



FCC SAR TEST REPORT

Application No: HR/2019/10005
Applicant: Unimax communications
Manufacturer: Unimax communications
Factory: Unimax communications
Product Name: Smartphone
Model No.(EUT): U683CL
Trade Mark: UMX
FCC ID: P46-U683CL
Standards: FCC 47CFR §2.1093
Date of Receipt: 2019-01-09
Date of Test: 2019-01-11 to 2019-01-22
Date of Issue: 2019-02-26
Test conclusion: **PASS ***

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

Authorized Signature:

Derek Yang

Wireless Laboratory Manager

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

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



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REVISION HISTORY

Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2019-02-26		Original



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TEST SUMMARY

Frequency Band	Maximum Reported SAR(W/kg)		
	Head	Body-worn	Hotspot
CDMA BC0	0.69	0.65	1.01
CDMA BC1	0.38	0.72	1.37
CDMA BC10	0.60	0.65	0.87
LTE Band 2	0.24	0.54	1.03
LTE Band 4	0.57	0.49	0.93
LTE Band 5	0.56	0.58	0.75
LTE Band 13	0.47	0.79	0.91
LTE Band 25	0.26	0.58	1.16
LTE Band 26	0.54	0.54	0.68
LTE Band 41	0.44	0.43	1.33
WI-FI (2.4GHz)	0.45	/	0.14
SAR Limited(W/kg)	1.6		
Maximum Simultaneous Transmission SAR (W/kg)			
Scenario	Head	Body-worn	Hotspot
Sum SAR	1.04	1.15	1.51
SPLSR	NA	NA	NA
SPLSR Limited	0.04		


Approved & Released by



Simon Ling

SAR Manager

Tested by



Jackson Li

SAR Engineer



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1 General Information

1.1 Details of Client

Applicant:	Unimax communications
Address:	18201 McDermott St.West Suite E,Irvine,CA 92614.
Manufacturer:	Unimax communications
Address:	18201 McDermott St.West Suite E,Irvine,CA 92614.
Factory:	Unimax communications
Address:	18201 McDermott St.West Suite E,Irvine,CA 92614.

1.2 Test Location

Company: SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch
 Address: No. 1 Workshop, M-10, Middle section, Science & Technology Park, Shenzhen, Guangdong, China
 Post code: 518057
 Telephone: +86 (0) 755 2601 2053
 Fax: +86 (0) 755 2671 0594
 E-mail: ee.shenzhen@sgs.com



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1.3 Test Facility

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

- **CNAS (No. CNAS L2929)**

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

- **A2LA (Certificate No. 3816.01)**

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

- **VCCI**

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

- **FCC –Designation Number: CN1178**

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

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

- **Industry Canada (IC)**

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



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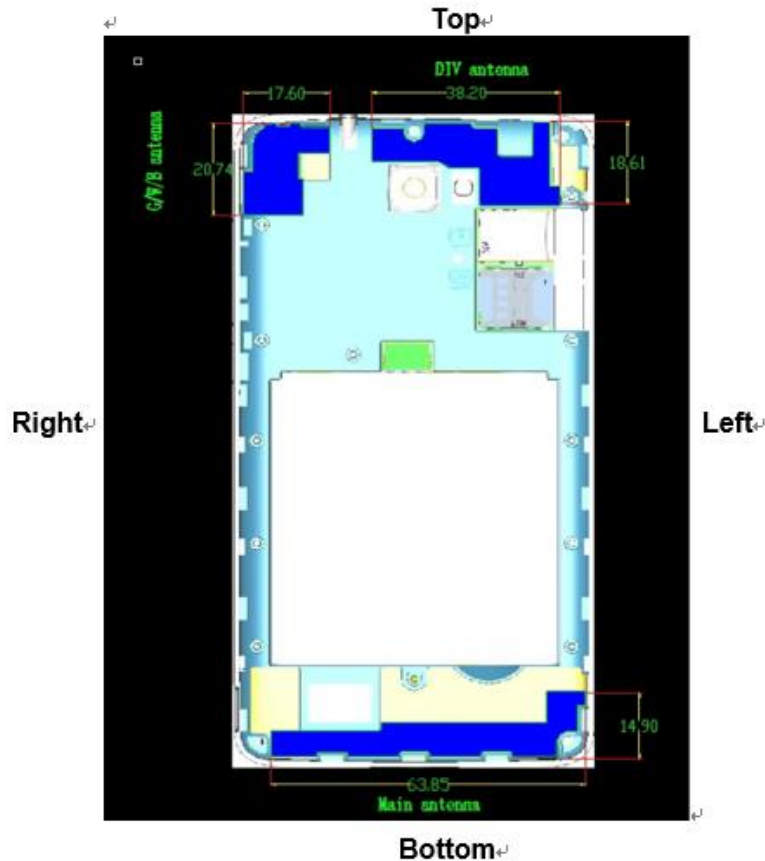
1.4 General Description of EUT

Product Name:	Smartphone		
Model No.(EUT):	U683CL		
FCC ID:	P46-U683CL		
Trade Mark:	UMX		
Product Phase:	production unit		
Device Type :	portable device		
Exposure Category:	uncontrolled environment / general population		
SN:	73684760/44be3e56/30d57959		
Hardware Version:	Q5007-MB-V1.0		
Software Version:	U683CL_01.01.01.111634		
Antenna Type:	internal		
Device Operating Configurations :			
Modulation Mode:	CDMA: QPSK LTE: QPSK,16QAM; WIFI: DSSS; OFDM; BT: GFSK, π/4DQPSK,8DPSK		
Power Class	3, tested with power control "all 1"(CDMA BC0/BC10/BC1) 3, tested with power control Max Power(LTE Band 2/4/5/13/25/26/41)		
Frequency Bands:	Band	Tx (MHz)	Rx (MHz)
	CDMA BC10	817~824	862~869
	CDMA BC0	824~849	869~894
	CDMA BC1	1850~1910	1930~1990
	LTE Band 2	1850~1910	1930~1990
	LTE Band 4	1710~1755	2110~2155
	LTE Band 5	824~849	869~894
	LTE Band 13	777~787	746~756
	LTE Band 25	1850~1915	1930~1995
	LTE Band 26	814~849	859~894
	LTE Band 41	2496~2690	2496~2690
	WIFI2.4G	2412~2462	2412~2462
	BT	2402~2480	2402~2480
Battery Information:	Model: U683CL		
	Rated capacity: 3.8V 2000mAh		
	Manufacturer: Dongguan Guoxiao Electronic Technology Co., Ltd.		



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1.4.1 DUT Antenna Locations(Back View)



Note:

- 1) The DIV Antenna does not support transmitter function.
- 2) The test device is a Smartphone. The display diagonal dimension is 127mm and the overall diagonal dimension of this device is 156mm.

According to the distance between LTE/CDMA antennas and the sides of the EUT we can draw the conclusion that:

EUT Sides for SAR Testing						
Mode	Front	Back	Left	Right	Top	Bottom
Main Antenna	Yes	Yes	Yes	Yes	No	Yes
2.4G WIFI	Yes	Yes	No	Yes	Yes	No

Table 1: EUT Sides for SAR Testing

Note:

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



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1.5 Test Specification

Identity	Document Title
FCC 47CFR §2.1093	Radiofrequency Radiation Exposure Evaluation: Portable Devices
ANSI/IEEE Std C95.1 – 1992	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 Procedures v03r01	3G SAR Measurement Procedures
KDB 941225 D05 SAR for LTE Devices v02r05	SAR EVALUATION CONSIDERATIONS FOR LTE DEVICES
KDB 941225 D06 Hotspot Mode SAR v02r01	SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities
KDB 248227 D01 802.11 Wi-Fi SAR v02r02	SAR GUIDANCE FOR IEEE 802.11 (Wi-Fi) TRANSMITTERS
KDB 648474 D04 Handset SAR v01r03	SAR Evaluation Considerations for Wireless Handsets
KDB447498 D01 General RF Exposure Guidance v06	Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies
KDB447498 D03 Supplement C Cross-Reference v01	OET Bulletin 65, Supplement C Cross-Reference
KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04	SAR Measurement Requirements for 100 MHz to 6 GHz
KDB 865664 D02 RF Exposure Reporting v01r02	RF Exposure Compliance Reporting and Documentation Considerations



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1.6 RF exposure limits

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

Notes:

* The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time

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

*** The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

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

Controlled Environments are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation.)



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2 Laboratory Environment

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

Table 2: The Ambient Conditions



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3 SAR Measurements System Configuration

3.1 The SAR Measurement System

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

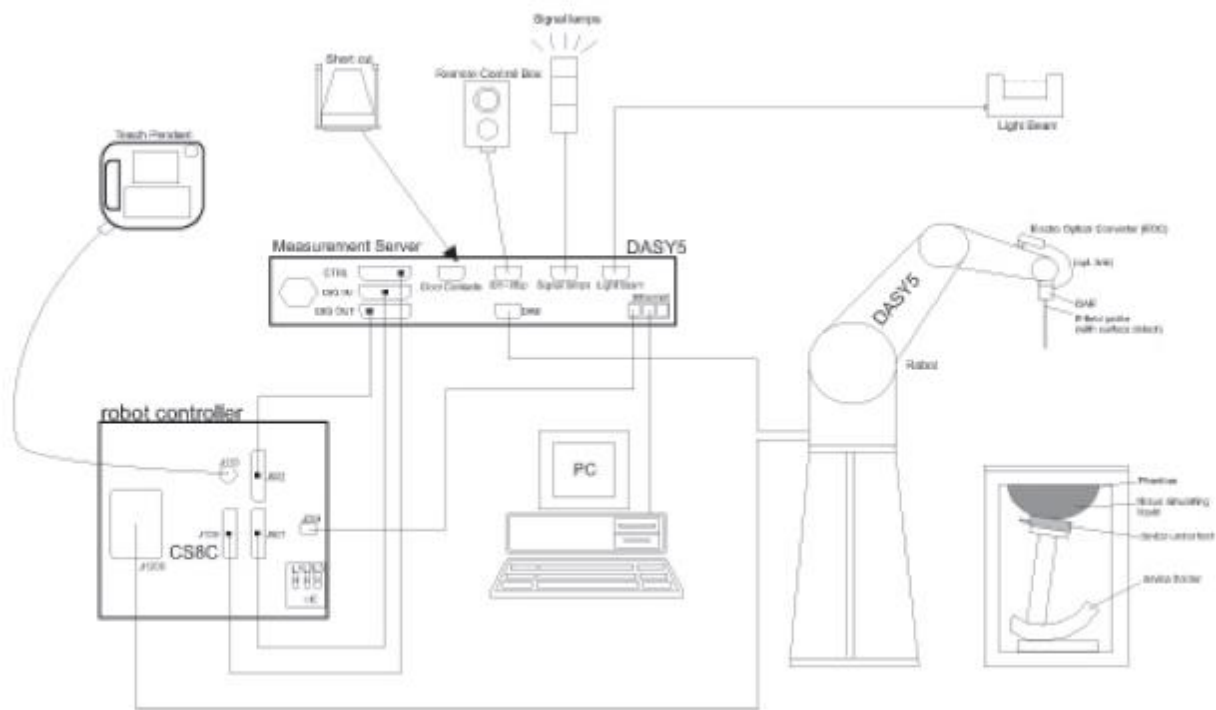
The DASY5 system for performing compliance tests consists of the following items:

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



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

3.2 Isotropic E-field Probe EX3DV4

	<p>Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)</p>
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 μ W/g to > 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 μ W/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



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3.3 Data Acquisition Electronics (DAE)

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

3.4 SAM Twin Phantom

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


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

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



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3.5 ELI Phantom

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

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

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



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3.6 Device Holder for Transmitters



F-2. Device Holder for Transmitters

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



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3.7 Measurement procedure

3.7.1 Scanning procedure

Step 1: Power reference measurement

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

Step 2: Area scan

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

Step 3: Zoom scan

Around this point, a volume of 32mm*32mm*30mm ($f \leq 2\text{GHz}$), 30mm*30mm*30mm (f for 2-3GHz) and 24mm*24mm*22mm (f for 5-6GHz) was assessed by measuring 5x5x7 points ($f \leq 2\text{GHz}$), 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.

Except when area scan based 1-g SAR estimation applies, a zoom scan measurement is required at the highest peak SAR location determined in the area scan to determine the 1-g SAR. When the 1-g SAR of the highest peak is within 2 dB of the SAR limit, additional zoom scans are required for other peaks within 2 dB of the highest peak that have not been included in any zoom scan to ensure there is no increase in SAR (per KDB publication 865664 D01), and the DASY System will be set up based on this condition to ensure that the measurement results is the maximum SAR.



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



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3.7.2 Data Storage

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

3.7.3 Data Evaluation by SEMCAD

The SEMCAD software automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software:

Probe parameters:	- Sensitivity	Normi, ai0, ai1, ai2
- Conversion factor	ConvFi	
- Diode compression point	Dcpi	
Device parameters:	- Frequency	f
- Crest factor	cf	
Media parameters:	- Conductivity	ε
- Density	ρ	

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASy components. In the direct measuring mode of the multimeter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics.

If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power.

The formula for each channel can be given as:

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

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

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

cf = crest factor of exciting field (DASy parameter)

dcp i = diode compression point (DASy parameter)

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



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E-field probes:

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

H-field probes:

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

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

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

[mV/(V/m)²] for E-field Probes

ConvF = sensitivity enhancement in solution

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

f = carrier frequency [GHz]

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

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

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

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

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

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

with SAR = local specific absorption rate in mW/g

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

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.

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

with P_{pwe} = equivalent power density of a plane wave in mW/cm²

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

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



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4 SAR measurement variability and uncertainty

4.1 SAR measurement variability

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

- 1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2) through 4) do not apply.
 - 2) When the original highest measured SAR is ≥ 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.



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4.2 SAR measurement uncertainty

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

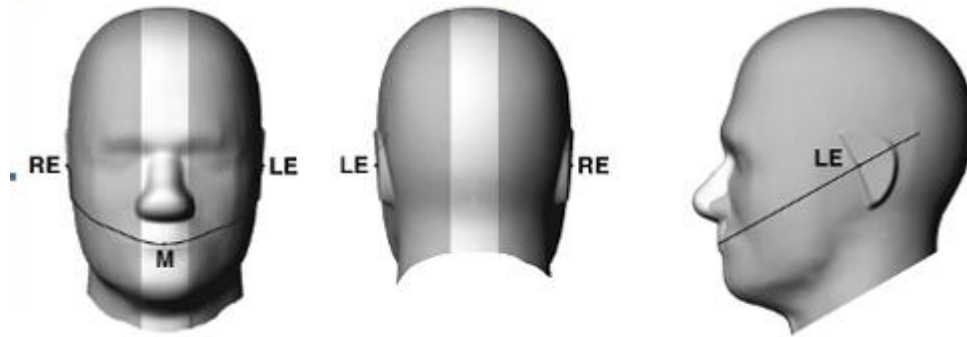


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5 Description of Test Position

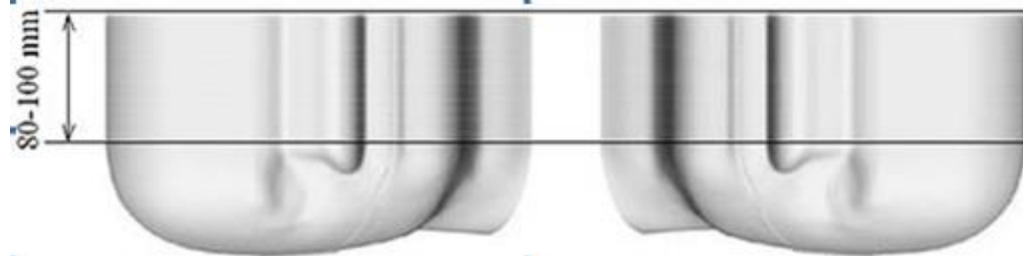
5.1 Head Exposure Condition

5.1.1 SAM Phantom Shape

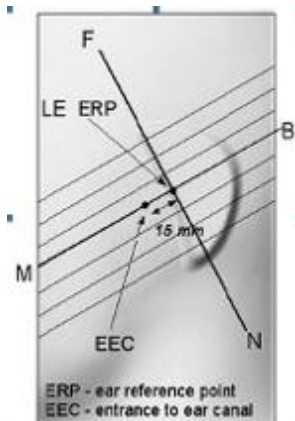


F-3. Front, back, and side views of SAM (model for the phantom shell). Full-head model is for illustration purposes only-procedures in this recommended practice are intended primarily for the phantom setup.

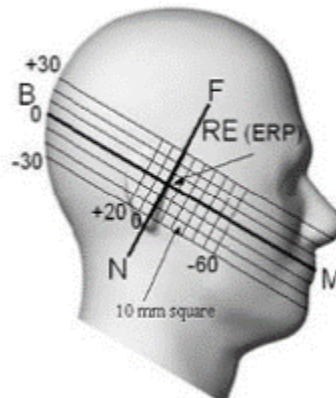
Note: The centre strip including the nose region has a different thickness tolerance.



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



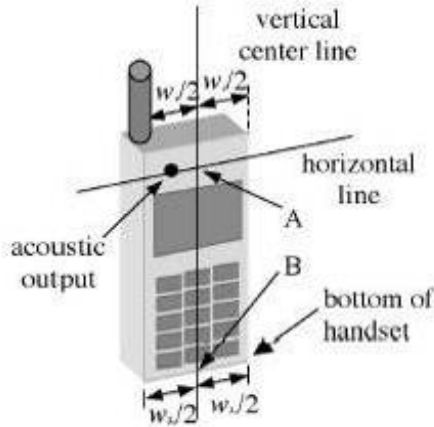
F-5. Close-up side view of phantom, showing the ear region, N-F and B-M lines, and seven cross-sectional plane locations



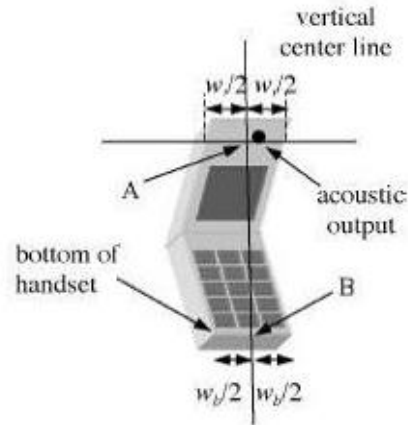
F-6. Side view of the phantom showing relevant markings and seven cross-sectional plane locations



5.1.2 EUT constructions



F-7. Handset vertical and horizontal reference lines-“fixed case”



F-8. Handset vertical and horizontal reference lines-“clam-shell case”

5.1.3 Definition of the “cheek” position

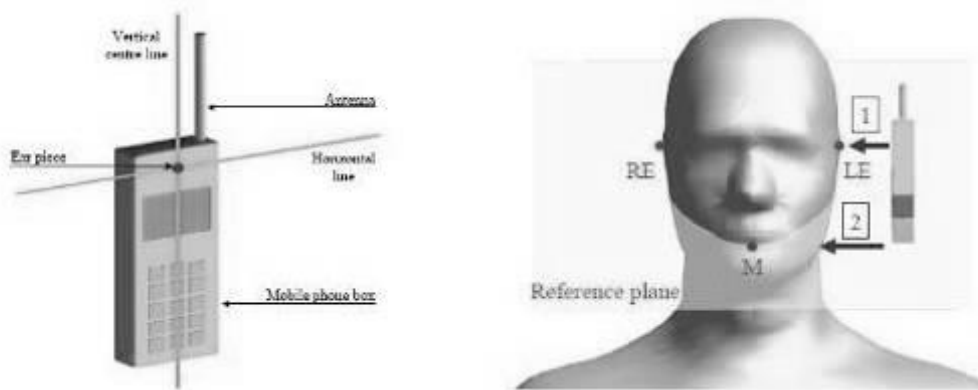
- Position the device with the vertical centre line of the body of the device and the horizontal line crossing the centre of the ear piece in a plane parallel to the sagittal plane of the phantom ("initial position"). While maintaining the device in this plane, align the vertical centre line with the 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.
- 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.



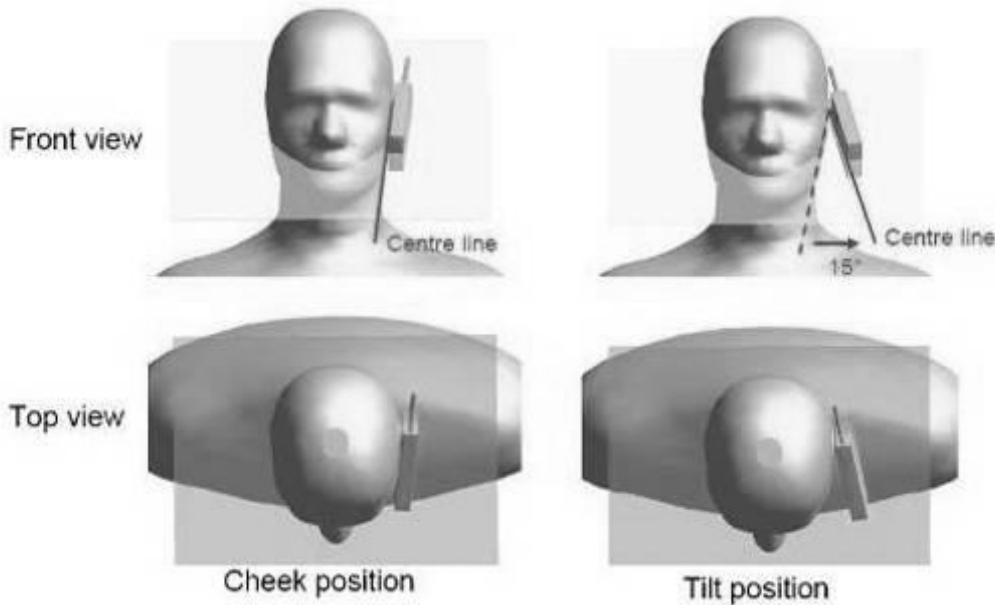
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5.1.4 Definition of the “tilted” position

- 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-9. Definition of the reference lines and points, on the phone and on the phantom and initial position



F-10. “Cheek” and “tilt” positions of the mobile phone on the left side



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5.2 Body Exposure Condition

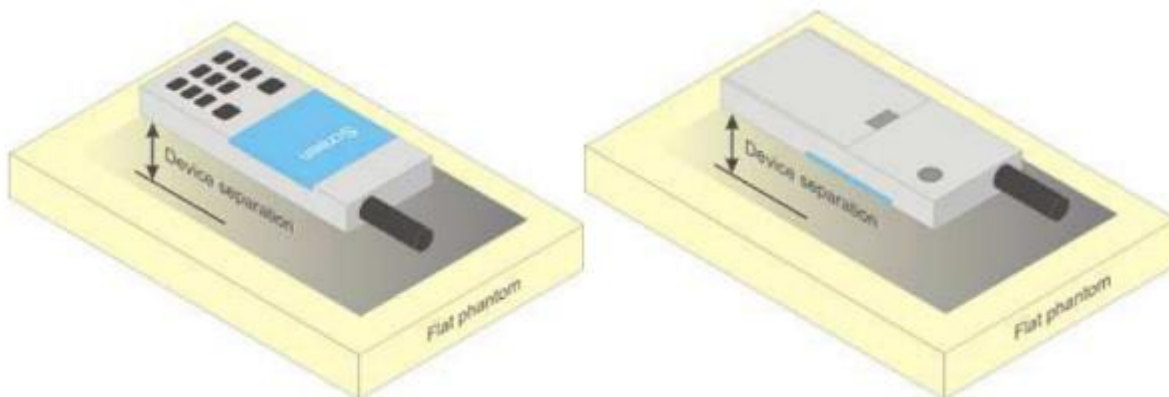
5.2.1 Body-worn accessory exposure conditions

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 $> 1.2 \text{ W/kg}$, 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-11. Test positions for body-worn devices



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5.2.2 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 ($L \times W \geq 9 \text{ cm} \times 5 \text{ cm}$) 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.



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6 SAR System Check Procedure

6.1 Tissue Simulate Liquid

6.1.1 Recipes for Tissue Simulate Liquid

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

Ingredients (% by weight)	Frequency (MHz)							
	450		835		1800-2000		2300-2700	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	40.30	50.75	55.24	70.17	55.00	68.53
Salt (NaCl)	3.95	1.49	1.38	0.94	0.31	0.39	0.2	0.1
Sucrose	56.32	46.78	57.90	48.21	0	0	0	0
HEC	0.98	0.52	0.24	0	0	0	0	0
Bactericide	0.19	0.05	0.18	0.10	0	0	0	0
Tween	0	0	0	0	44.45	29.44	44.80	31.37
Salt: 99+% Pure Sodium Chloride				Sucrose: 98+% Pure Sucrose				
Water: De-ionized, 16 MΩ ⁺ resistivity				HEC: Hydroxyethyl Cellulose				
Tween: Polyoxyethylene (20) sorbitan monolaurate								
HSL5GHz is composed of the following ingredients:								
Water: 50-65%								
Mineral oil: 10-30%								
Emulsifiers: 8-25%								
Sodium salt: 0-1.5%								
MSL5GHz is composed of the following ingredients:								
Water: 64-78%								
Mineral oil: 11-18%								
Emulsifiers: 9-15%								
Sodium salt: 2-3%								

Table 3: Recipe of Tissue Simulate Liquid



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6.1.2 Measurement for Tissue Simulate Liquid

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

Tissue Type	Measured Frequency (MHz)	Target Tissue ($\pm 5\%$)		Measured Tissue		Liquid Temp. ($^{\circ}\text{C}$)	Measured Date
		ϵ_r	$\sigma(\text{S/m})$	ϵ_r	$\sigma(\text{S/m})$		
750 Head	750	41.9 (39.81~44)	0.89 (0.85~0.94)	42.729	0.886	22.1	2019/1/11
750 Body	750	55.5 (52.73~58.28)	0.96 (0.91~1.00)	56.749	0.951	22.1	2019/1/13
835 Head	835	41.5 (39.43~43.58)	0.90 (0.86~0.95)	43.061	0.885	22.1	2019/1/17
835 Body	835	55.2 (52.44~57.96)	0.97 (0.92~1.02)	56.404	0.997	22.1	2019/1/16
835 Body	835	55.2 (52.44~57.96)	0.97 (0.92~1.02)	57.828	0.999	22.1	2019/1/22
1750 Head	1750	40.1 (38.10~42.11)	1.37 (1.30~1.44)	40.101	1.335	22.2	2019/1/19
1750 Body	1750	53.4 (50.73~56.07)	1.49 (1.42~1.56)	53.334	1.434	22.2	2019/1/18
1900 Head	1900	40.0 (38.00~42.00)	1.40 (1.33~1.47)	38.573	1.385	22.3	2019/1/19
1900 Body	1900	53.3 (50.64~55.97)	1.52 (1.44~1.60)	52.651	1.499	22.3	2019/1/18
2450 Head	2450	39.20 (37.24~41.16)	1.80 (1.71~1.89)	38.950	1.741	22.0	2019/1/16
2450 Body	2450	52.70 (50.07~55.34)	1.95 (1.85~2.05)	51.632	1.904	22.0	2019/1/11
2600 Head	2600	39.0 (37.05~40.95)	1.96 (1.86~2.06)	39.679	1.966	22.1	2019/1/19
2600 Body	2600	52.50 (49.88~55.13)	2.16 (2.05~2.27)	51.268	2.072	22.1	2019/1/17

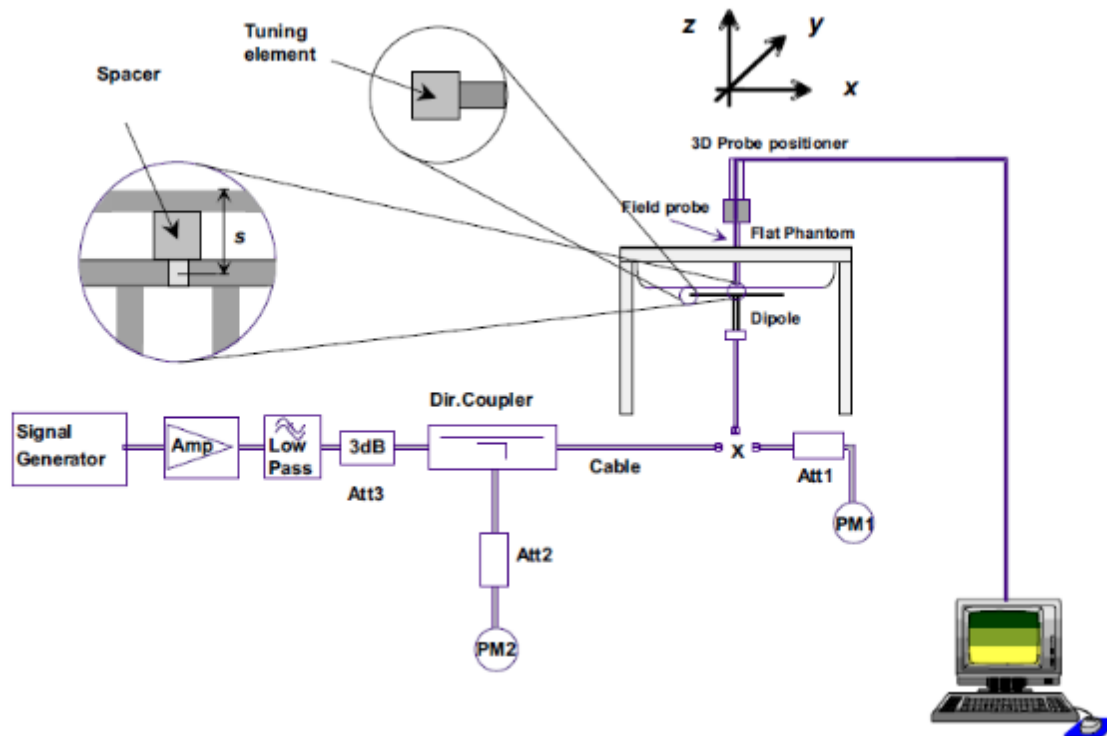
Table 4: Measurement result of Tissue electric parameters



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6.2 SAR System Check

The microwave circuit arrangement for system check is sketched in below figure. The daily system accuracy verification occurs within the flat section of the SAM phantom. A SAR measurement was performed to see if the measured SAR was within +/- 10% from the target SAR values. The tests were conducted on the same days as the measurement of the EUT. The obtained results from the system accuracy verification are displayed in the following table (A power level of 250mW (below 3GHz) or 100mW (3-6GHz) was input to the dipole antenna). During the tests, the ambient temperature of the laboratory was in the range 22±2°C, the relative humidity was in the range 60% and the liquid depth above the ear reference points was above 15±0.5 cm in all the cases. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values.



F-12. the microwave circuit arrangement used for SAR system check



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6.2.1 Justification for Extended SAR Dipole Calibrations

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

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

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



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6.2.2 Summary System Check Result(s)

Validation Kit		Measured SAR 250mW	Measured SAR 250mW	Measured SAR (normalized to 1W)	Measured SAR (normalized to 1W)	Target SAR (normalized to 1W) (±10%)	Target SAR (normalized to 1W) (±10%)	Liquid Temp. (°C)	Measured Date
		1g (W/kg)	10g (W/kg)	1g (W/kg)	10g (W/kg)	1-g(W/kg)	10-g(W/kg)		
D750V3	Head	1.97	1.30	7.88	5.20	8.17 (7.35~8.99)	5.36 (4.82~5.9)	22.1	2019/1/11
	Body	2.11	1.40	8.44	5.60	8.57 (7.71~9.43)	5.66 (5.09~6.23)	22.1	2019/1/13
D835V2	Head	2.45	1.61	9.80	6.44	9.59 (8.63~10.55)	6.29 (5.66~6.92)	22.1	2019/1/17
	Body	2.31	1.56	9.24	6.24	9.65 (8.69~10.62)	6.46 (5.81~7.11)	22.1	2019/1/16
	Body	2.64	1.74	10.56	6.96	9.65 (8.69~10.62)	6.46 (5.81~7.11)	22.1	2019/1/22
D1750V2	Head	8.75	4.71	35.00	18.84	36.7 (33.03~40.37)	19.5 (17.55~21.45)	22.2	2019/1/19
	Body	8.90	4.72	35.60	18.88	37 (33.30~40.70)	19.7 (17.73~21.67)	22.2	2019/1/18
D1900V2	Head	10.30	5.31	41.20	21.24	40.7 (36.63~44.77)	21.1 (18.99~23.21)	22.3	2019/1/19
	Body	10.70	5.64	42.80	22.56	41.6 (37.44~45.76)	21.4 (19.26~23.54)	22.3	2019/1/18
D2450V2	Head	12.70	5.87	50.80	23.48	53.1 (47.79~58.41)	24.9 (22.41~27.39)	22.0	2019/1/16
	Body	12.20	5.73	48.80	22.92	51.0 (45.9~56.1)	23.5 (21.15~25.85)	22.0	2019/1/11
D2600V2	Head	13.90	6.14	55.60	24.56	56.6 (50.94~62.26)	25.4 (22.86~27.94)	22.1	2019/1/19
	Body	12.80	5.77	51.20	23.08	54.2 (48.78~59.62)	24.3 (21.87~26.73)	22.1	2019/1/17

Table 5: SAR System Check Result

6.2.3 Detailed System Check Results

Please see the Appendix A



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7 Test Configuration

7.1 3G SAR Test Reduction Procedure

According to KDB 941225D01, in the following procedures, the mode tested for SAR is referred to as the primary mode. The equivalent modes considered for SAR test reduction are denoted as secondary modes. Both primary and secondary modes must be in the same frequency band. When the maximum output power and tune-up tolerance specified for production units in a secondary mode is $\leq \frac{1}{4}$ dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode. This is referred to as the 3G SAR test reduction procedure in the following SAR test guidance, where the primary mode is identified in the applicable wireless mode test procedures and the secondary mode is wireless mode being considered for SAR test reduction by that procedure. When the 3G SAR test reduction procedure is not satisfied, it is identified as “otherwise” in the applicable procedures; SAR measurement is required for the secondary mode.

7.2 Operation Configurations

7.2.1 CDMA Test Configuration

1) . 1x RTT Handsets

The following procedures apply to CDMA 2000 Release 0 and Release A single carrier (1x RTT) handsets operating with Mobile Protocol Revision 6 or 7 (MOB_P_REV 6 or 7). The default test configuration is to measure SAR in RC3 with an established radio link between the handset and a communication test set. SAR in RC1 is selectively confirmed according to the 3G SAR test reduction procedure with RC3 as the primary mode. The forward and reverse links are configured with the same RC for SAR measurement. Maximum output power is verified by applying the procedures defined in 3GPP2 C. S0011 and TIA-98-E. SAR must be measured according to these maximum output conditions and requirements in KDB Publication 447498 D01.

2) . Output Power Verification

Maximum output power is verified on the high, middle and low channels according to procedures in section 4.4.5.2 of 3GPP2 C.S0011/TIA-98-E. Results for at least steps 3, 4 and 10 of the power measurement procedures are required in the SAR report. Steps 3 and 4 are measured using Loopback Service Option SO55 with power control bits in “All Up” condition. TDSO/SO32 may be used instead of SO55 for step 4. Step 10 is measured using TDSO/SO32 with power control bits in the “Bits Hold” condition (i.e. alternative Up/Down Bits). All power measurements defined in C.S0011/TIA-98-E that are inapplicable to the handset or cannot be measured due to technical or equipment limitations must be clearly identified in the test report.

3) . Head SAR

SAR for next to the ear head exposure is measured in RC3 with the handset configured to transmit at full rate in SO55. The 3G SAR test reduction procedure is applied to RC1 with RC3 as the primary mode; otherwise, SAR is required for the channel with maximum measured output in RC1 using the head exposure configuration that results in the highest reported SAR in RC3.

4) . Body-Worn Accessory SAR

Body-worn accessory SAR is measured in RC3 with the handset configured in TDSO/SO32 to transmit at full rate on FCH only with all other code channels disabled. The body-worn accessory procedures in KDB Publication 447498 D01 are applied. The 3G SAR test reduction procedure is applied to the multiple code channel configuration (FCH+SCHn), with FCH only as the primary mode. Otherwise, SAR is required for multiple code channel configuration (FCH + SCHn), with FCH at full rate and SCH0 enabled at 9600 bps, using the highest



reported SAR configuration for FCH only. When multiple code channels are enabled, the transmitter output can shift by more than 0.5 dB and may lead to higher SAR drifts and SCH dropouts.

The 3G SAR test reduction procedure is applied to body-worn accessory SAR in RC1 with RC3 as the primary mode. Otherwise, SAR is required for RC1, with SO55 and full rate, using the highest reported SAR configuration for body-worn accessory exposure in RC3.

5) . **Handsets with built-in Ev-Do**

For handsets with Ev-Do capabilities, the 3G SAR test reduction procedure is applied to Ev-Do Rev. 0 with 1x RTT RC3 as the primary mode to determine body-worn accessory test requirements. Otherwise, body-worn accessory SAR is required for Rev. 0, at 153.6 kbps, using the highest reported SAR configuration for body-worn accessory exposure in RC3.

The 3G SAR test reduction procedure is applied separately to Rev. A and Rev. B, with Rev. 0 as the primary mode to determine body-worn accessory SAR test requirements. When SAR is not required for Rev. 0, the 3G SAR test reduction is applied with 1x RTT RC3 as the primary mode. Otherwise, SAR is required for Rev. A or Rev. B, with a Reverse Data Channel payload size of 4096 bits and a Termination Target of 16 slots defined for Subtype 2 and 3 Physical Layer configurations, using the highest reported SAR configuration for body-worn accessory exposure in Rev. 0 or RC3, as appropriate.

A Forward Traffic Channel data rate corresponding to the 2-slot version of 307.2 kbps with ACK Channel transmitting in all slots is configured in the downlink for Rev. 0, Rev. A and Rev. B



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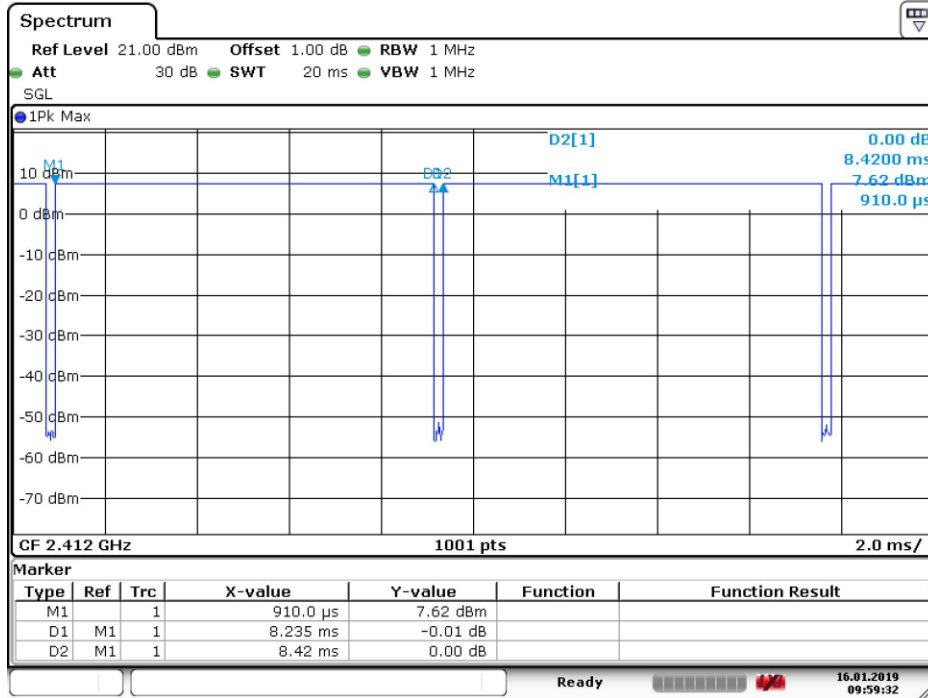
7.2.2 WiFi Test Configuration

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

7.2.2.1 Duty cycle

2.4GHz Wi-Fi 802.11b:

WiFi11 802.11b 11M: Duty cycle==8.345/8.42=99.11%



Date: 16 JAN 2019 09:59:32



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7.2.2.2 Initial Test Position SAR Test Reduction Procedure

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

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



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7.2.2.3 Initial Test Configuration Procedures

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

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

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



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7.2.2.4 Subsequent Test Configuration Procedures

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

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



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7.2.2.5 2.4 GHz WiFi SAR Procedures

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

- **802.11b DSSS SAR Test Requirements**

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

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

- **2.4 GHz 802.11g/n OFDM SAR Test Exclusion Requirements**

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

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

- **SAR Test Requirements for OFDM configurations**

When SAR measurement is required for 802.11 g/n OFDM configurations, each standalone and frequency aggregated band is considered separately for SAR test reduction. In applying the initial test configuration and subsequent test configuration procedures, the 802.11 transmission configuration with the highest specified maximum output power and the channel within a test configuration with the highest measured maximum output power should be clearly distinguished to apply the procedures.



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7.2.3 LTE Test Configuration

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

TDD LTE test consideration

For Time-Division Duplex (TDD) systems, SAR must be tested using a fixed periodic duty factor according to the highest transmission duty factor implemented for the device and supported by the defined 3GPP LTE TDD configurations.

SAR was tested with the highest transmission duty factor (63.33%) using Uplink-downlink configuration 0 and Special subframe configuration 7.

LTE TDD Band support 3GPP TS 36.211 section 4.2 for Type 2 Frame Structure and Table 4.2-2 for uplink-downlink configurations and Table 4.2-1 for Special subframe configurations.

Frame structure type 2:

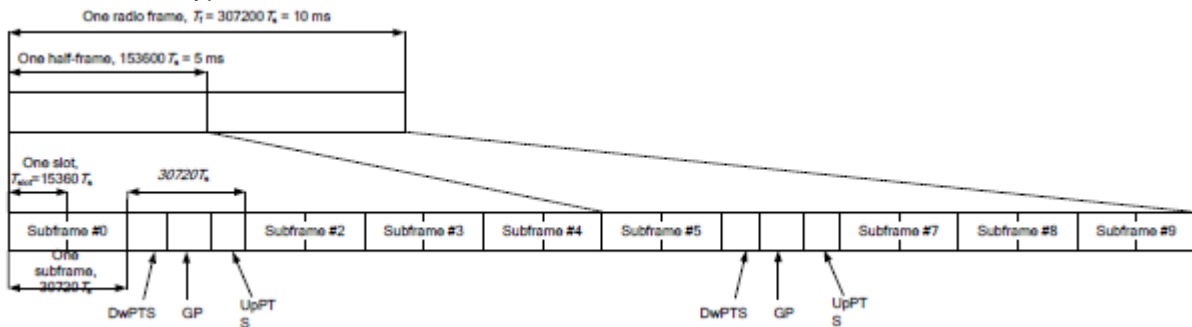


Table 4.2-1: Configuration of special subframe (lengths of DwPTS/GP/UpPTS).

Special subframe configuration	Normal cyclic prefix in downlink			Extended cyclic prefix in downlink		
	DwPTS	UpPTS		DwPTS	UpPTS	
		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink
0	6592.Ts	2192.Ts	2560.Ts	7680.Ts	2192.Ts	2560.Ts
1	19760.Ts			20480.Ts		
2	21952.Ts			23040.Ts		
3	24144.Ts			25600.Ts		
4	26336.Ts			7680.Ts		
5	6592.Ts	4384.Ts	5120.Ts	20480.Ts	4384.Ts	5120.Ts
6	19760.Ts			23040.Ts		
7	21952.Ts			25600.Ts		
8	24144.Ts			-		
9	13168.Ts			-		-



Table 4.2-2: Uplink-downlink configurations.

Uplink-downlink configuration	Downlink-to-Uplink Switch-point periodicity	Subframe number									
		0	1	2	3	4	5	6	7	8	9
0	5 ms	D	S	U	U	U	D	S	U	U	U
1	5 ms	D	S	U	U	D	D	S	U	U	D
2	5 ms	D	S	U	D	D	D	S	U	D	D
3	10 ms	D	S	U	U	U	D	D	D	D	D
4	10 ms	D	S	U	U	D	D	D	D	D	D
5	10 ms	D	S	U	D	D	D	D	D	D	D
6	5 ms	D	S	U	U	U	D	S	U	U	D

Calculated Duty Cycle=[Extended cyclic prefix in uplink x (Ts) x # of S + # of U]/10ms

Uplink-Downlink Configuration	Downlink-to-Uplink Switch-point Periodicity	Subframe Number										Calculated Duty Cycle (%)
		0	1	2	3	4	5	6	7	8	9	
0	5 ms	D	S	U	U	U	D	S	U	U	U	63.33
1	5 ms	D	S	U	U	D	D	S	U	U	D	43.33
2	5 ms	D	S	U	D	D	D	S	U	D	D	23.33
3	10 ms	D	S	U	U	U	D	D	D	D	D	31.67
4	10 ms	D	S	U	U	D	D	D	D	D	D	21.67
5	10 ms	D	S	U	D	D	D	D	D	D	D	11.67
6	5 ms	D	S	U	U	U	D	S	U	U	D	53.33

A) Spectrum Plots for RB Configurations

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

B) MPR

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

Modulation	Channel bandwidth / Transmission bandwidth (N _{RB})						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2

C) A-MPR

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

D) Largest channel bandwidth standalone SAR test requirements

1) QPSK with 1 RB allocation

Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle



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and lower edge of each required test channel. When the reported SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required for 1 RB allocation; otherwise, SAR is required for the remaining required test channels and only for the RB offset configuration with the highest output power for that channel. When the reported SAR of a required test channel is > 1.45 W/kg, SAR is required for all three RB offset configurations for that required test channel.

2) QPSK with 50% RB allocation

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

3) QPSK with 100% RB allocation

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

4) Higher order modulations

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

E) Other channel bandwidth standalone SAR test requirements

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



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8 Test Result

8.1 Measurement of RF Conducted Power

8.1.1 Conducted Power of CDMA

CDMA BC0(850MHz)				
Average Conducted Power(dBm)				
Channel	1013	384	777	Tune up
1XRTT RC1 SO55	24.58	24.52	24.31	25.00
1XRTT RC3 SO55	24.42	24.41	24.32	25.00
1XRTT RC3 SO32(FCH)	24.47	24.44	24.32	25.00
1XRTT RC3 SO32(FCH + SCH)	24.63	24.56	24.43	25.00
1XEVD0 RTAP153.6Kbps	24.41	24.57	24.19	25.00
1XEVD0 RETAP4096Bits	24.43	24.61	24.18	25.00
CDMA BC1(1900MHz)				
Average Conducted Power(dBm)				
Channel	25	600	1175	Tune up
1XRTT RC1 SO55	23.50	23.41	23.56	24.00
1XRTT RC3 SO55	23.53	23.48	23.71	24.00
1XRTT RC3 SO32(FCH)	23.54	23.61	23.75	24.00
1XRTT RC3 SO32(FCH + SCH)	23.61	23.57	23.62	24.00
1XEVD0 RTAP153.6Kbps	23.61	23.45	23.78	24.00
1XEVD0 RETAP4096Bits	23.54	23.42	23.76	24.00
CDMA BC10(850MHz)				
Average Conducted Power(dBm)				
Channel	476	580	684	Tune up
1XRTT RC1 SO55	24.46	24.59	24.36	25.00
1XRTT RC3 SO55	24.52	24.58	24.35	25.00
1XRTT RC3 SO32(FCH)	24.61	24.69	24.36	25.00
1XRTT RC3 SO32(FCH + SCH)	24.53	24.65	24.33	25.00
1XEVD0 RTAP153.6Kbps	24.52	24.58	24.35	25.00
1XEVD0 RETAP4096Bits	24.48	24.67	24.40	25.00

Table 6 : Conducted Power of CDMA



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8.1.2 Conducted Power of LTE

LTE Band 2				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				18607	18900	19193	
1.4MHz	QPSK	1	0	22.73	22.78	22.93	23.50
		1	2	22.83	22.91	22.98	23.50
		1	5	22.90	22.81	23.06	23.50
		3	0	22.83	22.97	23.27	23.50
		3	2	22.88	22.77	23.14	23.50
		3	3	23.00	22.84	23.13	23.50
	16QAM	6	0	21.92	21.82	22.02	22.50
		1	0	20.92	21.62	22.26	22.50
		1	2	21.71	21.68	22.14	22.50
		1	5	21.97	21.18	22.08	22.50
		3	0	21.79	21.46	22.11	22.50
		3	2	21.72	21.47	22.22	22.50
3MHz	QPSK	3	3	21.51	21.77	22.09	22.50
		6	0	20.92	20.98	21.35	21.50
		1	0	23.03	22.71	23.01	23.50
		1	7	22.72	22.85	23.29	23.50
		1	14	22.95	22.96	23.04	23.50
		8	0	21.98	21.89	22.17	22.50
	16QAM	8	4	21.99	21.90	22.14	22.50
		8	7	21.94	22.00	22.06	22.50
		15	0	21.91	21.95	22.09	22.50
		1	0	21.60	21.93	21.44	22.50
		1	7	21.40	22.01	22.16	22.50
		1	14	21.46	21.64	21.97	22.50
5MHz	QPSK	8	0	20.69	20.97	21.10	21.50
		8	4	20.76	20.97	21.16	21.50
		8	7	20.72	20.98	21.30	21.50
		15	0	20.93	20.85	21.19	21.50
		1	0	22.74	22.49	22.73	23.50
		1	13	22.79	22.64	22.92	23.50
	16QAM	1	24	22.77	22.73	22.81	23.50
		12	0	21.79	21.77	21.98	22.50
		12	6	21.81	21.77	21.93	22.50
		12	13	21.89	21.81	21.96	22.50
		25	0	21.81	21.82	21.84	22.50
		1	0	21.40	21.71	22.17	22.50
16QAM	1	13	21.09	21.79	21.42	22.50	
	1	24	21.64	21.99	21.20	22.50	



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Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				18650	18900	19150	
10MHz	QPSK	12	0	20.76	20.75	20.78	21.50
		12	6	20.84	20.75	20.89	21.50
		12	13	20.72	20.75	20.82	21.50
		25	0	20.73	20.87	21.00	21.50
		25	13	22.05	21.88	21.96	22.50
		25	25	22.06	21.87	21.95	22.50
	16QAM	50	0	22.01	22.02	21.99	22.50
		1	0	21.79	21.72	21.48	22.50
		1	25	21.52	21.90	21.43	22.50
		1	49	21.69	21.76	21.81	22.50
		25	0	21.07	21.01	21.07	21.50
		25	13	20.96	21.17	21.07	21.50
		25	25	21.09	20.88	21.02	21.50
		50	0	20.95	21.07	20.88	21.50
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				18675	18900	19125	
15MHz	QPSK	1	0	22.59	22.89	23.00	23.50
		1	38	22.95	22.87	22.89	23.50
		1	74	22.69	22.74	22.78	23.50
		36	0	22.06	22.00	22.03	22.50
		36	18	22.13	21.88	21.93	22.50
		36	39	22.00	21.95	21.85	22.50
	16QAM	75	0	22.05	22.02	21.98	22.50
		1	0	21.53	21.76	21.91	22.50
		1	38	22.12	21.79	22.16	22.50
		1	74	21.94	21.31	21.49	22.50
		36	0	21.13	20.98	20.97	21.50
		36	18	21.13	20.97	21.03	21.50
		36	39	21.09	20.89	20.94	21.50
		75	0	21.09	20.96	21.03	21.50
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				18700	18900	19100	
20MHz	QPSK	1	0	22.82	22.74	22.81	23.50
		1	50	23.10	23.04	23.16	23.50
		1	99	22.97	22.74	22.88	23.50
		50	0	22.07	22.11	22.10	22.50
		50	25	22.16	22.09	22.05	22.50
		50	50	22.06	21.93	21.90	22.50
	16QAM	100	0	22.14	22.00	22.09	22.50
		1	0	21.23	21.98	21.49	22.50
		1	50	21.85	22.31	21.85	22.50



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	1	99	21.53	21.40	21.72	22.50
	50	0	21.07	21.07	21.15	21.50
	50	25	21.28	21.16	21.20	21.50
	50	50	21.06	21.12	21.02	21.50
	100	0	21.11	21.10	21.08	21.50

LTE Band 4				Conducted Power(dBm)					
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up		
				19957	20175	20393			
1.4MHz	QPSK	1	0	24.20	24.37	24.11	24.50		
		1	2	24.21	24.27	24.25	24.50		
		1	5	24.32	24.34	24.18	24.50		
		3	0	24.42	24.28	24.36	24.50		
		3	2	24.41	24.27	24.38	24.50		
		3	3	24.40	24.25	24.28	24.50		
	16QAM	6	0	23.11	23.08	23.08	23.50		
		1	0	22.58	23.25	23.46	23.50		
		1	2	23.25	23.44	23.31	23.50		
		1	5	23.49	23.21	23.41	23.50		
		3	0	23.15	23.17	23.09	23.50		
		3	2	23.42	23.30	23.45	23.50		
3MHz	QPSK	3	3	23.25	23.23	23.34	23.50		
		6	0	22.23	21.91	22.37	22.40		
		Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
						19965	20175	20385	
		5MHz	QPSK	1	0	24.32	23.85	24.25	24.50
				1	7	24.22	24.33	24.25	24.50
	1			14	24.45	24.38	24.32	24.50	
	8			0	23.15	23.20	23.12	23.50	
	8			4	23.15	23.19	23.15	23.50	
	8			7	23.17	23.12	23.18	23.50	
	16QAM		15	0	23.10	23.17	23.18	23.50	
			1	0	23.46	22.56	22.92	23.50	
1			7	23.28	22.78	22.90	23.50		
1			14	23.25	22.41	22.80	23.50		
8			0	22.08	22.20	22.21	22.40		
8			4	22.34	22.32	22.22	22.40		
5MHz	QPSK	8	7	22.29	22.26	22.30	22.40		
		15	0	22.18	22.35	22.35	22.40		
		Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
						19975	20175	20375	
		QPSK	1	0	24.02	23.87	24.15	24.50	
			1	13	24.42	24.04	24.35	24.50	
	1		24	24.21	24.01	24.33	24.50		
	12		0	23.05	23.03	23.28	23.50		
	12		6	23.04	23.06	23.30	23.50		



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Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				20000	20175	20350	
10MHz	16QAM	12	13	23.02	23.01	23.17	23.50
		25	0	23.07	23.09	23.21	23.50
		1	0	23.15	22.45	22.53	23.50
		1	13	23.12	22.25	22.76	23.50
	1	24	22.64	22.23	22.49	23.50	
	12	0	21.92	22.06	22.18	22.40	
	12	6	22.00	21.93	22.16	22.40	
	12	13	22.13	22.00	22.15	22.40	
25	0	21.94	22.17	22.28	22.40		
10MHz	QPSK	1	0	23.90	24.10	24.22	24.50
		1	25	24.41	24.49	24.46	24.50
		1	49	24.19	24.32	24.49	24.50
		25	0	23.09	23.13	23.34	23.50
		25	13	23.22	23.10	23.34	23.50
		25	25	23.23	23.08	23.26	23.50
	16QAM	50	0	23.16	23.13	23.24	23.50
		1	0	22.67	23.26	23.47	23.50
		1	25	23.46	22.93	23.49	23.50
		1	49	23.39	22.48	23.26	23.50
		25	0	22.15	22.07	22.26	22.40
		25	13	22.27	22.16	22.36	22.40
		25	25	22.22	22.09	22.32	22.40
		50	0	22.32	22.16	22.29	22.40
15MHz	QPSK	1	0	24.25	23.90	24.32	24.50
		1	38	24.42	24.16	24.41	24.50
		1	74	24.08	24.29	24.42	24.50
		36	0	23.22	23.19	23.23	23.50
		36	18	23.26	23.11	23.30	23.50
		36	39	23.25	23.07	23.36	23.50
	16QAM	75	0	23.18	23.14	23.26	23.50
		1	0	22.81	22.31	23.39	23.50
		1	38	22.94	22.78	23.48	23.50
		1	74	22.80	22.68	23.35	23.50
		36	0	22.29	22.16	22.19	22.40
		36	18	22.27	22.11	22.37	22.40
		36	39	22.37	22.35	22.36	22.40
		75	0	22.32	22.16	22.38	22.40
20MHz	QPSK	1	0	24.39	24.02	24.11	24.50
		1	50	24.49	24.11	24.46	24.50
1		99	24.48	24.25	23.96	24.50	
50		0	23.30	23.14	23.40	23.50	



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16QAM	50	25	23.28	23.01	23.36	23.50
	50	50	23.20	23.33	23.24	23.50
	100	0	23.21	23.13	23.17	23.50
	1	0	22.67	23.23	23.11	23.50
	1	50	23.14	23.43	23.35	23.50
	1	99	22.69	22.56	22.68	23.50
	50	0	22.24	22.13	22.37	22.40
	50	25	22.33	22.22	22.36	22.40
	50	50	22.29	21.95	22.31	22.40
	100	0	22.22	22.17	22.17	22.40

LTE Band 5				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				20407	20525	20643	
1.4MHz	QPSK	1	0	23.81	23.71	23.72	24.50
		1	2	23.96	23.87	23.97	24.50
		1	5	23.93	23.66	23.98	24.50
		3	0	24.03	23.86	24.02	24.50
		3	2	24.04	24.04	24.05	24.50
		3	3	24.09	24.09	24.34	24.50
	16QAM	6	0	23.04	22.84	22.91	23.50
		1	0	22.93	22.23	23.13	23.50
		1	2	22.87	22.73	22.64	23.50
		1	5	22.23	22.51	22.65	23.50
		3	0	22.73	22.72	22.81	23.50
		3	2	22.58	22.79	22.72	23.50
		3	3	22.81	22.49	22.80	23.50
		6	0	21.72	21.64	21.69	22.40
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				20415	20525	20635	
3MHz	QPSK	1	0	24.11	24.29	24.01	24.50
		1	7	23.90	24.18	24.00	24.50
		1	14	24.01	23.91	24.06	24.50
		8	0	23.11	22.88	23.02	23.50
		8	4	22.85	22.96	22.94	23.50
		8	7	22.93	22.87	22.83	23.50
	16QAM	15	0	22.93	22.95	22.90	23.50
		1	0	22.89	22.55	22.46	23.50
		1	7	22.60	22.65	22.81	23.50
		1	14	22.12	23.42	22.68	23.50
		8	0	21.71	21.88	21.73	22.40
		8	4	21.94	22.01	21.86	22.40
		8	7	22.05	22.02	21.84	22.40
		15	0	21.74	21.95	21.94	22.40
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up



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Bandwidth	Modulation	RB size	RB offset	20425	20525	20625	Tune up
				Channel	Channel	Channel	
5MHz	QPSK	1	0	23.87	23.68	23.56	24.50
		1	13	23.92	23.87	24.00	24.50
		1	24	23.64	23.83	23.67	24.50
		12	0	22.86	22.89	22.73	23.50
		12	6	22.95	22.98	22.96	23.50
		12	13	22.85	22.88	22.93	23.50
	16QAM	25	0	22.82	22.85	22.81	23.50
		1	0	22.94	22.20	22.19	23.50
		1	13	23.21	22.42	23.46	23.50
		1	24	22.53	22.10	22.81	23.50
		12	0	21.80	21.87	21.91	22.40
		12	6	21.99	22.13	22.10	22.40
		12	13	21.96	21.74	22.03	22.40
		25	0	21.85	21.86	21.85	22.40
10MHz	QPSK	1	0	24.04	23.64	23.88	24.50
		1	25	23.91	24.05	23.89	24.50
		1	49	23.89	23.83	23.86	24.50
		25	0	22.85	22.86	22.91	23.50
		25	13	22.90	22.87	22.99	23.50
		25	25	22.86	22.97	22.73	23.50
	16QAM	50	0	22.95	23.13	22.84	23.50
		1	0	22.68	22.37	22.77	23.50
		1	25	22.91	22.57	22.77	23.50
		1	49	22.45	22.30	22.39	23.50
		25	0	21.77	22.07	21.96	22.40
		25	13	22.01	22.05	22.03	22.40
		25	25	21.88	22.16	21.89	22.40
		50	0	21.92	22.11	21.93	22.40

LTE FDD Band 13				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				23205	23230	23255	
5MHz	QPSK	1	0	24.17	24.00	23.97	24.50
		1	13	23.99	24.16	24.03	24.50
		1	24	24.00	24.08	24.26	24.50
		12	0	23.14	23.32	23.29	23.50
		12	6	23.06	23.41	23.31	23.50
		12	13	23.07	23.24	23.21	23.50
	16QAM	25	0	23.01	23.30	23.24	23.50
		1	0	22.72	22.59	22.30	23.50
		1	13	22.18	23.20	23.34	23.50
		1	24	22.34	22.71	22.68	23.50



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Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				NA	23230	NA	
10MHz	QPSK	12	0	22.21	22.20	21.94	22.40
		12	6	22.06	22.33	22.10	22.40
		12	13	22.07	22.37	22.17	22.40
		25	0	22.13	22.38	21.86	22.40
		1	0	NA	23.84	NA	24.50
		1	25	NA	24.09	NA	24.50
	16QAM	1	49	NA	24.09	NA	24.50
		25	0	NA	23.19	NA	23.50
		25	13	NA	23.27	NA	23.50
		25	25	NA	23.14	NA	23.50
		50	0	NA	23.21	NA	23.50
		1	0	NA	22.53	NA	23.50
		1	25	NA	22.59	NA	23.50
		1	49	NA	22.75	NA	23.50
		25	0	NA	22.23	NA	22.40
		25	13	NA	22.38	NA	22.40
25	25	NA	22.10	NA	22.40		
50	0	NA	22.28	NA	22.40		

LTE Band 25				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				26047	26365	26683	
1.4MHz	QPSK	1	0	22.24	22.20	22.39	23.00
		1	2	22.49	22.45	22.47	23.00
		1	5	22.34	22.26	22.28	23.00
		3	0	22.41	22.74	22.55	23.00
		3	2	22.56	22.74	22.76	23.00
		3	3	22.56	22.69	22.64	23.00
	16QAM	6	0	21.40	21.53	21.54	22.00
		1	0	21.65	20.71	21.41	22.00
		1	2	21.81	21.33	21.02	22.00
		1	5	21.77	20.79	21.21	22.00
		3	0	21.57	21.19	21.36	22.00
		3	2	21.29	21.37	21.25	22.00
		3	3	21.30	21.31	21.47	22.00
		6	0	20.34	20.37	20.39	21.00
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				26055	26365	26675	
3MHz	QPSK	1	0	22.39	22.17	22.09	23.00
		1	7	22.46	22.64	22.16	23.00
		1	14	22.03	22.49	22.37	23.00
		8	0	21.44	21.46	21.50	22.00
		8	4	21.44	21.48	21.57	22.00



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Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up		
				26065	26365	26665			
5MHz	16QAM	8	7	21.59	21.43	21.54	22.00		
		15	0	21.56	21.53	21.66	22.00		
		1	0	21.79	21.25	21.33	22.00		
		1	7	21.39	21.37	21.15	22.00		
		1	14	20.69	20.66	20.94	22.00		
		8	0	20.23	20.40	20.32	21.00		
		8	4	20.50	20.55	20.46	21.00		
		8	7	20.53	20.45	20.52	21.00		
5MHz	QPSK	1	0	22.29	22.28	22.28	23.00		
		1	13	22.16	22.33	22.32	23.00		
		1	24	22.07	22.44	22.24	23.00		
		12	0	21.46	21.53	21.57	22.00		
		12	6	21.46	21.56	21.53	22.00		
		12	13	21.48	21.48	21.51	22.00		
	16QAM	25	0	21.47	21.48	21.52	22.00		
		1	0	21.07	20.67	20.75	22.00		
		1	13	21.02	20.75	20.89	22.00		
		1	24	20.84	21.42	21.44	22.00		
		12	0	20.30	20.60	20.42	21.00		
		12	6	20.47	20.57	20.32	21.00		
10MHz	QPSK	12	13	20.57	20.66	20.21	21.00		
		25	0	20.47	20.45	20.43	21.00		
		1	0	22.35	22.29	22.16	23.00		
		1	25	22.34	22.70	22.78	23.00		
		1	49	22.30	22.33	22.41	23.00		
		25	0	21.44	21.56	21.56	22.00		
	16QAM	25	13	21.49	21.56	21.43	22.00		
		25	25	21.45	21.44	21.50	22.00		
		50	0	21.52	21.59	21.45	22.00		
		1	0	21.32	21.08	20.84	22.00		
		1	25	21.57	21.93	20.88	22.00		
		1	49	20.84	20.91	20.92	22.00		
15MHz	QPSK	25	0	20.48	20.41	20.72	21.00		
		25	13	20.59	20.52	20.43	21.00		
		25	25	20.54	20.55	20.38	21.00		
		50	0	20.63	20.69	20.51	21.00		
		1	0	22.57	22.30	22.48	23.00		
		1	38	22.33	22.47	22.43	23.00		
15MHz	QPSK	1	74	22.57	22.17	22.60	23.00		
		36	0	21.49	21.55	21.52	22.00		
						Channel	Channel	Channel	Tune up
						26115	26365	26615	



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	16QAM	36	18	21.51	21.53	21.50	22.00
		36	39	21.52	21.48	21.49	22.00
		75	0	21.51	21.56	21.54	22.00
		1	0	21.26	20.71	21.49	22.00
		1	38	21.44	21.53	21.28	22.00
		1	74	20.41	20.48	20.69	22.00
		36	0	20.51	20.52	20.76	21.00
		36	18	20.61	20.53	20.64	21.00
		36	39	20.58	20.38	20.49	21.00
		75	0	20.60	20.59	20.53	21.00
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				26140	26365	26590	
20MHz	QPSK	1	0	22.34	22.28	22.07	23.00
		1	50	22.67	22.71	22.69	23.00
		1	99	22.43	22.32	22.50	23.00
		50	0	21.62	21.59	21.55	22.00
		50	25	21.62	21.56	21.60	22.00
		50	50	21.62	21.61	21.53	22.00
	16QAM	100	0	21.56	21.60	21.67	22.00
		1	0	21.20	20.83	21.11	22.00
		1	50	21.33	21.28	20.76	22.00
		1	99	20.79	20.63	20.98	22.00
		50	0	20.61	20.72	20.53	21.00
		50	25	20.69	20.62	20.73	21.00
		50	50	20.76	20.58	20.56	21.00
		100	0	20.77	20.67	20.49	21.00

LTE FDD Band 26				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				26697	26865	27033	
1.4MHz	QPSK	1	0	24.21	23.95	24.00	24.50
		1	2	24.17	24.15	24.14	24.50
		1	5	24.14	23.92	23.82	24.50
		3	0	24.23	24.15	24.08	24.50
		3	2	24.34	24.19	24.09	24.50
		3	3	24.32	24.34	24.36	24.50
	16QAM	6	0	23.03	23.08	23.12	23.50
		1	0	22.36	23.17	22.59	23.50
		1	2	22.74	23.04	23.00	23.50
		1	5	23.30	23.40	23.03	23.50
		3	0	23.06	23.21	23.02	23.50
		3	2	22.92	23.37	23.49	23.50
		3	3	22.98	23.44	22.94	23.50
		6	0	22.17	22.03	21.90	22.40
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				26705	26865	27025	



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3MHz	QPSK	1	0	24.12	24.17	24.24	24.50
		1	7	24.16	24.26	24.11	24.50
		1	14	23.99	24.23	24.08	24.50
		8	0	23.00	23.04	23.05	23.50
		8	4	23.09	23.10	23.04	23.50
		8	7	23.09	23.06	22.82	23.50
		15	0	23.08	23.16	22.99	23.50
	16QAM	1	0	22.72	22.98	22.54	23.50
		1	7	22.79	22.41	22.64	23.50
		1	14	22.70	23.13	22.29	23.50
		8	0	22.14	21.72	21.78	22.40
		8	4	22.15	22.07	21.99	22.40
		8	7	22.17	22.25	22.28	22.40
		15	0	22.22	22.24	21.89	22.40
Bandwidth	Modulation	RB size	RB offset	Channel 26715	Channel 26865	Channel 27015	Tune up
5MHz	QPSK	1	0	23.84	24.10	24.11	24.50
		1	13	23.96	24.21	24.28	24.50
		1	24	23.97	24.10	24.16	24.50
		12	0	23.22	23.20	23.25	23.50
		12	6	23.24	23.31	23.10	23.50
		12	13	22.95	23.17	23.00	23.50
		25	0	23.30	23.17	23.13	23.50
	16QAM	1	0	23.24	22.82	22.68	23.50
		1	13	23.23	22.46	22.69	23.50
		1	24	22.49	22.45	22.64	23.50
		12	0	22.14	22.03	22.25	22.40
		12	6	22.15	22.20	22.04	22.40
		12	13	21.97	21.99	22.08	22.40
		25	0	22.18	22.37	22.15	22.40
Bandwidth	Modulation	RB size	RB offset	Channel 26740	Channel 26865	Channel 26990	Tune up
10MHz	QPSK	1	0	24.07	24.10	23.95	24.50
		1	25	23.97	24.44	24.32	24.50
		1	49	23.93	24.21	24.01	24.50
		25	0	23.27	23.31	23.27	23.50
		25	13	23.07	23.21	23.22	23.50
		25	25	23.13	23.20	23.06	23.50
		50	0	23.14	23.23	23.18	23.50
	16QAM	1	0	23.20	22.95	22.66	23.50
		1	25	23.38	22.82	22.54	23.50
		1	49	23.06	22.57	22.94	23.50
		25	0	22.06	22.34	22.31	22.40
		25	13	22.03	22.34	22.36	22.40
		25	25	22.18	22.39	22.11	22.40
		50	0	22.17	22.38	22.10	22.40
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up



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15MHz	QPSK	1	0	26765	26865	26965	
				24.25	24.08	24.18	24.50
		1	38	24.10	24.28	24.14	24.50
		1	74	24.22	24.21	24.12	24.50
		36	0	23.30	23.34	23.24	23.50
		36	18	23.36	23.17	23.21	23.50
	36	39	23.35	23.20	23.10	23.50	
	75	0	23.22	23.23	23.24	23.50	
	16QAM	1	0	22.32	22.25	22.69	23.50
		1	38	22.47	22.23	23.25	23.50
		1	74	22.46	22.34	22.41	23.50
		36	0	22.07	22.22	22.22	22.40
		36	18	22.26	22.14	22.39	22.40
		36	39	22.17	22.08	22.07	22.40
75	0	22.12	22.13	22.10	22.40		

LTE FDD Band 41 (Class 3)				Conducted Power(dBm)					Tune up
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Channel	Channel	
				39675	40148	40620	41093	41565	
5MHz	QPSK	1	0	22.53	22.65	22.39	22.48	22.12	23.50
		1	13	22.69	22.74	22.47	22.57	22.31	23.50
		1	24	22.83	22.61	22.35	22.64	22.28	23.50
		12	0	22.77	22.65	22.52	22.63	22.25	23.50
		12	6	22.51	22.53	22.16	22.53	22.35	23.50
		12	13	22.62	22.58	22.65	22.49	22.41	23.50
	16QAM	25	0	22.51	22.54	22.45	22.55	22.31	23.50
		1	0	22.25	22.43	22.12	22.31	22.02	23.50
		1	13	22.13	22.38	22.16	22.02	22.16	23.50
		1	24	22.23	22.16	22.06	22.17	22.11	23.50
		12	0	22.29	22.42	22.36	22.52	22.14	23.50
		12	6	22.52	22.45	22.45	22.35	22.22	23.50
		12	13	22.59	22.71	22.42	22.35	22.07	23.50
		25	0	22.54	22.36	22.59	22.02	22.35	23.50
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Channel	Channel	Tune up
				39700	40160	40620	41080	41540	
10MHz	QPSK	1	0	22.43	22.55	22.51	22.86	22.13	23.50
		1	25	23.02	22.74	22.66	22.64	22.27	23.50
		1	49	22.86	22.26	22.36	22.38	22.03	23.50
		25	0	22.98	22.49	22.57	22.57	22.37	23.50
		25	13	22.86	22.53	22.66	22.54	22.21	23.50
		25	25	22.16	22.38	22.65	22.53	22.14	23.50
	16QAM	50	0	22.63	22.41	22.42	22.49	22.14	23.50
		1	0	22.03	22.37	22.05	22.48	22.05	23.50
		1	25	22.35	22.52	22.25	22.32	22.03	23.50
		1	49	22.09	22.27	22.01	22.23	22.03	23.50
		25	0	22.57	22.63	22.54	22.69	22.34	23.50



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Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Channel	Channel	Tune up
				39725	40173	40620	41068	41515	
15MHz	QPSK	25	13	22.84	22.74	22.41	22.68	22.41	23.50
		25	25	22.77	22.54	22.53	22.72	22.35	23.50
		50	0	22.71	22.42	22.31	22.19	22.25	23.50
		1	0	22.43	22.71	22.69	22.74	22.33	23.50
		1	38	22.69	22.84	22.65	22.47	22.45	23.50
		1	74	22.47	22.51	22.57	22.51	22.36	23.50
		36	0	22.50	22.61	22.59	22.65	22.34	23.50
	16QAM	36	18	22.71	22.53	22.58	22.54	22.19	23.50
		36	39	22.56	22.52	22.48	22.52	22.18	23.50
		75	0	22.61	22.59	22.53	22.55	22.47	23.50
		1	0	22.07	22.11	22.61	22.54	22.12	23.50
		1	38	22.06	22.70	22.04	22.28	22.09	23.50
		1	74	22.12	22.06	22.01	22.24	22.06	23.50
		36	0	22.42	22.39	22.57	22.63	22.32	23.50
		36	18	22.83	22.66	22.62	22.71	22.46	23.50
20MHz	QPSK	36	39	22.56	22.61	22.52	22.89	22.52	23.50
		75	0	22.19	22.57	22.62	22.19	22.41	23.50
		1	0	22.53	22.87	22.54	22.58	22.25	23.50
		1	50	22.98	22.92	22.64	22.82	22.55	23.50
		1	99	22.60	22.63	22.18	22.26	22.36	23.50
		50	0	22.92	22.82	22.65	22.75	22.26	23.50
		50	25	22.96	22.67	22.63	22.53	22.24	23.50
	16QAM	50	50	22.86	22.69	22.71	22.38	22.34	23.50
		100	0	22.69	22.57	22.47	22.56	22.19	23.50
		1	0	22.17	22.48	22.32	22.41	22.06	23.50
		1	50	22.69	22.46	22.49	22.80	22.39	23.50
		1	99	22.26	22.27	22.08	22.12	22.16	23.50
		50	0	22.71	22.69	22.74	22.57	22.48	23.50
		50	25	22.94	22.74	22.54	22.69	22.37	23.50
		50	50	22.76	22.65	22.53	22.63	22.39	23.50
100	0	22.65	22.56	22.59	22.66	22.57	23.50		

LTE FDD Band 41 (Class 2)				Conducted Power(dBm)					
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Channel	Channel	Tune up
				39675	40148	40620	41093	41565	
5MHz	QPSK	1	0	24.74	24.73	24.46	24.82	24.82	25.70
		1	13	24.81	24.64	24.71	24.86	24.97	25.70
		1	24	24.91	24.73	24.52	24.72	24.80	25.70
		12	0	23.79	24.26	23.63	24.22	23.99	24.70
		12	6	23.72	24.38	23.91	24.20	24.01	24.70
		12	13	23.82	24.02	23.86	24.04	24.01	24.70
		25	0	23.65	23.99	23.84	23.91	23.92	24.70



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		1	0	23.40	23.79	23.34	23.94	23.36	24.70
		1	13	23.55	23.79	23.51	23.99	23.66	24.70
		1	24	23.63	23.75	23.66	23.85	23.33	24.70
	16QAM	12	0	22.84	23.13	22.56	23.08	22.87	23.70
		12	6	22.84	23.15	22.91	22.98	22.92	23.70
		12	13	22.86	23.00	22.47	23.02	22.88	23.70
		25	0	22.85	23.02	22.85	23.30	23.18	23.70
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Channel	Channel	Tune up
				39700	40160	40620	41080	41540	
10MHz	QPSK	1	0	24.77	24.79	24.84	24.99	25.01	25.70
		1	25	25.09	25.09	24.98	25.13	25.16	25.70
		1	49	25.00	24.76	24.76	24.90	25.01	25.70
		25	0	23.86	24.16	23.79	24.20	24.05	24.70
		25	13	23.95	24.06	24.00	24.18	24.09	24.70
		25	25	23.99	23.99	23.81	24.12	24.00	24.70
		50	0	23.87	24.18	23.91	24.11	23.97	24.70
	16QAM	1	0	24.01	23.80	23.75	23.72	23.87	24.70
		1	25	23.77	23.66	23.68	23.98	23.65	24.70
		1	49	23.54	23.70	23.66	23.84	23.56	24.70
		25	0	23.15	23.20	23.06	23.09	23.08	23.70
		25	13	23.05	23.37	23.18	23.06	23.32	23.70
		25	25	23.12	22.96	22.97	23.29	23.14	23.70
		50	0	22.98	23.06	22.75	22.88	22.94	23.70
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Channel	Channel	Tune up
				39725	40173	40620	41068	41515	
15MHz	QPSK	1	0	24.83	24.84	24.70	25.00	25.01	25.70
		1	38	24.80	24.83	24.77	25.09	25.05	25.70
		1	74	25.04	24.76	24.76	24.92	25.08	25.70
		36	0	23.69	24.09	24.00	24.33	24.12	24.70
		36	18	23.99	23.98	23.91	24.27	24.04	24.70
		36	39	23.83	24.11	23.82	24.22	24.02	24.70
		75	0	23.61	23.86	23.88	24.01	23.85	24.70
	16QAM	1	0	23.58	23.92	23.87	24.19	23.98	24.70
		1	38	23.28	23.86	23.81	24.15	24.08	24.70
		1	74	23.48	23.68	23.56	23.31	23.79	24.70
		36	0	22.77	22.96	22.78	23.13	22.93	23.70
		36	18	22.87	22.79	23.03	23.20	22.97	23.70
		36	39	22.74	23.01	22.58	23.01	22.93	23.70
		75	0	22.81	23.09	22.42	22.96	23.08	23.70
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Channel	Channel	Tune up
				39750	40185	40620	41055	41490	
20MHz	QPSK	1	0	24.92	24.90	24.69	25.22	24.90	25.70
		1	50	25.48	25.05	25.02	25.26	25.56	25.70
		1	99	24.66	24.82	24.79	24.70	24.77	25.70
		50	0	23.84	24.19	23.86	24.37	24.14	24.70
		50	25	23.75	24.20	23.77	24.38	24.07	24.70
		50	50	23.87	24.27	23.65	24.08	24.09	24.70



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16QAM	100	0	24.07	24.03	23.94	23.85	23.88	24.70
	1	0	23.66	23.93	23.65	24.17	23.80	24.70
	1	50	23.74	24.13	23.72	24.12	23.67	24.70
	1	99	23.48	23.60	23.47	23.82	23.45	24.70
	50	0	23.14	23.05	23.03	23.28	23.18	23.70
	50	25	22.83	22.66	23.10	23.24	23.11	23.70
	50	50	22.79	23.20	23.03	23.01	22.91	23.70
	100	0	22.02	23.06	23.04	22.87	22.89	23.70

Table 7: Conducted Power of LTE



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8.1.3 Conducted Power of WIFI and BT

Mode	Channel	Frequency(MHz)	Data Rate(Mbps)	Tune up	Average Power (dBm)	SAR Test
802.11b	1	2412	1	14.00	13.16	No
	6	2437		14.00	13.24	No
	11	2462		14.00	13.75	Yes
802.11g	1	2412	6	13.00	12.14	No
	6	2437		13.00	12.98	No
	11	2462		13.00	12.59	No
802.11n HT20 SISO	1	2412	6.5	13.00	11.94	No
	6	2437		13.00	12.95	No
	11	2462		13.00	12.65	No

Table 8 : Conducted Power of WIFI

Note:

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



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BT			Tune up (dBm)	Average Conducted Power(dBm)
Modulation	Channel	Frequency(MHz)		
GFSK	0	2402	5.00	2.48
	39	2441	5.00	4.03
	78	2480	5.00	2.88
π/4DQPSK	0	2402	5.00	0.91
	39	2441	5.00	2.64
	78	2480	5.00	1.33
8DPSK	0	2402	5.00	0.93
	39	2441	5.00	2.67
	78	2480	5.00	1.42

BLE			Tune up (dBm)	Average Conducted Power(dBm)
Modulation	Channel	Frequency(MHz)		
GFSK	0	2402	-0.50	-1.89
	19	2440	-0.50	-0.61
	39	2480	-0.50	-1.53

Table 9: Conducted Power of BT



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8.2 Stand-alone SAR test evaluation

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

Freq. Band	Frequency (GHz)	Position	Average Power		Test Separation (mm)	Calculate Value	Exclusion Threshold	Exclusion (Y/N)
			dBm	mW				
Wi-Fi	2.462	Head	14.00	25.12	0	7.9	3	N
		Body-worn	14.00	25.12	15	2.6	3	Y
		hotspot	14.00	25.12	10	3.9	3	N
Bluetooth	2.48	Head	5.00	3.16	0	1.0	3	Y
		Body-worn	5.00	3.16	15	0.3	3	Y
		hotspot	5.00	3.16	10	0.5	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:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$
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.



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8.3 Measurement of SAR Data

8.3.1 SAR Result of CDMA BC0

Test position	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg)1-g	Power Drift(dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR(W/kg)	Liquid Temp
Head Test data										
Left cheek	1xRTT(RC3 SO55)	384/836.52	1:1	0.513	-0.18	24.41	25.00	1.146	0.588	22.1
Left tilted	1xRTT(RC3 SO55)	384/836.52	1:1	0.324	0.11	24.41	25.00	1.146	0.371	22.1
Right cheek	1xRTT(RC3 SO55)	384/836.52	1:1	0.600	0.02	24.41	25.00	1.146	0.687	22.1
Right tilted	1xRTT(RC3 SO55)	384/836.52	1:1	0.462	-0.02	24.41	25.00	1.146	0.529	22.1
Body worn Test data(Separate 15mm)										
Front side	1xRTT(RC3 SO32)	384/836.52	1:1	0.423	-0.03	24.44	25.00	1.138	0.481	22.1
Back side	1xRTT(RC3 SO32)	384/836.52	1:1	0.572	0.03	24.44	25.00	1.138	0.651	22.1
Hotspot Test data(Separate 10mm)										
Front side	1xRTT(RC3 SO32)	384/836.52	1:1	0.473	-0.04	24.44	25.00	1.138	0.538	22.1
Back side	1xRTT(RC3 SO32)	384/836.52	1:1	0.609	-0.01	24.44	25.00	1.138	0.693	22.1
Left side	1xRTT(RC3 SO32)	384/836.52	1:1	0.417	0.02	24.44	25.00	1.138	0.474	22.1
Right side	1xRTT(RC3 SO32)	384/836.52	1:1	0.565	-0.01	24.44	25.00	1.138	0.643	22.1
Bottom side	1xRTT(RC3 SO32)	384/836.52	1:1	0.099	0.00	24.44	25.00	1.138	0.113	22.1
Back side	1XEVD0 RTAP 153.6Kbps	384/836.52	1:1	0.772	-0.04	24.57	25.00	1.104	0.852	22.1
Back side	1XEVD0 RTAP 153.6Kbps	1013/824.7	1:1	0.695	0.11	24.41	25.00	1.146	0.796	22.1
Back side	1XEVD0 RTAP 153.6Kbps	777/848.31	1:1	0.801	-0.03	24.19	25.00	1.205	0.965	22.1
Back side	1XEVD0 RETAP 4096Bits	384/836.52	1:1	0.766	0.01	24.61	25.00	1.094	0.838	22.1
Back side	1XEVD0 RETAP 4096Bits	1013/824.7	1:1	0.713	-0.13	24.43	25.00	1.140	0.813	22.1
Back side	1XEVD0 RETAP 4096Bits	777/848.31	1:1	0.839	0.01	24.18	25.00	1.208	1.013	22.1
Back side-Repeat	1XEVD0 RETAP 4096Bits	777/848.31	1:1	0.835	-0.03	24.18	25.00	1.208	1.009	22.1

Table 10: SAR of CDMA BC0 for Head and Body

Note:

- 1) The maximum Scaled SAR value is marked in bold. Graph Results refer to Appendix B
- 2) If the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s).

Test Position	Channel/ Frequency	Measured SAR (1g)	1 st Repeated	Ratio	2 nd Repeated	3 rd Repeated
	(MHz)		SAR (1g)		SAR (1g)	SAR (1g)
Back Side	777/848.31	0.839	0.835	1.005	N/A	N/A

Note: 1) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.

2) A second repeated measurement was performed only if the ratio of largest to smallest SAR for the original and first repeated measurements was > 1.20 or when the original or repeated measurement was ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).

3) A third repeated measurement was performed only if the original, first or second repeated measurement was ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20 .

4) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg

Table 11: SAR Measurement Variability Results.



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8.3.2 SAR Result of CDMA BC1

Test position	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg)1-g	Power Drift(dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR(W/kg)	Liquid Temp
Head Test data										
Left cheek	1xRTT(RC3 SO55)	600/1880	1:1	0.241	-0.06	23.48	24.00	1.127	0.272	22.3
Left tilted	1xRTT(RC3 SO55)	600/1880	1:1	0.119	-0.09	23.48	24.00	1.127	0.134	22.3
Right cheek	1xRTT(RC3 SO55)	600/1880	1:1	0.336	-0.03	23.48	24.00	1.127	0.379	22.3
Right tilted	1xRTT(RC3 SO55)	600/1880	1:1	0.144	0.08	23.48	24.00	1.127	0.162	22.3
Body worn Test data(Separate 15mm)										
Front side	1xRTT(RC3 SO32)	600/1880	1:1	0.255	0.00	23.61	24.00	1.094	0.279	22.3
Back side	1xRTT(RC3 SO32)	600/1880	1:1	0.658	-0.02	23.61	24.00	1.094	0.720	22.3
Hotspot Test data(Separate 10mm)										
Front side	1xRTT(RC3 SO32)	600/1880	1:1	0.483	0.06	23.61	24.00	1.094	0.528	22.3
Back side	1xRTT(RC3 SO32)	600/1880	1:1	1.110	0.02	23.61	24.00	1.094	1.214	22.3
Left side	1xRTT(RC3 SO32)	600/1880	1:1	0.253	-0.10	23.61	24.00	1.094	0.277	22.3
Right side	1xRTT(RC3 SO32)	600/1880	1:1	0.191	-0.01	23.61	24.00	1.094	0.209	22.3
Bottom side	1xRTT(RC3 SO32)	600/1880	1:1	0.785	0.01	23.61	24.00	1.094	0.859	22.3
Back side	1xRTT(RC3 SO32)	25/1851.25	1:1	1.030	0.01	23.54	24.00	1.112	1.145	22.3
Back side	1xRTT(RC3 SO32)	1175/1908.75	1:1	1.290	0.00	23.75	24.00	1.059	1.366	22.3
Bottom side	1xRTT(RC3 SO32)	25/1851.25	1:1	0.699	0.07	23.54	24.00	1.112	0.777	22.3
Bottom side	1xRTT(RC3 SO32)	1175/1908.75	1:1	1.000	0.01	23.75	24.00	1.059	1.059	22.3
Back side	1XEVD0 RTAP 153.6Kbps	1175/1908.75	1:1	1.230	0.11	23.78	24.00	1.052	1.294	22.3
Back side	1XEVD0 RTAP 153.6Kbps	25/1851.25	1:1	0.923	-0.02	23.61	24.00	1.094	1.010	22.3
Back side	1XEVD0 RTAP 153.6Kbps	600/1880	1:1	1.010	-0.09	23.45	24.00	1.135	1.146	22.3
Back side	1XEVD0 RETAP 4096Bits	1175/1908.75	1:1	1.220	0.04	23.76	24.00	1.057	1.289	22.3
Back side	1XEVD0 RETAP 4096Bits	25/1851.25	1:1	0.916	-0.13	23.54	24.00	1.112	1.018	22.3
Back side	1XEVD0 RETAP 4096Bits	600/1880	1:1	1.020	-0.02	23.42	24.00	1.143	1.166	22.3
Back side-Repeat	1xRTT(RC3 SO32)	1175/1908.75	1:1	1.170	-0.08	23.75	24.00	1.059	1.239	22.3

Table 12: SAR of CDMA BC1 for Head and Body

Note:

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

Test Position	Channel/ Frequency	Measured SAR (1g)	1 st Repeated	Ratio	2 nd Repeated	3 rd Repeated
	(MHz)		SAR (1g)		SAR (1g)	SAR (1g)
Back Side	1175/1908.75	1.290	1.170	1.103	N/A	N/A

Note: 1) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.

2) A second repeated measurement was performed only if the ratio of largest to smallest SAR for the original and first repeated measurements was > 1.20 or when the original or repeated measurement was ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).

3) A third repeated measurement was performed only if the original, first or second repeated measurement was ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20 .

4) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg

Table 13: SAR Measurement Variability Results.



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8.3.3 SAR Result of CDMA BC10

Test position	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg)1-g	Power Drift(dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR(W/kg)	Liquid Temp
Head Test data										
Left cheek	1xRTT(RC3 SO55)	580/820.5	1:1	0.498	0.13	24.58	25.00	1.102	0.549	22.1
Left tilted	1xRTT(RC3 SO55)	580/820.5	1:1	0.320	0.04	24.58	25.00	1.102	0.352	22.1
Right cheek	1xRTT(RC3 SO55)	580/820.5	1:1	0.542	-0.11	24.58	25.00	1.102	0.597	22.1
Right tilted	1xRTT(RC3 SO55)	580/820.5	1:1	0.437	0.04	24.58	25.00	1.102	0.481	22.1
Body worn Test data(Separate 15mm)										
Front side	1xRTT(RC3 SO32)	580/820.5	1:1	0.504	-0.01	24.69	25.00	1.074	0.541	22.1
Back side	1xRTT(RC3 SO32)	580/820.5	1:1	0.609	-0.09	24.69	25.00	1.074	0.654	22.1
Hotspot Test data(Separate 10mm)										
Front side	1xRTT(RC3 SO32)	580/820.5	1:1	0.534	-0.11	24.69	25.00	1.074	0.574	22.1
Back side	1xRTT(RC3 SO32)	580/820.5	1:1	0.706	-0.08	24.69	25.00	1.074	0.758	22.1
Left side	1xRTT(RC3 SO32)	580/820.5	1:1	0.388	-0.02	24.69	25.00	1.074	0.417	22.1
Right side	1xRTT(RC3 SO32)	580/820.5	1:1	0.695	-0.01	24.69	25.00	1.074	0.746	22.1
Bottom side	1xRTT(RC3 SO32)	580/820.5	1:1	0.101	0.04	24.69	25.00	1.074	0.108	22.1
Back side	1XEVD0 RTAP 153.6Kbps	580/820.5	1:1	0.737	0.06	24.58	25.00	1.102	0.812	22.1
Back side	1XEVD0 RTAP 153.6Kbps	476/817.9	1:1	0.736	-0.01	24.52	25.00	1.117	0.822	22.1
Back side	1XEVD0 RTAP 153.6Kbps	684/823.1	1:1	0.682	0.00	24.35	25.00	1.161	0.792	22.1
Back side	1XEVD0 RETAP 4096Bits	580/820.5	1:1	0.761	-0.07	24.67	25.00	1.079	0.821	22.1
Back side	1XEVD0 RETAP 4096Bits	476/817.9	1:1	0.754	-0.05	24.48	25.00	1.127	0.850	22.1
Back side	1XEVD0 RETAP 4096Bits	684/823.1	1:1	0.760	0.05	24.40	25.00	1.148	0.873	22.1

Table 14: SAR of CDMA BC10 for Head and Body

Note:

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



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8.3.4 SAR Result of LTE Band 2

Test position	BW.	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg)1-g	Power Drift(dB)	Conducted power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR(W/kg)	Liquid Temp.
Head Test data(1RB)											
Left cheek	20	QPSK 1RB_50	19100/1900	1:1	0.139	-0.12	23.16	23.50	1.081	0.150	22.3
Left tilted	20	QPSK 1RB_50	19100/1900	1:1	0.081	-0.05	23.16	23.50	1.081	0.087	22.3
Right cheek	20	QPSK 1RB_50	19100/1900	1:1	0.220	0.17	23.16	23.50	1.081	0.238	22.3
Right tilted	20	QPSK 1RB_50	19100/1900	1:1	0.092	0.04	23.16	23.50	1.081	0.100	22.3
Head Test data(50%RB)											
Left cheek	20	QPSK 50RB_25	18700/1860	1:1	0.090	0.07	22.16	22.50	1.081	0.097	22.3
Left tilted	20	QPSK 50RB_25	18700/1860	1:1	0.106	0.06	22.16	22.50	1.081	0.115	22.3
Right cheek	20	QPSK 50RB_25	18700/1860	1:1	0.184	0.02	22.16	22.50	1.081	0.199	22.3
Right tilted	20	QPSK 50RB_25	18700/1860	1:1	0.099	0.08	22.16	22.50	1.081	0.107	22.3
Body worn Test data(Separate 15mm 1RB)											
Front side	20	QPSK 1RB_50	19100/1900	1:1	0.193	0.02	23.16	23.50	1.081	0.209	22.3
Back side	20	QPSK 1RB_50	19100/1900	1:1	0.498	-0.02	23.16	23.50	1.081	0.539	22.3
Body worn Test data (Separate 15mm 50%RB)											
Front side	20	QPSK 50RB_25	18700/1860	1:1	0.163	0.12	22.16	22.50	1.081	0.176	22.3
Back side	20	QPSK 50RB_25	18700/1860	1:1	0.358	-0.01	22.16	22.50	1.081	0.387	22.3
Hotspot Test data(Separate 10mm 1RB)											
Front side	20	QPSK 1RB_50	19100/1900	1:1	0.416	-0.05	23.16	23.50	1.081	0.450	22.3
Back side	20	QPSK 1RB_50	19100/1900	1:1	0.954	-0.08	23.16	23.50	1.081	1.032	22.3
Left side	20	QPSK 1RB_50	19100/1900	1:1	0.148	0.18	23.16	23.50	1.081	0.160	22.3
Right side	20	QPSK 1RB_50	19100/1900	1:1	0.144	0.04	23.16	23.50	1.081	0.156	22.3
Bottom side	20	QPSK 1RB_50	19100/1900	1:1	0.653	0.05	23.16	23.50	1.081	0.706	22.3
Back side	20	QPSK 1RB_50	18700/1860	1:1	0.836	0.04	23.10	23.50	1.096	0.917	22.3
Back side	20	QPSK 1RB_50	18900/1880	1:1	0.874	-0.07	23.04	23.50	1.112	0.972	22.3
Back side-repeat	20	QPSK 1RB_50	19100/1900	1:1	0.914	-0.01	23.16	23.50	1.081	0.988	22.3
Hotspot Test data (Separate 10mm 50%RB)											
Front side	20	QPSK 50RB_25	18700/1860	1:1	0.304	0.10	22.16	22.50	1.081	0.329	22.3
Back side	20	QPSK 50RB_25	18700/1860	1:1	0.668	0.02	22.16	22.50	1.081	0.722	22.3
Left side	20	QPSK 50RB_25	18700/1860	1:1	0.143	0.14	22.16	22.50	1.081	0.155	22.3
Right side	20	QPSK 50RB_25	18700/1860	1:1	0.120	0.01	22.16	22.50	1.081	0.130	22.3
Bottom side	20	QPSK 50RB_25	18700/1860	1:1	0.445	0.06	22.16	22.50	1.081	0.481	22.3
Hotspot Test data (Separate 10mm 100%RB)											
Back side	20	QPSK 100RB_0	18700/1860	1:1	0.741	-0.01	22.14	22.50	1.086	0.805	22.3

Table 15: SAR of LTE Band 2 for Head and Body

Note:

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



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Test Position	Channel/ Frequency	Measured SAR (1g)	1 st Repeated	Ratio	2 nd Repeated	3 rd Repeated
	(MHz)		SAR (1g)		SAR (1g)	SAR (1g)
Back Side	19100/1900	0.954	0.914	1.044	N/A	N/A

Note: 1) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.
2) A second repeated measurement was performed only if the ratio of largest to smallest SAR for the original and first repeated measurements was > 1.20 or when the original or repeated measurement was ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).
3) A third repeated measurement was performed only if the original, first or second repeated measurement was ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20 .
4) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg

Table 16: SAR Measurement Variability Results.



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8.3.5 SAR Result of LTE Band 4

Test position	BW.	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg)1-g	Power Drift(dB)	Conducted power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR(W/kg)	Liquid Temp.
Head Test data(1RB)											
Left cheek	20	QPSK 1RB_50	20050/1720	1:1	0.471	0.18	24.49	24.50	1.002	0.472	22.2
Left tilted	20	QPSK 1RB_50	20050/1720	1:1	0.214	0.09	24.49	24.50	1.002	0.214	22.2
Right cheek	20	QPSK 1RB_50	20050/1720	1:1	0.569	0.06	24.49	24.50	1.002	0.570	22.2
Right tilted	20	QPSK 1RB_50	20050/1720	1:1	0.233	-0.01	24.49	24.50	1.002	0.234	22.2
Head Test data(50%RB)											
Left cheek	20	QPSK 50RB_0	20300/1745	1:1	0.399	0.05	23.40	23.50	1.023	0.408	22.2
Left tilted	20	QPSK 50RB_0	20300/1745	1:1	0.173	-0.04	23.40	23.50	1.023	0.177	22.2
Right cheek	20	QPSK 50RB_0	20300/1745	1:1	0.455	0.03	23.40	23.50	1.023	0.466	22.2
Right tilted	20	QPSK 50RB_0	20300/1745	1:1	0.190	0.18	23.40	23.50	1.023	0.194	22.2
Body worn Test data(Separate 15mm 1RB)											
Front side	20	QPSK 1RB_50	20050/1720	1:1	0.493	0.09	24.49	24.50	1.002	0.494	22.2
Back side	20	QPSK 1RB_50	20050/1720	1:1	0.492	0.03	24.49	24.50	1.002	0.493	22.2
Body worn Test data (Separate 15mm 50%RB)											
Front side	20	QPSK 50RB_0	20300/1745	1:1	0.409	0.00	23.40	23.50	1.023	0.419	22.2
Back side	20	QPSK 50RB_0	20300/1745	1:1	0.432	0.04	23.40	23.50	1.023	0.442	22.2
Hotspot Test data(Separate 10mm 1RB)											
Front side	20	QPSK 1RB_50	20050/1720	1:1	0.669	-0.08	24.49	24.50	1.002	0.671	22.2
Back side	20	QPSK 1RB_50	20050/1720	1:1	0.911	0.04	24.49	24.50	1.002	0.913	22.2
Left side	20	QPSK 1RB_50	20050/1720	1:1	0.356	0.05	24.49	24.50	1.002	0.357	22.2
Right side	20	QPSK 1RB_50	20050/1720	1:1	0.191	-0.04	24.49	24.50	1.002	0.191	22.2
Bottom side	20	QPSK 1RB_50	20050/1720	1:1	0.446	0.06	24.49	24.50	1.002	0.447	22.2
Back side	20	QPSK 1RB_99	20175/1732.5	1:1	0.871	0.05	24.25	24.50	1.059	0.923	22.2
Back side	20	QPSK 1RB_50	20300/1745	1:1	0.894	0.02	24.46	24.50	1.009	0.902	22.2
Back side-repeat	20	QPSK 1RB_50	20050/1720	1:1	0.923	-0.12	24.49	24.50	1.002	0.925	22.2
Hotspot Test data (Separate 10mm 50%RB)											
Front side	20	QPSK 50RB_0	20300/1745	1:1	0.605	0.03	23.40	23.50	1.023	0.619	22.2
Back side	20	QPSK 50RB_0	20300/1745	1:1	0.747	-0.02	23.40	23.50	1.023	0.764	22.2
Left side	20	QPSK 50RB_0	20300/1745	1:1	0.285	0.04	23.40	23.50	1.023	0.292	22.2
Right side	20	QPSK 50RB_0	20300/1745	1:1	0.187	0.04	23.40	23.50	1.023	0.191	22.2
Bottom side	20	QPSK 50RB_0	20300/1745	1:1	0.403	0.05	23.40	23.50	1.023	0.412	22.2
Hotspot Test data (Separate 10mm 100%RB)											
Back side	20	QPSK 100RB_0	20050/1720	1:1	0.802	-0.02	23.21	23.50	1.069	0.857	22.2

Table 17: SAR of LTE Band 4 for Head and Body

Note:

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



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Test Position	Channel/ Frequency	Measured SAR (1g)	1 st Repeated	Ratio	2 nd Repeated	3 rd Repeated
	(MHz)		SAR (1g)		SAR (1g)	SAR (1g)
Back Side	20050/1720	0.911	0.923	1.013	N/A	N/A
Note: 1) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once. 2) A second repeated measurement was performed only if the ratio of largest to smallest SAR for the original and first repeated measurements was > 1.20 or when the original or repeated measurement was ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit). 3) A third repeated measurement was performed only if the original, first or second repeated measurement was ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20 . 4) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg						

Table 18: SAR Measurement Variability Results.



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8.3.6 SAR Result of LTE Band 5

Test position	BW.	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg)1-g	Power Drift(dB)	Conducted power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR(W/kg)	Liquid Temp.
Head Test data(1RB)											
Left cheek	10	QPSK 1RB_25	20525/836.5	1:1	0.424	0.06	24.05	24.50	1.109	0.470	22.1
Left tilted	10	QPSK 1RB_25	20525/836.5	1:1	0.326	0.25	24.05	24.50	1.109	0.362	22.1
Right cheek	10	QPSK 1RB_25	20525/836.5	1:1	0.501	-0.10	24.05	24.50	1.109	0.556	22.1
Right tilted	10	QPSK 1RB_25	20525/836.5	1:1	0.334	0.01	24.05	24.50	1.109	0.370	22.1
Head Test data(50%RB)											
Left cheek	10	QPSK 25RB_13	20600/844	1:1	0.341	0.07	22.99	23.50	1.125	0.383	22.1
Left tilted	10	QPSK 25RB_13	20600/844	1:1	0.271	0.16	22.99	23.50	1.125	0.305	22.1
Right cheek	10	QPSK 25RB_13	20600/844	1:1	0.424	0.04	22.99	23.50	1.125	0.477	22.1
Right tilted	10	QPSK 25RB_13	20600/844	1:1	0.285	0.00	22.99	23.50	1.125	0.321	22.1
Body worn Test data(Separate 15mm 1RB)											
Front side	10	QPSK 1RB_25	20525/836.5	1:1	0.395	-0.10	24.05	24.50	1.109	0.438	22.1
Back side	10	QPSK 1RB_25	20525/836.5	1:1	0.524	0.18	24.05	24.50	1.109	0.581	22.1
Body worn Test data (Separate 15mm 50%RB)											
Front side	10	QPSK 25RB_13	20600/844	1:1	0.355	-0.08	22.99	23.50	1.125	0.399	22.1
Back side	10	QPSK 25RB_13	20600/844	1:1	0.495	0.00	22.99	23.50	1.125	0.557	22.1
Hotspot Test data(Separate 10mm 1RB)											
Front side	10	QPSK 1RB_25	20525/836.5	1:1	0.431	-0.03	24.05	24.50	1.109	0.478	22.1
Back side	10	QPSK 1RB_25	20525/836.5	1:1	0.676	0.02	24.05	24.50	1.109	0.750	22.1
Left side	10	QPSK 1RB_25	20525/836.5	1:1	0.349	-0.12	24.05	24.50	1.109	0.387	22.1
Right side	10	QPSK 1RB_25	20525/836.5	1:1	0.512	-0.13	24.05	24.50	1.109	0.568	22.1
Bottom side	10	QPSK 1RB_25	20525/836.5	1:1	0.100	0.14	24.05	24.50	1.109	0.111	22.1
Hotspot Test data (Separate 10mm 50%RB)											
Front side	10	QPSK 25RB_13	20600/844	1:1	0.379	-0.02	22.99	23.50	1.125	0.426	22.1
Back side	10	QPSK 25RB_13	20600/844	1:1	0.611	0.03	22.99	23.50	1.125	0.687	22.1
Left side	10	QPSK 25RB_13	20600/844	1:1	0.318	-0.02	22.99	23.50	1.125	0.358	22.1
Right side	10	QPSK 25RB_13	20600/844	1:1	0.504	0.05	22.99	23.50	1.125	0.567	22.1
Bottom side	10	QPSK 25RB_13	20600/844	1:1	0.079	0.18	22.99	23.50	1.125	0.088	22.1

Table 19: SAR of LTE Band 5 for Head and Body

Note:

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



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8.3.7 SAR Result of LTE Band 13

Test position	BW.	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg)1-g	Power Drift(dB)	Conducted power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR(W/kg)	Liquid Temp.
Head Test data(1RB)											
Left cheek	10	QPSK 1RB_25	23230/782	1:1	0.389	0.06	24.09	24.50	1.099	0.428	22.1
Left tilted	10	QPSK 1RB_25	23230/782	1:1	0.281	0.04	24.09	24.50	1.099	0.309	22.1
Right cheek	10	QPSK 1RB_25	23230/782	1:1	0.430	0.12	24.09	24.50	1.099	0.473	22.1
Right tilted	10	QPSK 1RB_25	23230/782	1:1	0.298	0.09	24.09	24.50	1.099	0.328	22.1
Head Test data(50%RB)											
Left cheek	10	QPSK 25RB_13	23230/782	1:1	0.287	0.02	23.27	23.50	1.054	0.303	22.1
Left tilted	10	QPSK 25RB_13	23230/782	1:1	0.222	0.04	23.27	23.50	1.054	0.234	22.1
Right cheek	10	QPSK 25RB_13	23230/782	1:1	0.334	0.08	23.27	23.50	1.054	0.352	22.1
Right tilted	10	QPSK 25RB_13	23230/782	1:1	0.235	0.10	23.27	23.50	1.054	0.248	22.1
Body worn Test data(Separate 15mm 1RB)											
Front side	10	QPSK 1RB_25	23230/782	1:1	0.499	-0.08	24.09	24.50	1.099	0.548	22.1
Back side	10	QPSK 1RB_25	23230/782	1:1	0.722	0.18	24.09	24.50	1.099	0.793	22.1
Body worn Test data (Separate 15mm 50%RB)											
Front side	10	QPSK 25RB_13	23230/782	1:1	0.402	0.15	23.27	23.50	1.054	0.424	22.1
Back side	10	QPSK 25RB_13	23230/782	1:1	0.557	0.01	23.27	23.50	1.054	0.587	22.1
Hotspot Test data(Separate 10mm 1RB)											
Front side	10	QPSK 1RB_25	23230/782	1:1	0.506	0.11	24.09	24.50	1.099	0.556	22.1
Back side	10	QPSK 1RB_25	23230/782	1:1	0.806	-0.08	24.09	24.50	1.099	0.886	22.1
Left side	10	QPSK 1RB_25	23230/782	1:1	0.447	0.11	24.09	24.50	1.099	0.491	22.1
Right side	10	QPSK 1RB_25	23230/782	1:1	0.507	-0.03	24.09	24.50	1.099	0.557	22.1
Bottom side	10	QPSK 1RB_25	23230/782	1:1	0.056	0.04	24.09	24.50	1.099	0.062	22.1
Back side-Repeat	10	QPSK 1RB_25	23230/782	1:1	0.831	0.02	24.09	24.50	1.099	0.913	22.1
Hotspot Test data (Separate 10mm 50%RB)											
Front side	10	QPSK 25RB_13	23230/782	1:1	0.387	-0.06	23.27	23.50	1.054	0.408	22.1
Back side	10	QPSK 25RB_13	23230/782	1:1	0.643	0.05	23.27	23.50	1.054	0.678	22.1
Left side	10	QPSK 25RB_13	23230/782	1:1	0.352	0.12	23.27	23.50	1.054	0.371	22.1
Right side	10	QPSK 25RB_13	23230/782	1:1	0.399	0.06	23.27	23.50	1.054	0.421	22.1
Bottom side	10	QPSK 25RB_13	23230/782	1:1	0.045	0.15	23.27	23.50	1.054	0.047	22.1
Hotspot Test data(Separate 10mm 100%RB)											
Back side	10	QPSK 50RB_0	23230/782	1:1	0.603	-0.08	23.21	23.50	1.069	0.645	22.1

Table 20: SAR of LTE Band 13 for Head and Body

Note:

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

Test Position	Channel/ Frequency (MHz)	Measured SAR (1g)	1 st Repeated	Ratio	2 nd Repeated	3 rd Repeated
			SAR (1g)		SAR (1g)	SAR (1g)
Back Side	23230/782	0.806	0.831	1.031	N/A	N/A

Note: 1) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.

2) A second repeated measurement was performed only if the ratio of largest to smallest SAR for the original and first repeated measurements was > 1.20 or when the original or repeated measurement was ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).

3) A third repeated measurement was performed only if the original, first or second repeated measurement was ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20 .

4) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg

Table 21: SAR Measurement Variability Results.





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8.3.8 SAR Result of LTE Band 25

Test position	BW.	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg)1-g	Power Drift(dB)	Conducted power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR(W/kg)	Liquid Temp.
Head Test data(1RB)											
Left cheek	20	QPSK 1RB_50	26365/1882.5	1:1	0.162	-0.05	22.71	23.00	1.069	0.173	22.3
Left tilted	20	QPSK 1RB_50	26365/1882.5	1:1	0.116	0.05	22.71	23.00	1.069	0.124	22.3
Right cheek	20	QPSK 1RB_50	26365/1882.5	1:1	0.247	0.19	22.71	23.00	1.069	0.264	22.3
Right tilted	20	QPSK 1RB_50	26365/1882.5	1:1	0.117	0.05	22.71	23.00	1.069	0.125	22.3
Head Test data(50%RB)											
Left cheek	20	QPSK 50RB_0	26140/1860	1:1	0.160	-0.09	21.62	22.00	1.091	0.175	22.3
Left tilted	20	QPSK 50RB_0	26140/1860	1:1	0.123	0.14	21.62	22.00	1.091	0.134	22.3
Right cheek	20	QPSK 50RB_0	26140/1860	1:1	0.216	0.05	21.62	22.00	1.091	0.236	22.3
Right tilted	20	QPSK 50RB_0	26140/1860	1:1	0.111	0.16	21.62	22.00	1.091	0.121	22.3
Body worn Test data(Separate 15mm 1RB)											
Front side	20	QPSK 1RB_50	26365/1882.5	1:1	0.219	-0.10	22.71	23.00	1.069	0.234	22.3
Back side	20	QPSK 1RB_50	26365/1882.5	1:1	0.545	0.12	22.71	23.00	1.069	0.583	22.3
Body worn Test data (Separate 15mm 50%RB)											
Front side	20	QPSK 50RB_0	26140/1860	1:1	0.181	0.01	21.62	22.00	1.091	0.198	22.3
Back side	20	QPSK 50RB_0	26140/1860	1:1	0.412	-0.04	21.62	22.00	1.091	0.450	22.3
Hotspot Test data(Separate 10mm 1RB)											
Front side	20	QPSK 1RB_50	26365/1882.5	1:1	0.441	-0.11	22.71	23.00	1.069	0.471	22.3
Back side	20	QPSK 1RB_50	26365/1882.5	1:1	1.080	0.06	22.71	23.00	1.069	1.155	22.3
Left side	20	QPSK 1RB_50	26365/1882.5	1:1	0.185	0.13	22.71	23.00	1.069	0.198	22.3
Right side	20	QPSK 1RB_50	26365/1882.5	1:1	0.161	0.07	22.71	23.00	1.069	0.172	22.3
Bottom side	20	QPSK 1RB_50	26365/1882.5	1:1	0.684	0.09	22.71	23.00	1.069	0.731	22.3
Back side	20	QPSK 1RB_50	26140/1860	1:1	1.010	0.14	22.67	23.00	1.079	1.090	22.3
Back side	20	QPSK 1RB_50	26590/1905	1:1	1.010	0.06	22.69	23.00	1.074	1.085	22.3
Back side-repeat	20	QPSK 1RB_50	26365/1882.5	1:1	1.040	0.02	22.71	23.00	1.069	1.112	22.3
Hotspot Test data (Separate 10mm 50%RB)											
Front side	20	QPSK 50RB_0	26140/1860	1:1	0.350	-0.05	21.62	22.00	1.091	0.382	22.3
Back side	20	QPSK 50RB_0	26140/1860	1:1	0.808	-0.11	21.62	22.00	1.091	0.882	22.3
Left side	20	QPSK 50RB_0	26140/1860	1:1	0.172	0.06	21.62	22.00	1.091	0.188	22.3
Right side	20	QPSK 50RB_0	26140/1860	1:1	0.143	0.20	21.62	22.00	1.091	0.156	22.3
Bottom side	20	QPSK 50RB_0	26140/1860	1:1	0.496	0.06	21.62	22.00	1.091	0.541	22.3
Back side	20	QPSK 50RB_50	26365/1882.5	1:1	0.882	0.08	21.61	22.00	1.094	0.965	22.3
Back side	20	QPSK 50RB_25	26590/1905	1:1	0.977	0.00	21.60	22.00	1.096	1.071	22.3
Hotspot Test data (Separate 10mm 100%RB)											
Back side	20	QPSK 100RB_0	26590/1905	1:1	0.962	-0.01	21.67	22.00	1.079	1.038	22.3

Table 22: SAR of LTE Band 25 for Head and Body

Note:

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

Test Position	Channel/ Frequency	Measured SAR (1g)	1 st Repeated	Ratio	2 nd Repeated	3 rd Repeated
	(MHz)		SAR (1g)		SAR (1g)	SAR (1g)
Back Side	26365/1882.5	1.08	1.04	1.038	N/A	N/A

Note: 1) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.

2) A second repeated measurement was performed only if the ratio of largest to smallest SAR for the original and first repeated measurements was > 1.20 or when the original or repeated measurement was ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).

3) A third repeated measurement was performed only if the original, first or second repeated measurement was ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20 .



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4) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg



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8.3.9 SAR Result of LTE Band 26

Test position	BW.	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg)1-g	Power Drift(dB)	Conducted power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR(W/kg)	Liquid Temp.
Head Test data(1RB)											
Left cheek	15	QPSK 1RB_38	26865/831.5	1:1	0.443	-0.08	24.28	24.50	1.052	0.466	22.1
Left tilted	15	QPSK 1RB_38	26865/831.5	1:1	0.317	0.01	24.28	24.50	1.052	0.333	22.1
Right cheek	15	QPSK 1RB_38	26865/831.5	1:1	0.509	0.04	24.28	24.50	1.052	0.535	22.1
Right tilted	15	QPSK 1RB_38	26865/831.5	1:1	0.266	-0.15	24.28	24.50	1.052	0.280	22.1
Head Test data(50%RB)											
Left cheek	15	QPSK 36RB_18	26765/821.5	1:1	0.353	0.03	23.36	23.50	1.033	0.365	22.1
Left tilted	15	QPSK 36RB_18	26765/821.5	1:1	0.260	-0.05	23.36	23.50	1.033	0.269	22.1
Right cheek	15	QPSK 36RB_18	26765/821.5	1:1	0.402	0.03	23.36	23.50	1.033	0.415	22.1
Right tilted	15	QPSK 36RB_18	26765/821.5	1:1	0.262	0.11	23.36	23.50	1.033	0.271	22.1
Body worn Test data(Separate 15mm 1RB)											
Front side	15	QPSK 1RB_38	26865/831.5	1:1	0.403	0.16	24.28	24.50	1.052	0.424	22.1
Back side	15	QPSK 1RB_38	26865/831.5	1:1	0.511	-0.02	24.28	24.50	1.052	0.538	22.1
Body worn Test data (Separate 15mm 50%RB)											
Front side	15	QPSK 36RB_18	26775/822.5	1:1	0.351	-0.09	23.36	23.50	1.033	0.362	22.1
Back side	15	QPSK 36RB_18	26775/822.5	1:1	0.462	0.02	23.36	23.50	1.033	0.477	22.1
Hotspot Test data(Separate 10mm 1RB)											
Front side	15	QPSK 1RB_38	26865/831.5	1:1	0.475	0.18	24.28	24.50	1.052	0.500	22.1
Back side	15	QPSK 1RB_38	26865/831.5	1:1	0.644	0.03	24.28	24.50	1.052	0.677	22.1
Left side	15	QPSK 1RB_38	26865/831.5	1:1	0.392	0.08	24.28	24.50	1.052	0.412	22.1
Right side	15	QPSK 1RB_38	26865/831.5	1:1	0.462	-0.16	24.28	24.50	1.052	0.486	22.1
Bottom side	15	QPSK 1RB_38	26865/831.5	1:1	0.087	0.19	24.28	24.50	1.052	0.092	22.1
Hotspot Test data (Separate 10mm 50%RB)											
Front side	15	QPSK 36RB_18	26775/822.5	1:1	0.404	0.09	23.36	23.50	1.033	0.417	22.1
Back side	15	QPSK 36RB_18	26775/822.5	1:1	0.529	0.04	23.36	23.50	1.033	0.546	22.1
Left side	15	QPSK 36RB_18	26775/822.5	1:1	0.375	0.12	23.36	23.50	1.033	0.387	22.1
Right side	15	QPSK 36RB_18	26775/822.5	1:1	0.382	-0.05	23.36	23.50	1.033	0.395	22.1
Bottom side	15	QPSK 36RB_18	26775/822.5	1:1	0.059	-0.05	23.36	23.50	1.033	0.061	22.1

Table 23: SAR of LTE Band 26 for Head and Body

Note:

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



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8.3.10 SAR Result of LTE Band 41(Class 3)

Test position	BW.	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg)1-g	Power Drift(dB)	Conducted power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR(W/kg)	Liquid Temp.
Head Test data(1RB)											
Left cheek	20	QPSK 1RB_50	39750/2506	1:1.58	0.102	0.07	22.98	23.50	1.127	0.115	22.1
Left tilted	20	QPSK 1RB_50	39750/2506	1:1.58	0.108	0.03	22.98	23.50	1.127	0.122	22.1
Right cheek	20	QPSK 1RB_50	39750/2506	1:1.58	0.178	0.03	22.98	23.50	1.127	0.201	22.1
Right tilted	20	QPSK 1RB_50	39750/2506	1:1.58	0.115	0.06	22.98	23.50	1.127	0.130	22.1
Head Test data(50%RB)											
Left cheek	20	QPSK 50RB_25	39750/2506	1:1.58	0.099	0.02	22.96	23.50	1.132	0.112	22.1
Left tilted	20	QPSK 50RB_25	39750/2506	1:1.58	0.101	0.06	22.96	23.50	1.132	0.114	22.1
Right cheek	20	QPSK 50RB_25	39750/2506	1:1.58	0.171	-0.18	22.96	23.50	1.132	0.194	22.1
Right tilted	20	QPSK 50RB_25	39750/2506	1:1.58	0.111	0.11	22.96	23.50	1.132	0.126	22.1
Body worn Test data(Separate 15mm 1RB)											
Front side	20	QPSK 1RB_50	39750/2506	1:1.58	0.256	0.01	22.98	23.50	1.127	0.289	22.1
Back side	20	QPSK 1RB_50	39750/2506	1:1.58	0.325	-0.11	22.98	23.50	1.127	0.366	22.1
Body worn Test data (Separate 15mm 50%RB)											
Front side	20	QPSK 50RB_25	39750/2506	1:1.58	0.238	-0.07	22.96	23.50	1.132	0.270	22.1
Back side	20	QPSK 50RB_25	39750/2506	1:1.58	0.327	0.07	22.96	23.50	1.132	0.370	22.1
Hotspot Test data(Separate 10mm 1RB)											
Front side	20	QPSK 1RB_50	39750/2506	1:1.58	0.428	-0.01	22.98	23.50	1.127	0.482	22.1
Back side	20	QPSK 1RB_50	39750/2506	1:1.58	0.904	0.11	22.98	23.50	1.127	1.019	22.1
Left side	20	QPSK 1RB_50	39750/2506	1:1.58	0.130	0.16	22.98	23.50	1.127	0.147	22.1
Right side	20	QPSK 1RB_50	39750/2506	1:1.58	0.186	0.14	22.98	23.50	1.127	0.210	22.1
Bottom side	20	QPSK 1RB_50	39750/2506	1:1.58	0.334	0.03	22.98	23.50	1.127	0.376	22.1
Back side	20	QPSK 1RB_50	40185/2549.5	1:1.58	0.687	0.02	22.92	23.50	1.143	0.785	22.1
Back side	20	QPSK 1RB_50	40620/2593	1:1.58	0.705	-0.14	22.64	23.50	1.219	0.859	22.1
Back side	20	QPSK 1RB_50	41055/2636.5	1:1.58	0.889	0.05	22.82	23.50	1.169	1.040	22.1
Back side	20	QPSK 1RB_50	41490/2680	1:1.58	0.884	0.10	22.55	23.50	1.245	1.100	22.1
Back side-repeat	20	QPSK 1RB_50	39750/2506	1:1.58	0.830	-0.02	22.98	23.50	1.127	0.936	22.1
Hotspot Test data (Separate 10mm 50%RB)											
Front side	20	QPSK 50RB_25	39750/2506	1:1.58	0.403	0.00	22.96	23.50	1.132	0.456	22.1
Back side	20	QPSK 50RB_25	39750/2506	1:1.58	0.806	0.15	22.96	23.50	1.132	0.913	22.1
Left side	20	QPSK 50RB_25	39750/2506	1:1.58	0.134	0.07	22.96	23.50	1.132	0.152	22.1
Right side	20	QPSK 50RB_25	39750/2506	1:1.58	0.185	0.00	22.96	23.50	1.132	0.209	22.1
Bottom side	20	QPSK 50RB_25	39750/2506	1:1.58	0.340	-0.07	22.96	23.50	1.132	0.385	22.1
Back side	20	QPSK 50RB_0	40185/2549.5	1:1.58	0.714	0.12	22.82	23.50	1.169	0.835	22.1
Back side	20	QPSK 50RB_50	40620/2593	1:1.58	0.808	0.05	22.71	23.50	1.199	0.969	22.1
Back side	20	QPSK 50RB_0	41055/2636.5	1:1.58	0.825	-0.01	22.75	23.50	1.189	0.981	22.1
Back side	20	QPSK 50RB_50	41490/2680	1:1.58	0.691	-0.01	22.34	23.50	1.306	0.903	22.1
Hotspot Test data (Separate 10mm 100%RB)											
Back side	20	QPSK 100RB_0	39750/2506	1:1.58	0.839	0.01	22.69	23.50	1.205	1.011	22.1

Table 24: SAR of LTE Band 41(Class 3) for Head and Body

Note:

- 1) The maximum Scaled SAR value is marked in bold. Graph results refer to Appendix B
- 2) If the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s).
- 3) 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:
 - a) ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz



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b) ≤ 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

c) ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz

4) This device supports Power Class 2 and Power Class 3 operations for LTE Band 41. The highest available duty cycle for Power Class 2 operations is 43.3% using UL-DL configuration 1. Per May 2017 TCB Workshop Notes based on the device behaviour, all SAR tests were performed using Power Class 3. SAR with Power Class 2 at the highest power and available duty factor was additionally performed for the Power Class 3 configuration with the highest SAR for each exposure condition.

Test Position	Channel/ Frequency (MHz)	Measured SAR (1g)	1 st Repeated	Ratio	2 nd Repeated	3 rd Repeated
			SAR (1g)		SAR (1g)	SAR (1g)
Back Side	39750/2506	0.904	0.830	1.089	N/A	N/A

Note: 1) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.
2) A second repeated measurement was performed only if the ratio of largest to smallest SAR for the original and first repeated measurements was > 1.20 or when the original or repeated measurement was ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).
3) A third repeated measurement was performed only if the original, first or second repeated measurement was ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20 .
4) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg

Table 25: SAR Measurement Variability Results.



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8.3.11 SAR Result of LTE Band 41(Class 2)

Test position	BW.	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg)1-g	Power Drift(dB)	Conducted power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR(W/kg)	Liquid Temp.
Head Test data(1RB)											
Left cheek	20	QPSK 1RB_50	41490/2680	1:2.31	0.422	-0.13	25.56	25.70	1.033	0.436	22.1
Left tilted	20	QPSK 1RB_50	41490/2680	1:2.31	0.137	-0.09	25.56	25.70	1.033	0.141	22.1
Right cheek	20	QPSK 1RB_50	41490/2680	1:2.31	0.154	-0.03	25.56	25.70	1.033	0.159	22.1
Right tilted	20	QPSK 1RB_50	41490/2680	1:2.31	0.195	0.18	25.56	25.70	1.033	0.201	22.1
Head Test data(50%RB)											
Left cheek	20	QPSK 50RB_25	41055/2636.5	1:2.31	0.294	0.04	24.38	24.70	1.076	0.316	22.1
Left tilted	20	QPSK 50RB_25	41055/2636.5	1:2.31	0.102	0.04	24.38	24.70	1.076	0.110	22.1
Right cheek	20	QPSK 50RB_25	41055/2636.5	1:2.31	0.135	-0.06	24.38	24.70	1.076	0.145	22.1
Right tilted	20	QPSK 50RB_25	41055/2636.5	1:2.31	0.216	0.11	24.38	24.70	1.076	0.233	22.1
Body worn Test data(Separate 15mm 1RB)											
Front side	20	QPSK 1RB_50	41490/2680	1:2.31	0.338	-0.08	25.56	25.70	1.033	0.349	22.1
Back side	20	QPSK 1RB_50	41490/2680	1:2.31	0.419	-0.11	25.56	25.70	1.033	0.433	22.1
Body worn Test data (Separate 15mm 50%RB)											
Front side	20	QPSK 50RB_25	41055/2636.5	1:2.31	0.244	-0.14	24.38	24.70	1.076	0.263	22.1
Back side	20	QPSK 50RB_25	41055/2636.5	1:2.31	0.354	-0.01	24.38	24.70	1.076	0.381	22.1
Hotspot Test data(Separate 10mm 1RB)											
Front side	20	QPSK 1RB_50	41490/2680	1:2.31	0.327	0.17	25.56	25.70	1.033	0.338	22.1
Back side	20	QPSK 1RB_50	41490/2680	1:2.31	1.030	-0.02	25.56	25.70	1.033	1.064	22.1
Left side	20	QPSK 1RB_50	41490/2680	1:2.31	0.710	-0.08	25.56	25.70	1.033	0.733	22.1
Right side	20	QPSK 1RB_50	41490/2680	1:2.31	0.044	0.18	25.56	25.70	1.033	0.045	22.1
Bottom side	20	QPSK 1RB_50	41490/2680	1:2.31	0.425	-0.04	25.56	25.70	1.033	0.439	22.1
Back side	20	QPSK 1RB_50	39750/2506	1:2.31	1.260	-0.04	25.48	25.70	1.052	1.325	22.1
Back side	20	QPSK 1RB_50	40185/2549.5	1:2.31	0.964	0.04	25.05	25.70	1.161	1.120	22.1
Back side	20	QPSK 1RB_50	40620/2593	1:2.31	0.992	-0.06	25.02	25.70	1.169	1.160	22.1
Back side	20	QPSK 1RB_50	41055/2636.5	1:2.31	0.940	-0.01	25.26	25.70	1.107	1.040	22.1
Left side	20	QPSK 1RB_50	39750/2506	1:2.31	0.553	0.15	25.48	25.70	1.052	0.582	22.1
Left side	20	QPSK 1RB_50	40185/2549.5	1:2.31	0.532	-0.19	25.05	25.70	1.161	0.618	22.1
Left side	20	QPSK 1RB_50	40620/2593	1:2.31	0.459	-0.08	25.02	25.70	1.169	0.537	22.1
Left side	20	QPSK 1RB_50	41055/2636.5	1:2.31	0.763	-0.02	25.26	25.70	1.107	0.844	22.1
Back side-repeat	20	QPSK 1RB_50	39750/2506	1:2.31	1.130	-0.11	25.48	25.70	1.052	1.189	22.1
Hotspot Test data (Separate 10mm 50%RB)											
Front side	20	QPSK 50RB_25	41055/2636.5	1:2.31	0.414	0.04	24.38	24.70	1.076	0.446	22.1
Back side	20	QPSK 50RB_25	41055/2636.5	1:2.31	0.766	-0.04	24.38	24.70	1.076	0.825	22.1
Left side	20	QPSK 50RB_25	41055/2636.5	1:2.31	0.453	0.01	24.38	24.70	1.076	0.488	22.1
Right side	20	QPSK 50RB_25	41055/2636.5	1:2.31	0.046	0.12	24.38	24.70	1.076	0.049	22.1
Bottom side	20	QPSK 50RB_25	41055/2636.5	1:2.31	0.397	0.09	24.38	24.70	1.076	0.427	22.1
Back side	20	QPSK 50RB_50	39750/2506	1:2.31	0.951	0.08	23.87	24.70	1.211	1.151	22.1
Back side	20	QPSK 50RB_50	40185/2549.5	1:2.31	0.832	0.17	24.27	24.70	1.104	0.919	22.1
Back side	20	QPSK 50RB_0	40620/2593	1:2.31	0.829	0.02	23.86	24.70	1.213	1.006	22.1
Back side	20	QPSK 50RB_0	41490/2680	1:2.31	0.750	-0.03	24.14	24.70	1.138	0.853	22.1
Hotspot Test data (Separate 10mm 100%RB)											
Back side	20	QPSK 100RB_0	39750/2506	1:2.31	1.010	0.07	24.07	24.70	1.156	1.168	22.1
Left side	20	QPSK 100RB_0	39750/2506	1:2.31	0.440	-0.02	24.07	24.70	1.156	0.509	22.1

Table 26: SAR of LTE Band 41(Class 2) for Head and Body

Note:

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



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- 2) If the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s).
- 3) 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:
 - a) ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
 - b) ≤ 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
 - c) ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz
- 4) This device supports Power Class 2 and Power Class 3 operations for LTE Band 41. The highest available duty cycle for Power Class 2 operations is 43.3% using UL-DL configuration 1. Per May 2017 TCB Workshop Notes based on the device behavior, all SAR tests were performed using Power Class 3. SAR with Power Class 2 at the highest power and available duty factor was additionally performed for the Power Class 3 configuration with the highest SAR for each exposure condition.

Test Position	Channel/ Frequency	Measured SAR (1g)	1 st Repeated	Ratio	2 nd Repeated	3 rd Repeated
	(MHz)		SAR (1g)		SAR (1g)	SAR (1g)
Back Side	39750/2506	1.260	1.130	1.115	N/A	N/A

Note: 1) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.
2) A second repeated measurement was performed only if the ratio of largest to smallest SAR for the original and first repeated measurements was > 1.20 or when the original or repeated measurement was ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).
3) A third repeated measurement was performed only if the original, first or second repeated measurement was ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20 .
4) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg

Table 27: SAR Measurement Variability Results.



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8.3.12 SAR Result of 2.4GHz WIFI

Test position	Test mode	Test Ch./Freq.	Duty Cycle	Duty Cycle Scaled factor	SAR (W/kg)1-g	Power drift(dB)	Conducted power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR(W/kg)	Liquid Temp.
Head Test data											
Left cheek	802.11b	11/2462	99.11%	1.009	0.418	0.05	13.75	14.00	1.059	0.447	22.0
Left tilted	802.11b	11/2462	99.11%	1.009	0.318	-0.01	13.75	14.00	1.059	0.340	22.0
Right cheek	802.11b	11/2462	99.11%	1.009	0.171	0.02	13.75	14.00	1.059	0.183	22.0
Right tilted	802.11b	11/2462	99.11%	1.009	0.190	0.01	13.75	14.00	1.059	0.203	22.0
Hotspot Test data (Separate 10mm)											
Front side	802.11b	11/2462	99.11%	1.009	0.081	0.12	13.75	14.00	1.059	0.087	22.0
Back side	802.11b	11/2462	99.11%	1.009	0.135	0.03	13.75	14.00	1.059	0.144	22.0
Right side	802.11b	11/2462	99.11%	1.009	0.075	0.17	13.75	14.00	1.059	0.080	22.0
Top side	802.11b	11/2462	99.11%	1.009	0.068	-0.07	13.75	14.00	1.059	0.073	22.0

Table 28: SAR of 2.4GHz WIFI for Head and Body

Note:

- 1) The maximum Scaled SAR value is marked in bold. Graph results refer to Appendix B
- 2) If the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s).
- 3) Each channel was tested at the lowest data rate.

Mode	Tune-up (dBm)	Tune-up (mw)	Max Reported SAR(W/kg)	Adjusted SAR(W/kg)	SAR test
Head					
802.11b	14.00	25.12	0.447	/	Yes
802.11g	13.00	19.95	/	0.36	No
802.1n 20M	13.00	19.95	/	0.36	No
Hotspot					
802.11b	14.00	25.12	0.144	/	Yes
802.11g	13.00	19.95	/	0.11	No
802.1n 20M	13.00	19.95	/	0.11	No

Note: Per KDB248227D01, for SAR test of WiFi 2.4G,

- 1) SAR is measured for 2.4 GHz 802.11b DSSS using the initial test position procedure.
- 2) As the highest *reported* SAR for DSSS is adjusted by the ratio of OFDM 802.11g/n to DSSS specified maximum output power and the adjusted SAR is < 1.2 W/kg, so SAR for 802.11g/n is not required.



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8.4 Multiple Transmitter Evaluation

8.4.1 Simultaneous SAR SAR test evaluation

Simultaneous Transmission

NO.	Simultaneous Transmission Configuration	Head	Body worn	Hotspot
1	CDMA(Voice) + WiFi	Yes	Yes	No
2	CDMA(Voice) + BT	Yes	Yes	No
3	CDMA(Data) + WiFi	No	Yes	Yes
4	CDMA(Data) + BT	No	Yes	Yes
5	LTE(Data) + WiFi	Yes	Yes	Yes
6	LTE(Data) + BT	Yes	Yes	Yes
7	BT+WIFI	No	No	No

Note:

- 1) Wi-Fi and Bluetooth share the same Txantenna and can't transmit simultaneously.



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8.4.2 Estimated SAR

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

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

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

- 0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the test separation distances is $> 50 \text{ mm}$.

Estimated SAR Result

	Frequency (GHz)	Test Position	max. power(dBm)	Max. power(mW)	Test Separation (mm)	Estimated
						1g SAR (W/kg)
Bluetooth	2.48	Head	5	3.2	0	0.133
		Body-worn	5	3.2	15	0.044
		hotspot	5	3.2	10	0.066
WiFi 2.4G	2.48	Body-worn	15	25.1	15	0.352



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8.4.3 Simultaneous Transmission SAR Summation Scenario

Test position		Main Antenna SAR _{max} (W/kg)										WiFi Antenna SAR _{max} (W/kg)		Summed SAR _{max} (W/kg)
		CDMA BC0	CDMA BC1	CDMA BC10	LTE Band 2	LTE Band 4	LTE Band 5	LTE Band 13	LTE Band 25	LTE Band 26	LTE Band 41	WLAN 2.4G	BT	
Head	Left Touch	0.588	0.272	0.549	0.150	0.472	0.470	0.428	0.175	0.466	0.436	0.447	0.133	1.035
	Left Tilt	0.371	0.134	0.352	0.115	0.214	0.362	0.309	0.134	0.333	0.141	0.340	0.133	0.711
	Right Touch	0.687	0.379	0.597	0.238	0.570	0.556	0.473	0.264	0.535	0.201	0.183	0.133	0.870
	Right Tilt	0.529	0.162	0.481	0.107	0.234	0.370	0.328	0.125	0.280	0.233	0.203	0.133	0.732
Body worn 15mm	Front	0.481	0.279	0.541	0.209	0.494	0.438	0.548	0.234	0.424	0.349	0.352	0.044	0.900
	Back	0.651	0.720	0.654	0.539	0.493	0.581	0.793	0.583	0.538	0.433	0.352	0.044	1.145
Hotspot	Front	0.538	0.528	0.574	0.450	0.671	0.478	0.556	0.471	0.500	0.482	0.087	0.066	0.758
	Back	1.013	1.366	0.873	1.032	0.925	0.750	0.913	1.155	0.677	1.325	0.144	0.066	1.510
	Left	0.474	0.277	0.417	0.160	0.357	0.387	0.491	0.198	0.412	0.844	/	0.066	0.910
	Right	0.643	0.209	0.746	0.156	0.191	0.568	0.557	0.172	0.486	0.210	0.080	0.066	0.826
	Top	/	/	/	/	/	/	/	/	/	/	0.073	0.066	0.073
	Bottom	0.113	1.059	0.108	0.706	0.447	0.111	0.062	0.731	0.092	0.439	/	0.066	1.125



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9 Equipment list

Test Platform		SPEAG DASY5 Professional				
Location		SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch				
Description		SAR Test System (Frequency range 300MHz-6GHz)				
Software Reference		DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)				
Hardware Reference						
	Equipment	Manufacturer	Model	Serial Number	Calibration Date	Due date of calibration
<input checked="" type="checkbox"/>	Robot	Staubli	TX60L	F14/5T2NA1/A/01	NCR	NCR
<input checked="" type="checkbox"/>	Robot	Staubli	TX60L	F13/5PP1B1/A/01	NCR	NCR
<input checked="" type="checkbox"/>	Twin Phantom	SPEAG	SAM 1	1283	NCR	NCR
<input checked="" type="checkbox"/>	Twin Phantom	SPEAG	SAM 2	1913	NCR	NCR
<input checked="" type="checkbox"/>	Twin Phantom	SPEAG	SAM 3	1912	NCR	NCR
<input checked="" type="checkbox"/>	Twin Phantom	SPEAG	SAM 4	1640	NCR	NCR
<input checked="" type="checkbox"/>	ELI	SPEAG	ELI V5.0	1123	NCR	NCR
<input checked="" type="checkbox"/>	DAE	SPEAG	DAE4	896	2018-11-08	2019-11-07
<input checked="" type="checkbox"/>	DAE	SPEAG	DAE3	414	2018-12-03	2019-12-02
<input checked="" type="checkbox"/>	E-Field Probe	SPEAG	EX3DV4	3789	2018-02-08	2019-02-07
<input checked="" type="checkbox"/>	E-Field Probe	SPEAG	EX3DV4	3923	2018-09-30	2019-09-29
<input checked="" type="checkbox"/>	Validation Kits	SPEAG	D750V3	1160	2016-06-22	2019-06-21
<input checked="" type="checkbox"/>	Validation Kits	SPEAG	D835V2	4d105	2016-12-08	2019-12-07
<input checked="" type="checkbox"/>	Validation Kits	SPEAG	D1750V2	1149	2016-06-23	2019-06-22
<input checked="" type="checkbox"/>	Validation Kits	SPEAG	D1900V2	5d028	2016-12-07	2019-12-06
<input checked="" type="checkbox"/>	Validation Kits	SPEAG	D2450V2	733	2016-12-07	2019-12-06
<input checked="" type="checkbox"/>	Validation Kits	SPEAG	D2600V2	1125	2016-06-22	2019-06-21
<input checked="" type="checkbox"/>	Agilent Network Analyzer	Agilent	E5071C	MY46523590	2018-03-13	2019-03-12
<input checked="" type="checkbox"/>	Dielectric Probe Kit	Agilent	85070E	US01440210	NCR	NCR
<input checked="" type="checkbox"/>	Radio Communication Analyzer	Anritsu Corporation	MT8821C	6201502984	2018-05-02	2019-05-01
<input checked="" type="checkbox"/>	Universal Radio Communication Tester	R&S	CMW500	103990	2018-03-13	2019-03-12
<input checked="" type="checkbox"/>	RF Bi-Directional Coupler	Agilent	86205-60001	MY31400031	NCR	NCR
<input checked="" type="checkbox"/>	Signal Generator	Agilent	N5171B	MY53050736	2018-03-13	2019-03-12
<input checked="" type="checkbox"/>	Preamplifier	Mini-Circuits	ZHL-42W	15542	NCR	NCR
<input checked="" type="checkbox"/>	Power Meter	Agilent	E4416A	GB41292095	2018-03-13	2019-03-12
<input checked="" type="checkbox"/>	Power Sensor	Agilent	8481H	MY41091234	2018-03-13	2019-03-12
<input checked="" type="checkbox"/>	Power Sensor	R&S	NRP-Z92	100025	2018-03-13	2019-03-12
<input checked="" type="checkbox"/>	Attenuator	SHX	TS2-3dB	30704	NCR	NCR



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<input checked="" type="checkbox"/>	Coaxial low pass filter	Mini-Circuits	VLF-2500(+)	NA	NCR	NCR
<input checked="" type="checkbox"/>	Coaxial low pass filter	Microlab Fxr	LA-F13	NA	NCR	NCR
<input checked="" type="checkbox"/>	50 Ω coaxial load	Mini-Circuits	KARN-50+	00850	NCR	NCR
<input checked="" type="checkbox"/>	DC POWER SUPPLY	SAKO	SK1730SL 5A	NA	NCR	NCR
<input checked="" type="checkbox"/>	Speed reading thermometer	MingGao	T809	NA	2018-03-19	2019-03-18
<input checked="" type="checkbox"/>	Humidity and Temperature Indicator	KIMTOKA	KIMTOKA	NA	2018-03-19	2019-03-18

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

10 Calibration certificate

Please see the Appendix C

11 Photographs

Please see the Appendix D



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Appendix A: Detailed System Check Results

Appendix B: Detailed Test Results

Appendix C: Calibration certificate

Appendix D: Photographs

---END---



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Appendix A

Detailed System Check Results

1. System Performance Check
System Performance Check 750 MHz Head
System Performance Check 750 MHz Body
System Performance Check 835 MHz Head
System Performance Check 835 MHz Body
System Performance Check 1750 MHz Head
System Performance Check 1750 MHz Body
System Performance Check 1900MHz Head
System Performance Check 1900MHz Body
System Performance Check 2450 MHz Head
System Performance Check 2450 MHz Body
System Performance Check 2600 MHz Head
System Performance Check 2600 MHz Body

Test Laboratory: SGS-SAR Lab

System Performance Check 750 MHz Head

DUT: D750V3; Type: D750V3; Serial: 1160

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

Medium: HSL750; Medium parameters used: $f = 750$ MHz; $\sigma = 0.886$ S/m; $\epsilon_r = 42.729$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3923; ConvF(10.59, 10.59, 10.59); Calibrated: 2018-09-30;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), $z = -2.0, 31.0$
- Electronics: DAE3 Sn414; Calibrated: 2018-12-03
- Phantom: SAM 3; Type: SAM; Serial: 1912
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/d=15mm, Pin=250mW/Area Scan (7x13x1): Measurement grid: $dx=15$ mm, $dy=15$ mm

Maximum value of SAR (measured) = 2.10 W/kg

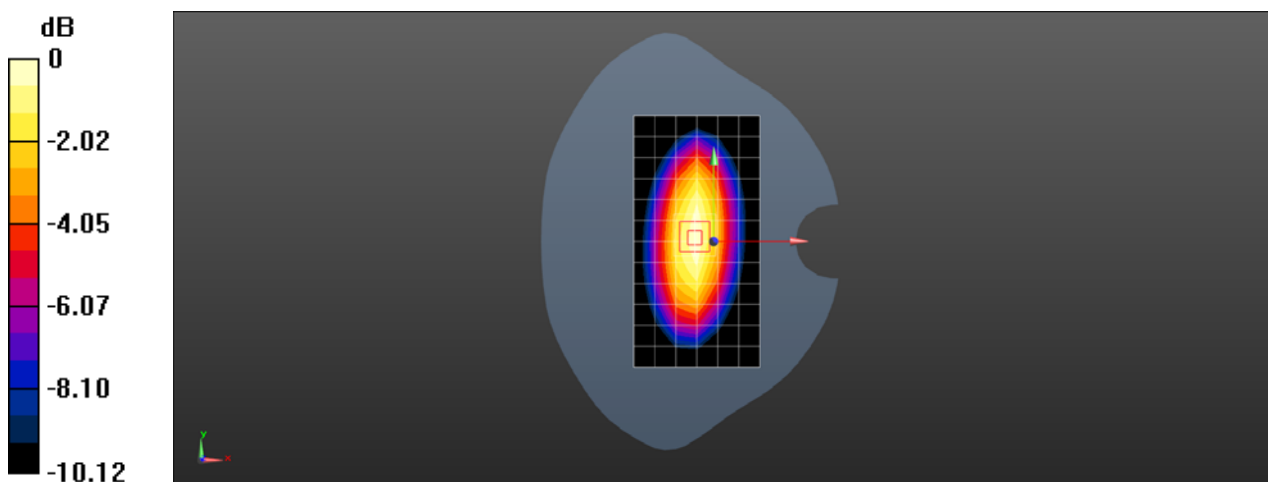
Body/d=15mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 48.68 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 2.97 W/kg

SAR(1 g) = 1.97 W/kg; SAR(10 g) = 1.3 W/kg

Maximum value of SAR (measured) = 2.12 W/kg



0 dB = 2.12 W/kg = 3.26 dBW/kg

Test Laboratory: SGS-SAR Lab

System Performance Check 750 MHz Body

DUT: D750V3; Type: D750V3; Serial: 1160

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

Medium: MSL750; Medium parameters used: $f = 750$ MHz; $\sigma = 0.951$ S/m; $\epsilon_r = 56.749$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3789; ConvF(9.27, 9.27, 9.27); Calibrated: 2018-02-08;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), $z = -2.0, 31.0$
- Electronics: DAE4 Sn896; Calibrated: 2018-11-08
- Phantom: SAM 1; Type: SAM; Serial: 1283
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/d=15mm, Pin=250mW/Area Scan (7x13x1): Measurement grid: $dx=15$ mm, $dy=15$ mm

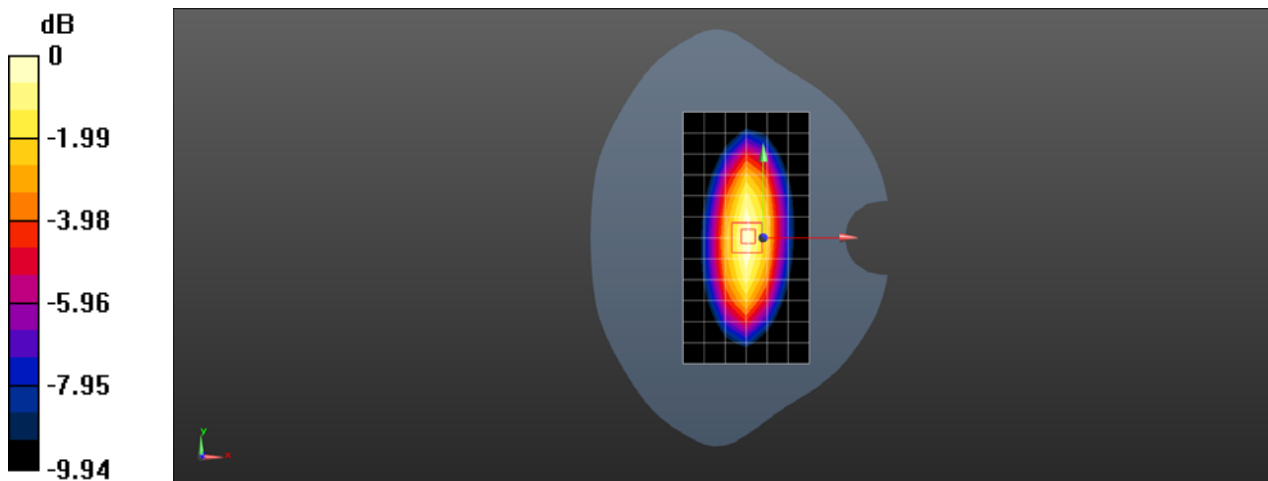
Maximum value of SAR (measured) = 2.64 W/kg

Body/d=15mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 46.96 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 3.11 W/kg

SAR(1 g) = 2.11 W/kg; SAR(10 g) = 1.4 W/kg



0 dB = 2.64 W/kg = 4.22 dBW/kg

Test Laboratory: SGS-SAR Lab

System Performance Check 835 MHz Head

DUT: D835V2; Type: D835V2; Serial: 4d105

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

Medium: HSL835; Medium parameters used: $f = 835$ MHz; $\sigma = 0.885$ S/m; $\epsilon_r = 43.061$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3923; ConvF(10.37, 10.37, 10.37); Calibrated: 2018-09-30;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), $z = -2.0, 31.0$
- Electronics: DAE3 Sn414; Calibrated: 2018-12-03
- Phantom: SAM 3; Type: SAM; Serial: 1912
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/d=15mm, Pin=250mW/Area Scan (6x13x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 2.69 W/kg

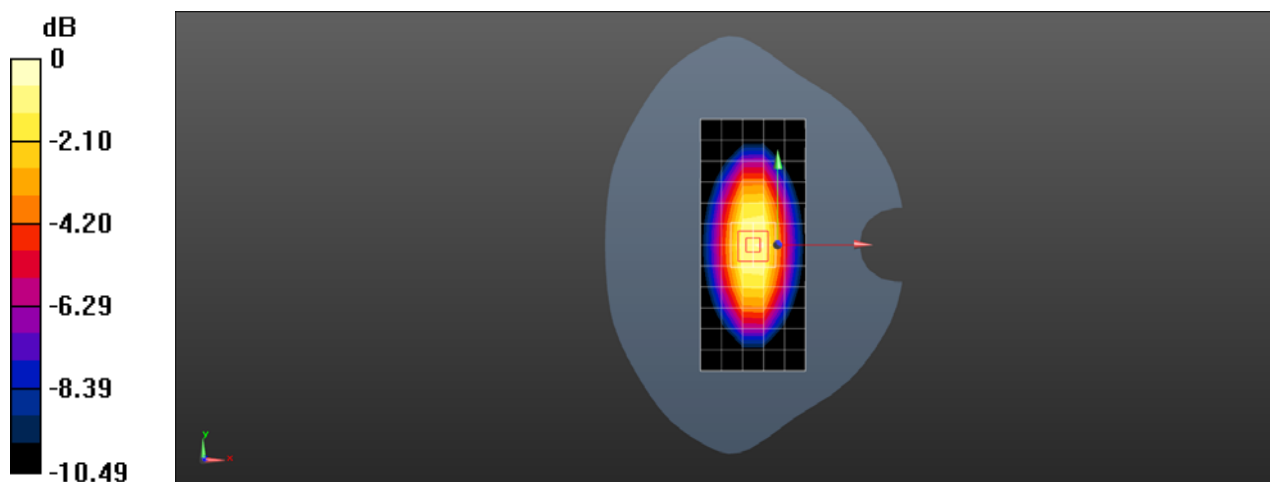
Body/d=15mm, Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 54.64 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 3.68 W/kg

SAR(1 g) = 2.45 W/kg; SAR(10 g) = 1.61 W/kg

Maximum value of SAR (measured) = 3.11 W/kg



0 dB = 3.11 W/kg = 4.93 dBW/kg

Test Laboratory: SGS-SAR Lab

System Performance Check 835 MHz Body

DUT: D835V2; Type: D835V2; Serial: 4d105

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

Medium: MSL835; Medium parameters used: $f = 835$ MHz; $\sigma = 0.997$ S/m; $\epsilon_r = 56.404$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3789; ConvF(8.84, 8.84, 8.84); Calibrated: 2018-02-08;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), $z = -2.0, 31.0$
- Electronics: DAE4 Sn896; Calibrated: 2018-11-08
- Phantom: SAM 1; Type: SAM; Serial: 1283
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/d=15mm, Pin=250mW/Area Scan (7x13x1): Measurement grid: $dx=15$ mm, $dy=15$ mm

Maximum value of SAR (measured) = 2.41 W/kg

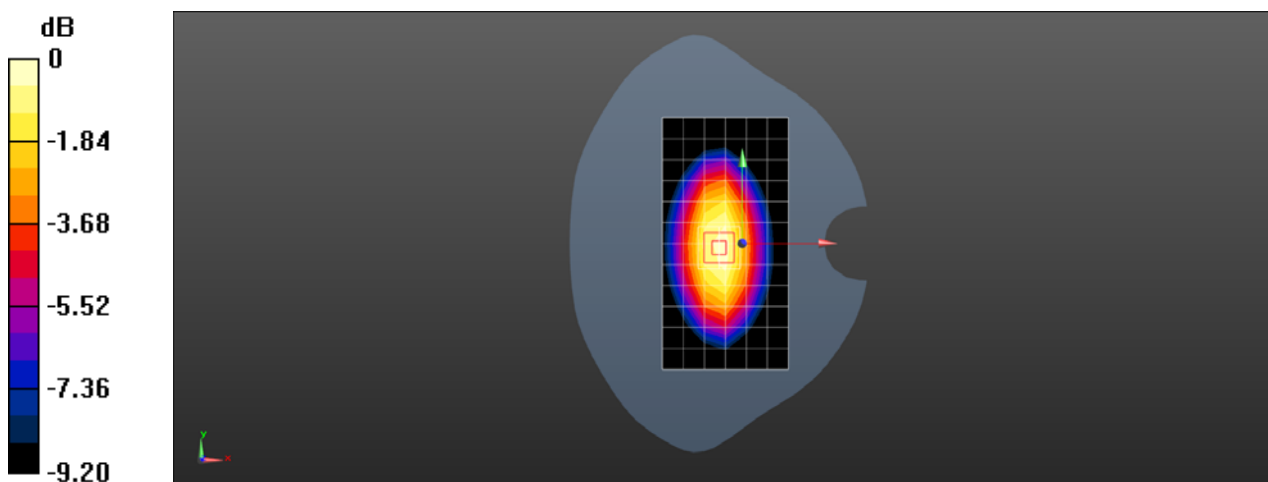
Body/d=15mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 50.43 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 3.32 W/kg

SAR(1 g) = 2.31 W/kg; SAR(10 g) = 1.56 W/kg

Maximum value of SAR (measured) = 2.48 W/kg



0 dB = 2.48 W/kg = 3.94 dBW/kg

Test Laboratory: SGS-SAR Lab

System Performance Check 835 MHz Body

DUT: D835V2; Type: D835V2; Serial: 4d105

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

Medium: MSL835; Medium parameters used: $f = 835$ MHz; $\sigma = 0.999$ S/m; $\epsilon_r = 57.828$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3789; ConvF(8.84, 8.84, 8.84); Calibrated: 2018-02-08;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), $z = -2.0, 31.0$
- Electronics: DAE4 Sn896; Calibrated: 2018-11-08
- Phantom: SAM 1; Type: SAM; Serial: 1283
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/d=15mm, Pin=250mW/Area Scan (7x13x1): Measurement grid: $dx=15$ mm, $dy=15$ mm

Maximum value of SAR (measured) = 2.84 W/kg

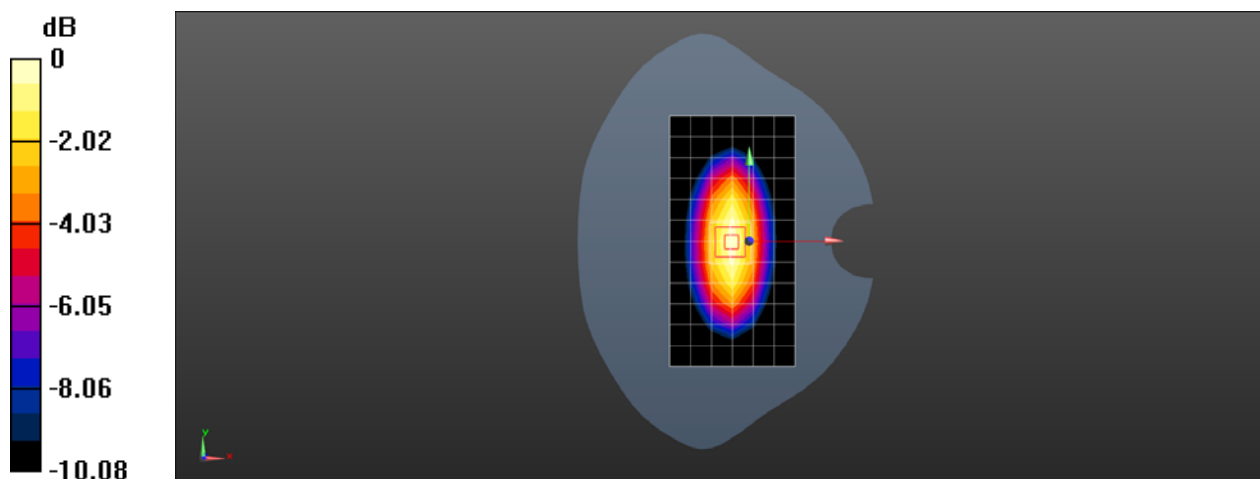
Body/d=15mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 52.75 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 3.89 W/kg

SAR(1 g) = 2.64 W/kg; SAR(10 g) = 1.74 W/kg

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



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

Test Laboratory: SGS-SAR Lab

System Performance Check 1750 MHz Head

DUT: D1750V2; Type: D1750V2; Serial: 1149

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

Medium: HSL1750; Medium parameters used: $f = 1750$ MHz; $\sigma = 1.335$ S/m; $\epsilon_r = 40.101$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3923; ConvF(8.92, 8.92, 8.92); Calibrated: 2018-09-30;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), $z = -2.0, 31.0$
- Electronics: DAE3 Sn414; Calibrated: 2018-12-03
- Phantom: SAM 4; Type: SAM; Serial: 1640
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/d=10mm, Pin=250mW/Area Scan (8x11x1): Measurement grid: $dx=12$ mm, $dy=12$ mm

Maximum value of SAR (measured) = 7.88 W/kg

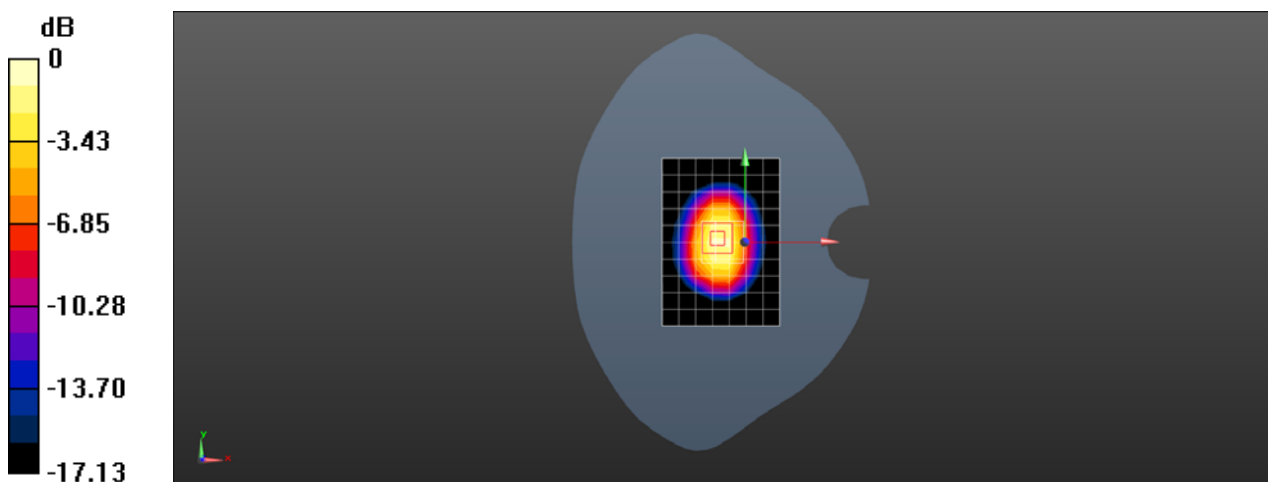
Body/d=10mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 86.40 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 15.8 W/kg

SAR(1 g) = 8.75 W/kg; SAR(10 g) = 4.71 W/kg

Maximum value of SAR (measured) = 9.72 W/kg



0 dB = 9.72 W/kg = 9.88 dBW/kg

Test Laboratory: SGS-SAR Lab

System Performance Check 1750 MHz Body

DUT: D1750V2; Type: D1750V2; Serial: 1149

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

Medium: MSL1750; Medium parameters used: $f = 1750$ MHz; $\sigma = 1.434$ S/m; $\epsilon_r = 53.334$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3789; ConvF(7.54, 7.54, 7.54); Calibrated: 2018-02-08;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), $z = -2.0, 31.0$
- Electronics: DAE4 Sn896; Calibrated: 2018-11-08
- Phantom: ELI V5.0; Type: ELI; Serial: 1123
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/d=10mm, Pin=250mW/Area Scan (7x13x1): Measurement grid: $dx=15$ mm, $dy=15$ mm

Maximum value of SAR (measured) = 11.7 W/kg

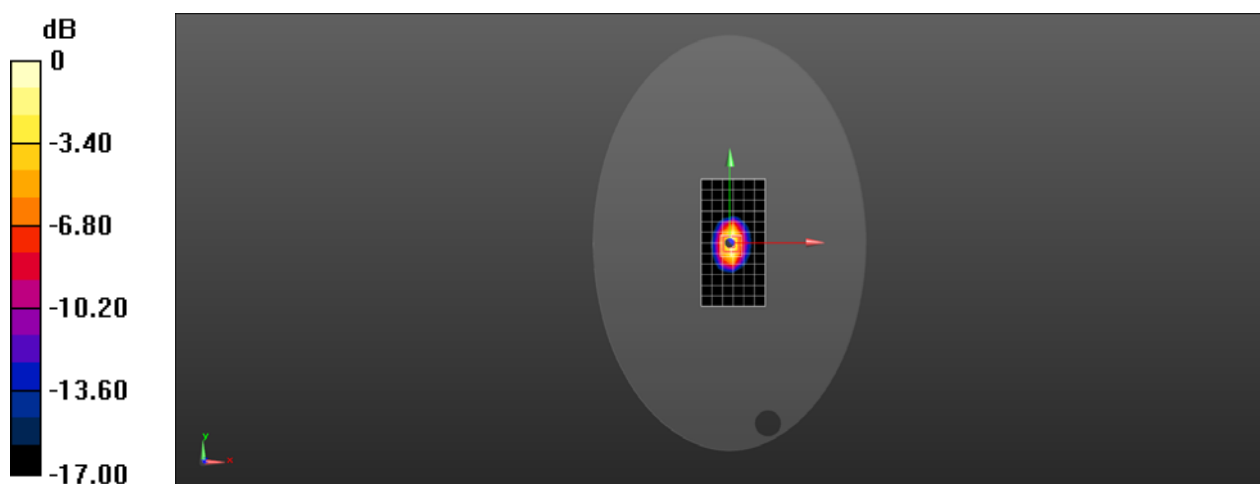
Body/d=10mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 82.82 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 16.0 W/kg

SAR(1 g) = 8.9 W/kg; SAR(10 g) = 4.72 W/kg

Maximum value of SAR (measured) = 12.6 W/kg



0 dB = 12.6 W/kg = 11.00 dBW/kg

Test Laboratory: SGS-SAR Lab

System Performance Check 1900 MHz Head

DUT: D1900V2; Type: D1900V2; Serial: 5d028

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

Medium: HSL1900; Medium parameters used: $f = 1900$ MHz; $\sigma = 1.385$ S/m; $\epsilon_r = 38.573$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3923; ConvF(8.51, 8.51, 8.51); Calibrated: 2018-09-30;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), $z = -2.0, 31.0$
- Electronics: DAE3 Sn414; Calibrated: 2018-12-03
- Phantom: SAM 4; Type: SAM; Serial: 1640
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/d=10mm, Pin=250mW/Area Scan (7x11x1): Measurement grid: $dx=15$ mm, $dy=15$ mm

Maximum value of SAR (measured) = 11.4 W/kg

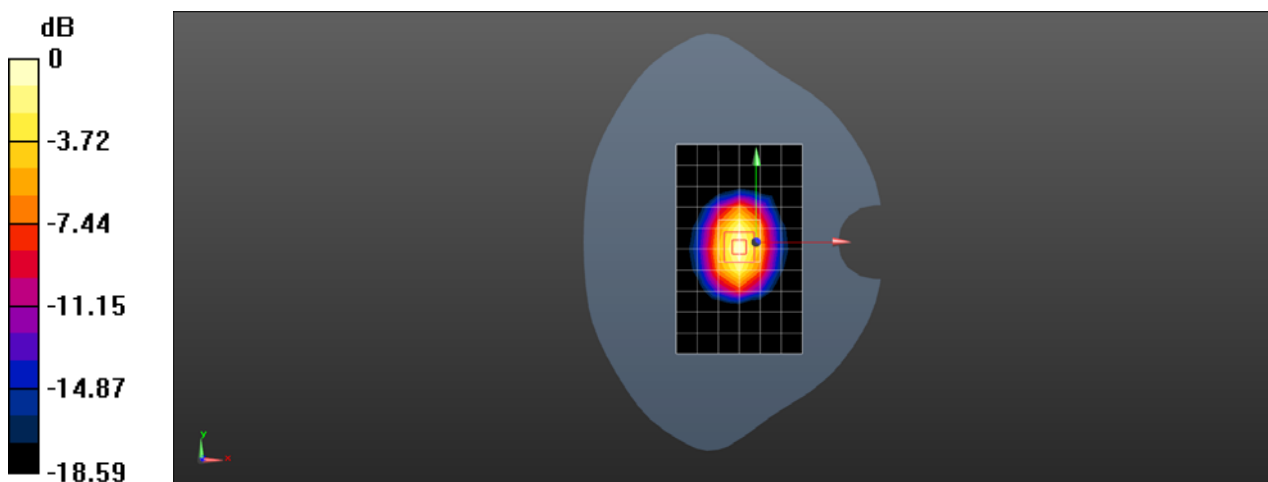
Body/d=10mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 84.20 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 19.5 W/kg

SAR(1 g) = 10.3 W/kg; SAR(10 g) = 5.31 W/kg

Maximum value of SAR (measured) = 11.5 W/kg



0 dB = 11.5 W/kg = 10.61 dBW/kg

Test Laboratory: SGS-SAR Lab

System Performance Check 1900 MHz Body

DUT: D1900V2; Type: D1900V2; Serial: 5d028

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

Medium: MSL1900; Medium parameters used: $f = 1900$ MHz; $\sigma = 1.499$ S/m; $\epsilon_r = 52.651$; $\rho = 1000$ kg/m³

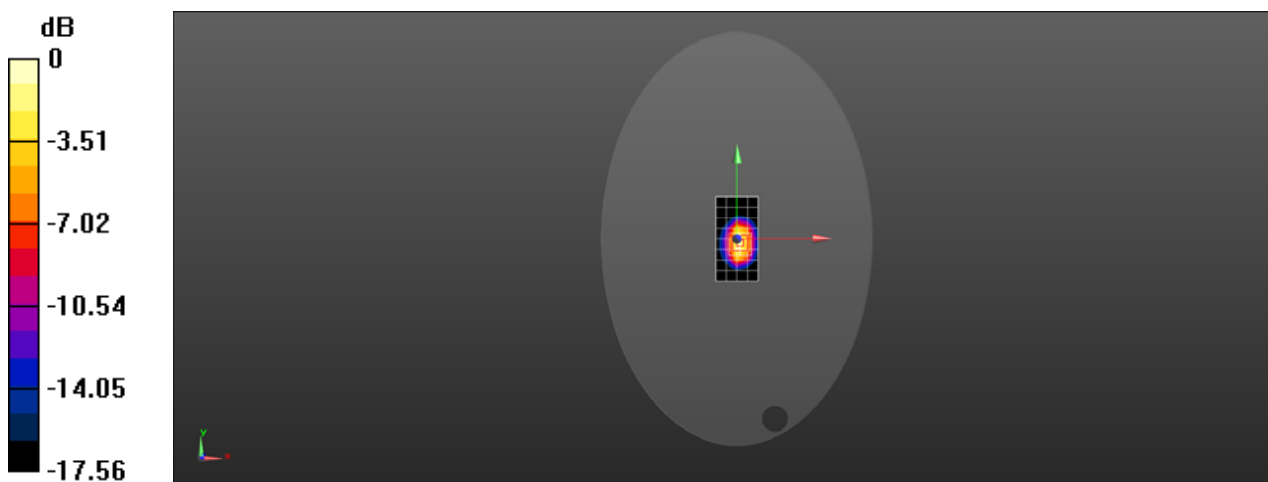
Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3923; ConvF(8.14, 8.14, 8.14); Calibrated: 2018-09-30;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), $z = -2.0, 31.0$
- Electronics: DAE3 Sn414; Calibrated: 2018-12-03
- Phantom: ELI V5.0; Type: ELI; Serial: 1123
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/d=10mm, Pin=250mW/Area Scan (5x9x1): Measurement grid: $dx=15$ mm, $dy=15$ mm
Maximum value of SAR (measured) = 12.4 W/kg

Body/d=10mm, Pin=250mW/Zoom Scan (7x7x7) (5x5x7)/Cube 0: Measurement grid:
 $dx=8$ mm, $dy=8$ mm, $dz=5$ mm
Reference Value = 82.55 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 18.8 W/kg
SAR(1 g) = 10.7 W/kg; SAR(10 g) = 5.64 W/kg
Maximum value of SAR (measured) = 15.1 W/kg



0 dB = 15.1 W/kg = 11.79 dBW/kg

Test Laboratory: SGS-SAR Lab

System Performance Check 2450MHz Head

DUT: D2450V2; Type: D2450V2; Serial: 733

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

Medium: HSL2450; Medium parameters used: $f = 2450$ MHz; $\sigma = 1.741$ S/m; $\epsilon_r = 38.95$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3923; ConvF(7.86, 7.86, 7.86); Calibrated: 2018-09-30;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), $z = -2.0, 31.0$
- Electronics: DAE3 Sn414; Calibrated: 2018-12-03
- Phantom: SAM 3; Type: SAM; Serial: 1912
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/d=10mm, Pin=250mW/Area Scan (9x14x1): Measurement grid: $dx=12$ mm, $dy=12$ mm

Maximum value of SAR (measured) = 13.3 W/kg

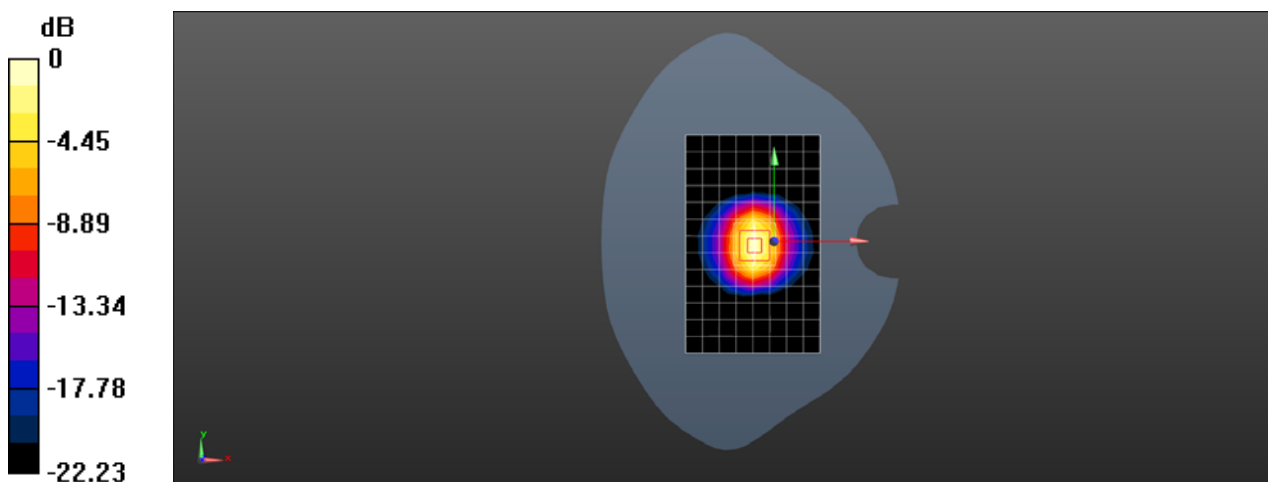
Body/d=10mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 86.57 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 26.7 W/kg

SAR(1 g) = 12.7 W/kg; SAR(10 g) = 5.87 W/kg

Maximum value of SAR (measured) = 14.5 W/kg



0 dB = 14.5 W/kg = 11.61 dBW/kg

Test Laboratory: SGS-SAR Lab

System Performance Check 2450MHz Body

DUT: D2450V2; Type: D2450V2; Serial: 733

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

Medium: MSL2450; Medium parameters used: $f = 2450$ MHz; $\sigma = 1.904$ S/m; $\epsilon_r = 51.632$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3789; ConvF(7.15, 7.15, 7.15); Calibrated: 2018-02-08;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), $z = -2.0, 31.0$
- Electronics: DAE4 Sn896; Calibrated: 2018-11-08
- Phantom: SAM 2; Type: SAM; Serial: 1913
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/d=10mm, Pin=250mW/Area Scan (10x14x1): Measurement grid: $dx=12$ mm, $dy=12$ mm

Maximum value of SAR (measured) = 13.0 W/kg

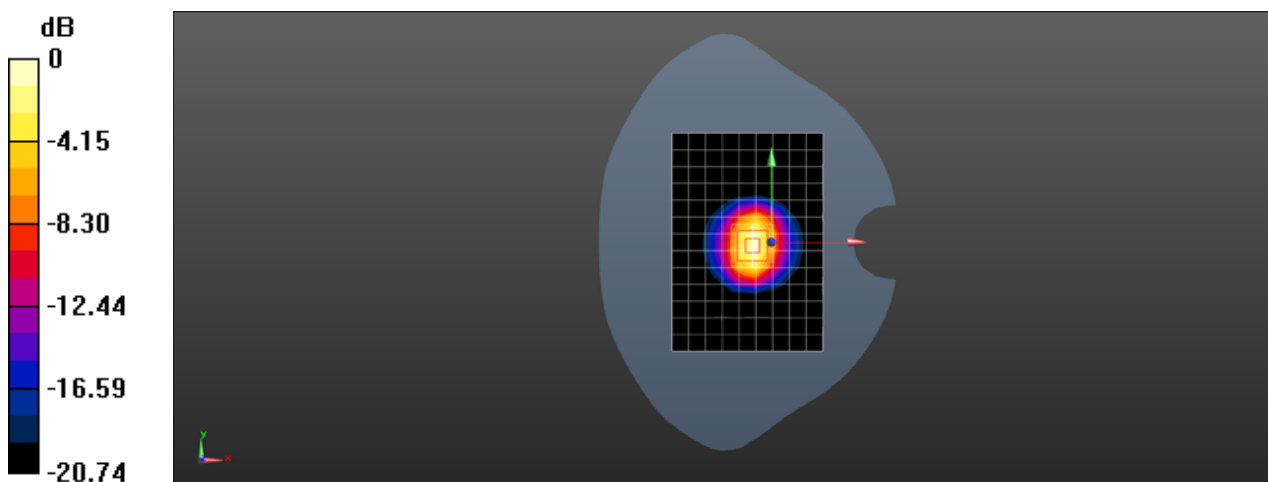
Body/d=10mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 79.74 V/m; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 24.4 W/kg

SAR(1 g) = 12.2 W/kg; SAR(10 g) = 5.73 W/kg

Maximum value of SAR (measured) = 14.1 W/kg



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