FCC SAR TEST REPORT

Report No:	HR/2019/B0013
Applicant:	Telcare, LLC
Manufacturer:	Telepoch LTD
Factory:	ShenZhen Luckcome Technology INC.,LTD
Product Name:	Blood Glucose Meter
Model No.(EUT):	BGM4.0
Trade Mark:	BioTel
FCC ID:	2AVLMCARE01
Standards:	FCC 47CFR §2.1093
Date of Receipt:	2019-12-25
Date of Test:	2019-12-26 to 2020-01-02
Date of Issue:	2020-01-06
Test conclusion:	**PASS ***

* In the configuration tested, the EUT detailed in this report complied with the standards specified above.

Authorized Signature:

Derek Yang

Wireless Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

REVISION HISTORY

Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2020-01-06		Original

TEST SUMMARY

Frequency Band	Maximum Reported SAR(W/kg)	
	Body-worn	Hotspot
LTE Band 2	0.44	1.19
LTE Band 4	0.40	0.90
LTE Band 13	0.45	0.73
LTE Band 25	0.46	1.07
LTE Band 5/26	**0.99**	**1.38**
LTE Band 66	0.38	0.98
WI-FI (2.4GHz)	<0.10	0.16
SAR Limited(W/kg)	1.6	
Maximum Simultaneous Transmission SAR (W/kg)		
Scenario	Body-worn	Hotspot
Sum SAR	1.07	1.54
SPLSR	NA	NA
SPLSR Limited	0.04	

Note: The Simultaneous transmission SAR is the same test position of the WWAN antenna + WiFi/BT antenna. According to TCB workshop April 2015 RF Exposure Procedures Update (Overlapping LTE Bands), SAR for LTE Band 5 (Frequency range: 824 - 849 MHz) is covered by LTE Band 26 (Frequency range: 814 - 849 MHz) due to similar frequency range, same maximum tune up limit and same channel bandwidth.

Approved & Released by

Simon Ling

SAR Manager

Tested by

Jackson Li

SAR Engineer

CONTENTS

1 General Information

1.1 Details of Client

Applicant:	Telcare, LLC
Address:	150 Baker Avenue Extension, Suite 300, Concord, MA 01742
Manufacturer:	Telepoch LTD
Address:	Room 602, Floor 6th, Building B, Software Park T3, Hi-Tech Park South, Nanshan District, Shenzhen, P.R. China 518057
Factory:	ShenZhen Luckcome Technology INC., LTD
Address:	6A, Building 6, Tongfuyu Industry Park, Tanglang, Xili Town, Nanshan District, Shenzhen, GuangDong, China

1.2 Test Location

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

Address: No. 1 Workshop, M-10, Middle section, Science & Technology Park, Shenzhen, Guangdong, China

Post code: 518057

Telephone: +86 (0) 755 2601 2053

Fax: +86 (0) 755 2671 0594

E-mail: ee.shenzhen@sgs.com

1.3 Test Facility

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

• CNAS (No. CNAS L2929)

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• 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

The 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-823, R-4188, T-1153 and C-2383 respectively.

• FCC –Designation Number: CN1178

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

Designation Number: CN1178. Test Firm Registration Number: 406779.

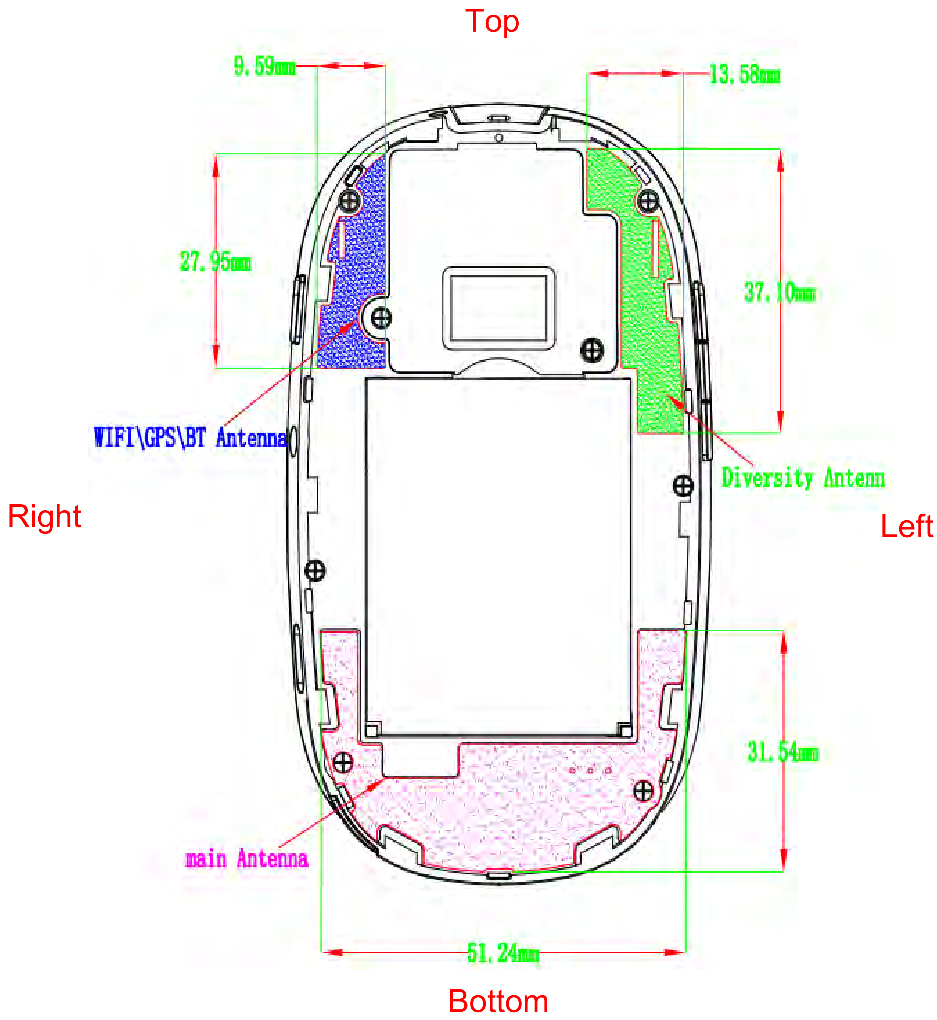
• Industry Canada (IC)

Two 3m Semi-anechoic chambers and the 10m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1, 4620C-2, 4620C-3.

1.4 General Description of EUT

Product Name:	Blood Glucose Meter		
Model No.(EUT):	BGM4.0		
FCC ID:	2AVLMCARE01		
Trade Mark:	BioTel		
Product Phase:	production unit		
Device Type :	portable device		
Exposure Category:	uncontrolled environment / general population		
IMEI:	990000900527484 / 990000900527286 / 990000900525330		
Hardware Version:	BG2802_MB_V2.2		
Software Version:	BG2802_01.01.07.131752		
Antenna Type:	Inner Antenna		
Device Operating Configurations :			
Modulation Mode:	**LTE:** QPSK,16QAM; **WIFI:** DSSS, OFDM; **BT:** GFSK, π/4DQPSK,8DPSK		
Power Class:	3, tested with power control Max Power(LTE Band 2/4/5/13/25/26/66)		
Frequency Bands:	Band	Tx (MHz)	Rx (MHz)
	LTE Band 2	1850~1910	1930~1990
	LTE Band 4	1710~1755	2110~2155
	LTE Band 5	824~849	869~894
	LTE Band 13	777~ 787	746~ 756
	LTE Band 25	1850~ 1915	1930~ 1995
	LTE Band 26	814~ 849	859~ 894
	LTE Band 66	1710~1780	2110~2180
	Wi-Fi 2.4G	2412~2462	2412~2462
	Bluetooth	2402~2480	2402~2480
Battery Information:	Model:	AC0010	
	Normal Voltage:	+3.85V	
	Rated capacity:	980mAh	
	Manufacturer:	Dongguan guoxia electronic technology co. LTD	

1.4.1 DUT Antenna Locations(Back View)



Note:

1） The overall diagonal dimension of this device is 102 mm.

2） The DIV Antenna does not support transmitter function.

According to the distance between LTE&WIFI&BT antennas and the sides of the EUT we can draw the conclusion that:

EUT Sides for SAR Testing							
Mode	Exposure Condition	Front	Back	Left	Right	Top	Bottom
Main Ant.	Hotspot	Yes	Yes	Yes	Yes	No	Yes
WIFI 2.4G&BT Ant.	Hotspot	Yes	Yes	No	Yes	Yes	No

Table 1： EUT Sides for SAR Testing

Note:

1) When the antenna-to-edge distance is greater than 2.5cm, such position does not need to be tested.

1.5 Test Specification

Identity	Document Title
FCC 47CFR §2.1093	Radiofrequency Radiation Exposure Evaluation: Portable Devices
IEEE/ANSI C95.1-1992	IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz – 300 GHz.
IEEE 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 941225 D01	3G SAR Measurement Procedures v03r01
KDB 941225 D05	SAR for LTE Devices v02r05
KDB 941225 D06	Hotspot Mode SAR v02r01
KDB 248227 D01	SAR Guidance for IEEE 802 11 Wi-Fi SAR v02r02
KDB 648474 D04	Handset SAR v01r03
KDB 447498 D01	General RF Exposure Guidance v06
KDB 865664 D01	SAR Measurement 100 MHz to 6 GHz v01r04
KDB 865664 D02	RF Exposure Reporting v01r02

1.6 RF exposure limits

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

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.)

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.	

Table 2： The Ambient Conditions

3 SAR Measurements System Configuration

3.1 The SAR Measurement System

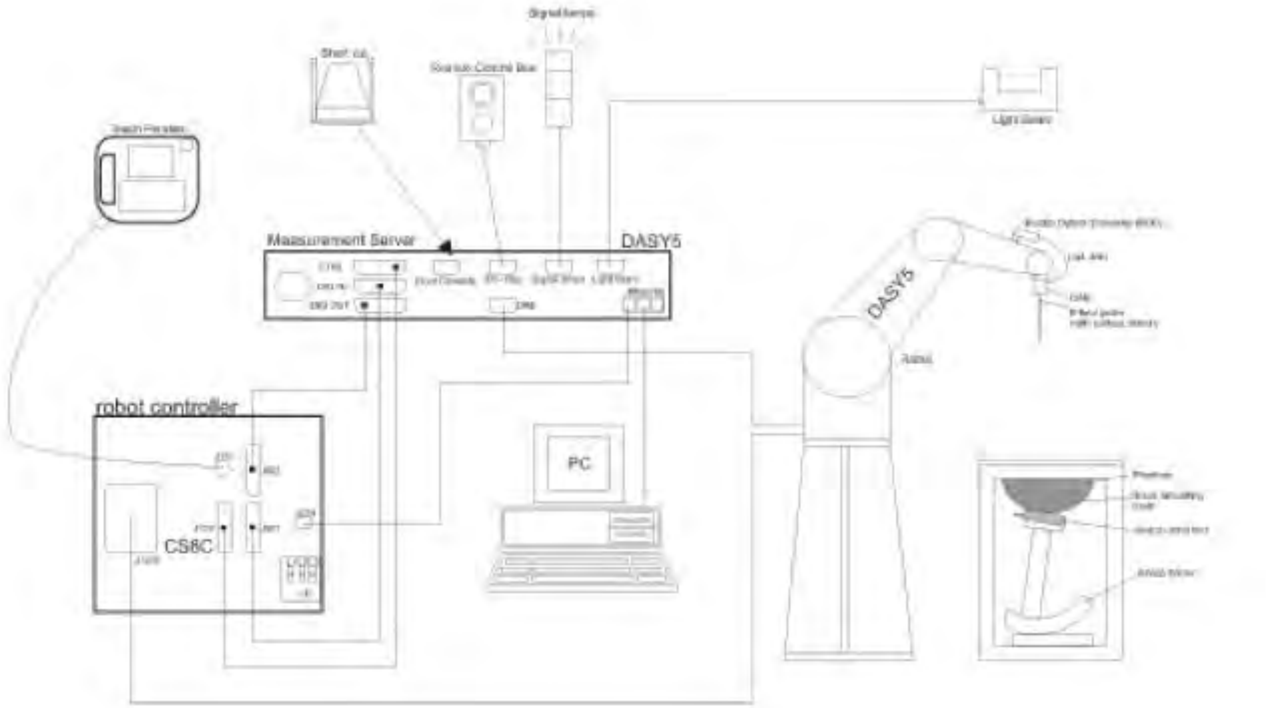
This SAR Measurement System uses a Computer-controlled 3-D stepper motor system (SPEAG DASY5 professional system). A E-field probe is used to determine the internal electric fields. The SAR can be obtained from the equation SAR= σ (|Ei|2)/ ρ where σ and ρ are the conductivity and mass density of the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



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 validating the proper functioning of the system.

3.2 Isotropic E-field Probe EX3DV4

	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	ISO/IEC 17025 calibration service available.
Frequency	10 MHz to > 6 GHz Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Directivity	± 0.3 dB in TSL (rotation around probe axis) ± 0.5 dB in TSL (rotation normal to probe axis)
Dynamic Range	10 μW/g to > 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 μW/g)
Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm
Application	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%.
Compatibility	DASY3, DASY4, DASY52 SAR and higher, EASY4/MRI

3.3 Data Acquisition Electronics (DAE)

Model	DAE
Construction	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.
Measurement Range	-100 to +300 mV (16 bit resolution and two range settings: 4mV,400mV)
Input Offset Voltage	< 5μV (with auto zero)
Input Bias Current	< 50 f A
Dimensions	60 x 60 x 68 mm

3.4 SAM Twin Phantom

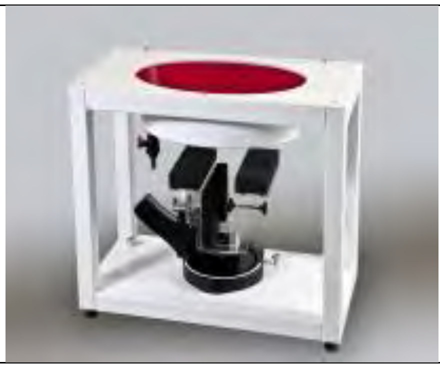
Material	Vinylester, glass fiber reinforced (VE-GF)
Liquid Compatibility	Compatible with all SPEAG tissue simulating liquids (incl. DGBE type)
Shell Thickness	2 ± 0.2 mm (6 ± 0.2 mm at ear point)
Dimensions (incl. Wooden Support)	Length: 1000 mm Width: 500 mm Height: adjustable feet
Filling Volume	approx.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

Material	Vinylester, glass fiber reinforced (VE-GF)
Liquid Compatibility	Compatible with all SPEAG tissue simulating liquids (incl. DGBE type)
Shell Thickness	2.0 ± 0.2 mm (bottom plate)
Dimensions	Major axis: 600 mm Minor axis: 400 mm
Filling Volume	approx. 30 liters
Wooden Support	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). This 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 ε=3 and loss tangent δ=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 32mm*32mm*30mm (f≤2GHz), 30mm*30mm*30mm (f for 2-3GHz) and 24mm*24mm*22mm (f for 5-6GHz) was assessed by measuring 5x5x7 points (f≤2GHz), 7x7x7 points (f for 2-3GHz) and 7x7x12 points (f for 5-6GHz). 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.

		≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface		5 ± 1 mm	½·δ·ln(2) ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location		30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}		≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
		When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	
Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}		≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$	≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid: $\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
	graded grid: $\Delta z_{Zoom}(n>1)$: between subsequent points	≤ 1.5·$\Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z	≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm

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 %

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 ".DAE4". 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:

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

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

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

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

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

$$SAR = (Etot^2 \cdot \sigma) / (\varepsilon \cdot 1000)$$

with SAR = local specific absorption rate in mW/g
Etot = total field strength in V/m
σ= conductivity in [mho/m] or [Siemens/m]
ε= equivalent tissue density in g/cm3

Note that the density is normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid. The power flow density is calculated assuming the excitation field to be a free space field.

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

with Ppwe = equivalent power density of a plane wave in mW/cm2
Etot = total electric field strength in V/m
Htot = total magnetic field strength in A/m

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 ⩾ 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 ⩾ 1.45 W/kg (~ 10% from the 1-g SAR limit).

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

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.

5 Description of Test Position

5.1 Body Exposure Condition

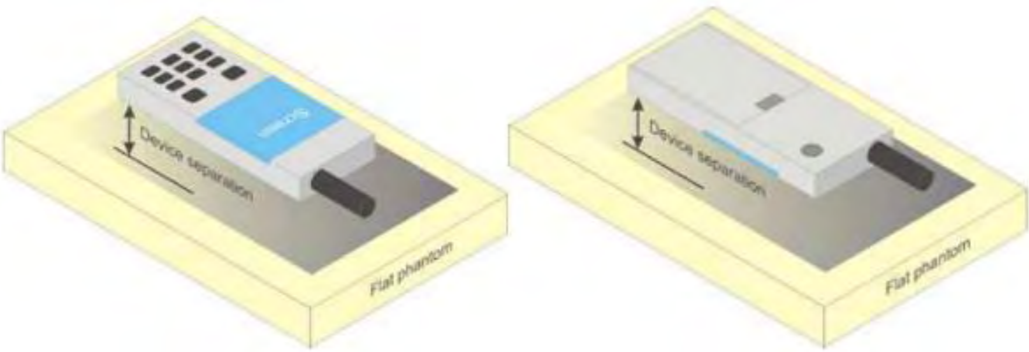
5.1.1 Body-worn accessory exposure conditions

Body-worn operating configurations should be tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in normal use configurations.

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration. Per FCC KDB Publication 648474 D04, Body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in FCC KDB Publication 447498 D01 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode, when applicable. When the reported SAR for a body-worn accessory, measured without a headset connected to the handset, is > 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a headset attached to the handset.

Accessories for Body-worn operation configurations are divided into two categories: those that do not contain metallic components and those that do contain metallic components. When multiple accessories that do not contain metallic components are supplied with the device, the device is tested with only the accessory that dictates the closest spacing to the body. Then multiple accessories that contain metallic components are tested with the device with each accessory. If multiple accessories share an identical metallic component (i.e. the same metallic belt-clip used with different holsters with no other metallic components) only the accessory that dictates the closest spacing to the body is tested.

Body-worn accessories may not always be supplied or available as options for some devices intended to be authorized for body-worn use. In this case, a test configuration with a separation distance between the back of the device and the flat phantom is used. Test position spacing was documented. Transmitters that are designed to operate in front of a person's face, as in push-to-talk configurations, are tested for SAR compliance with the front of the device positioned to face the flat phantom in head fluid. For devices that are carried next to the body such as a shoulder, waist or chest-worn transmitters, SAR compliance is tested with the accessories, including headsets and microphones, attached to the device and positioned against a flat phantom in a normal use configuration.



F-3. **Test positions for body-worn devices**

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5.1.2 Wireless Router exposure conditions

Some battery-operated handsets have the capability to transmit and receive user data through simultaneous transmission of WIFI simultaneously with a separate licensed transmitter. The FCC has provided guidance in FCC KDB Publication 941225 D06 where SAR test considerations for handsets (L x W ≥ 9 cm x 5 cm) are based on a composite test separation distance of 10 mm from the front, back and edges of the device containing transmitting antennas within 2.5 cm of their edges, determined from general mixed use conditions for this type of devices. For devices with form factors smaller than 9 cm x 5 cm, a test separation distance of 5 mm is required.

6 SAR System Verification Procedure

6.1 Tissue Simulate Liquid

6.1.1 Recipes for Tissue Simulate Liquid

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

Ingredients (% by weight)	Frequency (MHz)			
	450	700-950	1700-2000	2300-2700
Tissue Type	**Head**	**Head**	**Head**	**Head**
Water	38.56	40.30	55.24	55.00
Salt (NaCl)	3.95	1.38	0.31	0.2
Sucrose	56.32	57.90	0	0
HEC	0.98	0.24	0	0
Bactericide	0.19	0.18	0	0
Tween	0	0	44.45	44.80

Salt: 99^{+}% Pure Sodium Chloride
Sucrose: 98^{+}% Pure Sucrose
Water: De-ionized, 16 $M\Omega^{+}$ resistivity
HEC: Hydroxyethyl Cellulose
Tween: Polyoxyethylene (20) sorbitan monolaurate

HSL5GHz is composed of the following ingredients:
Water: 50-65%
Mineral oil: 10-30%
Emulsifiers: 8-25%
Sodium salt: 0-1.5%

Table 3： Recipe of Tissue Simulate Liquid

Note: According to April 2019 TCB workshop, Effective February 19, 2019, FCC has permitted the use of single head-tissue simulating liquid specified in IEC 62209-1 for all SAR tests.

6.1.2 Measurement for Tissue Simulate Liquid

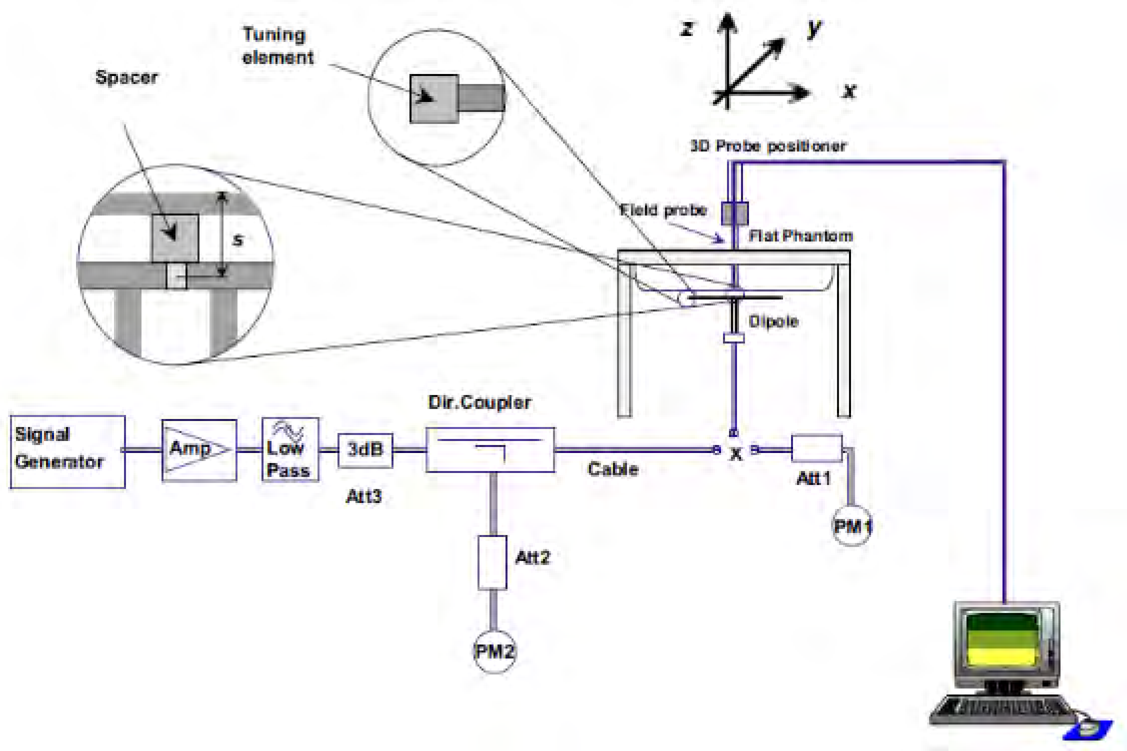
The dielectric properties for this Tissue Simulate Liquids were measured by using the Agilent Model 85070E Dielectric Probe in conjunction with Agilent E5071C Network Analyzer (300 KHz-8500 MHz). The Conductivity (σ) and Permittivity (ρ) are listed in bellow table. For the SAR measurement given in this report. The temperature variation of the Tissue Simulate Liquids was 22±2°C.

Tissue Type	Measured Frequency （MHz）	Target Tissue (±5%)		Measured Tissue		Liquid Temp.	Measured Date
		ε_r	σ(S/m)	ε_r	σ(S/m)	(℃)	
750 Head	750	41.9 (39.81~44)	0.89 (0.85~0.94)	43.091	0.879	22.1	2019/12/31
835 Head	835	41.5 (39.43~43.58)	0.90 (0.86~0.95)	42.422	0.878	22.1	2019/12/30
1750 Head	1750	40.1 (38.10~42.11)	1.37 (1.30~1.44)	40.679	1.336	22.2	2020/1/2
1900 Head	1900	40.0 (38.00~42.00)	1.40 (1.33~1.47)	40.64	1.372	22.3	2020/1/1
2450 Head	2450	39.20 (37.24~41.16)	1.80 (1.71~1.89)	40.224	1.805	22	2019/12/26

Table 4： Measurement result of Tissue electric parameters

6.2 SAR System Check

The microwave circuit arrangement for system Check is sketched in F-4. 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 +/- 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 (A power level of 250mW (below 3GHz) or 100mW (3-6GHz) was input to the dipole antenna). During the tests, the ambient temperature of the laboratory was in the range 22±2°C, the relative humidity was in the range 60% and the liquid depth above the ear reference points was above 15±0.5 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-4. the microwave circuit arrangement used for SAR system check

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 20% 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)

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%)	Liquid Temp. (℃)	Measured Date
		1g (W/kg)	10g (W/kg)	1g (W/kg)	10g (W/kg)	1-g(W/kg)	10-g(W/kg)		
D750V2	Head	2.1	1.41	8.4	5.64	8.39 (7.55~9.23)	5.63 (5.07~6.19)	22.1	2019/12/31
D835V2	Head	2.4	1.6	9.6	6.4	9.46 (8.51~10.41)	6.13 (5.52~6.74)	22.1	2019/12/30
D1750V2	Head	9.51	5.06	38.04	20.24	36.3 (32.67~39.93)	19.2 (17.28~21.12)	22.2	2020/1/2
D1900V2	Head	10.4	5.37	41.6	21.48	40.6 (36.54~44.66)	21.2 (19.08~23.32)	22.3	2020/1/1
D2450V2	Head	12.8	5.93	51.20	23.72	53.5 (48.15~58.85)	25.1 (22.59~27.61)	22	2019/12/26

Table 5： SAR System Check Result

6.2.3 Detailed System Check Results

Please see the Appendix A

7 Test Configuration

7.1 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 Anritsu MT8820C 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 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
64 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 2
64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 3

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.

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 > ½ 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

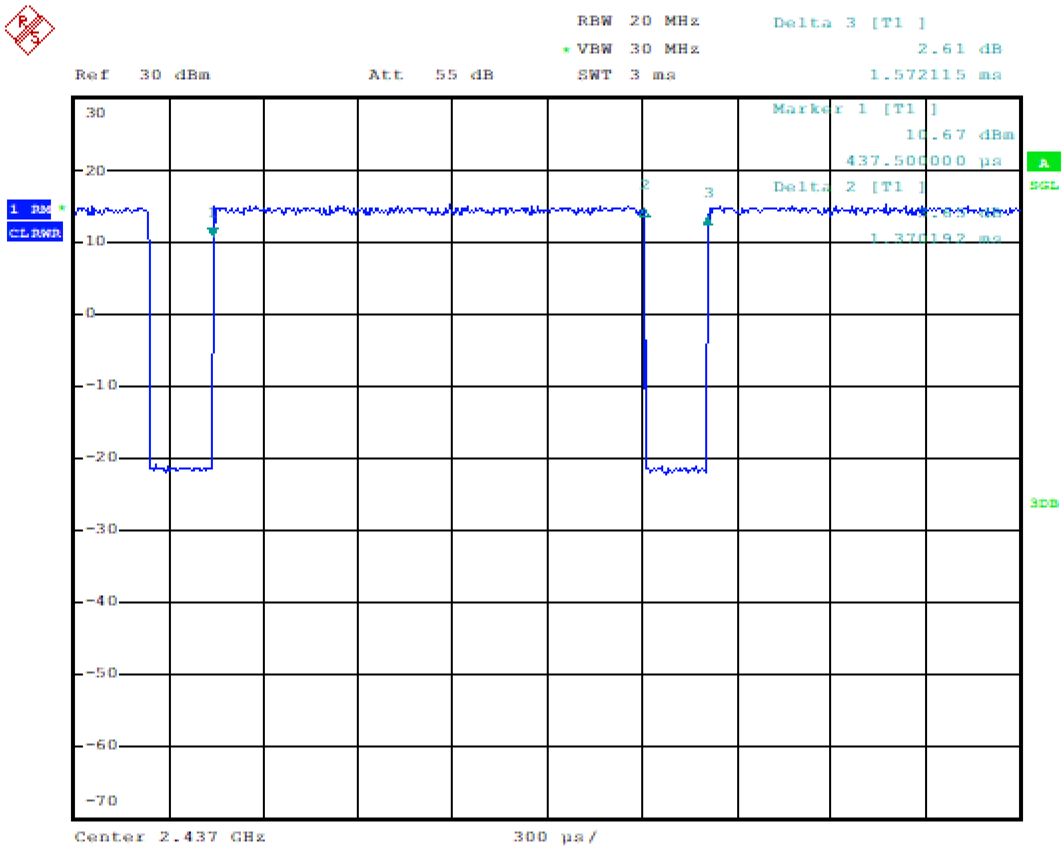
For the other channel bandwidths used by the device in a frequency band, apply all the procedures required for the largest channel bandwidth in section A) to determine the channels and RB configurations that need SAR testing and only measure SAR when the highest maximum output power of a configuration requiring testing in the smaller channel bandwidth is > ½ 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.

7.2 WiFi 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.

7.2.1 Duty cycle

2.4GHz Wi-Fi 802.11b:
duty cycle=1.37/1.57=87.26%



7.2.2 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 ≤ 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 ≤ 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 ≤ 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.

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7.2.3 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 ≤ 1.2 W/kg or all required channels are tested.

7.2.4 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 ≤ 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”

7.2.5 2.4 GHz WiFi 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 ≤ 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 ≤ 1.2 W/kg.

- **SAR Test Requirements for OFDM configurations**

When SAR measurement is required for 802.11 g/n OFDM configurations, each standalone and frequency aggregated band is considered separately for SAR test reduction. 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.

8 Test Result

8.1 Measurement of RF Conducted Power

8.1.1 Conducted Power of LTE

LTE Band 2				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel 18607	Channel 18900	Channel 19193	Tune up
1.4MHz	QPSK	1	0	21.38	21.62	21.63	22.5
		1	2	21.52	21.9	22.17	22.5
		1	5	21.3	21.32	21.8	22.5
		3	0	21.3	21.54	21.71	22.5
		3	2	21.54	21.84	22.09	22.5
		3	3	21.38	21.34	21.71	22.5
		6	0	20.56	20.72	20.74	21.5
	16QAM	1	0	20.22	20.92	20.86	21.5
		1	2	20.48	20.35	20.44	21.5
		1	5	20.15	20.25	20.12	21.5
		3	0	20.22	20.87	20.87	21.5
		3	2	20.41	20.43	20.34	21.5
		3	3	20.15	20.23	20.15	21.5
		6	0	19.72	19.76	19.65	20.5
Bandwidth	Modulation	RB size	RB offset	Channel 18615	Channel 18900	Channel 19185	Tune up
3MHz	QPSK	1	0	21.3	21.6	21.7	22.5
		1	7	21.52	21.88	22.23	22.5
		1	14	21.32	21.33	21.75	22.5
		8	0	20.66	20.79	20.94	21.5
		8	4	20.74	20.7	20.89	21.5
		8	7	20.59	20.62	20.68	21.5
		15	0	20.5	20.72	20.79	21.5
	16QAM	1	0	20.2	20.96	20.87	21.5
		1	7	20.41	20.41	20.34	21.5
		1	14	20.15	20.27	20.14	21.5
		8	0	19.62	19.88	19.23	20.5
		8	4	19.8	19.79	19.75	20.5
		8	7	19.72	19.83	19.77	20.5
		15	0	19.68	19.73	19.68	20.5
Bandwidth	Modulation	RB size	RB offset	Channel 18625	Channel 18900	Channel 19175	Tune up
5MHz	QPSK	1	0	21.33	21.56	21.61	22.5
		1	13	21.52	21.88	22.19	22.5
		1	24	21.39	21.32	21.68	22.5
		12	0	20.56	20.75	20.86	21.5
		12	6	20.72	20.72	20.87	21.5
		12	13	20.6	20.72	20.69	21.5
		25	0	20.57	20.68	20.8	21.5
	16QAM	1	0	20.21	20.97	20.87	21.5
		1	13	20.36	20.39	20.37	21.5
		1	24	20.13	20.25	20.05	21.5
		12	0	19.7	19.89	19.3	20.5

		12	6	19.77	19.76	19.8	20.5
		12	13	19.72	19.77	19.75	20.5
		25	0	19.67	19.65	19.68	20.5
Bandwidth	Modulation	RB size	RB offset	Channel 18650	Channel 18900	Channel 19150	Tune up
10MHz	QPSK	1	0	21.35	21.56	21.63	22.5
		1	25	21.55	21.87	22.19	22.5
		1	49	21.31	21.4	21.75	22.5
		25	0	20.66	20.77	20.94	21.5
		25	13	20.75	20.65	20.91	21.5
		25	25	20.57	20.69	20.67	21.5
		50	0	20.51	20.71	20.77	21.5
	16QAM	1	0	20.19	20.97	20.77	21.5
		1	25	20.37	20.38	20.38	21.5
		1	49	20.19	20.2	20.06	21.5
		25	0	19.63	19.84	19.29	20.5
		25	13	19.74	19.76	19.77	20.5
		25	25	19.73	19.79	19.77	20.5
		50	0	19.65	19.69	19.63	20.5
Bandwidth	Modulation	RB size	RB offset	Channel 18675	Channel 18900	Channel 19125	Tune up
15MHz	QPSK	1	0	21.3	21.54	21.71	22.5
		1	38	21.59	21.8	22.22	22.5
		1	74	21.38	21.34	21.71	22.5
		36	0	20.56	20.8	20.91	21.5
		36	18	20.75	20.73	20.9	21.5
		36	39	20.59	20.67	20.68	21.5
		75	0	20.6	20.65	20.73	21.5
	16QAM	1	0	20.28	20.9	20.78	21.5
		1	38	20.41	20.44	20.36	21.5
		1	74	20.12	20.24	20.13	21.5
		36	0	19.71	19.84	19.32	20.5
		36	18	19.76	19.82	19.78	20.5
		36	39	19.74	19.77	19.76	20.5
		75	0	19.65	19.64	19.72	20.5
Bandwidth	Modulation	RB size	RB offset	Channel 18700	Channel 18900	Channel 19100	Tune up
20MHz	QPSK	1	0	21.48	21.73	21.81	22.5
		1	50	**21.7**	**21.98**	**22.36**	22.5
		1	99	21.5	21.51	21.88	22.5
		50	0	20.76	20.91	21.04	21.5
		50	25	20.87	20.85	**21.05**	21.5
		50	50	20.77	20.82	20.83	21.5
		100	0	20.7	20.84	**20.91**	21.5
	16QAM	1	0	20.38	21.1	20.97	21.5
		1	50	20.56	20.55	20.53	21.5
		1	99	20.3	20.37	20.25	21.5
		50	0	19.81	19.99	19.43	20.5
		50	25	19.92	19.93	19.94	20.5
		50	50	19.91	19.96	19.91	20.5
		100	0	19.85	19.84	19.83	20.5

LTE Band 4				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel 19957	Channel 20175	Channel 20393	Tune up
1.4MHz	QPSK	1	0	21.26	20.95	20.87	22
		1	2	21.31	21.13	21.53	22
		1	5	20.94	20.57	21.04	22
		3	0	21.21	20.88	20.91	22
		3	2	21.29	21.07	21.48	22
		3	3	21.04	20.54	20.98	22
		6	0	20.15	20.01	20.23	21
	16QAM	1	0	20.05	19.79	19.55	21
		1	2	20.29	19.65	19.7	21
		1	5	19.51	19.55	20.21	21
		3	0	20.11	19.83	19.57	21
		3	2	20.32	19.69	19.69	21
		3	3	19.69	19.73	20.16	21
		6	0	19	18.96	18.99	20
Bandwidth	Modulation	RB size	RB offset	Channel 19965	Channel 20175	Channel 20385	Tune up
3MHz	QPSK	1	0	21.21	20.92	20.86	22
		1	7	21.3	21.11	21.48	22
		1	14	20.92	20.57	21.04	22
		8	0	20.15	20.14	20.16	21
		8	4	20.23	20.13	20.25	21
		8	7	20.03	20.04	20.17	21
		15	0	20.17	20	20.22	21
	16QAM	1	0	20.08	19.77	19.56	21
		1	7	20.25	19.66	19.77	21
		1	14	19.55	19.58	20.19	21
		8	0	19.02	19.11	19.06	20
		8	4	19.09	19.14	19.17	20
		8	7	18.92	19.11	19.04	20
		15	0	18.94	18.96	18.96	20
Bandwidth	Modulation	RB size	RB offset	Channel 19975	Channel 20175	Channel 20375	Tune up
5MHz	QPSK	1	0	21.21	20.88	20.95	22
		1	13	21.29	21.04	21.48	22
		1	24	21	20.59	20.98	22
		12	0	20.12	20.12	20.14	21
		12	6	20.2	20.07	20.3	21
		12	13	20.07	20.04	20.13	21
		25	0	20.15	20.04	20.14	21
	16QAM	1	0	20.1	19.86	19.56	21
		1	13	20.29	19.67	19.69	21
		1	24	19.54	19.55	20.24	21
		12	0	18.98	19.12	19.04	20
		12	6	19.11	19.2	19.19	20
		12	13	18.91	19.07	19.04	20
		25	0	18.93	18.97	19	20

Bandwidth	Modulation	RB size	RB offset	Channel 20000	Channel 20175	Channel 20350	Tune up
10MHz	QPSK	1	0	21.26	20.91	20.93	22
		1	25	21.3	21.09	21.57	22
		1	49	20.97	20.58	21.06	22
		25	0	20.19	20.15	20.24	21
		25	13	20.25	20.11	20.23	21
		25	25	20.02	20.03	20.2	21
		50	0	20.12	20.04	20.18	21
	16QAM	1	0	20.07	19.81	19.5	21
		1	25	20.3	19.69	19.69	21
		1	49	19.6	19.65	20.16	21
		25	0	18.99	19.16	19.11	20
		25	13	19.08	19.17	19.17	20
		25	25	18.88	19.07	19.05	20
		50	0	18.98	19.02	19.01	20
Bandwidth	Modulation	RB size	RB offset	Channel 20025	Channel 20175	Channel 20325	Tune up
15MHz	QPSK	1	0	21.18	20.89	20.88	22
		1	38	21.27	21.13	21.57	22
		1	74	20.98	20.61	20.98	22
		36	0	20.16	20.19	20.14	21
		36	18	20.23	20.11	20.29	21
		36	39	20.01	20.01	20.23	21
		75	0	20.15	20.02	20.22	21
	16QAM	1	0	20.08	19.78	19.53	21
		1	38	20.28	19.69	19.71	21
		1	74	19.53	19.6	20.18	21
		36	0	19.03	19.12	19.07	20
		36	18	19.06	19.17	19.21	20
		36	39	18.91	19.04	19.08	20
		75	0	18.98	19.01	19.03	20
Bandwidth	Modulation	RB size	RB offset	Channel 20050	Channel 20175	Channel 20300	Tune up
20MHz	QPSK	1	0	21.36	21.08	21.06	22
		1	50	**21.46**	**21.44**	**21.68**	22
		1	99	21.11	20.76	21.18	22
		50	0	20.3	20.29	20.34	21
		50	25	20.38	20.23	**20.43**	21
		50	50	20.19	20.14	20.33	21
		100	0	20.3	20.2	**20.34**	21
	16QAM	1	0	20.21	19.96	19.69	21
		1	50	20.42	19.83	19.88	21
		1	99	19.71	19.75	20.36	21
		50	0	19.14	19.29	19.21	20
		50	25	19.21	19.33	19.34	20
		50	50	19.08	19.22	19.2	20
		100	0	19.1	19.13	19.14	20

LTE Band 5				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel 20407	Channel 20525	Channel 20643	Tune up
1.4MHz	QPSK	1	0	23.2	23.41	23.32	24
		1	2	23.31	23.45	23.44	24
		1	5	23.33	23.46	23.23	24
		3	0	23.15	23.41	23.22	24
		3	2	23.28	23.43	23.45	24
		3	3	23.22	23.48	23.21	24
		6	0	22.34	22.33	22.28	23
	16QAM	1	0	21.84	22.41	22.17	23
		1	2	22.21	22.12	22.41	23
		1	5	22.58	22.21	21.84	23
		3	0	21.79	22.39	22.18	23
		3	2	22.23	22.14	22.43	23
		3	3	22.57	22.21	21.91	23
		6	0	21.33	21.38	21.13	22
Bandwidth	Modulation	RB size	RB offset	Channel 20415	Channel 20525	Channel 20635	Tune up
3MHz	QPSK	1	0	23.18	23.4	23.28	24
		1	7	23.33	23.54	23.44	24
		1	14	23.26	23.41	23.27	24
		8	0	22.26	22.32	22.21	23
		8	4	22.35	22.32	22.2	23
		8	7	22.21	22.29	22.07	23
		15	0	22.25	22.29	22.23	23
	16QAM	1	0	21.78	22.39	22.17	23
		1	7	22.18	22.08	22.43	23
		1	14	22.57	22.2	21.91	23
		8	0	21.03	21.21	21.32	22
		8	4	21.28	21.19	21.39	22
		8	7	21.38	21.09	21.29	22
		15	0	21.34	21.29	21.09	22
Bandwidth	Modulation	RB size	RB offset	Channel 20425	Channel 20525	Channel 20625	Tune up
5MHz	QPSK	1	0	23.13	23.41	23.22	24
		1	13	23.28	23.48	23.44	24
		1	24	23.26	23.48	23.2	24
		12	0	22.27	22.37	22.22	23
		12	6	22.36	22.3	22.24	23
		12	13	22.24	22.3	22.06	23
		25	0	22.35	22.31	22.22	23
	16QAM	1	0	21.86	22.42	22.25	23
		1	13	22.15	22.06	22.43	23
		1	24	22.6	22.19	21.83	23

		12	0	21.03	21.19	21.26	22
		12	6	21.38	21.17	21.44	22
		12	13	21.39	21.09	21.27	22
		25	0	21.35	21.33	21.15	22
Bandwidth	Modulation	RB size	RB offset	Channel 20450	Channel 20525	Channel 20600	Tune up
10MHz	QPSK	1	0	23.31	23.59	23.42	24
		1	25	23.43	**23.64**	23.61	24
		1	49	23.46	23.58	23.39	24
		25	0	22.38	**22.52**	22.34	23
		25	13	22.49	22.44	22.36	23
		25	25	22.35	22.42	22.21	23
		50	0	22.45	22.45	22.4	23
	16QAM	1	0	21.97	22.58	22.36	23
		1	25	22.32	22.23	22.58	23
		1	49	22.73	22.38	22.01	23
		25	0	21.23	21.38	21.44	22
		25	13	21.48	21.29	21.56	22
		25	25	21.51	21.24	21.43	22
		50	0	21.49	21.49	21.26	22

LTE Band 13				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel 23205	Channel 23230	Channel 23255	Tune up
5MHz	QPSK	1	0	23.08	23.2	22.9	24.5
		1	13	23.37	23.63	23.16	24.5
		1	24	23.05	23.09	22.87	24.5
		12	0	22.16	22.28	21.92	23.5
		12	6	22.11	22.27	21.92	23.5
		12	13	21.94	22.19	21.81	23.5
		25	0	22.14	22.35	22.06	23.5
	16QAM	1	0	22.23	22.4	22.14	23.5
		1	13	22.12	22.25	21.93	23.5
		1	24	21.78	21.83	21.74	23.5
		12	0	21.04	21.27	20.89	22.5
		12	6	21.19	21.34	20.98	22.5
		12	13	21.02	21.19	20.91	22.5
		25	0	21.08	21.27	20.97	22.5
Bandwidth	Modulation	RB size	RB offset	Channel NA	Channel 23230	Channel NA	Tune up
10MHz	QPSK	1	0	NA	23.38	NA	24.5
		1	25	NA	**23.75**	NA	24.5
		1	49	NA	23.28	NA	24.5
		25	0	NA	**22.45**	NA	23.5
		25	13	NA	22.42	NA	23.5
		25	25	NA	22.32	NA	23.5
		50	0	NA	22.45	NA	23.5
	16QAM	1	0	NA	22.52	NA	23.5
		1	25	NA	22.39	NA	23.5
		1	49	NA	21.89	NA	23.5
		25	0	NA	21.42	NA	22.5
		25	13	NA	21.47	NA	22.5
		25	25	NA	21.36	NA	22.5
		50	0	NA	21.41	NA	22.5

LTE Band 25				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel 26047	Channel 26365	Channel 26683	Tune up
1.4MHz	QPSK	1	0	21.7	21.97	21.56	22.5
		1	2	22	22.08	22.04	22.5
		1	5	21.43	21.76	21.53	22.5
		3	0	21.69	22.01	21.49	22.5
		3	2	22.13	22.05	22.01	22.5
		3	3	21.34	21.74	21.51	22.5
		6	0	20.78	20.74	20.84	21.5
	16QAM	1	0	20.67	20.77	20.32	21.5
		1	2	20.67	20.83	20.81	21.5
		1	5	20.44	20.52	20.3	21.5
		3	0	20.72	20.77	20.47	21.5
		3	2	20.67	20.9	20.81	21.5
		3	3	20.48	20.47	20.32	21.5
		6	0	19.75	19.83	19.93	20.5
Bandwidth	Modulation	RB size	RB offset	Channel 26055	Channel 26365	Channel 26675	Tune up
3MHz	QPSK	1	0	21.73	21.97	21.52	22.5
		1	7	22.07	22.03	22.06	22.5
		1	14	21.4	21.74	21.55	22.5
		8	0	20.83	20.89	20.92	21.5
		8	4	20.86	21.02	21.01	21.5
		8	7	20.84	20.89	20.78	21.5
		15	0	20.74	20.76	20.89	21.5
	16QAM	1	0	20.66	20.76	20.33	21.5
		1	7	20.75	20.84	20.82	21.5
		1	14	20.42	20.51	20.38	21.5
		8	0	19.73	19.46	19.99	20.5
		8	4	19.72	19.99	20.02	20.5
		8	7	19.62	19.89	19.97	20.5
		15	0	19.7	19.81	19.95	20.5
Bandwidth	Modulation	RB size	RB offset	Channel 26065	Channel 26365	Channel 26665	Tune up
5MHz	QPSK	1	0	21.69	22.02	21.49	22.5
		1	13	22.1	22.03	22	22.5
		1	24	21.4	21.74	21.51	22.5
		12	0	20.91	20.9	20.95	21.5
		12	6	20.84	20.97	20.96	21.5
		12	13	20.75	20.8	20.82	21.5
		25	0	20.82	20.81	20.85	21.5
	16QAM	1	0	20.67	20.83	20.38	21.5
		1	13	20.65	20.89	20.74	21.5
		1	24	20.5	20.49	20.32	21.5
		12	0	19.74	19.43	20.08	20.5
		12	6	19.73	19.99	19.98	20.5
		12	13	19.61	19.91	19.98	20.5
		25	0	19.74	19.78	19.97	20.5
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up

				26090	26365	26640	
10MHz	QPSK	1	0	21.69	21.97	21.57	22.5
		1	25	22.06	22.03	21.98	22.5
		1	49	21.37	21.7	21.52	22.5
		25	0	20.89	20.92	20.95	21.5
		25	13	20.88	20.95	20.99	21.5
		25	25	20.77	20.83	20.82	21.5
		50	0	20.79	20.76	20.83	21.5
	16QAM	1	0	20.72	20.81	20.36	21.5
		1	25	20.66	20.91	20.81	21.5
		1	49	20.48	20.47	20.32	21.5
		25	0	19.8	19.48	20.09	20.5
		25	13	19.74	20.05	20	20.5
		25	25	19.57	19.9	19.91	20.5
		50	0	19.71	19.81	19.88	20.5
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				26115	26365	26615	
15MHz	QPSK	1	0	21.72	22.01	21.48	22.5
		1	38	22.06	22.02	22.05	22.5
		1	74	21.43	21.68	21.52	22.5
		36	0	20.87	20.91	20.96	21.5
		36	18	20.85	21.02	20.96	21.5
		36	39	20.79	20.79	20.79	21.5
		75	0	20.76	20.81	20.88	21.5
	16QAM	1	0	20.74	20.74	20.34	21.5
		1	38	20.72	20.88	20.72	21.5
		1	74	20.49	20.51	20.3	21.5
		36	0	19.74	19.42	19.99	20.5
		36	18	19.76	20.01	19.97	20.5
		36	39	19.55	19.88	19.94	20.5
		75	0	19.69	19.85	19.92	20.5
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				26140	26365	26590	
20MHz	QPSK	1	0	21.89	22.14	21.67	22.5
		1	50	**22.2**	**22.21**	**22.18**	22.5
		1	99	21.54	21.86	21.68	22.5
		50	0	21.01	21.03	21.08	21.5
		50	25	**21.02**	**21.15**	**21.13**	21.5
		50	50	20.94	20.99	20.97	21.5
		100	0	20.94	20.93	**21.01**	21.5
	16QAM	1	0	20.85	20.93	20.48	21.5
		1	50	20.85	21.01	20.92	21.5
		1	99	20.6	20.62	20.49	21.5
		50	0	19.91	19.6	20.19	20.5
		50	25	19.92	20.17	20.12	20.5
		50	50	19.75	20.01	20.11	20.5
		100	0	19.86	19.95	20.08	20.5

LTE Band 26				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel 26697	Channel 26865	Channel 27033	Tune up
1.4MHz	QPSK	1	0	23.32	23.33	23.41	24
		1	2	23.42	23.42	23.55	24
		1	5	23.36	23.17	23.21	24
		3	0	23.56	23.42	23.45	24
		3	2	23.52	23.51	23.42	24
		3	3	23.47	23.35	23.36	24
		6	0	22.53	22.46	22.5	23
	16QAM	1	0	22.44	22.58	22.42	23
		1	2	22.35	22.34	22.41	23
		1	5	22.31	22.52	22.22	23
		3	0	22.43	22.46	22.39	23
		3	2	22.54	22.51	22.47	23
		3	3	22.57	22.47	22.32	23
		6	0	21.18	21.34	21.24	22
Bandwidth	Modulation	RB size	RB offset	Channel 26705	Channel 26865	Channel 27025	Tune up
3MHz	QPSK	1	0	23.39	23.38	23.38	24
		1	7	23.38	23.41	23.48	24
		1	14	23.33	23.17	23.22	24
		8	0	22.6	22.6	22.6	23
		8	4	22.5	22.56	22.38	23
		8	7	22.56	22.4	22.38	23
		15	0	22.44	22.51	22.51	23
	16QAM	1	0	22.44	22.58	22.46	23
		1	7	22.31	22.31	22.39	23
		1	14	22.31	22.58	22.19	23
		8	0	21.47	21.31	21.31	22
		8	4	21.19	21.23	21.4	22
		8	7	21.13	21.12	21.19	22
		15	0	21.23	21.37	21.17	22
Bandwidth	Modulation	RB size	RB offset	Channel 26715	Channel 26865	Channel 27015	Tune up
5MHz	QPSK	1	0	23.55	23.5	23.55	24
		1	13	23.64	23.52	23.67	24
		1	24	23.6	23.32	23.36	24
		12	0	22.75	22.76	22.71	23
		12	6	22.69	22.63	22.67	23
		12	13	22.68	22.61	22.56	23
		25	0	22.68	22.68	22.69	23
	16QAM	1	0	22.59	22.72	22.55	23
		1	13	22.51	22.54	22.47	23
		1	24	22.54	22.73	22.47	23

		12	0	21.6	21.51	21.51	22
		12	6	21.36	21.38	21.51	22
		12	13	21.34	21.31	21.36	22
		25	0	21.41	21.52	21.36	22
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				26740	26865	26990	
10MHz	QPSK	1	0	23.59	23.49	23.48	24
		1	25	23.56	23.51	23.72	24
		1	49	23.51	23.33	23.36	24
		25	0	22.67	22.68	22.79	23
		25	13	22.72	22.64	22.57	23
		25	25	22.7	22.64	22.51	23
		50	0	22.6	22.6	22.67	23
	16QAM	1	0	22.58	22.69	22.5	23
		1	25	22.47	22.54	22.56	23
		1	49	22.51	22.7	22.43	23
		25	0	21.61	21.53	21.47	22
		25	13	21.34	21.39	21.49	22
		25	25	21.32	21.29	21.36	22
		50	0	21.42	21.48	21.34	22
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				26765	26865	26965	
15MHz	QPSK	1	0	23.7	23.61	23.65	24
		1	38	**23.75**	**23.67**	**23.86**	24
		1	74	23.71	23.48	23.55	24
		36	0	**22.85**	**22.87**	**22.89**	23
		36	18	22.82	22.83	22.77	23
		36	39	22.83	22.79	22.71	23
		75	0	22.79	22.79	**22.8**	23
	16QAM	1	0	22.75	22.86	22.69	23
		1	38	22.62	22.64	22.67	23
		1	74	22.69	22.87	22.58	23
		36	0	21.71	21.66	21.61	22
		36	18	21.49	21.51	21.66	22
		36	39	21.44	21.44	21.46	22
		75	0	21.54	21.63	21.52	22

LTE Band 66				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel 131979	Channel 132322	Channel 132665	Tune up
1.4MHz	QPSK	1	0	19.99	20.3	20.23	21
		1	2	20.49	20.68	20.34	21
		1	5	20.01	20.47	20.24	21
		3	0	19.91	20.13	20.09	21
		3	2	20.3	20.56	20.32	21
		3	3	19.82	20.37	20.08	21
		6	0	19.42	19.51	19.31	20
	16QAM	1	0	18.79	19.28	19.11	20
		1	2	18.81	19.2	19.21	20
		1	5	19.29	19.17	19.01	20
		3	0	18.69	19.11	18.98	20
		3	2	18.66	18.98	18.96	20
		3	3	19.24	19.06	18.86	20
		6	0	18.21	18.19	18.05	19
Bandwidth	Modulation	RB size	RB offset	Channel 131987	Channel 132322	Channel 132657	Tune up
3MHz	QPSK	1	0	19.97	20.35	20.19	21
		1	7	20.47	20.63	20.4	21
		1	14	20.06	20.54	20.29	21
		8	0	19.3	19.46	19.31	20
		8	4	19.39	19.17	19.2	20
		8	7	19.38	19.35	19.02	20
		15	0	19.36	19.43	19.3	20
	16QAM	1	0	18.8	19.31	19.16	20
		1	7	18.79	19.15	19.16	20
		1	14	19.34	19.22	19	20
		8	0	18.31	18.28	18.35	19
		8	4	18.36	18.32	18.19	19
		8	7	18.14	18.08	17.96	19
		15	0	18.13	18.2	18.04	19
Bandwidth	Modulation	RB size	RB offset	Channel 131997	Channel 132322	Channel 132647	Tune up
5MHz	QPSK	1	0	20.02	20.32	20.26	21
		1	13	20.41	20.68	20.42	21
		1	24	19.97	20.49	20.27	21
		12	0	19.33	19.39	19.32	20
		12	6	19.45	19.24	19.13	20
		12	13	19.36	19.36	19.03	20
		25	0	19.37	19.5	19.24	20
	16QAM	1	0	18.77	19.25	19.17	20
		1	13	18.78	19.21	19.18	20
		1	24	19.32	19.21	19.05	20
		12	0	18.22	18.27	18.3	19
		12	6	18.36	18.34	18.15	19
		12	13	18.1	18.1	17.9	19
		25	0	18.14	18.22	18.02	19
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up

				132022	132322	132622	
10MHz	QPSK	1	0	20.02	20.27	20.25	21
		1	25	20.49	20.61	20.43	21
		1	49	20	20.5	20.32	21
		25	0	19.32	19.42	19.26	20
		25	13	19.4	19.2	19.15	20
		25	25	19.37	19.39	19.08	20
		50	0	19.35	19.52	19.32	20
	16QAM	1	0	18.8	19.32	19.2	20
		1	25	18.78	19.15	19.19	20
		1	49	19.32	19.22	19.02	20
		25	0	18.23	18.27	18.32	19
		25	13	18.45	18.34	18.2	19
		25	25	18.1	18.08	17.9	19
		50	0	18.12	18.15	18.03	19
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				132047	132322	132597	
15MHz	QPSK	1	0	20	20.3	20.18	21
		1	38	20.39	20.66	20.35	21
		1	74	20.02	20.46	20.27	21
		36	0	19.28	19.44	19.32	20
		36	18	19.41	19.24	19.16	20
		36	39	19.3	19.32	19.04	20
		75	0	19.44	19.49	19.3	20
	16QAM	1	0	18.8	19.28	19.11	20
		1	38	18.76	19.21	19.12	20
		1	74	19.3	19.16	19.09	20
		36	0	18.32	18.24	18.28	19
		36	18	18.36	18.31	18.15	19
		36	39	18.07	18.06	17.97	19
		75	0	18.15	18.21	18.1	19
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				132072	132322	132572	
20MHz	QPSK	1	0	20.14	20.47	20.38	21
		1	50	**20.59**	**20.8**	**20.53**	21
		1	99	20.17	20.65	20.43	21
		50	0	19.45	**19.59**	19.45	20
		50	25	19.58	19.36	19.33	20
		50	50	19.5	19.49	19.21	20
		100	0	19.54	**19.62**	19.42	20
	16QAM	1	0	18.97	19.45	19.31	20
		1	50	18.96	19.35	19.32	20
		1	99	19.46	19.36	19.2	20
		50	0	18.42	18.39	18.45	19
		50	25	18.56	18.45	18.32	19
		50	50	18.27	18.21	18.09	19
		100	0	18.32	18.35	18.21	19

Table 6： Conducted Power of LTE

8.1.2 Conducted Power of WIFI and BT

Mode	Channel	Frequency(MHz)	Data Rate(Mbps)	Tune up	Average Power (dBm)	SAR Test
802.11b	1	2412	1	17.5	16.55	NO
	6	2437		17.5	**17.19**	Yes
	11	2462		17.5	16.99	NO
802.11g	1	2412	6	14.5	13.18	NO
	6	2437		14.5	13.66	NO
	11	2462		14.5	14.06	NO
802.11n HT20	1	2412	6.5	13.5	12.14	NO
	6	2437		13.5	12.82	NO
	11	2462		13.5	12.91	NO

Table 7： Conducted Power of WiFi

Note:

1) Power must be measured at each transmit antenna port according to the DSSS and OFDM transmission configurations in each standalone and aggregated frequency band.

2) Power measurement is required for the transmission mode configuration with the highest maximum output power specified for production units.

a) 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.

b) 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.

3) 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.

BT			Tune up (dBm)	Average Conducted Power(dBm)
Modulation	Channel	Frequency(MHz)		
GFSK	0	2402	4	3.29
	39	2441	4	3.88
	78	2480	4	3.00
π/4DQPSK	0	2402	4	2.78
	39	2441	4	3.33
	78	2480	4	2.47
8DPSK	0	2402	4	2.78
	39	2441	4	3.34
	78	2480	4	2.47
BLE			Tune up (dBm)	Average Conducted Power(dBm)
Modulation	Channel	Frequency(MHz)		
GFSK	0	2402	4	2.51
	19	2440	4	3.32
	39	2480	4	2.15

Table 8： Conducted Power of BT

8.2 Stand-alone SAR test evaluation

Unless specifically required by the published RF exposure KDB procedures, standalone 1-g head or body and Product specific 10g SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding SAR Test Exclusion Threshold condition is satisfied. These test exclusion conditions are based on source-based time-averaged maximum conducted output power of the RF channel requiring evaluation, adjusted for tune-up tolerance, and the minimum test separation distance required for the exposure conditions.

Freq. Band	Frequency (GHz)	Position	Average Power		Test Separation (mm)	Calculate Value	Exclusion Threshold	Exclusion (Y/N)
			dBm	mW				
Wi-Fi	2.45	Body-worn	17.5	56.2	15	5.9	3	N
		hotspot	17.5	56.2	10	8.8	3	N
Bluetooth	2.48	Body-worn	4	2.5	15	0.3	3	Y
		hotspot	4	2.5	10	0.4	3	Y

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:
[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where
• f(GHz) is the RF channel transmit frequency in GHz
• Power and distance are rounded to the nearest mW and mm before calculation
• The result is rounded to one decimal place for comparison

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

8.3 Measurement of SAR Data

8.3.1 SAR Result of LTE Band 2

Test position	BW.	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg)1-g	Power Drift(dB)	Conducted power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR(W/kg)	Liquid Temp.
Body worn Test data(Separate 15mm 1RB)											
Front side	20	QPSK 1RB_50	19100/1900	1:1	0.424	0.02	22.36	22.50	1.033	**0.438**	22.3
Back side	20	QPSK 1RB_50	19100/1900	1:1	0.383	0.01	22.36	22.50	1.033	0.396	22.3
Body worn Test data (Separate 15mm 50%RB)											
Front side	20	QPSK 50RB_25	19100/1900	1:1	0.328	0.01	21.05	21.50	1.109	0.364	22.3
Back side	20	QPSK 50RB_25	19100/1900	1:1	0.300	0.12	21.05	21.50	1.109	0.333	22.3
Hotspot Test data(Separate 10mm 1RB)											
Front side	20	QPSK 1RB_50	19100/1900	1:1	0.813	0.01	22.36	22.50	1.033	0.840	22.3
Back side	20	QPSK 1RB_50	19100/1900	1:1	0.852	-0.15	22.36	22.50	1.033	0.880	22.3
Left side	20	QPSK 1RB_50	19100/1900	1:1	0.490	0.03	22.36	22.50	1.033	0.506	22.3
Right side	20	QPSK 1RB_50	19100/1900	1:1	0.251	0.02	22.36	22.50	1.033	0.259	22.3
Bottom side	20	QPSK 1RB_50	19100/1900	1:1	0.685	0.08	22.36	22.50	1.033	0.707	22.3
Front side	20	QPSK 1RB_50	18700/1860	1:1	0.908	0.02	21.70	22.50	1.202	1.092	22.3
Front side	20	QPSK 1RB_50	18900/1880	1:1	0.850	0.11	21.98	22.50	1.127	0.958	22.3
Back side	20	QPSK 1RB_50	18700/1860	1:1	0.989	0.04	21.70	22.50	1.202	**1.189**	22.3
Back side-repeat	20	QPSK 1RB_50	18700/1860	1:1	0.939	-0.02	21.70	22.50	1.202	1.129	22.3
Back side	20	QPSK 1RB_50	18900/1880	1:1	0.913	-0.02	21.98	22.50	1.127	1.029	22.3
Hotspot Test data (Separate 10mm 50%RB)											
Front side	20	QPSK 50RB_25	19100/1900	1:1	0.639	0.05	21.05	21.50	1.109	0.709	22.3
Back side	20	QPSK 50RB_25	19100/1900	1:1	0.673	0.07	21.05	21.50	1.109	0.746	22.3
Left side	20	QPSK 50RB_25	19100/1900	1:1	0.382	0.01	21.05	21.50	1.109	0.424	22.3
Right side	20	QPSK 50RB_25	19100/1900	1:1	0.191	-0.03	21.05	21.50	1.109	0.212	22.3
Bottom side	20	QPSK 50RB_25	19100/1900	1:1	0.553	0.02	21.05	21.50	1.109	0.613	22.3
Hotspot Test data(Separate 10mm 100RB)											
Front side	20	QPSK 100RB_0	19100/1900	1:1	0.569	0.00	20.91	21.5	1.146	0.652	22.3
Back side	20	QPSK 100RB_0	19100/1900	1:1	0.630	0.00	20.91	21.5	1.146	0.722	22.3

Test Position	Channel/ Frequency (MHz)	Measured SAR (1g)	1st Repeated SAR (1g)	Ratio	2nd Repeated SAR (1g)	3rd Repeated SAR (1g)
Back side	18700/1860	0.989	0.939	1.053	N/A	N/A
Note: 1) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.						
2) A second repeated measurement was performed only if the ratio of largest to smallest SAR for the original and first repeated measurements was > 1.20 or when the original or repeated measurement was ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).						
3) A third repeated measurement was performed only if the original, first or second repeated measurement was ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.						
4) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg						

Table 9： SAR of LTE Band 2 for Body.

Note:

1) The maximum Scaled SAR value is marked in bold. Graph results refer to Appendix B.

2) Per FCC KDB Publication 447498 D01, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s).

8.3.2 SAR Result of LTE Band 4

Test position	BW.	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg)1-g	Power Drift(dB)	Conducted power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR(W/kg)	Liquid Temp.
Body worn Test data(Separate 15mm 1RB)											
Front side	20	QPSK 1RB_50	20300/1745	1:1	0.246	0.05	21.68	22.00	1.076	0.265	22.2
Back side	20	QPSK 1RB_50	20300/1745	1:1	0.370	0.06	21.68	22.00	1.076	**0.398**	22.2
Body worn Test data (Separate 15mm 50%RB)											
Front side	20	QPSK 50RB_25	20300/1745	1:1	0.202	0.00	20.43	21.00	1.140	0.230	22.2
Back side	20	QPSK 50RB_25	20300/1745	1:1	0.298	-0.15	20.43	21.00	1.140	0.340	22.2
Hotspot Test data (Separate 10mm 1%RB)											
Front side	20	QPSK 1RB_50	20300/1745	1:1	0.452	-0.01	21.68	22.00	1.076	0.487	22.2
Back side	20	QPSK 1RB_50	20300/1745	1:1	0.835	-0.07	21.68	22.00	1.076	**0.899**	22.2
Back side-repeat	20	QPSK 1RB_50	20300/1745	1:1	0.814	0.18	21.68	22.00	1.076	0.876	22.2
Left side	20	QPSK 1RB_50	20300/1745	1:1	0.313	0.13	21.68	22.00	1.076	0.337	22.2
Right side	20	QPSK 1RB_50	20300/1745	1:1	0.140	-0.04	21.68	22.00	1.076	0.151	22.2
Bottom side	20	QPSK 1RB_50	20300/1745	1:1	0.408	0.12	21.68	22.00	1.076	0.439	22.2
Back side	20	QPSK 1RB_50	20050/1720	1:1	0.686	0.07	21.46	22.00	1.132	0.777	22.2
Back side	20	QPSK 1RB_50	20175/1732.5	1:1	0.789	-0.07	21.44	22.00	1.138	0.898	22.2
Hotspot Test data (Separate 10mm 50%RB)											
Front side	20	QPSK 50RB_25	20300/1745	1:1	0.355	0.19	20.43	21.00	1.140	0.405	22.2
Back side	20	QPSK 50RB_25	20300/1745	1:1	0.657	-0.08	20.43	21.00	1.140	0.749	22.2
Left side	20	QPSK 50RB_25	20300/1745	1:1	0.233	0.06	20.43	21.00	1.140	0.266	22.2
Right side	20	QPSK 50RB_25	20300/1745	1:1	0.120	0.09	20.43	21.00	1.140	0.137	22.2
Bottom side	20	QPSK 50RB_25	20300/1745	1:1	0.326	0.16	20.43	21.00	1.140	0.372	22.2
Hotspot Test data (Separate 10mm 100RB)											
Back side	20	QPSK 100RB_0	20300/1745	1:1	0.664	-0.02	20.34	21.00	1.164	0.773	22.2

Test Position	Channel/ Frequency (MHz)	Measured SAR (1g)	1st Repeated SAR (1g)	Ratio	2nd Repeated SAR (1g)	3rd Repeated SAR (1g)
Back side	20300/1745	0.835	0.814	1.026	N/A	N/A
Note: 1) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.						
2) A second repeated measurement was performed only if the ratio of largest to smallest SAR for the original and first repeated measurements was > 1.20 or when the original or repeated measurement was ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).						
3) A third repeated measurement was performed only if the original, first or second repeated measurement was ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.						
4) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg						

Table 10：SAR of LTE Band 4 for Body.

Note:

1) The maximum Scaled SAR value is marked in bold. Graph results refer to Appendix B.

2) Per FCC KDB Publication 447498 D01, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s).

8.3.3 SAR Result of LTE Band 13

Test position	BW.	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg)1-g	Power Drift(dB)	Conducted power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR(W/kg)	Liquid Temp.
Body worn Test data(Separate 15mm 1RB)											
Front side	10	QPSK 1RB_25	23230/782	1:1	0.181	0.05	23.75	24.50	1.189	0.215	22.1
Back side	10	QPSK 1RB_25	23230/782	1:1	0.350	0.05	23.75	24.50	1.189	0.416	22.1
Body worn Test data (Separate 15mm 50%RB)											
Front side	10	QPSK 25RB_0	23230/782	1:1	0.142	0.05	22.45	23.50	1.274	0.181	22.1
Back side	10	QPSK 25RB_0	23230/782	1:1	0.350	0.16	22.45	23.50	1.274	**0.446**	22.1
Hotspot Test data(Separate 10mm 1RB)											
Front side	10	QPSK 1RB_25	23230/782	1:1	0.276	0.03	23.75	24.50	1.189	0.328	22.1
Back side	10	QPSK 1RB_25	23230/782	1:1	0.614	0.05	23.75	24.50	1.189	**0.730**	22.1
Left side	10	QPSK 1RB_25	23230/782	1:1	0.146	0.03	23.75	24.50	1.189	0.174	22.1
Right side	10	QPSK 1RB_25	23230/782	1:1	0.123	0.01	23.75	24.50	1.189	0.146	22.1
Bottom side	10	QPSK 1RB_25	23230/782	1:1	0.082	0.02	23.75	24.50	1.189	0.097	22.1
Hotspot Test data (Separate 10mm 50%RB)											
Front side	10	QPSK 25RB_0	23230/782	1:1	0.207	0.02	22.45	23.50	1.274	0.264	22.1
Back side	10	QPSK 25RB_0	23230/782	1:1	0.513	-0.04	22.45	23.50	1.274	0.653	22.1
Left side	10	QPSK 25RB_0	23230/782	1:1	0.114	0.05	22.45	23.50	1.274	0.145	22.1
Right side	10	QPSK 25RB_0	23230/782	1:1	0.094	0.06	22.45	23.50	1.274	0.120	22.1
Bottom side	10	QPSK 25RB_0	23230/782	1:1	0.064	0.07	22.45	23.50	1.274	0.081	22.1

Table 11：SAR of LTE Band 13 for Body.

Note:

1) The maximum Scaled SAR value is marked in bold. Graph results refer to Appendix B.

2) Per FCC KDB Publication 447498 D01, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s).

8.3.4 SAR Result of LTE Band 25

Test position	BW.	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg)1-g	Power Drift(dB)	Conducted power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR(W/kg)	Liquid Temp.
Body worn Test data(Separate 15mm 1RB)											
Front side	20	QPSK 1RB_50	26365/1882.5	1:1	0.428	0.05	22.21	22.50	1.069	**0.458**	22.3
Back side	20	QPSK 1RB_50	26365/1882.5	1:1	0.411	0.01	22.21	22.50	1.069	0.439	22.3
Body worn Test data (Separate 15mm 50%RB)											
Front side	20	QPSK 50RB_25	26365/1882.5	1:1	0.350	0.20	21.15	21.50	1.084	0.379	22.3
Back side	20	QPSK 50RB_25	26365/1882.5	1:1	0.334	0.21	21.15	21.50	1.084	0.362	22.3
Hotspot Test data(Separate 10mm 1RB)											
Front side	20	QPSK 1RB_50	26365/1882.5	1:1	0.784	-0.07	22.21	22.50	1.069	0.838	22.3
Back side	20	QPSK 1RB_50	26365/1882.5	1:1	0.903	0.01	22.21	22.50	1.069	0.965	22.3
Left side	20	QPSK 1RB_50	26365/1882.5	1:1	0.510	-0.03	22.21	22.50	1.069	0.545	22.3
Right side	20	QPSK 1RB_50	26365/1882.5	1:1	0.292	0.04	22.21	22.50	1.069	0.312	22.3
Bottom side	20	QPSK 1RB_50	26365/1882.5	1:1	0.659	0.01	22.21	22.50	1.069	0.705	22.3
Front side	20	QPSK 1RB_50	26140/1860	1:1	0.842	0.19	22.20	22.50	1.072	0.902	22.3
Front side	20	QPSK 1RB_50	26590/1905	1:1	0.723	0.04	22.18	22.50	1.076	0.778	22.3
Back side	20	QPSK 1RB_50	26140/1860	1:1	1.000	0.04	22.20	22.50	1.072	**1.072**	22.3
Back side-repeat	20	QPSK 1RB_50	26140/1860	1:1	0.936	0.07	22.20	22.50	1.072	1.003	22.3
Back side	20	QPSK 1RB_50	26590/1905	1:1	0.795	0.04	22.18	22.50	1.076	0.856	22.3
Hotspot Test data (Separate 10mm 50%RB)											
Front side	20	QPSK 50RB_25	26365/1882.5	1:1	0.617	0.09	21.15	21.50	1.084	0.669	22.3
Back side	20	QPSK 50RB_25	26365/1882.5	1:1	0.740	0.01	21.15	21.50	1.084	0.802	22.3
Left side	20	QPSK 50RB_25	26365/1882.5	1:1	0.415	0.01	21.15	21.50	1.084	0.450	22.3
Right side	20	QPSK 50RB_25	26365/1882.5	1:1	0.235	0.08	21.15	21.50	1.084	0.255	22.3
Bottom side	20	QPSK 50RB_25	26365/1882.5	1:1	0.612	0.04	21.15	21.50	1.084	0.663	22.3
Back side	20	QPSK 50RB_25	26140/1860	1:1	0.797	0.02	21.02	21.50	1.117	0.890	22.3
Back side	20	QPSK 50RB_25	26590/1905	1:1	0.621	0.04	21.13	21.50	1.089	0.676	22.3
Hotspot Test data(Separate 10mm 100RB)											
Front side	20	QPSK 100RB_0	26590/1905	1:1	0.561	0.12	21.01	21.50	1.119	0.628	22.3
Back side	20	QPSK 100RB_0	26590/1905	1:1	0.585	0.06	21.01	21.50	1.119	0.655	22.3

<table>
<tr><th rowspan="2">Test Position</th><th>Channel/ Frequency</th><th rowspan="2">Measured SAR (1g)</th><th>1st Repeated</th><th rowspan="2">Ratio</th><th>2nd Repeated</th><th>3rd Repeated</th></tr>
<tr><th>(MHz)</th><th>SAR (1g)</th><th>SAR (1g)</th><th>SAR (1g)</th></tr>
<tr><td>Back side</td><td>26140/1860</td><td>1.000</td><td>0.936</td><td>1.068</td><td>N/A</td><td>N/A</td></tr>
<tr><td colspan="7">Note: 1) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.</td></tr>
<tr><td colspan="7">2) A second repeated measurement was performed only if the ratio of largest to smallest SAR for the original and first repeated measurements was > 1.20 or when the original or repeated measurement was ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).</td></tr>
<tr><td colspan="7">3) A third repeated measurement was performed only if the original, first or second repeated measurement was ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.</td></tr>
<tr><td colspan="7">4) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg</td></tr>
</table>

Table 12：SAR of LTE Band 25 for Body.
Note:

1) The maximum Scaled SAR value is marked in bold. Graph results refer to Appendix B.
2) Per FCC KDB Publication 447498 D01, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s).

8.3.5 SAR Result of LTE Band 26(LTE B26 covers LTE B5)

Test position	BW.	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg)1-g	Power Drift(dB)	Conducted power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR(W/kg)	Liquid Temp.
Body worn Test data(Separate 15mm 1RB)											
Front side	15	QPSK 1RB_38	26965/841.5	1:1	0.748	0.10	23.86	24	1.033	0.773	22.1
Back side	15	QPSK 1RB_38	26965/841.5	1:1	0.807	0.06	23.86	24	1.033	0.833	22.1
Back side	15	QPSK 1RB_38	26765/821.5	1:1	0.803	0.02	23.75	24	1.059	0.851	22.1
Back side	15	QPSK 1RB_38	26865/831.5	1:1	0.915	0.04	23.67	24	1.079	**0.987**	22.1
Back side-repeat	15	QPSK 1RB_38	26865/831.5	1:1	0.891	-0.02	23.67	24	1.079	0.961	22.1
Body worn Test data (Separate 15mm 50%RB)											
Front side	15	QPSK 36RB_0	26965/841.5	1:1	0.594	0.02	22.89	23	1.026	0.609	22.1
Back side	15	QPSK 36RB_0	26965/841.5	1:1	0.706	0.03	22.89	23	1.026	0.724	22.1
Hotspot Test data(Separate 10mm 1RB)											
Front side	15	QPSK 1RB_38	26965/841.5	1:1	0.957	-0.02	23.86	24	1.033	0.988	22.1
Back side	15	QPSK 1RB_38	26965/841.5	1:1	0.969	0.02	23.86	24	1.033	1.001	22.1
Left side	15	QPSK 1RB_38	26965/841.5	1:1	0.643	0.06	23.86	24	1.033	0.664	22.1
Right side	15	QPSK 1RB_38	26965/841.5	1:1	0.455	0.07	23.86	24	1.033	0.470	22.1
Bottom side	15	QPSK 1RB_38	26965/841.5	1:1	0.135	0.04	23.86	24	1.033	0.139	22.1
Front side	15	QPSK 1RB_38	26765/821.5	1:1	0.772	0.05	23.75	24	1.059	0.818	22.1
Front side	15	QPSK 1RB_38	26865/831.5	1:1	0.899	-0.03	23.67	24	1.079	0.970	22.1
Back side	15	QPSK 1RB_38	26765/821.5	1:1	1.290	0.09	23.75	24	1.059	1.366	22.1
Back side-repeat	15	QPSK 1RB_38	26765/821.5	1:1	1.270	0.00	23.75	24	1.059	1.345	22.1
Back side	15	QPSK 1RB_38	26865/831.5	1:1	1.280	-0.03	23.67	24	1.079	**1.381**	22.1
Hotspot Test data (Separate 10mm 50%RB)											
Front side	15	QPSK 36RB_0	26965/841.5	1:1	0.790	0.02	22.89	23	1.026	0.810	22.1
Back side	15	QPSK 36RB_0	26965/841.5	1:1	0.930	0.04	22.89	23	1.026	0.954	22.1
Left side	15	QPSK 36RB_0	26965/841.5	1:1	0.520	0.04	22.89	23	1.026	0.533	22.1
Right side	15	QPSK 36RB_0	26965/841.5	1:1	0.370	0.10	22.89	23	1.026	0.379	22.1
Bottom side	15	QPSK 36RB_0	26965/841.5	1:1	0.103	0.03	22.89	23	1.026	0.106	22.1
Front side	15	QPSK 36RB_0	26765/821.5	1:1	0.584	0.03	22.85	23	1.035	0.605	22.1
Front side	15	QPSK 36RB_0	26865/831.5	1:1	0.718	0.04	22.87	23	1.030	0.740	22.1
Back side	15	QPSK 36RB_0	26765/821.5	1:1	0.976	0.01	22.85	23	1.035	1.010	22.1
Back side	15	QPSK 36RB_0	26865/831.5	1:1	1.070	0.06	22.87	23	1.030	1.103	22.1
Hotspot Test data (Separate 10mm 100%RB)											
Front side	15	QPSK 75RB_0	26965/841.5	1:1	0.735	0.06	22.8	23	1.047	0.770	22.1
Back side	15	QPSK 75RB_0	26965/841.5	1:1	0.794	0.13	22.8	23	1.047	0.831	22.1

Test Position	Channel/ Frequency (MHz)	Measured SAR (1g)	1st Repeated SAR (1g)	Ratio	2nd Repeated SAR (1g)	3rd Repeated SAR (1g)
Back side	26765/821.5	1.290	1.270	1.016	N/A	N/A
Note: 1) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.						
2) A second repeated measurement was performed only if the ratio of largest to smallest SAR for the original and first repeated measurements was > 1.20 or when the original or repeated measurement was ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).						
3) A third repeated measurement was performed only if the original, first or second repeated measurement was ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.						
4) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg						

Test Position	Channel/ Frequency (MHz)	Measured SAR (1g)	1st Repeated SAR (1g)	Ratio	2nd Repeated SAR (1g)	3rd Repeated SAR (1g)
Back side	26865/831.5	0.915	0.891	1.027	N/A	N/A
Note: 1) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.						
2) A second repeated measurement was performed only if the ratio of largest to smallest SAR for the original and first repeated measurements was > 1.20 or when the original or repeated measurement was ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).						
3) A third repeated measurement was performed only if the original, first or second repeated measurement was ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.						
4) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg						

Table 13：SAR of LTE Band 26 for Body.

Note:

1) The maximum Scaled SAR value is marked in bold. Graph results refer to Appendix B.
2) Per FCC KDB Publication 447498 D01, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s).
3) According to TCB workshop April 2015 RF Exposure Procedures Update (Overlapping LTE Bands), SAR for LTE Band 5 (Frequency range: 824 - 849 MHz) is covered by LTE Band 26 (Frequency range: 814 - 849 MHz) due to similar frequency range, same maximum tune up limit and same channel bandwidth.

8.3.6 SAR Result of LTE Band 66

Test position	BW.	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg)1-g	Power Drift(dB)	Conducted power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR(W/kg)	Liquid Temp.
Body worn Test data(Separate 15mm 1RB)											
Front side	20	QPSK 1RB_50	132322/1745	1:1	0.240	0.04	20.80	21.00	1.047	0.251	22.2
Back side	20	QPSK 1RB_50	132322/1745	1:1	0.366	-0.12	20.80	21.00	1.047	**0.383**	22.2
Body worn Test data (Separate 15mm 50%RB)											
Front side	20	QPSK 50RB_0	132322/1745	1:1	0.194	-0.03	19.59	20.00	1.099	0.213	22.2
Back side	20	QPSK 50RB_0	132322/1745	1:1	0.293	0.03	19.59	20.00	1.099	0.322	22.2
Hotspot Test data(Separate 10mm 1RB)											
Front side	20	QPSK 1RB_50	132322/1745	1:1	0.466	-0.09	20.80	21.00	1.047	0.488	22.2
Back side	20	QPSK 1RB_50	132322/1745	1:1	0.857	-0.09	20.80	21.00	1.047	0.897	22.2
Left side	20	QPSK 1RB_50	132322/1745	1:1	0.308	0.00	20.80	21.00	1.047	0.323	22.2
Right side	20	QPSK 1RB_50	132322/1745	1:1	0.180	0.01	20.80	21.00	1.047	0.188	22.2
Bottom side	20	QPSK 1RB_50	132322/1745	1:1	0.517	0.05	20.80	21.00	1.047	0.541	22.2
Back side	20	QPSK 1RB_50	132072/1720	1:1	0.807	0.02	20.59	21.00	1.099	0.887	22.2
Back side	20	QPSK 1RB_50	132572/1770	1:1	0.877	-0.13	20.53	21.00	1.114	**0.977**	22.2
Back side-repeat	20	QPSK 1RB_50	132572/1770	1:1	0.856	0.04	20.53	21.00	1.114	0.954	22.2
Hotspot Test data (Separate 10mm 50%RB)											
Front side	20	QPSK 50RB_0	132322/1745	1:1	0.379	-0.05	19.59	20.00	1.099	0.417	22.2
Back side	20	QPSK 50RB_0	132322/1745	1:1	0.717	0.02	19.59	20.00	1.099	0.788	22.2
Left side	20	QPSK 50RB_0	132322/1745	1:1	0.244	0.20	19.59	20.00	1.099	0.268	22.2
Right side	20	QPSK 50RB_0	132322/1745	1:1	0.130	0.13	19.59	20.00	1.099	0.143	22.2
Bottom side	20	QPSK 50RB_0	132322/1745	1:1	0.361	0.13	19.59	20.00	1.099	0.397	22.2
Hotspot Test data (Separate 10mm 100RB)											
Back side	20	QPSK 100RB_0	132322/1745	1:1	0.712	0.11	19.62	20.00	1.091	0.777	22.2

Test Position	Channel/ Frequency (MHz)	Measured SAR (1g)	1st Repeated SAR (1g)	Ratio	2nd Repeated SAR (1g)	3rd Repeated SAR (1g)
Back side	132572/1770	0.877	0.856	1.025	N/A	N/A
Note: 1) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.						
2) A second repeated measurement was performed only if the ratio of largest to smallest SAR for the original and first repeated measurements was > 1.20 or when the original or repeated measurement was ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).						
3) A third repeated measurement was performed only if the original, first or second repeated measurement was ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.						
4) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg						

Table 14：SAR of LTE Band 66 for Body.

Note:

1) The maximum Scaled SAR value is marked in bold. Graph results refer to Appendix B.

2) Per FCC KDB Publication 447498 D01, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s).

8.3.7 SAR Result of WIFI 2.4G

Test position	Test mode	Test Ch./Freq.	Duty Cycle	Duty Cycle Scaled factor	SAR (W/kg)1-g	Power drift(dB)	Conducted power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR(W/kg)	Liquid Temp.
Body worn Test data (Separate 15mm)											
Front side	802.11b	6/2437	87.26%	1.146	0.056	0.00	17.19	17.50	1.074	0.069	22
Back side	802.11b	6/2437	87.26%	1.146	0.067	0.04	17.19	17.50	1.074	**0.083**	22
Hotspot Test data (Separate 10mm)											
Front side	802.11b	6/2437	87.26%	1.146	0.092	0.14	17.19	17.50	1.074	0.113	22
Back side	802.11b	6/2437	87.26%	1.146	0.126	-0.03	17.19	17.50	1.074	**0.155**	22
Right side	802.11b	6/2437	87.26%	1.146	0.101	0.03	17.19	17.50	1.074	0.124	22
Top side	802.11b	6/2437	87.26%	1.146	0.083	0.00	17.19	17.50	1.074	0.102	22

Mode	Tune-up (dBm)	Tune-up (mw)	Hightest Reported SAR1-g(W/kg)	Adjusted SAR1-g(W/kg)	SAR test
Body worn					
802.11b	17.50	56.23	0.083	/	Yes
802.11g	14.50	28.18	/	0.042	No
802.1n 20M	13.50	22.39	/	0.033	No
802.1n 40M	13.50	22.39	/	0.033	No
Hotspot					
802.11b	17.50	56.23	0.155	/	Yes
802.11g	14.50	28.18	/	0.078	No
802.1n 20M	13.50	22.39	/	0.062	No
802.1n 40M	13.50	22.39	/	0.062	No

Table 15：SAR of WIFI 2.4G for Body.

Note:

1) The maximum Scaled SAR value is marked in bold. Graph results refer to Appendix B.
2) Per FCC KDB Publication 447498 D01, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s).
3) Each channel was tested at the lowest data rate.
4) Per KDB248227D01, for SAR test of WiFi 2.4G, SAR is measured for 2.4 GHz 802.11b DSSS using the initial test position procedure.
5) As the highest reported SAR for DSSS is adjusted by the ratio of OFDM 802.11g/n to DSSS specified maximum output power and the adjusted SAR is < 1.2 W/kg, so SAR for 802.11g/n is not required.

8.4 Multiple Transmitter Evaluation

8.4.1 Simultaneous SAR test evaluation

NO.	Simultaneous Transmission Configuration	Body worn	Hotspot
1	LTE(Data) + WiFi	Yes	Yes
2	LTE(Data) + BT	Yes	Yes
3	BT+WIFI (They share the same antenna and cannot transmit at the same time by design.)	No	No

8.4.2 Estimated SAR

When the standalone SAR test exclusion is applied to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to the following to determine simultaneous transmission SAR test exclusion:

• (max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)]·[$\sqrt{f(GHz)}/x$] W/kg for test separation distances ≤ 50 mm;

Where x = 7.5 for 1-g SAR, and x = 18.75 for 10-g SAR.

• 0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the test separation distances is > 50 mm.

Estimated SAR Result

Freq. Band	Frequency (GHz)	Test Position	max. power(dBm)	Test Separation (mm)	Estimated
					1g SAR (W/kg)
Bluetooth	2.48	Body-worn	4	15	0.035
		hotspot	4	10	0.053

8.4.3 Simultaneous Transmission SAR Summation Scenario

Test position		Main Antenna SARmax (W/kg)						WiFi Antenna SARmax (W/kg)		Summed 1g SARmax (W/kg)
		LTE Band 2	LTE Band 4	LTE Band 13	LTE Band 25	LTE Band 5/26	LTE Band 66	WLAN 2.4G	BT	
Body 15mm	Front	0.438	0.265	0.215	0.458	0.773	0.251	0.069	0.035	0.842
	Back	0.396	0.398	0.446	0.439	**0.987**	0.383	0.083	0.035	**1.070**
Hotspot	Front	1.092	0.487	0.328	0.902	0.988	0.488	0.113	0.053	1.205
	Back	1.189	0.899	0.730	1.072	**1.381**	0.977	0.155	0.053	**1.536**
	Left	0.506	0.337	0.174	0.545	0.664	0.323	/	/	0.664
	Right	0.259	0.151	0.146	0.312	0.470	0.188	0.124	0.053	0.594
	Top	/	/	/	/	/	/	0.102	0.053	0.102
	Bottom	0.707	0.439	0.097	0.705	0.139	0.541	/	/	0.707

9 Equipment list

Test Platform	SPEAG DASY5 Professional
Description	SAR Test System (Frequency range 300MHz-6GHz)
Software Reference	DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Hardware Reference

	Equipment	Manufacturer	Model	Serial Number	Calibration Date	Due date of calibration
☒	Twin Phantom	SPEAG	SAM 5	1481	NCR	NCR
☒	Twin Phantom	SPEAG	SAM 6	1824	NCR	NCR
☒	DAE	SPEAG	DAE4	1374	2019-09-24	2020-09-23
☒	E-Field Probe	SPEAG	EX3DV4	3789	2019-05-25	2020-05-24
☒	E-Field Probe	SPEAG	EX3DV4	3962	2019-02-25	2020-02-24
☒	Validation Kits	SPEAG	D750V3	1160	2019-05-22	2022-05-21
☒	Validation Kits	SPEAG	D835V2	4d120	2019-06-20	2022-06-19
☒	Validation Kits	SPEAG	D1750V2	1149	2019-05-21	2022-05-20
☒	Validation Kits	SPEAG	D1900V2	5d142	2019-07-26	2022-07-25
☒	Validation Kits	SPEAG	D2450V2	869	2019-06-27	2022-06-26
☒	Agilent Network Analyzer	Agilent	E5071C	MY46523590	2019-04-12	2020-04-11
☒	Dielectric Probe Kit	Agilent	85070E	US01440210	NCR	NCR
☒	Universal Radio Communication Tester	R&S	CMU500	124587	2019-04-09	2020-04-08
☒	Radio Communication Analyzer	Anritsu	MT8820C	6201010267	2019-06-27	2020-06-26
☒	RF Bi-Directional Coupler	Agilent	86205-60001	MY31400031	NCR	NCR
☒	Signal Generator	Agilent	N5171B	MY53050736	2019-04-12	2020-04-11
☒	Preamplifier	Mini-Circuits	ZHL-42W	15542	NCR	NCR
☒	Preamplifier	Compliance Directions Systems Inc.	AMP28-3W	073501433	NCR	NCR
☒	Power Meter	Agilent	E4416A	GB41292095	2019-04-12	2020-04-11

☒	Power Sensor	Agilent	8481H	MY41091234	2019-04-12	2020-04-11
☒	Power Sensor	R&S	NRP-Z92	100025	2019-04-12	2020-04-11
☒	Attenuator	SHX	TS2-3dB	30704	NCR	NCR
☒	Coaxial low pass filter	Mini-Circuits	VLF-2500(+)	NA	NCR	NCR
☒	Coaxial low pass filter	Microlab Fxr	LA-F13	NA	NCR	NCR
☒	DC POWER SUPPLY	SAKO	SK1730SL5A	NA	NCR	NCR
☒	Speed reading thermometer	MingGao	T809	NA	2019-04-15	2020-04-14

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

10 Calibration certificate

Please see the Appendix C

11 Photographs

Please see the Appendix D

Appendix A: Detailed System Check Results

Appendix B: Detailed Test Results

Appendix C: Calibration certificate

Appendix D: Photographs

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Appendix A

Detailed System Check Results

1. System Performance Check
System Performance Check 750 MHz Head
System Performance Check 835 MHz Head
System Performance Check 1750 MHz Head
System Performance Check 1900 MHz Head
System Performance Check 2450 MHz Head

Date: 2019/12/31

Test Laboratory: SGS-SAR Lab

System Performance Check 750 MHz Head

DUT: D750V3; Type: D750V3; Serial: 1160

Communication System: UID 0, CW (0); Frequency: 750 MHz;Duty Cycle: 1:1

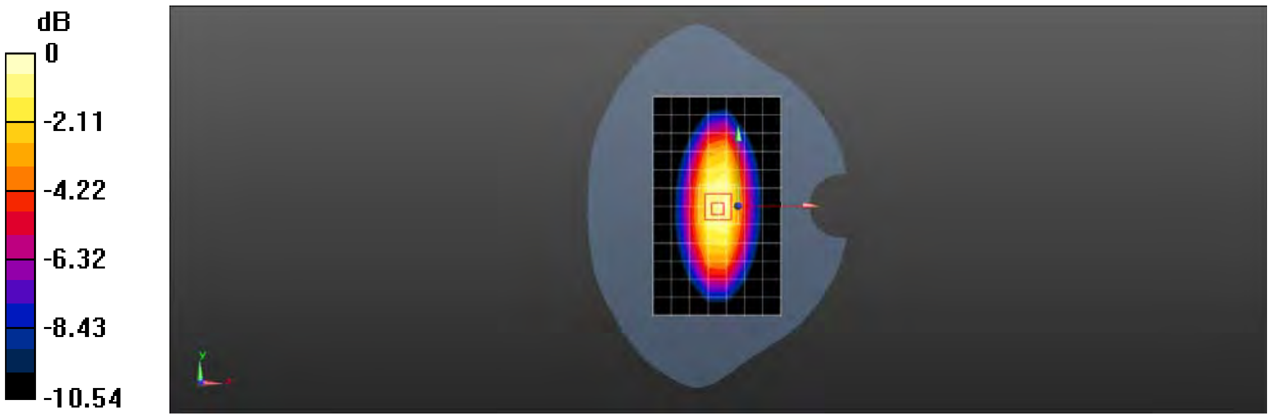
Medium: HSL750;Medium parameters used: f = 750 MHz; σ = 0.879 S/m; ε_r = 43.091; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3789; ConvF(8.84, 8.84, 8.84); Calibrated: 2019/5/25;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2019/9/24
- Phantom: SAM5; Type: SAM; Serial: 1481
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Body/d=15mm, Pin=250mW/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.58 W/kg

Body/d=15mm, Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 52.06 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 3.50 W/kg
SAR(1 g) = 2.1 W/kg; SAR(10 g) = 1.41 W/kg
Maximum value of SAR (measured) = 3.02 W/kg



0 dB = 3.02 W/kg = 5.00 dBW/kg

Date: 2019/12/30

Test Laboratory: SGS-SAR Lab

System Performance Check 835 MHz Head

DUT: D835V2; Type: D835V2; Serial: 4d120

Communication System: UID 0, CW (0); Frequency: 835 MHz;Duty Cycle: 1:1

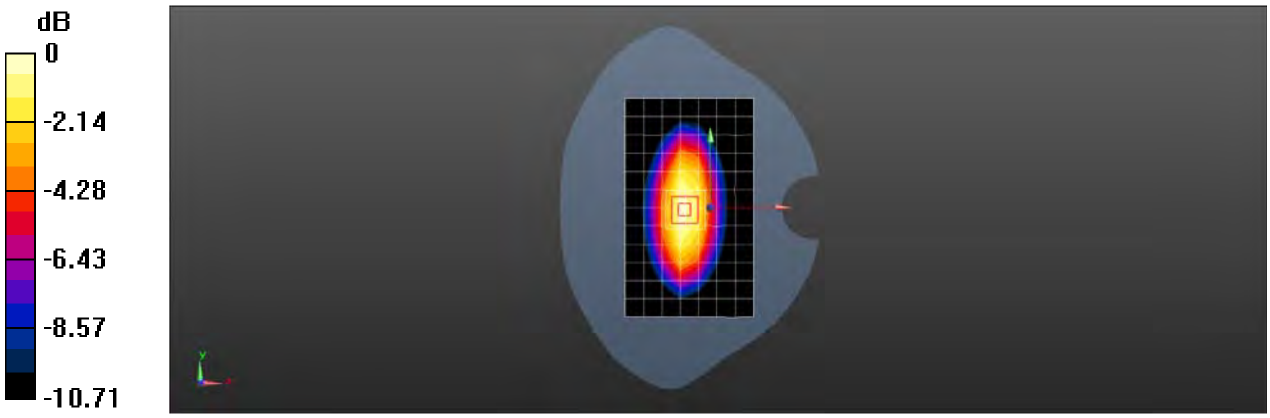
Medium: HSL835;Medium parameters used: f = 835 MHz; σ = 0.878 S/m; ε_r = 42.422; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3789; ConvF(8.52, 8.52, 8.52); Calibrated: 2019/5/25;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2019/9/24
- Phantom: SAM5; Type: SAM; Serial: 1481
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Body/d=15mm, Pin=250mW/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.96 W/kg

Body/d=15mm, Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 55.51 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 3.75 W/kg
SAR(1 g) = 2.4 W/kg; SAR(10 g) = 1.6 W/kg
Maximum value of SAR (measured) = 3.12 W/kg



0 dB = 3.12 W/kg = 5.21 dBW/kg

Date: 2020/1/2

Test Laboratory: SGS-SAR Lab

System Performance Check 1750 MHz Head

DUT: D1750V2; Type: D1750V2; Serial: 1149

Communication System: UID 0, CW (0); Frequency: 1750 MHz;Duty Cycle: 1:1

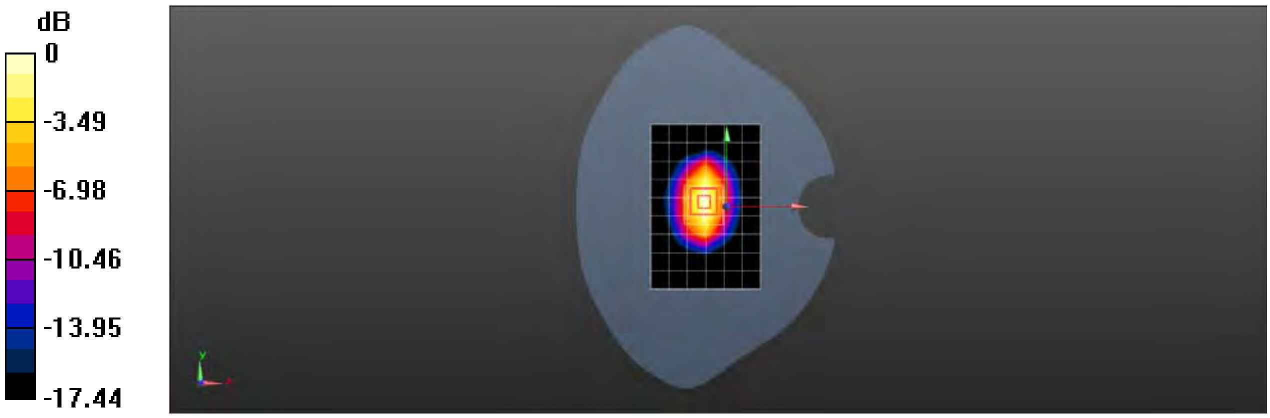
Medium: HSL1750;Medium parameters used: f = 1750 MHz; σ = 1.336 S/m; ε_r = 40.679; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3962; ConvF(8.44, 8.44, 8.44); Calibrated: 2019/2/25;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2019/9/24
- Phantom: SAM6; Type: SAM; Serial: 1824
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Body/d=10mm, Pin=250mW/Area Scan (7x10x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 14.2 W/kg

Body/d=10mm, Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 87.22 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 17.4 W/kg
SAR(1 g) = 9.51 W/kg; SAR(10 g) = 5.06 W/kg
Maximum value of SAR (measured) = 14.6 W/kg



0 dB = 14.6 W/kg = 11.64 dBW/kg

Date: 2020/1/1

Test Laboratory: SGS-SAR Lab

System Performance Check 1900 MHz Head

DUT: D1900V2; Type: D1900V2; Serial: 5d142

Communication System: UID 0, CW (0); Frequency: 1900 MHz;Duty Cycle: 1:1

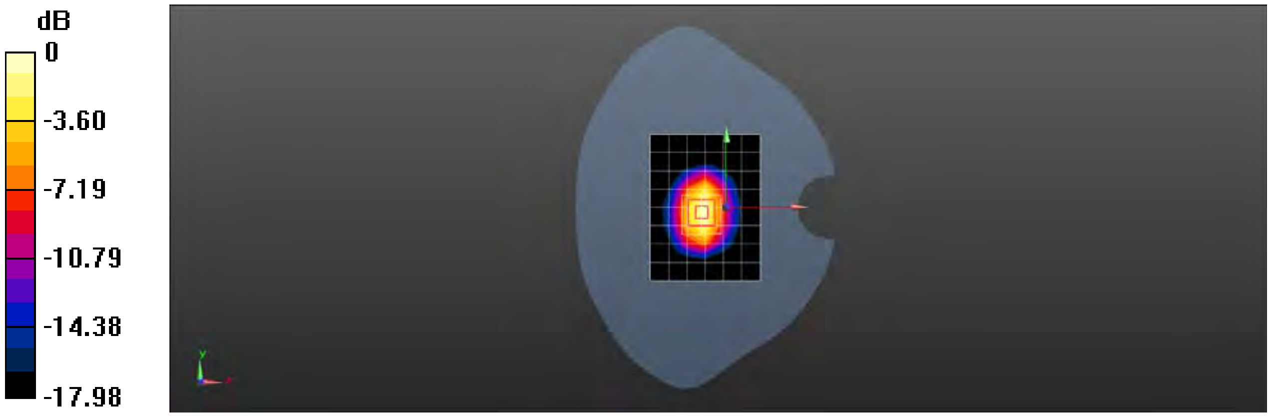
Medium: HSL1900;Medium parameters used: f = 1900 MHz; σ = 1.372 S/m; ε_r = 40.64; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3962; ConvF(8.14, 8.14, 8.14); Calibrated: 2019/2/25;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2019/9/24
- Phantom: SAM6; Type: SAM; Serial: 1824
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Body/d=10mm, Pin=250mW/Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 10.9 W/kg

Body/d=10mm, Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 89.57 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 19.3 W/kg
SAR(1 g) = 10.4 W/kg; SAR(10 g) = 5.37 W/kg
Maximum value of SAR (measured) = 11.6 W/kg



0 dB = 11.6 W/kg = 10.64 dBW/kg

Date: 2019/12/26

Test Laboratory: SGS-SAR Lab

System Performance Check 2450MHz Head

DUT: D2450V2; Type: D2450V2; Serial: 869

Communication System: UID 0, CW; Frequency: 2450 MHz;Duty Cycle: 1:1

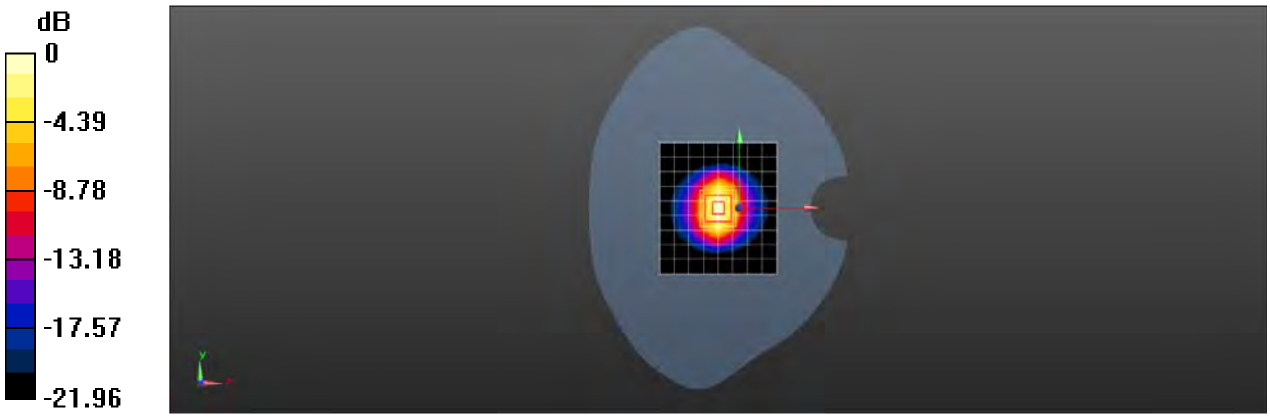
Medium: HSL2450;Medium parameters used: f = 2450 MHz; σ = 1.805 S/m; ε_r = 40.224; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3789; ConvF(6.85, 6.85, 6.85); Calibrated: 2019/5/25;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2019/9/24
- Phantom: SAM6; Type: SAM; Serial: 1824
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Body/d=10mm, Pin=250mW/Area Scan (9x10x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 19.9 W/kg

Body/d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 90.73 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 26.2 W/kg
SAR(1 g) = 12.8 W/kg; SAR(10 g) = 5.93 W/kg
Maximum value of SAR (measured) = 21.2 W/kg



0 dB = 21.2 W/kg = 13.26 dBW/kg

Appendix B

Detailed Test Results

1. LTE
LTE Band 2 for Body
LTE Band 4 for Body
LTE Band 13 for Body
LTE Band 25 for Body
LTE Band 5/26 for Body
LTE Band 66 for Body
2. WIFI
WIFI 2.4G for Body

Date: 2020/1/1

Test Laboratory: SGS-SAR Lab

BGM4-2802 LTE Band 2 20M QPSK 1RB50 19100CH Front side 15mm

DUT: BGM4-2802; Type: Smartphone; Serial: 990000900527286

Communication System: UID 0, LTE-FDD BW 20MHz (0); Frequency: 1900 MHz;Duty Cycle: 1:1

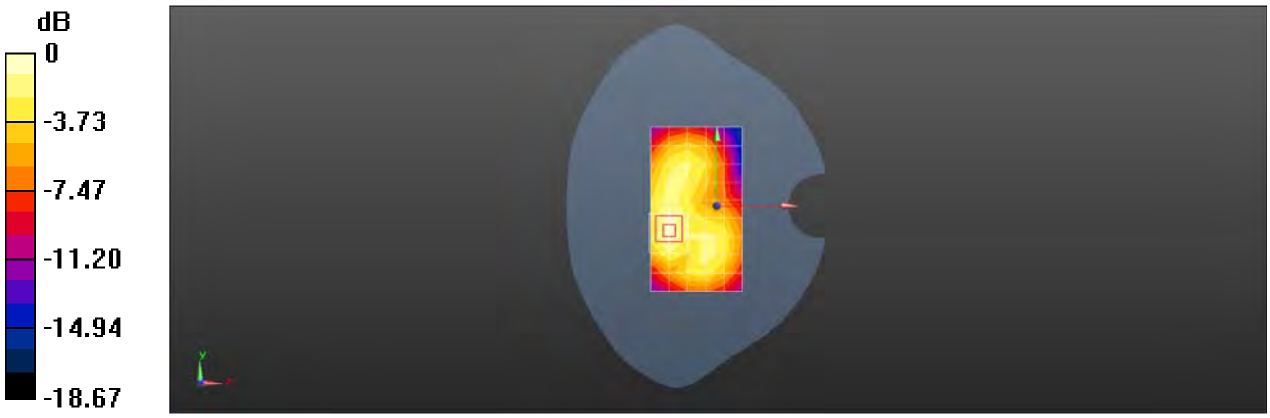
Medium: HSL1900;Medium parameters used: f = 1900 MHz; σ = 1.372 S/m; ε_r = 40.64; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3962; ConvF(8.14, 8.14, 8.14); Calibrated: 2019/2/25;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2019/9/24
- Phantom: SAM6; Type: SAM; Serial: 1824
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.617 W/kg

Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.40 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.774 W/kg
SAR(1 g) = 0.424 W/kg; SAR(10 g) = 0.237 W/kg
Maximum value of SAR (measured) = 0.640 W/kg



0 dB = 0.640 W/kg = -1.94 dBW/kg

Date: 2020/1/1

Test Laboratory: SGS-SAR Lab

BGM4-2802 LTE Band 2 20M QPSK 1RB50 18700CH Back side 10mm

DUT: BGM4-2802; Type: Smartphone; Serial: 990000900527286

Communication System: UID 0, LTE-FDD BW 20MHz (0); Frequency: 1860 MHz;Duty Cycle: 1:1

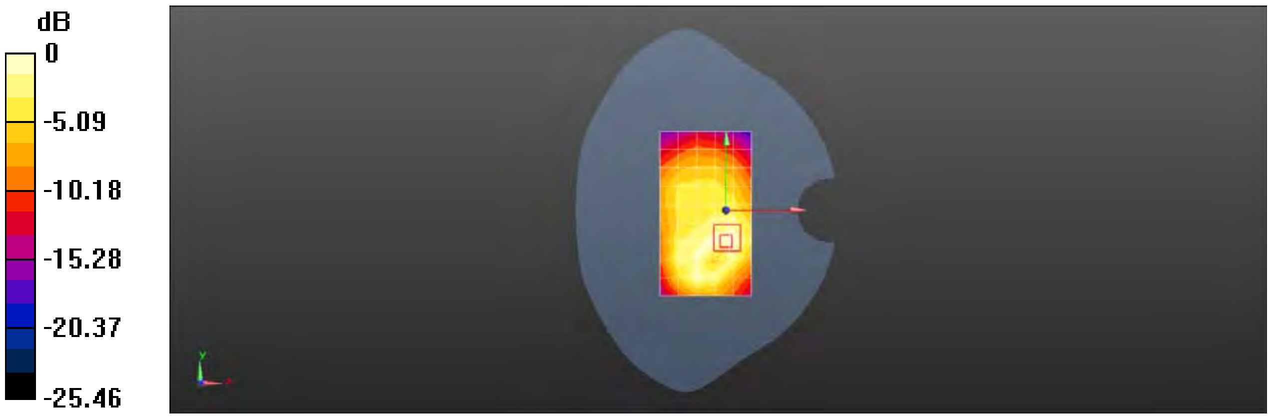
Medium: HSL1900;Medium parameters used: f = 1860 MHz; σ = 1.35 S/m; ε_r = 40.814; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3962; ConvF(8.14, 8.14, 8.14); Calibrated: 2019/2/25;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2019/9/24
- Phantom: SAM6; Type: SAM; Serial: 1824
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.35 W/kg

Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.03 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 1.88 W/kg
SAR(1 g) = 0.989 W/kg; SAR(10 g) = 0.520 W/kg
Maximum value of SAR (measured) = 1.44 W/kg



0 dB = 1.44 W/kg = 1.58 dBW/kg

Date: 2020/1/2

Test Laboratory: SGS-SAR Lab

BGM4-2802 LTE Band 4 20M QPSK 1RB50 20300CH Back side 15mm

DUT: BGM4-2802; Type: Smartphone; Serial: 990000900527286

Communication System: UID 0, LTE-FDD BW 20MHz (0); Frequency: 1745 MHz;Duty Cycle: 1:1

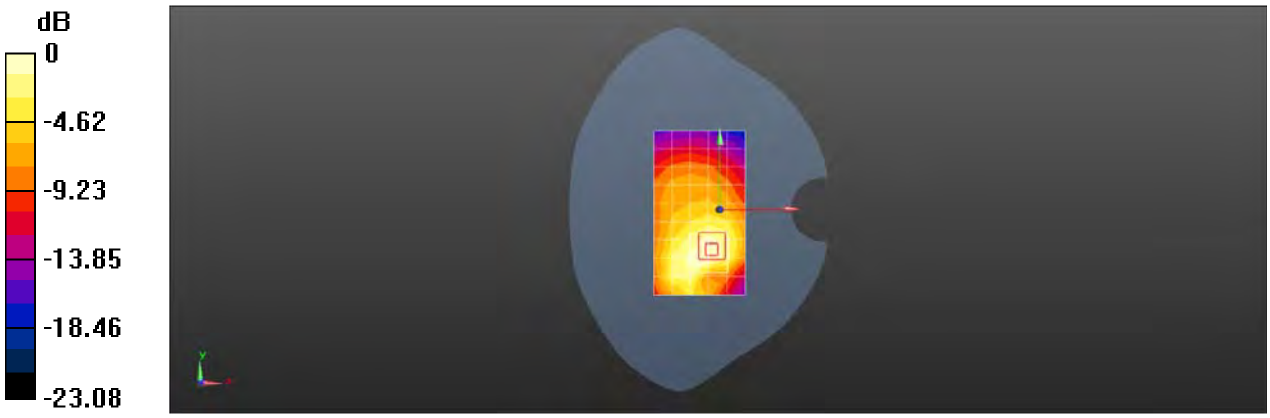
Medium: HSL1750;Medium parameters used: f = 1745 MHz; σ = 1.336 S/m; ε_r = 40.697; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3962; ConvF(8.44, 8.44, 8.44); Calibrated: 2019/2/25;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2019/9/24
- Phantom: SAM6; Type: SAM; Serial: 1824
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.509 W/kg

Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.578 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.676 W/kg
SAR(1 g) = 0.370 W/kg; SAR(10 g) = 0.205 W/kg
Maximum value of SAR (measured) = 0.545 W/kg



0 dB = 0.545 W/kg = -2.64 dBW/kg

Date: 2020/1/2

Test Laboratory: SGS-SAR Lab

BGM4-2802 LTE Band 4 20M QPSK 1RB50 20300CH Back side 10mm

DUT: BGM4-2802; Type: Smartphone; Serial: 990000900527286

Communication System: UID 0, LTE-FDD BW 20MHz (0); Frequency: 1745 MHz;Duty Cycle: 1:1

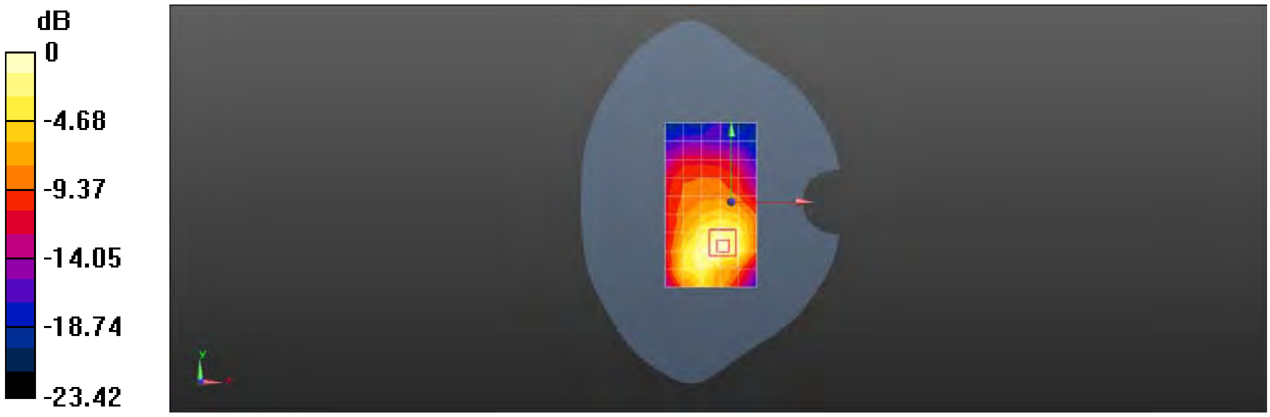
Medium: HSL1750;Medium parameters used: f = 1745 MHz; σ = 1.336 S/m; ε_r = 40.697; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3962; ConvF(8.44, 8.44, 8.44); Calibrated: 2019/2/25;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2019/9/24
- Phantom: SAM6; Type: SAM; Serial: 1824
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.27 W/kg

Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.17 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 1.66 W/kg
SAR(1 g) = 0.835 W/kg; SAR(10 g) = 0.443 W/kg
Maximum value of SAR (measured) = 1.25 W/kg



0 dB = 1.25 W/kg = 0.97 dBW/kg

Date: 2019/12/31

Test Laboratory: SGS-SAR Lab

BGM4-2802 LTE Band 13 10M QPSK 25RB0 23230CH Back side 15mm

DUT: BGM4-2802; Type: Smartphone; Serial: 990000900527286

Communication System: UID 0, LTE-FDD BW 10MHZ (0); Frequency: 782 MHz;Duty Cycle: 1:1

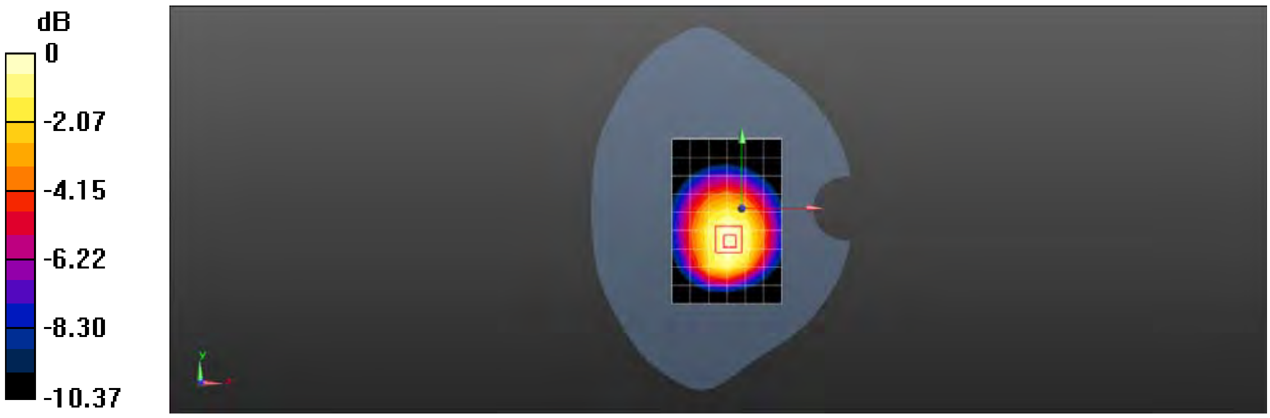
Medium: HSL750;Medium parameters used: f = 782 MHz; σ = 0.9 S/m; ε_r = 42.907; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3789; ConvF(8.84, 8.84, 8.84); Calibrated: 2019/5/25;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2019/9/24
- Phantom: SAM5; Type: SAM; Serial: 1481
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (7x10x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.444 W/kg

Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.42 V/m; Power Drift = 0.16 dB
Peak SAR (extrapolated) = 0.518 W/kg
SAR(1 g) = 0.350 W/kg; SAR(10 g) = 0.245 W/kg
Maximum value of SAR (measured) = 0.456 W/kg



0 dB = 0.456 W/kg = -3.41 dBW/kg

Date: 2019/12/31

Test Laboratory: SGS-SAR Lab

BGM4-2802 LTE Band 13 10M QPSK 1RB25 23230CH Back side 10mm

DUT: BGM4-2802; Type: Smartphone; Serial: 990000900527286

Communication System: UID 0, LTE-FDD BW 10MHZ (0); Frequency: 782 MHz;Duty Cycle: 1:1

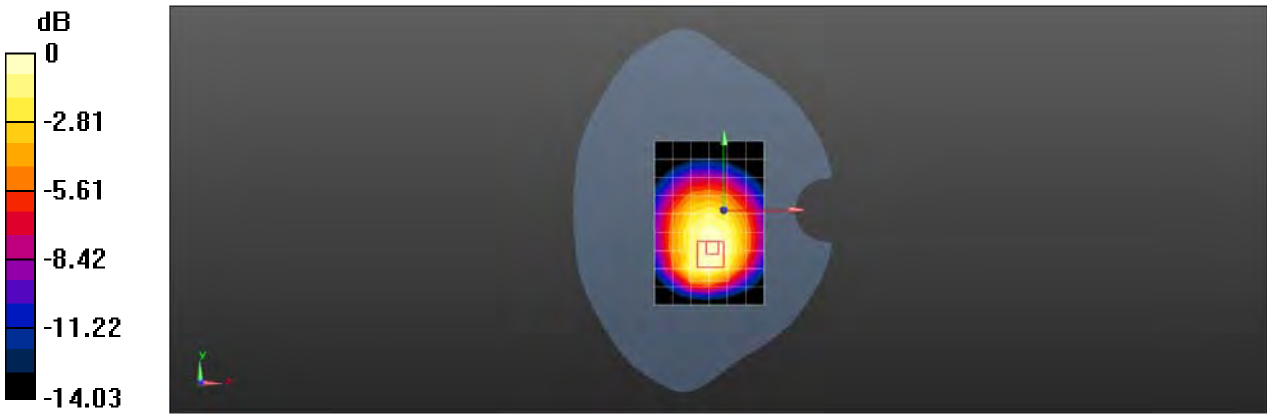
Medium: HSL750;Medium parameters used: f = 782 MHz; $\sigma = 0.9$ S/m; $\varepsilon_r = 42.907$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3789; ConvF(8.84, 8.84, 8.84); Calibrated: 2019/5/25;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2019/9/24
- Phantom: SAM5; Type: SAM; Serial: 1481
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (7x10x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.797 W/kg

Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.98 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.945 W/kg
SAR(1 g) = 0.614 W/kg; SAR(10 g) = 0.411 W/kg
Maximum value of SAR (measured) = 0.820 W/kg



0 dB = 0.820 W/kg = -0.86 dBW/kg

Date: 2020/1/1

Test Laboratory: SGS-SAR Lab

BGM4-2802 LTE Band 25 20M QPSK 1RB50 26365CH Front side 15mm

DUT: BGM4-2802; Type: Smartphone; Serial: 990000900527286

Communication System: UID 0, LTE-FDD BW 20MHz (0); Frequency: 1882.5 MHz;Duty Cycle: 1:1

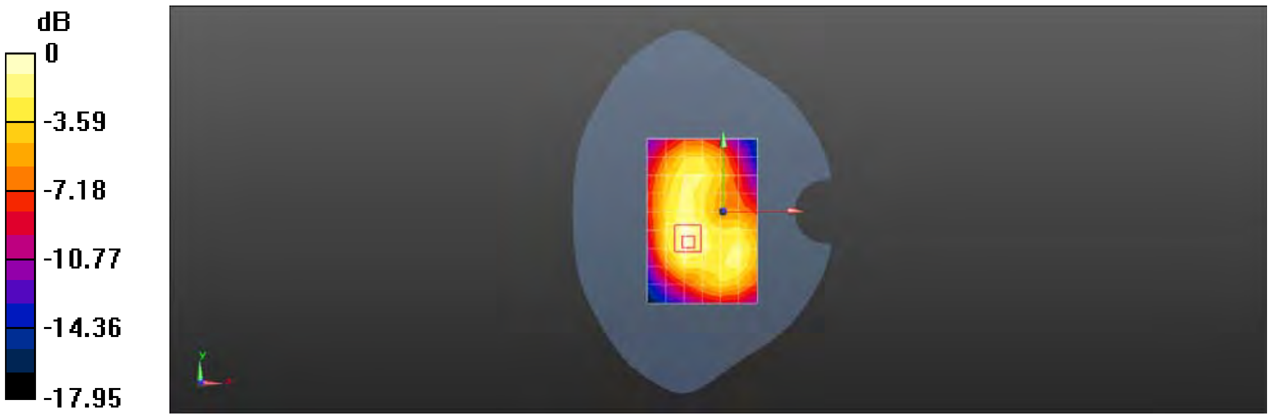
Medium: HSL1900;Medium parameters used (interpolated): f = 1882.5 MHz; σ = 1.362 S/m; ε_r = 40.623; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3962; ConvF(8.14, 8.14, 8.14); Calibrated: 2019/2/25;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2019/9/24
- Phantom: SAM6; Type: SAM; Serial: 1824
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (7x10x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.584 W/kg

Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.73 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.761 W/kg
SAR(1 g) = 0.428 W/kg; SAR(10 g) = 0.239 W/kg
Maximum value of SAR (measured) = 0.629 W/kg



0 dB = 0.629 W/kg = -2.01 dBW/kg

Date: 2020/1/1

Test Laboratory: SGS-SAR Lab

BGM4-2802 LTE Band 25 20M QPSK 1RB50 26140CH Back side 10mm

DUT: BGM4-2802; Type: Smartphone; Serial: 990000900527286

Communication System: UID 0, LTE-FDD BW 20MHz (0); Frequency: 1860 MHz;Duty Cycle: 1:1

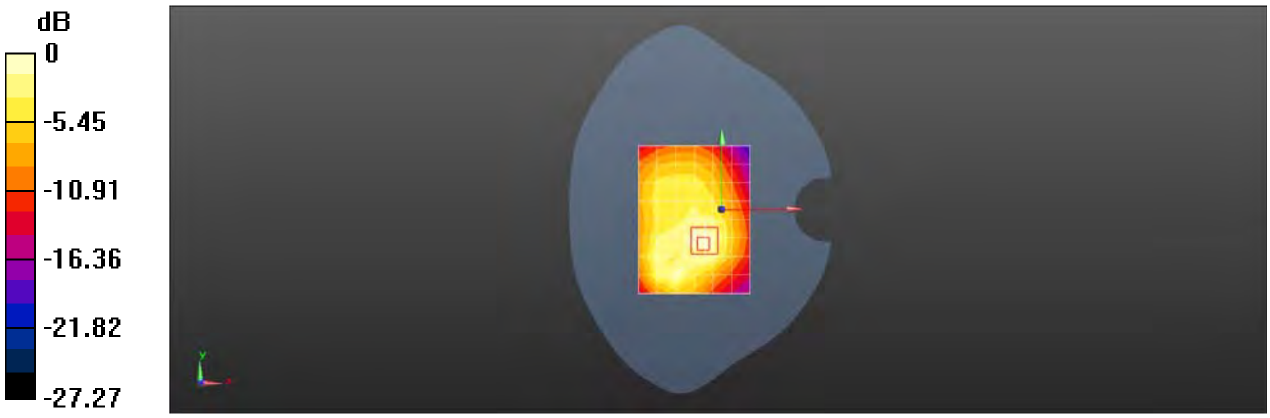
Medium: HSL1900;Medium parameters used: f = 1860 MHz; σ = 1.35 S/m; ε_r = 40.814; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3962; ConvF(8.14, 8.14, 8.14); Calibrated: 2019/2/25;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2019/9/24
- Phantom: SAM6; Type: SAM; Serial: 1824
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.27 W/kg

Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.48 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 1.90 W/kg
SAR(1 g) = 1 W/kg; SAR(10 g) = 0.525 W/kg
Maximum value of SAR (measured) = 1.48 W/kg



0 dB = 1.48 W/kg = 1.70 dBW/kg

Date: 2019/12/30

Test Laboratory: SGS-SAR Lab

BGM4-2802 LTE Band 26 15M QPSK 1RB38 26865CH Back side 15mm

DUT: BGM4-2802; Type: Smartphone; Serial: 990000900527286

Communication System: UID 0, LTE-FDD BW 15MHz (0); Frequency: 831.5 MHz;Duty Cycle: 1:1

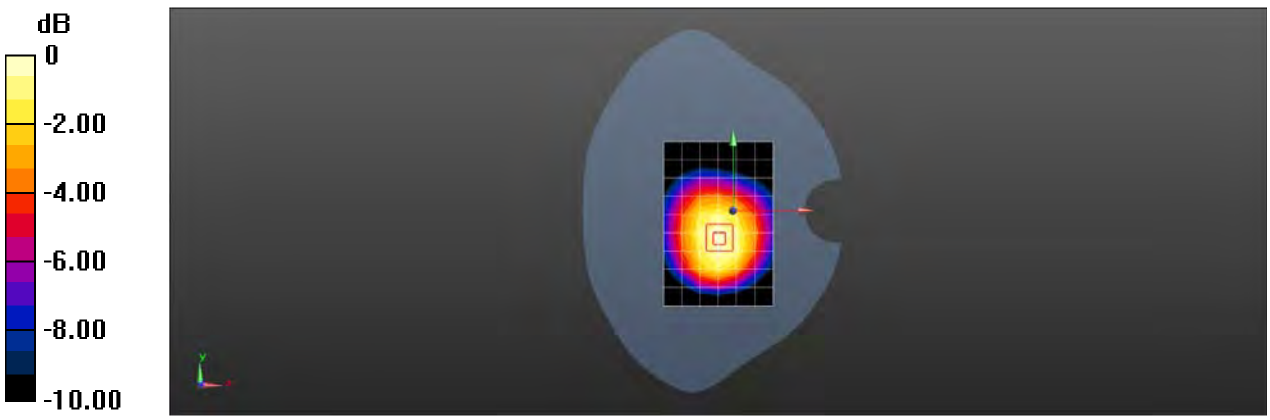
Medium: HSL835;Medium parameters used (interpolated): f = 831.5 MHz; σ = 0.926 S/m; ε_r = 42.557; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3789; ConvF(8.52, 8.52, 8.52); Calibrated: 2019/5/25;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2019/9/24
- Phantom: SAM5; Type: SAM; Serial: 1481
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (7x10x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.15 W/kg

Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 27.11 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 1.32 W/kg
SAR(1 g) = 0.915 W/kg; SAR(10 g) = 0.643 W/kg
Maximum value of SAR (measured) = 1.18 W/kg



0 dB = 1.18 W/kg = 0.72 dBW/kg

Date: 2019/12/30

Test Laboratory: SGS-SAR Lab

BGM4-2802 LTE Band 26 15M QPSK 1RB38 26865CH Back side 10mm

DUT: BGM4-2802; Type: Smartphone; Serial: 990000900527286

Communication System: UID 0, LTE-FDD BW 15MHz (0); Frequency: 831.5 MHz;Duty Cycle: 1:1

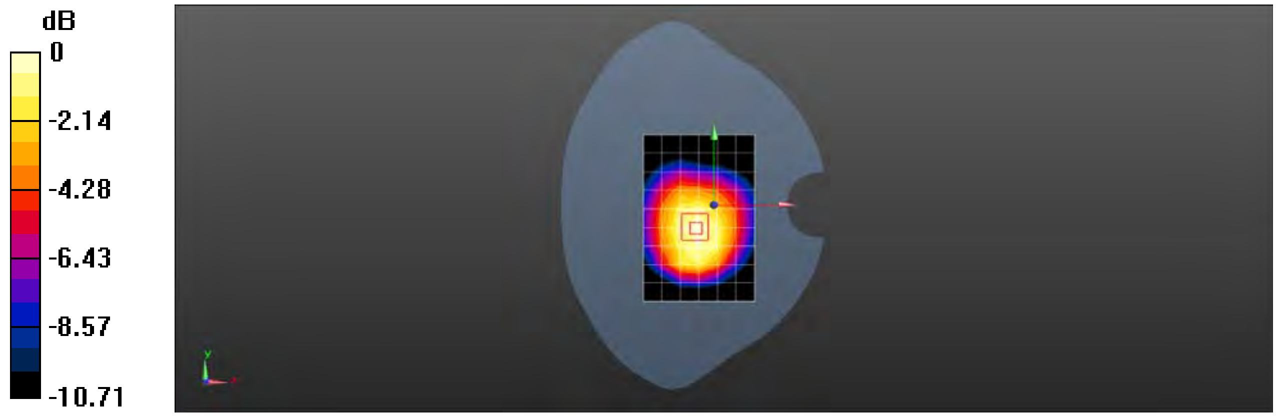
Medium: HSL835;Medium parameters used (interpolated): f = 831.5 MHz; σ = 0.926 S/m; ε_r = 42.557; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3789; ConvF(8.52, 8.52, 8.52); Calibrated: 2019/5/25;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2019/9/24
- Phantom: SAM5; Type: SAM; Serial: 1481
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (7x10x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.62 W/kg

Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 32.77 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 1.85 W/kg
SAR(1 g) = 1.28 W/kg; SAR(10 g) = 0.891 W/kg
Maximum value of SAR (measured) = 1.65 W/kg



0 dB = 1.65 W/kg = 2.17 dBW/kg

Date: 2020/1/2

Test Laboratory: SGS-SAR Lab

BGM4-2802 LTE Band 66 20M QPSK 1RB50 132322CH Back side 15mm

DUT: BGM4-2802; Type: Smartphone; Serial: 990000900527286

Communication System: UID 0, LTE-FDD BW 20MHz (0); Frequency: 1745 MHz;Duty Cycle: 1:1

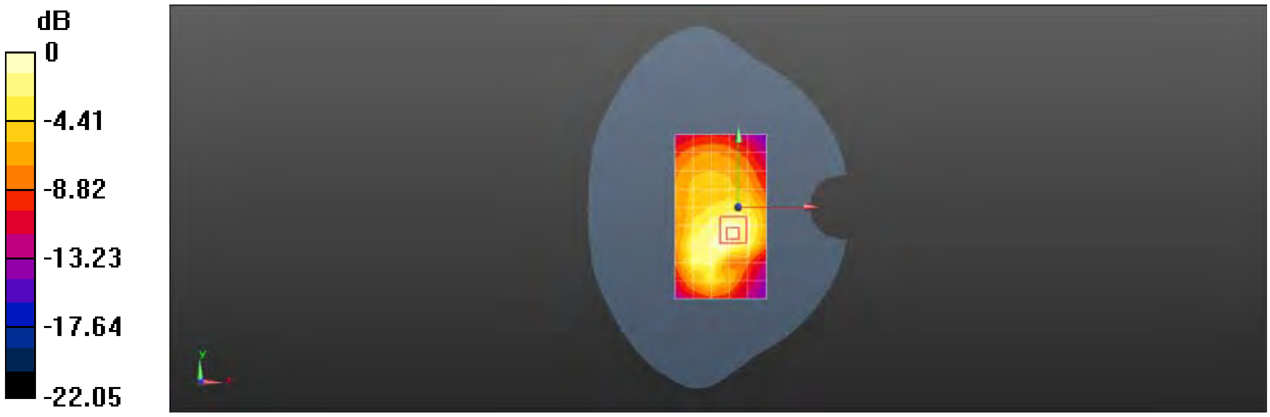
Medium: HSL1750;Medium parameters used: f = 1745 MHz; σ = 1.342 S/m; ε_r = 40.78; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3962; ConvF(8.44, 8.44, 8.44); Calibrated: 2019/2/25;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2019/9/24
- Phantom: SAM6; Type: SAM; Serial: 1824
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.463 W/kg

Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.84 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 0.673 W/kg
SAR(1 g) = 0.366 W/kg; SAR(10 g) = 0.202 W/kg
Maximum value of SAR (measured) = 0.545 W/kg



0 dB = 0.545 W/kg = -2.64 dBW/kg

Date: 2020/1/2

Test Laboratory: SGS-SAR Lab

BGM4-2802 LTE Band 66 20M QPSK 1RB50 132572CH Back side 10mm

DUT: BGM4-2802; Type: Smartphone; Serial: 990000900527286

Communication System: UID 0, LTE-FDD BW 20MHz (0); Frequency: 1770 MHz;Duty Cycle: 1:1

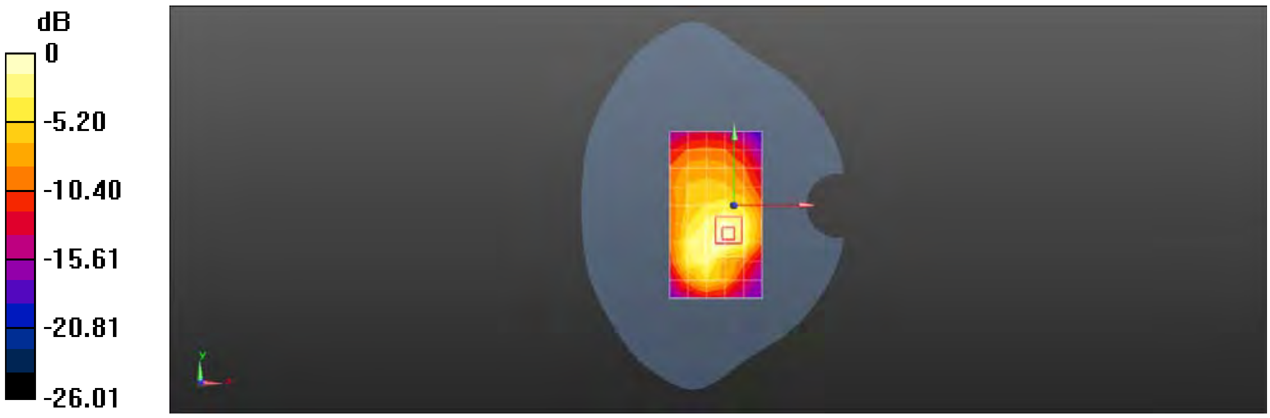
Medium: HSL1750;Medium parameters used: f = 1770 MHz; σ = 1.362 S/m; ε_r = 40.57; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3962; ConvF(8.44, 8.44, 8.44); Calibrated: 2019/2/25;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2019/9/24
- Phantom: SAM6; Type: SAM; Serial: 1824
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.17 W/kg

Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.52 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 1.71 W/kg
SAR(1 g) = 0.877 W/kg; SAR(10 g) = 0.454 W/kg
Maximum value of SAR (measured) = 1.33 W/kg



0 dB = 1.33 W/kg = 1.24 dBW/kg

Date: 2019/12/26

Test Laboratory: SGS-SAR Lab

B110DL Wi-Fi 2.4G 802.11b 6CH Back side 15mm

DUT: BGM4-2802; Type: Smartphone; Serial: 990000900527286

Communication System: UID 0, WI-FI(2.4GHz) (0); Frequency: 2437 MHz;Duty Cycle: 1:1

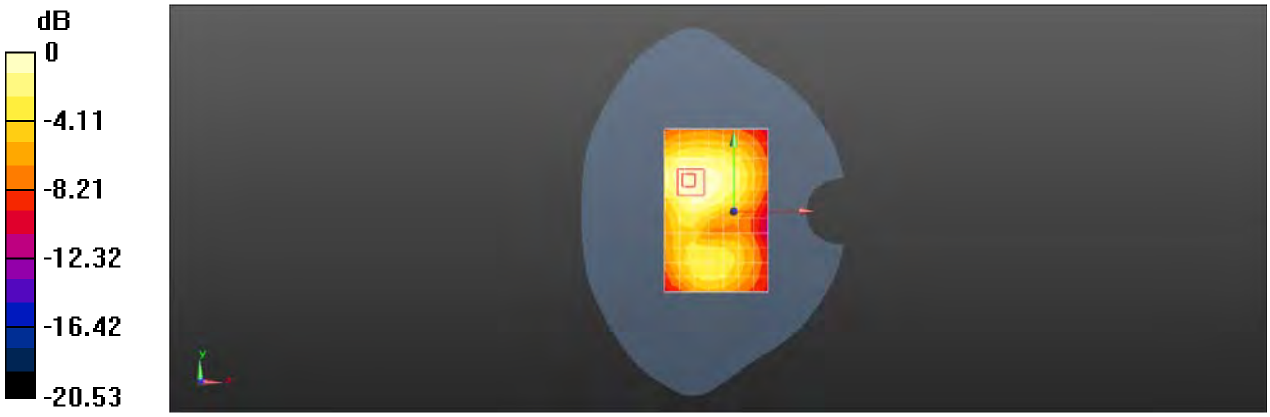
Medium: HSL2450;Medium parameters used: f = 2437 MHz; σ = 1.791 S/m; ε_r = 38.225; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3789; ConvF(6.85, 6.85, 6.85); Calibrated: 2019/5/25;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2019/9/24
- Phantom: SAM6; Type: SAM; Serial: 1824
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (8x12x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 0.104 W/kg

Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.250 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.136 W/kg
SAR(1 g) = 0.067 W/kg; SAR(10 g) = 0.037 W/kg
Maximum value of SAR (measured) = 0.108 W/kg



0 dB = 0.108 W/kg = -9.67 dBW/kg

Date: 2019/12/26

Test Laboratory: SGS-SAR Lab

B110DL Wi-Fi 2.4G 802.11b 6CH Back side 10mm

DUT: BGM4-2802; Type: Smartphone; Serial: 990000900527286

Communication System: UID 0, WI-FI(2.4GHz) (0); Frequency: 2437 MHz;Duty Cycle: 1:1

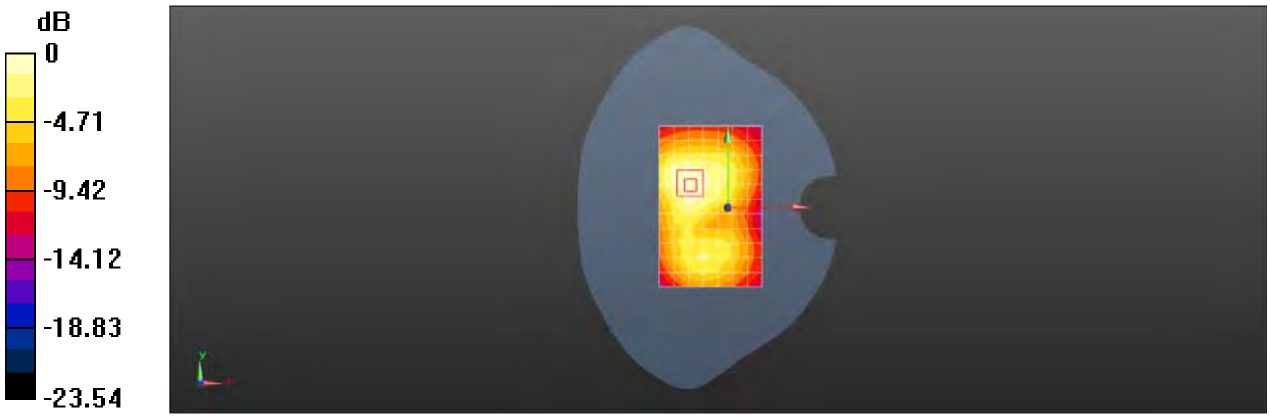
Medium: HSL2450;Medium parameters used: f = 2437 MHz; σ = 1.791 S/m; ε_r = 38.225; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3789; ConvF(6.85, 6.85, 6.85); Calibrated: 2019/5/25;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2019/9/24
- Phantom: SAM6; Type: SAM; Serial: 1824
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (8x12x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 0.208 W/kg

Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.158 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.260 W/kg
SAR(1 g) = 0.126 W/kg; SAR(10 g) = 0.067 W/kg
Maximum value of SAR (measured) = 0.205 W/kg



0 dB = 0.205 W/kg = -6.88 dBW/kg

Appendix C

Calibration certificate

1. Dipole
D750V3-SN 1160(2019-05-22)
D835V2-SN 4d120(2019-06-20)
D1750V2-SN 1149(2019-05-21)
D1900V2-SN 5d142(2019-07-26)
D2450V2-SN 869(2019-06-27)
2. DAE
DAE4-SN 1374(2019-09-24)
3. Probe
EX3DV4-SN 3789(2019-05-25)
EX3DV4-SN 3962(2019-02-25)

In Collaboration with
speag
CALIBRATION LABORATORY
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中国认可
国际互认
校准
CALIBRATION
CNAS L0570

Client **SGS** **Certificate No: Z19-60152**

CALIBRATION CERTIFICATE

Object	D750V3 - SN: 1160
Calibration Procedure(s)	FF-Z11-003-01 Calibration Procedures for dipole validation kits
Calibration date:	May 22, 2019

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	106277	20-Aug-18 (CTTL, No.J18X06862)	Aug-19
Power sensor NRP8S	104291	20-Aug-18 (CTTL, No.J18X06862)	Aug-19
Reference Probe EX3DV4	SN 3617	31-Jan-19(SPEAG,No.EX3-3617_Jan19)	Jan-20
DAE4	SN 1331	06-Feb-19(SPEAG,No.DAE4-1331_Feb19)	Feb-20
Secondary Standards	**ID #**	**Cal Date(Calibrated by, Certificate No.)**	**Scheduled Calibration**
Signal Generator E4438C	MY49071430	23-Jan-19 (CTTL, No.J19X00336)	Jan-20
NetworkAnalyzer E5071C	MY46116073	24-Jan-19 (CTTL, No.J19X00547)	Jan-20

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	
Reviewed by:	Lin Hao	SAR Test Engineer	
Approved by:	Qi Dianyuan	SAR Project Leader	

Issued: May 25, 2019

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E-mail: cttl@chinattl.com http://www.chinattl.cn

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORMx,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

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

b) IEC 62209-1, "Measurement procedure for assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices- Part 1: Device used next to the ear (Frequency range of 300MHz to 6GHz)", July 2016

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

d) KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

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

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Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY52	52.10.2.1495
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	42.3 ± 6 %	0.91 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.12 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**8.39 W/kg ± 18.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.42 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.63 W/kg ± 18.7 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	55.5	0.96 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	56.9 ± 6 %	0.95 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.12 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**8.62 W/kg ± 18.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	1.39 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**5.63 W/kg ±18.7 % (k=2)**

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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.8Ω- 3.06jΩ
Return Loss	- 29.1dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.1Ω- 3.83jΩ
Return Loss	- 27.2dB

General Antenna Parameters and Design

Electrical Delay (one direction)	0.897 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG

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DASY5 Validation Report for Head TSL Date: 05.22.2019

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1160

Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1

Medium parameters used: f = 750 MHz; σ = 0.905 S/m; ε_r = 42.28; ρ = 1000 kg/m3

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(10.03, 10.03, 10.03) @ 750 MHz; Calibrated: 1/31/2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1331; Calibrated: 2/6/2019
- Phantom: MFP_V5.1C ; Type: QD 000 P51CA; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

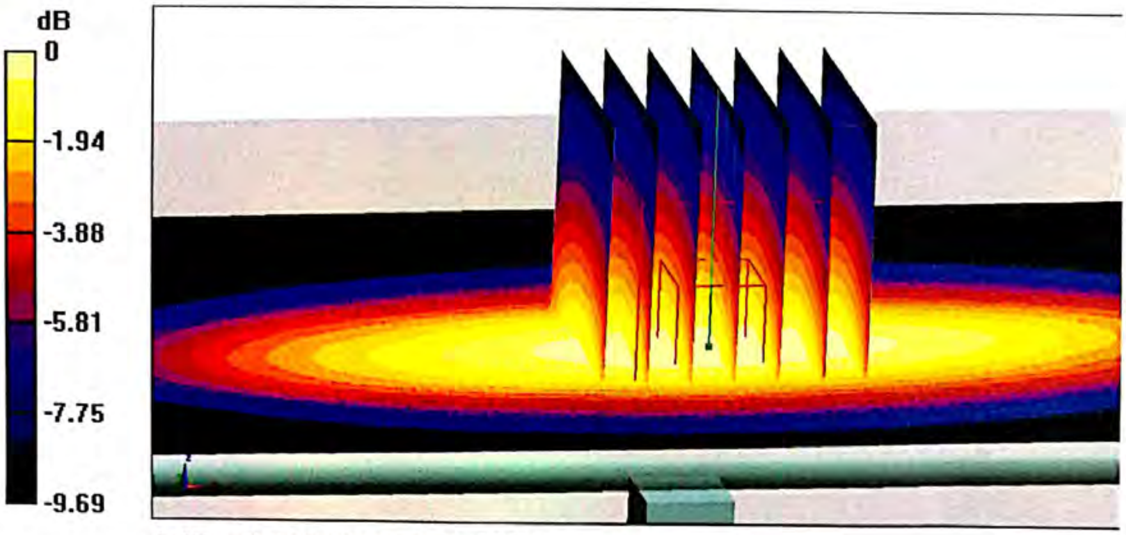
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 51.91 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 3.06 W/kg

SAR(1 g) = 2.12 W/kg; SAR(10 g) = 1.42 W/kg

Maximum value of SAR (measured) = 2.76 W/kg



0 dB = 2.76 W/kg = 4.41 dBW/kg

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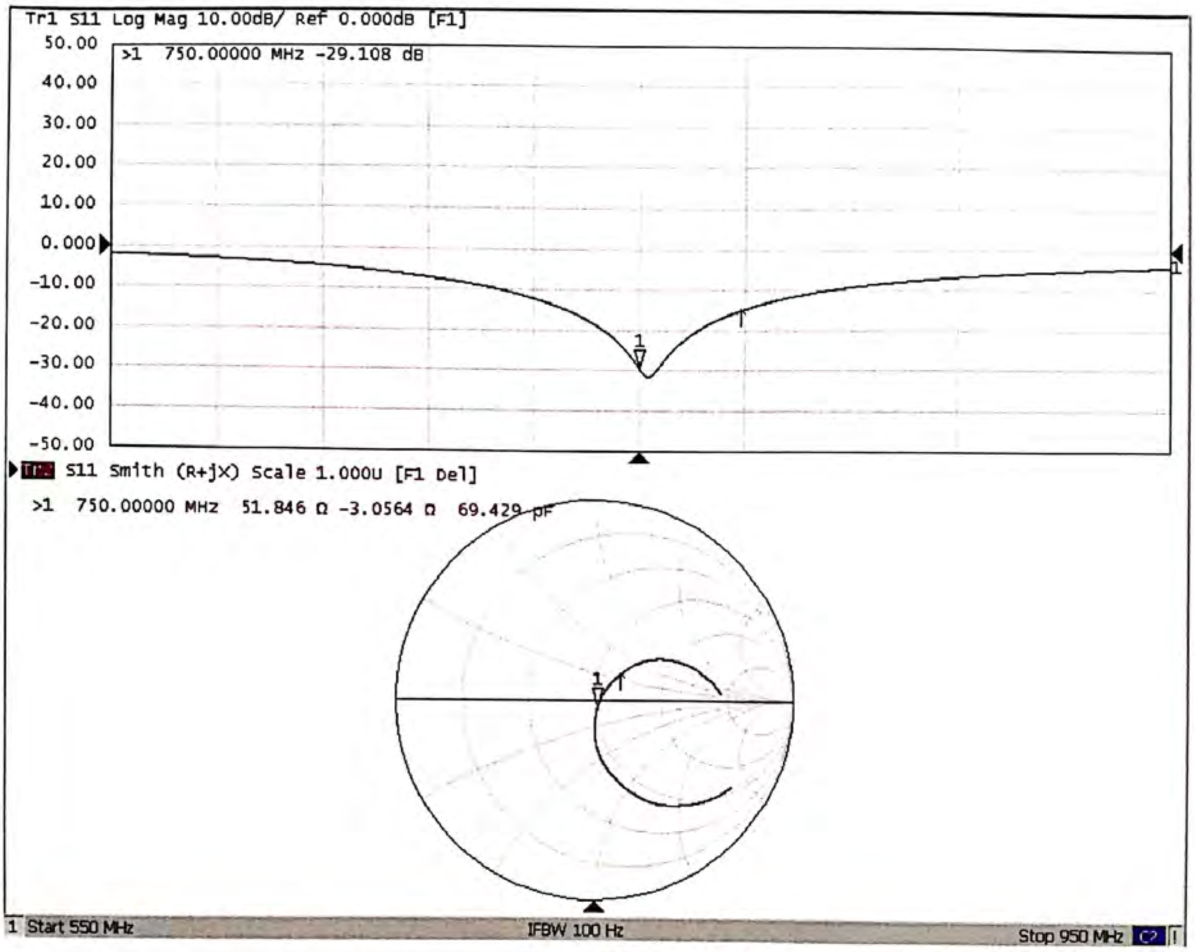
Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL Date: 05.22.2019

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1160

Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1

Medium parameters used: f = 750 MHz; σ = 0.946 S/m; ε_r = 56.92; ρ = 1000 kg/m3

Phantom section: Center Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(9.85, 9.85, 9.85) @ 750 MHz; Calibrated: 1/31/2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1331; Calibrated: 2/6/2019
- Phantom: MFP_V5.1C ; Type: QD 000 P51CA; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

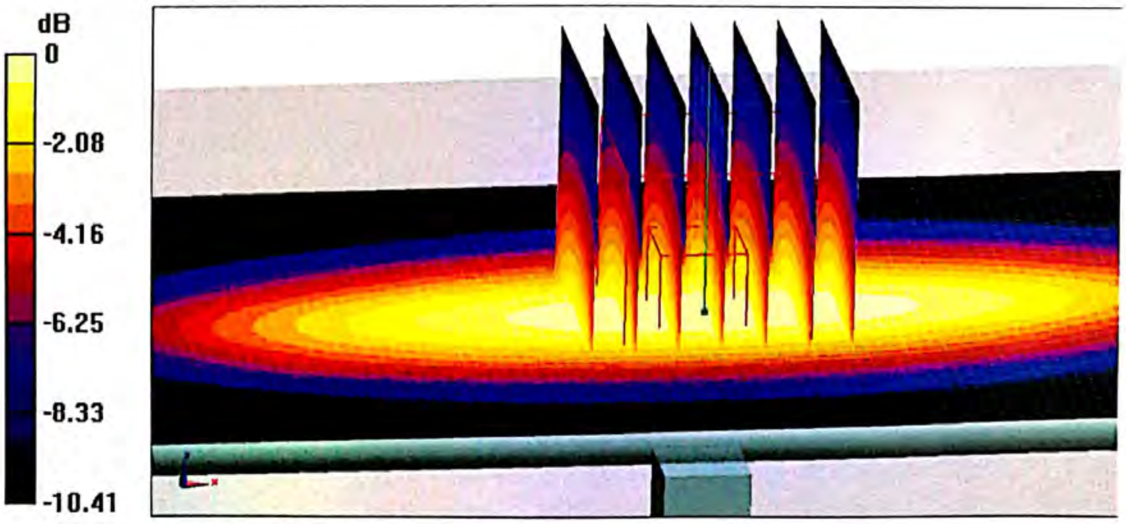
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 53.99 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 3.22 W/kg

SAR(1 g) = 2.12 W/kg; SAR(10 g) = 1.39 W/kg

Maximum value of SAR (measured) = 2.85 W/kg



0 dB = 2.85 W/kg = 4.55 dBW/kg

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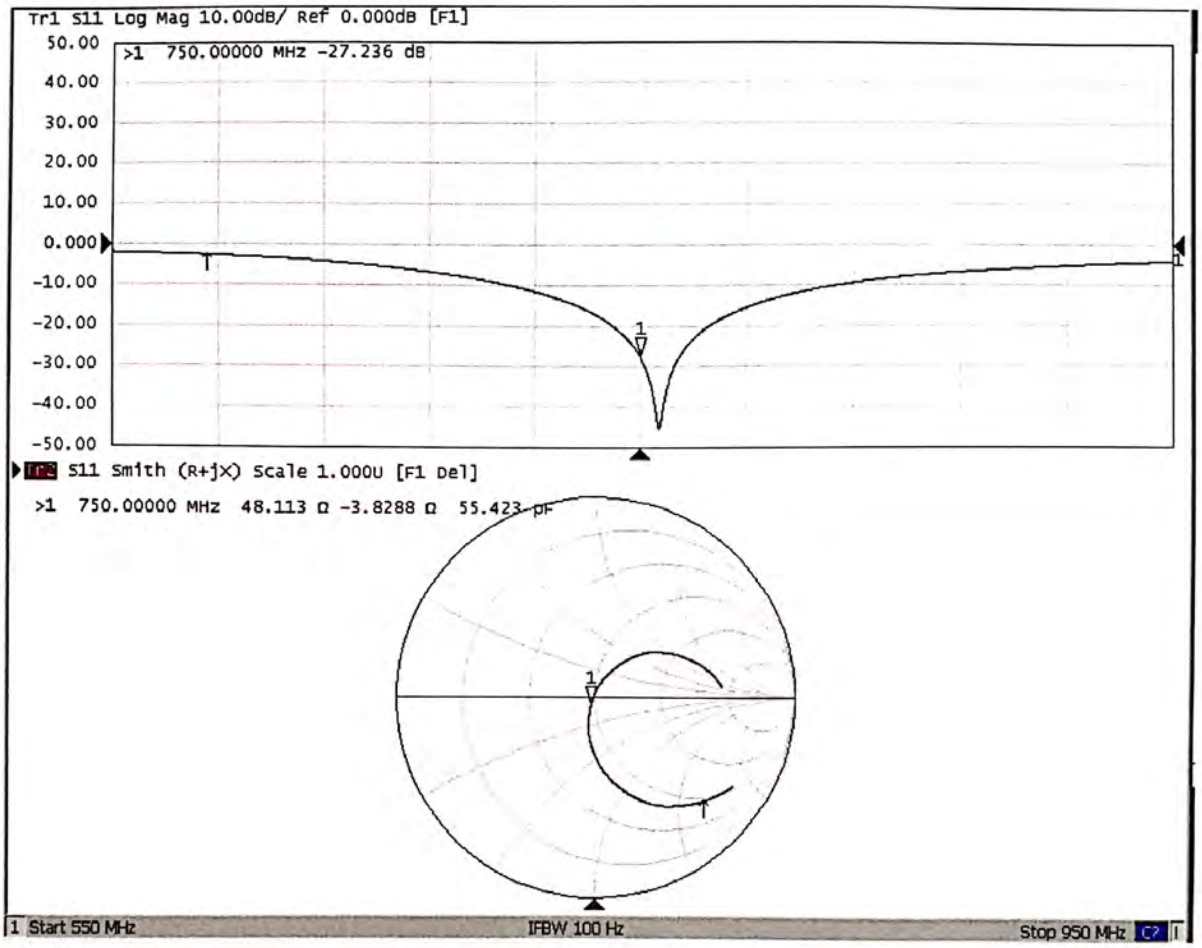
Impedance Measurement Plot for Body TSL



Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 0108

Client **Auden**

Certificate No: D835V2-4d120_Jun19

CALIBRATION CERTIFICATE

Object	D835V2 - SN:4d120
Calibration procedure(s)	QA CAL-05.v11 Calibration Procedure for SAR Validation Sources between 0.7-3 GHz
Calibration date:	June 20, 2019

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	03-Apr-19 (No. 217-02892/02893)	Apr-20
Power sensor NRP-Z91	SN: 103244	03-Apr-19 (No. 217-02892)	Apr-20
Power sensor NRP-Z91	SN: 103245	03-Apr-19 (No. 217-02893)	Apr-20
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-19 (No. 217-02894)	Apr-20
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-19 (No. 217-02895)	Apr-20
Reference Probe EX3DV4	SN: 7349	29-May-19 (No. EX3-7349_May19)	May-20
DAE4	SN: 601	30-Apr-19 (No. DAE4-601_Apr19)	Apr-20

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Feb-19)	In house check: Oct-20
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-18)	In house check: Oct-20
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-18)	In house check: Oct-19

	Name	Function	Signature
Calibrated by:	Claudio Leubler	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: June 21, 2019

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

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

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.10.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.8 ± 6 %	0.91 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.38 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**9.46 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.54 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**6.13 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	55.4 ± 6 %	0.98 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.42 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**9.61 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.58 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**6.28 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.0 Ω - 2.9 jΩ
Return Loss	- 30.4 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.9 Ω - 4.6 jΩ
Return Loss	- 25.7 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.397 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG

DASY5 Validation Report for Head TSL

Date: 20.06.2019

Test Laboratory: SPEAG, Zurich, Switzerland

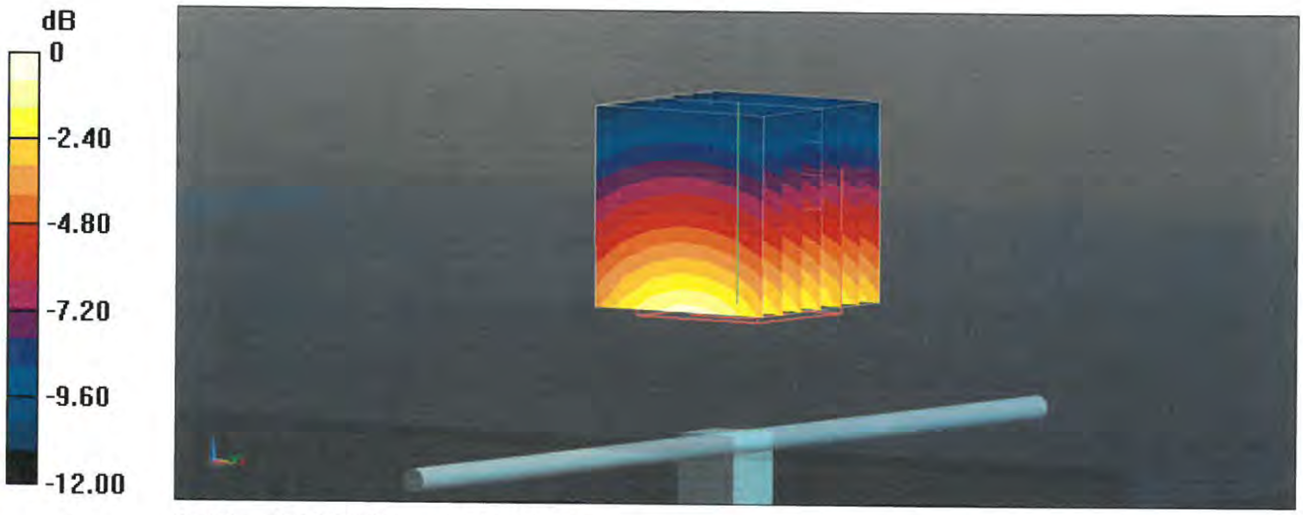
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d120

Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.91 S/m; ε_r = 41.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

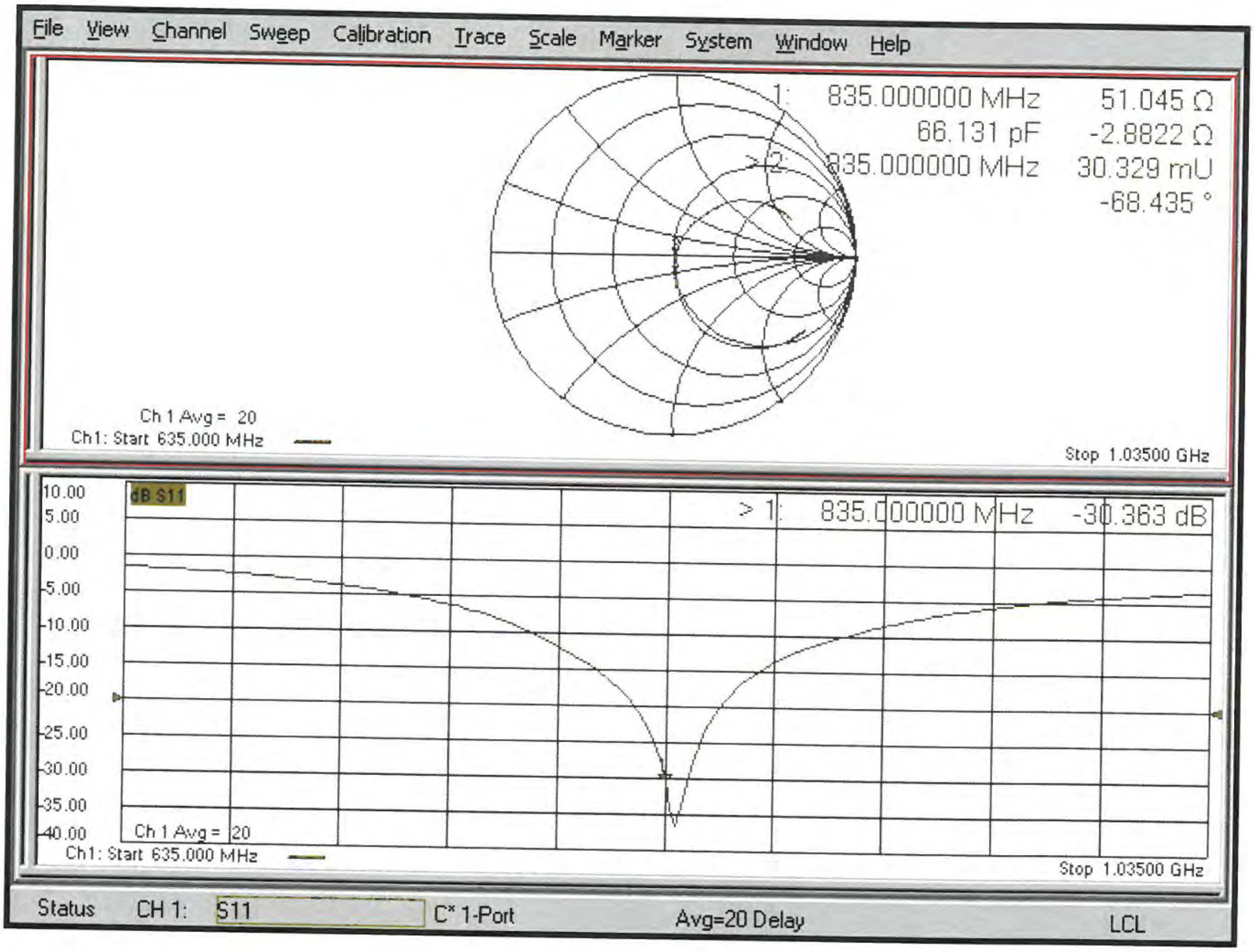
- Probe: EX3DV4 - SN7349; ConvF(9.89, 9.89, 9.89) @ 835 MHz; Calibrated: 29.05.2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.04.2019
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.2(1504); SEMCAD X 14.6.12(7470)

Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 63.32 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 3.61 W/kg
SAR(1 g) = 2.38 W/kg; SAR(10 g) = 1.54 W/kg
Maximum value of SAR (measured) = 3.21 W/kg



0 dB = 3.21 W/kg = 5.07 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 19.06.2019

Test Laboratory: SPEAG, Zurich, Switzerland

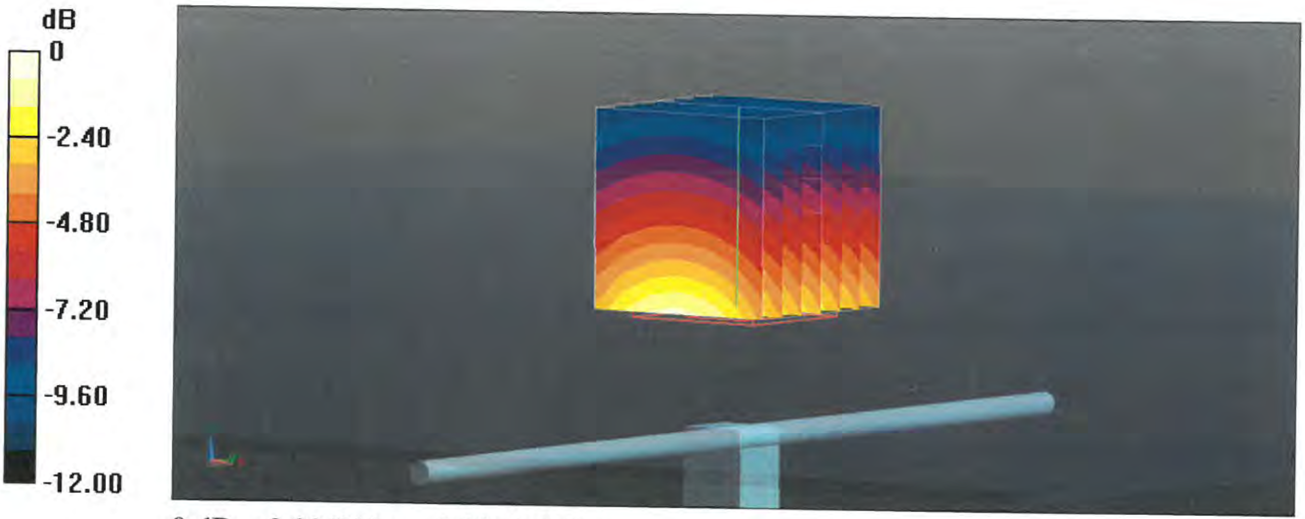
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d120

Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.98 S/m; ε_r = 55.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

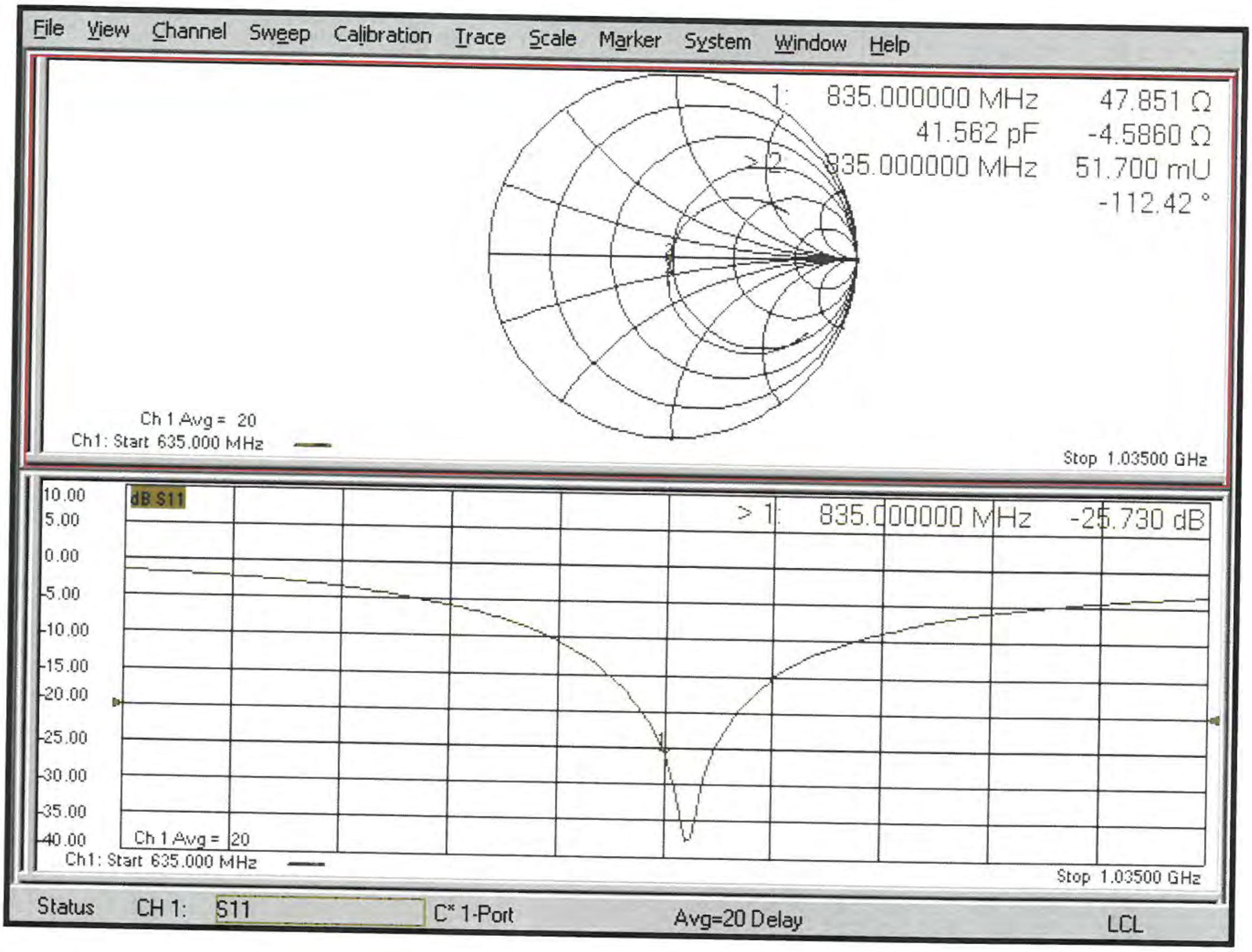
- Probe: EX3DV4 - SN7349; ConvF(10.16, 10.16, 10.16) @ 835 MHz; Calibrated: 29.05.2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.04.2019
- Phantom: Flat Phantom 4.9 (Back); Type: QD 00R P49 AA; Serial: 1005
- DASY52 52.10.2(1504); SEMCAD X 14.6.12(7470)

Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.71 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 3.63 W/kg
SAR(1 g) = 2.42 W/kg; SAR(10 g) = 1.58 W/kg
Maximum value of SAR (measured) = 3.23 W/kg



0 dB = 3.23 W/kg = 5.09 dBW/kg

Impedance Measurement Plot for Body TSL



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CNAS L0570

Client **SGS** **Certificate No: Z19-60153**

CALIBRATION CERTIFICATE

Object	D1750V2 - SN: 1149
Calibration Procedure(s)	FF-Z11-003-01 Calibration Procedures for dipole validation kits
Calibration date:	May 21, 2019

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	106277	20-Aug-18 (CTTL, No.J18X06862)	Aug-19
Power sensor NRP8S	104291	20-Aug-18 (CTTL, No.J18X06862)	Aug-19
Reference Probe EX3DV4	SN 3617	31-Jan-19(SPEAG,No.EX3-3617_Jan19)	Jan-20
DAE4	SN 1331	06-Feb-19(SPEAG,No.DAE4-1331_Feb19)	Feb-20
Secondary Standards	**ID #**	**Cal Date(Calibrated by, Certificate No.)**	**Scheduled Calibration**
Signal Generator E4438C	MY49071430	23-Jan-19 (CTTL, No.J19X00336)	Jan-20
NetworkAnalyzer E5071C	MY46110673	24-Jan-19 (CTTL, No.J19X00547)	Jan-20

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	
Reviewed by:	Lin Hao	SAR Test Engineer	
Approved by:	Qi Dianyuan	SAR Project Leader	

Issued: May 25, 2019

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Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORMx,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

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

b) IEC 62209-1, "Measurement procedure for assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices- Part 1: Device used next to the ear (Frequency range of 300MHz to 6GHz)", July 2016

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

d) KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

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

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Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY52	52.10.2.1495
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.1	1.37 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.8 ± 6 %	1.38 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.12 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**36.3 W/kg ± 18.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	4.81 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**19.2 W/kg ± 18.7 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.4	1.49 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.2 ± 6 %	1.48 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.34 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**37.6 W/kg ± 18.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	4.90 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**19.7 W/kg ± 18.7 % (k=2)**

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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	47.6Ω+ 0.70 jΩ
Return Loss	- 31.8 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	44.9Ω+ 0.29 jΩ
Return Loss	- 25.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.082 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG

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DASY5 Validation Report for Head TSL Date: 05.21.2019

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1149

Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium parameters used: f = 1750 MHz; σ = 1.379 S/m; ε_r = 39.84; ρ = 1000 kg/m3

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(8.38, 8.38, 8.38) @ 1750 MHz; Calibrated: 1/31/2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1331; Calibrated: 2/6/2019
- Phantom: MFP_V5.1C ; Type: QD 000 P51CA; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

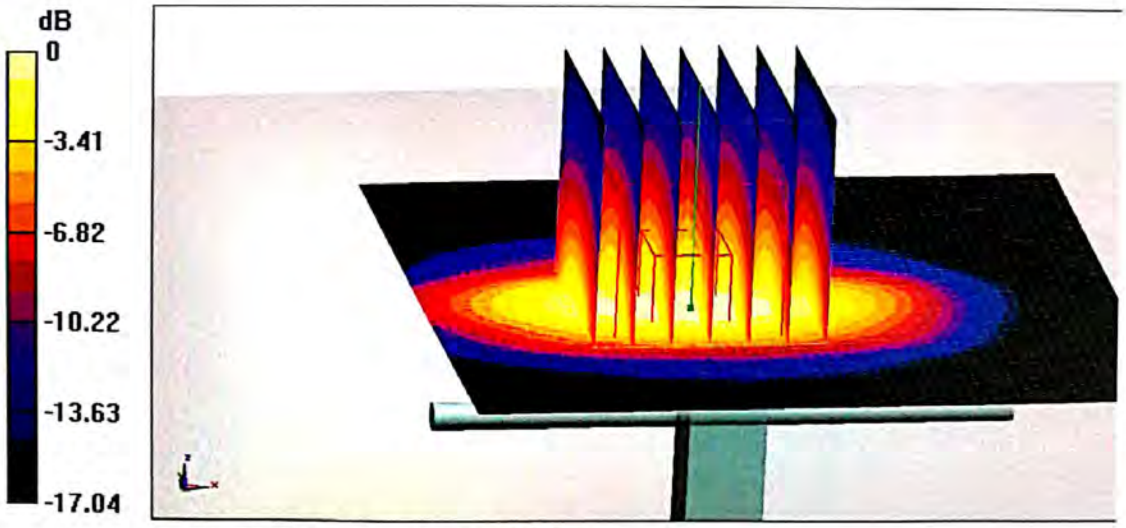
System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 88.07 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 17.2 W/kg

SAR(1 g) = 9.12 W/kg; SAR(10 g) = 4.81 W/kg

Maximum value of SAR (measured) = 14.2 W/kg



0 dB = 14.2 W/kg = 11.52 dBW/kg

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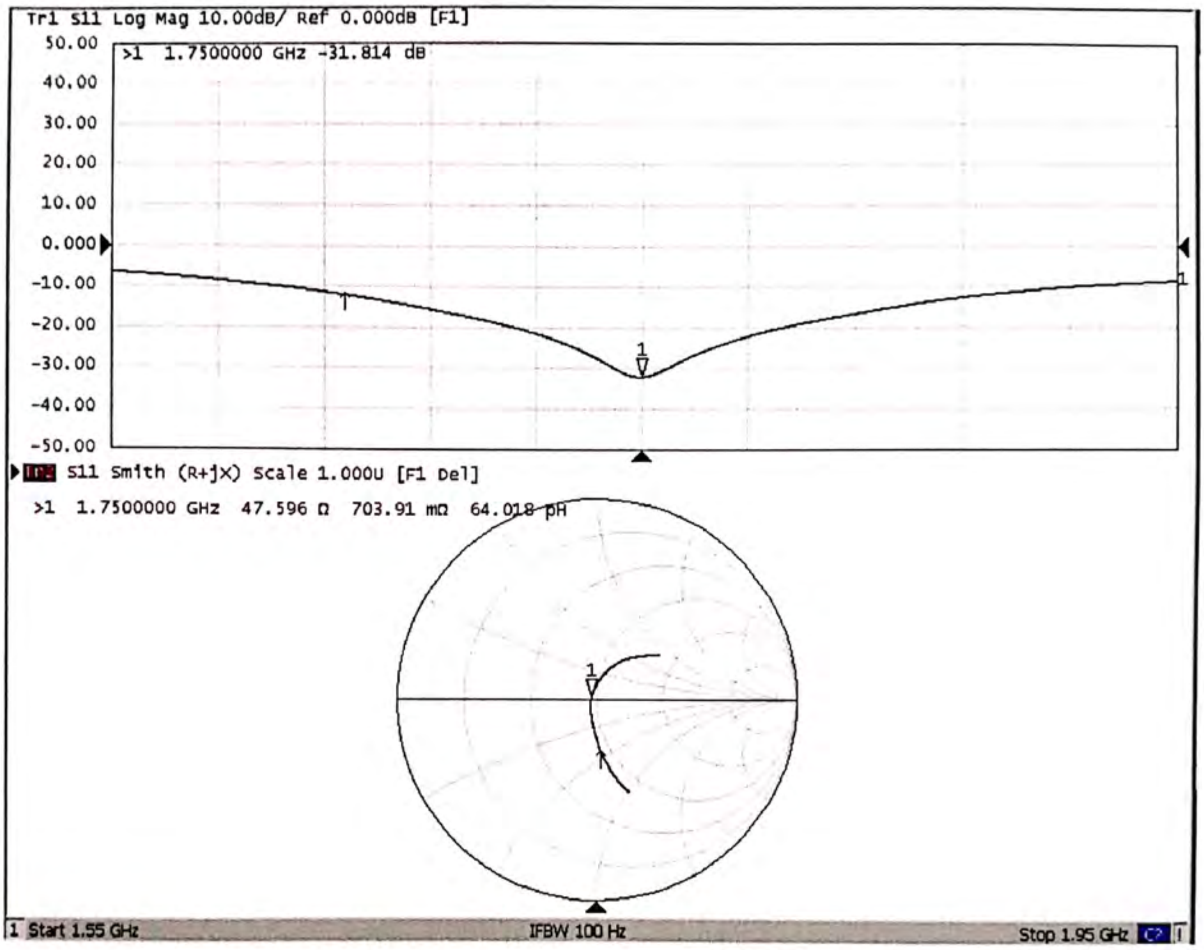
Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL Date: 05.21.2019

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1149

Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium parameters used: f = 1750 MHz; σ = 1.482 S/m; ε_r = 54.22; ρ = 1000 kg/m3

Phantom section: Center Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(8.03, 8.03, 8.03) @ 1750 MHz; Calibrated: 1/31/2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1331; Calibrated: 2/6/2019
- Phantom: MFP_V5.1C ; Type: QD 000 P51CA; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

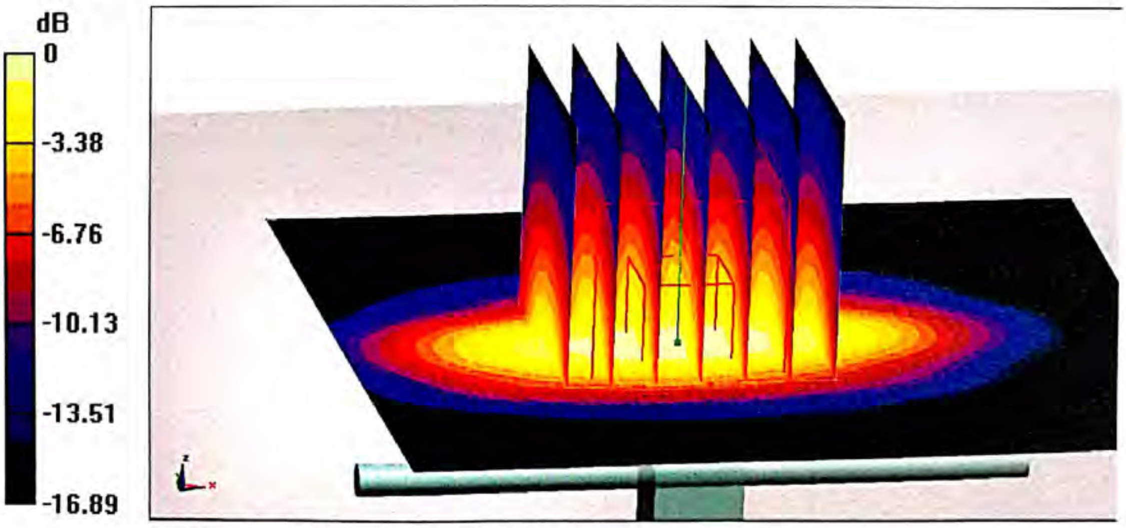
System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 93.60 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 17.5 W/kg

SAR(1 g) = 9.34 W/kg; SAR(10 g) = 4.9 W/kg

Maximum value of SAR (measured) = 14.6 W/kg



0 dB = 14.6 W/kg = 11.64 dBW/kg

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Impedance Measurement Plot for Body TSL