SAR TEST REPORT

For

Shenzhen Haimeilan Technology Co., LTD.

Smart Phone

Test Model: S25 Ultra

Additional Model No.: Please Refer to Page 10

Prepared for	:	Shenzhen Haimeilan Technology Co., LTD.
Address	:	9V777, East 9th Floor, Building 2, SEG Science Park, Huaqiang North Street, Futian District, Shenzhen, 518000 China
Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
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Date of receipt of test sample	:	January 14, 2025
Number of tested samples	:	1
Sample number	:	A241231038-1
Serial number	:	Prototype
Date of Test	:	March 05, 2025 ~ March 16, 2025
Date of Report	:	March 17, 2025

SAR TEST REPORT

Report Reference No. ....:	LCSA01035056E
Date Of Issue ....:	March 17, 2025
Testing Laboratory Name........... :	**Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address .... :	101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China
Testing Location/ Procedure .... :	Full application of Harmonised standards ■ Partial application of Harmonised standards □ Other standard testing method □
Applicant's Name ....:	**Shenzhen Haimeilan Technology Co., LTD.**
Address ....:	9V777, East 9th Floor, Building 2, SEG Science Park, Huaqiang North Street, Futian District, Shenzhen, 518000 China
Test Specification:	
Standard....................................:	FCC 47CFR §2.1093, ANSI/IEEE C95.1-2019, IEEE 1528-2013
Test Report Form No. ....:	TRF-4-E-102 A/0
TRF Originator............................:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF ....:	Dated 2014-09

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Test Item Description. ....:	**Smart Phone**
Trade Mark.................................:	/
Model/Type Reference ....:	S25 Ultra
Ratings.......................................:	DC 3.85V
Result ....:	**Positive**

Compiled by:	**Supervised by:**	**Approved by:**
Jay Zhan	Jack Liu	
Jay Zhan/ File administrators	Jack Liu / Technique principal	Gavin Liang/ Manager

SAR -- TEST REPORT

Test Report No. :	LCSA01035056E	March 17, 2025 Date of issue

EUT....................................	:	Smart Phone
Type/Model	:	S25 Ultra
Applicant..............................	:	**Shenzhen Haimeilan Technology Co., LTD.**
Address.................................	:	9V777, East 9th Floor, Building 2, SEG Science Park, Huaqiang North Street, Futian District, Shenzhen, 518000 China
Telephone.............................	:	/
Fax.......................................	:	/
Manufacturer.......................	:	**Shenzhen Yinma Intelligent Technology Co., Ltd**
Address.................................	:	2nd Floor, Building 2, Donglongxing Science and Technology Park, Dalang Street, Longhua District, Shenzhen, 518000 China
Telephone.............................	:	/
Fax.......................................	:	/
Factory.................................	:	/
Address.................................	:	/
Telephone.............................	:	/
Fax.......................................	:	/

Test Result	**Positive**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Revison History

Revision	Issue Date	Revision Content	Revised By
000	March 17, 2025	Initial Issue	---

TABLE OF CONTENTS

1. TEST STANDARDS AND TEST DESCRIPTION

1.1. Statement of Compliance

The maximum of results of SAR found during testing for S25 Ultra are follows:

<Highest Reported standalone SAR Summary>

Classment Class	Frequency Band	Head (Report SAR1-g (W/kg)	Hotspot/Body-worn (Report SAR1-g (W/kg) (Separation Distance 10mm)
PCE	GSM 850	0.479	0.391
	GSM1900	0.434	0.594
	WCDMA Band II	0.32	0.553
	WCDMA Band V	0.596	0.465
	LTE Band 2	0.328	0.692
	LTE Band 4	0.284	0.786
	LTE Band 5	0.457	0.444
	LTE Band 7	0.333	0.702
DTS	WIFI2.4G	0.466	0.387
	Bluetooth	0.235	0.21
NII	WIFI5.2G	0.32	0.357
	WIFI5.8G	0.269	0.181

Note

1) This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-2019, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2013.

<Highest Reported simultaneous SAR Summary>

Exposure Position	Classment Class	Body (Report SAR1-g (W/kg)	Highest Reported Simultaneous Transmission SAR1-g (W/kg)
Body	PCE	0.786	**1.173**
	DTS	0.387	

1.2. Test Location

Company:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Address:	101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China
Telephone:	(+86)755-82591330
Fax:	(+86)755-82591330
Web:	www.LCS-cert.com
E-mail:	webmaster@LCS-cert.com

1.3. Test Facility

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

Site Description		
SAR Lab.	:	NVLAP Accreditation Code is 600167-0. FCC Designation Number is CN5024. CAB identifier is CN0071. CNAS Registration Number is L4595. Test Firm Registration Number: 254912.

1.4. Test Laboratory Environment

Temperature	Min. = 18°C, Max. = 25 °C
Relative humidity	Min. = 30%, Max. = 70%
Ground system resistance	< 0.5 Ω
Atmospheric pressure:	950-1050mbar
Ambient noise is checked and found very low and in compliance with requirement of standards. Reflection of surrounding objects is minimized and in compliance with requirement of standards.	

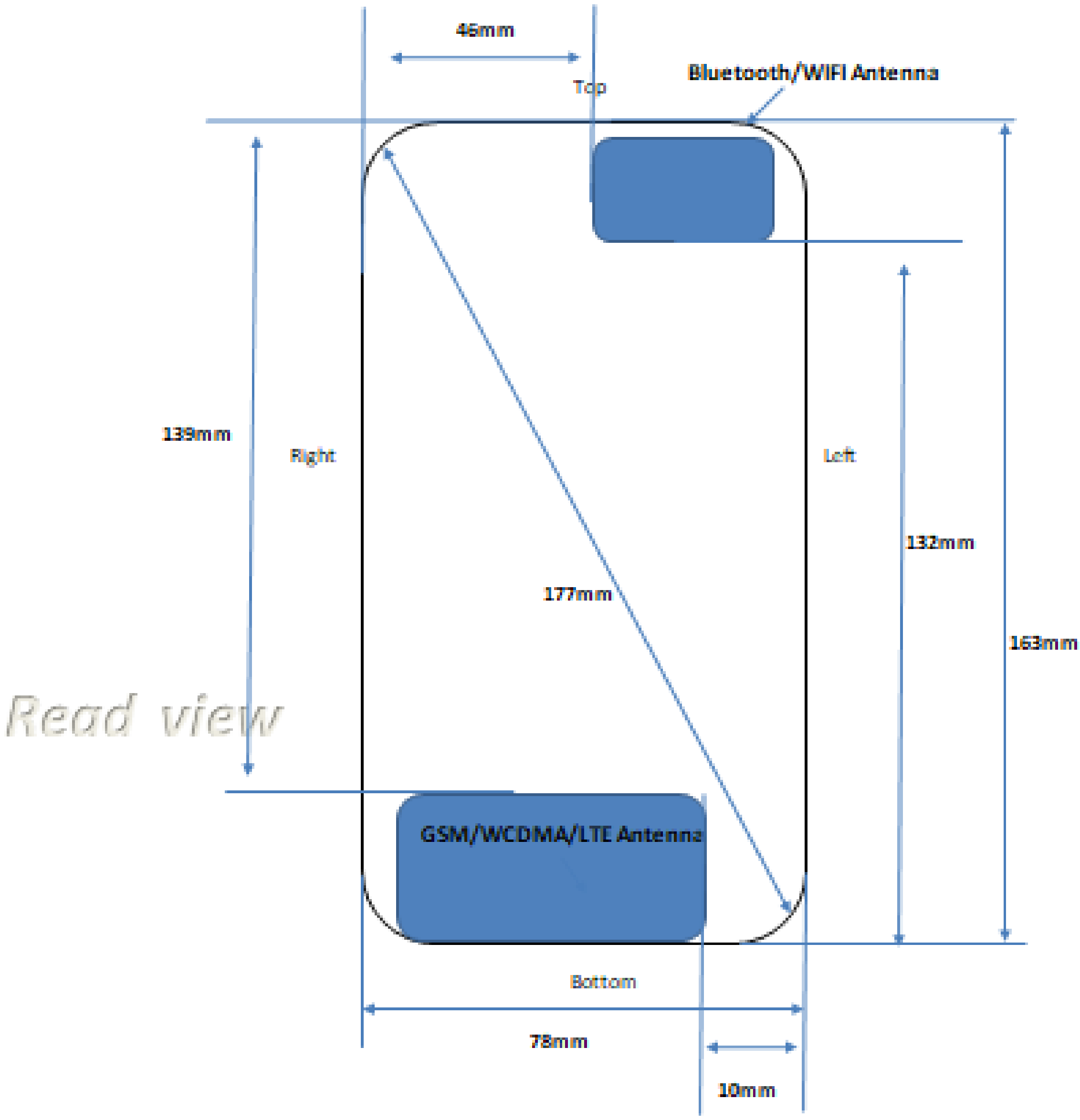
1.5. Product Description

The **Shenzhen Haimeilan Technology Co., LTD.**'s Model: S25 Ultra or the "EUT" as referred to in this report; more general information as follows, for more details, refer to the user's manual of the EUT.

EUT	:	Smart Phone
Test Model	:	S25 Ultra
Additional Model No.	:	S24 Ultra, S23 Ultra, C25 Ultra, C24 Ultra, C23 Ultra, X23 Ultra, X24 Ultra, X25 Ultra, Z23 Ultra, Z24 Ultra, Z25 Ultra, C10 Plus, C30 Plus, G50 Plus, G60 Plus, C73, C7 Ultra, Polaris7 Pro, C3 Luxury, G37 Ultra, M13 Pro, Polaris7, Rise77 Luxury, Opus33 Luxury, Acro77 Luxury, Sirius40 Ultra, H50 Ultra, G3 Luxury, Rise30 Ultra, G7 Ultra, E-on33 Ultra, Vista16 Ultra, I24 Ultra, I25 Ultra, X24, S01, C25, S10, S11, S08, S25 MAX, I15 Ultra, S24 Pro Max
Model Declaration,	:	All model's the function, software and electric circuit are the same, only with a product appearance, color and model named different. Test sample mode: S25 Ultra.
Power Supply	:	DC 3.85V
Hardware Version	:	V1.0
Software Version	:	V1.0
Bluetooth	:	
Frequency Range	:	2402MHz~2480MHz
Channel Number	:	79 channels for Bluetooth V5.0 (DSS) 40 channels for Bluetooth V5.0 (DTS)
Channel Spacing	:	1MHz for Bluetooth V5.0 (DSS)
Modulation Type	:	GFSK, π/4-DQPSK, 8-DPSK for Bluetooth V5.0 (DSS) GFSK for Bluetooth V5.0 (DTS)
Bluetooth Version	:	V5.0
Antenna Description	:	FPC Antenna, 0.72dBi(Max.)
WIFI(2.4G Band)	:	
Frequency Range	:	2412MHz~2462MHz
Channel Spacing	:	5MHz
Channel Number	:	11 Channels for 20MHz bandwidth (2412~2462MHz)
Modulation Type	:	IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK)
Antenna Description	:	FPC Antenna, 0.72dBi(Max.)
5.2G WLAN	:	
Frequency Range	:	5180MHz~5240MHz
Channel Number	:	4 Channels for 20MHz bandwidth(5180MHz~5240MHz)
Modulation Type	:	IEEE 802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11ac: OFDM (256QAM, 64QAM, 16QAM, QPSK, BPSK)
Antenna Description	:	FPC Antenna, 1.2dBi(Max.)
5.8G WLAN	:	
Frequency Range	:	5745MHz~5825MHz
Channel Number	:	5 channels for 20MHz bandwidth(5745MHz~5825MHz)
Modulation Type	:	IEEE 802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11ac: OFDM (256QAM, 64QAM, 16QAM, QPSK, BPSK)

Antenna Description	:	FPC Antenna, 1.2dBi(Max.)
2G	:	
Support Band	:	☒GSM 850 (U.S.-Band) ☒PCS 1900 (U.S.-Band)
Release Version	:	R99
GPRS Class	:	Class 12
EGPRS Class	:	Class 12
Type Of Modulation	:	GMSK for GSM/GPRS; GMSK/8PSK for EGPRS
Antenna Description	:	FPC Antenna 0.56dBi(max.) For GSM 850 0.56dBi(max.) For PCS 1900
3G	:	
Support Band	:	☒WCDMA Band II (U.S.-Band) ☒WCDMA Band V (U.S.-Band)
Release Version	:	R8
Type Of Modulation	:	QPSK
Antenna Description	:	FPC Antenna 0.56dBi(max.) For WCDMA Band II 0.56dBi(max.) For WCDMA Band V
LTE	:	
Support Band	:	☒E-UTRA Band 2(U.S.-Band) ☒E-UTRA Band 4(U.S.-Band) ☒E-UTRA Band 5(U.S.-Band) ☒E-UTRA Band 7(U.S.-Band)
LTE Release Version	:	R12
Type Of Modulation	:	QPSK/16QAM
Antenna Description	:	FPC Antenna 0.56dBi(max.) For E-UTRA Band 2 0.35dBi(max.) For E-UTRA Band 4 -1.39dBi(max.) For E-UTRA Band 5 1.12dBi(max.) For E-UTRA Band 7
Power Class	:	Class 3
Exposure category	:	Uncontrolled Environment General Population

1.6. DUT Antenna Locations



Note:
1) Main Antenna: GSM850/1900, WCDMA Band II/V, LTE Band 2/4/5/7, the Div ant only for Rx.

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

Distance from the antenna to the EUT edge(mm)						
Mode	Front	Back	Left	Right	Top	Bottom
GSM/WCDMA/LTE Antenna	≤5	≤5	10	≤5	139	≤5
Bluetooth/WIFI Antenna	≤5	≤5	≤5	46	≤5	132

EUT Sides for SAR Testing							
Mode	Exposure Condition	Front	Back	Left	Right	Top	Bottom
GSM/WCDMA/LTE Antenna	Body 1g SAR	Yes	Yes	Yes	Yes	No	Yes
WIFI Antenna	Body 1g SAR	Yes	Yes	Yes	No	Yes	No

Table 1： EUT Sides for SAR Testing

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

1.7. Test Specification

Identity	Document Title
FCC 47CFR §2.1093	Radiofrequency Radiation Exposure Evaluation: Portable Devices
ANSI/IEEE C95.1-2019	IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz – 300 GHz.
IEEE 1528-2013	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
KDB 941225 D01	3G SAR Measurement Procedures v03r01
KDB 941225 D05	SAR for LTE Devices v02r05
KDB 941225 D06	Hotspot Mode SAR v02r01
KDB 248227 D01	SAR Guidance for IEEE 802 11 Wi-Fi SAR v02r02
KDB 648474 D04	Handset SAR v01r03
KDB 447498 D01	General RF Exposure Guidance v06
KDB 865664 D01	SAR Measurement 100 MHz to 6 GHz v01r04
KDB 865664 D02	RF Exposure Reporting v01r02
KDB 690783 D01	SAR Listings on Grants v01r03

1.8. 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.)

1.9. Equipment list

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

Hardware Reference

	Equipment	Manufacturer	Model	Serial Number	Calibration Date	Due date of calibration
☒	PC	Lenovo	NA	NA	NA[1]	NA[1]
☒	Twin Phantom	SPEAG	SAM V5.0	1850	NA[1]	NA[1]
☒	ELI Phantom	SPEAG	ELI V6.0	2010	NA[1]	NA[1]
☒	DAE	SPEAG	DAE3	373	2025/2/17	2026/2/16
☒	E-Field Probe	SPEAG	EX3DV4	3805	2025/2/25	2026/2/24
☒	Validation Kits	SPEAG	D835V2	4d124	2023/10/24	2026/10/23
☒	Validation Kits	SPEAG	D1750V2	1035	2023/6/12	2026/6/11
☒	Validation Kits	SPEAG	D1900V2	5d055	2023/10/20	2026/10/19
☒	Validation Kits	SPEAG	D2450V2	808	2023/10/23	2026/10/22
☒	Validation Kits	SPEAG	D2600V2	1071	2023/6/20	2026/6/19
☒	Validation Kits	SPEAG	D5GHzV2	1046	2023/10/23	2026/10/22
☒	Agilent Network Analyzer	Agilent	8753E	SU38432944	2024/6/6	2025/6/5
☒	Dielectric Probe Kit	SPEAG	DAK3.5	1425	2024/6/6	2025/6/5
☒	Universal Radio Communication Tester	R&S	CMW500	42115	2024/10/08	2025/10/07
☒	Directional Coupler	MCLI/USA	4426-20	03746	2024/6/6	2025/6/5
☒	Power meter	Agilent	E4419B	MY45104493	2024/10/08	2025/10/07
☒	Power meter	Agilent	E4419B	MY45100308	2024/10/08	2025/10/07
☒	Power sensor	Agilent	E9301H	MY41495616	2024/10/08	2025/10/07
☒	Power sensor	Agilent	E9301H	MY41495234	2024/10/08	2025/10/07
☒	Signal Generator	Agilent	E4438C	MY49072627	2024/6/6	2025/6/5
☒	Broadband Preamplifier	/	BP-01M18G	P190501	2024/6/6	2025/6/5
☒	DC POWER SUPPLY	I-SHENG	SP-504	NA	2024/6/6	2025/6/5
☒	Speed reading thermometer	HTC-1	NA	LCS-E-138	2024/6/6	2025/6/5

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

"1" : NA as this is not measurement equipment.

2. SAR MEASUREMENTS SYSTEM CONFIGURATION

2.1. SAR Measurement System

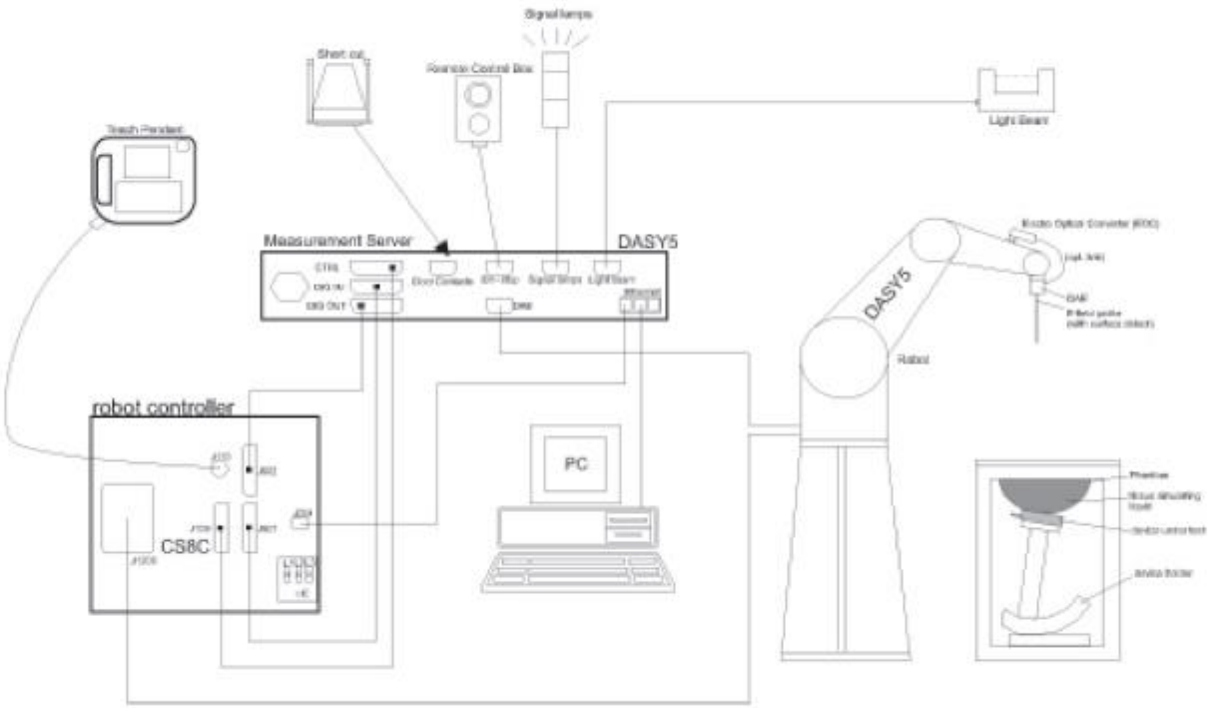
This SAR Measurement System uses a Computer-controlled 3-D stepper motor system (SPEAG DASY5 professional system). A E-field probe is used to determine the internal electric fields. The SAR can be obtained from the equation SAR= σ (|Ei|2)/ ρ where σ and ρ are the conductivity and mass density of the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

The DASY5 system for performing compliance tests consists of the following items:
A standard high precision 6-axis robot (Stabile RX family) with controller, teach pendant and software .An arm extension for accommodation the data acquisition electronics (DAE).

A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.

A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.

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



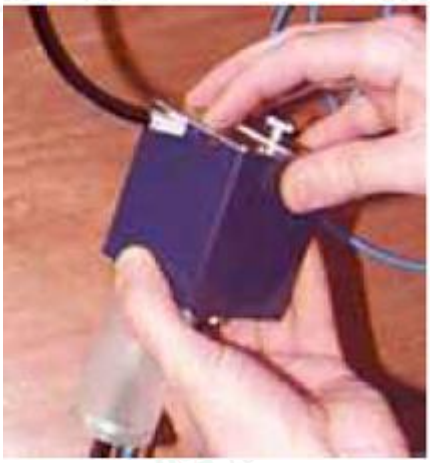
F-1. SAR Measurement System Configuration

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

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

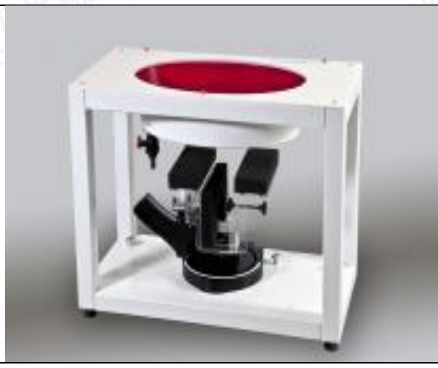
2.4. SAM Twin Phantom

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 IEC-IEEE 62209-1528. 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.		

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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.

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 32mm*32mm*30mm (f≤2GHz), 30mm*30mm*30mm (f for 2-3GHz) and 24mm*24mm*22mm (f for 5-6GHz) was assessed by measuring 5x5x7 points (f≤2GHz), 7x7x7 points (f for 2-3GHz) and 7x7x12 points (f for 5-6GHz). On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure:

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

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

		≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface		5 ± 1 mm	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5$ 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
	graded grid: $\Delta z_{Zoom}(n>1)$: 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

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 ".DAE4". The software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be re-evaluated. The measured data can be visualized or exported in different units or formats, depending on the selected probe type ([V/m], [A/m], [°C], [m W/g], [m W/cm²], [dBrel], etc.). Some of these units are not available in certain situations or show meaningless results, e.g., a SAR output in a lossless media will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

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)

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

E-field probes:

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

H-field probes:

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

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

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

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

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

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

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

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

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

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

3. SAR measurement variability and uncertainty

3.1. SAR measurement variability

Per KDB865664 D01 SAR measurement 100 MHz to 6 GHz v01r04, SAR measurement variability must be assessed for each frequency band, which is determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. The additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.
1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2) through 4) do not apply.
2) When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.
3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).
4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.
The same procedures should be adapted for measurements according to extremity and occupational exposure limits by applying a factor of 2.5 for extremity exposure and a factor of 5 for occupational exposure to the corresponding SAR thresholds.

3.2. SAR measurement uncertainty

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

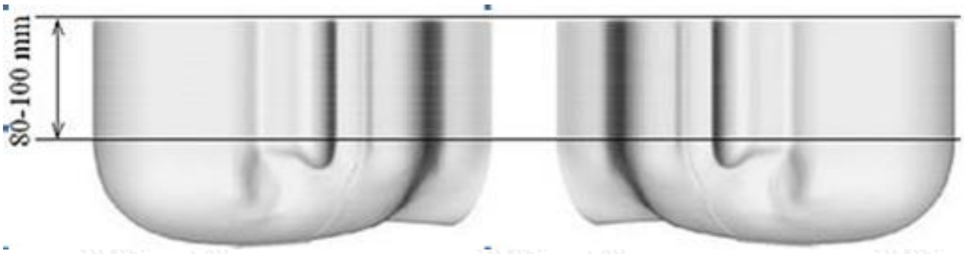
4. Description of Test Position

4.1. Head Exposure Condition

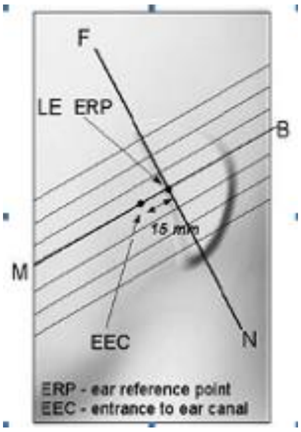
4.1.1. SAM Phantom Shape

F-3. Front, back, and side views of SAM (model for the phantom shell). Full-head model is for illustration purposes only-procedures in this recommended practice are intended primarily for the phantom setup.

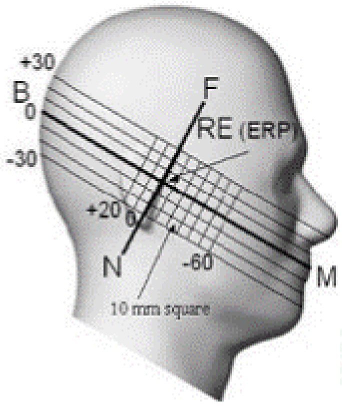
Note: The centre strip including the nose region has a different thickness tolerance.



F-4. Sagittally bisected phantom with extended perimeter (shown placed on its side as used for SAR measurements)



F-5. Close-up side view of phantom, showing the ear region, N-F and B-M lines, and seven cross-sectional plane locations



F-6. Side view of the phantom showing relevant markings and seven cross-sectional plane locations

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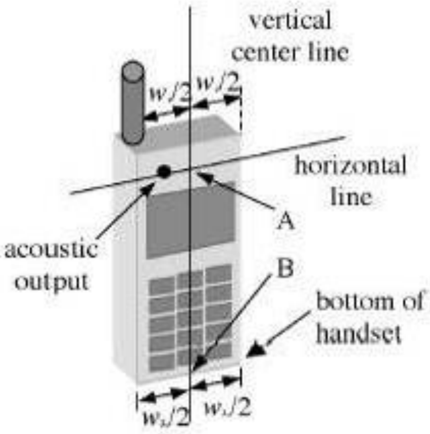
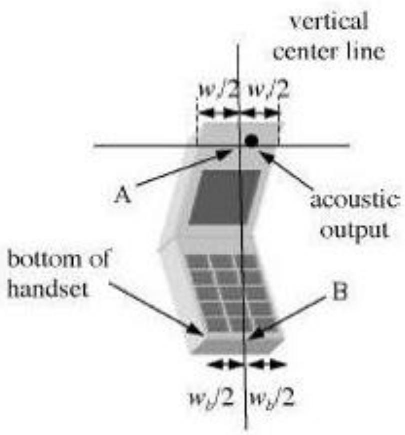
4.1.2. EUT constructions



F-1. Handset vertical and horizontal reference lines-“fixed case”



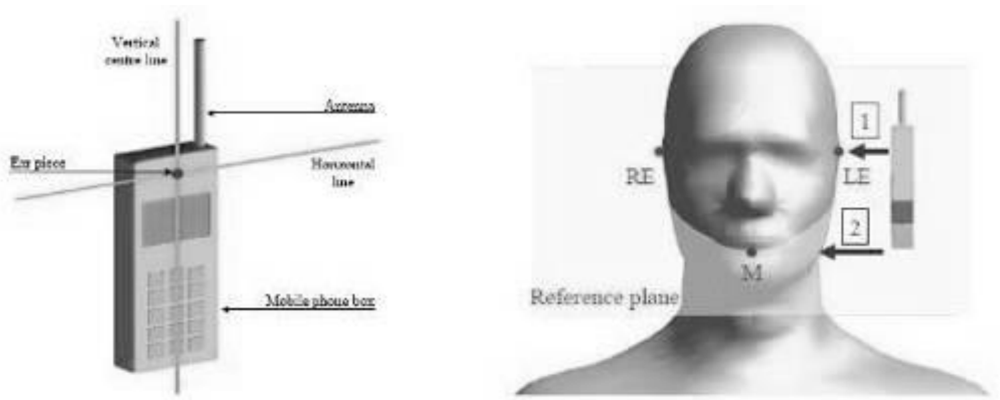
F-2. Handset vertical and horizontal reference lines-“clam-shell case”

4.1.3. Definition of the “cheek” position

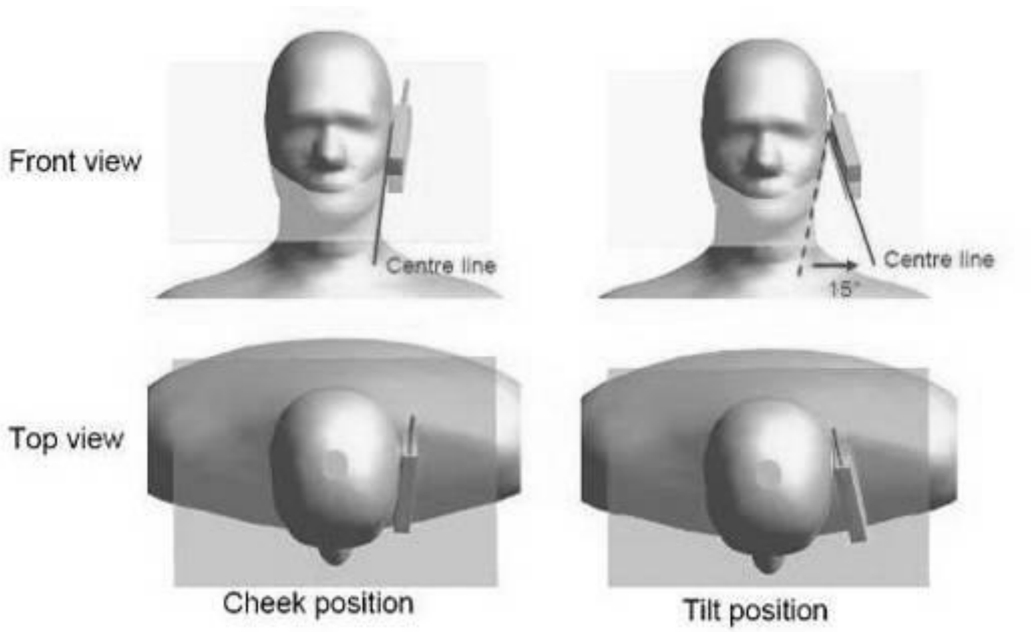
a) Position the device with the vertical centre line of the body of the device and the horizontal line crossing the centre of the ear piece in a plane parallel to the sagittal plane of the phantom ("initial position"). While maintaining the device in this plane, align the vertical centre line with the reference plane containing the three ear and mouth reference points (M, RE and LE) and align the centre of the ear piece with the line RE-LE.
b) Translate the mobile phone box towards the phantom with the ear piece aligned with the line LE-RE until telephone touches the ear. While maintaining the device in the reference plane and maintaining the phone contact with the ear, move the bottom of the box until any point on the front side is in contact with the cheek of the phantom or until contact with the ear is lost.

4.1.4. Definition of the "tilted" position

a) Position the device in the "cheek" position described above;
b) While maintaining the device in the reference plane described above and pivoting against the ear, move it outward away from the mouth by an angle of 15 degrees or until contact with the ear is lost.



F-1. **Definition of the reference lines and points, on the phone and on the phantom and initial position**



F-2. **"Cheek" and "tilt" positions of the mobile phone on the left side**

4.2. Body Exposure Condition

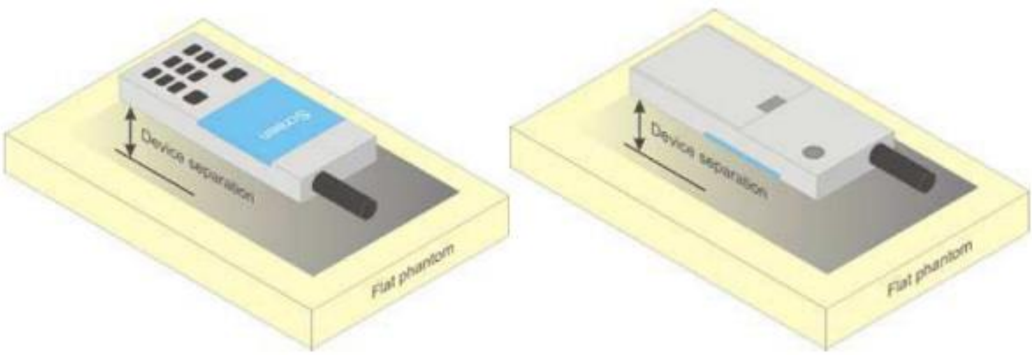
4.2.1. Body-worn accessory exposure conditions

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

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

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

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



F-1. **Test positions for body-worn devices**

4.2.2. Wireless Router exposure conditions

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

4.3. Extremity exposure conditions

Per FCC KDB 648474D04, for smart phones with a display diagonal dimension > 15.0 cm or an overall diagonal dimension > 16.0 cm that provide similar mobile web access and multimedia support found in mini-tablets or UMPC mini-tablets that support voice calls next to the ear, the device is marketed as “Phablet”.
The UMPC mini-tablet procedures must also be applied to test the SAR of all surfaces and edges with an antenna located at ≤ 25 mm from that surface or edge, in direct contact with a flat phantom, for Product Specific 10-g SAR according to the body-equivalent tissue dielectric parameters in IEC/IEEE 62209-1528 to address interactive hand use exposure conditions. The UMPC mini-tablet 1-g SAR at 5 mm is not required. When hotspot mode applies, Product Specific 10-g SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg; however, when power reduction applies to hotspot mode the measured SAR must be scaled to the maximum output power, including tolerance, allowed for phablet modes to compare with the 1.2 W/kg SAR test reduction threshold.

Due to the SAR result, the Main antenna frequency bands are not required to test with 0mm for the Product Specific 10 g SAR.

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	1750-2000	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 Water: De-ionized, 16 MΩ⁺ resistivity Tween: Polyoxyethylene (20) sorbitan monolaurate			Sucrose: 98⁺% Pure Sucrose HEC: Hydroxyethyl Cellulose		
HSL5GHz is composed of the following ingredients: Water：50-65% Mineral oil：10-30% Emulsifiers：8-25% Sodium salt：0-1.5%					

Table 2： Recipe of Tissue Simulate Liquid

5.1.2. Measurement for Tissue Simulate Liquid

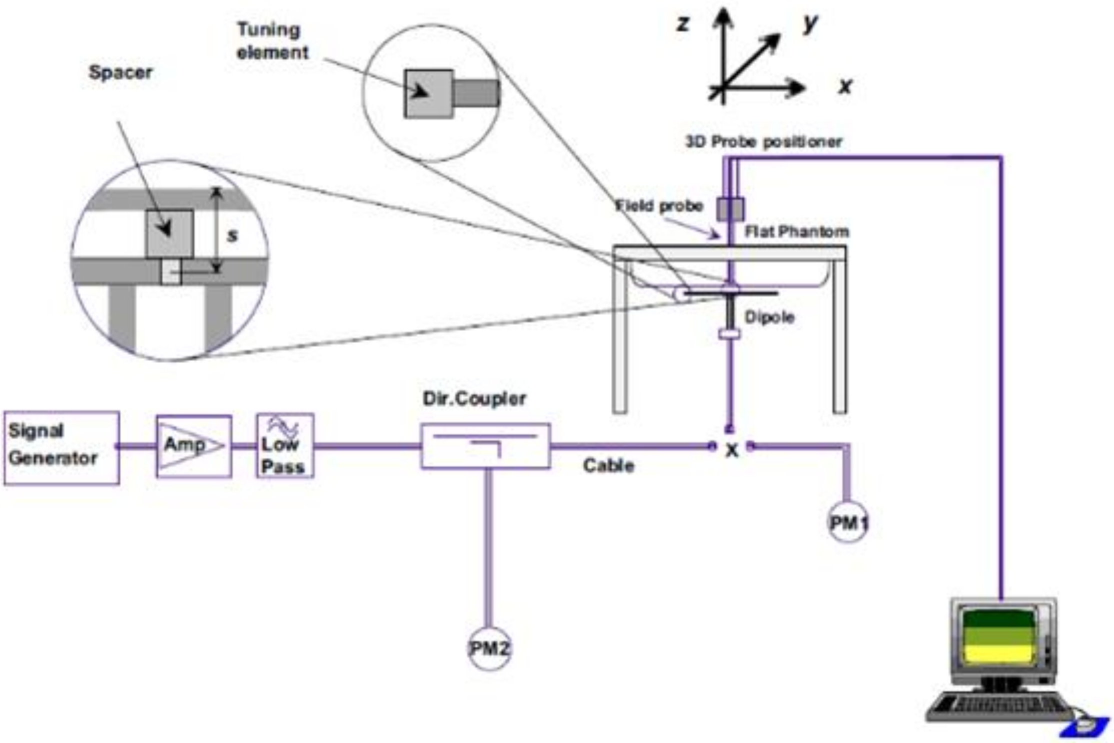
The dielectric properties for this Tissue Simulate Liquids were measured by using the DAKS. The Conductivity (σ) and Permittivity (ρ) are listed in bellow table. For the SAR measurement given in this report. The temperature variation of the Tissue Simulate Liquids was 22±2°C.

Tissue Type	Measured Frequency （MHz）	Target Tissue (±5%)		Measured Tissue		Liquid Temp. (℃)	Measured Date
		ε_r	σ(S/m)	ε_r	σ(S/m)		
835 Head	835	41.5 (39.43~43.58)	0.9 (0.86~0.95)	41.484	0.933	22.6	March 5, 2025
1750 Head	1750	40.1 (38.10~42.11)	1.37 (1.30~1.44)	40.256	1.359	22.4	March 6, 2025
1900 Head	1900	40 (38.00~42.00)	1.4 (1.33~1.47)	40.183	1.424	23.1	March 7, 2025
2450 Head	2450	39.2 (37.24~41.16)	1.8 (1.71~1.89)	39.657	1.813	22.8	March 8, 2025
2600 Head	2600	39 (37.05~40.95)	1.96 (1.86~2.06)	40.126	1.914	22.2	March 9, 2025
5250 Head	5250	36.0 (34.20~37.80)	4.66 (4.43~4.89)	37.142	4.834	22.6	March 10, 2025
5750 Head	5750	35.3 (33.54~37.07)	5.27 (5.01~5.53)	35.814	5.335	23.1	March 12, 2025

Table 3： Measurement result of Tissue electric parameters

5.2. SAR System Check

The microwave circuit arrangement for system Check is sketched in F-1. 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 100mW (below 3GHz) or 100mW (3-6GHz) was input to the dipole antenna). During the tests, the ambient temperature of the laboratory was in the range 22±2°C, the relative humidity was in the range 60% and the liquid depth above the ear reference points was above 15±0.5 cm in all the cases. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values.



F-1. 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 20% 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.

D835V2 SN 4d124 Extend Dipole Calibrations

Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)
2023-10-24	-35.6		50.2		1.65	
2024-10-23	-35.56	-0.11	49.8	-0.4	1.64	0.01

D1750V2 SN 1035 Extend Dipole Calibrations

Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)
2023-06-12	-38.3		48.8		-0.06	
2024-06-11	-38.54	0.63	48.5	-0.3	-0.04	0.02

D1900V2 SN 5d055 Extend Dipole Calibrations

Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)
2023-10-20	-26.1		51.3		4.84	
2024-10-19	-26.0	-0.38	51.5	0.2	4.85	0.01

D2450V2 SN 808 Extend Dipole Calibrations

Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)
2023-10-23	-26.3		51.4		4.73	
2024-10-22	-26.27	-0.11	51.2	-0.2	4.70	-0.03

D2600V2 SN 1071 Extend Dipole Calibrations

Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)
2023-06-20	-23.7		48.6		-6.32	
2024-06-19	-23.68	-0.08	48.5	-0.1	-6.30	0.02

D5GHzV2 SN 1046 Extend Dipole Calibrations(5250MHz)

Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)
2023-10-23	-28.6		49.9		3.71	
2024-10-22	-28.5	-0.35	49.6	-0.3	3.70	-0.01

D5GHzV2 SN 1046 Extend Dipole Calibrations(5750MHz)

Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)
2023-10-23	-26.8		54.6		1.18	
2024-10-22	-26.74	-0.22	54.9	0.3	1.20	0.02

5.2.2. Summary System Check Result(s)

Validation Kit		Measured SAR 100mW	Measured SAR 100mW	Measured SAR (normalized to 1W)	Measured SAR (normalized to 1W)	Target SAR (normalized to 1W) (±10%)	Target SAR (normalized to 1W) (±10%)	Liquid Temp. (℃)	Measured Date
		1g (W/kg)	10g (W/kg)	1g (W/kg)	10g (W/kg)	1-g(W/kg)	10-g(W/kg)		
D835V2	Head	0.97	0.65	9.70	6.50	9.59 (8.63~10.55)	6.37 (5.73~7.01)	22.6	March 5, 2025
D1750V2	Head	3.65	1.91	36.50	19.10	35.9 (32.31~39.49)	18.9 (17.01~20.79)	22.4	March 6, 2025
D1900V2	Head	4.15	2.13	41.50	21.30	40.2 (36.18~44.22)	20.9 (18.81~22.99)	23.1	March 7, 2025
D2450V2	Head	5.53	2.53	55.30	25.30	53.5 (48.15~58.85)	24.8 (22.32~27.28)	22.8	March 8, 2025
D2600V2	Head	5.91	2.64	59.10	26.40	56.80 (51.12~62.48)	25.5 (22.95~28.05)	22.2	March 9, 2025
Validation Kit		Measured SAR 100mW	Measured SAR 100mW	Measured SAR (normalized to 1W)	Measured SAR (normalized to 1W)	Target SAR (normalized to 1W) (±10%)	Target SAR (normalized to 1W) (±10%)	Liquid Temp. (℃)	Measured Date
		1g (W/kg)	10g (W/kg)	1g (W/kg)	10g (W/kg)	1-g(W/kg)	10-g(W/kg)		
D5GHzV2	Head (5.25GHz)	7.92	2.23	79.20	22.30	78.1 (70.29~85.91)	22.2 (19.98~24.42)	22.6	March 10, 2025
	Head (5.75GHz)	8.14	2.26	81.40	22.60	77.4 (69.66~85.14)	21.6 (19.44~23.76)	23.1	March 12, 2025

Table 4： Please see the Appendix A

6. SAR measurement procedure

The measurement procedures are as follows:

6.1. Conducted power measurement

a. For WWAN power measurement, use base station simulator connection with RF cable, at maximum power in each supported wireless interface and frequency band.
b. Read the WWAN RF power level from the base station simulator.
c. For WLAN/BT power measurement, use engineering software to configure EUT WLAN/BT continuously Transmission, at maximum RF power in each supported wireless interface and frequency band.
d. Connect EUT RF port through RF cable to the power meter, and measure WLAN/BT output power.

6.2. GSM Test Configuration

SAR tests for GSM 850 and GSM 1900, a communication link is set up with a System Simulator (SS) by air link. Using CMU200 the power level is set to “5” for GSM 850, set to “0” for GSM 1900. Since the GPRS class is 12 for this EUT, it has at most 4 timeslots in uplink and at most 4 timeslots in downlink, the maximum total timeslots is 4. the EGPRS class is 12 for this EUT, it has at most 4 timeslots in uplink and at most 4 timeslots in downlink, the maximum total timeslots is 4.

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. GSM voice and GPRS data use GMSK, which is a constant amplitude modulation with minimal peak to average power difference within the time-slot burst. For EDGE, GMSK is used for MCS 1 – MCS 4 and 8-PSK is used for MCS 5 – MCS 9; where 8-PSK has an inherently higher peak-to-average power ratio. The GMSK and 8-PSK EDGE configurations are considered separately for SAR compliance. The GMSK EDGE configurations are grouped with GPRS and considered with respect to time-averaged maximum output power to determine compliance. The 3G SAR test reduction procedure is applied to 8-PSK EDGE with GMSK GPRS/EDGE as the primary mode.

6.3. UMTS Test Configuration

3G SAR Test Reduction Procedure
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.3 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.

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 requied 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.

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.

1) Body-Worn Accessory SAR

SAR for body-worn accessory 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.

2) Handsets with Release 5 HSDPA

The 3G SAR test reduction procedure is applied to HSDPA body-worn accessory configurations with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured for HSDPA using the HSDPA body SAR procedures in the “Release 5 HSDPA Data Devices” section of this document, for the highest reported SAR body-worn accessory exposure configuration in 12.2 kbps RMC. Handsets with both HSDPA and HSUPA are tested according to Release 6 HSPA test procedures.

HSDPA should be configured according to the UE category of a test device.The number of HSDSCH/ 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 with 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) should be set according to values indicated in the Table below. The CQI value is determined by the UE category, transport block size, number of HS-PDSCHs and modulation used in the H-set

Table 2: Subtests for UMTS Release 5 HSDPA

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

Note1: $\triangle_{ACK}$, $\triangle_{NACK}$ and $\triangle_{CQI}$= 8⇔ $A_{hs} = \beta_{hs}/\beta_c$=30/15⇔ β_{hs}=30/15*β_c
Note2: CM=1 for β_c/β_d =12/15, β_{hs}/β_c=24/15.
Note3: For subtest 2 the $\beta_c\beta_d$ ratio of 12/15 for the TFC during the measurement period(TF1,TF0) is achieved by setting the signaled gain factors for the reference TFC (TFC1,TF1) to β_c=11/15 and β_d=15/15.

HSUPA Test Configuration

The 3G SAR test reduction procedure is applied to HSPA (HSUPA/HSDPA with RMC) body-worn accessory configurations with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured for HSPA using the HSPA body SAR procedures in the “Release 6 HSPA Data Devices” section of this document, for the highest reported body-worn accessory exposure SAR configuration in 12.2 kbps RMC. When VOIP is applicable for next to the ear head exposure in HSPA, the 3G SAR test reduction procedure is applied to HSPA with 12.2 kbps RMC as the primary mode; otherwise, the same HSPA configuration used for body-worn accessory measurements is tested for next to the ear head exposure.

Due to inner loop power control requirements in HSPA, a communication test set is required for output power and SAR tests. The 12.2 kbps RMC, FRC H-set 1 and E-DCH configurations for HSPA are configured according to the β values indicated in Table 2 and other applicable procedures described in the ‘WCDMA Handset’ and ‘Release 5 HSDPA Data Devices’ sections of this document

Table 3: Sub-Test 5 Setup for Release 6 HSUPA

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Sub-set	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (1)	β_{ec}	β_{ed}	β_{ed} (SF)	β_{ed} (codes)	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}, ΔNACK and Δ_{CQI} = 8 ⇔ A_{hs} = β_{hs}/β_c = 30/15 ⇔ β_{hs}= 30/15 *β_c.
Note 2: CM = 1 for βc/βd =12/15, β_{hs}/β_c =24/15. For all other combinations of DPDCH, DPCCH, HS- DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.
Note 3: For subtest 1 the βc/βd ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to βc = 10/15 and βd = 15/15.
Note 4: For subtest 5 the βc/βd ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to βc = 14/15 and βd = 15/15.
Note 5: Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Figure 5.1g.
Note 6: βed can not be set directly; it is set by Absolute Grant Value.

6.4. LTE Test Configuration

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 among RB offsets at the upper edge, middle and lower edge of each required test channel. When the reported SAR is ≤ 0.8 W/kg, testing 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.8 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.

QPSK with 50% RB allocation
The procedures required for 1 RB allocation in section 4.2.1 are applied to measure the SAR for QPSK with 50% RB allocation.9

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 sections 4.2.1 and 4.2.2 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.

6.5. WIFI Test Configuration

The SAR measurement and test reduction procedures are structured according to either the DSSS or OFDM transmission mode configurations used in each standalone frequency band and aggregated band. For devices that operate in exposure configurations that require multiple test positions, additional SAR test reduction may be applied. The maximum output power specified for production units, including tune-up tolerance, are used to determine initial SAR test requirements for the 802.11 transmission modes in a frequency band. SAR is measured using the highest measured maximum output power channel for the initial test configuration. SAR measurement and test reduction for the remaining 802.11 modes and test channels are determined according to measured or specified maximum output power and reported SAR of the initial measurements. The general test reduction and SAR measurement approaches are summarized in the following:
1. The maximum output power specified for production units are determined for all applicable 802.11 transmission modes in each standalone and aggregated frequency band. Maximum output power is measured for the highest maximum output power configuration(s) in each frequency band according to the default power measurement procedures.
2. For OFDM transmission configurations in the 2.4 GHz and 5 GHz bands, an “initial test configuration” is first determined for each standalone and aggregated frequency band according to the maximum output power and tune-up tolerance specified for production units.

a. When the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11a/g/n/ac mode is used for SAR measurement, on the highest measured output power channel in the initial test configuration, for each frequency band.
b. SAR is measured for OFDM configurations using the initial test configuration procedures. Additional frequency band specific SAR test reduction may be considered for individual frequency bands
c. Depending on the reported SAR of the highest maximum output power channel tested in the initial test configuration, SAR test reduction may apply to subsequent highest output channels in the initial test configuration to reduce the number of SAR measurements.
3. The Initial test configuration does not apply to DSSS. The 2.4 GHz band SAR test requirements and 802.11b DSSS procedures are used to establish the transmission configurations required for SAR measurement.
4. An "initial test position"is applied to further reduce the number of SAR tests for devices operating in next to the ear, UMPC mini-tablet or hotspot mode exposure configurations that require multiple test positions .
a. SAR is measured for 802.11b according to the 2.4 GHz DSSS procedure using the exposure condition established by the initial test position.
b. SAR is measured for 2.4 GHz and 5 GHz OFDM configurations using the initial test configuration. 802.11b/g/n operating modes are tested independently according to the service requirements in each frequency band. 802.11b/g/n modes are tested on the maximum average output channel.
5. The Initial test position does not apply to devices that require a fixed exposure test position. SAR is measured in a fixed exposure test position for these devices in 802.11b according to the 2.4 GHz DSSS procedure or in 2.4 GHz and 5 GHz OFDM configurations using the initial test configuration procedures .
6. The "subsequent test configuration"procedures are applied to determine if additional SAR measurements are required for the remaining OFDM transmission modes that have not been tested in the initial test configuration. SAR test exclusion is determined according to reported SAR in the initial test configuration and maximum output power specified or measured for these other OFDM configurations.

2.4 GHz and 5GHz 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 section 5.2.2.
1. 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:
a. When the reported SAR of the highest measured maximum output power channel (section 3.1) for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.
b. 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.
1. 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). SAR is not required for the following 2.4 GHz OFDM conditions.
a. When KDB Publication 447498 SAR test exclusion applies to the OFDM configuration
b. 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.
2. SAR Test Requirements for OFDM Configurations
When SAR measurement is required for 802.11 a/g/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.20 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.
3. OFDM Transmission Mode SAR Test Configuration and Channel Selection Requirements

The initial test configuration for 2.4 GHz and 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 (section 4). 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.

a. The largest channel bandwidth configuration is selected among the multiple configurations with the same specified maximum output power.
b. 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.
c. 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.
d. When multiple transmission modes (802.11a/g/n/ac) have the same specified maximum output power, largest channel bandwidth, lowest order modulation and lowest data rate, the lowest order 802.11 mode is selected; i.e., 802.11a is chosen over 802.11n then 802.11ac or 802.11g is chosen over 802.11n.

After an initial test configuration is determined, if multiple test channels have the same measured maximum output power, the channel chosen for SAR measurement is determined according to the following. These channel selection procedures apply to both the initial test configuration and subsequent test configuration(s), with respect to the default power measurement procedures or additional power measurements required for further SAR test reduction. The same procedures also apply to subsequent highest output power channel(s) selection.

a. Channels with measured maximum output power within ¼ dB of each other are considered to have the same maximum output.
b. When there are multiple test channels with the same measured maximum output power, the channel closest to mid-band frequency is selected for SAR measurement.
c. When there are multiple test channels with the same measured maximum output power and 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.

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 (see section 5.3.2). SAR test reduction of subsequent highest output test channels is based on the 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.23 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 the subsequent next highest measured output power channel(s) in the initial test configuration until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.

4. Subsequent Test Configuration Procedures

SAR measurement requirements for the remaining 802.11 transmission mode configurations that have not been tested in the initial test configuration are determined separately for each standalone and aggregated frequency band, in each exposure condition, according to the maximum output power specified for production units. The initial test position procedure is applied to next to the ear, UMPC mini-tablet and hotspot mode configurations. When the same maximum output power is specified for multiple transmission modes, the procedures in section 5.3.2 are applied to determine the test configuration. 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.

a. 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.
b. 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.
c. 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.

1). SAR should first be measured for the channel with highest measured output power in the subsequent test configuration.

2). 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.

a) 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.

d. 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 applying the subsequent test configuration procedures in this section to the remaining configurations according to the following:

1) replace “subsequent test configuration” with “next subsequent test configuration” (i.e., subsequent next highest specified maximum output power configuration)

2) replace “initial test configuration” with “all tested higher output power configurations.

6.6. Power Reduction

The product without any power reduction.

6.7. Power Drift

To control the output power stability during the SAR test, SAR system calculates the power drift by measuring the E-field at the same location at the beginning and at the end of the measurement for each test position. This ensures that the power drift during one measurement is within ±0.2dB .

7. TEST CONDITIONS AND RESULTS

7.1. Conducted Power Results

According KDB 447498 D01 General RF Exposure Guidance v06 Section 4.1 2) states that “Unless it is specified differently in the published RF exposure KDB procedures, these requirements also apply to test reduction and test exclusion considerations. Time-averaged maximum conducted output power applies to SAR and, as required by § 2.1091(c), time-averaged ERP applies to MPE. When an antenna port is not available on the device to support conducted power measurement, such as FRS and certain Part 15 transmitters with built-in integral antennas, the maximum output power allowed for production units should be used to determine RF exposure test exclusion and compliance.”

<GSM Conducted Power>

General Note:

1. Per KDB 447498 D01v06, the maximum output power channel is used for SAR testing and for further SAR test reduction.
2. According to October 2013TCB Workshop, for GSM / GPRS / EGPRS, the number of time slots to test for SAR should correspond to the highest frame-average maximum output power configuration, considering the possibility of e.g. 3rd party VoIP operation for head and body-worn SAR testing, the EUT was set in GPRS (3Tx slot) for GSM850/GSM1900 band due to their highest frame-average power.
3. For hotspot mode SAR testing, GPRS should be evaluated, therefore the EUT was set in GPRS (3 Tx slots) for GSM850/GSM1900 band due to its highest frame-average power.

7.1.1. Conducted power measurement results for GSM850

GSM 850										
Burst Output Power(dBm)					Tune up	Division Factors	Frame-Average Output Power(dBm)			Tune up
Channel		128	190	251			128	190	251	
GSM(GMSK)	GSM	33.61	33.79	33.76	34.00	-9.19	24.58	24.76	24.73	25.00
GPRS(GMSK)	1 TX Slot	33.54	33.61	33.62	33.70	-9.19	24.51	24.58	24.59	25.00
	2 TX Slots	32.41	32.53	32.55	32.60	-6.18	26.39	26.51	26.53	27.00
	3 TX Slots	30.14	30.30	30.35	30.40	-4.42	25.88	26.04	26.09	26.50
	4 TX Slots	29.00	29.17	29.22	29.30	-3.17	25.99	26.16	26.21	26.50
EGPRS(8PSK)	1 TX Slot	31.30	31.16	31.40	31.50	-9.19	22.27	22.13	22.37	23.00
	2 TX Slots	30.33	30.31	30.47	30.50	-6.18	24.31	24.29	24.45	25.00
	3 TX Slots	28.39	28.36	28.57	28.60	-4.42	24.13	24.10	24.31	25.00
	4 TX Slots	27.34	27.30	27.51	27.60	-3.17	24.33	24.29	24.50	25.00

7.1.2. Conducted power measurement results for PCS1900

GSM 1900										
Burst Output Power(dBm)					Tune up	Division Factors	Frame-Average Output Power(dBm)			Tune up
Channel		512	661	810			512	661	810	
GSM(GMSK)	GSM	32.02	31.48	31.24	32.50	-9.19	22.99	22.45	22.21	23.50
GPRS(GMSK)	1 TX Slot	31.97	31.41	31.18	31.99	-9.19	22.94	22.38	22.15	23.50
	2 TX Slots	31.22	30.73	30.51	31.30	-6.18	25.20	24.71	24.49	25.50
	3 TX Slots	29.34	28.94	28.80	29.40	-4.42	25.08	24.68	24.54	25.50
	4 TX Slots	28.22	27.88	27.74	28.30	-3.17	25.21	24.87	24.73	26.00
EGPRS(8PSK)	1 TX Slot	31.14	30.60	30.44	31.20	-9.19	22.11	21.57	21.41	22.50
	2 TX Slots	30.39	30.00	29.83	30.40	-6.18	24.37	23.98	23.81	24.50
	3 TX Slots	28.77	28.50	28.40	28.80	-4.42	24.51	24.24	24.14	25.00
	4 TX Slots	27.83	27.44	27.39	27.90	-3.17	24.82	24.43	24.38	25.00

Note:
1)CMW500 measures GSM peak and average output power for active timeslots. 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

2)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. The calculated method is shown as below:

3)Frame-averaged power = 10 x log (Burst-averaged power mW x Slot used / 8

When the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel must be used

When multiple slots can be used, SAR should be tested to account for the maximum source-based time-averaged output power.

<UMTS Conducted Power>

The following tests were conducted according to the test requirements outlines in 3GPP TS 34.121 specification. A summary of these settings are illustrated below:

HSDPA Setup Configuration:

a. The EUT was connected to Base Station CMW500 referred to the Setup Configuration.
b. The RF path losses were compensated into the measurements.
c. A call was established between EUT and Base Station with following setting:
   i. Set Gain Factors (β_c and β_d) and parameters were set according to each
   ii. Specific sub-test in the following table, C10.1.4, quoted from the TS 34.121
   iii. Set RMC 12.2Kbps + HSDPA mode.
   iv. Set Cell Power = -86 dBm
   v. Set HS-DSCH Configuration Type to FRC (H-set 1, QPSK)
   vi. Select HSDPA Uplink Parameters
   vii. Set Delta ACK, Delta NACK and Delta CQI = 8
   viii. Set Ack-Nack Repetition Factor to 3
   ix. Set CQI Feedback Cycle (k) to 4 ms
   x. Set CQI Repetition Factor to 2
   xi. Power Ctrl Mode = All Up bits
d. The transmitted maximum output power was recorded.

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

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

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with $\beta_{hs} = 30/15 * \beta_c$.

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

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

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

Setup Configuration

HSUPA Setup Configuration:

a. The EUT was connected to Base Station R&S CMW500 referred to the Setup Configuration.
b. The RF path losses were compensated into the measurements.
c. A call was established between EUT and Base Station with following setting * :
   i. Call Configs = 5.2B, 5.9B, 5.10B, and 5.13.2B with QPSK
   ii. Set the Gain Factors (β_c and β_d) and parameters (AG Index) were set according to each specific sub-test in the following table, C11.1.3, quoted from the TS 34.121
   iii. Set Cell Power = -86 dBm
   iv. Set Channel Type = 12.2k + HSPA
   v. Set UE Target Power
   vi. Power Ctrl Mode= Alternating bits
   vii. Set and observe the E-TFCI
   viii. Confirm that E-TFCI is equal to the target E-TFCI of 75 for sub-test 1, and other subtest's E-TFCI
d. The transmitted maximum output power was recorded.

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

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note1)	β_{ec}	β_{ed} (Note 5) (Note 6)	β_{ed} (SF)	β_{ed} (Codes)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 6)	E-TFCI
1	11/15 (Note 3)	15/15 (Note 3)	64	11/15 (Note 3)	22/15	209/225	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed}1: 47/15 β_{ed}2: 47/15	4 4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15 (Note 4)	15/15 (Note 4)	64	15/15 (Note 4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81

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

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

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

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

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

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

General Note

1. Per KDB 941225 D01, RMC 12.2kbps setting is used to evaluate SAR. If AMR 12.2kbps power is < 0.25dB higher than RMC 12.2kbps, SAR tests with AMR 12.2kbps can be excluded.
2. By design, AMR and HSDPA/HSUPA RF power will not be larger than RMC 12.2kbps, detailed information is included in Tune-up Procure exhibit.
3. It is expected by the manufacturer that MPR for some HSDPA/HSUPA subtests may differ from the specification of 3GPP, according to the chipset implementation in this model. The implementation and expected deviation are detailed in tune-up procedure exhibit.

7.1.3. Conducted Power Measurement Results(WCDMA Band II)

Item	Band	WCDMA Band II result (dBm)			
		Channel/Frequency(MHz)			
	sub-test	9262/1852.4	9400/1880	9538/1907.6	Tune up
RMC	12.2kbps RMC	24.04	23.87	24.04	24.50
HSDPA	Sub –Test 1	22.34	22.68	23.22	23.50
	Sub –Test 2	23.31	23.86	22.95	24.00
	Sub –Test 3	23.06	22.77	23.08	23.50
	Sub –Test 4	22.46	22.32	23.87	24.00
HSUPA	Sub –Test 1	22.62	22.70	23.31	23.50
	Sub –Test 2	22.78	23.86	22.72	24.00
	Sub –Test 3	22.64	23.30	23.41	24.00
	Sub –Test 4	23.15	22.90	23.51	24.00
	Sub –Test 5	22.16	23.82	23.17	24.00

Note:
when the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel must be used.

7.1.4. Conducted Power Measurement Results(WCDMA Band V)

Item	Band	WCDMA Band V result (dBm)			
		Channel/Frequency(MHz)			
	sub-test	4132/826.4	4182/836.4	4233/846.6	Tune up
RMC	12.2kbps RMC	23.35	23.49	23.68	24.00
HSDPA	Sub –Test 1	23.14	22.59	22.17	23.50
	Sub –Test 2	22.25	22.76	23.09	23.50
	Sub –Test 3	22.71	22.03	22.34	23.00
	Sub –Test 4	22.92	22.55	22.12	23.00
HSUPA	Sub –Test 1	22.83	22.98	22.75	23.50
	Sub –Test 2	22.08	22.53	22.48	23.00
	Sub –Test 3	23.00	22.99	22.60	23.50
	Sub –Test 4	22.27	22.46	23.00	23.50
	Sub –Test 5	22.65	23.31	23.07	23.50

Note:
when the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel must be used.

7.1.5. Conducted Power Measurement Results(LTE Band 2)

LTE FDD Band 2						
TX Channel Bandwidth	Frequency (MHz)	RB Size/Offset	Burst Average Power [dBm]	Tune Up (dBm)	Burst Average Power [dBm]	Tune Up (dBm)
			QPSK		16QAM	
1.4 MHz	1850.7	1 RB low	23.66	24.00	23.27	24.00
		1 RB high	23.53	24.00	22.03	23.00
		50% RB mid	24.35	25.00	23.66	24.00
		100% RB	24.31	25.00	23.78	24.00
	1880.0	1 RB low	24.13	25.00	23.73	24.00
		1 RB high	23.84	24.00	23.65	24.00
		50% RB mid	24.04	25.00	23.94	24.00
		100% RB	24.15	25.00	23.23	24.00
	1909.3	1 RB low	23.58	24.00	22.40	23.00
		1 RB high	23.89	24.00	22.99	23.00
		50% RB mid	23.71	24.00	22.10	23.00
		100% RB	24.12	25.00	23.05	24.00
3 MHz	1851.5	1 RB low	24.22	25.00	23.71	24.00
		1 RB high	23.35	24.00	22.41	23.00
		50% RB mid	24.33	25.00	23.32	24.00
		100% RB	23.25	24.00	22.19	23.00
	1880.0	1 RB low	23.31	24.00	22.27	23.00
		1 RB high	23.67	24.00	22.66	23.00
		50% RB mid	23.37	24.00	22.15	23.00
		100% RB	24.36	25.00	23.10	24.00
	1908.5	1 RB low	23.58	24.00	22.77	23.00
		1 RB high	24.04	25.00	23.57	24.00
		50% RB mid	23.79	24.00	22.43	23.00
		100% RB	23.78	24.00	22.17	23.00
5 MHz	1852.5	1 RB low	24.40	25.00	23.50	24.00
		1 RB high	23.19	24.00	22.43	23.00
		50% RB mid	24.09	25.00	23.47	24.00
		100% RB	24.12	25.00	22.81	23.00
	1880.0	1 RB low	23.95	24.00	22.99	23.00
		1 RB high	23.83	24.00	22.30	23.00
		50% RB mid	24.02	25.00	23.83	24.00
		100% RB	23.06	24.00	22.46	23.00
	1907.5	1 RB low	23.69	24.00	22.25	23.00
		1 RB high	24.43	25.00	23.28	24.00
		50% RB mid	23.67	24.00	22.26	23.00
		100% RB	23.37	24.00	22.66	23.00
10 MHz	1855.0	1 RB low	23.77	24.00	22.87	23.00
		1 RB high	24.10	25.00	23.84	24.00
		50% RB mid	24.44	25.00	22.65	23.00
		100% RB	23.33	24.00	22.64	23.00
	1880.0	1 RB low	24.03	25.00	22.89	23.00
		1 RB high	23.43	24.00	22.24	23.00
		50% RB mid	23.88	24.00	22.85	23.00
		100% RB	23.27	24.00	22.83	23.00
	1905.0	1 RB low	24.22	25.00	23.16	24.00
		1 RB high	23.54	24.00	22.98	23.00
		50% RB mid	24.17	25.00	23.30	24.00
		100% RB	23.25	24.00	22.23	23.00
15 MHz	1857.5	1 RB low	24.17	25.00	23.38	24.00
		1 RB high	23.49	24.00	22.95	23.00
		50% RB mid	23.21	24.00	22.86	23.00

		100% RB	23.24	24.00	22.25	23.00
	1880.0	1 RB low	24.11	25.00	23.61	24.00
		1 RB high	23.77	24.00	22.56	23.00
		50% RB mid	24.10	25.00	23.46	24.00
		100% RB	24.34	25.00	23.17	24.00
	1902.5	1 RB low	23.33	24.00	22.63	23.00
		1 RB high	24.03	25.00	23.15	24.00
		50% RB mid	23.43	24.00	22.49	23.00
		100% RB	23.88	24.00	22.98	23.00
20 MHz	1860.0	1 RB low	24.27	25.00	23.78	24.00
		1 RB high	23.68	24.00	22.83	23.00
		50% RB mid	24.11	25.00	24.02	25.00
		100% RB	23.46	24.00	22.76	23.00
	1880.0	1 RB low	24.21	25.00	22.80	23.00
		1 RB high	23.36	24.00	22.92	23.00
		50% RB mid	24.07	25.00	22.93	23.00
		100% RB	23.42	24.00	22.33	23.00
	1900.0	1 RB low	24.20	25.00	23.08	24.00
		1 RB high	24.24	25.00	23.27	24.00
		50% RB mid	24.16	25.00	23.03	24.00
		100% RB	23.95	24.00	22.75	23.00

7.1.6. Conducted Power Measurement Results(LTE Band 4)

LTE FDD Band 4						
TX Channel Bandwidth	Frequency (MHz)	RB Size/Offset	Average Power [dBm]	Tune Up (dBm)	Average Power [dBm]	Tune Up (dBm)
			QPSK		16QAM	
1.4 MHz	1710.7	1 RB low	23.70	24.00	22.71	23.00
		1 RB high	23.04	24.00	22.33	23.00
		50% RB mid	23.94	24.00	22.21	23.00
		100% RB	22.67	23.00	21.92	22.00
	1732.5	1 RB low	23.27	24.00	22.76	23.00
		1 RB high	23.57	24.00	21.96	22.00
		50% RB mid	23.44	24.00	21.52	22.00
		100% RB	22.12	23.00	21.95	22.00
	1754.3	1 RB low	22.66	23.00	21.91	22.00
		1 RB high	23.40	24.00	22.45	23.00
		50% RB mid	23.86	24.00	22.36	23.00
		100% RB	22.35	23.00	21.09	22.00
3 MHz	1711.5	1 RB low	23.52	24.00	22.72	23.00
		1 RB high	23.10	24.00	22.28	23.00
		50% RB mid	23.72	24.00	22.50	23.00
		100% RB	22.91	23.00	22.00	23.00
	1732.5	1 RB low	22.90	23.00	21.04	22.00
		1 RB high	22.91	23.00	22.22	23.00
		50% RB mid	22.55	23.00	21.96	22.00
		100% RB	22.89	23.00	22.02	23.00
	1753.5	1 RB low	23.48	24.00	22.83	23.00
		1 RB high	23.23	24.00	22.91	23.00
		50% RB mid	23.06	24.00	22.42	23.00
		100% RB	23.99	24.00	22.98	23.00
5 MHz	1712.	1 RB low	23.23	24.00	22.21	23.00
		1 RB high	22.74	23.00	22.06	23.00
		50% RB mid	23.67	24.00	21.76	22.00
		100% RB	22.90	23.00	21.64	22.00
	1732.5	1 RB low	23.63	24.00	22.18	23.00
		1 RB high	22.31	23.00	21.08	22.00
		50% RB mid	23.01	24.00	22.09	23.00
		100% RB	23.77	24.00	22.46	23.00
	1752.5	1 RB low	22.21	23.00	22.02	23.00
		1 RB high	23.39	24.00	22.06	23.00
		50% RB mid	23.83	24.00	22.82	23.00
		100% RB	22.49	23.00	22.31	23.00
10 MHz	1715.0	1 RB low	23.82	24.00	22.96	23.00
		1 RB high	23.10	24.00	22.25	23.00
		50% RB mid	22.90	23.00	21.90	22.00
		100% RB	23.53	24.00	22.85	23.00
	1732.5	1 RB low	22.32	23.00	21.17	22.00
		1 RB high	23.23	24.00	22.60	23.00
		50% RB mid	23.70	24.00	22.60	23.00
		100% RB	23.71	24.00	22.20	23.00
	1750.0	1 RB low	23.01	24.00	22.29	23.00
		1 RB high	23.11	24.00	22.27	23.00
		50% RB mid	23.45	24.00	22.53	23.00
		100% RB	22.72	23.00	22.12	23.00
15 MHz	1717.5	1 RB low	23.63	24.00	21.34	22.00
		1 RB high	23.13	24.00	22.04	23.00
		50% RB mid	23.32	24.00	22.30	23.00

		100% RB	23.10	24.00	22.09	23.00
	1732.5	1 RB low	23.59	24.00	23.20	24.00
		1 RB high	22.62	23.00	21.67	22.00
		50% RB mid	23.39	24.00	23.07	24.00
		100% RB	22.89	23.00	21.81	22.00
	1747.5	1 RB low	22.64	23.00	21.94	22.00
		1 RB high	23.10	24.00	22.32	23.00
		50% RB mid	22.52	23.00	21.95	22.00
		100% RB	23.06	24.00	21.99	22.00
20 MHz	1720.0	1 RB low	22.69	23.00	22.05	23.00
		1 RB high	22.61	23.00	21.64	22.00
		50% RB mid	23.29	24.00	22.23	23.00
		100% RB	23.64	24.00	22.86	23.00
	1732.5	1 RB low	22.67	23.00	22.23	23.00
		1 RB high	22.57	23.00	21.42	22.00
		50% RB mid	23.69	24.00	22.91	23.00
		100% RB	22.39	23.00	21.29	22.00
	1745.0	1 RB low	22.32	23.00	21.12	22.00
		1 RB high	23.43	24.00	22.25	23.00
		50% RB mid	23.71	24.00	22.04	23.00
		100% RB	22.90	23.00	21.00	22.00

7.1.7. Conducted Power Measurement Results(LTE Band 5)

LTE FDD Band 5						
TX Channel Bandwidth	Frequency (MHz)	RB Size/Offset	Burst Average Power [dBm]	Tune Up (dBm)	Burst Average Power [dBm]	Tune Up (dBm)
			QPSK		16QAM	
1.4 MHz	824.7	1 RB low	23.88	24.00	22.56	23.00
		1 RB high	23.03	24.00	22.18	23.00
		50% RB mid	22.97	23.00	22.04	23.00
		100% RB	22.75	23.00	22.08	23.00
	836.5	1 RB low	23.25	24.00	22.75	23.00
		1 RB high	22.70	23.00	21.49	22.00
		50% RB mid	22.83	23.00	21.44	22.00
		100% RB	22.97	23.00	21.40	22.00
	848.3	1 RB low	23.07	24.00	22.14	23.00
		1 RB high	23.85	24.00	22.32	23.00
		50% RB mid	22.66	23.00	21.49	22.00
		100% RB	23.61	24.00	22.66	23.00
3 MHz	825.5	1 RB low	23.96	24.00	22.21	23.00
		1 RB high	22.53	23.00	21.24	22.00
		50% RB mid	23.83	24.00	22.91	23.00
		100% RB	22.38	23.00	21.43	22.00
	836.5	1 RB low	23.26	24.00	22.48	23.00
		1 RB high	23.88	24.00	22.23	23.00
		50% RB mid	23.55	24.00	22.44	23.00
		100% RB	23.14	24.00	22.82	23.00
	847.5	1 RB low	22.61	23.00	21.27	22.00
		1 RB high	23.36	24.00	22.95	23.00
		50% RB mid	22.99	23.00	21.29	22.00
		100% RB	23.16	24.00	22.93	23.00
5 MHz	826.5	1 RB low	23.68	24.00	22.18	23.00
		1 RB high	23.73	24.00	22.93	23.00
		50% RB mid	22.46	23.00	21.96	22.00
		100% RB	22.78	23.00	22.31	23.00
	836.5	1 RB low	23.55	24.00	22.71	23.00
		1 RB high	22.82	23.00	21.20	22.00
		50% RB mid	22.66	23.00	21.17	22.00
		100% RB	22.92	23.00	21.44	22.00
	846.5	1 RB low	22.97	23.00	21.85	22.00
		1 RB high	22.69	23.00	21.56	22.00
		50% RB mid	23.89	24.00	22.55	23.00
		100% RB	23.82	24.00	22.99	23.00
10 MHz	829.0	1 RB low	23.12	24.00	22.42	23.00
		1 RB high	22.38	23.00	21.93	22.00
		50% RB mid	23.41	24.00	22.70	23.00
		100% RB	22.39	23.00	21.69	22.00
	836.5	1 RB low	22.52	23.00	21.18	22.00
		1 RB high	23.03	24.00	22.40	23.00
		50% RB mid	22.93	23.00	21.71	22.00
		100% RB	22.68	23.00	21.50	22.00
	844.0	1 RB low	22.95	23.00	21.83	22.00
		1 RB high	23.27	24.00	22.86	23.00
		50% RB mid	23.04	24.00	22.84	23.00
		100% RB	22.37	23.00	21.63	22.00

7.1.8. Conducted Power Measurement Results(LTE Band 7)

	LTE Band 7					
TX Channel Bandwidth	Frequency (MHz)	RB Size/Offset	Burst Average Power [dBm]	Tune Up (dBm)	Burst Average Power [dBm]	Tune Up (dBm)
			QPSK		16QAM	
5 MHz	2502.5	1 RB low	23.95	24.00	23.34	24.00
		1 RB mid	22.34	23.00	21.19	22.00
		1 RB high	23.39	24.00	22.86	23.00
		50% RB low	23.53	24.00	23.34	24.00
		50% RB mid	23.08	24.00	22.31	23.00
		50% RB high	22.90	23.00	21.82	22.00
		100% RB	22.77	23.00	21.42	22.00
	2535	1 RB low	23.52	24.00	23.12	24.00
		1 RB mid	23.10	24.00	22.20	23.00
		1 RB high	23.01	24.00	22.06	23.00
		50% RB low	22.18	23.00	21.67	22.00
		50% RB mid	23.16	24.00	22.55	23.00
		50% RB high	22.98	23.00	22.00	23.00
		100% RB	23.22	24.00	22.98	23.00
	2567.5	1 RB low	22.54	23.00	21.98	22.00
		1 RB mid	23.15	24.00	22.14	23.00
		1 RB high	23.59	24.00	22.68	23.00
		50% RB low	22.70	23.00	21.22	22.00
		50% RB mid	23.45	24.00	22.26	23.00
		50% RB high	23.51	24.00	22.15	23.00
		100% RB	22.97	23.00	21.91	22.00
10 MHz	2505	1 RB low	23.90	24.00	23.38	24.00
		1 RB mid	23.84	24.00	23.07	24.00
		1 RB high	22.86	23.00	22.18	23.00
		50% RB low	23.72	24.00	22.85	23.00
		50% RB mid	22.53	23.00	21.32	22.00
		50% RB high	23.00	24.00	22.12	23.00
		100% RB	22.10	23.00	21.89	22.00
	2535	1 RB low	23.94	24.00	22.71	23.00
		1 RB mid	22.59	23.00	21.55	22.00
		1 RB high	23.20	24.00	22.29	23.00
		50% RB low	22.52	23.00	21.16	22.00
		50% RB mid	22.89	23.00	22.03	23.00
		50% RB high	22.99	23.00	22.03	23.00
		100% RB	23.24	24.00	21.25	22.00
	2565	1 RB low	23.03	24.00	22.32	23.00
		1 RB mid	22.92	23.00	22.42	23.00
		1 RB high	22.45	23.00	21.30	22.00
		50% RB low	23.35	24.00	22.83	23.00
		50% RB mid	22.74	23.00	22.15	23.00
		50% RB high	23.84	24.00	22.21	23.00
		100% RB	22.58	23.00	22.11	23.00
15 MHz	2507.5	1 RB low	23.31	24.00	22.78	23.00
		1 RB mid	22.21	23.00	21.53	22.00
		1 RB high	23.77	24.00	22.39	23.00
		50% RB low	22.22	23.00	21.74	22.00
		50% RB mid	23.31	24.00	22.78	23.00

		50% RB high	23.77	24.00	23.18	24.00
		100% RB	22.98	23.00	21.82	22.00
	2535	1 RB low	23.66	24.00	22.04	23.00
		1 RB mid	22.95	23.00	21.64	22.00
		1 RB high	23.74	24.00	22.86	23.00
		50% RB low	22.43	23.00	21.86	22.00
		50% RB mid	23.82	24.00	22.92	23.00
		50% RB high	23.48	24.00	21.22	22.00
		100% RB	23.97	24.00	22.69	23.00
	2562.5	1 RB low	24.06	25.00	23.13	24.00
		1 RB mid	23.18	24.00	22.45	23.00
		1 RB high	22.50	23.00	21.07	22.00
		50% RB low	23.91	24.00	22.94	23.00
		50% RB mid	22.76	23.00	21.35	22.00
		50% RB high	23.34	24.00	22.31	23.00
		100% RB	22.44	23.00	22.10	23.00
20 MHz	2510	1 RB low	23.55	24.00	22.97	23.00
		1 RB mid	23.58	24.00	22.15	23.00
		1 RB high	23.20	24.00	22.36	23.00
		50% RB low	23.69	24.00	22.61	23.00
		50% RB mid	24.03	25.00	23.22	24.00
		50% RB high	23.62	24.00	22.20	23.00
		100% RB	24.12	25.00	23.43	24.00
	2535	1 RB low	23.50	24.00	22.64	23.00
		1 RB mid	24.08	25.00	23.77	24.00
		1 RB high	23.90	24.00	22.06	23.00
		50% RB low	24.11	25.00	23.45	24.00
		50% RB mid	23.29	24.00	22.88	23.00
		50% RB high	23.85	24.00	22.24	23.00
		100% RB	23.30	24.00	23.05	24.00
	2560	1 RB low	23.95	24.00	22.86	23.00
		1 RB mid	23.32	24.00	22.86	23.00
		1 RB high	24.39	25.00	23.19	24.00
		50% RB low	23.52	24.00	22.01	23.00
		50% RB mid	24.18	25.00	23.39	24.00
		50% RB high	23.45	24.00	22.22	23.00
		100% RB	24.23	25.00	23.06	24.00

7.1.9. Conducted Power Measurement Results(WIFI 2.4G)

Mode	TX Type	Frequency (MHz)	Maximum Average Conducted Output Power (dBm)	Tune Up (dBm)	Antenna Gain(dBi)	E.I.R.P (dBm)	Tune Up (dBm)
802.11b	SISO	2412	12.16	13.00	0.72	12.88	13.00
		2437	13.19	14.00	0.72	13.91	14.00
		2462	13.53	14.00	0.72	14.25	15.00
802.11g	SISO	2412	11.95	12.00	0.72	12.67	13.00
		2437	12.99	13.00	0.72	13.71	14.00
		2462	12.69	13.00	0.72	13.41	14.00
802.11n(HT20)	SISO	2412	12.41	13.00	0.72	13.13	14.00
		2437	12.28	13.00	0.72	13.00	14.00
		2462	12.52	13.00	0.72	13.24	14.00
802.11n(HT40)	SISO	2422	12.2	13.00	0.72	12.92	13.00
		2437	11.72	12.00	0.72	12.44	13.00
		2452	11.94	12.00	0.72	12.66	13.00

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

7.1.10. Conducted Power Measurement Results(WIFI 5.2G)

Mode	TX Type	Frequency (MHz)	Maximum Average Conducted Output Power (dBm)	Tune Up (dBm)	Antenna Gain(dBi)	E.I.R.P (dBm)	Tune Up (dBm)
802.11a	SISO	CH36	7.24	8.00	1.2	8.44	9.00
		CH40	8.47	9.00	1.2	9.67	10.00
		CH48	8.04	9.00	1.2	9.24	10.00
802.11n(HT20)	SISO	CH36	7.13	8.00	1.2	8.33	9.00
		CH40	6.34	7.00	1.2	7.54	8.00
		CH48	7.88	8.00	1.2	9.08	9.50
802.11n(HT40)	SISO	CH38	6.21	7.00	1.2	7.41	8.00
		CH46	7.45	8.00	1.2	8.65	9.00
802.11ac(HT20)	SISO	CH36	6.04	7.00	1.2	7.24	8.00
		CH40	6.18	7.00	1.2	7.38	8.00
		CH48	7.32	8.00	1.2	8.52	9.00
802.11ac(HT40)	SISO	CH38	6.13	7.00	1.2	7.33	8.00
		CH46	7.41	8.00	1.2	8.61	9.00
802.11ac(HT80)	SISO	CH42	6.41	7.00	1.2	7.61	8.00

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

7.1.11. Conducted Power Measurement Results(WIFI 5.8G)

Mode	TX Type	Frequency (MHz)	Maximum Average Conducted Output Power (dBm)	Tune Up (dBm)	Antenna Gain(dBi)	E.I.R.P (dBm)	Tune Up (dBm)
802.11a	SISO	CH149	6.31	7.00	1.2	7.51	8.00
		CH157	8.61	9.00	1.2	9.81	10.00
		CH165	7.05	8.00	1.2	8.25	9.00
802.11n(HT20)	SISO	CH149	7.76	8.00	1.2	8.96	9.00
		CH157	6.2	7.00	1.2	7.4	8.00
		CH165	6.72	7.00	1.2	7.92	8.00
802.11n(HT40)	SISO	CH151	7.6	8.00	1.2	8.8	9.00
		CH159	6.66	7.00	1.2	7.86	8.00
802.11ac(HT20)	SISO	CH149	8.16	9.00	1.2	9.36	9.50
		CH157	6.43	7.00	1.2	7.63	8.00
		CH165	7.9	8.00	1.2	9.1	9.50
802.11ac(HT40)	SISO	CH151	7.61	8.00	1.2	8.81	9.00
		CH159	6.76	7.00	1.2	7.96	8.00
802.11ac(HT80)	SISO	CH155	6.99	7.00	1.2	8.19	9.00

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

7.1.12. Conducted Power Measurement Results(Bluetooth)

Type	Channel	Maximum Peak Conducted Output Power (dBm)	Tune Up (dBm)
GFSK	00	7.86	8.00
	39	7.07	8.00
	78	7.98	8.00
π/4DQPSK	00	7.05	8.00
	39	6.14	7.00
	78	7.14	8.00
8DPSK	00	6.61	7.00
	39	6.19	7.00
	78	7.16	8.00

Channel	Channel Frequency (MHz)	Output Power (dBm)	Tune Up (dBm)
Low	2402	-4.58	-4.00
Middle	2440	-4.45	-4.00
High	2480	-3.70	-3.00

7.2. Stand-alone SAR test evaluation

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

Freq. Band	Frequency (GHz)	Position	Average Power		Test Separation (mm)	Calculate Value	Exclusion Threshold	Exclusion (Y/N)
			dBm	mW				
Bluetooth	2.48	Head	8.0	6.31	5	1.987	3	Y
		Body-worn	8.0	6.31	10	0.994	3	Y
		hotspot	8.0	6.31	10	0.994	3	Y

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

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

7.3. SAR Measurement Results

The calculated SAR is obtained by the following formula:

Reported SAR=Measured SAR*10$^{(Ptarget-Pmeasured))/10}$

Scaling factor=10$^{(Ptarget-Pmeasured))/10}$

Reported SAR= Measured SAR* Scaling factor

Where

P_{target} is the power of manufacturing upper limit;

$P_{measured}$ is the measured power;

Measured SAR is measured SAR at measured power which including power drift)

Reported SAR which including Power Drift and Scaling factor

7.3.1. SAR Results[GSM 850]

SAR Values [GSM850]								
Ch/ Freq. (MHz)	Channel Type	Test Position	Conducted Power (dBm)	Maximum Allowed Power (dBm)	Power Drift (dB)	Scaling Factor	SAR_{1-g} results(W/kg)	
							Measured	Reported
measured / reported SAR numbers – Head Test data								
190/836.6	GSM	Left Cheek	33.79	34.00	0.19	1.050	**0.456**	**0.479**
190/836.6	GSM	Left Tilt	33.79	34.00	-0.16	1.050	0.251	0.263
190/836.6	GSM	Right Cheek	33.79	34.00	-0.15	1.050	0.406	0.426
190/836.6	GSM	Right Tilt	33.79	34.00	-0.08	1.050	0.297	0.312
measured / reported SAR numbers - Body (Hotspot Test data distance 10mm)								
251/848.8	GPRS 2TS	Front side	32.55	32.60	0.01	1.012	0.311	0.315
251/848.8	GPRS 2TS	Rear side	32.55	32.60	-0.16	1.012	**0.387**	**0.391**
251/848.8	GPRS 2TS	Left side	32.55	32.60	-0.16	1.012	0.133	0.135
251/848.8	GPRS 2TS	Right side	32.55	32.60	-0.15	1.012	0.273	0.276
251/848.8	GPRS 2TS	Bottom side	32.55	32.60	-0.08	1.012	0.309	0.313

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.

7.3.2. SAR Results[GSM 1900]

SAR Values [GSM1900]								
Ch/ Freq. (MHz)	Channel Type	Test Position	Conducted Power (dBm)	Maximum Allowed Power (dBm)	Power Drift (dB)	Scaling Factor	SAR_{1-g} results(W/kg)	
							Measured	Reported
measured / reported SAR numbers – Head Test data								
512/1850.2	GSM	Left Cheek	32.02	32.50	0.02	1.117	**0.389**	**0.434**
512/1850.2	GSM	Left Tilt	32.02	32.50	0.16	1.117	0.113	0.126
512/1850.2	GSM	Right Cheek	32.02	32.50	0.15	1.117	0.349	0.390
512/1850.2	GSM	Right Tilt	32.02	32.50	0.02	1.117	0.125	0.140
measured / reported SAR numbers - Body (Hotspot Test data distance 10mm)								
512/1850.2	GPRS 4TS	Front side	28.22	28.30	-0.11	1.019	0.478	0.487
512/1850.2	GPRS 4TS	Rear side	28.22	28.30	0.05	1.019	**0.583**	**0.594**
512/1850.2	GPRS 4TS	Left side	28.22	28.30	0.16	1.019	0.237	0.241
512/1850.2	GPRS 4TS	Right side	28.22	28.30	0.14	1.019	0.460	0.469
512/1850.2	GPRS 4TS	Bottom side	28.22	28.30	0.03	1.019	0.440	0.448

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.

7.3.3. SAR Results [WCDMA Band II]

SAR Values [WCDMA Band II]								
Ch/ Freq. (MHz)	Channel Type	Test Position	Conducted Power (dBm)	Maximum Allowed Power (dBm)	Power Drift (dB)	Scaling Factor	$SAR_{1\text{-}g}$ results(W/kg)	
							Measured	Reported
measured / reported SAR numbers – Head Test data								
9538/1907.6	RMC	Left Cheek	24.04	24.50	0.19	1.112	**0.288**	**0.320**
9538/1907.6	RMC	Left Tilt	24.04	24.50	-0.19	1.112	0.094	0.105
9538/1907.6	RMC	Right Cheek	24.04	24.50	-0.02	1.112	0.155	0.172
9538/1907.6	RMC	Right Tilt	24.04	24.50	-0.14	1.112	0.088	0.098
measured / reported SAR numbers - Body (Hotspot Test data distance 10mm)								
9538/1907.6	RMC	Front side	24.04	24.50	0.12	1.112	0.483	0.537
9538/1907.6	RMC	Rear side	24.04	24.50	0.14	1.112	**0.497**	**0.553**
9538/1907.6	RMC	Left side	24.04	24.50	-0.03	1.112	0.213	0.237
9538/1907.6	RMC	Right side	24.04	24.50	-0.12	1.112	0.366	0.407
9538/1907.6	RMC	Bottom side	24.04	24.50	-0.01	1.112	0.385	0.428

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.

3) RMC* - RMC 12.2kbps mode;

7.3.4. SAR Results [WCDMA Band V]

SAR Values [WCDMA Band V]								
Ch/ Freq. (MHz)	Channel Type	Test Position	Conducted Power (dBm)	Maximum Allowed Power (dBm)	Power Drift (dB)	Scaling Factor	SAR_{1-g} results(W/kg)	
							Measured	Reported
measured / reported SAR numbers – Head Test data								
4233/846.6	RMC	Left Cheek	23.68	24.00	0.12	1.076	0.487	0.524
4233/846.6	RMC	Left Tilt	23.68	24.00	-0.02	1.076	0.241	0.259
4233/846.6	RMC	Right Cheek	23.68	24.00	-0.09	1.076	**0.554**	**0.596**
4233/846.6	RMC	Right Tilt	23.68	24.00	-0.15	1.076	0.326	0.351
measured / reported SAR numbers - Body (Hotspot Test data distance 10mm)								
4233/846.6	RMC	Front side	23.68	24.00	-0.13	1.076	0.341	0.367
4233/846.6	RMC	Rear side	23.68	24.00	0.02	1.076	**0.432**	**0.465**
4233/846.6	RMC	Left side	23.68	24.00	0.14	1.076	0.380	0.409
4233/846.6	RMC	Right side	23.68	24.00	0.07	1.076	0.168	0.181
4233/846.6	RMC	Bottom side	23.68	24.00	-0.04	1.076	0.356	0.383

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.

3) RMC* - RMC 12.2kbps mode;

7.3.5. SAR Results [LTE Band 2]

SAR Values [LTE Band 2]									
Ch/ Freq. (MHz)	BW.	Channel Type	Test Position	Conducted Power (dBm)	Maximum Allowed Power (dBm)	Power Drift (dB)	Scaling Factor	SAR_{1-g} results(W/kg)	
								Measured	Reported
measured / reported SAR numbers – Head <1RB>									
18700/1860	20M	QPSK 1RB_0	Left Cheek	24.27	25.00	0.18	1.183	0.207	0.245
18700/1860	20M	QPSK 1RB_0	Left Tilt	24.27	25.00	0.12	1.183	0.120	0.142
18700/1860	20M	QPSK 1RB_0	Right Cheek	24.27	25.00	0.04	1.183	**0.277**	**0.328**
18700/1860	20M	QPSK 1RB_0	Right Tilt	24.27	25.00	-0.07	1.183	0.097	0.115
measured / reported SAR numbers – Head <50%RB>									
19100/1900	20M	QPSK 50RB_25	Left Cheek	24.16	25.00	0.16	1.213	0.194	0.235
19100/1900	20M	QPSK 50RB_25	Left Tilt	24.16	25.00	0.08	1.213	0.113	0.137
19100/1900	20M	QPSK 50RB_25	Right Cheek	24.16	25.00	-0.03	1.213	0.261	0.317
19100/1900	20M	QPSK 50RB_25	Right Tilt	24.16	25.00	0.18	1.213	0.095	0.115
measured / reported SAR numbers - Body (Hotspot Test data distance 10mm)<1RB>									
18700/1860	20M	QPSK 1RB_0	Front side	24.27	25.00	-0.06	1.183	0.446	0.528
18700/1860	20M	QPSK 1RB_0	Rear side	24.27	25.00	-0.17	1.183	**0.585**	**0.692**
18700/1860	20M	QPSK 1RB_0	Left side	24.27	25.00	-0.19	1.183	0.239	0.283
18700/1860	20M	QPSK 1RB_0	Right side	24.27	25.00	-0.07	1.183	0.270	0.319
18700/1860	20M	QPSK 1RB_0	Bottom side	24.27	25.00	0.12	1.183	0.417	0.493
measured / reported SAR numbers - Body (Hotspot Test data distance 10mm)<50%RB>									
19100/1900	20M	QPSK 50RB_25	Front side	24.16	25.00	0.15	1.213	0.413	0.501
19100/1900	20M	QPSK 50RB_25	Rear side	24.16	25.00	0.07	1.213	0.547	0.664
19100/1900	20M	QPSK 50RB_25	Left side	24.16	25.00	0.10	1.213	0.204	0.248
19100/1900	20M	QPSK 50RB_25	Right side	24.16	25.00	-0.04	1.213	0.225	0.273
19100/1900	20M	QPSK 50RB_25	Bottom side	24.16	25.00	-0.18	1.213	0.379	0.460

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.

7.3.6. SAR Results [LTE Band 4]

SAR Values [LTE Band 4]									
Ch/ Freq. (MHz)	BW.	Channel Type	Test Position	Conducted Power (dBm)	Maximum Allowed Power (dBm)	Power Drift (dB)	Scaling Factor	SAR_{1-g} results(W/kg)	
								Measured	Reported
measured / reported SAR numbers – Head <1RB>									
20300/1745	20M	QPSK 1RB_99	Left Cheek	23.43	24.00	-0.14	1.140	**0.249**	**0.284**
20300/1745	20M	QPSK 1RB_0	Left Tilt	23.43	24.00	0.08	1.074	0.145	0.156
20300/1745	20M	QPSK 1RB_0	Right Cheek	23.43	24.00	0.06	1.074	0.197	0.212
20300/1745	20M	QPSK 1RB_0	Right Tilt	23.43	24.00	0.13	1.074	0.102	0.110
measured / reported SAR numbers – Head <50%RB>									
20300/1745	20M	QPSK 50RB_25	Left Cheek	23.71	24.00	0.06	1.069	0.224	0.239
20300/1745	20M	QPSK 50RB_25	Left Tilt	23.71	24.00	-0.12	1.069	0.137	0.146
20300/1745	20M	QPSK 50RB_25	Right Cheek	23.71	24.00	0.12	1.069	0.186	0.199
20300/1745	20M	QPSK 50RB_25	Right Tilt	23.71	24.00	-0.11	1.069	0.112	0.120
measured / reported SAR numbers - Body (Hotspot Test data distance 10mm)<1RB>									
20300/1745	20M	QPSK 1RB_0	Front side	23.43	24.00	-0.19	1.074	0.543	0.583
20300/1745	20M	QPSK 1RB_99	Rear side	23.43	24.00	0.05	1.140	**0.689**	**0.786**
20300/1745	20M	QPSK 1RB_0	Left side	23.43	24.00	0.07	1.074	0.417	0.448
20300/1745	20M	QPSK 1RB_0	Right side	23.43	24.00	-0.03	1.074	0.452	0.485
20300/1745	20M	QPSK 1RB_0	Bottom side	23.43	24.00	-0.08	1.074	0.588	0.632
measured / reported SAR numbers - Body (Hotspot Test data distance 10mm)<50%RB>									
20300/1745	20M	QPSK 50RB_25	Front side	23.71	24.00	0.19	1.069	0.553	0.591
20300/1745	20M	QPSK 50RB_25	Rear side	23.71	24.00	0.11	1.069	0.673	0.719
20300/1745	20M	QPSK 50RB_25	Left side	23.71	24.00	0.18	1.069	0.401	0.429
20300/1745	20M	QPSK 50RB_25	Right side	23.71	24.00	-0.01	1.069	0.410	0.438
20300/1745	20M	QPSK 50RB_25	Bottom side	23.71	24.00	-0.15	1.069	0.527	0.563

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.

7.3.7. SAR Results [LTE Band 5]

SAR Values [LTE Band 5]									
Ch/ Freq. (MHz)	BW.	Channel Type	Test Position	Conducted Power (dBm)	Maximum Allowed Power (dBm)	Power Drift (dB)	Scaling Factor	SAR_{1-g} results(W/kg)	
								Measured	Reported
measured / reported SAR numbers – Head <1RB>									
20600/844	10M	QPSK 1RB_49	Left Cheek	23.27	24.00	-0.02	1.183	**0.386**	**0.457**
20600/844	10M	QPSK 1RB_49	Left Tilt	23.27	24.00	-0.04	1.183	0.172	0.203
20600/844	10M	QPSK 1RB_49	Right Cheek	23.27	24.00	-0.16	1.183	0.265	0.314
20600/844	10M	QPSK 1RB_49	Right Tilt	23.27	24.00	0.10	1.183	0.103	0.122
measured / reported SAR numbers – Head <50%RB>									
20450/829	10M	QPSK 25RB_12	Left Cheek	23.41	24.00	0.05	1.146	0.248	0.284
20450/829	10M	QPSK 25RB_12	Left Tilt	23.41	24.00	-0.07	1.146	0.135	0.155
20450/829	10M	QPSK 25RB_12	Right Cheek	23.41	24.00	0.10	1.146	0.195	0.223
20450/829	10M	QPSK 25RB_12	Right Tilt	23.41	24.00	-0.16	1.146	0.098	0.112
measured / reported SAR numbers - Body (Hotspot Test data distance 10mm)<1RB>									
20600/844	10M	QPSK 1RB_49	Front side	23.27	24.00	0.13	1.183	0.206	0.244
20600/844	10M	QPSK 1RB_49	Rear side	23.27	24.00	0.14	1.183	**0.375**	**0.444**
20600/844	10M	QPSK 1RB_49	Left side	23.27	24.00	0.14	1.183	0.196	0.232
20600/844	10M	QPSK 1RB_49	Right side	23.27	24.00	-0.11	1.183	0.167	0.198
20600/844	10M	QPSK 1RB_49	Bottom side	23.27	24.00	0.12	1.183	0.258	0.305
measured / reported SAR numbers - Body (Hotspot Test data distance 10mm)<50%RB>									
20450/829	10M	QPSK 25RB_12	Front side	23.41	24.00	-0.07	1.146	0.157	0.180
20450/829	10M	QPSK 25RB_12	Rear side	23.41	24.00	-0.03	1.146	0.255	0.292
20450/829	10M	QPSK 25RB_12	Left side	23.41	24.00	-0.14	1.146	0.123	0.141
20450/829	10M	QPSK 25RB_12	Right side	23.41	24.00	-0.06	1.146	0.097	0.111
20450/829	10M	QPSK 25RB_12	Bottom side	23.41	24.00	0.16	1.146	0.201	0.230

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.

7.3.8. SAR Results [LTE Band 7]

SAR Values [LTE Band 7]									
Ch/ Freq. (MHz)	BW.	Channel Type	Test Position	Conducted Power (dBm)	Maximum Allowed Power (dBm)	Power Drift (dB)	Scaling Factor	SAR_{1-g} results(W/kg)	
								Measured	Reported
measured / reported SAR numbers – Head<1RB>									
21350/2560	20M	QPSK 1RB_99	Left Cheek	24.39	25.00	0.03	1.151	**0.289**	**0.333**
21350/2560	20M	QPSK 1RB_99	Left Tilt	24.39	25.00	-0.12	1.151	0.184	0.212
21350/2560	20M	QPSK 1RB_99	Right Cheek	24.39	25.00	0.14	1.151	0.242	0.278
21350/2560	20M	QPSK 1RB_99	Right Tilt	24.39	25.00	0.14	1.151	0.165	0.190
measured / reported SAR numbers – Head<50%RB>									
21350/2560	20M	QPSK 50RB_25	Left Cheek	24.18	25.00	-0.02	1.208	0.213	0.257
21350/2560	20M	QPSK 50RB_25	Left Tilt	24.18	25.00	0.18	1.208	0.151	0.182
21350/2560	20M	QPSK 50RB_25	Right Cheek	24.18	25.00	0.16	1.208	0.197	0.238
21350/2560	20M	QPSK 50RB_25	Right Tilt	24.18	25.00	-0.06	1.208	0.101	0.122
measured / reported SAR numbers - Body (Hotspot Test data distance 10mm)<1RB>									
21350/2560	20M	QPSK 1RB_99	Front side	24.39	25.00	-0.08	1.151	0.460	0.529
21350/2560	20M	QPSK 1RB_99	Rear side	24.39	25.00	-0.05	1.151	**0.610**	**0.702**
21350/2560	20M	QPSK 1RB_99	Left side	24.39	25.00	-0.16	1.151	0.317	0.365
21350/2560	20M	QPSK 1RB_99	Right side	24.39	25.00	-0.12	1.151	0.294	0.338
21350/2560	20M	QPSK 1RB_99	Bottom side	24.39	25.00	-0.05	1.151	0.438	0.504
measured / reported SAR numbers - Body (Hotspot Test data distance 10mm)<50%RB>									
21350/2560	20M	QPSK 50RB_25	Front side	24.18	25.00	0.07	1.208	0.397	0.480
21350/2560	20M	QPSK 50RB_25	Rear side	24.18	25.00	-0.02	1.208	0.574	0.693
21350/2560	20M	QPSK 50RB_25	Left side	24.18	25.00	-0.06	1.208	0.223	0.269
21350/2560	20M	QPSK 50RB_25	Right side	24.18	25.00	-0.18	1.208	0.217	0.262
21350/2560	20M	QPSK 50RB_25	Bottom side	24.18	25.00	-0.01	1.208	0.397	0.480

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.

7.3.9. SAR Results [WIFI 2.4G]

SAR Values [WIFI 2.4G]								
Ch/ Freq. (MHz)	Channel Type	Test Position	Conducted Power (dBm)	Maximum Allowed Power (dBm)	Power Drift (dB)	Scaling Factor	SAR_{1-g} results(W/kg)	
							Measured	Reported
measured / reported SAR numbers – Head								
11/2462	802.11b	Left Cheek	13.53	14.00	-0.11	1.114	**0.418**	**0.466**
11/2462	802.11b	Left Tilt	13.53	14.00	0.12	1.114	0.282	0.314
11/2462	802.11b	Right Cheek	13.53	14.00	-0.08	1.114	0.360	0.401
11/2462	802.11b	Right Tilt	13.53	14.00	0.19	1.114	0.233	0.260
measured / reported SAR numbers - Body (Hotspot Test data distance 10mm)								
11/2462	802.11b	Front side	13.53	14.00	-0.09	1.114	0.236	0.263
11/2462	802.11b	Rear side	13.53	14.00	0.01	1.114	**0.347**	**0.387**
11/2462	802.11b	Left side	13.53	14.00	0.09	1.114	0.248	0.276
11/2462	802.11b	Top side	13.53	14.00	-0.09	1.114	0.236	0.263

Note:
1) The maximum Scaled SAR value is marked in bold. Graph results refer to Appendix B.
2) Per KDB 648474 D04, Product Specific 10-g SAR test is not required for this frequency band since hotspot mode 1-g reported SAR < 1.2 W/kg.
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.

7.3.10. SAR Results [WIFI 5.2G]

SAR Values [WIFI 5.2G]								
Ch/ Freq. (MHz)	Channel Type	Test Position	Conducted Power (dBm)	Maximum Allowed Power (dBm)	Power Drift (dB)	Scaling Factor	SAR_{1-g} *results(W/kg)*	
							Measured	Reported
measured / reported SAR numbers – Head								
40/5200	802.11a	Left Cheek	8.47	9.00	-0.07	1.130	**0.283**	**0.320**
40/5200	802.11a	Left Tilt	8.47	9.00	-0.09	1.130	0.161	0.182
40/5200	802.11a	Right Cheek	8.47	9.00	-0.14	1.130	0.213	0.241
40/5200	802.11a	Right Tilt	8.47	9.00	0.07	1.130	0.197	0.223
measured / reported SAR numbers - Body (Hotspot Test data distance 10mm)								
40/5200	802.11a	Front side	8.47	9.00	-0.06	1.130	0.227	0.256
40/5200	802.11a	Rear side	8.47	9.00	0.18	1.130	**0.316**	**0.357**
40/5200	802.11a	Left side	8.47	9.00	-0.12	1.130	0.204	0.230
40/5200	802.11a	Top side	8.47	9.00	-0.04	1.114	0.227	0.253

Note:

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

2) Per KDB 648474 D04, Product Specific 10-g SAR test is not required for this frequency band since hotspot mode 1-g reported SAR < 1.2 W/kg.

3) 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.

7.3.11. SAR Results [WIFI 5.8G]

SAR Values [WIFI 5.8G]								
Ch/ Freq. (MHz)	Channel Type	Test Position	Conducted Power (dBm)	Maximum Allowed Power (dBm)	Power Drift (dB)	Scaling Factor	SAR_{1-g} *results(W/kg)*	
							Measured	Reported
measured / reported SAR numbers – Head								
157/5785	802.11a	Left Cheek	8.61	9.00	0.02	1.094	**0.241**	**0.298**
157/5785	802.11a	Left Tilt	8.61	9.00	-0.03	1.094	0.133	0.145
157/5785	802.11a	Right Cheek	8.61	9.00	-0.18	1.094	0.108	0.118
157/5785	802.11a	Right Tilt	8.61	9.00	-0.11	1.094	0.094	0.103
measured / reported SAR numbers - Body (Hotspot Test data distance 10mm)								
157/5785	802.11a	Front side	8.61	9.00	-0.1	1.094	0.094	0.103
157/5785	802.11a	Rear side	8.61	9.00	-0.07	1.094	**0.165**	**0.204**
157/5785	802.11a	Left side	8.61	9.00	0.13	1.094	0.108	0.118
157/5785	802.11a	Top side	8.61	9.00	-0.19	1.094	0.094	0.103

Note:

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

2) Per KDB 648474 D04, Product Specific 10-g SAR test is not required for this frequency band since hotspot mode 1-g reported SAR < 1.2 W/kg.

3) 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.

7.4. Multiple Transmitter Evaluation

7.4.1. Simultaneous SAR SAR test evaluation

Simultaneous Transmission Possibilities

NO.	Simultaneous Tx Combination	Head	Body	Hotspot
1	GSM Voice + BT	Yes	Yes	Yes
2	GSM DATA + BT	Yes	Yes	Yes
3	GSM Voice + WiFi 2.4G	Yes	Yes	Yes
4	GSM DATA + WiFi 2.4G	Yes	Yes	Yes
5	GSM Voice + WiFi 5G	Yes	Yes	Yes
6	GSM DATA + WiFi 5G	Yes	Yes	Yes
7	UMTS + BT	Yes	Yes	Yes
8	UMTS + WiFi 2.4G	Yes	Yes	Yes
9	UMTS + WiFi 5G	Yes	Yes	Yes
10	LTE + WiFi 2.4G	Yes	Yes	Yes
11	LTE + WiFi 5G	Yes	Yes	Yes
12	LTE + BT	Yes	Yes	Yes

Note:
1) Wi-Fi and Bluetooth share the same Tx antenna and can't transmit simultaneously.
2) The device does not support DTM function.

7.4.2. Estimated SAR

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

• (max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)]·[√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.

Estimated SAR Result

Freq. Band	Frequency (GHz)	Test Position	max. power (dBm)	max. power (mw)	Test Separation (mm)	Estimated 1g SAR (W/kg)
Bluetooth	2.48	Head	8.0	6.31	5	0.265
		Body-worn	8.0	6.31	10	0.132
		hotspot	8.0	6.31	10	0.132

7.4.3. Simultaneous Transmission SAR Summation Scenario

Test position		Main Antenna SARmax (W/kg)								WiFi Antenna SARmax (W/kg)				Summed 1g SARmax (W/kg)
		GSM 850	GSM 1900	WCDMA Band II	WCDMA Band V	LTE Band 2	LTE Band 4	LTE Band 5	LTE Band 7	WLAN 2.4G	WLAN 5.2G	WLAN 5.8G	BT	
Head	Left cheek	0.479	0.434	0.32	0.524	0.245	0.284	0.457	0.333	0.466	0.32	0.269	0.265	0.99
	Left tilted	0.263	0.126	0.105	0.259	0.142	0.156	0.203	0.212	0.314	0.182	0.145	0.265	0.577
	Right cheek	0.426	0.39	0.172	0.596	0.328	0.212	0.314	0.278	0.401	0.241	0.118	0.265	0.997
	Right tilted	0.312	0.14	0.098	0.351	0.115	0.12	0.122	0.19	0.26	0.223	0.103	0.265	0.611
Body	Front side	0.315	0.487	0.537	0.367	0.528	0.591	0.244	0.529	0.263	0.256	0.103	0.132	0.854
	Back side	0.391	0.594	0.553	0.465	0.692	0.786	0.444	0.702	0.387	0.357	0.181	0.132	**1.173**
	Left side	0.135	0.241	0.237	0.409	0.283	0.448	0.232	0.365	0.276	0.23	0.118	0.132	0.724
	Right side	0.276	0.469	0.407	0.181	0.319	0.485	0.198	0.338	/	/	/	/	0.485
	Top side	/	/	/	/	/	/	/	/	0.263	0.253	0.103	0.132	0.263
	Bottom side	0.313	0.448	0.428	0.383	0.493	0.632	0.305	0.504	/	/	/	/	0.632

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Appendix A: Detailed System Check Results

Appendix B: Detailed Test Results

Appendix C: Calibration certificate

Appendix D: Photographs

....................The End of Test Report.........................