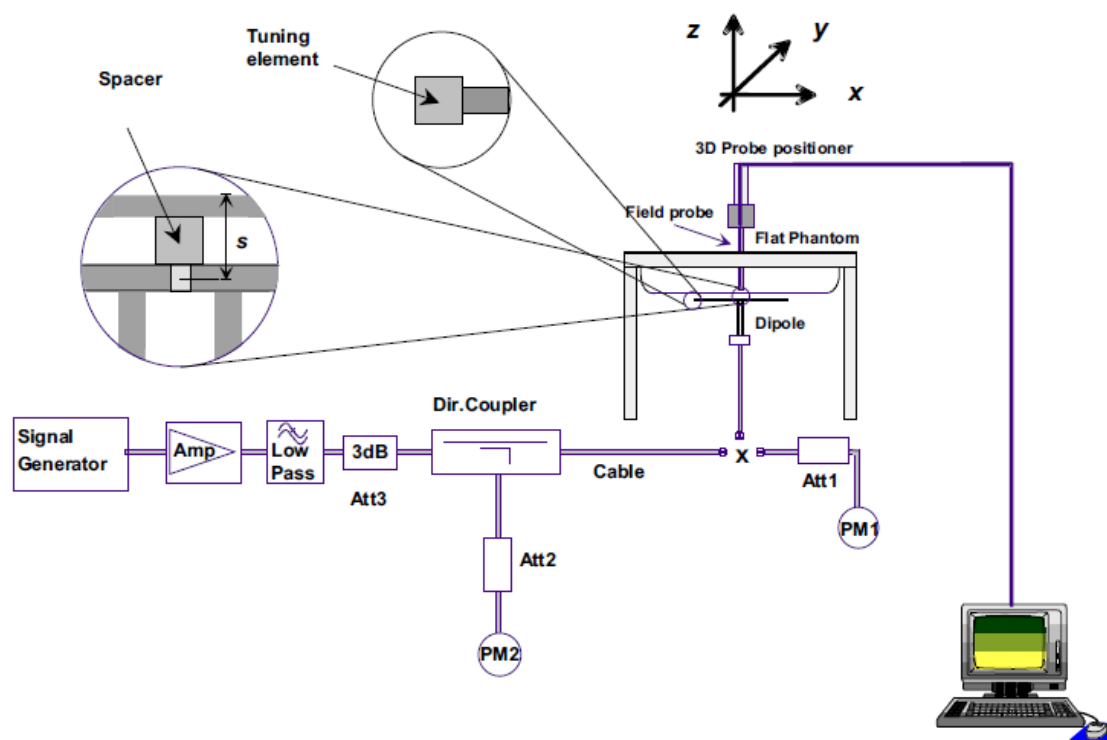
The dielectric properties for this Tissue Simulate Liquids were measured by using the SPEAG DAK3.5 dielectric probe kit in conjunction with Agilent Network Analyzer (300 KHz-8500 MHz). The Conductivity ( $\sigma$ ) and Permittivity ( $\rho$ ) are listed in bellow table. For the SAR measurement given in this report. The temperature variation of the Tissue Simulate Liquids was  $22\pm 2^{\circ}\text{C}$ .

Measurement for Tissue Simulate Liquid										
Tissue Type	Measured Frequency (MHz)	Conductivity ( $\sigma$ )	Permittivity ( $\epsilon_r$ )	Conductivity Target ( $\sigma$ )	Permittivity Target ( $\epsilon_r$ )	Delta ( $\sigma$ ) (%)	Delta ( $\epsilon_r$ ) (%)	Limit (%)	Liquid Temp. ( $^{\circ}\text{C}$ )	Date
835 Head	835	0.922	42.121	0.90	41.50	2.44	1.50	$\pm 5$	22.1	2023/7/18
1800 Head	1800	1.383	39.873	1.40	40.00	-1.21	-0.32	$\pm 5$	22.2	2023/7/16
1950 Head	1950	1.41	40.089	1.40	40.00	0.71	0.22	$\pm 5$	22.3	2023/7/13
2450 Head	2450	1.817	39.995	1.80	39.20	0.94	2.03	$\pm 5$	22	2023/7/10
2600 Head	2600	1.967	39.725	1.96	39.00	0.36	1.86	$\pm 5$	22.1	2023/7/7
5250 Head	5250	4.72	36.74	4.71	35.95	0.21	2.20	$\pm 5$	22.2	2023/7/20
5600 Head	5600	5.15	35.63	5.07	35.50	1.58	0.37	$\pm 5$	22.2	2023/7/21
5750 Head	5750	5.19	35.31	5.22	35.35	-0.57	-0.11	$\pm 5$	22.2	2023/7/23



## 6.2 SAR System Check

The microwave circuit arrangement for system check is sketched in bellow figure. The daily system accuracy verification occurs within the flat section of the SAM phantom. A SAR measurement was performed to see if the measured SAR was within  $\pm 10\%$  from the target SAR values. The tests were conducted on the same days as the measurement of the EUT. The obtained results from the system accuracy verification are displayed in the following table. During the tests, the ambient temperature of the laboratory was in the range  $22\pm 2^{\circ}\text{C}$ , the relative humidity was in the range 60% and the liquid depth above the ear reference points was above 15 cm in all the cases. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values.



F-3. the microwave circuit arrangement used for SAR system verification



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## 6.2.1 Justification for Extended SAR Dipole Calibrations

1) Referring to KDB865664 D01 requirements for dipole calibration, instead of the typical annual calibration recommended by measurement standards, longer calibration intervals of up to three years may be considered when it is demonstrated that the SAR target, impedance and return loss of a dipole have remain stable according to the following requirements. Each measured dipole is expected to evaluate with the following criteria at least on annual interval in Appendix C.

- a) There is no physical damage on the dipole;
- b) System check with specific dipole is within 10% of calibrated value;
- c) Return-loss is within 10% of calibrated measurement;
- d) Impedance is within 5Ω from the previous measurement.

2) Network analyzer probe calibration against air, distilled water and a shorting block performed before measuring liquid parameters.



## 6.2.2 Summary System Check Result(s)

SAR System Validation Result(s)											
Validation Kit		Measured SAR 250mW	Measured SAR 250mW	Measured SAR (normalized to 1w)	Measured SAR (normalized to 1w)	Target SAR (normalized to 1w) (±10%)	Target SAR (normalized to 1w) (±10%)	Deviation (Within ±10%)		Liquid emp. (°C)	Measured Date
		1g (W/kg)	10g (W/kg)	1g (W/kg)	10g (W/kg)	1-g(W/kg)	10-g(W/kg)	1-g(W/kg)	10-g(W/kg)		
D835V2	Head	2.36	1.58	9.44	6.32	9.41	6.25	0.32%	1.12%	22.1	2023/7/18
D1800V2	Head	9.88	5.19	39.52	20.76	38.4	20.2	2.92%	2.77%	22.2	2023/7/16
D1950V3	Head	10.1	5.19	40.4	20.76	40.3	20.4	0.25%	1.76%	22.3	2023/7/13
D2450V2	Head	13.1	6.12	52.4	24.48	53	24.6	-1.13%	-0.49%	22	2023/7/10
D2600V2	Head	14.4	6.33	57.6	25.32	56.2	25	2.49%	1.28%	22.1	2023/7/7
Validation Kit		Measured SAR 100mW	Measured SAR 100mW	Measured SAR (normalized to 1w)	Measured SAR (normalized to 1w)	Target SAR (normalized to 1w) (±10%)	Target SAR (normalized to 1w) (±10%)	Deviation (Within ±10%)		Liquid Temp. (°C)	Measured Date
		1g (W/kg)	10g (W/kg)	1g (W/kg)	10g (W/kg)	1-g(W/kg)	10-g(W/kg)	1-g(W/kg)	10-g(W/kg)		
D5GHzV2	Head (5.25GHz)	7.76	2.19	77.6	21.9	77.7	22.4	-0.13%	-2.23%	22.2	2023/7/20
	Head (5.6GHz)	8.22	2.37	82.2	23.7	81.2	23.5	1.23%	0.85%	22.2	2023/7/21
	Head (5.75GHz)	7.83	2.24	78.3	22.4	78.9	22.7	-0.76%	-1.32%	22.2	2023/7/23

## 6.2.3 Detailed System Check Results

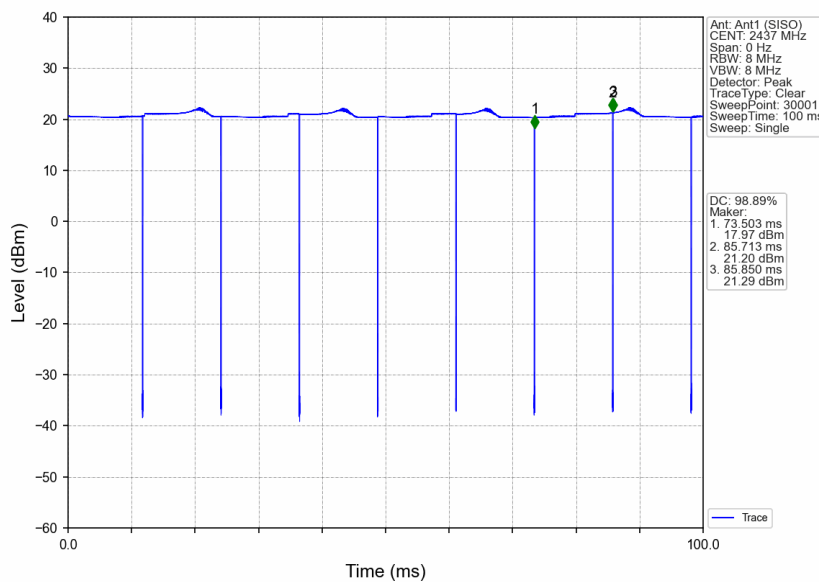
Please see the Appendix A

### 6.2.4 Wi-Fi Test Configuration

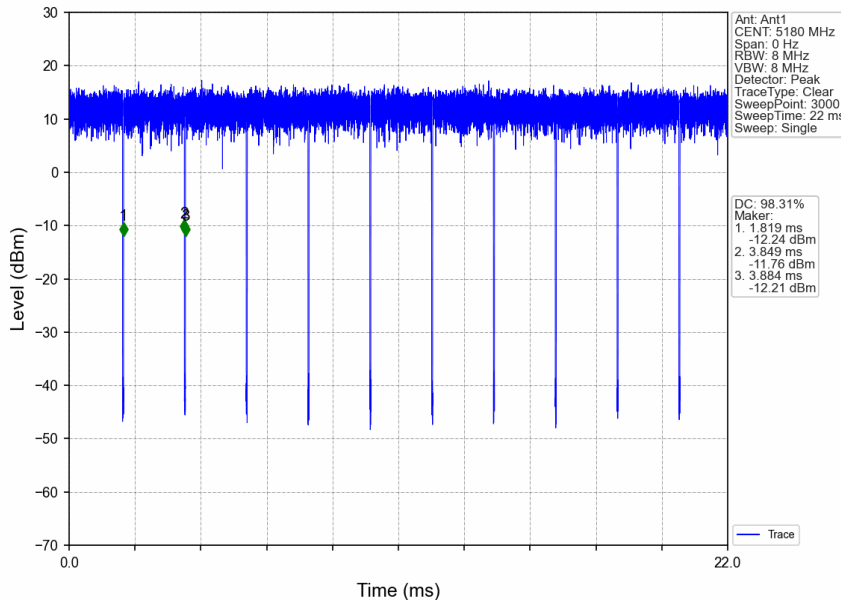
A Wi-Fi device must be configured to transmit continuously at the required data rate, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools for SAR measurement.

#### 6.2.4.1 Duty cycle

2.4GWLAN duty cycle: 98.89%



5GWLAN duty cycle: 98.31%



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## 6.2.4.2 Initial Test Position SAR Test Reduction Procedure

DSSS and OFDM configurations are considered separately according to the required SAR procedures. SAR is measured in the initial test position using the 802.11 transmission mode configuration required by the DSSS procedure or initial test configuration and subsequent test configuration(s) according to the OFDM procedures. The initial test position procedure is described in the following:

- 1) .When the reported SAR of the initial test position is  $\leq 0.4$  W/kg, further SAR measurement is not required for the other (remaining) test positions in that exposure configuration and 802.11 transmission mode combinations within the frequency band or aggregated band. SAR is also not required for that exposure configuration in the subsequent test configuration(s).
- 2) .When the reported SAR of the initial test position is  $> 0.4$  W/kg, SAR is repeated for the 802.11 transmission mode configuration tested in the initial test position using subsequent highest extrapolated or estimated 1-g SAR conditions determined by area scans or next closest/smallest test separation distance and maximum RF coupling test positions based on manufacturer justification, on the highest maximum output power channel, until the reported SAR is  $\leq 0.8$  W/kg or all required test positions (left, right, touch, tilt or subsequent surfaces and edges) are tested.
- 3) .For all positions/configurations tested using the initial test position and subsequent test positions, when the reported SAR is  $> 0.8$  W/kg, SAR is measured for these test positions/configurations on the subsequent next highest measured output power channel(s) until the reported SAR is  $\leq 1.2$  W/kg or all required channels are tested. a) Additional power measurements may be required for this step, which should be limited to those necessary for identifying the subsequent highest output power channels.

## 6.2.4.3 Initial Test Configuration Procedures

An initial test configuration is determined for OFDM transmission modes according to the channel bandwidth, modulation and data rate combination(s) with the highest maximum output power specified for production units in each standalone and aggregated frequency band. SAR is measured using the highest measured maximum output power channel. For configurations with the same specified or measured maximum output power, additional transmission mode and test channel selection procedures are required. SAR test reduction for subsequent highest output test channels is determined according to *reported* SAR of the initial test configuration.

For next to the ear, hotspot mode and UMC mini-tablet exposure configurations where multiple test positions are required, the initial test position procedure is applied to minimize the number of test positions required for SAR measurement using the initial test configuration transmission mode. For fixed exposure conditions that do not have multiple SAR test positions, SAR is measured in the transmission mode determined by the initial test configuration.

When the *reported* SAR of the initial test configuration is  $> 0.8$  W/kg, SAR measurement is required for subsequent next highest measured output power channel(s) in the initial test configuration until *reported* SAR is  $\leq 1.2$  W/kg or all required channels are tested.

## 6.2.4.4 Subsequent Test Configuration Procedures

SAR measurement requirements for the remaining 802.11 transmission mode configurations that have not been tested in the initial test configuration are determined separately for each standalone and aggregated frequency band, in each exposure condition, according to the maximum output power specified for production units. The



initial test position procedure is applied to next to the ear, UMPC mini-tablet and hotspot mode configurations. When the same maximum output power is specified for multiple transmission modes, additional power measurements may be required to determine if SAR measurements are required for subsequent highest output power channels in a subsequent test configuration. The subsequent test configuration and SAR measurement procedures are described in the following.

- 1) . When SAR test exclusion provisions of KDB Publication 447498 are applicable and SAR measurement is not required for the initial test configuration, SAR is also not required for the next highest maximum output power transmission mode subsequent test configuration(s) in that frequency band or aggregated band and exposure configuration.
- 2) . When the highest *reported* SAR for the initial test configuration (when applicable, include subsequent highest output channels), according to the initial test position or fixed exposure position requirements, is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is  $\leq 1.2$  W/kg, SAR is not required for that subsequent test configuration.
- 3) . The number of channels in the initial test configuration and subsequent test configuration can be different due to differences in channel bandwidth. When SAR measurement is required for a subsequent test configuration and the channel bandwidth is smaller than that in the initial test configuration, all channels in the subsequent test configuration that overlap with the larger bandwidth channel tested in the initial test configuration should be used to determine the highest maximum output power channel. This step requires additional power measurement to identify the highest maximum output power channel in the subsequent test configuration to determine SAR test reduction.
  - a) SAR should first be measured for the channel with highest measured output power in the subsequent test configuration.
  - b) SAR for subsequent highest measured maximum output power channels in the subsequent test configuration is required only when the *reported* SAR of the preceding higher maximum output power channel(s) in the subsequent test configuration is  $> 1.2$  W/kg or until all required channels are tested. i) For channels with the same measured maximum output power, SAR should be measured using the channel closest to the center frequency of the larger channel bandwidth channel in the initial test configuration.
- 4) . SAR measurements for the remaining highest specified maximum output power OFDM transmission mode configurations that have not been tested in the initial test configuration (highest maximum output) or subsequent test configuration(s) (subsequent next highest maximum output power) is determined by recursively applying the subsequent test configuration procedures in this section to the remaining configurations according to the following:
  - a) replace "subsequent test configuration" with "next subsequent test configuration" (i.e., subsequent next highest specified maximum output power configuration)
  - b) replace "initial test configuration" with "all tested higher output power configurations"

## 6.2.4.5 2.4 GHz Wi-Fi SAR Procedures

Separate SAR procedures are applied to DSSS and OFDM configurations in the 2.4 GHz band to simplify DSSS test requirements. For 802.11b DSSS SAR measurements, DSSS SAR procedure applies to fixed exposure test position and initial test position procedure applies to multiple exposure test positions. When SAR measurement is required for an OFDM configuration, the initial test configuration, subsequent test configuration and initial test position procedures are applied. The SAR test exclusion requirements for 802.11g/n OFDM configurations are described in following.

### • 802.11b DSSS SAR Test Requirements

SAR is measured for 2.4 GHz 802.11b DSSS using either a fixed test position or, when applicable, the initial test position procedure. SAR test reduction is determined according to the following:



- 1) . When the reported SAR of the highest measured maximum output power channel for the exposure configuration is  $\leq 0.8$  W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.
- 2) . When the reported SAR is  $> 0.8$  W/kg, SAR is required for that exposure configuration using the next highest measured output power channel. When any reported SAR is  $> 1.2$  W/kg, SAR is required for the third channel; i.e., all channels require testing.

## • 2.4 GHz 802.11g/n OFDM SAR Test Exclusion Requirements

When SAR measurement is required for 2.4 GHz 802.11g/n OFDM configurations, the measurement and test reduction procedures for OFDM are applied (section 5.3, including sub-sections). SAR is not required for the following 2.4 GHz OFDM conditions.

- 1) . When KDB Publication 447498 SAR test exclusion applies to the OFDM configuration.
- 2) . When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is  $\leq 1.2$  W/kg.

## 6.2.4.6 5 GHz Wi-Fi SAR Procedures

### • U-NII-1 and U-NII-2A Bands

For devices that operate in only one of the U-NII-1 and U-NII-2A bands, the normally required SAR procedures for OFDM configurations are applied. For devices that operate in both U-NII bands using the same transmitter and antenna(s), SAR test reduction is determined according to the following:

- 1) When the same maximum output power is specified for both bands, begin SAR measurement in U-NII-2A band by applying the OFDM SAR requirements. If the highest reported SAR for a test configuration is  $\leq 1.2$  W/kg, SAR is not required for U-NII-1 band for that configuration (802.11 mode and exposure condition); otherwise, both bands are tested independently for SAR.
- 2) When different maximum output power is specified for the bands, begin SAR measurement in the band with higher specified maximum output power. The highest reported SAR for the tested configuration is adjusted by the ratio of lower to higher specified maximum output power for the two bands. When the adjusted SAR is  $\leq 1.2$  W/kg, SAR is not required for the band with lower maximum output power in that test configuration; otherwise, both bands are tested independently for SAR.
- 3) The two U-NII bands may be aggregated to support a 160 MHz channel on channel number 50. Without additional testing, the maximum output power for this is limited to the lower of the maximum output power certified for the two bands. When SAR measurement is required for at least one of the bands and the highest reported SAR adjusted by the ratio of specified maximum output power of aggregated to standalone band is  $> 1.2$  W/kg, SAR is required for the 160 MHz channel. This procedure does not apply to an aggregated band with maximum output higher than the standalone band(s); the aggregated band must be tested independently for SAR. SAR is not required when the 160 MHz channel is operating at a reduced maximum power and also qualifies for SAR test exclusion.

### • U-NII-2C and U-NII-3 Bands

The frequency range covered by these bands is 380 MHz (5.47 – 5.85 GHz), which requires a minimum of at least two SAR probe calibration frequency points to support SAR measurements. when Terminal Doppler Weather Radar (TDWR) restriction applies, all channels that operate at 5.60 – 5.65 GHz must be included to apply the SAR test reduction and measurement procedures.

When the same transmitter and antenna(s) are used for U-NII-2C band and U-NII-3 band or 5.8 GHz band of §15.247, the bands may be aggregated to enable additional channels with 20, 40 or 80 MHz bandwidth to span across the band gap, as illustrated in Appendix B. The maximum output power for the additional band gap channels is limited to the lower of those certified for the bands. Unless band gap channels are permanently



disabled, they must be considered for SAR testing. The frequency range covered by these bands is 380 MHz (5.47 – 5.85 GHz), which requires a minimum of at least two SAR probe calibration frequency points to support SAR measurements. To maintain SAR measurement accuracy and to facilitate test reduction, the channels in U-NII-2C band above 5.65 GHz may be grouped with the 5.8 GHz channels in U-NII-3 or §15.247 band to enable two SAR probe calibration frequency points to cover the bands, including the band gap channels. When band gap channels are supported and the bands are not aggregated for SAR testing, band gap channels must be considered independently in each band according to the normally required OFDM SAR measurement and probe calibration frequency points requirements.

## • OFDM Transmission Mode SAR Test Configuration and Channel Selection Requirements

The initial test configuration for 5 GHz OFDM transmission modes is determined by the 802.11 configuration with the highest maximum output power specified for production units, including tune-up tolerance, in each standalone and aggregated frequency band. SAR for the initial test configuration is measured using the highest maximum output power channel determined by the default power measurement procedures. When multiple configurations in a frequency band have the same specified maximum output power, the initial test configuration is determined according to the following steps applied sequentially.

- 1) The largest channel bandwidth configuration is selected among the multiple configurations with the same specified maximum output power.
- 2) If multiple configurations have the same specified maximum output power and largest channel bandwidth, the lowest order modulation among the largest channel bandwidth configurations is selected.
- 3) If multiple configurations have the same specified maximum output power, largest channel bandwidth and lowest order modulation, the lowest data rate configuration among these configurations is selected.
- 4) When multiple transmission modes (802.11a/g/n/ac) have the same specified maximum output power, largest channel bandwidth, lowest order modulation and lowest data rate, the lowest order 802.11 mode is selected; i.e., 802.11a is chosen over 802.11n then 802.11ac or 802.11g is chosen over 802.11n. After an initial test configuration is determined, if multiple test channels have the same measured maximum output power, the channel chosen for SAR measurement is determined according to the following. These channel selection procedures apply to both the initial test configuration and subsequent test configuration(s), with respect to the default power measurement procedures or additional power measurements required for further SAR test reduction. The same procedures also apply to subsequent highest output power channel(s) selection.
  - a) The channel closest to mid-band frequency is selected for SAR measurement.
  - b) For channels with equal separation from mid-band frequency; for example, high and low channels or two mid-band channels, the higher frequency (number) channel is selected for SAR measurement.

## • SAR Test Requirements for OFDM configurations

When SAR measurement is required for 802.11 a/n/ac OFDM configurations, each standalone and frequency aggregated band is considered separately for SAR test reduction. When the same transmitter and antenna(s) are used for U-NII-1 and U-NII-2A bands, additional SAR test reduction applies. When band gap channels between U-NII-2C band and 5.8 GHz U-NII-3 or §15.247 band are supported, the highest maximum output power transmission mode configuration and maximum output power channel across the bands must be used to determine SAR test reduction, according to the initial test configuration and subsequent test configuration requirements. In applying the initial test configuration and subsequent test configuration procedures, the 802.11 transmission configuration with the highest specified maximum output power and the channel within a test configuration with the highest measured maximum output power should be clearly distinguished to apply the procedures.



## 6.2.5 LTE Test Configuration

LTE modes were tested according to FCC KDB 941225 D05 publication. Please see notes after the tabulated SAR data for required test configurations. Establishing connections with base station simulators ensure a consistent means for testing SAR and are recommended for evaluating SAR [4]. The R&S CMW500 was used for LTE output power measurements and SAR testing. Max power control was used so the UE transmits with maximum output power during SAR testing. SAR must be measured with the maximum TTI (transmit time interval) supported by the device in each LTE configuration.

### A) Spectrum Plots for RB Configurations

A properly configured base station simulator was used for SAR tests and power measurements. Therefore, spectrum plots for RB configurations were not required to be included in this report.

### B) MPR

MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36.101 V13.5.0 (201609) Section 6.2.3 – 6.2.5 under Table 6.2.3-1.

Modulation	Channel bandwidth / Transmission bandwidth ( $N_{RB}$ )						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

### C) A-MPR

A-MPR (Additional MPR) has been disabled for all SAR tests by setting NS=01 on the base station simulator.

### D) Largest channel bandwidth standalone SAR test requirements

#### 1) QPSK with 1 RB allocation

Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for 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 of the remaining RB offset configurations and required test channels is not required for 1 RB allocation; otherwise, SAR is required for the remaining required test channels and only for the RB offset configuration with the highest output power for that channel. When the reported SAR of a required test channel is > 1.45 W/kg, SAR is required for all three RB offset configurations for that required test channel.

#### 2) QPSK with 50% RB allocation

The procedures required for 1 RB allocation in 1) are applied to measure the SAR for QPSK with 50% RB allocation.

#### 3) QPSK with 100% RB allocation

For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation in 1) and 2) are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.



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### 4) Higher order modulations

For each modulation besides QPSK; e.g., 16-QAM, 64-QAM, apply the QPSK procedures in above sections to determine the QAM configurations that may need SAR measurement. For each configuration identified as required for testing, SAR is required only when the highest maximum output power for the configuration in the higher order modulation is  $> \frac{1}{2}$  dB higher than the same configuration in QPSK or when the reported SAR for the QPSK configuration is  $> 1.45$  W/kg.

### E) Other channel bandwidth standalone SAR test requirements

For the other channel bandwidths used by the device in a frequency band, apply all the procedures required for the largest channel bandwidth in section A) to determine the channels and RB configurations that need SAR testing and only measure SAR when the highest maximum output power of a configuration requiring testing in the smaller channel bandwidth is  $> \frac{1}{2}$  dB higher than the equivalent channel configurations in the largest channel bandwidth configuration or the reported SAR of a configuration for the largest channel bandwidth is  $> 1.45$  W/kg.



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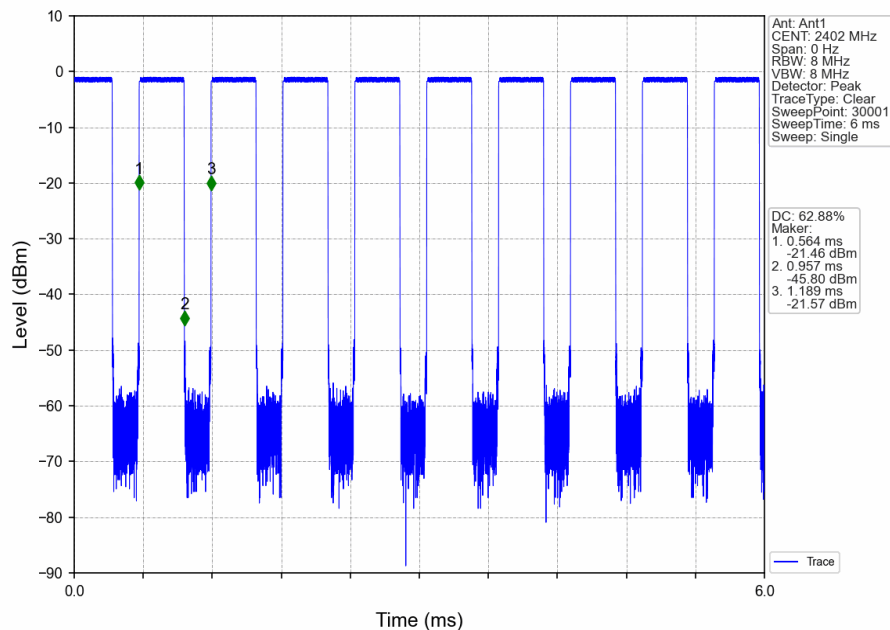
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### 6.2.6 BluetoothTest Configuration

For the Bluetooth SAR tests, a communication link is set up with the test mode software for BT mode test. Bluetooth USES frequency hopping technology to divide the transmitted data into packets and transmit the packets respectively through 79 designated Bluetooth channels, 1MHz Bandwidth, frequency hops at 1600 hops/second per the Bluetooth standard. The Radio Frequency Channel Number (RFCN) is allocated to 0, 39 and 78 respectively in the case of 2402~2480 MHz during the test at each test frequency channel, the EUT is operated at the RF continuous emission mode.

#### 6.2.6.1 Duty cycle

Bluetooth duty cycle: 62.88%



## 7 Test Result

### 7.1 Measurement of RF Conducted Power

#### 7.1.1 Conducted Power Of GSM

GSM 850										
Burst Output Power(dBm)					Tune up	Division Factors	Frame-Average Output Power(dBm)			Tune up
Channel		128	190	251			128	190	251	
GPRS/EGPRS (GMSK)	1 TX Slot	33.83	32.85	33.32	34.0	-9.03	24.8	23.82	24.29	24.97
	2 TX Slots	32.3	32.34	32.25	33.0	-6.02	26.28	<b>26.32</b>	26.23	<b>26.98</b>
	3 TX Slots	29.64	29.42	29.46	30.0	-4.26	25.38	25.16	25.2	25.74
	4 TX Slots	28.49	28.28	28.34	29.0	-3.01	25.48	25.27	25.33	25.99
EGPRS(8PSK)	1 TX Slot	25.76	25.89	25.7	26.0	-9.03	16.73	16.86	16.67	16.97
	2 TX Slots	24.6	24.62	24.73	25.0	-6.02	18.58	18.6	18.71	18.98
	3 TX Slots	23.63	23.56	23.57	24.0	-4.26	19.37	19.3	19.31	19.74
	4 TX Slots	22.25	22.42	22.54	23.0	-3.01	19.24	19.41	19.53	19.99
GSM 1900										
Burst Output Power(dBm)					Tune up	Division Factors	Frame-Average Output Power(dBm)			Tune up
Channel		512	661	810			512	661	810	
GPRS/EGPRS (GMSK)	1 TX Slot	29.78	29.85	29.89	30.5	-9.03	20.75	20.82	20.86	21.47
	2 TX Slots	28.72	28.87	28.83	29.5	-6.02	22.7	<b>22.85</b>	22.81	<b>23.48</b>
	3 TX Slots	26.31	26.24	26.47	27.5	-4.26	22.05	21.98	22.21	23.24
	4 TX Slots	25.25	25.17	25.37	26	-3.01	22.24	22.16	22.36	22.99
EGPRS(8PSK)	1 TX Slot	25.17	25.12	25.23	26	-9.03	16.14	16.09	16.2	16.97
	2 TX Slots	24.96	24.86	24.92	25	-6.02	18.94	18.84	18.9	18.98
	3 TX Slots	23.25	23.42	23.49	24	-4.26	18.99	19.16	19.23	19.74
	4 TX Slots	22.27	22.22	22.31	23	-3.01	19.26	19.21	19.3	19.99
WCDMA Band II										
Average Conducted Power(dBm)										
Channel					9262	9400	9538	Tune up		
WCDMA	12.2kbps RMC				23.68	<b>23.78</b>	23.7	24.5		
HSDPA	Subtest 1				21.76	21.89	21.75	22.5		
	Subtest 2				21.81	21.91	21.68	22.5		
	Subtest 3				21.74	21.85	21.7	22.5		
	Subtest 4				21.8	21.99	21.86	22.5		
HSUPA	Subtest 1				19.63	19.48	19.78	20.5		
	Subtest 2				19.6	19.74	19.35	20.5		
	Subtest 3				19.63	19.45	19.86	20.5		
	Subtest 4				19.87	19.48	19.61	20.5		
	Subtest 5				19.32	19.83	19.66	20.5		

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WCDMA Band IV					
Average Conducted Power(dBm)					
Channel		1312	1412	1513	Tune up
WCDMA	12.2kbps RMC	22.09	<b>22.26</b>	22.17	23
HSDPA	Subtest 1	20.32	20.6	20.69	21.5
	Subtest 2	20.31	20.65	20.71	21.5
	Subtest 3	20.49	20.55	20.55	21.5
	Subtest 4	20.66	20.78	20.71	21.5
HSUPA	Subtest 1	18.45	18.49	18.45	19.5
	Subtest 2	18.63	18.74	18.43	19.5
	Subtest 3	18.62	18.42	18.61	19.5
	Subtest 4	18.57	18.49	18.61	19.5
	Subtest 5	18.42	18.57	18.6	19.5

WCDMA Band V					
Average Conducted Power(dBm)					
Channel		4132	4182	4233	Tune up
WCDMA	12.2kbps RMC	22.93	22.91	<b>23.08</b>	23.5
HSDPA	Subtest 1	21	21.27	21.34	22.0
	Subtest 2	21.37	21.26	21.45	22.0
	Subtest 3	21.28	21.24	21.5	22.0
	Subtest 4	21.36	21.31	21.56	22.0
HSUPA	Subtest 1	18.74	19.32	19.24	20.5
	Subtest 2	18.96	19.31	18.96	20.5
	Subtest 3	18.91	18.94	19.57	20.5
	Subtest 4	18.95	19.4	19.57	20.5
	Subtest 5	18.9	19.4	19.34	20.5



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## 7.1.2 Conducted Power Of LTE

LTE Band 2				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				18607	18900	19193	
1.4MHz	QPSK	1	0	23.29	23.78	23.54	24.0
		1	2	23.28	23.62	23.62	24.0
		1	5	23.2	23.69	23.5	24.0
		3	0	23.22	23.43	23.24	23.5
		3	2	23.34	23.44	23.36	23.5
		3	3	23.35	23.38	23.27	23.5
		6	0	22.51	22.56	22.66	23.5
	16QAM	1	0	22.76	22.74	22.73	23.5
		1	2	22.84	22.83	22.68	23.5
		1	5	22.69	22.7	22.56	23.5
		3	0	22.55	22.57	22.55	23.0
		3	2	22.56	22.69	22.61	23.0
		3	3	22.48	22.66	22.52	23.0
		6	0	21.55	21.39	21.25	22.0
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				18615	18900	19185	
3MHz	QPSK	1	0	23.42	23.51	23.41	24
		1	7	23.49	23.9	23.56	24
		1	14	23.27	23.57	23.36	24
		8	0	22.43	22.53	22.63	23
		8	4	22.43	22.5	22.58	23
		8	7	22.38	22.61	22.61	23
		15	0	22.47	22.49	22.67	23
	16QAM	1	0	22.81	22.4	22.95	23
		1	7	22.89	22.5	22.75	23
		1	14	22.69	22.4	22.69	23
		8	0	21.76	21.39	21.8	22
		8	4	21.53	21.54	21.71	22
		8	7	21.51	21.67	21.65	22
		15	0	21.38	21.59	21.48	22
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				18625	18900	19175	
5MHz	QPSK	1	0	23.22	23.32	23.16	24
		1	13	23.44	23.68	23.58	24
		1	24	23.18	23.44	23.11	24
		12	0	22.5	22.5	22.44	23



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		12	6	22.55	22.62	22.63	23
		12	13	22.41	22.67	22.55	23
		25	0	22.46	22.55	22.44	23
	16QAM	1	0	22.49	22.42	22.67	23
		1	13	22.19	22.85	22.82	23
		1	24	22.54	22.45	22.73	23
		12	0	21.48	21.42	21.14	22
		12	6	21.45	21.59	21.38	22
		12	13	21.33	21.67	21.26	22
		25	0	21.39	21.63	21.44	22
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				18650	18900	19150	
10MHz	QPSK	1	0	23.55	23.67	23.58	24
		1	25	23.72	23.87	23.89	24
		1	49	23.28	23.47	23.46	24
		25	0	22.56	22.42	22.34	23
		25	13	22.39	22.61	22.6	23
		25	25	22.33	22.63	22.6	23
		50	0	22.38	22.51	22.48	23
	16QAM	1	0	22.74	22.66	22.62	23
		1	25	22.86	22.77	22.69	23
		1	49	22.57	21.94	22.46	23
		25	0	21.48	21.36	21.31	22
		25	13	21.47	21.69	21.67	22
		25	25	21.33	21.79	21.68	22
		50	0	21.45	21.46	21.5	22
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				18675	18900	19125	
15MHz	QPSK	1	0	23.4	23.34	23.49	24
		1	38	23.4	23.57	23.6	24
		1	74	23.3	23.23	23.4	24
		36	0	22.47	22.5	22.54	23
		36	18	22.47	22.62	22.57	23
		36	39	22.41	22.63	22.56	23
		75	0	22.49	22.47	22.52	23
	16QAM	1	0	22.93	22.55	22.12	23
		1	38	22.95	22.84	22.76	23
		1	74	22.75	22.63	22.74	23
		36	0	21.49	21.32	21.41	22
		36	18	21.41	21.6	21.66	22
		36	39	21.32	21.54	21.55	22
		75	0	21.41	21.49	21.45	22



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Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				18700	18900	19100	
20MHz	QPSK	1	0	23.45	23.32	23.57	24
		1	50	23.56	<b>23.88</b>	23.83	24
		1	99	23.26	23.24	23.67	24
		50	0	22.45	22.53	22.46	23
		50	25	22.51	<b>22.59</b>	22.54	23
		50	50	22.41	22.58	22.53	23
		100	0	22.52	22.54	22.54	23
	16QAM	1	0	22.81	22.76	22.64	23
		1	50	22.89	22.69	22.56	23
		1	99	22.25	22.45	22.57	23
		50	0	21.64	21.33	21.51	22
		50	25	21.59	21.57	21.57	22
		50	50	21.47	21.57	21.62	22
		100	0	21.51	21.45	21.5	22

LTE Band 4				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				19957	20175	20393	
1.4MHz	QPSK	1	0	22.04	22.77	22.63	23
		1	2	22.1	22.63	22.43	23
		1	5	22.08	22.53	22.4	23
		3	0	22.26	22.44	22.32	22.5
		3	2	22.07	22.36	22.46	22.5
		3	3	22.03	22.39	22.48	22.5
		6	0	21.81	21.72	21.57	22.5
	16QAM	1	0	21.86	22.22	21.77	22.5
		1	2	22	22.32	21.84	22.5
		1	5	21.8	22.33	21.61	22.5
		3	0	21.15	21.97	21.42	22
		3	2	21.17	21.68	21.72	22
		3	3	21.09	21.6	21.64	22
		6	0	20.78	20.71	20.55	21
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
3MHz	QPSK	1	0	22.15	22.93	22.61	23
		1	7	22.33	22.69	22.8	23
		1	14	22.16	22.9	22.71	23
		8	0	21.27	21.89	21.78	22
		8	4	21.33	21.92	21.64	22



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		8	7	21.44	21.91	21.69	22
		15	0	21.31	21.94	21.85	22
	16QAM	1	0	21.64	21.92	21.75	22
		1	7	21.97	21.92	21.5	22
		1	14	21.89	21.77	21.39	22
		8	0	20.39	20.51	20.93	21
		8	4	20.15	20.88	20.7	21
		8	7	20.14	20.96	20.61	21
		15	0	20.02	20.7	20.51	21
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				19975	20175	20375	
5MHz	QPSK	1	0	22.09	22.65	22.32	23
		1	13	22.43	22.92	22.48	23
		1	24	22.15	22.78	22.46	23
		12	0	21.28	21.83	21.73	22
		12	6	21.49	21.93	21.8	22
		12	13	21.45	21.91	21.74	22
		25	0	21.43	21.75	21.78	22
		1	0	20.89	21.66	21.91	22
	16QAM	1	13	21.78	21.77	21.86	22
		1	24	20.96	21.76	21.99	22
		12	0	20.26	20.67	20.59	21
		12	6	20.32	20.83	20.66	21
		12	13	20.34	20.74	20.55	21
		25	0	20.36	20.7	20.76	21
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				20000	20175	20350	
10MHz	QPSK	1	0	22.34	22.58	22.73	23
		1	25	22.54	21.86	22.94	23
		1	49	22.39	22.8	22.53	23
		25	0	21.51	21.65	21.61	22
		25	13	21.39	21.83	21.58	22
		25	25	21.32	21.81	21.61	22
		50	0	21.53	21.78	21.55	22
	16QAM	1	0	21.97	21.36	21.86	22
		1	25	21.48	21.66	21.82	22
		1	49	21.76	21.52	21.82	22
		25	0	20.45	20.45	20.7	21
		25	13	20.43	20.91	20.68	21
		25	25	20.23	20.85	20.4	21
		50	0	20.42	20.64	20.52	21



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				20025	20175	20325	
15MHz	QPSK	1	0	22.23	22.41	22.76	23
		1	38	22.43	22.67	22.76	23
		1	74	22.35	22.36	22.37	23
		36	0	21.29	21.68	21.68	22
		36	18	21.41	21.75	21.55	22
		36	39	21.35	21.77	21.55	22
		75	0	21.33	21.67	21.64	22
	16QAM	1	0	21.77	21.51	21.75	22
		1	38	21.57	21.68	21.39	22
		1	74	21.72	21.4	21.82	22
		36	0	20.3	20.43	20.66	21
		36	18	20.35	20.76	20.7	21
		36	39	20.29	20.69	20.39	21
		75	0	20.28	20.5	20.51	21
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				20050	20175	20300	
20MHz	QPSK	1	0	22.85	22.48	22.87	23
		1	50	22.8	22.86	<b>22.94</b>	23
		1	99	22.56	22.56	22.42	23
		50	0	21.63	21.62	<b>21.78</b>	22
		50	25	21.55	21.67	21.71	22
		50	50	21.62	21.72	21.58	22
		100	0	21.65	21.62	21.61	22
	16QAM	1	0	21.72	21.65	21.87	22
		1	50	21.77	21.9	21.86	22
		1	99	21.57	21.46	21.21	22
		50	0	20.67	20.41	20.69	21
		50	25	20.56	20.58	20.67	21
		50	50	20.6	20.65	20.5	21
		100	0	20.56	20.5	20.55	21

LTE Band 5				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				20407	20525	20643	
1.4MHz	QPSK	1	0	22.83	22.98	23.3	23.5
		1	2	22.92	22.98	23.04	23.5
		1	5	22.83	22.89	22.85	23.5



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		3	0	22.83	22.99	23	23
		3	2	22.84	22.99	22.91	23
		3	3	22.79	22.98	22.87	23
		6	0	21.85	22.15	22.09	22.5
	16QAM	1	0	21.7	22.27	22.14	22.5
		1	2	21.75	22.32	21.85	22.5
		1	5	21.82	22.4	21.7	22.5
		3	0	21.87	21.96	21.68	22
		3	2	21.96	21.74	21.75	22
		3	3	21.89	21.8	21.73	22
		6	0	21	20.94	20.9	21.5
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				20415	20525	20635	
3MHz	QPSK	1	0	22.85	23.14	23.02	23.5
		1	7	22.87	23.5	22.95	23.5
		1	14	22.79	23	22.7	23.5
		8	0	21.98	22.1	22.14	22.5
		8	4	22.04	22.2	22.05	22.5
		8	7	22.02	22.07	22	22.5
		15	0	22.01	22.06	22.1	22.5
	16QAM	1	0	22.48	21.91	22.49	22.5
		1	7	22.41	21.97	22.47	22.5
		1	14	22.23	21.89	22.42	22.5
		8	0	21.17	20.96	21.45	22
		8	4	21.17	21.05	21.07	22
		8	7	21.19	21.03	20.85	22
		15	0	21.02	21.24	21.01	22
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				20425	20525	20625	
5MHz	QPSK	1	0	22.55	22.98	22.84	23.5
		1	13	22.81	23.25	23.09	23.5
		1	24	22.75	22.9	22.65	23.5
		12	0	22.08	22.16	22.13	22.5
		12	6	22.08	22.27	22.23	22.5
		12	13	21.92	22.13	22.09	22.5
		25	0	22.04	22.16	22.2	22.5
	16QAM	1	0	21.27	22.33	22.4	22.5
		1	13	21.6	22.37	22.46	22.5
		1	24	21.12	21.97	22.28	22.5
		12	0	21.05	21.04	21.06	22
		12	6	21.01	21.21	21.1	22
		12	13	20.81	21.14	20.99	22



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Bandwidth	Modulation	25	0	21.11	21.21	21.22	22
		RB size	RB offset	Channel	Channel	Channel	Tune up
10MHz	QPSK	1	0	22.9	22.92	23.16	23.5
		1	25	23.03	23.21	<b>23.34</b>	23.5
		1	49	23.05	23.04	22.75	23.5
		25	0	21.99	22.1	22.14	22.5
		25	13	22.06	22.27	<b>22.32</b>	22.5
		25	25	21.98	22.23	22.25	22.5
		50	0	21.99	22.18	22.11	22.5
	16QAM	1	0	21.44	22.14	22.48	22.5
		1	25	22.39	22.19	22.43	22.5
		1	49	22.45	21.86	22.21	22.5
		25	0	21.09	21.02	21.23	22
		25	13	21.12	21.25	21.06	22
		25	25	21.1	21.52	21.05	22
		50	0	20.92	21.12	21.23	22

LTE Band 7				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				20775	21100	21425	
5MHz	QPSK	1	0	23.22	23.28	23.41	24
		1	13	23.08	23.61	23.57	24
		1	24	23.05	23.23	23.53	24
		12	0	22.41	22.68	22.78	23
		12	6	22.42	22.69	22.78	23
		12	13	22.08	22.61	22.7	23
		25	0	22.3	22.62	22.75	23
	16QAM	1	0	22.1	22.96	22.38	23
		1	13	22.66	22.42	22.49	23
		1	24	22.4	22.47	21.93	23
		12	0	21.32	21.48	21.81	22
		12	6	21.1	21.55	21.82	22
		12	13	21.43	21.58	21.69	22
		25	0	21.03	21.49	21.82	22
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				20800	21100	21400	
10MHz	QPSK	1	0	23.37	23.72	23.6	24
		1	25	23.4	23.87	23.83	24
		1	49	23.11	23.95	23.52	24
		25	0	22.08	22.65	22.6	23



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		25	13	22.24	22.8	22.88	23
		25	25	22.15	22.71	22.74	23
		50	0	22.11	22.71	22.76	23
	16QAM	1	0	22.24	22.85	22.99	23
		1	25	22.79	22.8	22.96	23
		1	49	22.42	22.62	22.79	23
		25	0	21.19	21.73	21.85	22
		25	13	21.37	21.91	21.98	22
		25	25	21.31	21.92	21.62	22
		50	0	21.13	21.51	21.77	22
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				20825	21100	21375	
15MHz	QPSK	1	0	23.45	23.58	23.54	24
		1	38	23.33	23.78	23.57	24
		1	74	23.15	23.61	23.65	24
		36	0	22.13	22.67	22.57	23
		36	18	22.26	22.79	22.6	23
		36	39	22.17	22.74	22.67	23
		75	0	22.29	22.71	22.74	23
	16QAM	1	0	22.47	22.73	22.84	23
		1	38	22.7	22.78	22.69	23
		1	74	22.57	22.88	22.99	23
		36	0	21.28	21.45	21.61	22
		36	18	21.44	21.75	21.69	22
		36	39	21.26	21.74	21.6	22
		75	0	21.21	21.66	21.78	22
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				20850	21100	21350	
20MHz	QPSK	1	0	23.41	23.45	23.43	24
		1	50	23.75	23.98	23.83	24
		1	99	23.45	23.67	23.53	24
		50	0	22.15	22.69	22.53	23
		50	25	22.65	22.79	22.68	23
		50	50	22.28	22.69	22.6	23
		100	0	22.23	22.7	22.61	23
	16QAM	1	0	22.34	22.74	22.63	23
		1	50	22.79	22.85	22.67	23
		1	99	22.59	22.83	22.19	23
		50	0	21.34	21.49	21.74	22
		50	25	21.28	21.73	21.65	22
		50	50	21.3	21.63	21.64	22
		100	0	21.28	21.61	21.62	22



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LTE Band 38				Conducted Power(dBm)			Tune up
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	
				37775	38000	38225	
5MHz	QPSK	1	0	23.47	23.29	23.75	24
		1	13	23.43	23.38	23.92	24
		1	24	23.02	23.18	23.78	24
		12	0	22.61	22.57	22.83	23
		12	6	22.55	22.62	22.82	23
		12	13	22.3	22.5	22.73	23
		25	0	22.41	22.51	22.73	23
	16QAM	1	0	22.88	22.31	22.76	23
		1	13	22.97	22.42	22.94	23
		1	24	22.48	22.26	22.54	23
		12	0	21.47	21.45	21.77	22
		12	6	21.53	21.54	21.81	22
		12	13	21.12	21.48	21.76	22
		25	0	21.28	21.56	21.82	22
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				37800	38000	38200	
10MHz	QPSK	1	0	23.64	23.5	23.65	24
		1	25	23.52	23.55	23.98	24
		1	49	23.11	23.33	23.78	24
		25	0	22.5	22.66	22.81	23
		25	13	22.43	22.64	22.91	23
		25	25	22.31	22.63	22.85	23
		50	0	22.38	22.6	22.81	23
	16QAM	1	0	22.36	22.76	22.97	23
		1	25	22.38	22.85	22.79	23
		1	49	21.94	22.85	22.84	23
		25	0	21.37	21.68	21.59	22
		25	13	21.29	21.73	21.89	22
		25	25	21.22	21.69	21.8	22
		50	0	21.25	21.52	21.84	22
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				37825	38000	38175	
15MHz	QPSK	1	0	23.63	23.55	23.49	24
		1	38	23.28	23.3	23.71	24
		1	74	23.25	23.1	23.68	24
		36	0	22.33	22.55	22.58	23
		36	18	22.34	22.51	22.66	23



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		36	39	22.39	22.49	22.68	23
		75	0	22.47	22.49	22.62	23
	16QAM	1	0	22.42	22.46	22.84	23
		1	38	22.08	22.82	22.9	23
		1	74	21.73	22.47	22.79	23
		36	0	21.29	21.5	21.75	22
		36	18	21.32	21.5	21.72	22
		36	39	21.32	21.34	21.52	22
		75	0	21.41	21.43	21.43	22
<b>Bandwidth</b>	<b>Modulation</b>	<b>RB size</b>	<b>RB offset</b>	<b>Channel</b>	<b>Channel</b>	<b>Channel</b>	<b>Tune up</b>
				37850	38000	38150	
<b>20MHz</b>	QPSK	1	0	23.53	23.47	23.25	24
		1	50	23.78	<b>23.83</b>	23.79	24
		1	99	23.32	23.34	23.3	24
		50	0	22.34	<b>22.71</b>	22.62	23
		50	25	22.31	22.5	22.46	23
		50	50	22.34	22.47	22.39	23
		100	0	22.45	22.54	22.64	23
		1	0	22.8	22.85	22.27	23
	16QAM	1	50	22.75	22.94	22.53	23
		1	99	22.61	22.83	22.35	23
		50	0	21.51	21.63	21.63	22
		50	25	21.39	21.62	21.6	22
		50	50	21.37	21.6	21.58	22
		100	0	21.37	21.55	21.58	22



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### 7.1.3 Conducted Power Of Wi-Fi

#### Note:

- a) Power must be measured at each transmit antenna port according to the DSSS and OFDM transmission configurations in each standalone and aggregated frequency band.
- b) Power measurement is required for the transmission mode configuration with the highest maximum output power specified for production units.
  - 1) When the same highest maximum output power specification applies to multiple transmission modes, the largest channel bandwidth configuration with the lowest order modulation and lowest data rate is measured.
  - 2) When the same highest maximum output power is specified for multiple largest channel bandwidth configurations with the same lowest order modulation or lowest order modulation and lowest data rate, power measurement is required for all equivalent 802.11 configurations with the same maximum output power.
- c) For each transmission mode configuration, power must be measured for the highest and lowest channels; and at the mid-band channel(s) when there are at least 3 channels. For configurations with multiple mid-band channels, due to an even number of channels, both channels should be measured.





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For 2.4G

Mode	Channel	Frequency(MHz)	Data Rate(Mbps)	Average Power (dBm)	Tune up
802.11b	1	2412	1	<b>16.18</b>	17
	6	2437		16.79	17
	11	2462		16.39	17
802.11g	1	2412	6	<b>13.85</b>	15
	6	2437		14.66	15
	11	2462		14.28	15
802.11n HT20 SISO	1	2412	6.5	13.71	15
	6	2437		14.53	15
	11	2462		14.13	15
802.11n HT40 SISO	3	2422	13.5	13.99	15
	6	2437		14.51	15
	9	2452		14.4	15



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For 5G

5GHz	mode	Channel	Frequency(MHz)	Data Rate(Mbps)	Average Power (dBm)	Tune up
802.11a	U-NII-1	36	5180	6	14.83	15
		40	5200		14.76	15
		48	5240		13.74	15
	U-NII-2A	52	5260		12.82	13
		60	5300		11.74	13
		64	5320		11.84	13
	U-NII-2C	100	5500		10.92	12
		116	5580		10.95	12
		140	5700		11.85	12
	U-NII-3	149	5745		12.91	14
		157	5785		13.41	14
		165	5825		13.36	14
5GHz	mode	Channel	Frequency(MHz)	Data Rate(Mbps)	Average Power (dBm)	Tune up
802.11n-HT20	U-NII-1	36	5180	MCS0	12.67	14
		44	5220		13.6	14
		48	5240		13.72	14
	U-NII-2A	52	5260		12.23	13
		60	5300		11.64	13
		64	5320		11.85	13
	U-NII-2C	100	5500		10.86	12
		116	5580		10.33	12
		140	5700		11.67	12
	U-NII-3	149	5745		13.19	14
		157	5785		13.31	14
		165	5825		13.34	14
5GHz	mode	Channel	Frequency(MHz)	Data Rate(Mbps)	Average Power (dBm)	Tune up
802.11n-HT40	U-NII-1	38	5190	MCS0	10.6	11
		46	5230		10.14	11
	U-NII-2A	54	5270		8.86	10
		62	5310		9.68	10
	U-NII-2C	102	5510		8.03	10
		110	5550		8.4	10
		134	5670		8.67	10



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	U-NII-3	151	5755		12.86	13
		159	5795		12.4	13
5GHz	mode	Channel	Frequency(MHz)	Data Rate(Mbps)	Average Power (dBm)	Tune up
802.11ac 20M	U-NII-1	36	5180	MCS0	11.19	12
		40	5200		11.49	12
		48	5240		10.36	12
	U-NII-2A	52	5260		11.43	12
		60	5300		10.05	12
		64	5320		10.6	12
	U-NII-2C	100	5500		7.18	9
		116	5580		7.31	9
		140	5700		8.68	9
	U-NII-3	149	5745		11.28	13
		157	5785		12.33	13
		165	5825		12.5	13
5GHz	mode	Channel	Frequency(MHz)	Data Rate(Mbps)	Average Power (dBm)	Tune up
802.11ac 40M	U-NII-1	38	5190	MCS0	9.32	10
		46	5230		9.85	10
	U-NII-2A	54	5270		8.59	9
		62	5310		7.98	9
	U-NII-2C	102	5510		7.04	8
		110	5550		6.83	8
		134	5670		7.52	8
	U-NII-3	151	5755		12.57	13
		159	5795		12.62	13
5GHz	mode	Channel	Frequency(MHz)	Data Rate(Mbps)	Average Power (dBm)	Tune up
802.11ac 80M	U-NII-1	42	5210	MCS0	7.51	8
	U-NII-2A	58	5290		7.46	8
	U-NII-2C	106	5530		6.51	7
		122	5610		6.79	7
	U-NII-3	155	5775		10.76	11



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## 7.1.4 Conducted Power Of BT

BT			Average Conducted Power(dBm)	Tune up (dBm)
Modulation	Channel	Frequency(MHz)		
GFSK	0	2402	8.76	10
	39	2441	9.77	10
	78	2480	8.67	10
π/4DQPSK	0	2402	9.61	11
	39	2441	10.71	11
	78	2480	9.75	11
8DPSK	0	2402	9.95	11
	39	2441	10.91	11
	78	2480	9.96	11

BLE			Average Conducted Power(dBm)	Tune up (dBm)
Modulation	Channel	Frequency(MHz)		
GFSK	0	2402	-1.13	-1
	19	2440	0.87	1
	39	2480	-0.94	0

### 7.2 Measurement of SAR Data

Note:

- 1) The maximum Scaled SAR value is marked in bold. Graph Results refer to Appendix B
- 2) Per FCC KDB Publication 447498 D04, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is  $\leq 0.8$  W/kg (2.0W/kg for 10g) then testing at the other channels is not required for such test configuration(s).
- 3) “\*” is repeated measurement.

WiFi 2.4G:

- 1) When the highest reported SAR for the initial test configuration is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is  $\leq 1.2$  W/kg, SAR test for the other 802.11 modes are not required.

WiFi 5G:

- 1) When the highest reported SAR for the initial test configuration is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is  $\leq 1.2$  W/kg, SAR test for the other 802.11 modes are not required.



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## 7.2.1 SAR Result Of GSM 850

GSM850 SAR Test Record													
Test position	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg) 1-g	SAR (W/kg) 10-g	Power Drift (dB)	Conducted Power (dBm)	Tune up Limit (dBm)	Scaled factor	Scaled SAR (W/kg) 1-g	Scaled SAR (W/kg) 10-g	Liquid Temp	SAR limit (W/kg)
Extremity Test data(Separate 0mm)													
Front side	GPRS 2TS	190/836.6	1:4.15	0.044	0.027	-0.06	32.34	33.00	1.164	0.051	0.032	22.1	4
Back side	GPRS 2TS	190/836.6	1:4.15	1.210	0.705	-0.09	32.34	33.00	1.164	1.409	<b>0.821</b>	22.1	4
Left side	GPRS 2TS	190/836.6	1:4.15	0.203	0.130	-0.16	32.34	33.00	1.164	0.236	0.151	22.1	4
Right side	GPRS 2TS	190/836.6	1:4.15	0.467	0.292	-0.12	32.34	33.00	1.164	0.544	0.340	22.1	4
Top side	GPRS 2TS	190/836.6	1:4.15	0.257	0.162	0.06	32.34	33.00	1.164	0.299	0.189	22.1	4
Bottom side	GPRS 2TS	190/836.6	1:4.15	0.024	0.016	-0.17	32.34	33.00	1.164	0.028	0.018	22.1	4



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## 7.2.2 SAR Result Of GSM 1900

GSM1900 SAR Test Record													
Test position	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg) 1-g	SAR (W/kg) 10-g	Power Drift(dB)	Conducted Power (dBm)	Tune up Limit (dBm)	Scaled factor	Scaled SAR (W/kg) 1-g	Scaled SAR (W/kg) 10-g	Liquid Temp	SAR limit (W/kg)
Extremity Test data(Separate 0mm)													
Front side	GPRS 2TS	661/1880	1:4.15	0.141	0.067	-0.15	28.87	29.5	1.156	0.163	0.077	22.3	4
Back side	GPRS 2TS	661/1880	1:4.15	1.860	1.020	0.06	28.87	29.5	1.156	2.150	<b>1.179</b>	22.3	4
Left side	GPRS 2TS	661/1880	1:4.15	0.114	0.069	-0.15	28.87	29.5	1.156	0.132	0.079	22.3	4
Right side	GPRS 2TS	661/1880	1:4.15	0.227	0.115	0.16	28.87	29.5	1.156	0.262	0.133	22.3	4
Top side	GPRS 2TS	661/1880	1:4.15	0.583	0.313	-0.1	28.87	29.5	1.156	0.674	0.362	22.3	4
Bottom side	GPRS 2TS	661/1880	1:4.15	0.022	0.008	0.12	28.87	29.5	1.156	0.025	0.009	22.3	4



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## 7.2.3 SAR Result Of WCDMA Band II

WCDMA Band II SAR Test Record													
Test position	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg) 1-g	SAR (W/kg) 10-g	Power Drift (dB)	Conducted Power (dBm)	Tune up Limit (dBm)	Scaled factor	Scaled SAR (W/kg) 1-g	Scaled SAR (W/kg) 10-g	Liquid Temp	SAR limit (W/kg)
Extremity Test data(Separate 0mm)													
Front side	RMC	9400/1880	1:1	0.216	0.119	0.19	23.78	24.5	1.180	0.255	0.140	22.3	4
Back side	RMC	9400/1880	1:1	3.42	1.88	-0.15	23.78	24.5	1.180	4.037	<b>2.219</b>	22.3	4
Left side	RMC	9400/1880	1:1	0.249	0.136	0.09	23.78	24.5	1.180	0.294	0.161	22.3	4
Right side	RMC	9400/1880	1:1	0.457	0.228	-0.16	23.78	24.5	1.180	0.539	0.269	22.3	4
Top side	RMC	9400/1880	1:1	1.41	0.689	0.19	23.78	24.5	1.180	1.664	0.813	22.3	4
Bottom side	RMC	9400/1880	1:1	0.059	0.024	-0.11	23.78	24.5	1.180	0.070	0.028	22.3	4
Back side	RMC	9262/1852.4	1:1	3.35	1.76	0.13	23.68	24.5	1.208	4.046	2.126	22.3	4
Back side	RMC	9538/1907.6	1:1	3.22	1.69	0.03	23.7	24.5	1.202	3.871	2.032	22.3	4

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## 7.2.4 SAR Result Of WCDMA Band V

WCDMA Band V SAR Test Record													
Test position	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg) 1-g	SAR (W/kg) 10-g	Power Drift (dB)	Conducted Power (dBm)	Tune up Limit (dBm)	Scaled factor	Scaled SAR (W/kg) 1-g	Scaled SAR (W/kg) 10-g	Liquid Temp	SAR limit (W/kg)
Extremity Test data(Separate 0mm)													
Front side	RMC	4233/846.6	1:1	0.058	0.036	0.03	23.08	24	1.236	0.072	0.045	22.1	4
Back side	RMC	4233/846.6	1:1	1.16	0.667	-0.19	23.08	24	1.236	1.434	<b>0.824</b>	22.1	4
Left side	RMC	4233/846.6	1:1	0.222	0.141	-0.14	23.08	24	1.236	0.274	0.174	22.1	4
Right side	RMC	4233/846.6	1:1	0.354	0.226	-0.17	23.08	24	1.236	0.438	0.279	22.1	4
Top side	RMC	4233/846.6	1:1	0.224	0.133	0.06	23.08	24	1.236	0.277	0.164	22.1	4
Bottom side	RMC	4233/846.6	1:1	0.05	0.028	0.1	23.08	24	1.236	0.062	0.035	22.1	4



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### 7.2.5 SAR Result Of WCDMA Band IV

WCDMA Band IV SAR Test Record													
Test position	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg) 1-g	SAR (W/kg) 10-g	Power Drift (dB)	Conducted Power (dBm)	Tune up Limit (dBm)	Scaled factor	Scaled SAR (W/kg) 1-g	Scaled SAR (W/kg) 10-g	Liquid Temp	SAR limit (W/kg)
Extremity Test data(Separate 0mm)													
Front side	RMC	1412/1732.4	1:1	0.065	0.039	0.16	22.26	23	1.186	0.077	0.046	22.2	4
Back side	RMC	1412/1732.4	1:1	3.040	1.68	0.03	22.26	23	1.186	3.605	1.992	22.2	4
Left side	RMC	1412/1732.4	1:1	0.353	0.209	-0.13	22.26	23	1.186	0.419	0.248	22.2	4
Right side	RMC	1412/1732.4	1:1	0.234	0.139	-0.1	22.26	23	1.186	0.277	0.165	22.2	4
Top side	RMC	1412/1732.4	1:1	0.509	0.265	-0.05	22.26	23	1.186	0.604	0.314	22.2	4
Bottom side	RMC	1412/1732.4	1:1	0.180	0.075	-0.01	22.26	23	1.186	0.213	0.089	22.2	4



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### 7.2.6 SAR Result Of LTE Band 2

LTE Band 2 SAR Test Record													
Test position	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg) 1-g	SAR (W/kg) 10-g	Power Drift (dB)	Conducted power (dBm)	Tune up Limit (dBm)	Scaled factor	Scaled SAR (W/kg) 1-g	Scaled SAR (W/kg) 10-g	Liquid Temp.	SAR limit (W/kg)
Extremity Test data(Separate 0mm)													
Front side	20M_QPSK 1RB_50	18900/1880	1:1	0.155	0.090	-0.06	23.88	24	1.028	0.159	0.092	22.3	4
Front side	20M_QPSK 50RB_25	18900/1880	1:1	0.123	0.071	-0.05	22.59	23	1.099	0.135	0.078	22.3	4
Back side	20M_QPSK 1RB_50	18900/1880	1:1	3.290	1.810	0.09	23.88	24	1.028	3.382	1.861	22.3	4
Back side	20M_QPSK 50RB_25	18900/1880	1:1	2.613	1.438	-0.16	22.59	23	1.099	2.872	1.580	22.3	4
Left side	20M_QPSK 1RB_50	18900/1880	1:1	0.292	0.174	-0.08	23.88	24	1.028	0.300	0.179	22.3	4
Left side	20M_QPSK 50RB_25	18900/1880	1:1	0.232	0.138	0.14	22.59	23	1.099	0.255	0.152	22.3	4
Right side	20M_QPSK 1RB_50	18900/1880	1:1	0.418	0.222	0.04	23.88	24	1.028	0.430	0.228	22.3	4
Right side	20M_QPSK 50RB_25	18900/1880	1:1	0.332	0.176	-0.14	22.59	23	1.099	0.365	0.193	22.3	4
Top side	20M_QPSK 1RB_50	18900/1880	1:1	1.230	0.655	0.14	23.88	24	1.028	1.264	0.673	22.3	4
Top side	20M_QPSK 50RB_25	18900/1880	1:1	0.977	0.520	-0.11	22.59	23	1.099	1.074	0.571	22.3	4
Bottom side	20M_QPSK 1RB_50	18900/1880	1:1	0.033	0.018	0.17	23.88	24	1.028	0.034	0.018	22.3	4
Bottom side	20M_QPSK 50RB_25	18900/1880	1:1	0.026	0.014	-0.12	22.59	23	1.099	0.029	0.015	22.3	4



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### 7.2.7 SAR Result Of LTE Band 4

LTE Band 4 SAR Test Record													
Test position	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg) 1-g	SAR (W/kg) 10-g	Power Drift (dB)	Conducted power (dBm)	Tune up Limit (dBm)	Scaled factor	Scaled SAR (W/kg) 1-g	Scaled SAR (W/kg) 10-g	Liquid Temp.	SAR limit (W/kg)
Extremity Test data(Separate 0mm)													
Front side	20M_QPSK 1RB_50	20300/1745	1:1	0.053	0.033	-0.06	22.94	23	1.014	0.054	0.033	22.2	4
Front side	20M_QPSK 50RB_0	20300/1745	1:1	0.047	0.029	0.09	21.78	22	1.052	0.049	0.031	22.2	4
Back side	20M_QPSK 1RB_50	20300/1745	1:1	2.42	1.36	0.06	22.94	23	1.014	2.454	<b>1.379</b>	22.2	4
Back side	20M_QPSK 50RB_0	20300/1745	1:1	2.157	1.212	0.04	21.78	22	1.052	2.269	1.275	22.2	4
Left side	20M_QPSK 1RB_50	20300/1745	1:1	0.444	0.265	0.12	22.94	23	1.014	0.450	0.269	22.2	4
Left side	20M_QPSK 50RB_0	20300/1745	1:1	0.396	0.236	0.19	21.78	22	1.052	0.417	0.248	22.2	4
Right side	20M_QPSK 1RB_50	20300/1745	1:1	0.196	0.121	-0.17	22.94	23	1.014	0.199	0.123	22.2	4
Right side	20M_QPSK 50RB_0	20300/1745	1:1	0.175	0.108	0.17	21.78	22	1.052	0.184	0.114	22.2	4
Top side	20M_QPSK 1RB_50	20300/1745	1:1	0.491	0.268	0.04	22.94	23	1.014	0.498	0.272	22.2	4
Top side	20M_QPSK 50RB_0	20300/1745	1:1	0.438	0.239	0.05	21.78	22	1.052	0.461	0.251	22.2	4
Bottom side	20M_QPSK 1RB_50	20300/1745	1:1	0.014	0.008	-0.11	22.94	23	1.014	0.014	0.008	22.2	4
Bottom side	20M_QPSK 50RB_0	20300/1745	1:1	0.012	0.007	0.02	21.78	22	1.052	0.013	0.007	22.2	4



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### 7.2.8 SAR Result Of LTE Band 5

LTE Band 5 SAR Test Record													
Test position	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg) 1-g	SAR (W/kg) 10-g	Power Drift (dB)	Conducted power (dBm)	Tune up Limit (dBm)	Scaled factor	Scaled SAR (W/kg) 1-g	Scaled SAR (W/kg) 10-g	Liquid Temp.	SAR limit (W/kg)
Extremity Test data(Separate 0mm)													
Front side	20M_QPSK 1RB_25	20600/844	1:1	0.089	0.04	0.14	23.34	23.5	1.038	0.092	0.042	22.1	4
Front side	20M_QPSK 25RB_13	20600/844	1:1	0.079	0.036	-0.01	22.32	22.5	1.042	0.082	0.038	22.1	4
Back side	20M_QPSK 1RB_25	20600/844	1:1	1.28	0.713	-0.19	23.34	23.5	1.038	1.328	<b>0.740</b>	22.1	4
Back side	20M_QPSK 25RB_13	20600/844	1:1	1.141	0.635	-0.03	22.32	22.5	1.042	1.189	0.662	22.1	4
Left side	20M_QPSK 1RB_25	20600/844	1:1	0.192	0.126	-0.04	23.34	23.5	1.038	0.199	0.131	22.1	4
Left side	20M_QPSK 25RB_13	20600/844	1:1	0.171	0.112	0.15	22.32	22.5	1.042	0.178	0.117	22.1	4
Right side	20M_QPSK 1RB_25	20600/844	1:1	0.379	0.248	0.17	23.34	23.5	1.038	0.393	0.257	22.1	4
Right side	20M_QPSK 25RB_13	20600/844	1:1	0.338	0.221	-0.08	22.32	22.5	1.042	0.352	0.230	22.1	4
Top side	20M_QPSK 1RB_25	20600/844	1:1	0.225	0.14	-0.1	23.34	23.5	1.038	0.233	0.145	22.1	4
Top side	20M_QPSK 25RB_13	20600/844	1:1	0.201	0.125	-0.06	22.32	22.5	1.042	0.210	0.130	22.1	4
Bottom side	20M_QPSK 1RB_25	20600/844	1:1	0.019	0.012	0.08	23.34	23.5	1.038	0.019	0.013	22.1	4
Bottom side	20M_QPSK 25RB_13	20600/844	1:1	0.017	0.011	-0.03	22.32	22.5	1.042	0.018	0.011	22.1	4



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### 7.2.9 SAR Result Of LTE Band 7

LTE Band 7 SAR Test Record													
Test position	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg) 1-g	SAR (W/kg) 10-g	Power Drift (dB)	Conducted power (dBm)	Tune up Limit (dBm)	Scaled factor	Scaled SAR (W/kg) 1-g	Scaled SAR (W/kg) 10-g	Liquid Temp.	SAR limit (W/kg)
Extremity Test data(Separate 0mm)													
Front side	20M_QPSK 1RB_50	21100/2535.5	1:1	0.067	0.039	-0.04	23.98	24	1.005	0.068	0.039	22.1	4
Front side	20M_QPSK 50RB_25	21100/2535.5	1:1	0.060	0.035	-0.01	22.79	23	1.050	0.063	0.037	22.1	4
Back side	20M_QPSK 1RB_50	21100/2535.5	1:1	5.100	2.310	-0.05	23.98	24	1.005	5.124	2.321	22.1	4
Back side	20M_QPSK 50RB_25	21100/2535.5	1:1	4.545	2.059	0.07	22.79	23	1.050	4.770	2.161	22.1	4
Left side	20M_QPSK 1RB_50	21100/2535.5	1:1	0.250	0.142	0.02	23.98	24	1.005	0.251	0.143	22.1	4
Left side	20M_QPSK 50RB_25	21100/2535.5	1:1	0.223	0.127	0.03	22.79	23	1.050	0.234	0.133	22.1	4
Right side	20M_QPSK 1RB_50	21100/2535.5	1:1	0.349	0.177	-0.17	23.98	24	1.005	0.351	0.178	22.1	4
Right side	20M_QPSK 50RB_25	21100/2535.5	1:1	0.311	0.158	0.11	22.79	23	1.050	0.326	0.166	22.1	4
Top side	20M_QPSK 1RB_50	21100/2535.5	1:1	0.508	0.221	0.12	23.98	24	1.005	0.510	0.222	22.1	4
Top side	20M_QPSK 50RB_25	21100/2535.5	1:1	0.453	0.197	0.14	22.79	23	1.050	0.475	0.207	22.1	4
Bottom side	20M_QPSK 1RB_50	21100/2535.5	1:1	0.010	0.005	0.09	23.98	24	1.005	0.010	0.005	22.1	4
Bottom side	20M_QPSK 50RB_25	21100/2535.5	1:1	0.009	0.004	0.04	22.79	23	1.050	0.009	0.004	22.1	4
Back side	20M_QPSK 1RB_50	20850/2510	1:1	4.640	2.110	-0.08	23.75	24	1.059	4.915	2.235	22.1	4
Back side	20M_QPSK 1RB_50	21350/2560	1:1	4.780	2.230	-0.03	23.83	24	1.040	4.971	2.319	22.1	4
Back side	20M_QPSK 50RB_25	20850/2510	1:1	4.360	1.970	-0.02	22.65	23	1.084	4.726	2.135	22.1	4
Back side	20M_QPSK 50RB_25	21350/2560	1:1	4.440	1.980	0.09	22.68	23	1.076	4.780	2.131	22.1	4



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### 7.2.10 SAR Result Of LTE Band 38

LTE Band 38 SAR Test Record													
Test position	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg) 1-g	SAR (W/kg) 10-g	Power Drift (dB)	Conducted power (dBm)	Tune up Limit (dBm)	Scaled factor	Scaled SAR (W/kg) 1-g	Scaled SAR (W/kg) 10-g	Liquid Temp.	SAR limit (W/kg)
Extremity Test data(Separate 0mm)													
Front side	20M_QPSK 1RB_50	38000/2595	1:1	0.059	0.031	0.19	23.83	24	1.040	0.061	0.033	22.1	4
Front side	20M_QPSK 50RB_0	38000/2595	1:1	0.052	0.028	-0.01	22.71	23	1.069	0.056	0.030	22.1	4
Back side	20M_QPSK 1RB_50	38000/2595	1:1	3.010	1.270	0.07	23.83	24	1.040	3.130	1.321	22.1	4
Back side	20M_QPSK 50RB_0	38000/2595	1:1	2.683	1.132	-0.05	22.71	23	1.069	2.868	1.210	22.1	4
Left side	20M_QPSK 1RB_50	38000/2595	1:1	0.142	0.083	0.12	23.83	24	1.040	0.148	0.086	22.1	4
Left side	20M_QPSK 50RB_0	38000/2595	1:1	0.127	0.074	-0.16	22.71	23	1.069	0.136	0.079	22.1	4
Right side	20M_QPSK 1RB_50	38000/2595	1:1	0.199	0.105	0.07	23.83	24	1.040	0.207	0.109	22.1	4
Right side	20M_QPSK 50RB_0	38000/2595	1:1	0.177	0.094	-0.19	22.71	23	1.069	0.189	0.100	22.1	4
Top side	20M_QPSK 1RB_50	38000/2595	1:1	0.287	0.128	-0.01	23.83	24	1.040	0.298	0.133	22.1	4
Top side	20M_QPSK 50RB_0	38000/2595	1:1	0.256	0.114	0.17	22.71	23	1.069	0.274	0.122	22.1	4
Bottom side	20M_QPSK 1RB_50	38000/2595	1:1	0.006	0.003	0.02	23.83	24	1.040	0.006	0.003	22.1	4
Bottom side	20M_QPSK 50RB_0	38000/2595	1:1	0.004	0.002	0.07	22.71	23	1.069	0.004	0.002	22.1	4



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### 7.2.11 SAR Result Of 2.4GHz Wi-Fi

Wi-Fi 2.4G SAR Test Record													
Test position	Test mode	Test Ch./Freq.	Duty Cycle	Duty Cycle Scaled factor	SAR (W/kg)1-g	SAR (W/kg)10-g	Power drift(dB)	Conducted power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR(W/kg)	Liquid Temp.	SAR limit (W/kg)
Extremity Test data(Separate 0mm)													
Front side	802.11b	6/2437	98.89%	1.011	0.177	0.074	0.13	16.79	17.00	1.050	0.078	22.0	4
Back side	802.11b	6/2437	98.89%	1.011	0.037	0.020	0.14	16.79	17.00	1.050	0.021	22.0	4
Left side	802.11b	6/2437	98.89%	1.011	0.060	0.027	-0.17	16.79	17.00	1.050	0.029	22.0	4
Right side	802.11b	6/2437	98.89%	1.011	0.781	0.273	0.01	16.79	17.00	1.050	<b>0.290</b>	22.0	4
Top side	802.11b	6/2437	98.89%	1.011	0.007	0.004	-0.19	16.79	17.00	1.050	0.004	22.0	4
Bottom side	802.11b	6/2437	98.89%	1.011	0.020	0.010	-0.08	16.79	17.00	1.050	0.011	22.0	4



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## 7.2.12SAR Result Of Bluetooth

Bluetooth SAR Test Record													
Test position	Test mode	Test Ch./Freq.	Duty Cycle	Duty Cycle Scaled factor	SAR (W/kg) 1-g	SAR (W/kg) 10-g	Power drift(dB)	Conducted power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR(W/kg)	Liquid Temp.	SAR limit (W/kg)
Extremity Test data(Separate 0mm)													
Front side	8DPSK	39/2441	62.88%	1.59	0.046	0.024	0.03	10.91	11.00	1.021	0.039	22.0	4
Back side	8DPSK	39/2441	62.88%	1.59	0.011	0.006	0.14	10.91	11.00	1.021	0.010	22.0	4
Left side	8DPSK	39/2441	62.88%	1.59	0.002	0.003	0.19	10.91	11.00	1.021	0.005	22.0	4
Right side	8DPSK	39/2441	62.88%	1.59	0.309	0.117	-0.03	10.91	11.00	1.021	0.190	22.0	4
Top side	8DPSK	39/2441	62.88%	1.59	0.001	0.001	-0.07	10.91	11.00	1.021	0.002	22.0	4
Bottom side	8DPSK	39/2441	62.88%	1.59	0.016	0.004	-0.10	10.91	11.00	1.021	0.006	22.0	4



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### 7.2.13 SAR Result Of 5G WiFi

Wi-Fi 5G SAR Test Record														
Test position	Test mode	Test Ch./Freq.	Duty Cycle %	Duty Cycle Scaled factor	SAR (W/kg) 1-g	SAR (W/kg) 1-g	Power drift (dB)	Conducted power (dBm)	Tune up Limit (dBm)	Scaled factor	Scaled SAR (W/kg) 1-g	Scaled SAR (W/kg) 10-g	Liquid Temp.	SAR limit (W/kg)
Extremity Test data(Separate 0mm)														
Front side	802.11a	36/5180	98.31	1.017	0.477	0.123	-0.17	14.83	15	1.040	0.504	0.130	22.2	4
Back side	802.11a	36/5180	98.31	1.017	0.123	0.051	-0.07	14.83	15	1.040	0.130	0.054	22.2	4
Left side	802.11a	36/5180	98.31	1.017	0.057	0.015	0.15	14.83	15	1.040	0.060	0.016	22.2	4
Right side	802.11a	36/5180	98.31	1.017	3.78	0.664	-0.03	14.83	15	1.040	3.998	<b>0.702</b>	22.2	4
Top side	802.11a	36/5180	98.31	1.017	0.045	0.018	-0.18	14.83	15	1.040	0.048	0.019	22.2	4
Bottom side	802.11a	36/5180	98.31	1.017	0.186	0.041	-0.19	14.83	15	1.040	0.197	0.043	22.2	4
Extremity Test data(Separate 0mm)														
Front side	802.11a	140/5700	98.31	1.017	0.214	0.058	0.07	11.85	12	1.035	0.225	0.061	22.2	4
Back side	802.11a	140/5700	98.31	1.017	0.081	0.021	-0.12	11.85	12	1.035	0.085	0.022	22.2	4
Left side	802.11a	140/5700	98.31	1.017	0.025	0.016	0.08	11.85	12	1.035	0.026	0.017	22.2	4
Right side	802.11a	140/5700	98.31	1.017	1.32	0.236	-0.01	11.85	12	1.035	1.390	<b>0.248</b>	22.2	4
Top side	802.11a	140/5700	98.31	1.017	0.018	0.008	-0.19	11.85	12	1.035	0.019	0.008	22.2	4
Bottom side	802.11a	140/5700	98.31	1.017	0.018	0.007	0.15	11.85	12	1.035	0.018	0.007	22.2	4
Extremity Test data(Separate 0mm)														
Front side	802.11a	157/5785	98.31	1.017	0.041	0.013	-0.04	13.41	14	1.146	0.048	0.015	22.2	4
Back side	802.11a	157/5785	98.31	1.017	0.031	0.012	0.11	13.41	14	1.146	0.036	0.014	22.2	4
Left side	802.11a	157/5785	98.31	1.017	0.029	0.008	0.1	13.41	14	1.146	0.034	0.009	22.2	4
Right side	802.11a	157/5785	98.31	1.017	1.1	0.199	-0.11	13.41	14	1.146	1.281	<b>0.232</b>	22.2	4
Top side	802.11a	157/5785	98.31	1.017	0.021	0.006	-0.06	13.41	14	1.146	0.024	0.007	22.2	4
Bottom side	802.11a	157/5785	98.31	1.017	0.032	0.01	-0.07	13.41	14	1.146	0.037	0.012	22.2	4



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## 7.3 Multiple Transmitter Evaluation

### 7.3.1 Simultaneous SAR test evaluation

#### Simultaneous Transmission

NO.	Simultaneous Transmission Configuration	Extremity
1	WWAN + WIFI 2.4GHz	Yes
2	WWAN + 5GHz	Yes
3	WWAN + BT	Yes
4	WIFI + BT (They share the same antenna and cannot transmit at the same time by design.)	No

#### Simultaneous Transmission SAR Summation Scenario for Extremity

WWAN Band	Exposure position	①MAX. WWAN SAR (W/kg)	②MAX. WLAN2.4G SAR (W/kg)	③MAX BT SAR (W/kg)	④MAX. WLAN5G SAR (W/kg)	Summed SAR ①+②	Summed SAR ①+③	Summed SAR ①+④	Volume scan
GSM850	Front	0.032	0.078	0.039	0.13	0.110	0.071	0.162	NO
	Back	<b>0.821</b>	0.021	0.010	0.054	0.842	0.831	0.875	NO
	Left	0.151	0.029	0.005	0.016	0.180	0.156	0.167	NO
	Right	0.34	0.29	0.190	0.702	0.630	0.530	1.042	NO
	Top	0.189	0.004	0.002	0.019	0.193	0.191	0.208	NO
	Bottom	0.018	0.011	0.006	0.043	0.029	0.024	0.061	NO
GSM1900	Front	0.077	0.078	0.039	0.13	0.155	0.116	0.207	NO
	Back	<b>1.179</b>	0.021	0.010	0.054	1.200	1.189	1.233	NO
	Left	0.079	0.029	0.005	0.016	0.108	0.084	0.095	NO
	Right	0.133	0.29	0.190	0.702	0.423	0.323	0.835	NO
	Top	0.362	0.004	0.002	0.019	0.366	0.364	0.381	NO
	Bottom	0.009	0.011	0.006	0.043	0.020	0.015	0.052	NO
WCDMA Band II	Front	0.14	0.078	0.039	0.13	0.218	0.179	0.270	NO
	Back	<b>2.219</b>	0.021	0.010	0.054	2.240	2.229	2.273	NO
	Left	0.161	0.029	0.005	0.016	0.190	0.166	0.177	NO
	Right	0.269	0.29	0.190	0.702	0.559	0.459	0.971	NO
	Top	0.813	0.004	0.002	0.019	0.817	0.815	0.832	NO
	Bottom	0.028	0.011	0.006	0.043	0.039	0.034	0.071	NO
WCDMA Band IV	Front	0.046	0.078	0.039	0.13	0.124	0.085	0.176	NO
	Back	<b>1.992</b>	0.021	0.010	0.054	2.013	2.002	2.046	NO
	Left	0.248	0.029	0.005	0.016	0.277	0.253	0.264	NO
	Right	0.165	0.29	0.190	0.702	0.455	0.355	0.867	NO
	Top	0.314	0.004	0.002	0.019	0.318	0.316	0.333	NO
	Bottom	0.089	0.011	0.006	0.043	0.100	0.095	0.132	NO





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WCDMA Band V	Front	0.045	0.078	0.039	0.13	0.123	0.084	0.175	NO
	Back	<b>0.824</b>	0.021	0.010	0.054	0.845	0.834	0.878	NO
	Left	0.174	0.029	0.005	0.016	0.203	0.179	0.190	NO
	Right	0.279	0.29	0.190	0.702	0.569	0.469	0.981	NO
	Top	0.164	0.004	0.002	0.019	0.168	0.166	0.183	NO
	Bottom	0.035	0.011	0.006	0.043	0.046	0.041	0.078	NO
LTE Band 2	Front	0.092	0.078	0.039	0.13	0.170	0.131	0.222	NO
	Back	<b>1.861</b>	0.021	0.010	0.054	1.882	1.871	1.915	NO
	Left	0.179	0.029	0.005	0.016	0.208	0.184	0.195	NO
	Right	0.228	0.29	0.190	0.702	0.518	0.418	0.930	NO
	Top	0.673	0.004	0.002	0.019	0.677	0.675	0.692	NO
	Bottom	0.018	0.011	0.006	0.043	0.029	0.024	0.061	NO
LTE Band 4	Front	0.033	0.078	0.039	0.13	0.111	0.072	0.163	NO
	Back	<b>1.379</b>	0.021	0.010	0.054	1.400	1.389	1.433	NO
	Left	0.269	0.029	0.005	0.016	0.298	0.274	0.285	NO
	Right	0.123	0.29	0.190	0.702	0.413	0.313	0.825	NO
	Top	0.272	0.004	0.002	0.019	0.276	0.274	0.291	NO
	Bottom	0.008	0.011	0.006	0.043	0.019	0.014	0.051	NO
LTE Band 5	Front	0.042	0.078	0.039	0.13	0.120	0.081	0.172	NO
	Back	<b>0.74</b>	0.021	0.010	0.054	0.761	0.750	0.794	NO
	Left	0.131	0.029	0.005	0.016	0.160	0.136	0.147	NO
	Right	0.257	0.29	0.190	0.702	0.547	0.447	0.959	NO
	Top	0.145	0.004	0.002	0.019	0.149	0.147	0.164	NO
	Bottom	0.013	0.011	0.006	0.043	0.024	0.019	0.056	NO
LTE Band 7	Front	0.039	0.078	0.039	0.13	0.117	0.078	0.169	NO
	Back	<b>2.321</b>	0.021	0.010	0.054	2.342	2.331	<b>2.375</b>	NO
	Left	0.143	0.029	0.005	0.016	0.172	0.148	0.159	NO
	Right	0.178	0.29	0.190	0.702	0.468	0.368	0.880	NO
	Top	0.222	0.004	0.002	0.019	0.226	0.224	0.241	NO
	Bottom	0.005	0.011	0.006	0.043	0.016	0.011	0.048	NO
LTE Band 38	Front	0.033	0.078	0.039	0.13	0.111	0.072	0.163	NO
	Back	<b>1.321</b>	0.021	0.010	0.054	1.342	1.331	1.375	NO
	Left	0.086	0.029	0.005	0.016	0.115	0.091	0.102	NO
	Right	0.109	0.29	0.190	0.702	0.399	0.299	0.811	NO
	Top	0.133	0.004	0.002	0.019	0.137	0.135	0.152	NO
	Bottom	0.003	0.011	0.006	0.043	0.014	0.009	0.046	NO



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### 8 Equipment list

Test Platform		SPEAG DASY5 Professional				
Location		SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch				
Software Reference		DASY52 52.8.4(1052); SEMCAD X 14.6.8(7028)				
Hardware Reference						
Equipment		Manufacturer	Model	Serial Number	Calibration Date	Due date of calibration
<input checked="" type="checkbox"/>	P C	DELL	Core(TM)i3-6100 3.7GHz	7LLVLG2	N/A	N/A
<input checked="" type="checkbox"/>	Signal Generator	Agilent	N5173B	MY53270267	2023/03/21	2024/03/20
<input checked="" type="checkbox"/>	S-Parameter Network Analyzer	Agilent	E5071C	MY46527453	2023/03/21	2024/03/20
<input checked="" type="checkbox"/>	DAK-3.5 probe	SPEAG	DAK-3.5	1102	N/A	N/A
<input checked="" type="checkbox"/>	Power sensor	KEYSIGHT	U2021XA	MY57110007	2023/03/21	2024/03/20
<input checked="" type="checkbox"/>	universal Radio communication tester	R&S	CMW500	154501	2023/03/20	2024/03/19
<input checked="" type="checkbox"/>	DAE	SPEAG	DAE4	760	2023/06/26	2024/06/25
<input checked="" type="checkbox"/>	E-field PROBE	SPEAG	EX3DV4	7380	2023/06/21	2024/06/20
<input checked="" type="checkbox"/>	Dipole	SPEAG	D835V2	4d042	2022/06/08	2025/06/07
<input checked="" type="checkbox"/>	Dipole	SPEAG	D1800V2	254	2022/06/16	2025/06/15
<input checked="" type="checkbox"/>	Dipole	SPEAG	D1950V3	1138	2022/10/31	2025/10/30
<input checked="" type="checkbox"/>	Dipole	SPEAG	D2450V2	955	2022/06/06	2025/06/05
<input checked="" type="checkbox"/>	Dipole	SPEAG	D2600V2	1125	2022/06/14	2025/06/13
<input checked="" type="checkbox"/>	Dipole	SPEAG	D5GHzV2	1042	2022/06/01	2025/05/31
<input checked="" type="checkbox"/>	Electro Thermometer	MITIR	N/A	N/A	2023/03/23	2024/04/22
<input checked="" type="checkbox"/>	Amplifier	Mini-circuits	ZVE-3W-83+	857501833	N/A	N/A
<input checked="" type="checkbox"/>	Amplifier	Mini-circuits	ZHL-42W	A0950002	N/A	N/A
<input checked="" type="checkbox"/>	3db ATTENUATOR	SHX	SMA-3dB-6G	12021302	N/A	N/A
<input checked="" type="checkbox"/>	DUMMY PROBE	SPEAG	DP_2	SPDP2001AA	N/A	N/A
<input checked="" type="checkbox"/>	Dual Directional Coupler	Agilent	772D	MY46151275	N/A	N/A
<input checked="" type="checkbox"/>	SAM PHANTOM (ELI4 v4.0)	SPEAG	QDOVA001BB	1102	N/A	N/A
<input checked="" type="checkbox"/>	ELI V8.0	SPEAG	QDOVA004AA	2062	N/A	N/A
<input checked="" type="checkbox"/>	Twin SAM Phantom	SPEAG	QD000P40CD	1673	N/A	N/A
	Twin Phantom	SPEAG	QD000P40CB	1438	N/A	N/A
<input checked="" type="checkbox"/>	ROBOT KRC	SPEAG	CS8	SP1/D/211/421/00	N/A	N/A
<input checked="" type="checkbox"/>	LIQUID CALIBRATION KIT	ANTENNESSA	41/05 OCP9	00425167	N/A	N/A

Note: All the equipments are within the valid period when the tests are performed.

All measurement facilities used to collect the measurement data are located at

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### 9 Calibration certificate

Please see the Appendix C

### 10 Photographs

Please see the Appendix D





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### Appendix A: Detailed System Check Results

The plots of worse case are showing as followings.



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Date: 2023/7/18

Test Laboratory: SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch

**SystemPerformanceCheck-D835**

**DUT: Dipole 835 MHz; Type: D835V2; Serial:4d042**

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1

Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.922 \text{ S/m}$ ;  $\epsilon_r = 42.121$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7380; ConvF(9.62, 9.62, 9.62); Calibrated: 2023/6/21;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn760; Calibrated: 2023/6/26
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1673
- Measurement SW: DASY52, Version 52.8 (4); SEMCAD X Version 14.6.8 (7028)

**System Performance Check at Frequencies Low 1 GHz/d=15mm, Pin=250 mW, dist=3.0mm (EX-Probe)/Area Scan (7x12x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 3.35 W/kg

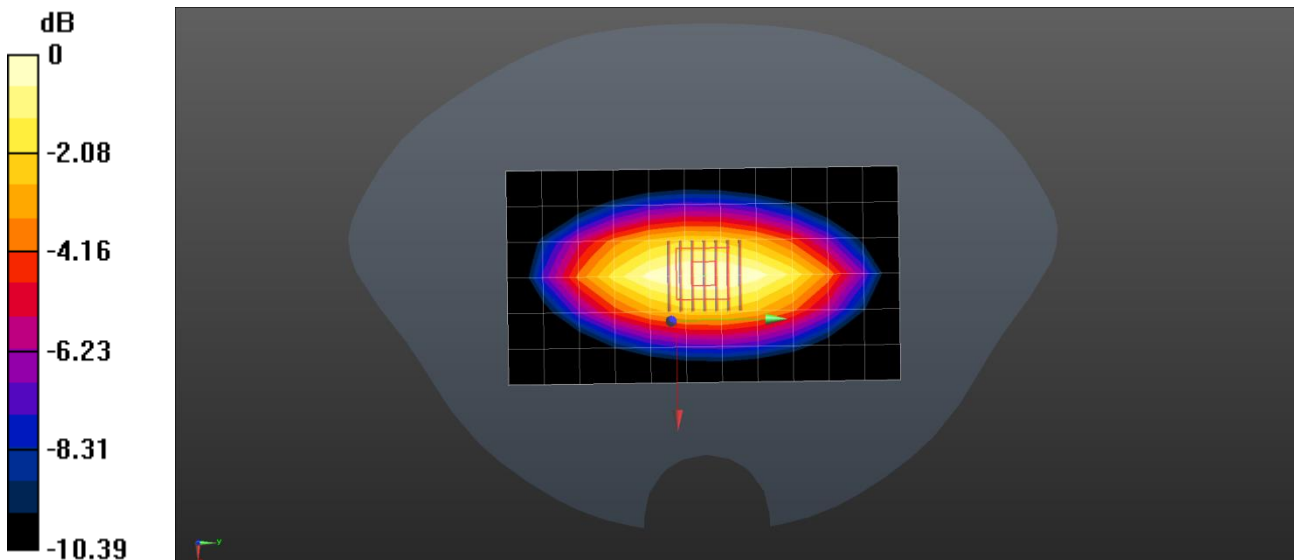
**System Performance Check at Frequencies Low 1 GHz/d=15mm, Pin=250 mW, dist=3.0mm (EX-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 62.474 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 3.65 W/kg

**SAR(1 g) = 2.36 W/kg; SAR(10 g) = 1.58 W/kg**

Maximum value of SAR (measured) = 3.10 W/kg



0 dB = 3.10 W/kg = 4.91 dBW/kg



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Test Laboratory: SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch

**SystemPerformanceCheck-D1800**

**DUT: Dipole 1800 MHz; Type: D1800V2; Serial:254**

Communication System: CW; Frequency: 1800 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1800 \text{ MHz}$ ;  $\sigma = 1.383 \text{ S/m}$ ;  $\epsilon_r = 39.873$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7380; ConvF(8.35, 8.35, 8.35); Calibrated: 2023/6/21;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn760; Calibrated: 2023/6/26
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1673
- Measurement SW: DASY52, Version 52.8 (4); SEMCAD X Version 14.6.8 (7028)

**System Performance Check at Frequencies above 1 GHz/d=10mm, Pin=250 mW, dist=3.0mm (EX-Probe)/Area Scan (7x7x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 11.1 W/kg

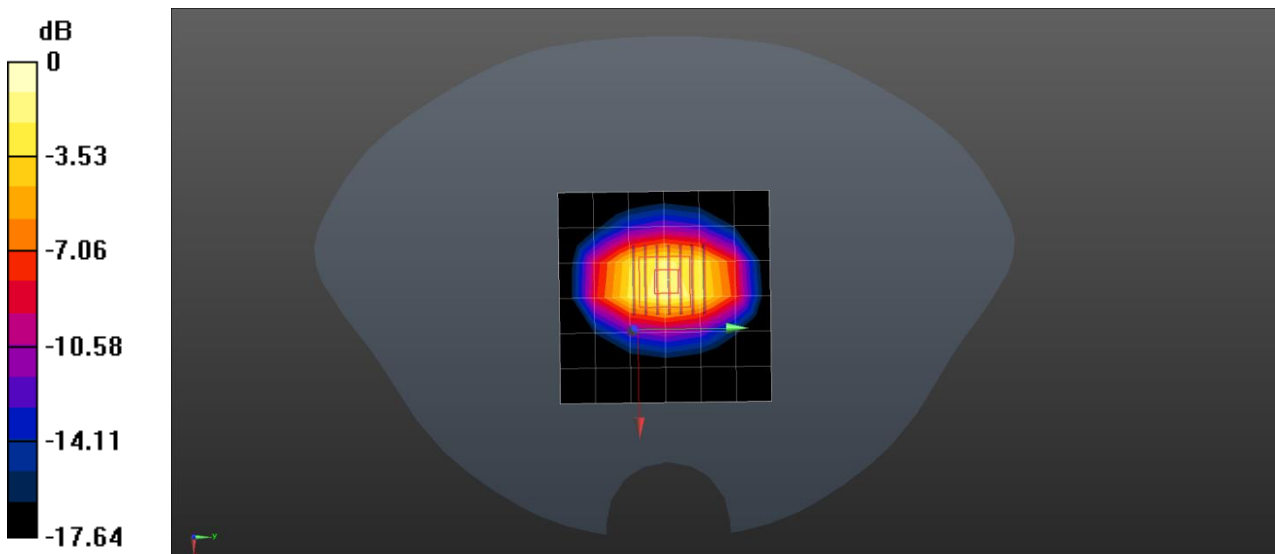
**System Performance Check at Frequencies above 1 GHz/d=10mm, Pin=250 mW, dist=3.0mm (EX-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 106.1 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 20.1 W/kg

**SAR(1 g) = 9.88 W/kg; SAR(10 g) = 5.19 W/kg**

Maximum value of SAR (measured) = 15.6 W/kg



0 dB = 15.6 W/kg = 11.93 dBW/kg



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### System Performance Check 1950 MHz

DUT: Dipole 1950 MHz; Type: D1950V2; Serial: 1138

Communication System: CW (0); Frequency: 1950 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1950$  MHz;  $\sigma = 1.41$  S/m;  $\epsilon_r = 40.089$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

### DASY5 Configuration:

- Probe: EX3DV4 - SN7380; ConvF(8.05, 8.05, 8.05); Calibrated: 2023/6/21;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn760; Calibrated: 2023/6/26
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1673
- Measurement SW: DASY52, Version 52.8 (4); SEMCAD X Version 14.6.8 (7028)

Body/d=10mm, Pin=250mW/Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 10.0 W/kg

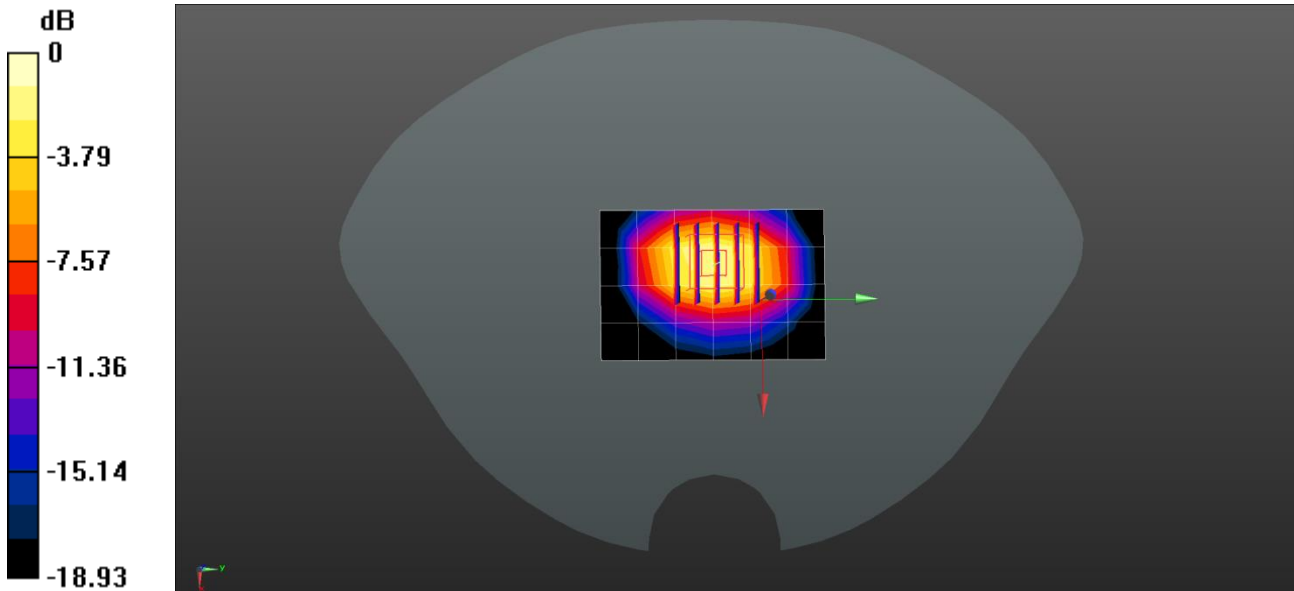
Body/d=10mm, Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 75.458 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 20.1 W/kg

SAR(1 g) = 10.1 W/kg; SAR(10 g) = 5.19 W/kg

Maximum value of SAR (measured) = 13.5 W/kg



0 dB = 13.5 W/kg = 11.30 dBW/kg



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### System Performance Check 2450MHz

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 955

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.817$  S/m;  $\epsilon_r = 39.995$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

### DASY5 Configuration:

- Probe: EX3DV4 - SN7380; ConvF(7.50, 7.50, 7.50); Calibrated: 2023/6/21;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn760; Calibrated: 2023/6/26
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1673
- Measurement SW: DASY52, Version 52.8 (4); SEMCAD X Version 14.6.8 (7028)

Body/d=10mm, Pin=250mW/Area Scan (8x8x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (measured) = 19.9 W/kg

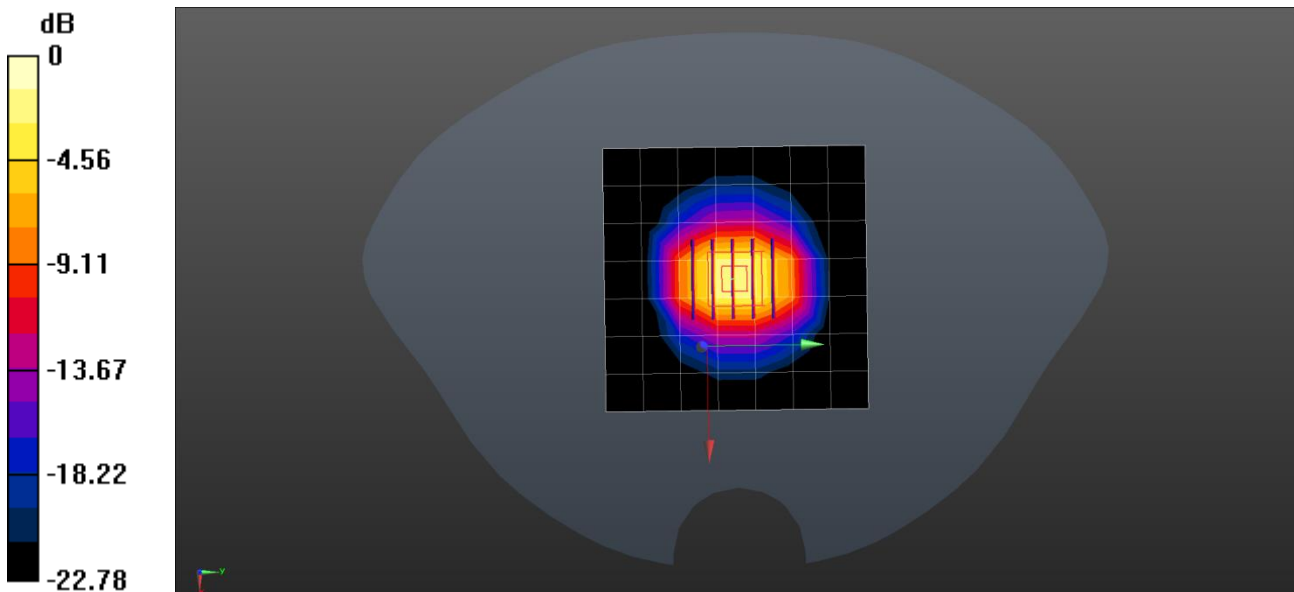
Body/d=10mm, Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 118.4 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 45.1 W/kg

SAR(1 g) = 13.1 W/kg; SAR(10 g) = 6.12 W/kg

Maximum value of SAR (measured) = 36.9 W/kg



0 dB = 36.9 W/kg = 15.67 dBW/kg



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### System Performance Check 2600MHz

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: 1125

Communication System: CW (0); Frequency: 2600 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 2600$  MHz;  $\sigma = 1.967$  S/m;  $\epsilon_r = 39.725$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

### DASY5 Configuration:

- Probe: EX3DV4 - SN7380; ConvF(7.35, 7.35, 7.35); Calibrated: 2023/6/21;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn760; Calibrated: 2023/6/26
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1673
- Measurement SW: DASY52, Version 52.8 (4); SEMCAD X Version 14.6.8 (7028)

Body/d=10mm, Pin=250mW/Area Scan (5x8x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (measured) = 25.4 W/kg

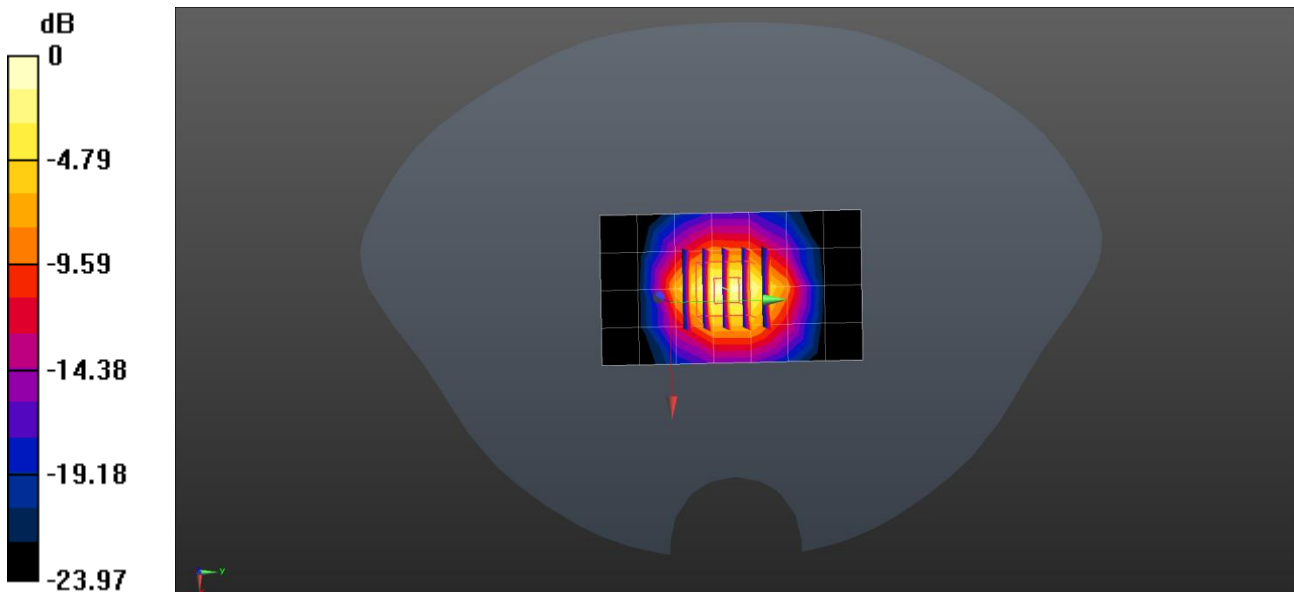
Body/d=10mm, Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 97.696 V/m; Power Drift = -0.10 dB

Peak SAR (extrapolated) = 36.8 W/kg

SAR(1 g) = 14.4 W/kg; SAR(10 g) = 6.33 W/kg

Maximum value of SAR (measured) = 29.6 W/kg



0 dB = 29.6 W/kg = 14.71 dBW/kg



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### System Performance Check 5.25GHz

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: 1042

Communication System: CW (0); Frequency: 5250 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 5250$  MHz;  $\sigma = 4.72$  S/m;  $\epsilon_r = 36.74$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

### DASY5 Configuration:

- Probe: EX3DV4 - SN7380; ConvF(5.45, 5.45, 5.45); Calibrated: 2023/6/21;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn760; Calibrated: 2023/6/26
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1673
- Measurement SW: DASY52, Version 52.8 (4); SEMCAD X Version 14.6.8 (7028)

Body/d=10mm, Pin=100mW, f=5250 MHz/Area Scan (8x11x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 24.4 W/kg

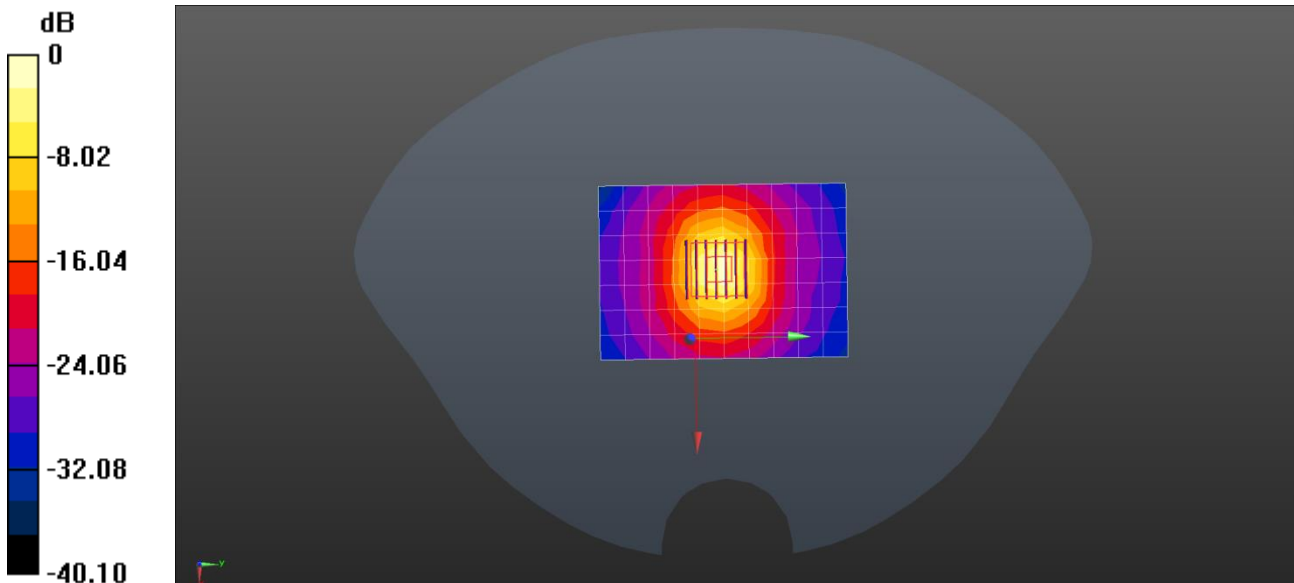
Body/d=10mm, Pin=100mW, f=5250 MHz/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 89.135 V/m; Power Drift = -0.12 dB

Peak SAR (extrapolated) = 51.8 W/kg

SAR(1 g) = 7.76 W/kg; SAR(10 g) = 2.19 W/kg

Maximum value of SAR (measured) = 32.6 W/kg



0 dB = 32.6 W/kg = 15.13 dBW/kg



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### System Performance Check 5.6GHz

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: 1042

Communication System: CW (0); Frequency: 5600 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 5600$  MHz;  $\sigma = 5.15$  S/m;  $\epsilon_r = 35.63$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

### DASY5 Configuration:

- Probe: EX3DV4 - SN7380; ConvF(4.86, 4.86, 4.86); Calibrated: 2023/6/21;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn760; Calibrated: 2023/6/26
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1673
- Measurement SW: DASY52, Version 52.8 (4); SEMCAD X Version 14.6.8 (7028)

Body/d=10mm, Pin=100mW, f=5600 MHz/Area Scan (8x11x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 26.3 W/kg

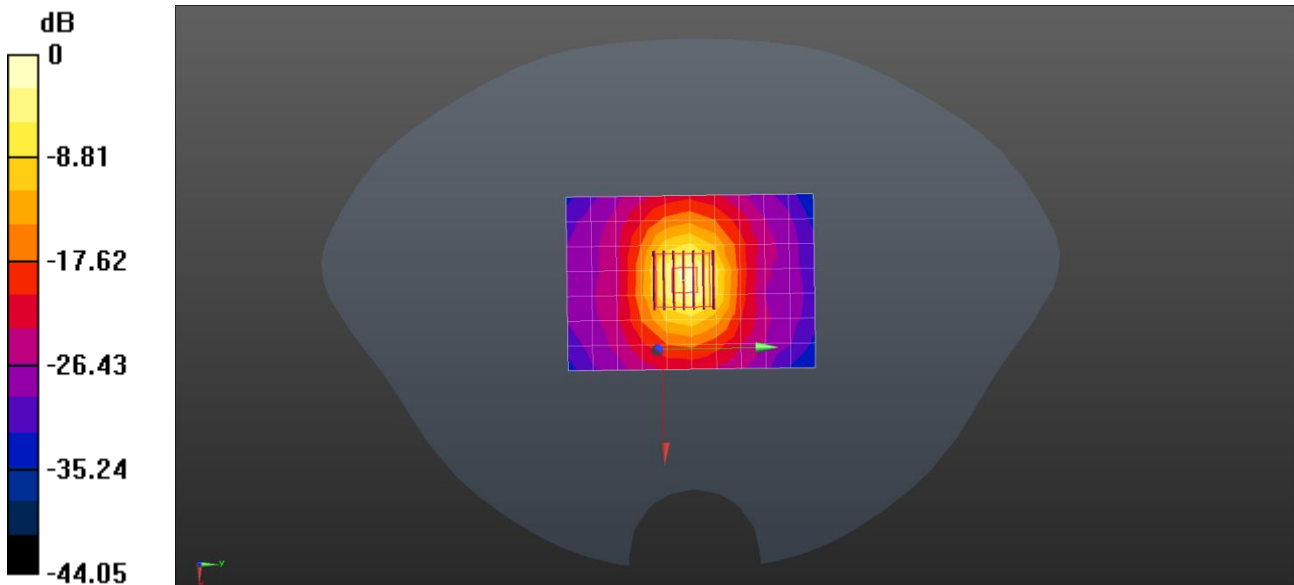
Body/d=10mm, Pin=100mW, f=5600 MHz/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 88.312 V/m; Power Drift = -0.17 dB

Peak SAR (extrapolated) = 57.2 W/kg

SAR(1 g) = 8.22 W/kg; SAR(10 g) = 2.37 W/kg

Maximum value of SAR (measured) = 34.8 W/kg



0 dB = 34.8 W/kg = 15.42 dBW/kg



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### System Performance Check 5.75GHz

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: 1042

Communication System: CW (0); Frequency: 5750 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 5750$  MHz;  $\sigma = 5.19$  S/m;  $\epsilon_r = 35.31$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

### DASY5 Configuration:

- Probe: EX3DV4 - SN7380; ConvF(4.96, 4.96, 4.96); Calibrated: 2023/6/21;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn760; Calibrated: 2023/6/26
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1673
- Measurement SW: DASY52, Version 52.8 (4); SEMCAD X Version 14.6.8 (7028)

Body/d=10mm, Pin=100mW, f=5750 MHz/Area Scan (8x11x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 26.8 W/kg

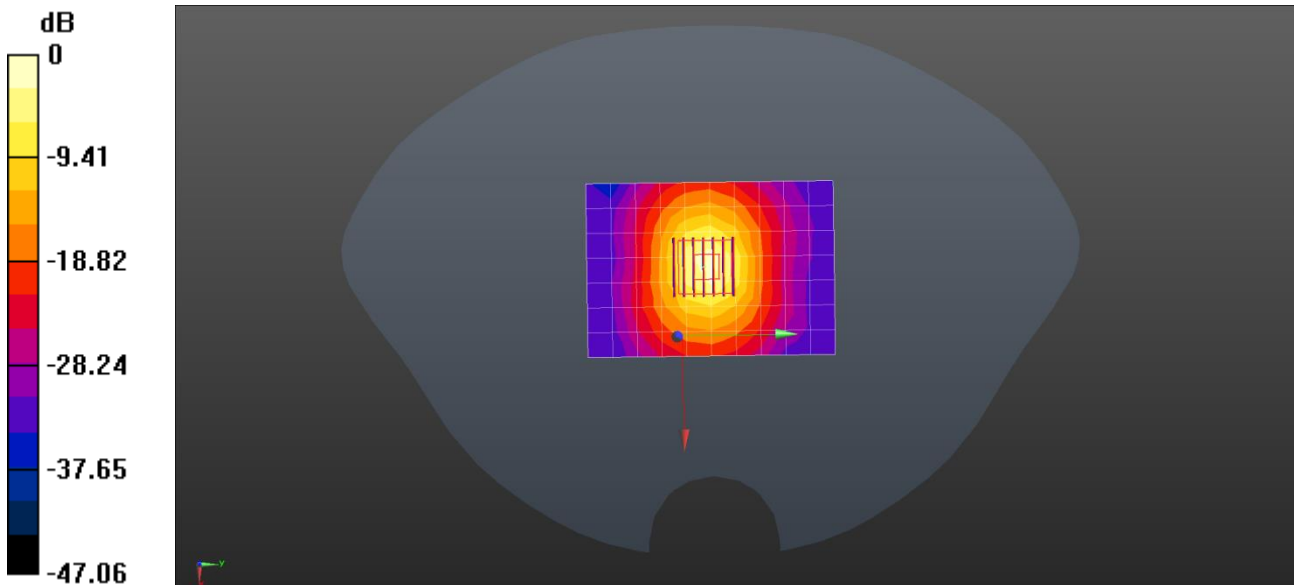
Body/d=10mm, Pin=100mW, f=5750 MHz/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 84.473 V/m; Power Drift = -0.15 dB

Peak SAR (extrapolated) = 56.7 W/kg

SAR(1 g) = 7.83 W/kg; SAR(10 g) = 2.24 W/kg

Maximum value of SAR (measured) = 32.9 W/kg



0 dB = 32.9 W/kg = 15.17 dBW/kg



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### Appendix B: Detailed Test Results

The plots of worse case are showing as followings.



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Test Laboratory: SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

**GSM850 GPRS 2TS Back Side 0mm Ch190**

**DUT: Android POS Terminal; Type: A99;**

Communication System: GPRS-2TX; Frequency: 836.6 MHz; Duty Cycle: 1:4.14954

Medium parameters used (interpolated):  $f = 836.6 \text{ MHz}$ ;  $\sigma = 0.933 \text{ S/m}$ ;  $\epsilon_r = 42.213$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7380; ConvF(9.62, 9.62, 9.62); Calibrated: 2023/6/21;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn760; Calibrated: 2023/6/26
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1673
- Measurement SW: DASY52, Version 52.8 (4); SEMCAD X Version 14.6.8 (7028)

**Body/Area Scan (8x15x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

Maximum value of SAR (measured) = 1.31 W/kg

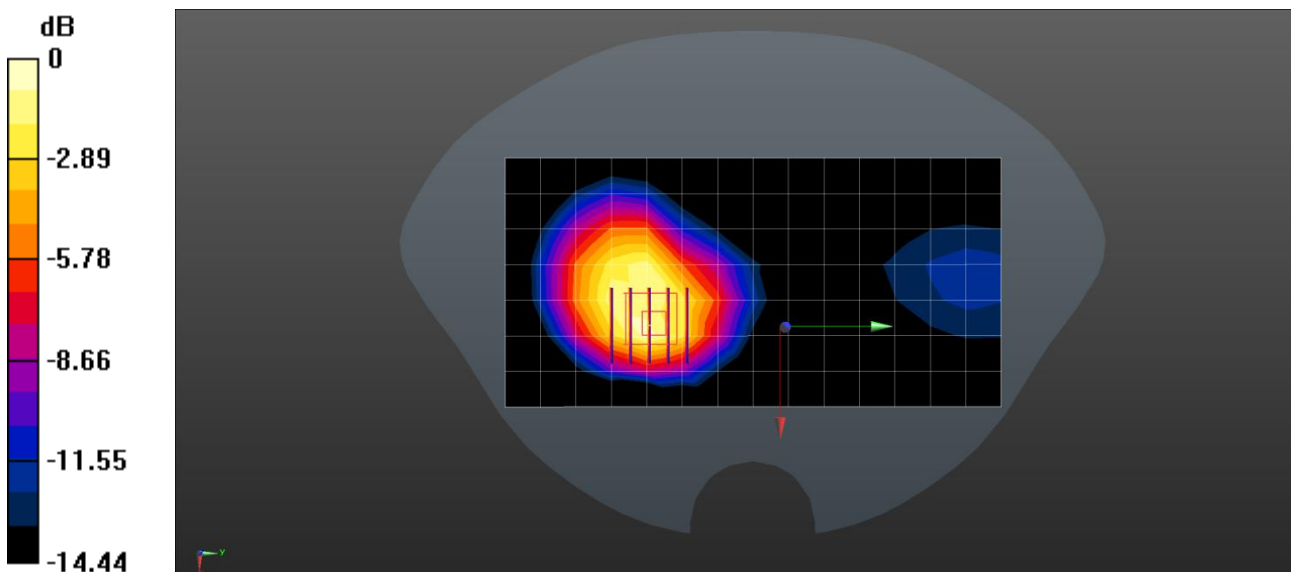
**Body/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 10.112 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 2.05 W/kg

**SAR(1 g) = 1.21 W/kg; SAR(10 g) = 0.705 W/kg**

Maximum value of SAR (measured) = 1.46 W/kg



0 dB = 1.46 W/kg = 1.64 dBW/kg



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Test Laboratory: SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

### GSM1900 GPRS 2TS Back Side 0mm Ch661

DUT: Android POS Terminal; Type: A99;

Communication System: GPRS-2TX; Frequency: 1880 MHz; Duty Cycle: 1:4.14954

Medium parameters used (interpolated):  $f = 1880 \text{ MHz}$ ;  $\sigma = 1.417 \text{ S/m}$ ;  $\epsilon_r = 40.165$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

### DASY5 Configuration:

- Probe: EX3DV4 - SN7380; ConvF(8.05, 8.05, 8.05); Calibrated: 2023/6/21;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn760; Calibrated: 2023/6/26
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1673
- Measurement SW: DASY52, Version 52.8 (4); SEMCAD X Version 14.6.8 (7028)

**Body/Area Scan (8x15x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

Maximum value of SAR (measured) = 1.73 W/kg

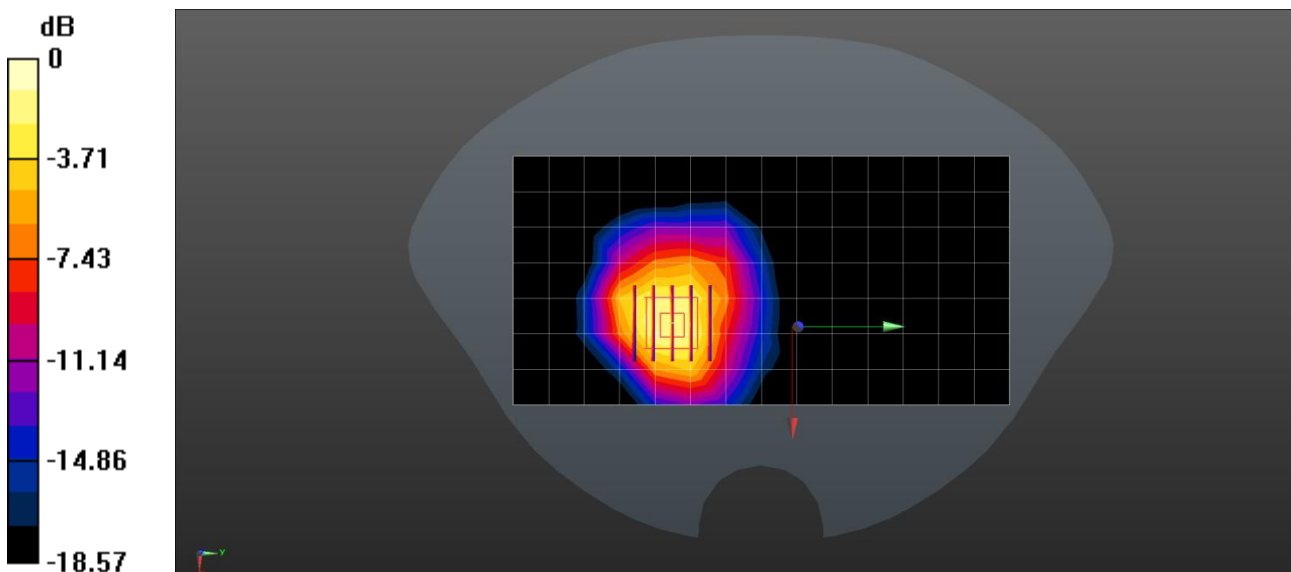
**Body/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 7.454 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 3.08 W/kg

**SAR(1 g) = 1.86 W/kg; SAR(10 g) = 1.02 W/kg**

Maximum value of SAR (measured) = 2.27 W/kg



0 dB = 2.27 W/kg = 3.56 dBW/kg



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### WCDMA Band 2 RMC Back Side 0mm Ch9400

DUT: Android POS Terminal; Type: A99;

Communication System: WCDMA; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1880 \text{ MHz}$ ;  $\sigma = 1.417 \text{ S/m}$ ;  $\epsilon_r = 40.165$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

### DASY5 Configuration:

- Probe: EX3DV4 - SN7380; ConvF(8.05, 8.05, 8.05); Calibrated: 2023/6/21;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn760; Calibrated: 2023/6/26
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1673
- Measurement SW: DASY52, Version 52.8 (4); SEMCAD X Version 14.6.8 (7028)

**Body/Area Scan (8x15x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

Maximum value of SAR (measured) = 4.07 W/kg

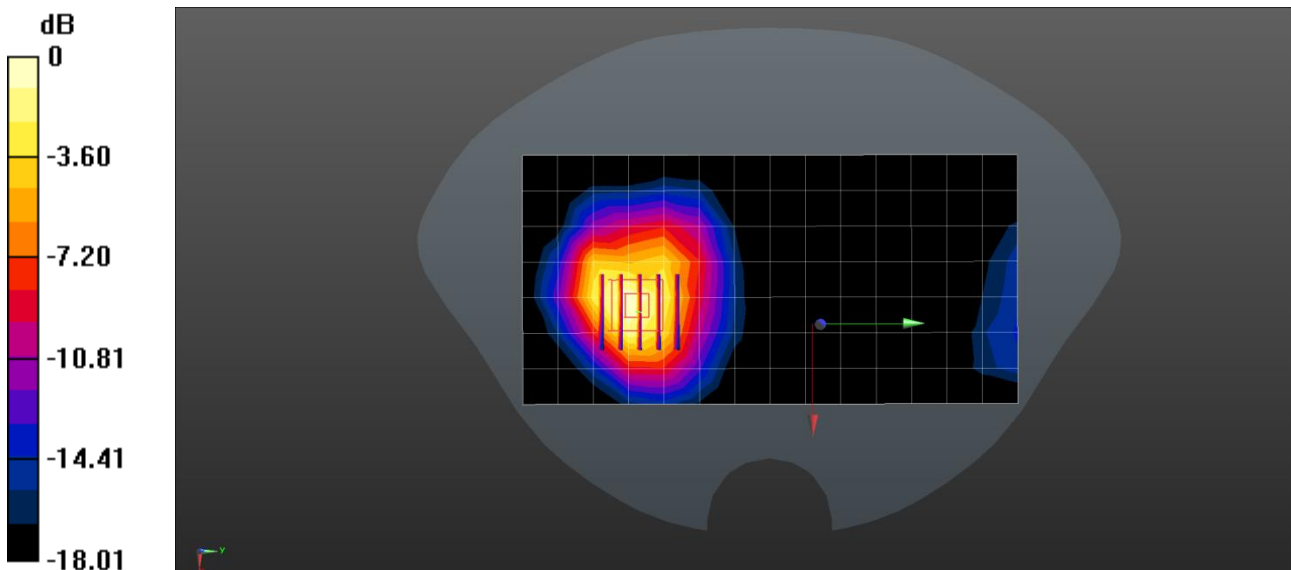
**Body/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 4.890 V/m; Power Drift = -0.15 dB

Peak SAR (extrapolated) = 5.68 W/kg

**SAR(1 g) = 3.42 W/kg; SAR(10 g) = 1.88 W/kg**

Maximum value of SAR (measured) = 4.13 W/kg



0 dB = 4.13 W/kg = 6.16 dBW/kg



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### WCDMA Band 5 RMC Back Side 0mm Ch4233

DUT: Android POS Terminal; Type: A99;

Communication System: WCDMA; Frequency: 846.6 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 846.6$  MHz;  $\sigma = 0.936$  S/m;  $\epsilon_r = 42.179$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

### DASY5 Configuration:

- Probe: EX3DV4 - SN7380; ConvF(9.62, 9.62, 9.62); Calibrated: 2023/6/21;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn760; Calibrated: 2023/6/26
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1673
- Measurement SW: DASY52, Version 52.8 (4); SEMCAD X Version 14.6.8 (7028)

**Body/Area Scan (8x15x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 1.10 W/kg

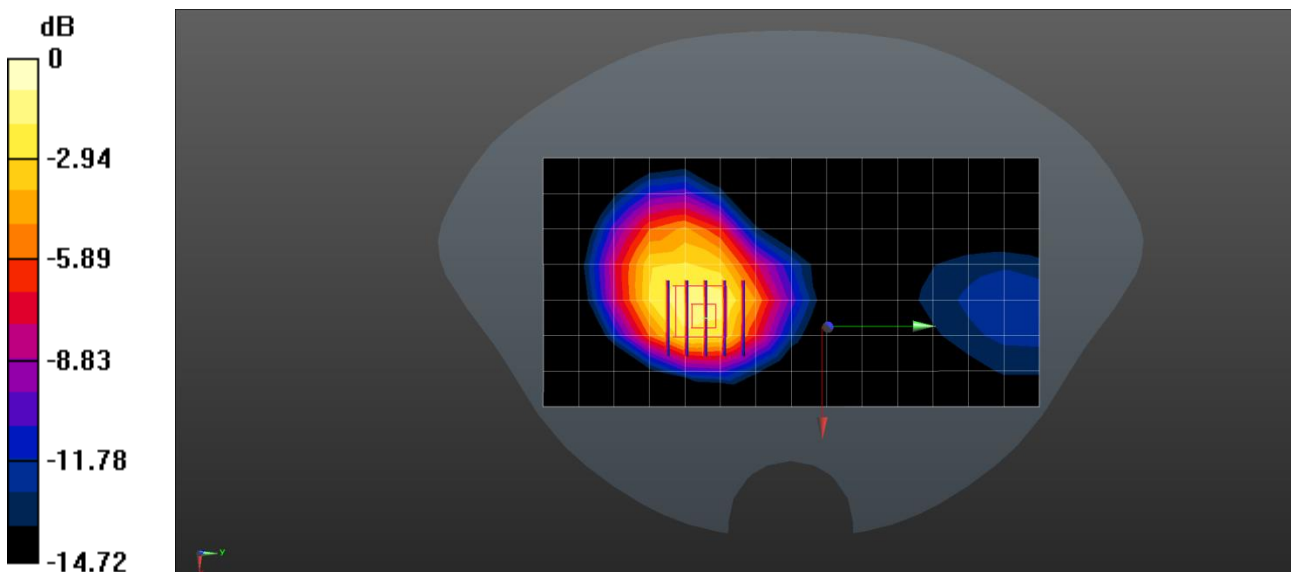
**Body/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 12.040 V/m; Power Drift = -0.19 dB

Peak SAR (extrapolated) = 2.03 W/kg

**SAR(1 g) = 1.16 W/kg; SAR(10 g) = 0.667 W/kg**

Maximum value of SAR (measured) = 1.47 W/kg



0 dB = 1.47 W/kg = 1.67 dBW/kg



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Test Laboratory: SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

### WCDMA Band 4 RMC Back Side 0mm Ch1412

DUT: Android POS Terminal; Type: A99;

Communication System: WCDMA; Frequency: 1732.4 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1732.4 \text{ MHz}$ ;  $\sigma = 1.357 \text{ S/m}$ ;  $\epsilon_r = 40.374$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

### DASY5 Configuration:

- Probe: EX3DV4 - SN7380; ConvF(8.35, 8.35, 8.35); Calibrated: 2023/6/21;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn760; Calibrated: 2023/6/26
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1673
- Measurement SW: DASY52, Version 52.8 (4); SEMCAD X Version 14.6.8 (7028)

**Body/Area Scan (8x15x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

Maximum value of SAR (measured) = 3.57 W/kg

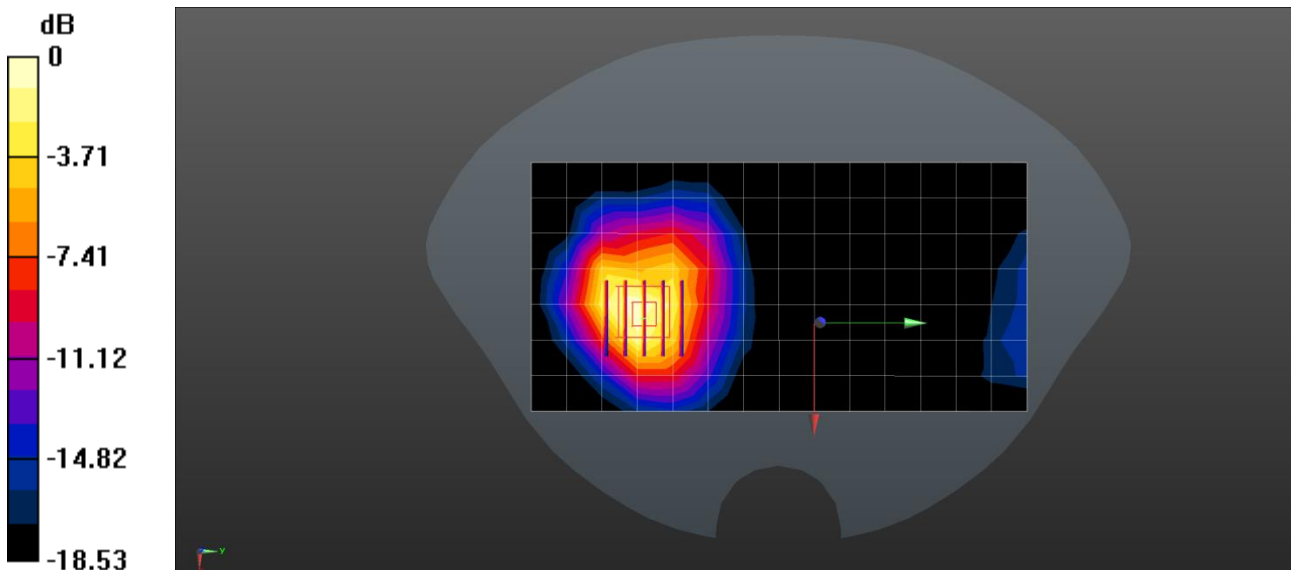
**Body/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 4.515 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 5.12 W/kg

**SAR(1 g) = 3.04 W/kg; SAR(10 g) = 1.68 W/kg**

Maximum value of SAR (measured) = 3.69 W/kg



0 dB = 3.69 W/kg = 5.67 dBW/kg



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**LTE Band 2 20M\_QPSK 1RB\_50 Back Side 0mm Ch18900**

**DUT: Android POS Terminal; Type: A99;**

Communication System: Generic LTE; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1880 \text{ MHz}$ ;  $\sigma = 1.417 \text{ S/m}$ ;  $\epsilon_r = 40.165$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7380; ConvF(8.05, 8.05, 8.05); Calibrated: 2023/6/21;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn760; Calibrated: 2023/6/26
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1673
- Measurement SW: DASY52, Version 52.8 (4); SEMCAD X Version 14.6.8 (7028)

**Body/Area Scan (8x15x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

Maximum value of SAR (measured) = 4.13 W/kg

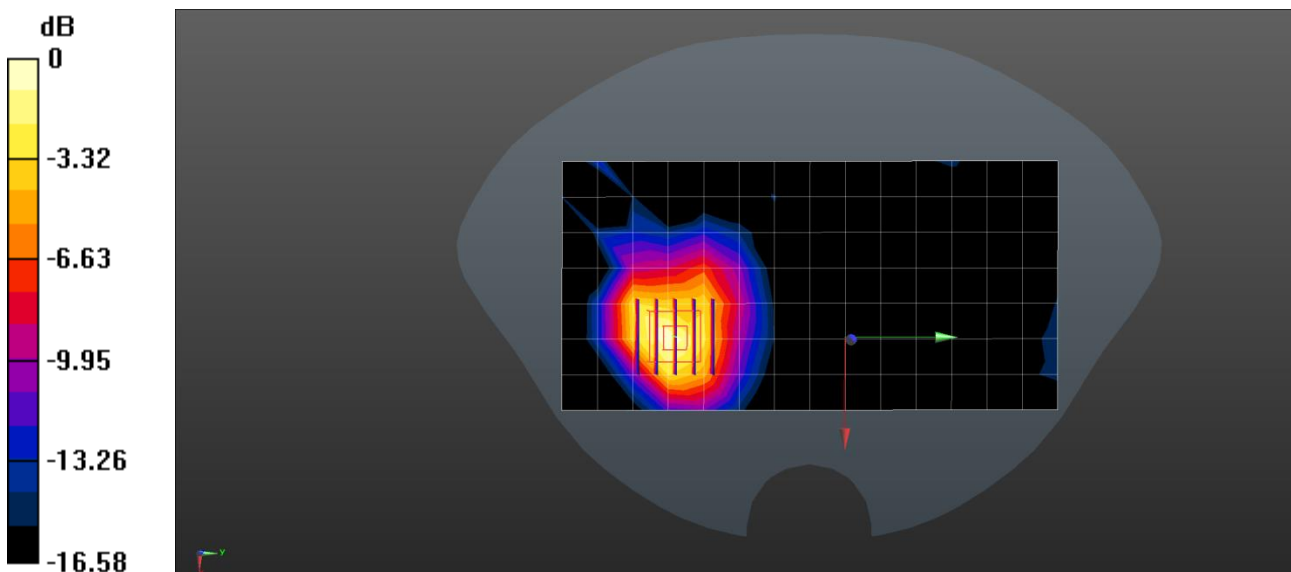
**Body/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 4.543 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 5.81 W/kg

**SAR(1 g) = 3.29 W/kg; SAR(10 g) = 1.81 W/kg**

Maximum value of SAR (measured) = 4.15 W/kg



0 dB = 4.15 W/kg = 6.18 dBW/kg



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**LTE Band 4 20M\_QPSK 1RB\_50 Back Side 0mm Ch20300**

**DUT: Android POS Terminal; Type: A99;**

Communication System: Generic LTE; Frequency: 1754.9 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1754.9$  MHz;  $\sigma = 1.37$  S/m;  $\epsilon_r = 40.342$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7380; ConvF(8.35, 8.35, 8.35); Calibrated: 2023/6/21;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn760; Calibrated: 2023/6/26
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1673
- Measurement SW: DASY52, Version 52.8 (4); SEMCAD X Version 14.6.8 (7028)

**Body/Area Scan (8x15x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 2.63 W/kg

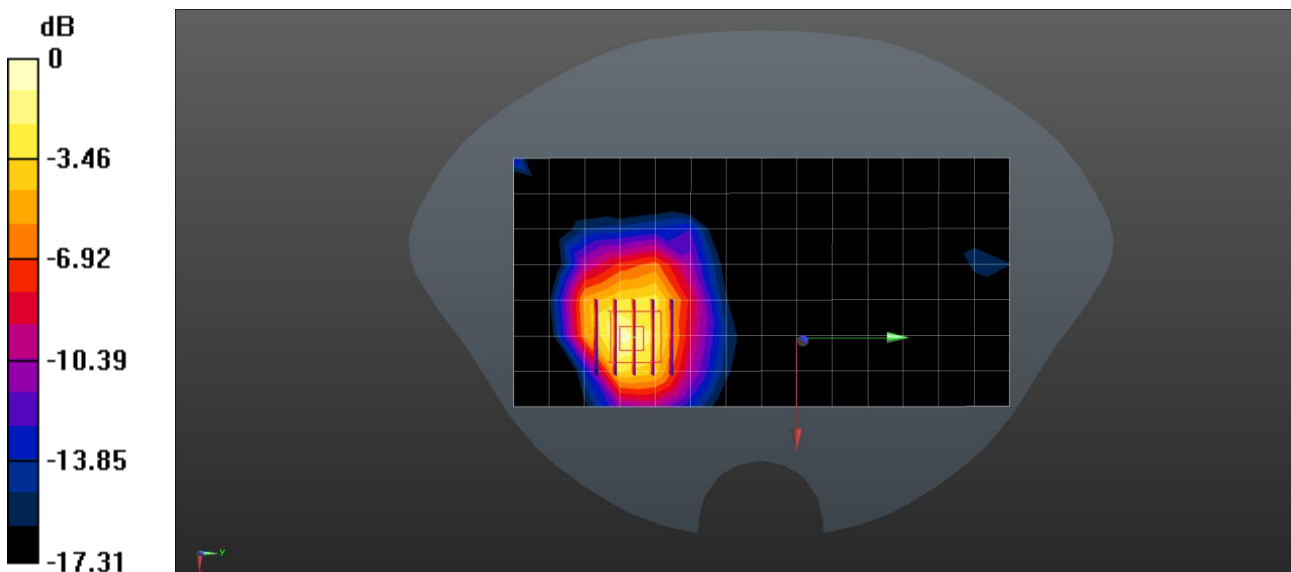
**Body/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.217 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 3.92 W/kg

**SAR(1 g) = 2.42 W/kg; SAR(10 g) = 1.36 W/kg**

Maximum value of SAR (measured) = 2.94 W/kg



0 dB = 2.94 W/kg = 4.68 dBW/kg



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SZSAR-TRF-01-A01 Rev. A/0 May15,2023

Report No.: SZCR230600188811

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Date: 2023/7/18

Test Laboratory: SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

**LTE Band 5 10M\_QPSK 1RB\_25 Back Side 0mm Ch20600**

**DUT: Android POS Terminal; Type: A99;**

Communication System: Generic LTE; Frequency: 848.9 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 848.9$  MHz;  $\sigma = 0.937$  S/m;  $\epsilon_r = 42.171$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7380; ConvF(9.62, 9.62, 9.62); Calibrated: 2023/6/21;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn760; Calibrated: 2023/6/26
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1673
- Measurement SW: DASY52, Version 52.8 (4); SEMCAD X Version 14.6.8 (7028)

**Body/Area Scan (8x15x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 1.53 W/kg

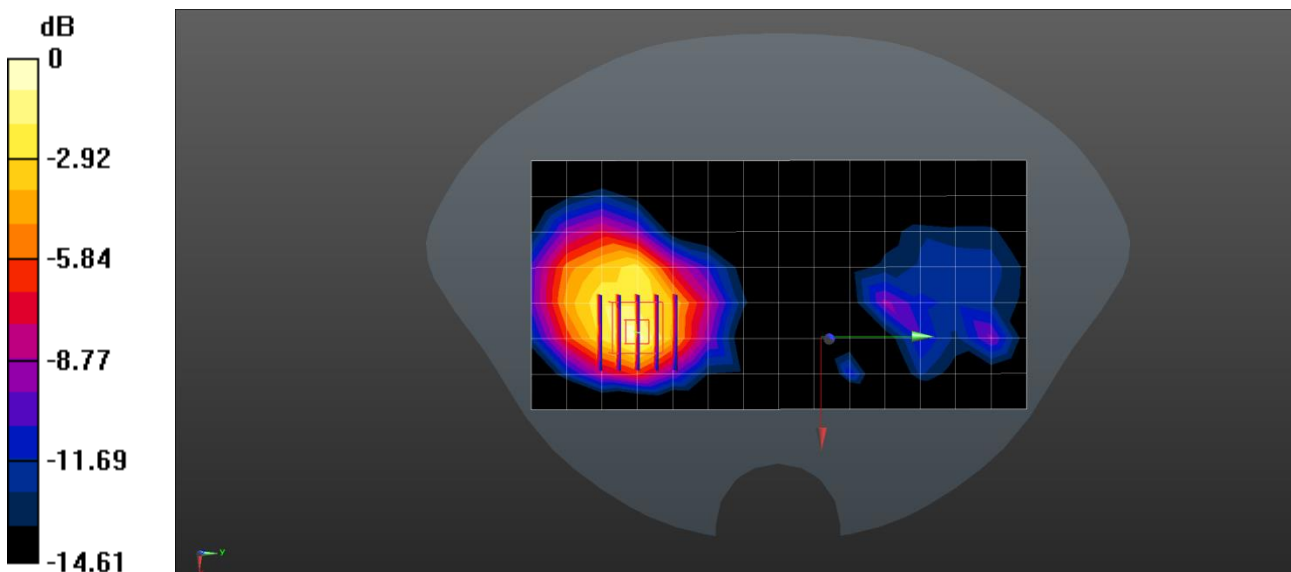
**Body/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 7.831 V/m; Power Drift = -0.19 dB

Peak SAR (extrapolated) = 2.28 W/kg

**SAR(1 g) = 1.28 W/kg; SAR(10 g) = 0.713 W/kg**

Maximum value of SAR (measured) = 1.64 W/kg



0 dB = 1.64 W/kg = 2.15 dBW/kg



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SZSAR-TRF-01-A01 Rev. A/0 May15,2023

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Date: 2023/7/7

Test Laboratory: SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

**LTE Band 7 20M\_QPSK 1RB\_50 Back Side 0mm Ch21100**

**DUT: Android POS Terminal; Type: A99;**

Communication System: Generic LTE; Frequency: 2535 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 2535 \text{ MHz}$ ;  $\sigma = 1.885 \text{ S/m}$ ;  $\epsilon_r = 39.214$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7380; ConvF(7.5, 7.5, 7.5); Calibrated: 2023/6/21;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn760; Calibrated: 2023/6/26
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1673
- Measurement SW: DASY52, Version 52.8 (4); SEMCAD X Version 14.6.8 (7028)

**Body/Area Scan (10x18x1):** Measurement grid:  $dx=12\text{mm}$ ,  $dy=12\text{mm}$

Maximum value of SAR (measured) = 5.22 W/kg

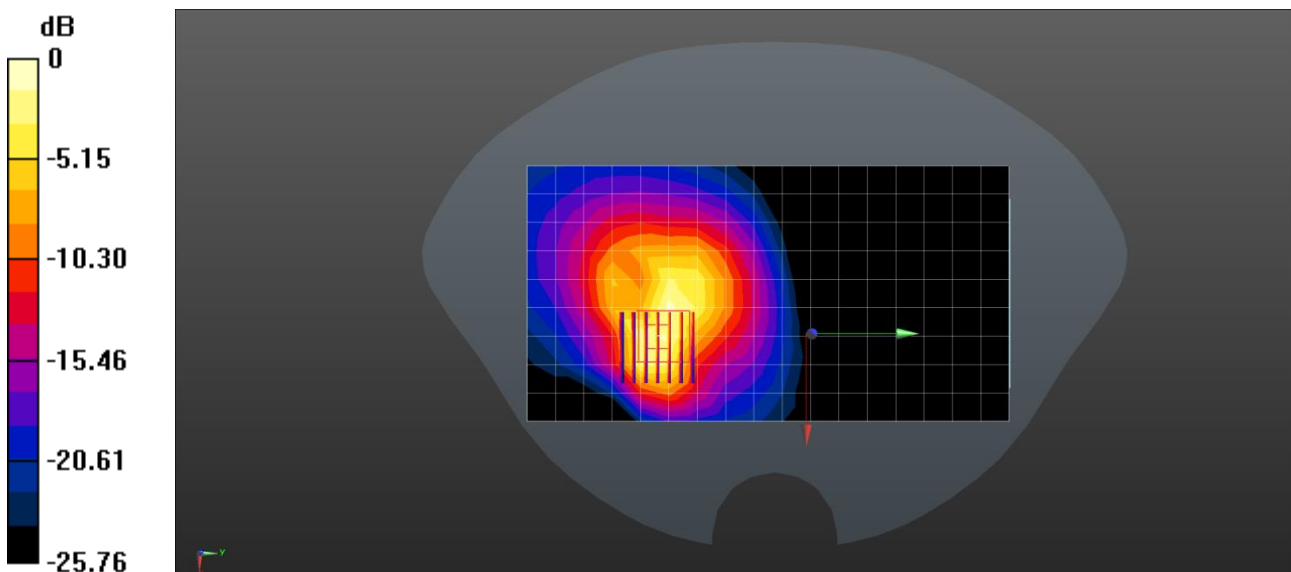
**Body/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 7.110 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 10.2 W/kg

**SAR(1 g) = 5.1 W/kg; SAR(10 g) = 2.31 W/kg**

Maximum value of SAR (measured) = 6.61 W/kg



0 dB = 6.61 W/kg = 8.20 dBW/kg



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Test Laboratory: SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

**LTE Band 38 20M\_QPSK 1RB\_50 Back Side 0mm Ch38000**

**DUT: Android POS Terminal; Type: A99;**

Communication System: Generic LTE; Frequency: 2595 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 2595 \text{ MHz}$ ;  $\sigma = 1.952 \text{ S/m}$ ;  $\epsilon_r = 39.126$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7380; ConvF(7.35, 7.35, 7.35); Calibrated: 2023/6/21;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn760; Calibrated: 2023/6/26
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1673
- Measurement SW: DASY52, Version 52.8 (4); SEMCAD X Version 14.6.8 (7028)

**Body/Area Scan (10x18x1):** Measurement grid:  $dx=12\text{mm}$ ,  $dy=12\text{mm}$

Maximum value of SAR (measured) = 3.80 W/kg

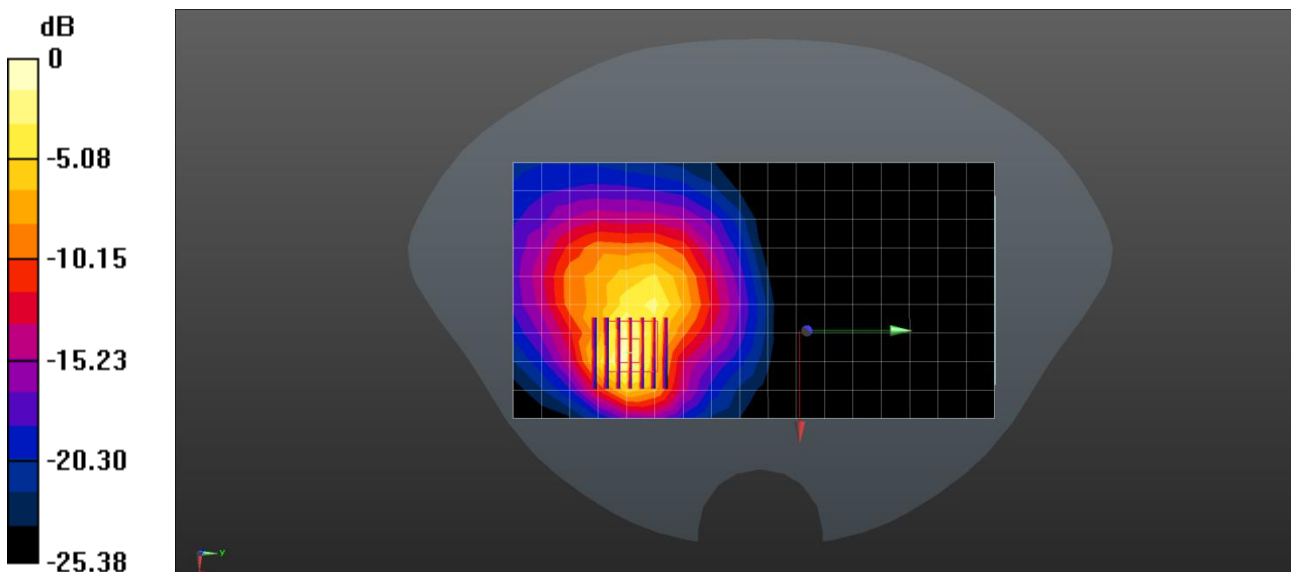
**Body/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 3.828 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 6.35 W/kg

**SAR(1 g) = 3.01 W/kg; SAR(10 g) = 1.27 W/kg**

Maximum value of SAR (measured) = 4.07 W/kg



0 dB = 4.07 W/kg = 6.10 dBW/kg



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Test Laboratory: SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

**WLAN2.4GHz 802.11b Right side 0mm Ch6**

**DUT: Android POS Terminal; Type: A99;**

Communication System: 2.4G WIFI; Frequency: 2437 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 2437 \text{ MHz}$ ;  $\sigma = 1.798 \text{ S/m}$ ;  $\epsilon_r = 39.35$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7380; ConvF(7.5, 7.5, 7.5); Calibrated: 2023/6/21;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn760; Calibrated: 2023/6/26
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1673
- Measurement SW: DASY52, Version 52.8 (4); SEMCAD X Version 14.6.8 (7028)

**Body/Area Scan (10x18x1):** Measurement grid:  $dx=12\text{mm}$ ,  $dy=12\text{mm}$

Maximum value of SAR (measured) = 1.08 W/kg

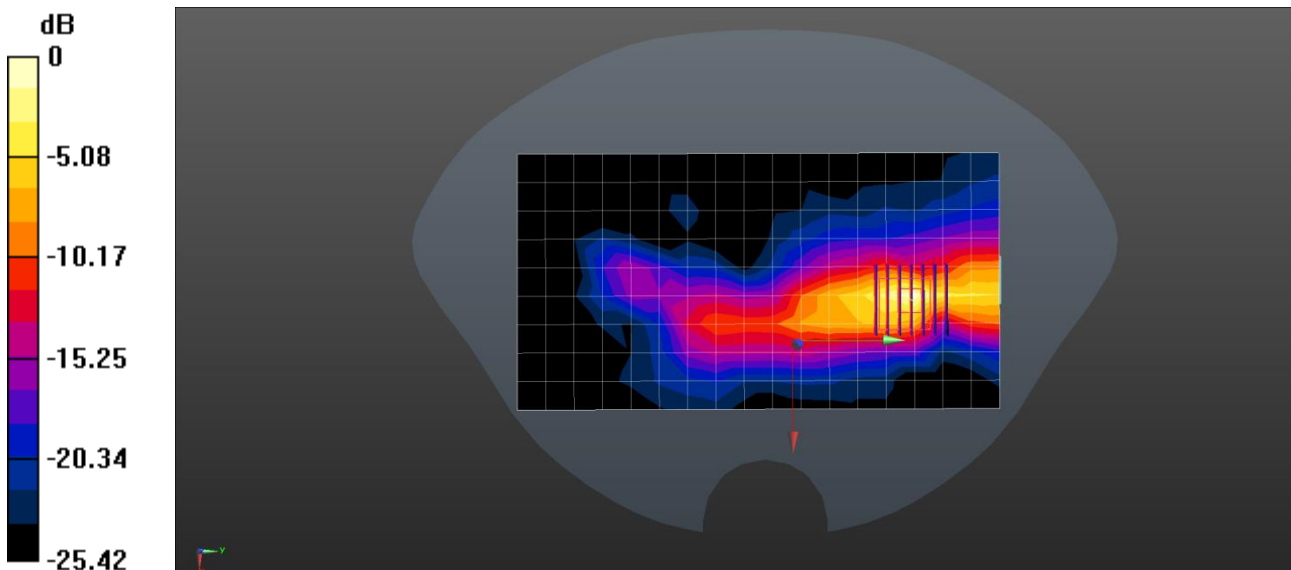
**Body/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 2.348 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 2.51 W/kg

**SAR(1 g) = 0.781 W/kg; SAR(10 g) = 0.273 W/kg**

Maximum value of SAR (measured) = 1.20 W/kg



0 dB = 1.20 W/kg = 0.79 dBW/kg



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Test Laboratory: SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

**Bluetooth 8DPSK Right side 0mm Ch39**  
**DUT: Android POS Terminal; Type: A99;**

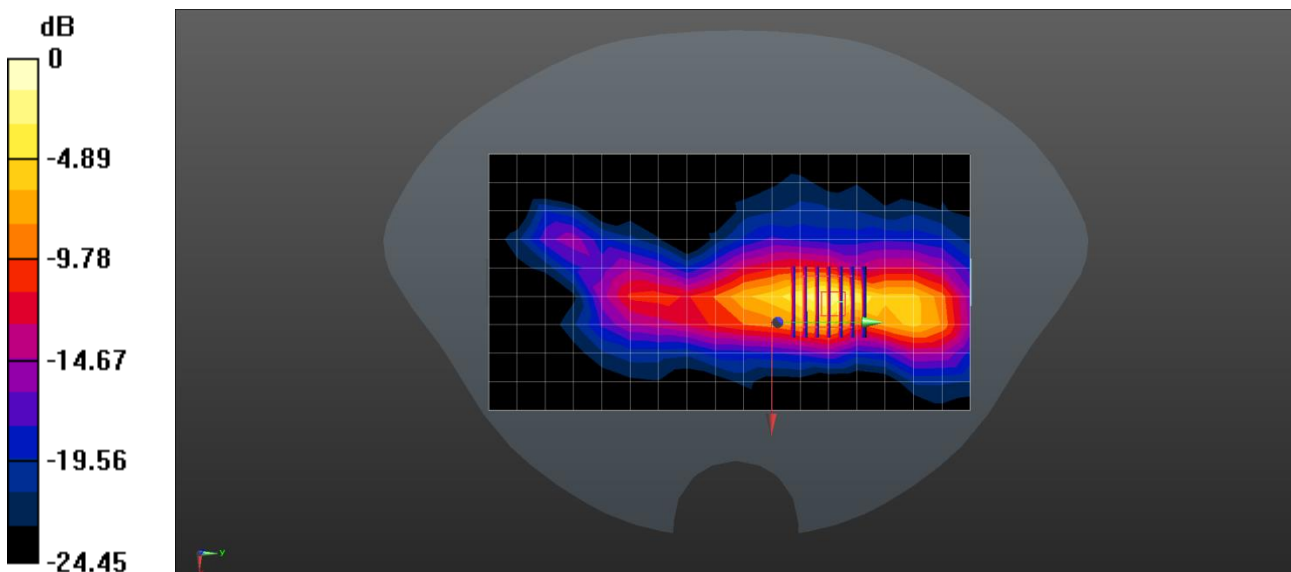
Communication System: BT; Frequency: 2441 MHz; Duty Cycle: 1:1  
 Medium parameters used (interpolated):  $f = 2441 \text{ MHz}$ ;  $\sigma = 1.801 \text{ S/m}$ ;  $\epsilon_r = 39.342$ ;  $\rho = 1000 \text{ kg/m}^3$   
 Phantom section: Flat Section  
 Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7380; ConvF(7.5, 7.5, 7.5); Calibrated: 2023/6/21;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn760; Calibrated: 2023/6/26
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1673
- Measurement SW: DASY52, Version 52.8 (4); SEMCAD X Version 14.6.8 (7028)

**Body/Area Scan (10x18x1):** Measurement grid:  $dx=12\text{mm}$ ,  $dy=12\text{mm}$   
 Maximum value of SAR (measured) = 0.884 W/kg

**Body/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$   
 Reference Value = 8.777 V/m; Power Drift = -0.03 dB  
 Peak SAR (extrapolated) = 2.42 W/kg  
**SAR(1 g) = 0.309 W/kg; SAR(10 g) = 0.117 W/kg**  
 Maximum value of SAR (measured) = 1.19 W/kg



0 dB = 1.19 W/kg = 0.76 dBW/kg



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Test Laboratory: SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

**WLAN5.2GHz 802.11a Right Side 0mm Ch36**

**DUT: Android POS Terminal; Type: A99;**

Communication System: 5GWIFI; Frequency: 5180 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 5180 \text{ MHz}$ ;  $\sigma = 4.612 \text{ S/m}$ ;  $\epsilon_r = 35.129$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7380; ConvF(5.45, 5.45, 5.45); Calibrated: 2023/6/21;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn760; Calibrated: 2023/6/26
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1673
- Measurement SW: DASY52, Version 52.8 (4); SEMCAD X Version 14.6.8 (7028)

**Body/Area Scan (9x22x1):** Measurement grid:  $dx=10\text{mm}$ ,  $dy=10\text{mm}$

Maximum value of SAR (measured) = 6.81 W/kg

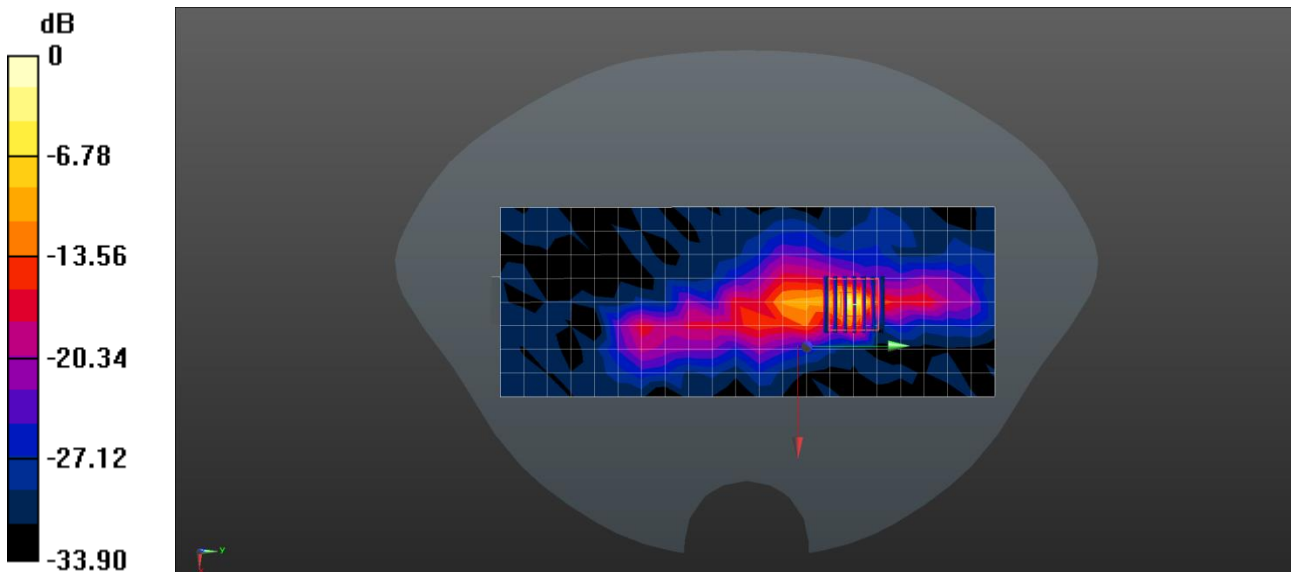
**Body/Zoom Scan (7x7x12)/Cube 0:** Measurement grid:  $dx=4\text{mm}$ ,  $dy=4\text{mm}$ ,  $dz=2\text{mm}$

Reference Value = 7.937 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 24.8 W/kg

**SAR(1 g) = 3.78 W/kg; SAR(10 g) = 0.664 W/kg**

Maximum value of SAR (measured) = 10.5 W/kg



0 dB = 10.5 W/kg = 10.21 dBW/kg



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Test Laboratory: SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

**WLAN5.6GHz 802.11a Right Side 0mm Ch140**

**DUT: Android POS Terminal; Type: A99;**

Communication System: 5GWIFI; Frequency: 5700 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 5700 \text{ MHz}$ ;  $\sigma = 5.146 \text{ S/m}$ ;  $\epsilon_r = 34.103$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7380; ConvF(4.86, 4.86, 4.86); Calibrated: 2023/6/21;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn760; Calibrated: 2023/6/26
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1673
- Measurement SW: DASY52, Version 52.8 (4); SEMCAD X Version 14.6.8 (7028)

**Body/Area Scan (9x22x1):** Measurement grid:  $dx=10\text{mm}$ ,  $dy=10\text{mm}$

Maximum value of SAR (measured) = 2.25 W/kg

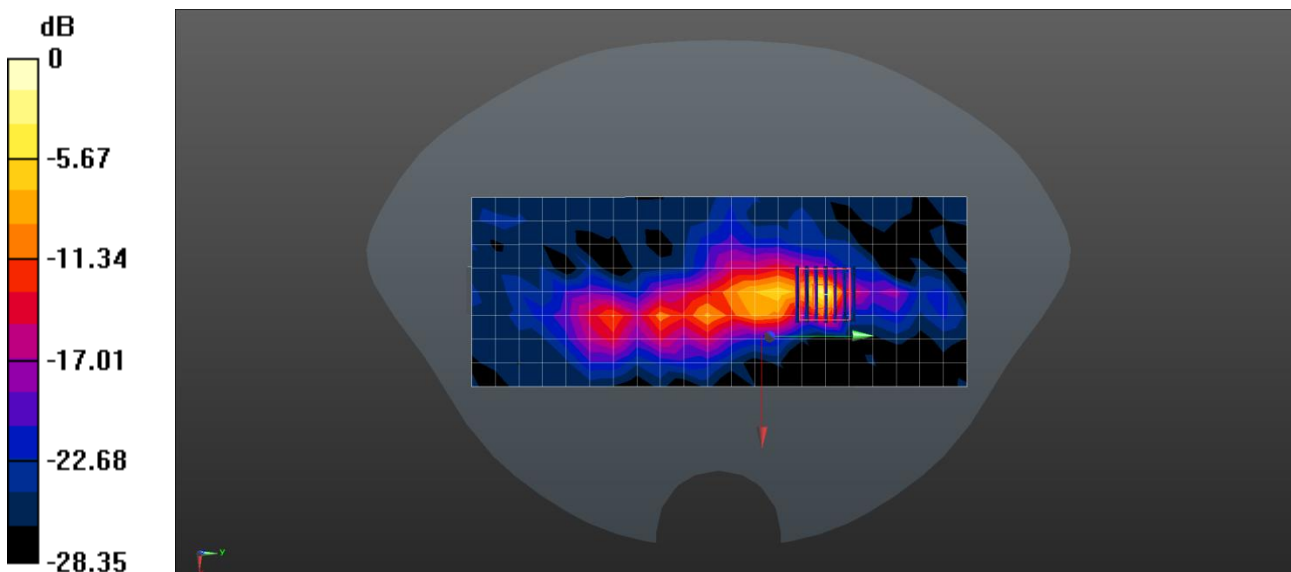
**Body/Zoom Scan (7x7x12)/Cube 0:** Measurement grid:  $dx=4\text{mm}$ ,  $dy=4\text{mm}$ ,  $dz=2\text{mm}$

Reference Value = 6.273 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 10.7 W/kg

**SAR(1 g) = 1.32 W/kg; SAR(10 g) = 0.236 W/kg**

Maximum value of SAR (measured) = 3.51 W/kg



0 dB = 3.51 W/kg = 5.45 dBW/kg



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SZSAR-TRF-01-A01 Rev. A/0 May15,2023

Report No.: SZCR230600188811

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Date: 2023/7/23

Test Laboratory: SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

**WLAN5.8GHz 802.11a Right Side 0mm Ch157**

**DUT: Android POS Terminal; Type: A99;**

Communication System: 5GWIFI; Frequency: 5785 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 5785 \text{ MHz}$ ;  $\sigma = 5.218 \text{ S/m}$ ;  $\epsilon_r = 33.932$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7380; ConvF(4.96, 4.96, 4.96); Calibrated: 2023/6/21;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn760; Calibrated: 2023/6/26
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1673
- Measurement SW: DASY52, Version 52.8 (4); SEMCAD X Version 14.6.8 (7028)

**Body/Area Scan (11x22x1):** Measurement grid:  $dx=10\text{mm}$ ,  $dy=10\text{mm}$

Maximum value of SAR (measured) = 1.47 W/kg

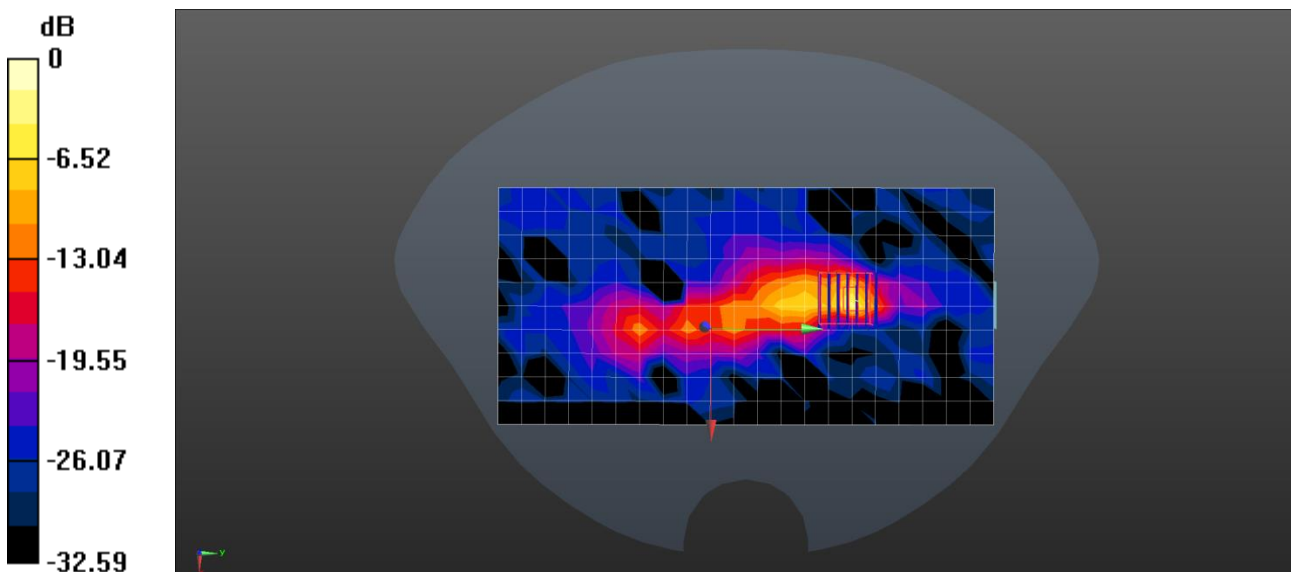
**Body/Zoom Scan (7x7x12)/Cube 0:** Measurement grid:  $dx=4\text{mm}$ ,  $dy=4\text{mm}$ ,  $dz=2\text{mm}$

Reference Value = 5.726 V/m; Power Drift = -0.11 dB

Peak SAR (extrapolated) = 8.89 W/kg

**SAR(1 g) = 1.1 W/kg; SAR(10 g) = 0.199 W/kg**

Maximum value of SAR (measured) = 2.96 W/kg



0 dB = 2.96 W/kg = 4.71 dBW/kg



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SZSAR-TRF-01-A01 Rev. A/0 May15,2023

Report No.: SZCR230600188811

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### Appendix C: Calibration certificate

### Appendix D: Photographs

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