SGS-CSTC Standards Technical Services (Xi'an) Co., Ltd.

FCC SAR TEST REPORT

Application No.:	XEWM2309000447RG11
Applicant:	Lenovo (Shanghai) Electronics Technology Co., Ltd.
Manufacturer:	Lenovo PC HK Limited
Product Name:	Portable Tablet Computer
Model No.(EUT):	TB330XU
Trade Mark:	Lenovo
FCC ID:	O57TB330XU
Standards:	FCC 47CFR §2.1093
Date of Receipt:	2023-08-30
Date of Test:	2023-09-14 to 2023-09-23
Date of Issue:	2023-09-28
Test Result:	**PASS ***

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

Authorized Signature:

Peter Tan

Regulatory Technical 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

Report Number	Revision	Description	Issue Date
XEWM2309000447RG11	01	Original	2023-09-28

Prepared By	Captain Zhou Captain Zhou
Reviewed by	Yuan Zhao **Yuan Zhao**

TEST SUMMARY

Frequency Band	Test position	Max Report SAR1-g (W/kg)	SAR limit (W/kg)
GSM850	Body	0.43	1.60
GSM1900	Body	**1.09**	1.60
WCDMA Band II	Body	0.56	1.60
WCDMA Band IV	Body	0.69	1.60
WCDMA Band V	Body	0.41	1.60
LTE Band 7	Body	0.43	1.60
LTE Band 12/17	Body	0.41	1.60
LTE Band 13	Body	0.42	1.60
LTE Band 14	Body	0.43	1.60
LTE Band 25/2	Body	0.42	1.60
LTE Band 26/5	Body	0.40	1.60
LTE Band 30	Body	0.34	1.60
LTE Band 41/38	Body	0.36	1.60
LTE Band 66/4	Body	0.35	1.60
LTE Band 71	Body	0.43	1.60
WI-FI (2.4GHz)	Body	1.04	1.60
WI-FI (5GHz)	Body	0.73	1.60
BT	Body	0.41	1.60
Maximum Simultaneous Transmission SAR (W/kg)			
Scenario	Body		
Sum SAR	1.57		
SPLSR	/		
SPLSR Limited	1.60		

Note:

1) According to TCB workshop (Overlapping LTE Bands): SAR in LTE band 17 (frequency range: 704-716 MHz) is covered by LTE band 12 (frequency range: 699-716 MHz). SAR in LTE band 2 (frequency range: 1850 - 1910MHz) is covered by LTE band 25 (frequency range: 1850 -1915MHz).SAR in LTE band 5 (frequency range: 824-849 MHz) is covered by LTE band 26 (frequency range: 814-849 MHz). The SAR in LTE band 38 (frequency range: 2570-2620 MHz) is covered by LTE band 41 (frequency range: 2496-2690 MHz). SAR in LTE band 4 (frequency range: 1710-1755 MHz) is covered by LTE band 66(frequency range: 1710-1780 MHz).Because the frequency range is similar, the maximum tuning limit is the same, and the channel bandwidth and other operating parameters for the smaller band is fully supported by the larger band.
2) The Simultaneous transmission SAR is the same test position of the WWAN antenna + WiFi/BT antenna.

CONTENTS

1 General Information

1.1 Details of Client

Applicant:	Lenovo (Shanghai) Electronics Technology Co., Ltd.
Address:	Section 304-305, Building No. 4, # 222, Meiyue Road, China (Shanghai) Pilot Free Trade Zone
Manufacturer:	Lenovo PC HK Limited
Address:	23/F, Lincoln House, Taikoo Place 979 King's Road, Quarry Bay, Hong Kong, China

1.2 Test Location

Company:	SGS-CSTC Standards Technical Services (XI 'AN) Co., Ltd.
Address:	1 / F, Unit D, Building 1, Kanghong Orange Science park, No.137 Keyuan 3rd Road, Fengdong New Town, Xi 'an, Shaanxi, China
Post code:	710086
Test Engineer：	Captain Zhou, Yuan Zhao

1.3 Test Facility

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

• **A2LA (Certificate No. 4854.01)**

SGS-CSTC Standards Technical Services (Xi'an) Co., Ltd. is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 4854.01.

• **Innovation, Science and Economic Development Canada**

SGS-CSTC Standards Technical Services (Xi'an) Co., Ltd. has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0095

ISED#: 25613.

• **FCC –Designation Number: CN1337**

SGS-CSTC Standards Technical Services (Xi'an) Co., Ltd. has been recognized as an accredited testing laboratory.

Designation Number: CN1337.

Test Firm Registration Number: 917410

1.4 General Description of EUT

Product Name:	Portable Tablet Computer		
Model No.(EUT):	TB330XU		
Trade Mark:	Lenovo		
Product Phase:	production unit		
Device Type:	portable device		
Exposure Category:	uncontrolled environment / general population		
IMEI:	865823060003547; 865823060006714; 865823060009106; 865823060007696; 865823060003497		
Hardware Version:	TB330XU		
Software Version:	Lenovo ZUI 15.1.027		
Antenna Type:	PIFA Antenna		
Device Operating Configurations:			
Modulation Mode:	**GSM**: GMSK, 8PSK; **WCDMA**: QPSK,16QAM **LTE**: QPSK,16QAM,64QAM **WIFI**: DSSS, OFDM ; **BT**: GFSK, π/4DQPSK,8DPSK		
Device Class:	B		
GPRS Multi-slots Class:	12	EGPRS Multi-slots Class:	12
HSDPA UE Category:	24	HSUPA UE Category	7
DC-HSDPA UE Category:	24		
Power Class:	4,tested with power level 5(GSM850)		
	1,tested with power level 0(GSM1900)		
	3, tested with power control "all 1"(WCDMA Band)		
	3, tested with power control Max Power(LTE Band)		

Frequency Bands:

Band	Tx (MHz)	Rx (MHz)
GSM850	824 - 849	869 - 894
GSM1900	1850 - 1910	1930 - 1990
WCDMA Band II	1850 - 1910	1930 - 1990
WCDMA Band IV	1710 - 1755	2110 - 2155
WCDMA Band V	824 - 849	869 - 894
LTE Band 2	1850 - 1910	1930 - 1990
LTE Band 4	1710 - 1755	2110 - 2155
LTE Band 5	824 - 849	869 - 894
LTE Band 7	2500 - 2570	2620 - 2690
LTE Band 12	699 - 716	729 - 746
LTE Band 13	777 - 787	746 - 756
LTE Band 14	788 - 798	758 - 768
LTE Band 17	704 - 716	734 - 746
LTE Band 25	1850 - 1915	1930 - 1995
LTE Band 26	814 - 849	859 - 894
LTE Band 30	2305 - 2315	2350 - 2360
LTE Band 38	2570 - 2620	2570 - 2620
LTE Band 41	2496 - 2690	2496 - 2690
LTE Band 66	1710 - 1780	2110 - 2200
LTE Band 71	663 - 698	617 - 652
WIFI(2.4GHz)	2412 - 2462	2412 - 2462
WIFI(5GHz)	5150 - 5250	5150 - 5250
	5250 - 5350	5250 - 5350
	5470 - 5725	5470 - 5725
	5725 - 5850	5725 - 5850

	BT	2402 - 2480	2402 - 2480
Battery Information 1:	Model:	L23D2P31	
	Normal Voltage:	+3.91V	
	Rated capacity:	6820mAh	
	Manufacturer	Ningde Amperex Technology Limited	
Battery Information 2 :	Model:	L23D2P31	
	Normal Voltage:	+3.91V	
	Rated capacity:	6820mAh	
	Manufacturer	SUNWODA Electronic Co.,Ltd	
Note: *Since the above data and/or information is provided by the client relevant results or conclusions of this report are only made for these data and/or information, SGS is not responsible for the authenticity, integrity and results of the data and information and/or the validity of the conclusion. Remark: As above information is provided and confirmed by the applicant. SGS is not liable to the accuracy, suitability, reliability or/and integrity of the information.			

Remark for report XEWM2309000447RG11:

According to the Product Declaration, we tested SKU4/5/7 for the worst case based on SAR report XEWM2309000447RG11.

1.5 Test Specification

Identity	Document Title
FCC 47CFR §2.1093	Radiofrequency Radiation Exposure Evaluation: Portable Devices
ANSI/IEEE Std 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 D05A	LTE Rel.10 KDB Inquiry Sheet v01r02
KDB 248227 D01	SAR Guidance for IEEE 802 11 Wi-Fi SAR v02r02
KDB 616217 D04 v01r02	SAR for laptop and tablets
KDB 447498 D01	General RF Exposure Guidance v06
KDB 447498 D03 v01	Supplement C Cross-Reference
KDB 865664 D01 v01r04	SAR Measurement 100 MHz to 6 GHz
KDB 865664 D02 v01r02	RF Exposure Reporting
KDB 648474 D04	SAR Evaluation Considerations for Wireless Handsets

SGS-CSTC Standards Technical Services (Xi'an) Co., Ltd. Wireless Laboratory
1/F, Unit D, Building 1, Kanghong Orange Science Park, No.137, Keyuan 3rd Road, Fengdong New Town, Xi'an, Shaanxi, China 710086 t (86–29) 6282 7885 www.sgsgroup.com.cn
中国・西安・沣东新城科源三路137号康鸿橙方科技园1号楼D单元1层 邮编: 710086 t (86–29) 6282 7885 sgs.china@sgs.com

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 SAR Measurements System Configuration

2.1 The SAR Measurement System

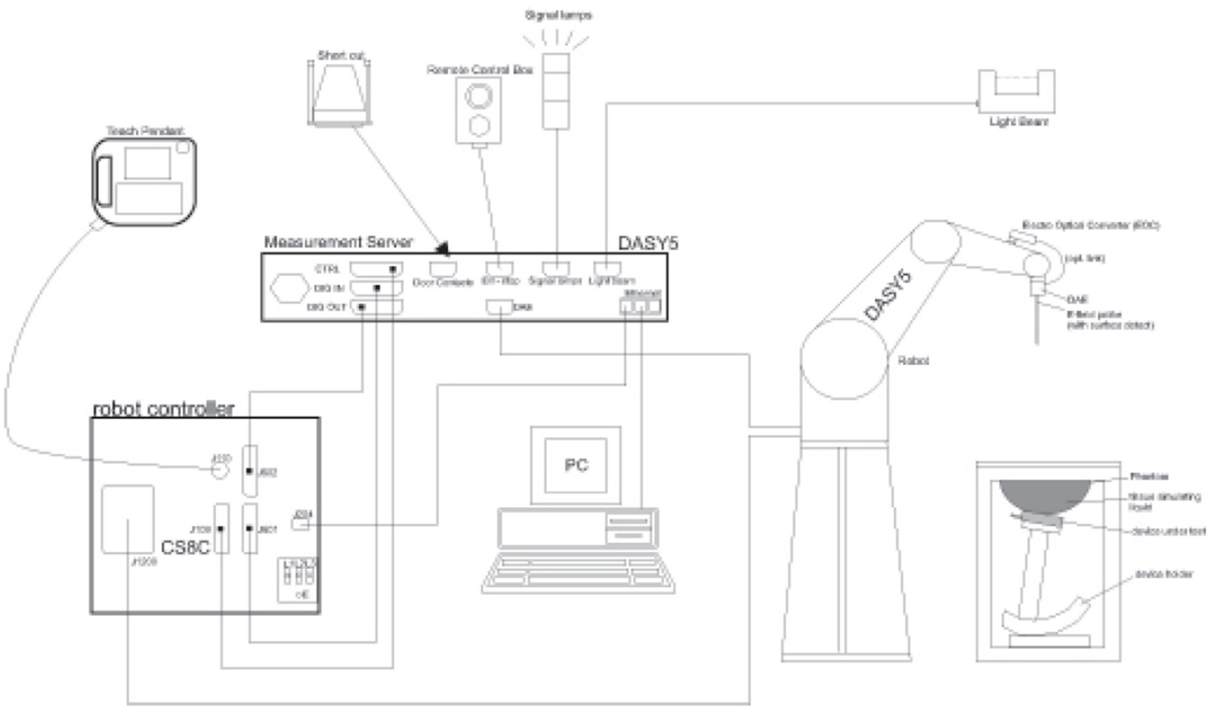
This SAR Measurement System uses a Computer-controlled 3-D stepper motor system (SPEAG DASY5 professional system). A E-field probe is used to determine the internal electric fields. The SAR can be obtained from the equation SAR= σ (|Ei|2)/ ρ where σ and ρ are the conductivity and mass density of the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

SGS-CSTC Standards Technical Services (Xi'an) Co., Ltd. Wireless Laboratory
1/F, Unit D, Building 1, Kanghong Orange Science Park, No.137, Keyuan 3rd Road, Fengdong New Town, Xi'an, Shaanxi, China 710086 t (86–29) 6282 7885 www.sgsgroup.com.cn
中国・西安・沣东新城科源三路137号康鸿橙方科技园1号楼D单元1层 邮编: 710086 t (86–29) 6282 7885 sgs.china@sgs.com

- 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.

2.2 Isotropic E-field Probe EX3DV4

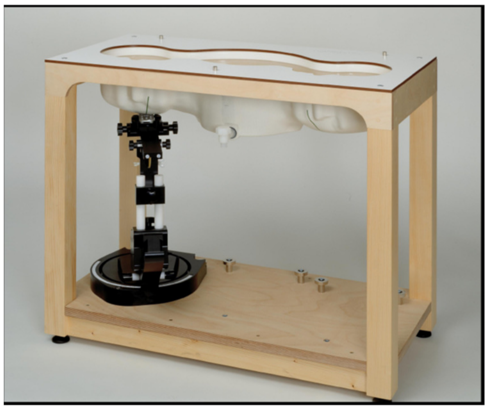
	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	ISO/IEC 17025 calibration service available.
Frequency	10 MHz to > 6 GHz Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Directivity	± 0.3 dB in TSL (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

2.3 Data Acquisition Electronics (DAE)

Model	DAE4
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

2.4 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.

2.5 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.

2.6 Device Holder for Transmitters

F-2. **Device Holder for Transmitters**

- The DASY device holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation centres for both scales are the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.
- The DASY device holder has been made out of low-loss POM material having the following dielectric parameters: relative permittivity 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.

1/F, Unit D, Building 1, Kanghong Orange Science Park, No.137, Keyuan 3rd Road, Fengdong New Town, Xi'an, Shaanxi, China 710086 t (86–29) 6282 7885 www.sgsgroup.com.cn
中国・西安・沣东新城科源三路137号康鸿橙方科技园1号楼D单元1层 邮编: 710086 t (86–29) 6282 7885 sgs.china@sgs.com

2.7 Measurement procedure

2.7.1 Scanning procedure

Step 1: Power reference measurement

The "reference" and "drift" measurements are located at the beginning and end of the batch process. They measure the field drift at one single point in the liquid over the complete procedure.

Step 2: *Area scan*

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

Step 3: *Zoom scan*

Around this point, a volume of 30mm*30mm*30mm (fine resolution volume scan, zoom scan) was assessed by measuring 5x5x7 points (≤2GHz) and 7x7x7 points (≥2GHz). 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.

SGS-CSTC Standards Technical Services (Xi'an) Co., Ltd. Wireless Laboratory
1/F, Unit D, Building 1, Kanghong Orange Science Park, No.137, Keyuan 3rd Road, Fengdong New Town, Xi'an, Shaanxi, China 710086 t (86–29) 6282 7885 www.sgsgroup.com.cn
中国・西安・沣东新城科源三路137号康鸿橙方科技园1号楼D单元1层 邮编: 710086 t (86–29) 6282 7885 sgs.china@sgs.com

			≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface			5 ± 1 mm	$\frac{1}{2}\cdot\delta\cdot\ln(2) \pm 0.5$ 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
		$\Delta z_{Zoom}(n>1)$: between subsequent points	$\leq 1.5\cdot\Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm

Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.

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

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 %

2.7.2 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 "DAE". 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], [℃], [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.

2.7.3 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)

SGS-CSTC Standards Technical Services (Xi'an) Co., Ltd. Wireless Laboratory
1/F, Unit D, Building 1, Kanghong Orange Science Park, No.137, Keyuan 3rd Road, Fengdong New Town, Xi'an, Shaanxi, China 710086 t (86–29) 6282 7885 www.sgsgroup.com.cn
中国・西安・沣东新城科源三路137号康鸿橙方科技园1号楼D单元1层 邮编: 710086 t (86–29) 6282 7885 sgs.china@sgs.com

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.

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

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

3 Description of Test Position

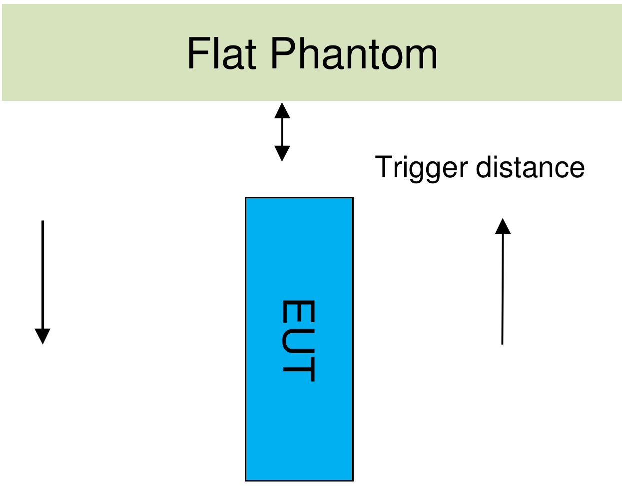
3.1 The Body Test Position

The overall diagonal dimension of the display section of a tablet is > 20 cm, Per FCC KDB 616217, the back surface and edges of the tablet should be tested for SAR compliance with the tablet touching the phantom. SAR evaluation for the front surface of tablet display screens are generally not necessary. The SAR Exclusion Threshold in KDB 447498 D01 can be applied to determine SAR test exclusion for adjacent edge configurations. The closest distance from the antenna to an adjacent tablet edge is used to determine if SAR testing is required for the adjacent edges, with the adjacent edge positioned against the phantom and the edge containing the antenna positioned perpendicular to the phantom.

4 Proximity Sensor Triggering Test

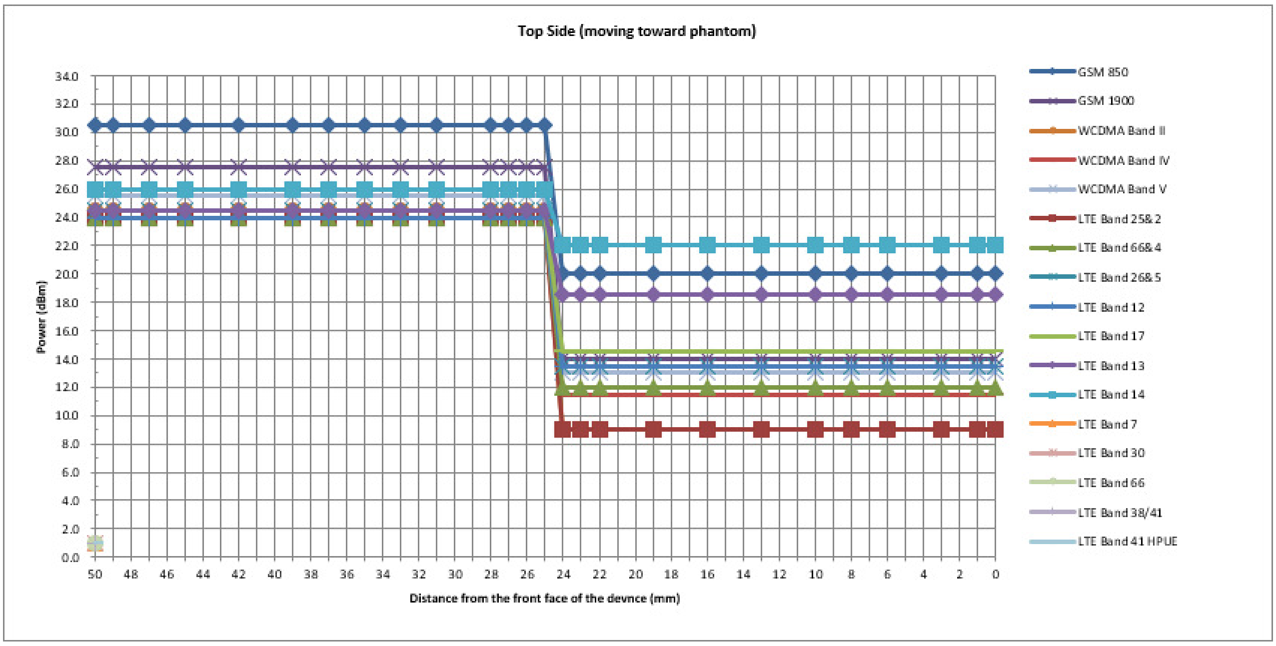
1) Proximity sensor triggering distances

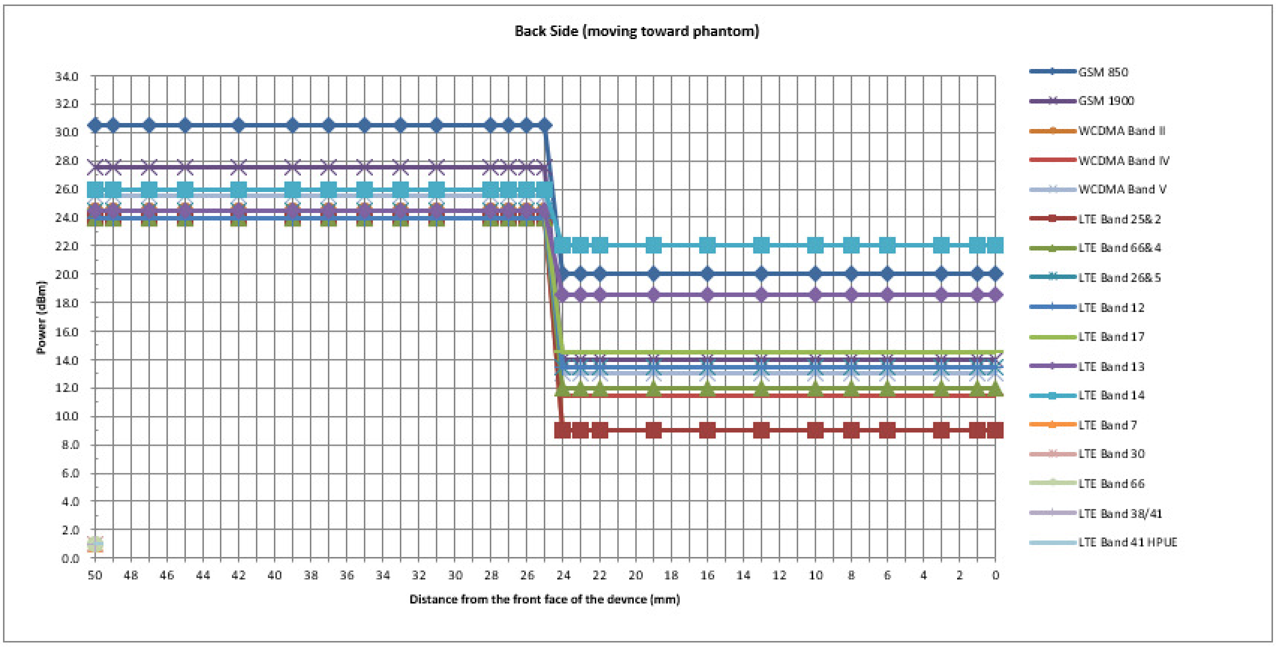
The Proximity sensor triggering was applied to WWAN antenna. Proximity sensor triggering distance testing was performed which the EUT moving further away from the flat phantom and EUT moving toward the flat phantom were both assessed.

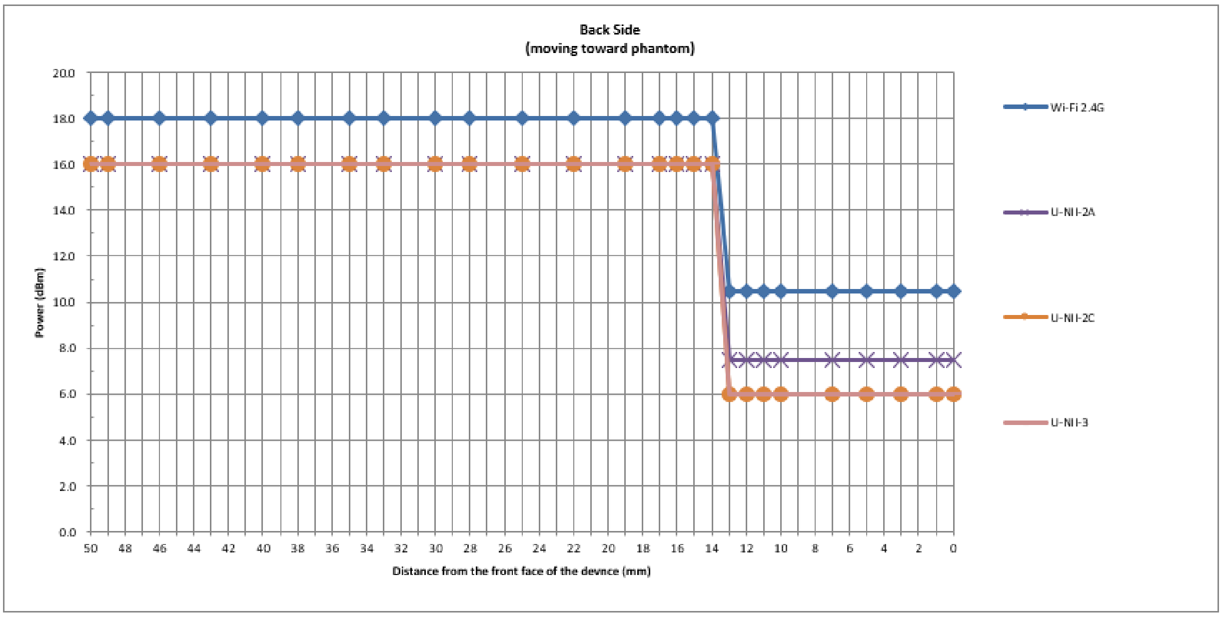


Proximity Sensor Triggering Distance(mm)			
DUT	WWAN		WIFI
Position	Back side	Top side	Back side
Minimum	25mm	25mm	14mm
Required SAR Test	24mm	24mm	13mm

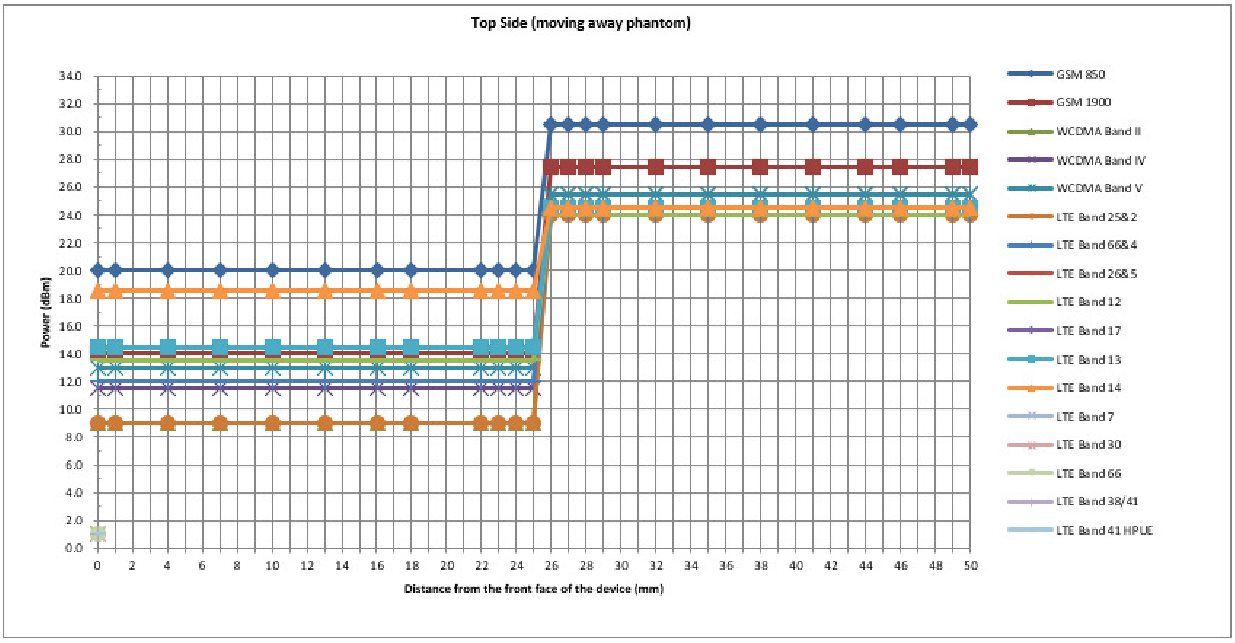
- DUT Moving Toward(Trigger)the Phantom

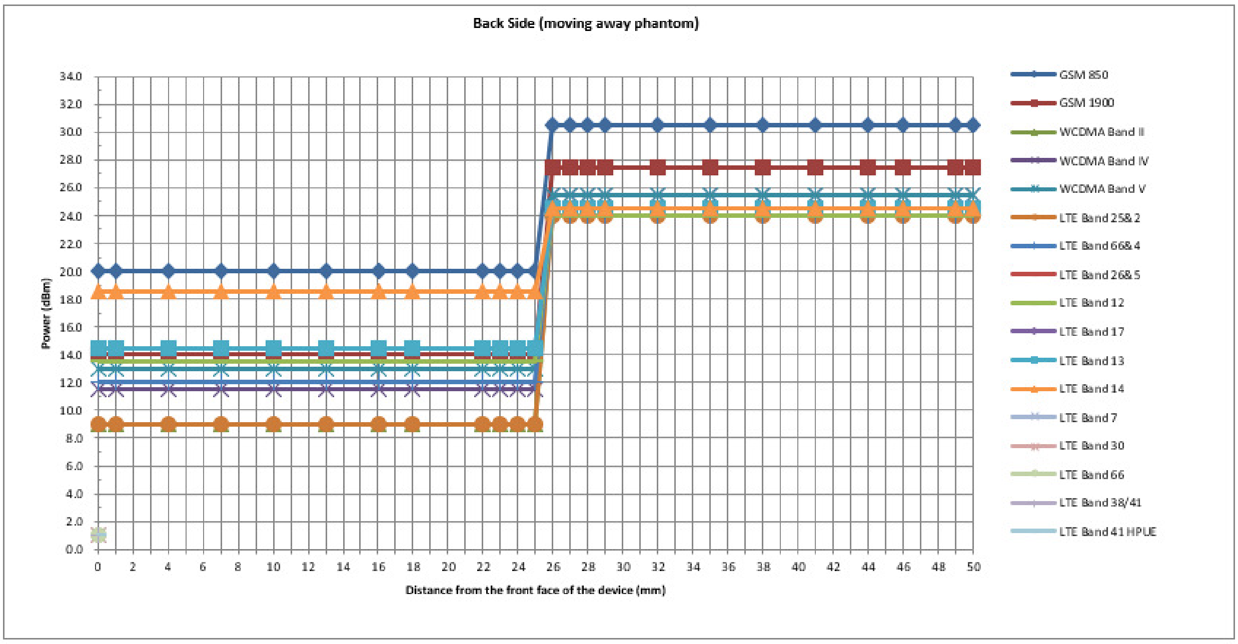


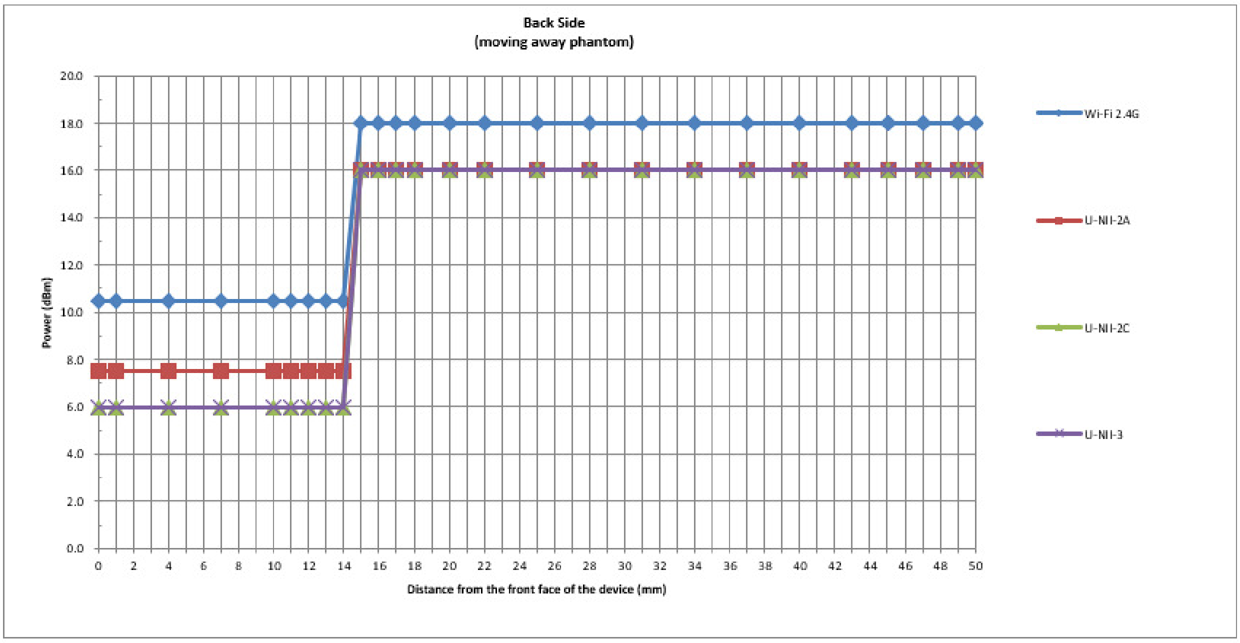



Back Side
(moving toward phantom)
Power (dBm)
Distance from the front face of the devnce (mm)
Wi-Fi 2.4G
U-NII-2A
U-NII-2C
U-NII-3
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
50 48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 8 6 4 2 0

- DUT Moving Away(Release) from the Phantom






Back Side
(moving away phantom)
Power (dBm)
Distance from the front face of the device (mm)
Wi-Fi 2.4G
U-NII-2A
U-NII-2C
U-NII-3

2) Proximity sensor coverage

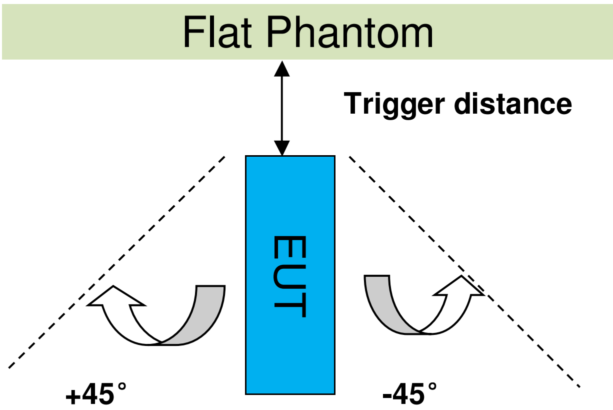
If a sensor is spatially offset from the antenna(s), it is necessary to verify sensor triggering for conditions where the antenna is next to the user but the sensor is laterally further away to ensure sensor coverage is sufficient for reducing the power to maintain compliance. For p-sensor coverage testing, the device is moved and "along the direction of maximum antenna and sensor offset".

The proximity sensor and main antenna use same metallic electrode, so there is no spatial offset.

3) Device tilt angle influences to proximity sensor triggering

The influence of device tilt angles to proximity sensor triggering was determined by positioning each tablet edge that contains a transmitting antenna, perpendicular to the flat phantom.

Rotating the tablet around the edge next to the phantom in ≤ 10° increments until the tablet is ± 45° from the vertical position at 0°, and the maximum output power remains in the reduced mode.



Summary of Tablet Tilt Angle Influence to Proximity Sensor Triggering												
Band	Minimum trigger distance at which power reduction was maintained over ±45°	Power Reduction Status										
		-45°	-35°	-25°	-15°	-5°	0°	5°	15°	25°	35°	45°
WWAN	Top Side 25mm	on	on	on	on	on	on	on	on	on	on	on

5 SAR System Verification Procedure

5.1 Tissue Simulate Liquid

5.1.1 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	700-900	1800-2000	2300-2500	2500-2700
Water	38.56	40.30	55.24	55.00	54.92
Salt (NaCl)	3.95	1.38	0.31	0.2	0.23
Sucrose	56.32	57.90	0	0	0
HEC	0.98	0.24	0	0	0
Bactericide	0.19	0.18	0	0	0
Tween	0	0	44.45	44.80	44.85

Salt: 99⁺% Pure Sodium Chloride

Sucrose: 98⁺% Pure Sucrose

Water: De-ionized, 16 MΩ⁺ 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 1： Recipe of Tissue Simulate Liquid

SGS-CSTC Standards Technical Services (Xi'an) Co., Ltd. Wireless Laboratory
1/F, Unit D, Building 1, Kanghong Orange Science Park, No.137, Keyuan 3rd Road, Fengdong New Town, Xi'an, Shaanxi, China 710086 t (86–29) 6282 7885 www.sgsgroup.com.cn
中国·西安·沣东新城科源三路137号康鸿橙方科技园1号楼D单元1层 邮编: 710086 t (86–29) 6282 7885 sgs.china@sgs.com

5.1.2 Measurement for Tissue Simulate Liquid

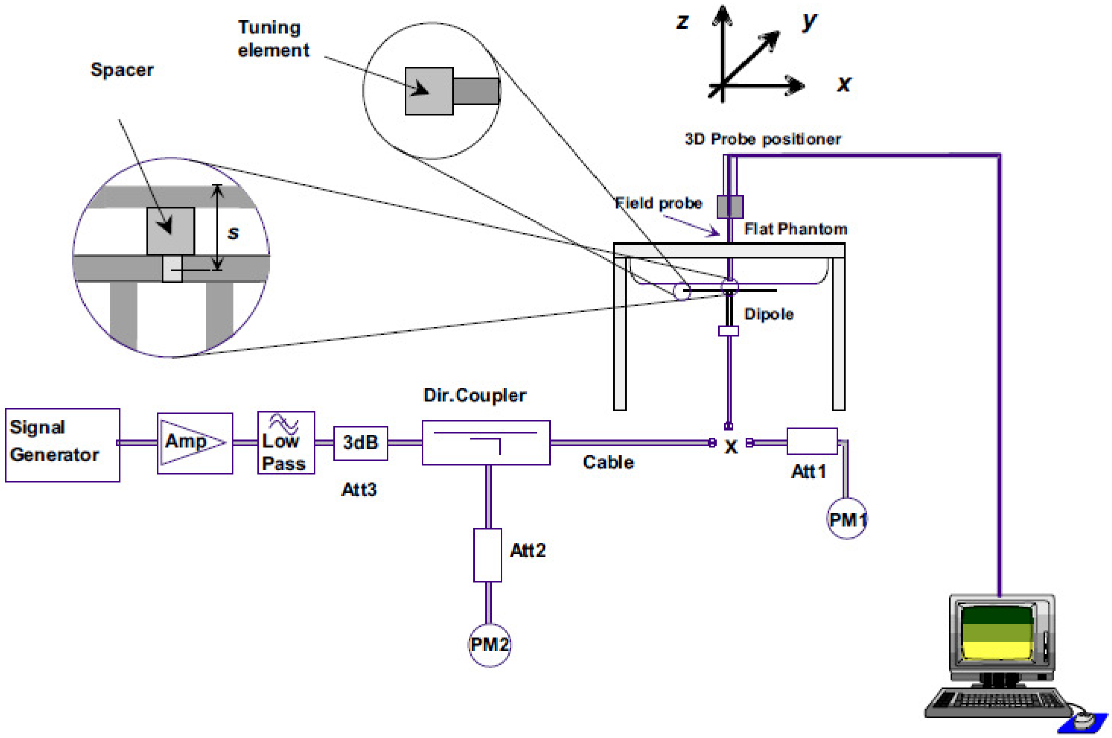
The Conductivity (σ) and Permittivity (ρ) are listed in Table 2. For the SAR measurement given in this report. The temperature variation of the Tissue Simulate Liquids was 22±2℃.

Tissue Type	Measured Frequency （MHz）	Target Tissue (±5%)		Measured Tissue		Deviation (Within ±5%)		Liquid Temp. (℃)	Test Date
		ε_r	σ(S/m)	ε_r	σ(S/m)	1-g(W/kg)	10-g(W/kg)		
750 Head	750	41.90	0.89	40.956	0.888	-2.25%	-0.22%	22.0	2023/9/14
750 Head	750	41.90	0.89	42.434	0.848	1.27%	-4.72%	22.0	2023/9/15
750 Head	750	41.90	0.89	41.637	0.894	-0.63%	0.45%	22.2	2023/9/21
835 Head	835	41.50	0.90	42.824	0.915	3.19%	1.67%	22.4	2023/9/19
1750 Head	1750	40.10	1.37	40.296	1.377	0.49%	0.51%	22.2	2023/9/22
1950 Head	1950	40.00	1.40	38.554	1.444	-3.61%	3.14%	22.5	2023/9/20
2300 Head	2300	39.50	1.67	39.009	1.641	-1.24%	-1.74%	21.5	2023/9/22
2450 Head	2450	39.20	1.80	38.453	1.816	-1.91%	0.89%	21.9	2023/9/18
2600 Head	2600	39.00	1.96	37.884	1.979	-2.86%	0.97%	21.5	2023/9/16
5250 Head	5250	35.90	4.71	36.291	4.623	1.09%	-1.85%	21.3	2023/9/23
5600 Head	5600	35.50	5.07	34.919	5.088	-1.64%	0.36%	21.3	2023/9/23
5750 Head	5750	35.40	5.22	34.656	5.323	-2.10%	1.97%	21.3	2023/9/23

Table 2： Measurement result of Tissue electric parameters

5.2 SAR System Check

The microwave circuit arrangement for system Check is sketched in F-3. 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℃, 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-3. the microwave circuit arrangement used for SAR system check

5.2.1 Justification for Extended SAR Dipole Calibrations

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

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

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

5.2.2 Summary System Validation Result(s)

Validation Kit		Measured SAR 250mW	Measured SAR 250mW	Measured SAR (normalized to 1W)	Measured SAR (normalized to 1W)	Target SAR (normalized to 1W)	Target SAR (normalized to 1W)	Deviation (Within ±10%)		Liquid Temp. (℃)	Test Date
		1g (W/kg)	10g (W/kg)	1g (W/kg)	10g (W/kg)	1-g(W/kg)	10-g(W/kg)	1-g(W/kg)	10-g(W/kg)		
D750V3	Head	2.18	1.44	8.72	5.76	8.40	5.52	3.81%	4.35%	22.0	2023/9/14
D750V3	Head	2.04	1.35	8.16	5.40	8.40	5.52	-2.86%	-2.17%	22.0	2023/9/15
D750V3	Head	2.14	1.42	8.56	5.68	8.40	5.52	1.90%	2.90%	22.2	2023/9/21
D835V2	Head	2.30	1.52	9.20	6.08	9.63	6.18	-4.47%	-1.62%	22.4	2023/9/19
D1750V2	Head	9.05	4.85	36.20	19.40	37.00	19.30	-2.16%	0.52%	22.2	2023/9/22
D1950V3	Head	10.40	5.34	41.60	21.36	40.40	20.80	2.97%	2.69%	22.5	2023/9/20
D2300V2	Head	12.80	6.33	51.20	25.32	49.50	24.00	3.43%	5.50%	21.5	2023/9/22
D2450V2	Head	12.80	6.14	51.20	24.56	54.00	25.10	-5.19%	-2.15%	21.9	2023/9/18
D2600V2	Head	14.60	6.81	58.40	27.24	57.30	25.40	1.92%	7.24%	21.5	2023/9/16
Validation Kit		Measured SAR 100mW	Measured SAR 100mW	Measured SAR (normalized to 1W)	Measured SAR (normalized to 1W)	Target SAR (normalized to 1W)	Target SAR (normalized to 1W)	Deviation (Within ±10%)		Liquid Temp. (℃)	Test Date
		1g (W/kg)	10g (W/kg)	1g (W/kg)	10g (W/kg)	1-g(W/kg)	10-g(W/kg)	1-g(W/kg)	10-g(W/kg)		
D5GHzV2	Head(5.25GHz)	7.98	2.31	79.80	23.10	78.00	21.80	2.31%	5.96%	21.3	2023/9/23
	Head(5.6GHz)	7.86	2.21	78.60	22.10	79.90	22.50	-1.63%	-1.78%	21.3	2023/9/23
	Head(5.75GHz)	7.83	2.22	78.30	22.20	76.40	21.20	2.49%	4.72%	21.3	2023/9/23

Table 3： SAR System Check Result

5.2.3 Detailed System Check Results

Please see the Appendix A

SGS-CSTC Standards Technical Services (Xi'an) Co., Ltd.
Wireless Laboratory
1/F, Unit D, Building 1, Kanghong Orange Science Park, No.137, Keyuan 3rd Road, Fengdong New Town, Xi'an, Shaanxi, China 710086 t (86–29) 6282 7885 www.sgsgroup.com.cn
中国・西安・沣东新城科源三路137号康鸿橙方科技园1号楼D单元1层 邮编: 710086 t (86–29) 6282 7885 sgs.china@sgs.com

6 Test Configuration

6.1 3G SAR Test Reduction Procedure

According to KDB 941225D01, in the following procedures, the mode tested for SAR is referred to as the primary mode. The equivalent modes considered for SAR test reduction are denoted as secondary modes. Both primary and secondary modes must be in the same frequency band. When the maximum output power and tune-up tolerance specified for production units in a secondary mode is ≤ ¼ dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode. This is referred to as the 3G SAR test reduction procedure in the following SAR test guidance, where the primary mode is identified in the applicable wireless mode test procedures and the secondary mode is wireless mode being considered for SAR test reduction by that procedure. When the 3G SAR test reduction procedure is not satisfied, it is identified as "otherwise" in the applicable procedures; SAR measurement is required for the secondary mode.

6.2 Operation Configurations

6.2.1 GSM Test Configuration

SAR tests for GSM 850 and GSM 1900, a communication link is set up with a base station by air link. Using CMW500 the power lever is set to "5"and "0" in SAR of GSM 850 and GSM 1900. The tests in the band of GSM 850 and GSM 1900 are performed in the mode of GPRS/EGPRS function. Since the GPRS class is 10 for this EUT, it has at most 4 timeslots in uplink and at most 4 timeslots in downlink, the maximum total timeslot is 5. The EGPRS class is 10 for this EUT, it has at most 4 timeslots in uplink, and at most 4 timeslots in downlink, the maximum total timeslot is 5.

SAR test reduction for GPRS and EDGE modes is determined by the source-based time-averaged output power specified for production units, including tune-up tolerance. The data mode with highest specified time-averaged output power should be tested for SAR compliance in the applicable exposure conditions. For modes with the same specified maximum output power and tolerance, the higher number time-slot configuration should be tested.

When SAR tests for EGPRS mode is necessary, GMSK modulation should be used to minimize SAR measurement error due to higher peak-to-average power (PAR) ratios inherent in 8-PSK.

The 3G SAR test reduction procedure is applied to 8-PSK EDGE with GMSK GPRS/EDGE as the primary mode.

6.2.2 WCDMA Test Configuration

1）. Output Power Verification

Maximum output power is verified on the high, middle and low channels according to procedures described in section 5.2 of 3GPP TS 34.121, using the appropriate RMC or AMR with TPC (transmit power control) set to all "1's" for WCDMA/HSDPA or by applying the required inner loop power control procedures to maintain maximum output power while HSUPA is active. Results for all applicable physical channel configurations (DPCCH, DPDCHn and spreading codes, HSDPA, HSPA) are required in the SAR report. All configurations that are not supported by the handset or cannot be measured due to technical or equipment limitations must be clearly identified.

2）. Head SAR

SAR for next to the ear head exposure is measured using a 12.2 kbps RMC with TPC bits configured to all "1's". The 3G SAR test reduction procedure is applied to AMR configurations with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured for 12.2 kbps AMR in 3.4 kbps SRB (signaling radio bearer) using the highest reported SAR configuration in 12.2 kbps RMC for head exposure

3）. Body SAR

SAR for body configurations is measured using a 12.2 kbps RMC with TPC bits configured to all "1's". The 3G SAR test reduction procedure is applied to other spreading codes and multiple DPDCHn configurations supported by the handset with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured using an applicable RMC configuration with the corresponding spreaing code or DPDCHn, for the highest reported body-worn accessory exposure SAR configuration in 12.2 kbps RMC. When more than 2 DPDCHn are supported by the handset, it may be necessary to configure additional DPDCHn using FTM (Factory Test Mode) or other chipset based test approaches with parameters similar to those used in 384 kbps and 768 kbps RMC.

4）. HSDPA / HSUPA / DC-HSDPA

According to KDB 941225 D01v03, RMC 12.2kbps setting is used to evaluate SAR. If the maximum output power and tune-up tolerance specified for production units in HSDPA / HSUPA / DC-HSDPA is ≤ ¼ dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio of specified maximum output power and tune-up tolerance of HSDPA / HSUPA / DC-HSDPA to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA / DC-HSDPA

a) HSDPA

HSDPA is configured according to the applicable UE category of a test device. The number of HS-DSCH/HS-PDSCHs, HARQ processes, minimum inter-TTI interval, transport block sizes and RV coding sequence are defined by the H-set. To maintain a consistent test configuration and stable transmission conditions, QPSK is used in the H-set for SAR testing. HS-DPCCH should be configured with a CQI feedback cycle of 4 ms and a CQI repetition factor of 2 to maintain a constant rate of active CQI slots. DPCCH and DPDCH gain factors(βc, βd), and HS-DPCCH power offset parameters (ΔACK, ΔNACK, ΔCQI) are set according to values indicated in the following table The CQI value is determined by the UE category, transport block size, number of HS-PDSCHs and modulation used in the H-set.

Sub-test	βc	Bd	βd(SF)	βc/βd	βhs	CM(dB)	MPR (dB)
1	2/15	15/15	64	2/15	4/15	0.0	0
2	12/15(3)	15/15(3)	64	12/15(3)	24/15	1.0	0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

Note1: △ACK, △NACK and △CQI= 8 Ahs = βhs/βc=30/15 βhs=30/15*βc

Note2:For the HS-DPCCH power mask requirement test in clause 5.2C,5.7A,and the Error Vector Magnitude(EVM) with HS-DPCCH test in clause 5.13.1.A,and HSDPA EVM with phase discontinuity in clause 5.13.1AA, △ACK and △NACK= 8 (Ahs=30/15) with βhs=30/15*βc,and △CQI=
7 (Ahs=24/15) with βhs=24/15*βc.

Note3: CM=1 forβc/βd =12/15, βhs/βc=24/15. For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.

The measurements were performed with a Fixed Reference Channel (FRC) and H-Set 1 QPSK.

Parameter	Value
Nominal average inf. bit rate	534 kbit/s
Inter-TTI Distance	3 TTI"s
Number of HARQ Processes	2 Processes
Information Bit Payload	3202 Bits
MAC-d PDU size	336 Bits
Number Code Blocks	1 Block
Binary Channel Bits Per TTI	4800 Bits
Total Available SMLs in UE	19200 SMLs
Number of SMLs per HARQ Process	9600 SMLs
Coding Rate	0.67
Number of Physical Channel Codes	5

Table 4： settings of required H-Set 1 QPSK acc. to 3GPP 34.121

HS-DSCH Category	Maximum HS-DSCH Codes Received	Minimum Inter-TTI Interval	MaximumH S-DSCH Transport BlockBits/HS-DSCH TTI	Total Soft Channel Bits
1	5	3	7298	19200
2	5	3	7298	28800
3	5	2	7298	28800
4	5	2	7298	38400
5	5	1	7298	57600
6	5	1	7298	67200
7	10	1	14411	115200
8	10	1	14411	134400
9	15	1	25251	172800
10	15	1	27952	172800
11	5	2	3630	14400
12	5	1	3630	28800
13	15	1	34800	259200
14	15	1	42196	259200
15	15	1	23370	345600
16	15	1	27952	345600

Table 5： HSDPA UE category

b) <u>HSUPA</u>

Due to inner loop power control requirements in HSUPA, a commercial communication test set should be used for the output power and SAR tests. The 12.2 kbps RMC, FRC H-set 1 and E-DCH configurations for HSUPA should be configured according to the values indicated below as well as other applicable procedures described in the WCDMA Handset and Release 5 HSUPA Data Device sections of 3G device.

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (1)	β_{ec}	β_{ed}	β_{ec} (SF)	β_{ed} (code)	CM (2) (dB)	MPR (dB)	AG (4) Index	E-TFCI
1	11/15(3)	15/15(3)	64	11/15(3)	22/15	209/225	1039/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed1}:47/15 β_{ed2}:47/15	4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15(4)	15/15(4)	64	15/15(4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: Δ ACK, Δ NACK and Δ CQI = 8 $A_{hs} = \beta_{hs}/\beta_c = 30/15$ $\beta_{hs} = 30/15 * \beta_c$

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

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

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

Note 5 : Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Table 5.1g

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

Table 6： Subtests for UMTS Release 6 HSUPA

UE E-DCH Category	Maximum E-DCH Codes Transmitted	Number of HARQ Processes	E-DCH TTI(ms)	Minimum Speading Factor	Maximum E-DCH Transport Block Bits	Max Rate (Mbps)
1	1	4	10	4	7110	0.7296
2	2	8	2	4	2798	1.4592
	2	4	10	4	14484	
3	2	4	10	4	14484	1.4592
4	2	8	2	2	5772	2.9185
	2	4	10	2	20000	2.00
5	2	4	10	2	20000	2.00
6 (No DPDCH)	4	8	10	2SF2&2SF4	11484	5.76
	4	4	2		20000	2.00
7 (No DPDCH)	4	8	2	2SF2&2SF4	22996	?
	4	4	10		20000	?

NOTE: When 4 codes are transmitted in parallel, two codes shall be transmitted with SF2 and two with SF4.UE categories 1 to 6 support QPSK only. UE category 7 supports QPSK and 16QAM.(TS25.306-7.3.0).

Table 7： HSUPA UE category

c) **DC-HSDPA**

SAR is required for Rel. 8 DC-HSDPA when SAR is required for Rel. 5 HSDPA; otherwise, the 3G SAR test reduction procedure is applied to DC-HSDPA with 12.2 kbps RMC as the primary mode. Power is measured for DC-HSDPA according to the H-Set 12, FRC configuration in Table C.8.1.12 of 3GPP TS 34.121-1 to determine SAR test reduction. A primary and a Second serving HS-DSCH Cell are required to perform the power measurement and for the results to be acceptable.

The following tests were completed according to procedures in section 7.3.13 of 3GPP TS 34.108 v9.5.0.

A summary of these settings are illustrated below:

Downlink Physical Channels are set as per 3GPP TS34.121-1 v9.0.0 E.5.0

Table E.5.0: Levels for HSDPA connection setup

Parameter During Connection setup	Unit	Value
P-CPICH_Ec/Ior	dB	-10
P-CCPCH and SCH_Ec/Ior	dB	-12
PICH _Ec/Ior	dB	-15
HS-PDSCH	dB	off
HS-SCCH_1	dB	off
DPCH_Ec/Ior	dB	-5
OCNS_Ec/Ior	dB	-3.1

Call is set up as per 3GPP TS34.108 v9.5.0 sub clause 7.3.13.

The configurations of the fixed reference channels for HSDPA RF tests are described in 3GPP TS 34.121, annex C for FDD and 3GPP TS 34.122.

The measurements were performed with a Fixed Reference Channel (FRC) H-Set 12 with QPSK.

Parameter	Value
Nominal average inf. bit rate	60 kbit/s
Inter-TTI Distance	1 TTI's
Number of HARQ Processes	6 Processes
Information Bit Payload	120 Bits
Number Code Blocks	1 Block
Binary Channel Bits Per TTI	960 Bits
Total Available SMLs in UE	19200 SMLs
Number of SMLs per HARQ Process	3200 SMLs
Coding Rate	0.15
Number of Physical Channel Codes	1

Table 8： settings of required H-Set 12 QPSK acc. to 3GPP 34.121

Note:

1. The RMC is intended to be used for DC-HSDPA mode and both cells shall transmit with identical parameters as listed in the table above.

2. Maximum number of transmission is limited to 1,i.e.,retransmission is not allowed. The redundancy and constellation version 0 shall be used.

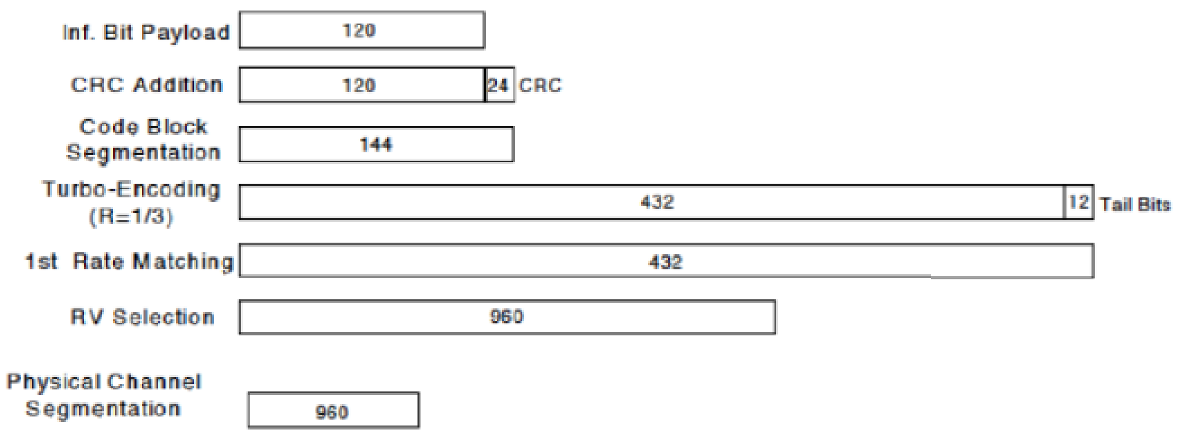


Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

The following 4 Sub-tests for HSDPA were completed according to Release 5 procedures. A summary of subtest settings are illustrated below:

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (1)	CM(dB)(2)	MPR (dB)
1	2/15	15/15	64	2/15	4/15	0.0	0
2	12/15(3)	15/15(3)	64	12/15(3)	24/15	1.0	0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

Note 1: ΔACK, ΔNACK and ΔCQI = 8 $A_{hs} = \beta_{hs}/\beta_c = 30/15$ $\beta_{hs} = 30/15 * \beta_c$

Note 2: CM=1 for $\beta_c/\beta_d = 12/15$, $\beta_{hs}/\beta_c = 24/15$. For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.

Note 3: For subtest 2 the β_c/β_d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 11/15$ and $\beta_d = 15/15$

Up commands are set continuously to set the UE to Max power.

Note:

1. The Dual Carriers transmission only applies to HSDPA physical channels
2. The Dual Carriers belong to the same Node and are on adjacent carriers.
3. The Dual Carriers do not support MIMO to serve UEs configured for dual cell operation
4. The Dual Carriers operate in the same frequency band.
5. The device doesn't support the modulation of 16QAM in uplink but 64QAM in downlink for DC-HSDPA mode.
6. The device doesn't support carrier aggregation for it just can operate in Release 8.

d) HSPA+

SAR is required for Rel. 7 HSPA+ when SAR is required for Rel. 6 HSPA; otherwise, the 3G SAR test reduction procedure is applied to (uplink) HSPA+ with 12.2 kbps RMC as the primary mode. Power is measured for HSPA+ that supports uplink 16 QAM according to configurations in Table C.11.1.4 of 3GPP TS 34.121-1 to determine SAR test reduction.

- **Table C.11.1.4: β values for transmitter characteristics tests with HS-DPCCH and E-DCH with 16QAM**

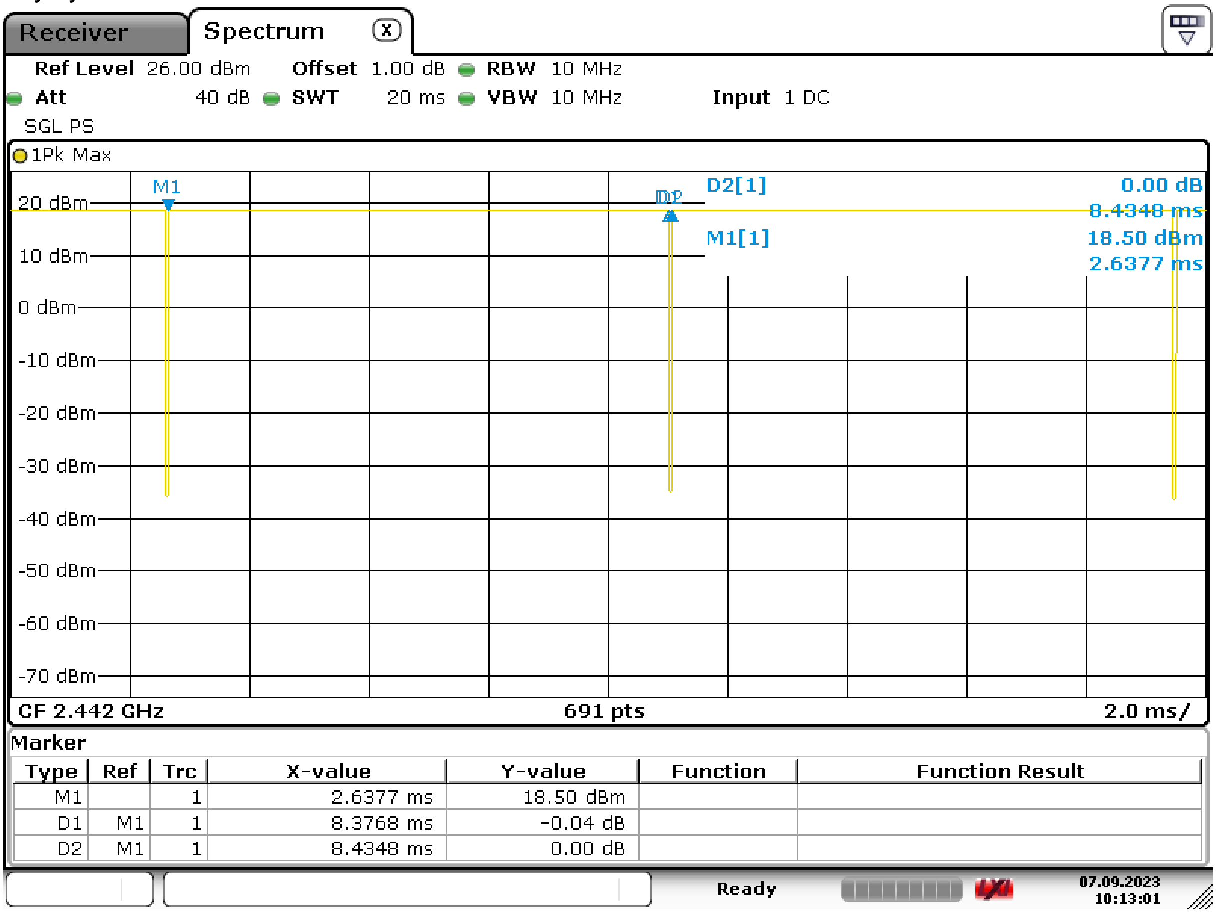
Sub-test	β_c (Note3)	β_d	β_{HS} (Note1)	β_{ec}	β_{ed} (2xSF2) (Note 4)	β_{ed} (2xSF4) (Note 4)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 4)	E-TFCI (Note 5)	E-TFCI (boost)
1	1	0	30/15	30/15	β_{ed}1: 30/15 β_{ed}2: 30/15	β_{ed}3: 24/15 β_{ed}4: 24/15	3.5	2.5	14	105	105

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c.
Note 2: CM = 3.5 and the MPR is based on the relative CM difference, MPR = MAX(CM-1,0).
Note 3: DPDCH is not configured, therefore the β_c is set to 1 and β_d = 0 by default.
Note 4: β_{ed} can not be set directly; it is set by Absolute Grant Value.
Note 5: All the sub-tests require the UE to transmit 2SF2+2SF4 16QAM EDCH and they apply for UE using E-DPDCH category 7. E-DCH TTI is set to 2ms TTI and E-DCH table index = 2. To support these E-DCH configurations DPDCH is not allocated. The UE is signalled to use the extrapolation algorithm.

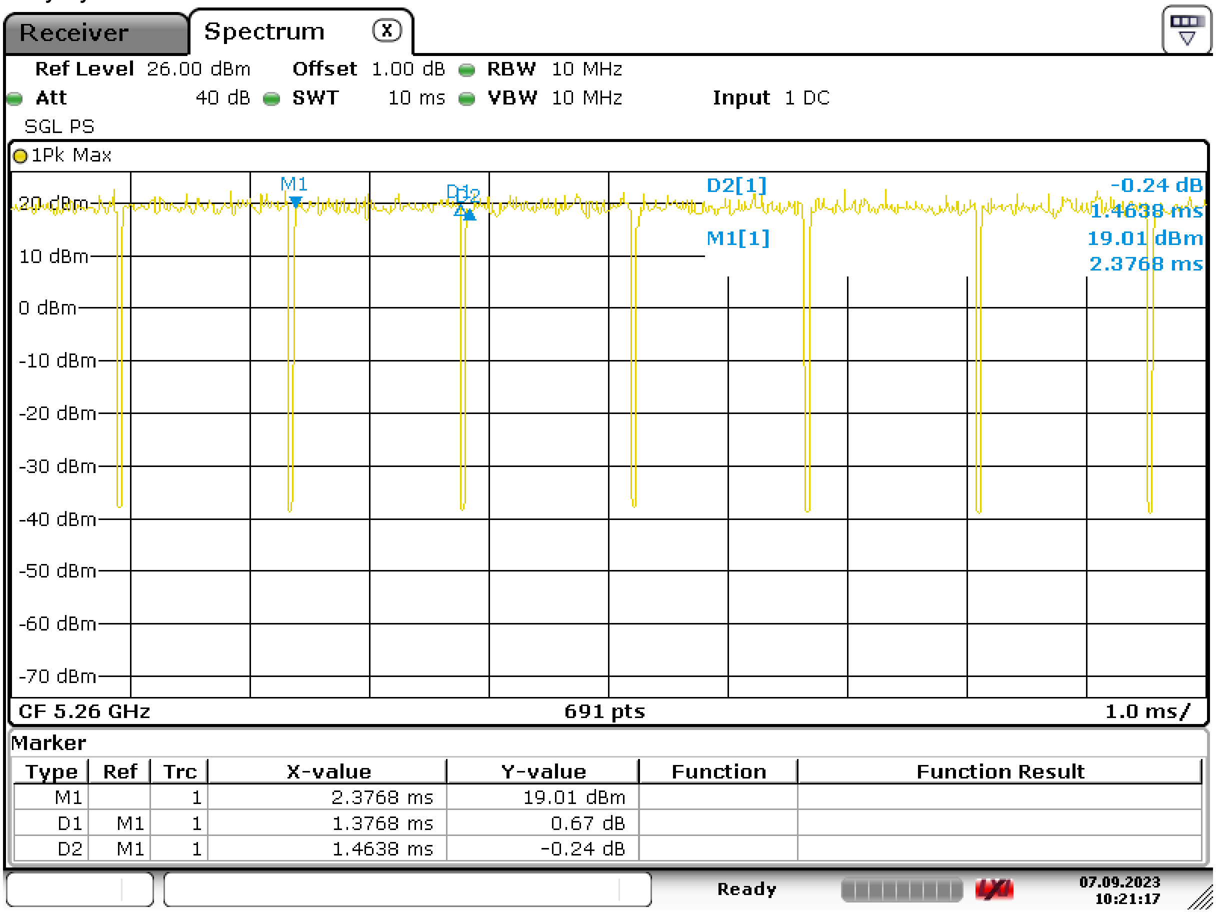
6.2.3 WiFi Test Configuration

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.

- 2.4G WIFI 802.11b:
  Duty cycle=99.31%



- 5G WIFI 802.11a:
  Duty cycle=94.06%



6.2.3.1 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.

6.2.3.2 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.

6.2.3.3 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"

6.2.3.4 2.4 GHz 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.

6.2.3.5 WiFi 5G SAR Test Procedures

6.2.3.5.1 U-NII-1 and U-NII-2A Bands

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

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

6.2.3.5.2 U-NII-2C and U-NII-3 Bands

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

When the same transmitter and antenna(s) are used for U-NII-2C band and U-NII-3 band or 5.8 GHz band of §15.247, the bands may be aggregated to enable additional channels with 20, 40 or 80 MHz bandwidth to span across the band gap, as illustrated in Appendix B. The maximum output power for the additional band gap channels is limited to the lower of those certified for the bands. Unless band gap channels are permanently disabled, they must be considered for SAR testing. The frequency range covered by these bands is 380 MHz (5.47 – 5.85 GHz), which requires a minimum of at least two SAR probe calibration frequency points to support SAR measurements. To maintain SAR measurement accuracy and to facilitate test reduction, the channels in U-NII-2C band above 5.65 GHz may be grouped with the 5.8 GHz channels in U-NII-3 or §15.247 band to enable two SAR probe calibration frequency points to cover the bands, including the band gap channels. When band gap channels are supported and the bands are not aggregated for SAR testing, band gap channels must be considered independently in each band according to the normally required OFDM SAR measurement and probe calibration frequency points requirements.

6.2.3.5.3 OFDM Transmission Mode SAR Test Configuration and Channel Selection Requirements

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

1) The largest channel bandwidth configuration is selected among the multiple configurations with the same specified maximum output power.
2) If multiple configurations have the same specified maximum output power and largest channel bandwidth, the lowest order modulation among the largest channel bandwidth configurations is selected.
3) If multiple configurations have the same specified maximum output power, largest channel bandwidth and lowest order modulation, the lowest data rate configuration among these configurations is selected.

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

6.2.3.5.4 SAR Test Requirements for OFDM configurations

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

6.2.4 LTE Test Configuration

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

A) Spectrum Plots for RB Configurations

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

B) MPR

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

Modulation	Channel bandwidth / Transmission bandwidth configuration [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
256 QAM	≥ 1						≤ 5

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.

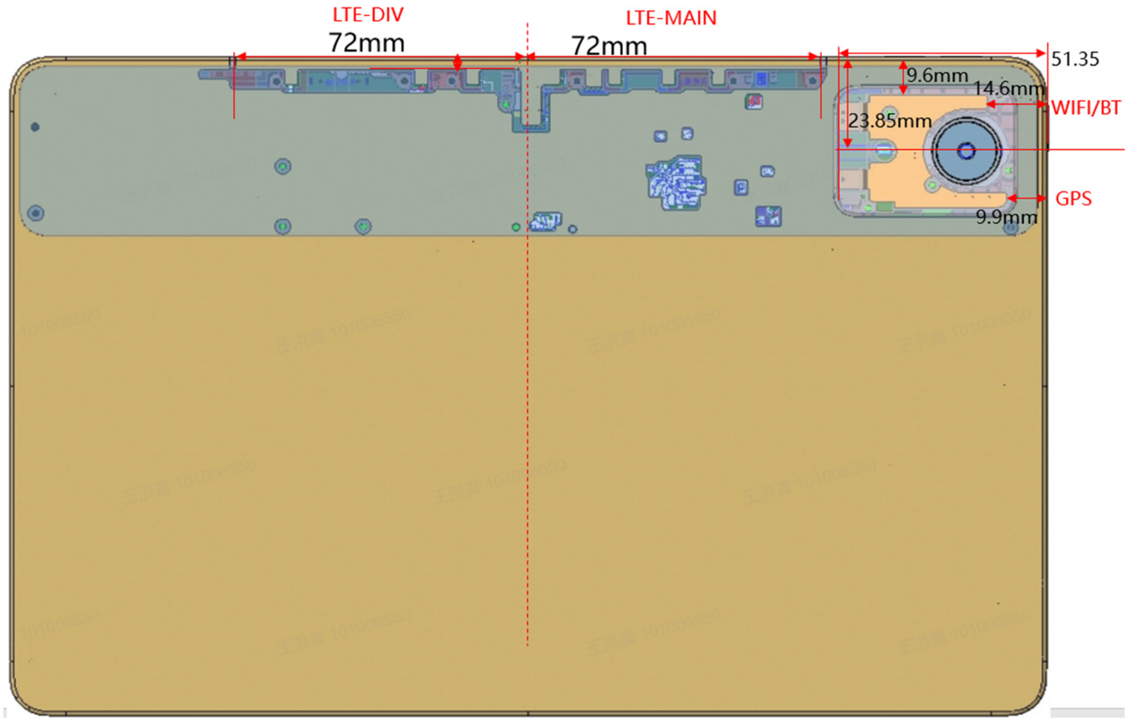
4) Higher order modulations

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.

6.2.5 DUT Antenna Locations(Back Veiw)



EUT Sides for SAR Testing					
Mode	Back	Left	Right	Top	Bottom
GSM/WCDMA/LTE /WIFI/BT Antenna	Yes	Yes	Yes	Yes	Yes

6.2.6 EUT side for SAR Testing

- **Stand-alone SAR test evaluation**

1) Per FCC KDB 447498D01, 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
When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.
2) At 100 MHz to 6 GHz and for test separation distances > 50 mm, the SAR test exclusion threshold is determined according to the following:
a) [Power allowed at numeric threshold for 50 mm in step 1) + (test separation distance - 50 mm)·(f(MHz)/150)] mW, at 100 MHz to 1500 MHz
b) [Power allowed at numeric threshold for 50 mm in step 1) + (test separation distance - 50 mm)·10] mW at > 1500 MHz and ≤ 6 GHz

Standalone SAR exclusion calculation:

Bnad	Exposure Condition	f (GHz)	Pmax	Pmax	SAR Test（Yes or No)				
			(dBm)	(mw)	Back side	Left side	Right side	Top side	Bottom side
GSM850	Body 0mm	0.835	30.5	1122.02	Yes	Yes	Yes	Yes	Yes
GSM1900	Body 0mm	1.9	27.5	562.34	Yes	Yes	No	Yes	No
WCDMA B2	Body 0mm	1.9	24.5	281.84	Yes	No	No	Yes	No
WCDMA B4	Body 0mm	1.75	25.5	354.81	Yes	Yes	No	Yes	No
WCDMA B5	Body 0mm	0.835	25.5	354.81	Yes	Yes	No	Yes	No
LTE B2	Body 0mm	1.9	24	251.19	Yes	No	No	Yes	No
LTE B4	Body 0mm	1.75	24	251.19	Yes	No	No	Yes	No
LTE B5	Body 0mm	0.835	24.5	281.84	Yes	Yes	No	Yes	No
LTE B7	Body 0mm	2.6	24	251.19	Yes	No	No	Yes	No
LTE B12	Body 0mm	0.75	24.5	281.84	Yes	Yes	No	Yes	No
LTE B13	Body 0mm	0.75	24.5	281.84	Yes	Yes	No	Yes	No
LTE B14	Body 0mm	0.75	24.5	281.84	Yes	Yes	No	Yes	No
LTE B17	Body 0mm	0.75	24	251.19	Yes	No	No	Yes	No
LTE B25	Body 0mm	1.9	24	251.19	Yes	No	No	Yes	No
LTE B26	Body 0mm	0.835	24.5	281.84	Yes	Yes	No	Yes	No
LTE B30	Body 0mm	2.3	24	251.19	Yes	No	No	Yes	No
LTE B66	Body 0mm	1.75	24	251.19	Yes	No	No	Yes	No
LTE B71	Body 0mm	0.75	24	251.19	Yes	No	No	Yes	No
LTE B38	Body 0mm	2.6	24	251.19	Yes	No	No	Yes	No
LTE B41	Body 0mm	2.6	23.5	223.87	Yes	No	No	Yes	No
LTE B41	Body 0mm	2.6	26	398.11	Yes	Yes	No	Yes	No
WIFI 2.4G	Body 0mm	2.450	18.00	63.10	Yes	Yes	No	Yes	No
WIFI 5.2G	Body 0mm	5.200	16.00	39.81	Yes	Yes	No	Yes	No
WIFI 5.3G	Body 0mm	5.300	16.00	39.81	Yes	Yes	No	Yes	No
WIFI 5.5G	Body 0mm	5.500	16.00	39.81	Yes	Yes	No	Yes	No
WIFI 5.8G	Body 0mm	5.800	16.00	39.81	Yes	Yes	No	Yes	No
BT	Body 0mm	2.450	10.00	10.00	Yes	Yes	No	Yes	No

When standalone SAR test exclusion applies to an antenna that transmits simultaneously, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:
1) (max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)]· [√f(GHz)/x] W/kg for test separation distances ≤ 50 mm, where x = 7.5 for 1-g SAR and x = 18.75 for 10-g SAR.
When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion

2) 0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the test separation distance is > 50 mm.

Band	Exposure Condition	f (GHz)	Pmax	Pmax	separation distance(**cm**)					Calculated Value					Estimated SAR(W/Kg) Limit 1g 1.6				
			(dBm)	(mw)	Back side	Left side	Right side	Top side	Bottom side	Back side	Left side	Right side	Top side	Bottom side	Back side	Left side	Right side	Top side	Bottom side
GSM850	Body 0mm	0.835	30.5	1122.02	0.50	5.6	12.77	0.50	14.29	9.25	279.44	903.26	9.25	1058.95	194.147	6.424	1.988	194.147	1.695
GSM1900	Body 0mm	1.9	27.5	562.34	0.50	5.6	12.77	0.50	14.29	3.36	288.63	1336.18	3.36	1644.64	267.497	3.117	0.673	267.497	0.547
WCDMA B2	Body 0mm	1.9	24.5	281.84	0.50	5.6	12.77	0.50	14.29	3.36	288.63	1336.18	3.36	1644.64	134.066	1.562	0.337	134.066	0.274
WCDMA B4	Body 0mm	1.75	25.5	354.81	0.50	5.6	12.77	0.50	14.29	3.59	295.30	1346.92	3.59	1654.54	158.019	1.922	0.421	158.019	0.343
WCDMA B5	Body 0mm	0.835	25.5	354.81	0.50	5.6	12.77	0.50	14.29	9.25	279.44	903.26	9.25	1058.95	61.395	2.032	0.629	61.395	0.536
LTE B2	Body 0mm	1.9	24	251.19	0.50	5.6	12.77	0.50	14.29	3.36	288.63	1336.18	3.36	1644.64	119.486	1.392	0.301	119.486	0.244
LTE B4	Body 0mm	1.75	24	251.19	0.50	5.6	12.77	0.50	14.29	3.59	295.30	1346.92	3.59	1654.54	111.869	1.361	0.298	111.869	0.243
LTE B5	Body 0mm	0.835	24.5	281.84	0.50	5.6	12.77	0.50	14.29	9.25	279.44	903.26	9.25	1058.95	48.767	1.614	0.499	48.767	0.426
LTE B7	Body 0mm	2.6	24	251.19	0.50	5.6	12.77	0.50	14.29	2.62	264.56	1295.97	2.62	1607.41	153.615	1.519	0.310	153.615	0.250
LTE B12	Body 0mm	0.75	24.5	281.84	0.50	5.6	12.77	0.50	14.29	10.75	274.47	837.17	10.75	973.78	41.948	1.643	0.539	41.948	0.463
LTE B13	Body 0mm	0.75	24.5	281.84	0.50	5.6	12.77	0.50	14.29	10.75	274.47	837.17	10.75	973.78	41.948	1.643	0.539	41.948	0.463
LTE B14	Body 0mm	0.75	24.5	281.84	0.50	5.6	12.77	0.50	14.29	10.75	274.47	837.17	10.75	973.78	41.948	1.643	0.539	41.948	0.463
LTE B17	Body 0mm	0.75	24	251.19	0.50	5.6	12.77	0.50	14.29	10.75	274.47	837.17	10.75	973.78	37.386	1.464	0.480	37.386	0.413
LTE B25	Body 0mm	1.9	24	251.19	0.50	5.6	12.77	0.50	14.29	3.36	288.63	1336.18	3.36	1644.64	119.486	1.392	0.301	119.486	0.244
LTE B26	Body 0mm	0.835	24.5	281.84	0.50	5.6	12.77	0.50	14.29	9.25	279.44	903.26	9.25	1058.95	48.767	1.614	0.499	48.767	0.426
LTE B30	Body 0mm	2.3	24	251.19	0.50	5.6	12.77	0.50	14.29	2.89	273.72	1311.54	2.89	1621.86	139.246	1.468	0.306	139.246	0.248
LTE B66	Body 0mm	1.75	24	251.19	0.50	5.6	12.77	0.50	14.29	3.59	295.30	1346.92	3.59	1654.54	111.869	1.361	0.298	111.869	0.243
LTE B71	Body 0mm	0.75	24	251.19	0.50	5.6	12.77	0.50	14.29	10.75	274.47	837.17	10.75	973.78	37.386	1.464	0.480	37.386	0.413
LTE B38	Body 0mm	2.6	24	251.19	0.50	5.6	12.77	0.50	14.29	2.62	264.56	1295.97	2.62	1607.41	153.615	1.519	0.310	153.615	0.250
LTE B41	Body 0mm	2.6	23.5	223.87	0.50	5.6	12.77	0.50	14.29	2.62	264.56	1295.97	2.62	1607.41	136.910	1.354	0.276	136.910	0.223
LTE B41	Body 0mm	2.6	26	398.11	0.50	5.6	12.77	0.50	14.29	2.62	264.56	1295.97	2.62	1607.41	243.464	2.408	0.492	243.464	0.396
WIFI 2.4G	Body 0mm	2.450	18.00	63.10	0.50	0.50	19.97	0.50	11.90	2.74	2.74	3051.28	2.74	1139.77	36.793	36.793	0.033	36.793	0.089
WIFI 5.2G	Body 0mm	5.200	16.00	39.81	0.50	0.50	19.97	0.50	11.90	1.50	1.50	3050.53	1.50	1047.06	42.420	42.420	0.021	42.420	0.061
WIFI 5.3G	Body 0mm	5.300	16.00	39.81	0.50	0.50	19.97	0.50	11.90	1.48	1.48	3050.51	1.48	1044.81	43.072	43.072	0.021	43.072	0.061
WIFI 5.5G	Body 0mm	5.500	16.00	39.81	0.50	0.50	19.97	0.50	11.90	1.44	1.44	3050.47	1.44	1040.46	44.369	44.369	0.021	44.369	0.061
WIFI 5.8G	Body 0mm	5.800	16.00	39.81	0.50	0.50	19.97	0.50	11.90	1.38	1.38	3050.42	1.38	1034.24	46.297	46.297	0.021	46.297	0.062
BT	Body 0mm	2.450	10.00	10.00	0.50	0.50	19.97	0.50	11.90	2.74	2.74	3051.28	2.74	1139.77	5.831	5.831	0.005	5.831	0.014

Table 9： Estimated SAR calculation for GSM/WCDMA/LTE/WiFi/BT.

Note:

1) * - maximum possible output power declared by manufacturer

6.3 Measurement of RF conducted Power

6.3.1 Conducted Power of GSM

For SAR the time based average power is relevant. The difference in between depends on the duty cycle of the TDMA signal:

No. of timeslots	1	2	3	4
Duty Cycle	1:8.3	1:4.15	1:2.77	1:2.075
Time based avg. power compared to slotted avg. power	-9.19	-6.18	-4.42	-3.17

1) The frame-averaged power is linearly proportion to the slot number configured and it is linearly scaled the maximum burst-averaged power based on time slots.

Note: The detailed conducted power can be referred to Appendix E.

6.3.2 Conducted Power of WCDMA

Note: The detailed conducted power can be referred to Appendix E.

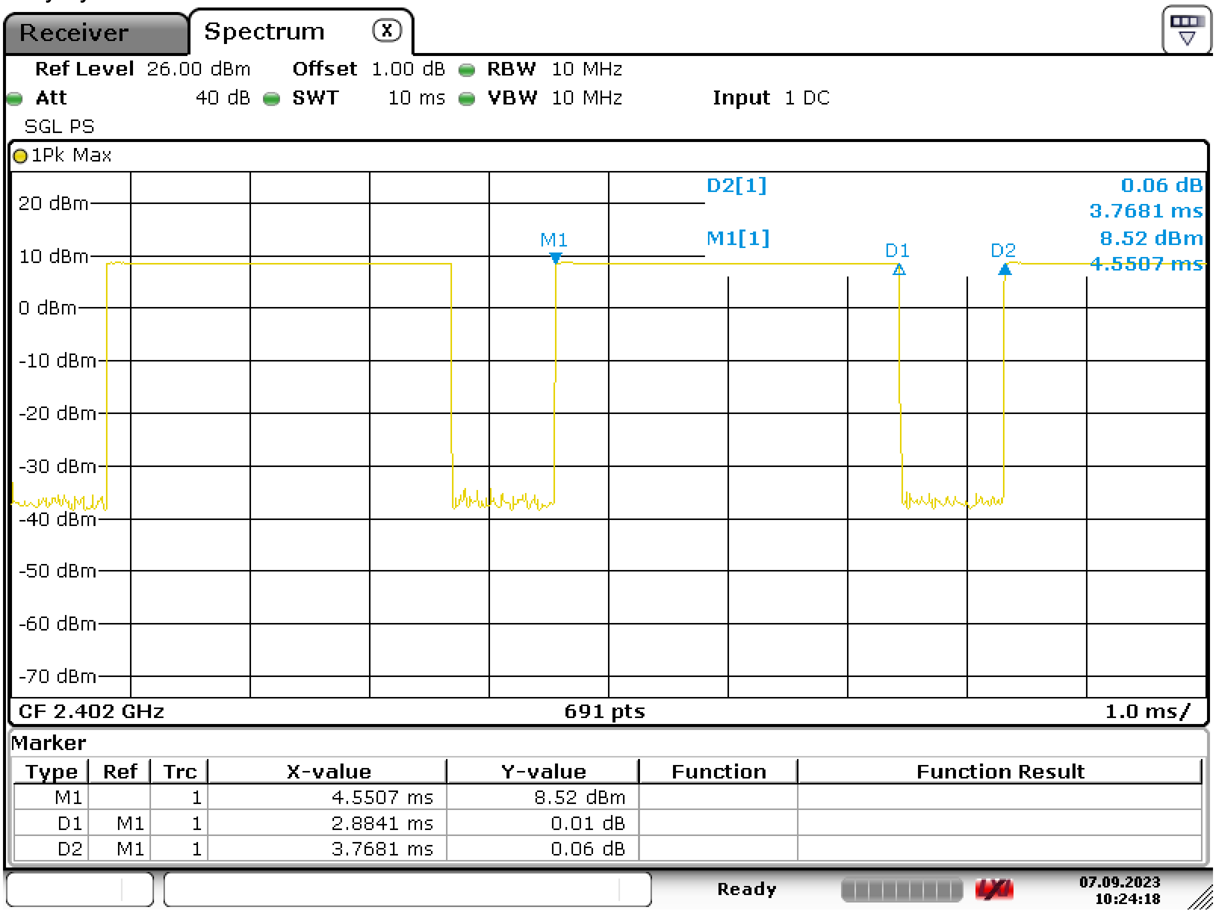
6.3.3 Conducted Power of LTE

Note: The detailed conducted power can be referred to Appendix E.

6.3.4 Conducted Power of WiFi and BT

Note: For each frequency band, testing at higher data rates is not required when the maximum average output power for each of these configurations is less than 0.25dB higher than those measured at the lowest data rate. The detailed conducted power can be referred to Appendix E.

- BT DH5
  Duty cycle=76.54%



6.4 Measurement of SAR Data

Note:

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

2) Per KDB447498 D01, testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is:

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

WiFi 2.4G:

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

WiFi 5G:

1) When the same maximum output power is specified for both bands, begin SAR measurement in U-NII-2A band by applying the OFDM SAR requirements. As the highest reported SAR for a test configuration is ≤ 1.2 W/kg, SAR is not required for U-NII-1 band for that configuration.
2) For Wi-Fi 5G, U-NII-2A (5250-5350 MHz) and U-NII-2C (5470-5725 MHz) bands does not support hotspot function.
3) When the highest reported SAR for the initial test configuration is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR test for the other 802.11 modes are not required.

6.4.1 SAR Result of GSM850

GSM850 SAR Test Record										
Test position	**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 1-g (W/kg)**	**Liquid Temp.(℃)**
Body Test data Sensor on (Separate 0mm) DSI 2										
Back side	GPRS 4TS	190/836.6	1:2.075	0.345	-0.11	19.09	20.00	1.233	**0.425**	22.4
Top side	GPRS 4TS	190/836.6	1:2.075	0.185	0.08	19.09	20.00	1.233	0.228	22.4
Body Test data Sensor off DSI 1										
Back side - 24mm	GPRS 4TS	190/836.6	1:2.075	0.331	-0.13	29.42	30.50	1.282	0.424	22.4
Left side - 0mm	GPRS 4TS	190/836.6	1:2.075	0.265	0.02	29.42	30.50	1.282	0.340	22.4
Top side - 24mm	GPRS 4TS	190/836.6	1:2.075	0.291	0.04	29.42	30.50	1.282	0.373	22.4
Right side - 0mm	GPRS 4TS	190/836.6	1:2.075	0.186	-0.07	29.42	30.50	1.282	0.239	22.4
Bottom side - 0mm	GPRS 4TS	190/836.6	1:2.075	0.064	-0.02	29.42	30.50	1.282	0.082	22.4

Table 10：SAR of GSM850 for Body.

6.4.2 SAR Result of GSM1900

GSM1900 SAR Test Record										
Test position	**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 1-g (W/kg)**	**Liquid Temp.(℃)**
Body Test data Sensor on (Separate 0mm) DSI 2										
Back side	GPRS 4TS	661/1880	1:2.075	0.301	0.07	12.91	14.00	1.285	0.387	22.5
Top side	GPRS 4TS	661/1880	1:2.075	0.103	0.07	12.91	14.00	1.285	0.132	22.5
Body Test data Sensor off DSI 1										
Back side - 24mm	GPRS 4TS	661/1880	1:2.075	0.213	0.07	26.12	27.50	1.374	0.293	22.5
Left side - 0mm	GPRS 4TS	661/1880	1:2.075	0.608	0.04	26.12	27.50	1.374	0.835	22.5
Left side - 0mm	GPRS 4TS	512/1850.2	1:2.075	0.500	-0.09	25.88	27.50	1.452	0.726	22.5
Left side - 0mm	GPRS 4TS	810/1909.8	1:2.075	0.835	-0.04	26.35	27.50	1.303	**1.088**	22.5
Left side - 0mm Repeat	GPRS 4TS	810/1909.8	1:2.075	0.804	0.02	26.35	27.50	1.303	1.048	22.5
Left side - 0mm SKU4	GPRS 4TS	810/1909.8	1:2.075	0.558	-0.17	26.35	27.50	1.303	0.727	22.5
Left side - 0mm SKU5	GPRS 4TS	810/1909.8	1:2.075	0.557	0.03	26.35	27.50	1.303	0.726	22.5
Left side - 0mm SKU7	GPRS 4TS	810/1909.8	1:2.075	0.610	0.04	26.35	27.50	1.303	0.795	22.5
Top side - 24mm	GPRS 4TS	661/1880	1:2.075	0.241	0.12	26.12	27.50	1.374	0.331	22.5

Test Position	**Channel/ Frequency (MHz)**	**Measured SAR (1g)**	**1st Repeated SAR (1g)**	**Ratio**	**2nd Repeated SAR (1g)**	**3rd Repeated SAR (1g)**
Left side 0mm	810/1909.8	0.835	0.804	1.039	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 preformed 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 preformed 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						
5) 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. The repeated measurement results must be clearly identified in the SAR report.						

Table 11：SAR of GSM1900 for Body.

6.4.3 SAR Result of WCDMA Band II

WBII SAR Test Record										
Test position	**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 1-g (W/kg)**	**Liquid Temp.(℃)**
Body Test data Sensor on (Separate 0mm) DSI 2										
Back side	RMC	9400/1880	1:1	0.374	0.01	8.64	9.00	1.086	0.406	22.5
Top side	RMC	9400/1880	1:1	0.138	0.07	8.64	9.00	1.086	0.150	22.5
Body Test data Sensor off DSI 1										
Back side - 24mm	RMC	9400/1880	1:1	0.405	0.02	24.30	24.50	1.047	0.424	22.5
Top side - 24mm	RMC	9400/1880	1:1	0.537	-0.07	24.30	24.50	1.047	**0.562**	22.5

Table 12：SAR of WCDMA Band II for Body.

6.4.4 SAR Result of WCDMA Band IV

WBIV SAR Test Record										
Test position	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 1-g (W/kg)	Liquid Temp.(℃)
Body Test data Sensor on (Separate 0mm) DSI 2										
Back side	RMC	1412/1732.4	1:1	0.318	0.09	10.53	11.50	1.250	0.398	22.2
Top side	RMC	1412/1732.4	1:1	0.231	0.01	10.53	11.50	1.250	0.289	22.2
Body Test data Sensor off DSI 1										
Back side - 24mm	RMC	1412/1732.4	1:1	0.246	0.10	24.43	25.50	1.279	0.315	22.2
Left side - 0mm	RMC	1412/1732.4	1:1	0.540	0.04	24.43	25.50	1.279	**0.691**	22.2
Top side - 24mm	RMC	1412/1732.4	1:1	0.278	0.06	24.43	25.50	1.279	0.356	22.2

Table 13： SAR of WCDMA Band IV for Body.

SGS-CSTC Standards Technical Services (Xi'an) Co., Ltd. Wireless Laboratory
1/F, Unit D, Building 1, Kanghong Orange Science Park, No.137, Keyuan 3rd Road, Fengdong New Town, Xi'an, Shaanxi, China 710086 t (86–29) 6282 7885 www.sgsgroup.com.cn
中国・西安・沣东新城科源三路137号康鸿橙方科技园1号楼D单元1层 邮编: 710086 t (86–29) 6282 7885 sgs.china@sgs.com

6.4.5 SAR Result of WCDMA Band V

WBV SAR Test Record										
Test position	**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 1-g (W/kg)**	**Liquid Temp.(℃)**
Body Test data Sensor on (Separate 0mm) DSI 2										
Back side	RMC	4182/836.4	1:1	0.301	-0.17	11.83	13.00	1.309	0.394	22.4
Top side	RMC	4182/836.4	1:1	0.148	-0.03	11.83	13.00	1.309	0.194	22.4
Body Test data Sensor off DSI 1										
Back side - 24mm	RMC	4182/836.4	1:1	0.312	-0.03	24.27	25.50	1.327	**0.414**	22.4
Left side - 0mm	RMC	4182/836.4	1:1	0.256	-0.01	24.27	25.50	1.327	0.340	22.4
Top side - 24mm	RMC	4182/836.4	1:1	0.269	0.01	24.27	25.50	1.327	0.357	22.4

Table 14： SAR of WCDMA Band V for Body.

6.4.6 SAR Result of LTE Band 7

LTE Band 7 SAR Test Record											
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 1-g (W/kg)**	**Liquid Temp.(℃)**
Body Test data Sensor on (Separate 0mm 1RB) DSI 2											
Back side	20	QPSK 1_50	20850/2510	1:1	0.374	0.09	17.92	18.50	1.143	**0.427**	21.5
Top side	20	QPSK 1_50	20850/2510	1:1	0.156	0.13	17.92	18.50	1.143	0.178	21.5
Body Test data Sensor on (Separate 0mm 50%RB) DSI 2											
Back side	20	QPSK 50_25	20850/2510	1:1	0.371	0.02	17.90	18.50	1.148	0.426	21.5
Top side	20	QPSK 50_25	20850/2510	1:1	0.147	0.09	17.90	18.50	1.148	0.169	21.5
Body Test data Sensor off (1RB) DSI 1											
Back side - 24mm	20	QPSK 1_50	20850/2510	1:1	0.022	0.08	23.41	24.50	1.285	0.028	21.5
Top side - 24mm	20	QPSK 1_50	20850/2510	1:1	0.013	0.02	23.41	24.50	1.285	0.017	21.5
Body Test data Sensor off (50%RB) DSI 1											
Back side - 24mm	20	QPSK 50_50	20850/2510	1:1	0.018	0.03	22.40	23.50	1.288	0.023	21.5
Top side - 24mm	20	QPSK 50_50	20850/2510	1:1	0.009	-0.01	22.40	23.50	1.288	0.011	21.5

Table 15：SAR of LTE Band 7 for Body.

6.4.7 SAR Result of LTE Band 12

LTE Band 12 SAR Test Record											
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 1-g (W/kg)**	**Liquid Temp.(℃)**
Body Test data Sensor on (Separate 0mm 1RB) DSI 2											
Back side	10	QPSK 1_25	23130/711	1:1	0.332	-0.05	13.15	14.00	1.216	0.404	22.0
Top side	10	QPSK 1_25	23130/711	1:1	0.130	0.02	13.15	14.00	1.216	0.158	22.0
Body Test data Sensor on (Separate 0mm 50%RB) DSI 2											
Back side	10	QPSK 25_25	23060/704	1:1	0.335	-0.08	13.13	14.00	1.222	**0.409**	22.0
Top side	10	QPSK 25_25	23060/704	1:1	0.134	-0.01	13.13	14.00	1.222	0.164	22.0
Body Test data Sensor off (Separate 0mm 1RB) DSI 1											
Back side - 24mm	10	QPSK 1_25	23130/711	1:1	0.223	-0.03	23.01	24.50	1.409	0.314	22.0
Left side - 0mm	10	QPSK 1_25	23130/711	1:1	0.143	0.07	23.01	24.50	1.409	0.202	22.0
Top side - 24mm	10	QPSK 1_25	23130/711	1:1	0.217	0.00	23.01	24.50	1.409	0.306	22.0
Body Test data Sensor off (Separate 0mm 50%RB) DSI 1											
Back side - 24mm	10	QPSK 25_25	23060/704	1:1	0.177	-0.12	22.05	23.50	1.396	0.247	22.0
Left side - 0mm	10	QPSK 25_25	23060/704	1:1	0.117	0.04	22.05	23.50	1.396	0.163	22.0
Top side - 24mm	10	QPSK 25_25	23060/704	1:1	0.169	0.00	22.05	23.50	1.396	0.236	22.0

Table 16： SAR of LTE Band 12 for Body.

6.4.1 SAR Result of LTE Band 13

LTE Band 13 SAR Test Record											
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 1-g (W/kg)**	**Liquid Temp.(℃)**
Body Test data Sensor on (Separate 0mm 1RB DSI 2											
Back side	10	QPSK 1_25	23230/782	1:1	0.314	-0.02	13.29	14.50	1.321	**0.415**	22.0
Top side	10	QPSK 1_25	23230/782	1:1	0.191	0.02	13.29	14.50	1.321	0.252	22.0
Body Test data Sensor on (Separate 0mm 50%RB) DSI 2											
Back side	10	QPSK 25_13	23230/782	1:1	0.302	-0.01	13.13	14.50	1.371	0.414	22.0
Top side	10	QPSK 25_13	23230/782	1:1	0.173	0.02	13.13	14.50	1.371	0.237	22.0
Body Test data Sensor off (1RB) DSI 1											
Back side - 24mm	10	QPSK 1_25	23230/782	1:1	0.223	-0.01	22.88	24.50	1.452	0.324	22.0
Left side - 0mm	10	QPSK 1_25	23230/782	1:1	0.149	-0.03	22.88	24.50	1.452	0.216	22.0
Top side - 24mm	10	QPSK 1_25	23230/782	1:1	0.226	-0.02	22.88	24.50	1.452	0.328	22.0
Body Test data Sensor off (50%RB) DSI 1											
Back side - 24mm	10	QPSK 25_13	23230/782	1:1	0.178	-0.12	21.82	23.50	1.472	0.262	22.0
Left side - 0mm	10	QPSK 25_13	23230/782	1:1	0.118	-0.04	21.82	23.50	1.472	0.174	22.0
Top side - 24mm	10	QPSK 25_13	23230/782	1:1	0.180	0.02	21.82	23.50	1.472	0.265	22.0

Table 17： SAR of LTE Band 13 for Body.

6.4.2 SAR Result of LTE Band 14

LTE Band 14 SAR Test Record											
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 1-g (W/kg)**	**Liquid Temp.(℃)**
Body Test data Sensor on (Separate 0mm 1RB DSI 2											
Back side	10	QPSK 1_49	23330/793	1:1	0.301	-0.04	13.12	14.50	1.374	0.414	22.0
Top side	10	QPSK 1_49	23230/782	1:1	0.187	0.05	13.12	14.50	1.374	0.257	22.0
Body Test data Sensor on (Separate 0mm 50%RB) DSI 2											
Back side	10	QPSK 25_13	23330/793	1:1	0.309	-0.01	13.10	14.50	1.380	**0.427**	22.0
Top side	10	QPSK 25_13	23330/793	1:1	0.191	0.01	13.10	14.50	1.380	0.264	22.0
Body Test data Sensor off (1RB) DSI 1											
Back side - 24mm	10	QPSK 1_49	23330/793	1:1	0.206	-0.13	22.70	24.50	1.514	0.312	22.0
Left side - 0mm	10	QPSK 1_49	23330/793	1:1	0.156	-0.09	22.70	24.50	1.514	0.236	22.0
Top side - 24mm	10	QPSK 1_49	23330/793	1:1	0.194	0.05	22.70	24.50	1.514	0.294	22.0
Body Test data Sensor off (50%RB) DSI 1											
Back side - 24mm	10	QPSK 25_13	23330/793	1:1	0.171	-0.14	21.80	23.50	1.479	0.253	22.0
Left side - 0mm	10	QPSK 25_13	23330/793	1:1	0.126	0.01	21.80	23.50	1.479	0.186	22.0
Top side - 24mm	10	QPSK 25_13	23330/793	1:1	0.164	0.04	21.80	23.50	1.479	0.243	22.0

Table 18： SAR of LTE Band 14 for Body.

6.4.3 SAR Result of LTE Band 25

LTE Band 25 SAR Test Record											
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 1-g (W/kg)**	**Liquid Temp.(℃)**
Body Test data Sensor on (Separate 0mm 1RB) DSI 2											
Back side	20	QPSK 1_50	26590/1905	1:1	0.353	0.02	8.28	9.00	1.180	**0.417**	22.5
Top side	20	QPSK 1_50	26590/1905	1:1	0.125	0.01	8.28	9.00	1.180	0.148	22.5
Body Test data Sensor on (Separate 0mm 50%RB) DSI 2											
Back side	20	QPSK 50_50	26590/1905	1:1	0.320	0.03	8.01	9.00	1.256	0.402	22.5
Top side	20	QPSK 50_50	26590/1905	1:1	0.119	0.19	8.01	9.00	1.256	0.149	22.5
Body Test data Sensor off (1RB) DSI 1											
Back side - 24mm	20	QPSK 1_50	26590/1905	1:1	0.288	0.03	23.22	24.00	1.197	0.345	22.5
Top side - 24mm	20	QPSK 1_50	26590/1905	1:1	0.335	-0.15	23.22	24.00	1.197	0.401	22.5
Body Test data Sensor off (50%RB) DSI 1											
Back side - 24mm	20	QPSK 50_25	26590/1905	1:1	0.234	0.03	22.34	23.00	1.164	0.272	22.5
Top side - 24mm	20	QPSK 50_25	26590/1905	1:1	0.288	-0.14	22.34	23.00	1.164	0.335	22.5

Table 19：SAR of LTE Band 25 for Body.

6.4.4 SAR Result of LTE Band 26

LTE Band 26 SAR Test Record											
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 1-g (W/kg)**	**Liquid Temp.(℃)**
Body Test data Sensor on (Separate 0mm 1RB) DSI 2											
Back side	15	QPSK 1_74	26865/831.5	1:1	0.298	-0.09	12.33	13.50	1.309	0.390	22.4
Top side	15	QPSK 1_74	26865/831.5	1:1	0.145	0.03	12.33	13.50	1.309	0.190	22.4
Body Test data Sensor on (Separate 0mm 50%RB) DSI 2											
Back side	15	QPSK 36_18	26965/841.5	1:1	0.308	-0.09	12.37	13.50	1.297	**0.400**	22.4
Top side	15	QPSK 36_18	26965/841.5	1:1	0.151	0.12	12.37	13.50	1.297	0.196	22.4
Body Test data Sensor off (1RB) DSI 1											
Back side - 24mm	15	QPSK 1_74	26865/831.5	1:1	0.217	-0.12	22.91	24.50	1.442	0.313	22.4
Left side - 0mm	15	QPSK 1_74	26865/831.5	1:1	0.178	0.04	22.91	24.50	1.442	0.257	22.4
Top side - 24mm	15	QPSK 1_74	26865/831.5	1:1	0.201	0.01	22.91	24.50	1.442	0.290	22.4
Body Test data Sensor off (50%RB) DSI 1											
Back side - 24mm	15	QPSK 36_18	26865/831.5	1:1	0.178	-0.10	21.94	23.50	1.432	0.255	22.4
Left side - 0mm	15	QPSK 36_18	26865/831.5	1:1	0.139	-0.07	21.94	23.50	1.432	0.199	22.4
Top side - 24mm	15	QPSK 36_18	26865/831.5	1:1	0.163	-0.01	21.94	23.50	1.432	0.233	22.4

Table 20： SAR of LTE Band 26 for Body.

6.4.5 SAR Result of LTE Band 30

LTE Band 30 SAR Test Record											
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 1-g (W/kg)**	**Liquid Temp.(℃)**
Body Test data Sensor on (Separate 0mm 1RB) DSI 2											
Back side	10	QPSK 1_25	27710/2310	1:1	0.319	-0.14	12.76	13.00	1.057	**0.337**	21.5
Top side	10	QPSK 1_25	27710/2310	1:1	0.077	0.02	12.76	13.00	1.057	0.081	21.5
Body Test data Sensor on (Separate 0mm 50%RB) DSI 2											
Back side	10	QPSK 25_0	27710/2310	1:1	0.314	-0.10	12.85	13.00	1.035	0.325	21.5
Top side	10	QPSK 25_0	27710/2310	1:1	0.075	0.03	12.85	13.00	1.035	0.077	21.5
Body Test data Sensor off (1RB) DSI 1											
Back side - 24mm	10	QPSK 1_0	27710/2310	1:1	0.098	0.03	23.75	25.00	1.334	0.131	21.5
Top side - 24mm	10	QPSK 1_0	27710/2310	1:1	0.038	-0.09	23.75	25.00	1.334	0.051	21.5
Body Test data Sensor off (50%RB) DSI 1											
Back side - 24mm	10	QPSK 25_0	27710/2310	1:1	0.077	-0.02	23.58	24.00	1.102	0.085	21.5
Top side - 24mm	10	QPSK 25_0	27710/2310	1:1	0.031	0.04	23.58	24.00	1.102	0.034	21.5

Table 21：SAR of LTE Band 30 for Body.

6.4.6 SAR Result of LTE Band 41

LTE Band 41 SAR Test Record											
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 1-g (W/kg)**	**Liquid Temp.(℃)**
Body Test data Sensor on (Separate 0mm 1RB) DSI 2											
Back side	20	QPSK 1_50	39750/2506	1:1.58	0.260	0.15	18.99	19.50	1.125	0.292	21.5
Top side	20	QPSK 1_50	39750/2506	1:1.58	0.102	0.06	18.99	19.50	1.125	0.115	21.5
Back side-HPUE	20	QPSK 1_50	39750/2506	1:1.58	0.350	0.08	21.90	22.00	1.023	**0.358**	21.5
Body Test data Sensor on (Separate 0mm 50%RB) DSI 2											
Back side	20	QPSK 50_25	39750/2506	1:1.58	0.259	0.14	18.99	19.50	1.125	0.291	21.5
Top side	20	QPSK 50_25	39750/2506	1:1.58	0.099	0.04	18.99	19.50	1.125	0.111	21.5
Body Test data Sensor off (1RB) DSI 1											
Back side - 24mm	20	QPSK 1_50	39750/2506	1:1.58	0.012	0.05	22.88	23.50	1.153	0.014	21.5
Left side - 0mm	20	QPSK 1_50	39750/2506	1:1.58	0.020	0.02	22.88	23.50	1.153	0.023	21.5
Left side - 0mm HPUE	20	QPSK 1_50	39750/2506	1:1.58	0.031	0.03	25.71	26.00	1.069	0.033	21.5
Top side - 24mm	20	QPSK 1_50	39750/2506	1:1.58	0.007	0.04	22.88	23.50	1.153	0.008	21.5
Body Test data Sensor off (50%RB) DSI 1											
Back side - 24mm	20	QPSK 50_25	39750/2506	1:1.58	0.009	-0.09	21.83	22.50	1.167	0.010	21.5
Left side - 0mm	20	QPSK 50_25	39750/2506	1:1.58	0.015	0.09	21.83	22.50	1.167	0.018	21.5
Top side - 24mm	20	QPSK 50_25	39750/2506	1:1.58	0.004	-0.06	21.83	22.50	1.167	0.005	21.5

Table 22：SAR of LTE Band 41 for Body.

6.4.7 SAR Result of LTE Band 66

LTE Band 66 SAR Test Record											
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 1-g (W/kg)**	**Liquid Temp.(℃)**
Body Test data Sensor on (Separate 0mm 1RB) DSI 2											
Back side	20	QPSK 1_50	132072/1720	1:1	0.286	0.09	11.21	12.00	1.199	0.343	22.2
Top side	20	QPSK 1_50	132072/1720	1:1	0.161	0.03	11.21	12.00	1.199	0.193	22.2
Body Test data Sensor on (Separate 0mm 50%RB) DSI 2											
Back side	20	QPSK 50_25	132072/1720	1:1	0.287	0.04	11.14	12.00	1.219	**0.350**	22.2
Top side	20	QPSK 50_25	132072/1720	1:1	0.158	0.06	11.14	12.00	1.219	0.193	22.2
Body Test data Sensor off (1RB) DSI 1											
Back side - 24mm	20	QPSK 1_50	132072/1720	1:1	0.152	0.08	22.78	24.00	1.324	0.201	22.2
Top side - 24mm	20	QPSK 1_50	132072/1720	1:1	0.159	-0.03	22.78	24.00	1.324	0.211	22.2
Body Test data Sensor off (50%RB) DSI 1											
Back side - 24mm	20	QPSK 50_25	132072/1720	1:1	0.119	0.08	21.73	23.00	1.340	0.159	22.2
Top side - 24mm	20	QPSK 50_25	132072/1720	1:1	0.124	0.16	21.73	23.00	1.340	0.166	22.2

Table 23：SAR of LTE Band 66 for Body.

6.4.8 SAR Result of LTE Band 71

LTE Band 71 SAR Test Record											
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 1-g (W/kg)**	**Liquid Temp.(℃)**
Body Test data Sensor on (Separate 0mm 1RB) DSI 2											
Back side	20	QPSK 1_50	133222/673	1:1	0.392	-0.09	17.60	18.00	1.096	**0.430**	22.2
Top side	20	QPSK 1_50	133222/673	1:1	0.174	-0.08	17.60	18.00	1.096	0.191	22.2
Body Test data Sensor on (Separate 0mm 50%RB) DSI 2											
Back side	20	QPSK 50_25	133372/688	1:1	0.377	-0.09	17.45	18.00	1.135	0.428	22.2
Top side	20	QPSK 50_25	133372/688	1:1	0.174	-0.06	17.45	18.00	1.135	0.197	22.2
Body Test data Sensor off (1RB) DSI 1											
Back side - 24mm	20	QPSK 1_50	133222/673	1:1	0.320	-0.04	23.26	24.00	1.186	0.379	22.2
Top side - 24mm	20	QPSK 1_50	133222/673	1:1	0.294	0.07	23.26	24.00	1.186	0.349	22.2
Body Test data Sensor off (50%RB) DSI 1											
Back side - 24mm	20	QPSK 50_25	133222/673	1:1	0.254	-0.18	22.22	23.00	1.197	0.304	22.2
Top side - 24mm	20	QPSK 50_25	133222/673	1:1	0.237	0.02	22.22	23.00	1.197	0.284	22.2

Table 24：SAR of LTE Band 71 for Body.

6.4.9 SAR Result of WIFI 2.4G

Wi-Fi 2.4G SAR Test Record											
Test position	Test mode	Test ch./Freq.	Duty Cycle	Duty Cycle Scaled factor	SAR (W/kg) 1-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Liquid Temp.(℃)
Body Test data Sensor on (Separate 0mm)											
Back side	802.11b	6/2437	99.31%	1.007	0.838	0.13	9.61	10.50	1.227	**1.036**	21.9
Back side Repeat	802.11b	6/2437	99.31%	1.007	0.761	0.09	9.61	10.50	1.227	0.941	21.9
Back side	802.11b	1/2412	99.31%	1.007	0.634	0.05	9.56	10.50	1.242	0.793	21.9
Body Test data Sensor off											
Back side - 13mm	802.11b	6/2437	99.31%	1.007	0.280	0.05	17.16	18.00	1.213	0.342	21.9
Left side - 0mm	802.11b	6/2437	99.31%	1.007	0.124	0.02	17.16	18.00	1.213	0.152	21.9
Top side - 0mm	802.11b	6/2437	99.31%	1.007	0.187	0.07	17.16	18.00	1.213	0.228	21.9

Test Position	Channel/ Frequency	Measured SAR (1g)	1st Repeated	Ratio	2nd Repeated	3rd Repeated
	(MHz)		SAR (1g)		SAR (1g)	SAR (1g)
Back side	6/2437	0.838	0.761	1.101	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 preformed 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 preformed 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						
5) 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. The repeated measurement results must be clearly identified in the SAR report.						

Table 25：SAR of WIFI 2.4G for Body.

Note:

1)Per KDB 248227 D01, for Body SAR test of WiFi 2.4G, SAR is measured for 2.4 GHz 802.11b DSSS using the initial test position procedure. As the 802.11b highest reported SAR is smaller than 1.2 W/kg , and the tune-up of the other 802.11 modes are not higher than 802.11b,therefore the adjusted SAR is ≤ 1.2 W/kg for other 802.11 modes, SAR test for the other 802.11 modes are not required.

6.4.10 SAR Result of WIFI 5G

Wi-Fi 5G SAR Test Record											
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 1-g (W/kg)**	**Liquid Temp.(℃)**
Body Test data Sensor on of U-NII-2A (Separate 0mm)											
Back side	802.11a	60/5300	94.06%	1.063	0.594	-0.09	6.89	7.50	1.151	0.727	21.3
Body Test data Sensor on of U-NII-2C (Separate 0mm)											
Back side	802.11a	108/5540	94.06%	1.063	0.475	0.00	5.28	6.00	1.180	0.596	21.3
Body Test data Sensor on of U-NII-3 (Separate 0mm)											
Back side	802.11a	161/5805	94.06%	1.063	0.606	0.00	5.45	6.00	1.135	**0.731**	21.3
Body Test data Sensor off of U-NII-2A (Separate 0mm)											
Back side - 13mm	802.11a	60/5300	94.06%	1.063	0.442	-0.05	15.32	16.00	1.169	0.550	21.3
Left side - 0mm	802.11a	60/5300	94.06%	1.063	0.080	0.13	15.32	16.00	1.169	0.099	21.3
Top side - 0mm	802.11a	60/5300	94.06%	1.063	0.211	0.08	15.32	16.00	1.169	0.262	21.3
Body Test data Sensorr off of U-NII-2C (Separate 0mm)											
Back side - 13mm	802.11a	108/5540	94.06%	1.063	0.440	0.09	15.34	16.00	1.164	0.545	21.3
Left side - 0mm	802.11a	108/5540	94.06%	1.063	0.092	0.05	15.34	16.00	1.164	0.114	21.3
Top side - 0mm	802.11a	108/5540	94.06%	1.063	0.219	-0.19	15.34	16.00	1.164	0.271	21.3
Body Test data Sensor off of U-NII-3 (Separate 0mm)											
Back side - 13mm	802.11a	161/5805	94.06%	1.063	0.412	0.07	15.42	16.00	1.143	0.501	21.3
Left side - 0mm	802.11a	161/5805	94.06%	1.063	0.037	0.04	15.42	16.00	1.143	0.045	21.3
Top side - 0mm	802.11a	161/5805	94.06%	1.063	0.213	0.03	15.42	16.00	1.143	0.259	21.3

Table 26：SAR of WIFI 5G for Body.

Note:

1) When the same maximum output power is specified for both bands, begin SAR measurement in U-NII-2A band by applying the OFDM SAR requirements. As the highest reported SAR for a test configuration is ≤ 1.2 W/kg, SAR is not required for U-NII-1 band for that configuration;

2) Per KDB248227D01,as the highest reported SAR for the initial test configuration is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR test for the other 802.11 modes are not required.

6.4.11 SAR Result of BT

Bluetooth SAR Test Record											
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 1-g (W/kg)**	**Liquid Temp.(℃)**
Body Test data (Separate 0mm)											
Back side	DH5	78/2480	76.54%	1.307	0.300	0.10	10.29	10.50	1.050	**0.411**	21.9
Left side	DH5	78/2480	76.54%	1.307	0.007	0.12	10.29	10.50	1.050	0.009	21.9
Top side	DH5	78/2480	76.54%	1.307	0.012	0.09	10.29	10.50	1.050	0.016	21.9

Table 27： SAR of BT for Body.

6.5 LTE Band 41 Power Class 2 and Power Class 3 Linearity

This device supports Power Class 2 and Power Class 3 operations for LTE Band 41. The highest available duty cycle for Power Class 2 operations is 43.3 % using UL-DL configuration 1. Per May 2017 TCB Workshop Notes based on the device behavior, all SAR tests were performed using Power Class 3. SAR with Power Class 2 at the highest power and available duty factor was additionally performed for the Power Class 3 configuration with the highest SAR for each exposure condition. The linearity between the Power Class 2 and Power Class 3 SAR results and the respective frame averaged powers was calculated to determine that the results were linear.

Per May 2017 TCB Workshop, no additional SAR measurements were required since the linearity between power classes was < 10% and all reported SAR values were < 1.4 W/kg for 1g and < 3.5 W/kg for 10g.

LTE Band 41 SAR testing with power class 2 at the highest power and available duty factor was additionally performed for the power class 3 configuration with the highest SAR for each exposure condition.

LTE Band 41 Head Linearity Data:

	Power Class 3	Power Class 2
Tune-up(dBm)	19.50	22.00
Measured power(dBm)	18.99	21.90
Measured SAR(W/kg)	0.292	0.358
Measured power(mw)	79.25	154.88
Duty Cycle	63.3%	43.3%
Frame Average power(mw)	50.17	67.06
% deviation from expected linearity		-8.29%

LTE Band 41 Body Linearity Data

	Power Class 3	Power Class 2
Tune-up(dBm)	23.50	26.00
Measured power(dBm)	22.88	25.71
Measured SAR(W/kg)	0.023	0.033
Measured power(mw)	194.09	372.39
Duty Cycle	63.3%	43.3%
Frame Average power(mw)	122.86	161.25
% deviation from expected linearity		9.32%

6.6 Multiple Transmitter Evaluation

6.6.1 Simultaneous SAR SAR test evaluation

No.	Simultaneous Tx Combination	Body
1	WWAN + WLAN 2.4GHz	Yes
2	WWAN + WLAN 5GHz	Yes
3	WWAN + BT	Yes
4	WWAN + WLAN 5GHz+ BT	Yes

6.6.2 Simultaneous Transmission SAR Summation Scenario

Body 0mm:

Test position		SARmax (W/kg)				Summed SAR			
		Main Ant0	WiFi 2.4G Ant6(chain0)	WiFi 5G Ant6(chain0)	BT				
		1	2	3	4	1+2	1+3	1+4	1+3+4
GSM 850	Back side	0.43	1.04	0.73	0.41	1.46	1.16	0.84	1.57
	Left side	0.37	0.15	0.11	0.01	0.53	0.49	0.38	0.50
	Right side	0.24	0.40	0.40	0.40	0.64	0.64	0.64	1.04
	Top side	0.37	0.23	0.27	0.02	0.60	0.64	0.39	0.66
	Bottom side	0.08	0.40	0.40	0.40	0.48	0.48	0.48	0.88
GSM 1900	Back side	0.39	1.04	0.73	0.41	1.42	1.12	0.80	1.53
	Left side	1.09	0.15	0.11	0.01	1.24	1.20	1.10	1.21
	Right side	0.40	0.40	0.40	0.40	0.80	0.80	0.80	1.20
	Top side	0.33	0.23	0.27	0.02	0.56	0.60	0.35	0.62
	Bottom side	0.40	0.40	0.40	0.40	0.80	0.80	0.80	1.20
WCDMA Band II	Back side	0.42	1.04	0.73	0.41	1.46	1.16	0.84	1.57
	Left side	0.40	0.15	0.11	0.01	0.55	0.51	0.41	0.52
	Right side	0.40	0.40	0.40	0.40	0.80	0.80	0.80	1.20
	Top side	0.56	0.23	0.27	0.02	0.79	0.83	0.58	0.85
	Bottom side	0.40	0.40	0.40	0.40	0.80	0.80	0.80	1.20
WCDMA Band IV	Back side	0.40	1.04	0.73	0.41	1.43	1.13	0.81	1.54
	Left side	0.69	0.15	0.11	0.01	0.84	0.81	0.70	0.81
	Right side	0.40	0.40	0.40	0.40	0.80	0.80	0.80	1.20
	Top side	0.36	0.23	0.27	0.02	0.58	0.63	0.37	0.64
	Bottom side	0.40	0.40	0.40	0.40	0.80	0.80	0.80	1.20
WCDMA Band V	Back side	0.41	1.04	0.73	0.41	1.45	1.15	0.83	1.56
	Left side	0.34	0.15	0.11	0.01	0.49	0.45	0.35	0.46
	Right side	0.40	0.40	0.40	0.40	0.80	0.80	0.80	1.20
	Top side	0.36	0.23	0.27	0.02	0.59	0.63	0.37	0.64
	Bottom side	0.40	0.40	0.40	0.40	0.80	0.80	0.80	1.20
LTE Band 7	Back side	0.43	1.04	0.73	0.41	1.46	1.16	0.84	1.57
	Left side	0.40	0.15	0.11	0.01	0.55	0.51	0.41	0.52
	Right side	0.40	0.40	0.40	0.40	0.80	0.80	0.80	1.20
	Top side	0.18	0.23	0.27	0.02	0.41	0.45	0.19	0.47
	Bottom side	0.40	0.40	0.40	0.40	0.80	0.80	0.80	1.20
LTE Band 12	Back side	0.41	1.04	0.73	0.41	1.45	1.14	0.82	1.55
	Left side	0.20	0.15	0.11	0.01	0.35	0.32	0.21	0.33
	Right side	0.40	0.40	0.40	0.40	0.80	0.80	0.80	1.20
	Top side	0.31	0.23	0.27	0.02	0.53	0.58	0.32	0.59
	Bottom side	0.40	0.40	0.40	0.40	0.80	0.80	0.80	1.20
LTE Band 13	Back side	0.42	1.04	0.73	0.41	1.45	1.15	0.83	1.56
	Left side	0.22	0.15	0.11	0.01	0.37	0.33	0.23	0.34
	Right side	0.40	0.40	0.40	0.40	0.80	0.80	0.80	1.20
	Top side	0.33	0.23	0.27	0.02	0.56	0.60	0.34	0.62
	Bottom side	0.40	0.40	0.40	0.40	0.80	0.80	0.80	1.20
LTE Band 14	Back side	0.43	1.04	0.73	0.41	1.46	1.16	0.84	1.57
	Left side	0.19	0.15	0.11	0.01	0.34	0.30	0.20	0.31
	Right side	0.40	0.40	0.40	0.40	0.80	0.80	0.80	1.20
	Top side	0.29	0.23	0.27	0.02	0.52	0.57	0.31	0.58
	Bottom side	0.40	0.40	0.40	0.40	0.80	0.80	0.80	1.20
LTE Band 25	Back side	0.42	1.04	0.73	0.41	1.45	1.15	0.83	1.56
	Left side	0.40	0.15	0.11	0.01	0.55	0.51	0.41	0.52
	Right side	0.40	0.40	0.40	0.40	0.80	0.80	0.80	1.20
	Top side	0.40	0.23	0.27	0.02	0.63	0.67	0.42	0.69

1/F, Unit D, Building 1, Kanghong Orange Science Park, No.137, Keyuan 3rd Road, Fengdong New Town, Xi'an, Shaanxi, China 710086 t (86–29) 6282 7885 www.sgsgroup.com.cn
中国・西安・沣东新城科源三路137号康鸿橙方科技园1号楼D单元1层 邮编: 710086 t (86–29) 6282 7885 sgs.china@sgs.com

	Bottom side	0.40	0.40	0.40	0.40	0.80	0.80	0.80	1.20
LTE Band 26	Back side	0.40	1.04	0.73	0.41	1.44	1.13	0.81	1.54
	Left side	0.26	0.15	0.11	0.01	0.41	0.37	0.27	0.38
	Right side	0.40	0.40	0.40	0.40	0.80	0.80	0.80	1.20
	Top side	0.29	0.23	0.27	0.02	0.52	0.56	0.31	0.58
	Bottom side	0.40	0.40	0.40	0.40	0.80	0.80	0.80	1.20
LTE Band 30	Back side	0.34	1.04	0.73	0.41	1.37	1.07	0.75	1.48
	Left side	0.00	0.15	0.11	0.01	0.15	0.11	0.01	0.12
	Right side	0.00	0.40	0.40	0.40	0.40	0.40	0.40	0.80
	Top side	0.08	0.23	0.27	0.02	0.31	0.35	0.10	0.37
	Bottom side	0.00	0.40	0.40	0.40	0.40	0.40	0.40	0.80
LTE Band 41	Back side	0.36	1.04	0.73	0.41	1.39	1.09	0.77	1.50
	Left side	0.02	0.15	0.11	0.01	0.18	0.14	0.03	0.15
	Right side	0.00	0.40	0.40	0.40	0.40	0.40	0.40	0.80
	Top side	0.36	0.23	0.27	0.02	0.59	0.63	0.37	0.65
	Bottom side	0.00	0.40	0.40	0.40	0.40	0.40	0.40	0.80
LTE Band 66	Back side	0.35	1.04	0.73	0.41	1.39	1.08	0.76	1.49
	Left side	0.00	0.15	0.11	0.01	0.15	0.11	0.01	0.12
	Right side	0.00	0.40	0.40	0.40	0.40	0.40	0.40	0.80
	Top side	0.21	0.23	0.27	0.02	0.44	0.48	0.23	0.50
	Bottom side	0.00	0.40	0.40	0.40	0.40	0.40	0.40	0.80
LTE Band 71	Back side	0.43	1.04	0.73	0.41	1.47	1.16	0.84	1.57
	Left side	0.40	0.15	0.11	0.01	0.55	0.51	0.41	0.52
	Right side	0.40	0.40	0.40	0.40	0.80	0.80	0.80	1.20
	Top side	0.35	0.23	0.27	0.02	0.58	0.62	0.37	0.64
	Bottom side	0.40	0.40	0.40	0.40	0.80	0.80	0.80	1.20

Note:

1) MAX. ΣSAR_{10g} =Unlicensed SAR_{MAX} +Licensed SAR_{MAX}

SGS-CSTC Standards Technical Services (Xi'an) Co., Ltd. Wireless Laboratory
1/F, Unit D, Building 1, Kanghong Orange Science Park, No.137, Keyuan 3rd Road, Fengdong New Town, Xi'an, Shaanxi, China 710086 t (86–29) 6282 7885 www.sgsgroup.com.cn
中国・西安・沣东新城科源三路137号康鸿橙方科技园1号楼D单元1层 邮编: 710086 t (86–29) 6282 7885 sgs.china@sgs.com

7 Equipment list

Test Platform		SPEAG DASY5 Professional				
Description		SAR Test System (Frequency range 300MHz-6GHz)				
Software Reference		DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)				
Hardware Reference						
Equipment		Manufacturer	Model	Serial Number	Calibration Date	Due date of calibration
☒	E-Field Probe	SPEAG	EX3DV4	3923	2023-02-28	2024-02-27
☒	Twin Phantom	SPEAG	SAM 7	1702	NCR	NCR
☒	DAE	SPEAG	DAE4	1327	2022-11-18	2023-11-17
☒	Validation Kits	SPEAG	D750V3	1214	2022-02-07	2025-02-06
☒	Validation Kits	SPEAG	D835V2	4d256	2023-06-01	2026-05-31
☒	Validation Kits	SPEAG	D1750V2	1038	2021-12-16	2024-12-15
☒	Validation Kits	SPEAG	D1950V3	1218	2023-05-04	2026-05-03
☒	Validation Kits	SPEAG	D2300V2	1124	2022-02-03	2025-02-02
☒	Validation Kits	SPEAG	D2450V2	1038	2023-06-01	2026-05-31
☒	Validation Kits	SPEAG	D2600V2	1187	2022-02-03	2025-02-02
☒	Validation Kits	SPEAG	D5GHzV2	1313	2022-01-25	2025-01-24
☒	Vector Network Analyzer and Vector Reflectometer	SPEAG	DAKS-VNA R140	21460031	2023-03-20	2024-03-19
☒	Dielectric parameter probes	SPEAG	DAKS-3.5	1148	2023-03-20	2024-03-19
☒	Universal Radio Communication Tester	R&S	CMW500	124587	2023-02-16	2024-02-15
☒	Radio Communication Analyze	Anritsu	MT8821C	6201588568	2022-11-07	2023-11-06
☒	RF Bi-Directional Coupler	QIJI	QJOR31015001	6606_SMA-50-1	NCR	NCR
☒	Signal Generator	R&S	SMR20	1001189	2023-08-30	2024-8-29
☒	Radio Communication Analyzer	Anritsu	MT8820C	6200951859	2022-10-26	2023-10-25
☒	Preamplifier	QIJI	YX28982103	20211121063175	NCR	NCR
☒	Power Meter	Agilent	E4419B	GB43318103	2023-05-15	2024-05-14
☒	Power Sensor	Agilent	E9031H	MY41495605	2023-05-15	2024-05-14
☒	Power Sensor	Agilent	E9031A	MY41496508	2023-05-15	2024-05-14
☒	Coaxial low pass filter	Mini Circuits	VLF-3000+	15542	NCR	NCR

☒	Attenuator	Zhengchang Libo	3dB 8G	NA	NCR	NCR
☒	Temperature and humidity meter	MingGao	T809	NA	2023-09-04	2024-09-03

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

8 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.

9 Calibration certificate

Please see the Appendix C

10 Photographs

Please see the Appendix D

Appendix A: Detailed System Check Results

Appendix B: Detailed Test Results

Appendix C: Calibration certificate

Appendix D: Photographs

Appendix E: Conducted RF Output Power

---END---

SGS-CSTC Standards Technical Services (Xi'an) Co., Ltd.
Wireless Laboratory
1/F, Unit D, Building 1, Kanghong Orange Science Park, No.137, Keyuan 3rd Road, Fengdong New Town, Xi'an, Shaanxi, China 710086 t (86–29) 6282 7885 www.sgsgroup.com.cn
中国・西安・沣东新城科源三路137号康鸿橙方科技园1号楼D单元1层 邮编: 710086 t (86–29) 6282 7885 sgs.china@sgs.com