



# FCC SAR TEST REPORT

**Application No.:** SEWM2311000476RG  
**Applicant:** Sony Corporation  
**Manufacturer:** Sony Corporation  
**EUT Description:** GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac, NFC and GNSS  
**Brand Name:** Sony  
**FCC ID:** PY7-75946U  
**Standards:** FCC 47CFR §2.1093  
**Date of Receipt:** 2023-11-22  
**Date of Test:** 2023-12-31 to 2024-01-28  
**Date of Issue:** 2024-04-11  
**Test conclusion:** **PASS \***

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

Authorized Signature:

Well Wei

Wireless Laboratory Manager

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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

Report Number	Revision	Description	Issue Date
SEWM2311000476RG02	01	Original	2024-01-29
SEWM2311000476RG02	02	Update Test Summary and Simultaneous Transmission SAR	2024-04-11



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## TEST SUMMARY

Frequency Band	Maximum Reported SAR(W/kg)			
	Head	Body-worn	Hotspot	Product specific 10g SAR
GSM850	0.41	0.66	0.66	/
GSM1900	0.21	0.52	0.52	/
WCDMA Band IV	0.21	0.78	0.78	/
LTE Band 4	0.11	0.75	0.75	/
LTE Band 12	0.26	0.25	0.25	/
WI-FI (2.4GHz)	0.73	0.29	0.29	/
WI-FI (5GHz)	0.69	0.24	0.30	0.74
BT	0.20	0.16	0.16	/
NFC	/	/	/	<0.10
SAR Limited(W/kg)	1.6			4.0
Maximum Simultaneous Transmission SAR (W/kg)				
Scenario	Head	Body-worn	Hotspot	Product specific 10g SAR
Sum SAR	1.19	1.18	1.18	0.78
SPLSR	/	/	/	/
SPLSR Limited	0.04			0.1
<p>Note:1) For LTE band 4/12 that do not support at least three non-overlapping channels in certain channel bandwidths, test the available non-overlapping channels instead. When a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.</p>				

**Reviewed by**



Nick Hu

**Prepared by**



Leon Xu



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## 1 General Information

### 1.1 Details of Client

Applicant:	Sony Corporation
Address:	1-7-1 Konan Minato-ku Tokyo, 108-0075 Japan
Manufacturer:	Sony Corporation
Address:	1-7-1 Konan Minato-ku Tokyo, 108-0075 Japan

### 1.2 Test Location

Company:	SGS-CSTC Standards Technical Services (Suzhou) Co., Ltd.
Address:	South of No. 6 Plant, No. 1, Runsheng Road, Suzhou Industrial Park, Suzhou Area, China (Jiangsu) Pilot Free Trade Zone
Post code:	215000
Test Engineer:	Leon Xu



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### 1.3 Test Facility

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

• **A2LA (Certificate No. 6336.01)**

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. Is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 6336.01.

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

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. Has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0120.

IC#: 27594.

• **FCC –Designation Number: CN1312**

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. Has been recognized as an accredited testing laboratory.

Designation Number: CN1312.

Test Firm Registration Number: 717327



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### 1.4 General Description of EUT

Device Type:	portable device		
Exposure Category:	uncontrolled environment / general population		
EUT Description:	GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac, NFC and GNSS		
Trade Mark:	Sony		
FCC ID:	PY7-75946U		
SN:	HQ63B103D5		
Hardware Version:	A		
Software Version:	1.68		
Antenna Type:	PIFA/LOOP		
Device Operating Configurations :			
Modulation Mode:	<b>GSM:</b> GMSK, 8PSK,DTM; <b>WCDMA:</b> QPSK, 16QAM(HSPA+); <b>LTE:</b> QPSK,16QAM,64QAM <b>WIFI:</b> DSSS, OFDM; <b>BT:</b> GFSK, π/4DQPSK,8DPSK		
Device Class:	B		
GPRS Multi-slots Class:	33	EGPRS Multi-slots Class:	33
HSDPA UE Category:	24	HSUPA UE Category	6
Power Class	4, tested with power level 5(GSM850)		
	1, tested with power level 0(GSM1900)		
	3, tested with power control "all 1"(WCDMA Band IV)		
	3, tested with power control Max Power(LTE Band 4/12)		
Frequency Bands:	Band	Tx (MHz)	Rx (MHz)
	GSM850	824~849	869~894
	GSM1900	1850~1910	1930~1990
	WCDMA Band IV	1710~1755	2110~2155
	LTE Band 4	1710~1755	2110~2155
	LTE Band 12	699-716	729-746
	Bluetooth	2402~2480	2402~2480
	Wi-Fi 2.4G	2412~2462	2412~2462
	Wi-Fi 5G	5150~5250	5150~5250
		5250~5350	5250~5350
5470~5725		5470~5725	
5725~5850		5725~5850	
RF Cable:	<input checked="" type="checkbox"/> Provided by the Applicant <input type="checkbox"/> Provided by the laboratory		
NFC	Wireless Technology and Frequency Range	13.56MHz	
	Mode	ASK	
<p>Note:            *Since the above data and/or information is provided by the client relevant results or conclusions of this report are only made for these data and/or information, SGS is not responsible for the authenticity, integrity and results of the data and information and/or the validity of the conclusion.            According to the declaration letter from manufacturer, this project enabled WCDMA band 4 &amp; LTE band 4, and disabled WCDMA band 5 &amp; LTE band 41 by software. So we added new testing for WCDMA band 4 &amp; LTE band 4, other test data in this report are based on the previous report with report number SEWM2311000475RG02&amp;SEWM2311000471RG02.            Remark:            As above information is provided and confirmed by the applicant. SGS is not liable to the accuracy, suitability, reliability or/and integrity of the information.</p>			



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### 1.4.1 DUT Antenna Locations(Back View)

Please see the Appendix D

**Note:**

The test device is a smart phone. The overall diagonal dimension of this device is 165.1 mm, and display diagonal dimension is 153.8 mm. Per KDB 648474 D04, because the display diagonal dimension > 150mm and overall diagonal dimension > 160 mm, so it is a phablet.

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

EUT Sides for SAR Testing							
Mode	Exposure Condition	Front	Back	Left	Right	Top	Bottom
Ant 0	Hotspot	Yes	Yes	Yes	Yes	No	Yes
Ant 1	Hotspot	Yes	Yes	Yes	No	No	Yes
Ant 6	Hotspot	Yes	Yes	Yes	No	Yes	No
Ant 7	Hotspot	Yes	Yes	No	Yes	Yes	No

Table 1: EUT Sides for SAR Testing

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



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## 1.5 Test Specification

Identity	Document Title
FCC 47CFR §2.1093	Radiofrequency Radiation Exposure Evaluation: Portable Devices
ANSI/IEEE C95.1-1992	IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz – 300 GHz.
IEEE Std 1528-2013	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
KDB 941225 D01	3G SAR Measurement Procedures v03r01
KDB 941225 D05	SAR for LTE Devices v02r05
KDB 941225 D06	Hotspot Mode SAR v02r01
KDB 248227 D01	SAR Guidance for IEEE 802 11 Wi-Fi SAR v02r02
KDB 648474 D04	Handset SAR v01r03
KDB 447498 D01	General RF Exposure Guidance v06
KDB 865664 D01	SAR Measurement 100 MHz to 6 GHz v01r04
KDB 865664 D02	RF Exposure Reporting v01r02
KDB 690783 D01	SAR Listings on Grants v01r03
KDB 616217 D04	SAR for laptop and tablets v01r02



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## 1.6 RF exposure limits

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

**Notes:**

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

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

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

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

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



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## 2 Laboratory Environment

Temperature	Min. = 18°C, Max. = 25 °C
Relative humidity	Min. = 30%, Max. = 70%
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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- 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>
<p><b>Calibration</b></p>	<p>ISO/IEC 17025 <a href="#">calibration service</a> available.</p>
<p><b>Frequency</b></p>	<p>10 MHz to &gt; 6 GHz Linearity: ± 0.2 dB (30 MHz to 6 GHz)</p>
<p><b>Directivity</b></p>	<p>± 0.3 dB in TSL (rotation around probe axis) ± 0.5 dB in TSL (rotation normal to probe axis)</p>
<p><b>Dynamic Range</b></p>	<p>10 µW/g to &gt; 100 mW/g Linearity: ± 0.2 dB (noise: typically &lt; 1 µW/g)</p>
<p><b>Dimensions</b></p>	<p>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</p>
<p><b>Application</b></p>	<p>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%.</p>
<p><b>Compatibility</b></p>	<p>DASY3, DASY4, DASY52 SAR and higher, EASY4/MRI</p>




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### 3.3 Data Acquisition Electronics (DAE)

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

### 3.4 SAM Twin Phantom

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

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

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




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### 3.5 ELI Phantom

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

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

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



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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.



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		$\leq 3$ GHz	$> 3$ GHz	
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface		$5 \pm 1$ mm	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5$ mm	
Maximum probe angle from probe axis to phantom surface normal at the measurement location		$30^\circ \pm 1^\circ$	$20^\circ \pm 1^\circ$	
Maximum area scan spatial resolution: $\Delta x_{Area}$ , $\Delta y_{Area}$		$\leq 2$ GHz: $\leq 15$ mm 2 – 3 GHz: $\leq 12$ mm	3 – 4 GHz: $\leq 12$ mm 4 – 6 GHz: $\leq 10$ 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 $\leq$ the corresponding x or y dimension of the test device with at least one measurement point on the test device.		
Maximum zoom scan spatial resolution: $\Delta x_{Zoom}$ , $\Delta y_{Zoom}$		$\leq 2$ GHz: $\leq 8$ mm 2 – 3 GHz: $\leq 5$ mm*	3 – 4 GHz: $\leq 5$ mm* 4 – 6 GHz: $\leq 4$ mm*	
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$	$\leq 5$ mm	3 – 4 GHz: $\leq 4$ mm 4 – 5 GHz: $\leq 3$ mm 5 – 6 GHz: $\leq 2$ mm	
	graded grid	$\Delta z_{Zoom}(1)$ : between 1 <sup>st</sup> two points closest to phantom surface	$\leq 4$ mm	3 – 4 GHz: $\leq 3$ mm 4 – 5 GHz: $\leq 2.5$ mm 5 – 6 GHz: $\leq 2$ mm
		$\Delta z_{Zoom}(n>1)$ : between subsequent points	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z	$\geq 30$ mm	3 – 4 GHz: $\geq 28$ mm 4 – 5 GHz: $\geq 25$ mm 5 – 6 GHz: $\geq 22$ 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.  $\pm 5\%$



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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/cm<sup>2</sup>], [dBrel], etc.). Some of these units are not available in certain situations or show meaningless results, e.g., a SAR output in a lossless media will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

### 3.7.3 Data Evaluation by SEMCAD

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

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

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

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

If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given as:

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

With  $V_i$  = compensated signal of channel  $i$  ( $i = x, y, z$ )  
 $U_i$  = input signal of channel  $i$  ( $i = x, y, z$ )  
 $cf$  = crest factor of exciting field (DASY parameter)  
 $dcpi$  = diode compression point (DASY parameter)

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

E-field probes:

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



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H-field probes:

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

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

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

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

ConvF = sensitivity enhancement in solution

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

$f$  = carrier frequency [GHz]

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

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

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

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

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

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

with SAR = local specific absorption rate in mW/g

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

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

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

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

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

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

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

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



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## 4 SAR measurement variability and uncertainty

### 4.1 SAR measurement variability

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

- 1) Repeated measurement is not required when the original highest measured SAR is  $< 0.80$  W/kg; steps 2) through 4) do not apply.
  - 2) When the original highest measured SAR is  $\geq 0.80$  W/kg, repeat that measurement once.
  - 3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is  $> 1.20$  or when the original or repeated measurement is  $\geq 1.45$  W/kg ( $\sim 10\%$  from the 1-g SAR limit).
  - 4) Perform a third repeated measurement only if the original, first or second repeated measurement is  $\geq 1.5$  W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is  $> 1.20$ .
- The same procedures should be adapted for measurements according to extremity and occupational exposure limits by applying a factor of 2.5 for extremity exposure and a factor of 5 for occupational exposure to the corresponding SAR thresholds.

### 4.2 SAR measurement uncertainty

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



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## 5 Description of Test Position

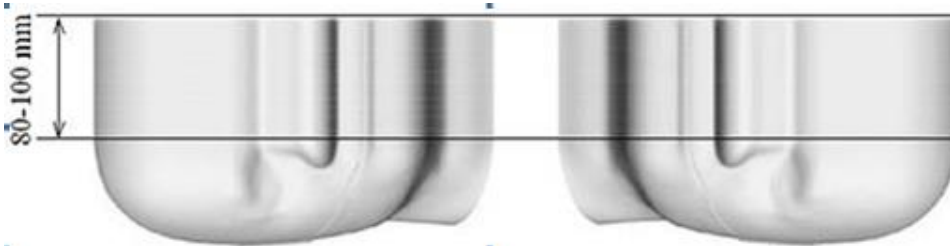
### 5.1 Head Exposure Condition

#### 5.1.1 SAM Phantom Shape

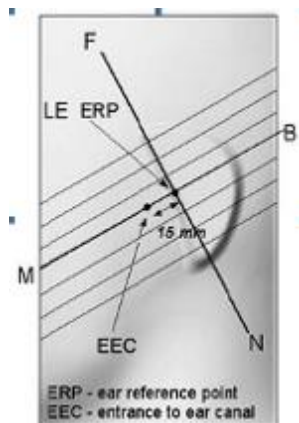


F-3. Front, back, and side views of SAM (model for the phantom shell). Full-head model is for illustration purposes only—procedures in this recommended practice are intended primarily for the phantom setup.

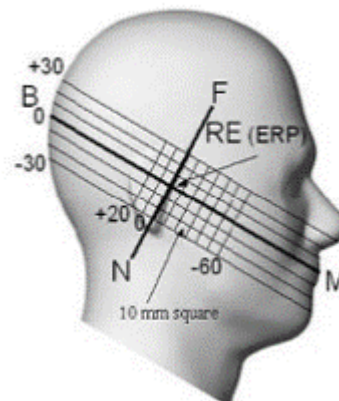
Note: The centre strip including the nose region has a different thickness tolerance.



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

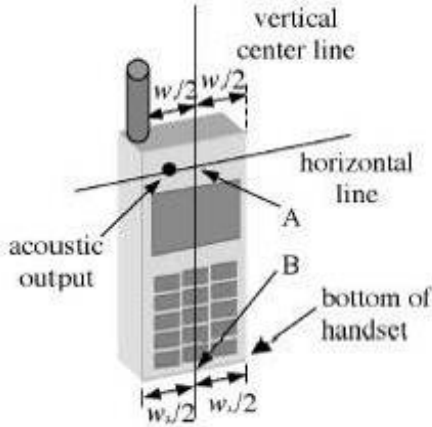


F-5. Close-up side view of phantom, showing the ear region, N-F and B-M lines, and seven cross-sectional plane locations

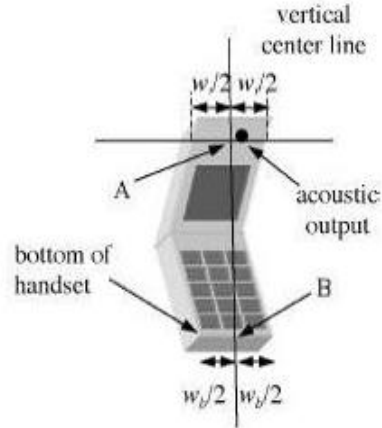


F-6. Side view of the phantom showing relevant markings and seven cross-sectional plane locations

### 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.



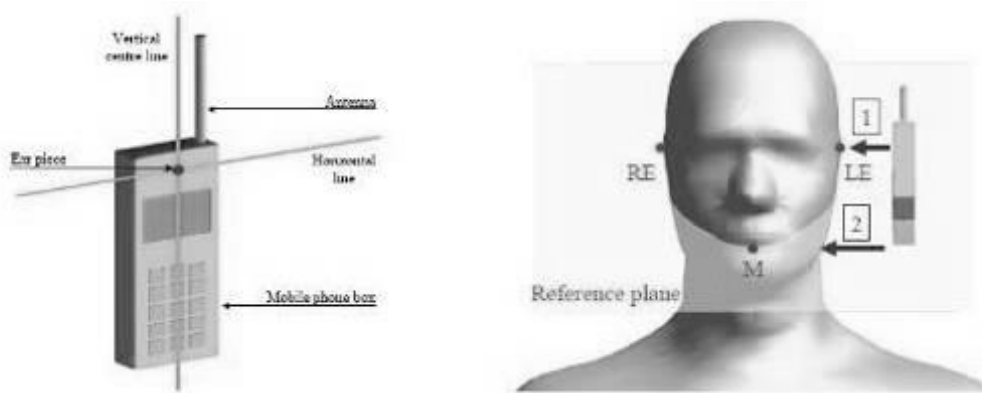
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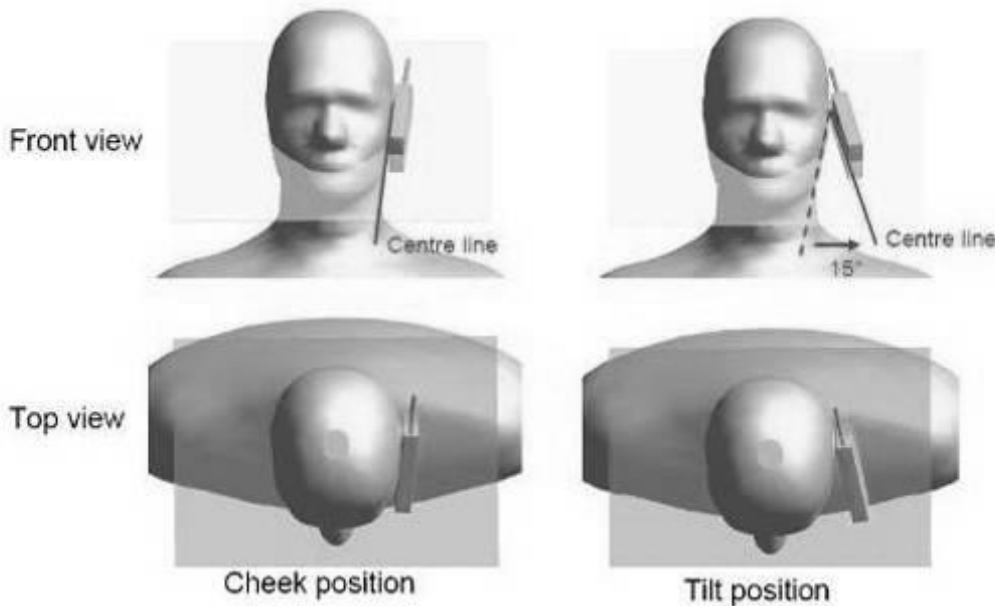


### 5.1.4 Definition of the “tilted” position

- 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

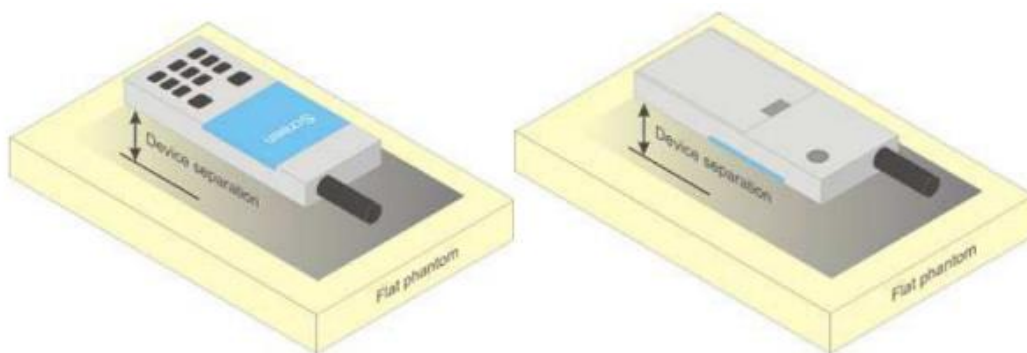
### 5.2.1 Body-worn accessory exposure conditions

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  $> 1.2$  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.

### 5.3 Extremity exposure conditions

Per FCC KDB 648474D04, for smart phones with a display diagonal dimension > 15.0 cm or an overall diagonal dimension > 16.0 cm that provide similar mobile web access and multimedia support found in mini-tablets or UMPC mini-tablets that support voice calls next to the ear, the device is marketed as “Phablet”. The UMPC mini-tablet procedures must also be applied to test the SAR of all surfaces and edges with an antenna located at  $\leq 25 \text{ mm}$  from that surface or edge, in direct contact with a flat phantom, for Product Specific 10-g SAR according to the body-equivalent tissue dielectric parameters in KDB 865664 to address interactive hand use exposure conditions. The UMPC mini-tablet 1-g SAR at 5 mm is not required. When hotspot mode applies, Product Specific 10-g SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg; however, when power reduction applies to hotspot mode the measured SAR must be scaled to the maximum output power, including tolerance, allowed for phablet modes to compare with the 1.2 W/kg SAR test reduction threshold. Due to the overall diagonal dimension of this device is 16.5 cm, the device is marketed as “Phablet”.



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## 6 SAR System Verification Procedure

### 6.1 Tissue Simulate Liquid

#### 6.1.1 Recipes for Tissue Simulate Liquid

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

Ingredients (% by weight)	Frequency (MHz)				
	450	700-900	1750-2000	2300-2500	2500-2700
Water	38.56	40.30	55.24	55.00	54.92
Salt (NaCl)	3.95	1.38	0.31	0.2	0.23
Sucrose	56.32	57.90	0	0	0
HEC	0.98	0.24	0	0	0
Bactericide	0.19	0.18	0	0	0
Tween	0	0	44.45	44.80	44.85
Salt: 99+% Pure Sodium Chloride Water: De-ionized, 16 MΩ <sup>+</sup> resistivity Tween: Polyoxyethylene (20) sorbitan monolaurate			Sucrose: 98+% Pure Sucrose HEC: Hydroxyethyl Cellulose		
HSL13MHz is composed of the following ingredients: Water: 50-90% Non-ionic detergents: 5-50% NaCl: 0-2% Preservative: 0.03-0.1%					
HSL5GHz is composed of the following ingredients: Water: 50-65% Mineral oil: 10-30% Emulsifiers: 8-25% Sodium salt: 0-1.5%					

Table 3: Recipe of Tissue Simulate Liquid



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### 6.1.2 Measurement for Tissue Simulate Liquid

The Conductivity ( $\sigma$ ) and Permittivity ( $\rho$ ) are listed in bellow table. For the SAR measurement given in this report. The temperature variation of the Tissue Simulate Liquids was  $22\pm 2^{\circ}\text{C}$ .

Tissue Type	Measured Frequency (MHz)	Target Tissue ( $\pm 5\%$ )		Measured Tissue		Liquid Temp. ( $^{\circ}\text{C}$ )	Test Date
		$\epsilon_r$	$\sigma(\text{S/m})$	$\epsilon_r$	$\sigma(\text{S/m})$		
1750 Head	1750	40.1	1.37	40.207	1.380	22.3	2024-01-06

Table 4: Measurement result of Tissue electric parameters



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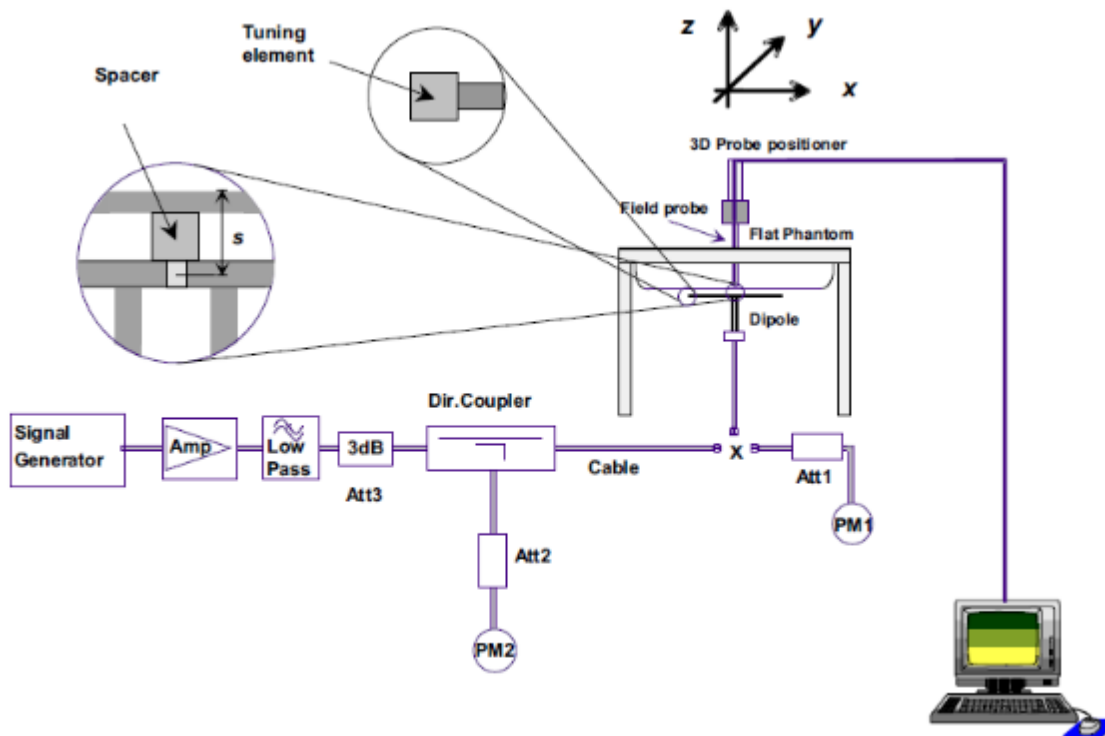
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## 6.2 SAR System Check

The microwave circuit arrangement for system Check is sketched in F-12. 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)	Target SAR (normalized to 1W)	Liquid Temp. (°C)	Test Date
	1g (W/kg)	10g (W/kg)	1g (W/kg)	10g (W/kg)	1-g(W/kg)	10-g(W/kg)		
D1750V2 Head	9.33	4.88	37.32	19.52	35.30	18.70	22.3	2024-01-06

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 GSM SAR Test Reduction Procedure

SAR tests for GSM 850 and GSM 1900, a communication link is set up with a base station by air link. Using CMW500 the power lever is set to “5” and “0” in SAR of GSM 850 and GSM 1900. The tests in the band of GSM 850 and GSM 1900 are performed in the mode of GPRS/EGPRS/DTM function. Since the GPRS class is 33 for this EUT, it has at most 4 timeslots in uplink and at most 5 timeslots in downlink, the maximum total timeslot is 6. The EGPRS class is 33 for this EUT, it has at most 4 timeslots in uplink, and at most 5 timeslots in downlink, the maximum total timeslot is 6. The DTM class is 11 for this EUT, it has at most 3 timeslots in uplink, and at most 4 timeslots in downlink, the maximum total timeslot is 5.

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

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

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

### 7.2 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  $\leq 1/4$  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  $\leq 1.2$  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.

## 7.3 Operation Configurations

### 7.3.1 WCDMA Test Configuration

#### 1) . Output Power Verification

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

#### 2) . Head SAR

SAR for next to the ear head exposure is measured using a 12.2 kbps RMC with TPC bits configured to all “1’s”. The 3G SAR test reduction procedure is applied to AMR configurations with 12.2 kbps RMC as the primary mode.



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Otherwise, SAR is measured for 12.2 kbps AMR in 3.4 kbps SRB (signaling radio bearer) using the highest reported SAR configuration in 12.2 kbps RMC for head exposure

**3) . Body SAR**

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

**4) . HSDPA / HSUPA**

According to KDB 941225 D01v03, RMC 12.2kbps setting is used to evaluate SAR. If the maximum output power and tune-up tolerance specified for production units in HSDPA / HSUPA is  $\leq \frac{1}{4}$  dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio of specified maximum output power and tune-up tolerance of HSDPA / HSUPA to RMC12.2Kbps and the adjusted SAR is  $\leq 1.2$  W/kg, SAR measurement is not required for HSDPA / HSUPA

**a) HSDPA**

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

Sub-test	$\beta_c$	Bd	$\beta_d(SF)$	$\beta_c/\beta_d$	$\beta_{hs}$	CM(dB)	MPR (dB)
1	2/15	15/15	64	2/15	4/15	0.0	0
2	12/15(3)	15/15(3)	64	12/15(3)	24/15	1.0	0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

Note1:  $\Delta_{ACK}$ ,  $\Delta_{NACK}$  and  $\Delta_{CQI} = 8$  Ahs =  $\beta_{hs}/\beta_c = 30/15$   $\beta_{hs} = 30/15 * \beta_c$   
 Note2: For the HS-DPCCH power mask requirement test in clause 5.2C, 5.7A, and the Error Vector Magnitude(EVM) with HS-DPCCH test in clause 5.13.1.A, and HSDPA EVM with phase discontinuity in clause 5.13.1AA,  $\Delta_{ACK}$  and  $\Delta_{NACK} = 8$  ( Ahs=30/15) with  $\beta_{hs} = 30/15 * \beta_c$ , and  $\Delta_{CQI} = 7$  ( Ahs=24/15) with  $\beta_{hs} = 24/15 * \beta_c$ .  
 Note3: CM=1 for  $\beta_c/\beta_d = 12/15$ ,  $\beta_{hs}/\beta_c = 24/15$ . For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.

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



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

Table 6: settings of required H-Set 1 QPSK acc. to 3GPP 34.121



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

Table 7: HSDPA UE category

**b) HSUPA**

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



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Sub-test <sup>⓪</sup>	$\beta_{c\ominus}$	$\beta_{d\ominus}$	$\beta_d$ (SF) <sup>⓪</sup>	$\beta_c/\beta_{d\ominus}$	$\beta_{hs}$ <sup>(1)</sup>	$\beta_{ec}$	$\beta_{ed}$	$\beta_c$ <sup>(e)</sup> (SF) <sup>⓪</sup>	$\beta_{ed}$ <sup>(e)</sup> (code) <sup>⓪</sup>	CM <sup>(2)</sup> <sup>(e)</sup> (dB) <sup>⓪</sup>	MP R <sup>(e)</sup> (dB) <sup>⓪</sup>	AG <sup>(4)</sup> <sup>(e)</sup> Inde <sup>x</sup>	E-TFC I <sup>⓪</sup>
1 <sup>⓪</sup>	11/15 <sup>(3)</sup>	15/15 <sup>(3)</sup>	64 <sup>⓪</sup>	11/15 <sup>(3)</sup>	22/15 <sup>⓪</sup>	209/225 <sup>⓪</sup>	1039/225 <sup>⓪</sup>	4 <sup>⓪</sup>	1 <sup>⓪</sup>	1.0 <sup>⓪</sup>	0.0 <sup>⓪</sup>	20 <sup>⓪</sup>	75 <sup>⓪</sup>
2 <sup>⓪</sup>	6/15 <sup>⓪</sup>	15/15 <sup>⓪</sup>	64 <sup>⓪</sup>	6/15 <sup>⓪</sup>	12/15 <sup>⓪</sup>	12/15 <sup>⓪</sup>	94/75 <sup>⓪</sup>	4 <sup>⓪</sup>	1 <sup>⓪</sup>	3.0 <sup>⓪</sup>	2.0 <sup>⓪</sup>	12 <sup>⓪</sup>	67 <sup>⓪</sup>
3 <sup>⓪</sup>	15/15 <sup>⓪</sup>	9/15 <sup>⓪</sup>	64 <sup>⓪</sup>	15/9 <sup>⓪</sup>	30/15 <sup>⓪</sup>	30/15 <sup>⓪</sup>	$\beta_{ed1}:47/15$ <sup>⓪</sup> $\beta_{ed2}:47/15$ <sup>⓪</sup>	4 <sup>⓪</sup>	2 <sup>⓪</sup>	2.0 <sup>⓪</sup>	1.0 <sup>⓪</sup>	15 <sup>⓪</sup>	92 <sup>⓪</sup>
4 <sup>⓪</sup>	2/15 <sup>⓪</sup>	15/15 <sup>⓪</sup>	64 <sup>⓪</sup>	2/15 <sup>⓪</sup>	4/15 <sup>⓪</sup>	2/15 <sup>⓪</sup>	56/75 <sup>⓪</sup>	4 <sup>⓪</sup>	1 <sup>⓪</sup>	3.0 <sup>⓪</sup>	2.0 <sup>⓪</sup>	17 <sup>⓪</sup>	71 <sup>⓪</sup>
5 <sup>⓪</sup>	15/15 <sup>(4)</sup>	15/15 <sup>(4)</sup>	64 <sup>⓪</sup>	15/15 <sup>(4)</sup>	30/15 <sup>⓪</sup>	24/15 <sup>⓪</sup>	134/15 <sup>⓪</sup>	4 <sup>⓪</sup>	1 <sup>⓪</sup>	1.0 <sup>⓪</sup>	0.0 <sup>⓪</sup>	21 <sup>⓪</sup>	81 <sup>⓪</sup>

Note 1:  $\Delta ACK, \Delta NACK$  and  $\Delta CQI = 8$      $A_{hs} = \beta_{hs}/\beta_c = 30/15$      $\beta_{hs} = 30/15 * \beta_c$   
 Note 2: CM = 1 for  $\beta_c/\beta_d = 12/15, \beta_{hs}/\beta_c = 24/15$ . For all other combinations of DPDCH, DPCCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference<sup>⓪</sup>  
 Note 3 : For subtest 1 the  $\beta_c/\beta_d$  ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to  $\beta_c = 10/15$  and  $\beta_d = 15/15$ <sup>⓪</sup>  
 Note 4 : For subtest 5 the  $\beta_c/\beta_d$  ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to  $\beta_c = 14/15$  and  $\beta_d = 15/15$ <sup>⓪</sup>  
 Note 5 : Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Table 5.1g<sup>⓪</sup>  
 Note 6:  $\beta_{ed}$  can not be set directly; it is set by Absolute Grant Value.<sup>⓪</sup>

Table 8: Subtests for UMTS Release 6 HSUPA

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

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

Table 9: HSUPA UE category



**c) HSPA+**

Per KDB941225D01, SAR is required for Rel. 7 HSPA+ when SAR is required for Rel. 6 HSPA; otherwise, the 3G SAR test reduction procedure is applied to (uplink) HSPA+ with 12.2 kbps RMC as the primary mode. Power is measured for HSPA+ that supports uplink 16 QAM according to configurations in Table C.11.1.4 of 3GPP TS 34.121-1 to determine SAR test reduction.

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

Sub-test	$\beta_c$ (Note3)	$\beta_d$	$\beta_{HS}$ (Note1)	$\beta_{ec}$	$\beta_{ed}$ (2xSF2) (Note 4)	$\beta_{ed}$ (2xSF4) (Note 4)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 4)	E-TFCI (Note 5)	E-TFCI (boost)
1	1	0	30/15	30/15	$\beta_{ed1}$ : 30/15 $\beta_{ed2}$ : 30/15	$\beta_{ed3}$ : 24/15 $\beta_{ed4}$ : 24/15	3.5	2.5	14	105	105

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

Note 2: CM = 3.5 and the MPR is based on the relative CM difference, MPR = MAX(CM-1,0)

Note 3: DPDCH is not configured, therefore the  $\beta_c$  is set to 1 and  $\beta_d = 0$  by default.

Note 4:  $\beta_{ed}$  can not be set directly; it is set by Absolute Grant Value.

Note 5: All the sub-tests require the UE to transmit 2SF2+2SF4 16QAM EDCH and they apply for UE using E-DPDCH category 7. E-DCH TTI is set to 2ms TTI and E-DCH table index = 2. To support these E-DCH configurations DPDCH is not allocated. The UE is signalled to use the extrapolation algorithm.



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### 7.3.2 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.

#### 7.3.2.1 Duty cycle

1) Wi-Fi 2.4GHz 802.11b Ant6:

Duty cycle=98.73%



2) Wi-Fi 2.4GHz 802.11b Ant7:

Duty cycle=98.89%



3) Wi-Fi 5GHz 802.11ac 80M Ant6:

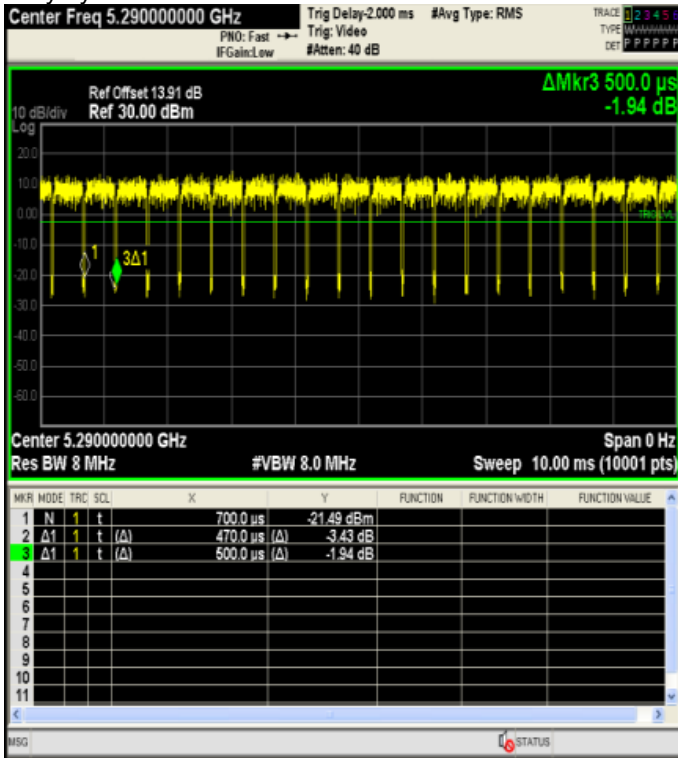


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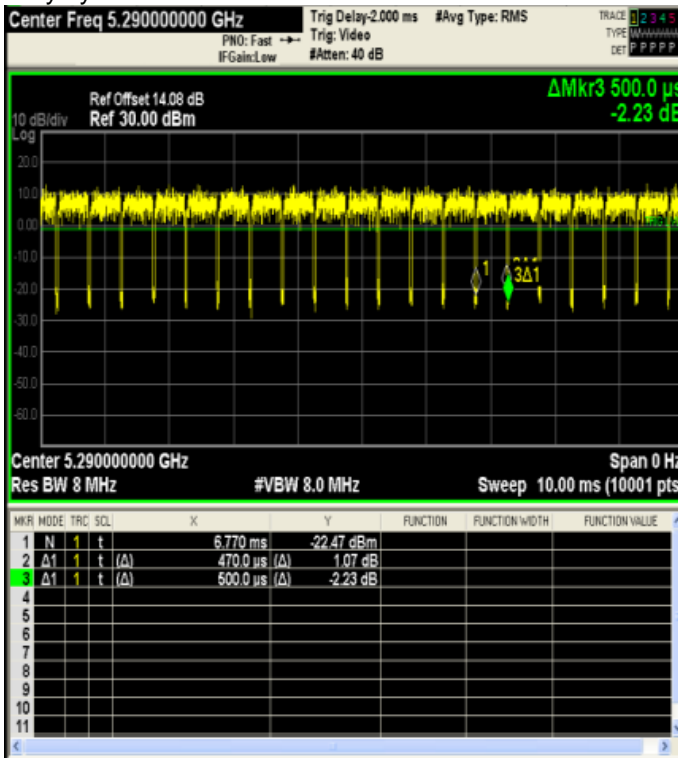
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Duty cycle=94%



4) Wi-Fi 5GHz 802.11ac 80M Ant7:  
Duty cycle=94%



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

### 7.3.2.3 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  $\leq 1.2$  W/kg or all required channels are tested.

### 7.3.2.4 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.



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When the highest *reported* SAR for the initial test configuration (when applicable, include subsequent highest output channels), according to the initial test position or fixed exposure position requirements, is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is  $\leq 1.2$  W/kg, SAR is not required for that subsequent test configuration.

- 2) . 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.
- 3) . 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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### 7.3.2.5 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  $\leq 0.8$  W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.
- 2) . When the reported SAR is  $> 0.8$  W/kg, SAR is required for that exposure configuration using the next highest measured output power channel. When any reported SAR is  $> 1.2$  W/kg, SAR is required for the third channel; i.e., all channels require testing.

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

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

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

- **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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**7.3.2.6 5 GHz WiFi SAR Procedures**

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

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

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

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

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

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



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

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

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

• **SAR Test Requirements for OFDM configurations**

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



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### 7.3.3 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 Anritsu MT8820C was used for LTE output power measurements and SAR testing. Max power control was used so the UE transmits with maximum output power during SAR testing. SAR must be measured with the maximum TTI (transmit time interval) supported by the device in each LTE configuration.

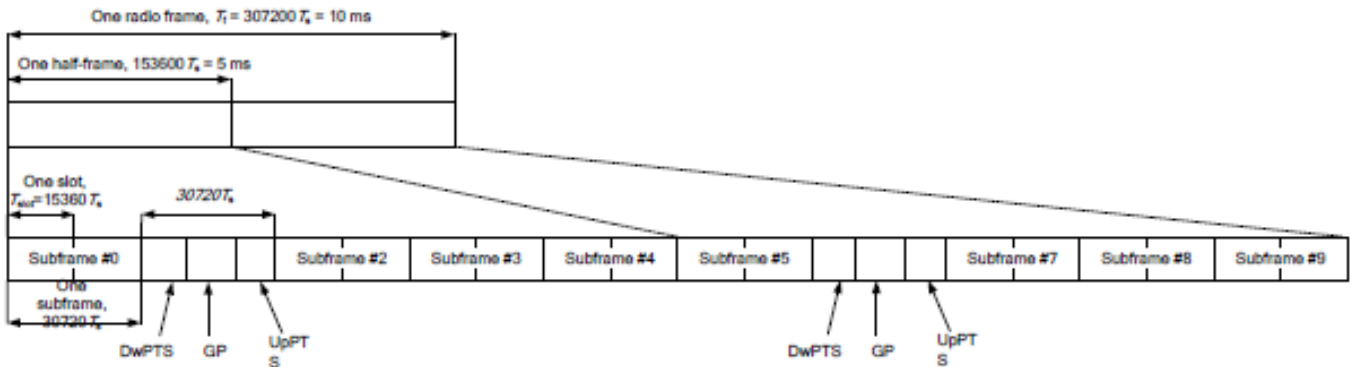
#### TDD LTE test consideration

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:



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	4384.Ts	5120.Ts	7680.Ts	4384.Ts	5120.Ts
5	6592.Ts			20480.Ts		
6	19760.Ts			23040.Ts		
7	21952.Ts			25600.Ts		
8	24144.Ts	-	-	-	-	-
9	13168.Ts	-	-	-	-	-

Uplink-downlink configurations.



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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 Section 6.2.3 – 6.2.5 under Table 6.2.3-1.

Modulation	Channel bandwidth / Transmission bandwidth (N <sub>RB</sub> )						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
64 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 2
64 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 2
64 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 3

**C) A-MPR**

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

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

**1) QPSK with 1 RB allocation**

Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel. When the reported SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required for 1 RB allocation; otherwise, SAR is required for the remaining required test channels and only for the RB offset configuration with the highest output power for that channel. When the reported SAR of a required test channel is > 1.45 W/kg, SAR is required for all three RB offset configurations for that required test channel.



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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  $\leq 0.8$  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 GSM

GSM 850										
Burst Output Power(dBm)		Channel			Tune up	Division Factors	Frame-Average Output Power(dBm)			Tune up
		128	190	251			128	190	251	
GSM(GMSK)	GSM	32.55	32.61	32.51	33.50	-9.19	23.36	23.42	23.32	24.31
GPRS/EGPRS (GMSK)	1 TX Slot	32.62	32.70	32.75	33.50	-9.19	23.43	23.51	23.56	24.31
	2 TX Slots	30.75	30.64	30.78	31.50	-6.18	24.57	24.46	24.60	25.32
	3 TX Slots	28.65	28.81	28.78	30.00	-4.42	24.23	24.39	24.36	25.58
	4 TX Slots	27.62	27.69	27.54	28.50	-3.17	24.45	24.52	24.37	25.33
EGPRS(8PSK)	1 TX Slot	26.27	26.24	26.15	27.00	-9.19	17.08	17.05	16.96	17.81
	2 TX Slots	24.70	24.64	24.74	25.50	-6.18	18.52	18.46	18.56	19.32
	3 TX Slots	23.81	23.81	23.58	24.50	-4.42	19.39	19.39	19.16	20.08
	4 TX Slots	22.90	22.75	22.87	23.50	-3.17	19.73	19.58	19.70	20.33
DTM Multi-slot Class5	GSM	30.62	30.49	30.46	31.50	-6.18	24.44	24.31	24.28	25.32
	GPRS 1 TX Slot	30.52	30.52	30.52	31.50	-6.18	24.34	24.34	24.34	25.32
DTM Multi-slot Class9	GSM	30.63	30.53	30.58	31.50	-6.18	24.45	24.35	24.40	25.32
	GPRS 1 TX Slot	30.58	30.53	30.51	31.50	-6.18	24.40	24.35	24.33	25.32
DTM Multi-slot Class11	GSM	28.53	28.55	28.74	30.00	-4.42	24.11	24.13	24.32	25.58
	GPRS 1 TX Slot	28.53	28.60	28.63	30.00	-4.42	24.11	24.18	24.21	25.58
DTM Multi-slot Class5	GSM	24.54	24.39	24.49	25.50	-6.18	18.36	18.21	18.31	19.32
	EGPRS 1 TX Slot	24.37	24.44	24.45	25.50	-6.18	18.19	18.26	18.27	19.32
DTM Multi-slot Class9	GSM	24.44	24.51	24.51	25.50	-6.18	18.26	18.33	18.33	19.32
	EGPRS 1 TX Slot	24.55	24.37	24.53	25.50	-6.18	18.37	18.19	18.35	19.32
DTM Multi-slot Class11	GSM	23.65	23.58	23.42	24.50	-4.42	19.23	19.16	19.00	20.08
	EGPRS 1 TX Slot	23.57	23.65	23.39	24.50	-4.42	19.15	19.23	18.97	20.08

GSM 1900										
Burst Output Power(dBm)		Channel			Tune up	Division Factors	Frame-Average Output Power(dBm)			Tune up
		512	661	810			512	661	810	
GSM(GMSK)	GSM	27.16	27.20	27.18	28.00	-9.19	17.97	18.01	17.99	18.81
GPRS/EGPRS (GMSK)	1 TX Slot	27.29	27.41	27.33	28.00	-9.19	18.10	18.22	18.14	18.81
	2 TX Slots	26.39	26.31	26.28	27.00	-6.18	<b>20.21</b>	20.13	20.10	20.82
	3 TX Slots	24.33	24.28	24.34	25.00	-4.42	19.91	19.86	19.92	20.58
	4 TX Slots	23.16	23.25	23.19	24.00	-3.17	19.99	20.08	20.02	20.83
EGPRS(8PSK)	1 TX Slot	22.80	22.67	22.73	23.50	-9.19	13.61	13.48	13.54	14.31
	2 TX Slots	22.31	22.29	22.23	23.00	-6.18	16.13	16.11	16.05	16.82
	3 TX Slots	20.34	20.47	20.37	21.00	-4.42	15.92	16.05	15.95	16.58
	4 TX Slots	19.97	19.88	19.88	20.50	-3.17	16.80	16.71	16.71	17.33
DTM Multi-slot Class5	GSM	26.34	26.22	26.30	27.00	-6.18	20.16	20.04	20.12	20.82
	GPRS 1 TX Slot	26.43	26.35	26.37	27.00	-6.18	20.25	20.17	20.19	20.82
DTM Multi-slot Class9	GSM	26.35	26.34	26.26	27.00	-6.18	20.17	20.16	20.08	20.82
	GPRS 1 TX Slot	26.38	26.30	26.39	27.00	-6.18	20.20	20.12	20.21	20.82
DTM Multi-slot Class11	GSM	24.41	24.37	24.31	25.00	-4.42	19.99	19.95	19.89	20.58
	GPRS 1 TX Slot	24.30	24.25	24.33	25.00	-4.42	19.88	19.83	19.91	20.58
DTM Multi-slot Class5	GSM	22.29	22.20	22.26	23.00	-6.18	16.11	16.02	16.08	16.82
	EGPRS 1 TX Slot	22.31	22.25	22.26	23.00	-6.18	16.13	16.07	16.08	16.82
DTM Multi-slot Class9	GSM	22.27	22.25	22.24	23.00	-6.18	16.09	16.07	16.06	16.82
	EGPRS 1 TX Slot	22.30	22.26	22.24	23.00	-6.18	16.12	16.08	16.06	16.82
DTM Multi-slot Class11	GSM	20.44	20.31	20.44	21.00	-4.42	16.02	15.89	16.02	16.58
	EGPRS 1 TX Slot	20.42	20.39	20.40	21.00	-4.42	16.00	15.97	15.98	16.58

Note:

- 1) . CMW500 measures GSM peak and average output power for active timeslots. For SAR the time based average power is relevant. The difference in between depends on the duty cycle of the TDMA signal:



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

- 2) . The maximum output power channel is used for SAR testing and for further SAR test reduction
- 3) . For DTM multi-slot class mode, the device was linked with base station simulator (CMW500)and transmit maximum power on maximum number of TX slots,ie.one CS timeslot, and additional PS timeslots(1 for DTM class5) in one TDMA frame.
- 4) . CMW500 was used to setup the device operated under DTM mode for power measurement and SAR testing.For conducted power, the power of the burst for voice and the power of the bursts for data was reported separately in the table above, and the frame-average power is derived below to determine SAR testing.
- 5) . The frame-averaged power is linearly proportion to the slot number configured and it is linearly scaled the maximum burst-averaged power based on time slots. The calculated method is shown as below:  
Frame-averaged power = 10 x log (Burst-averaged power mW x Slot used / 8
- 6) . When the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel must be used
- 7) . For SAR testing,the EUT was set in DTM11(2TX slots) and GPRS 3 TX Slots for GSM850 due to its same frame-average power, Give priority to GPRS 3 TX test, and DTM Class 11 to test the worst conditions.

### 8.1.2 Conducted Power of WCDMA

WCDMA Band IV					
Average Conducted Power(dBm)					
Channel		1312	1412	1513	Tune up
WCDMA	12.2kbps RMC	22.12	22.27	22.01	23.00
	12.2kbps AMR	22.18	22.09	22.10	23.00
HSDPA	Subtest 1	21.21	21.19	21.27	22.00
	Subtest 2	21.24	21.13	21.34	22.00
	Subtest 3	20.77	20.87	20.78	21.00
	Subtest 4	20.82	20.66	20.91	21.00
HSUPA	Subtest 1	21.09	21.08	21.10	22.00
	Subtest 2	19.19	19.17	19.25	20.00
	Subtest 3	20.26	20.16	20.29	21.00
	Subtest 4	18.74	18.60	18.75	20.00
	Subtest 5	20.09	20.26	20.31	22.00
HSPA+	16QAM	19.20	19.07	19.18	20.50

Note:

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



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**8.1.3 Conducted Power of LTE**

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	20.30	20.23	20.19	21.00	
		1	2	20.32	20.28	20.31	21.00	
		1	5	20.28	20.24	20.28	21.00	
		3	0	20.25	20.19	20.30	21.00	
		3	2	20.22	20.22	20.32	21.00	
		3	3	20.26	20.22	20.20	21.00	
	16QAM	6	0	20.27	20.26	20.19	21.00	
		1	0	20.29	20.29	20.26	21.00	
		1	2	20.22	20.28	20.25	21.00	
		1	5	20.22	20.21	20.30	21.00	
		3	0	20.31	20.19	20.19	21.00	
		3	2	20.30	20.26	20.24	21.00	
	64QAM	3	3	20.27	20.27	20.30	21.00	
		6	0	20.23	20.29	20.21	21.00	
		1	0	20.22	20.30	20.32	21.00	
		1	2	20.30	20.31	20.29	21.00	
		1	5	20.21	20.20	20.23	21.00	
		3	0	20.29	20.21	20.20	21.00	
	3MHz	QPSK	3	2	20.26	20.22	20.26	21.00
			3	3	20.21	20.31	20.20	21.00
6			0	20.21	20.24	20.28	21.00	
1			0	20.21	20.30	20.22	21.00	
1			7	20.25	20.27	20.25	21.00	
1			14	20.18	20.24	20.31	21.00	
16QAM		8	0	20.26	20.31	20.19	21.00	
		8	4	20.30	20.30	20.26	21.00	
		8	7	20.29	20.26	20.31	21.00	
		15	0	20.19	20.26	20.29	21.00	
		1	0	20.30	20.21	20.18	21.00	
		1	7	20.26	20.22	20.25	21.00	
64QAM		1	14	20.18	20.27	20.22	21.00	
		8	0	20.23	20.19	20.26	21.00	
		8	4	20.22	20.27	20.19	21.00	
		8	7	20.25	20.23	20.31	21.00	
		15	0	20.31	20.19	20.26	21.00	
		1	0	20.23	20.27	20.21	21.00	
19965		QPSK	1	7	20.20	20.28	20.28	21.00
			1	14	20.30	20.29	20.21	21.00
	8		0	20.18	20.28	20.31	21.00	
	8		4	20.27	20.30	20.22	21.00	
	8		7	20.23	20.25	20.27	21.00	
	15		0	20.21	20.21	20.31	21.00	
19975	QPSK	1	7	20.20	20.28	20.28	21.00	
		1	14	20.30	20.29	20.21	21.00	
		8	0	20.18	20.28	20.31	21.00	
		8	4	20.27	20.30	20.22	21.00	
		8	7	20.23	20.25	20.27	21.00	
		15	0	20.21	20.21	20.31	21.00	
20175	QPSK	1	7	20.20	20.28	20.28	21.00	
		1	14	20.30	20.29	20.21	21.00	
		8	0	20.18	20.28	20.31	21.00	
		8	4	20.27	20.30	20.22	21.00	
		8	7	20.23	20.25	20.27	21.00	
		15	0	20.21	20.21	20.31	21.00	
20385	QPSK	1	7	20.20	20.28	20.28	21.00	
		1	14	20.30	20.29	20.21	21.00	
		8	0	20.18	20.28	20.31	21.00	
		8	4	20.27	20.30	20.22	21.00	
		8	7	20.23	20.25	20.27	21.00	
		15	0	20.21	20.21	20.31	21.00	
20375	QPSK	1	7	20.20	20.28	20.28	21.00	
		1	14	20.30	20.29	20.21	21.00	
		8	0	20.18	20.28	20.31	21.00	
		8	4	20.27	20.30	20.22	21.00	
		8	7	20.23	20.25	20.27	21.00	
		15	0	20.21	20.21	20.31	21.00	



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5MHz	QPSK	1	0	20.24	20.19	20.32	21.00
		1	13	20.30	20.21	20.20	21.00
		1	24	20.22	20.23	20.26	21.00
		12	0	20.23	20.28	20.29	21.00
		12	6	20.30	20.24	20.27	21.00
		12	13	20.30	20.31	20.23	21.00
		25	0	20.24	20.19	20.26	21.00
	16QAM	1	0	20.20	20.21	20.18	21.00
		1	13	20.32	20.23	20.25	21.00
		1	24	20.28	20.31	20.22	21.00
		12	0	20.29	20.20	20.28	21.00
		12	6	20.25	20.26	20.30	21.00
		12	13	20.31	20.26	20.30	21.00
		25	0	20.24	20.31	20.18	21.00
	64QAM	1	0	20.22	20.19	20.24	21.00
		1	13	20.21	20.23	20.28	21.00
		1	24	20.19	20.24	20.19	21.00
		12	0	20.25	20.31	20.31	21.00
		12	6	20.24	20.21	20.23	21.00
		12	13	20.21	20.22	20.20	21.00
		25	0	20.30	20.18	20.24	21.00
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
10MHz	QPSK	1	0	20.22	20.30	20.18	21.00
		1	25	20.25	20.25	20.23	21.00
		1	49	20.25	20.28	20.28	21.00
		25	0	20.27	20.31	20.24	21.00
		25	13	20.19	20.23	20.23	21.00
		25	25	20.26	20.22	20.31	21.00
		50	0	20.27	20.31	20.25	21.00
	16QAM	1	0	20.23	20.19	20.20	21.00
		1	25	20.21	20.21	20.28	21.00
		1	49	20.20	20.20	20.29	21.00
		25	0	20.19	20.19	20.21	21.00
		25	13	20.24	20.32	20.24	21.00
		25	25	20.23	20.23	20.27	21.00
		50	0	20.25	20.23	20.25	21.00
	64QAM	1	0	20.24	20.32	20.23	21.00
		1	25	20.21	20.25	20.20	21.00
		1	49	20.22	20.27	20.24	21.00
		25	0	20.32	20.22	20.26	21.00
		25	13	20.32	20.28	20.26	21.00
		25	25	20.29	20.24	20.26	21.00
		50	0	20.29	20.26	20.30	21.00
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
15MHz	QPSK	1	0	20.23	20.25	20.30	21.00
		1	38	20.20	20.26	20.24	21.00
		1	74	20.23	20.20	20.32	21.00
		36	0	20.18	20.23	20.18	21.00
		36	18	20.22	20.34	20.21	21.00
		36	39	20.30	20.26	20.31	21.00



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Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up	
				20050	20175	20300		
20MHz	16QAM	75	0	20.24	20.29	20.24	21.00	
		1	0	20.30	20.29	20.29	21.00	
		1	38	20.28	20.27	20.20	21.00	
		1	74	20.29	20.26	20.28	21.00	
		36	0	20.21	20.19	20.32	21.00	
		36	18	20.26	20.21	20.31	21.00	
		36	39	20.20	20.29	20.28	21.00	
		75	0	20.23	20.31	20.25	21.00	
	64QAM	1	0	20.31	20.22	20.24	21.00	
		1	38	20.29	20.22	20.32	21.00	
		1	74	20.22	20.24	20.28	21.00	
		36	0	20.28	20.23	20.19	21.00	
		36	18	20.26	20.28	20.29	21.00	
		36	39	20.25	20.25	20.30	21.00	
		75	0	20.27	20.20	20.18	21.00	
		20MHz	QPSK	1	0	20.34	20.39	20.29
	1			50	20.30	20.31	20.26	21.00
	1			99	20.28	20.22	20.25	21.00
	50			0	20.32	20.35	20.27	21.00
	50			25	20.21	20.31	20.18	21.00
	50			50	20.29	20.31	20.25	21.00
	100			0	20.30	20.31	20.30	21.00
	16QAM			1	0	20.19	20.29	20.27
			1	50	20.29	20.24	20.28	21.00
			1	99	20.23	20.20	20.23	21.00
			50	0	20.21	20.28	20.27	21.00
			50	25	20.30	20.24	20.30	21.00
			50	50	20.29	20.24	20.27	21.00
100			0	20.28	20.23	20.30	21.00	
64QAM			1	0	20.26	20.30	20.27	21.00
	1		50	20.27	20.23	20.21	21.00	
	1		99	20.24	20.21	20.24	21.00	
	50		0	20.32	20.21	20.29	21.00	
	50		25	20.30	20.27	20.22	21.00	
	50		50	20.24	20.27	20.31	21.00	
	100	0	20.19	20.22	20.27	21.00		

LTE FDD Band 12				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				23017	23095	23173	
1.4MHz	QPSK	1	0	23.72	23.59	23.79	24.50
		1	2	23.59	23.83	23.67	24.50
		1	5	23.70	23.61	23.80	24.50
		3	0	23.61	23.73	23.70	24.50
		3	2	23.63	23.86	23.60	24.50
		3	3	23.57	23.78	23.57	24.50
		6	0	22.70	22.87	22.67	23.50
		16QAM	1	0	22.81	22.85	22.82
	1		2	22.82	22.88	22.98	23.50



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Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				23025	23095	23165	
3MHz	QPSK	1	0	23.70	23.76	23.73	24.50
		1	7	23.70	23.70	23.63	24.50
		1	14	23.75	23.65	23.72	24.50
		8	0	22.73	22.72	22.63	23.50
		8	4	22.77	22.72	22.72	23.50
		8	7	22.80	22.67	22.85	23.50
	16QAM	15	0	22.74	22.75	22.77	23.50
		1	0	22.87	22.88	22.80	23.50
		1	7	22.88	22.72	22.90	23.50
		1	14	22.74	22.77	22.81	23.50
		8	0	21.89	21.78	21.96	22.50
		8	4	21.81	22.01	21.92	22.50
	64QAM	8	7	21.84	21.90	21.94	22.50
		15	0	21.84	21.88	21.89	22.50
		1	0	21.87	21.84	21.80	22.50
		1	7	21.86	21.90	21.93	22.50
		1	14	21.92	21.89	21.87	22.50
		8	0	20.90	21.02	20.90	21.50
5MHz	QPSK	8	4	21.01	20.96	20.93	21.50
		8	7	20.99	21.02	21.01	21.50
		15	0	20.91	20.97	20.98	21.50
		1	0	23.82	23.69	23.79	24.50
		1	13	23.80	23.66	23.57	24.50
		1	24	23.77	23.67	23.72	24.50
	16QAM	12	0	22.72	22.69	22.78	23.50
		12	6	22.73	22.71	22.80	23.50
		12	13	22.83	22.70	22.82	23.50
		25	0	22.81	22.68	22.76	23.50
		1	0	22.84	22.90	22.79	23.50
		1	13	22.78	22.77	22.83	23.50
	64QAM	1	24	22.76	22.73	22.82	23.50
		12	0	21.80	21.85	21.90	22.50
		12	6	21.86	21.83	21.79	22.50
		12	13	21.94	21.89	21.91	22.50
		25	0	21.87	21.84	21.84	22.50
		1	0	21.85	21.89	21.85	22.50



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Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				23060	23095	23130	
10MHz	QPSK	1	13	21.80	21.95	21.89	22.50
		1	24	21.78	21.93	21.91	22.50
		12	0	20.86	20.93	21.01	21.50
		12	6	20.96	20.91	20.96	21.50
		12	13	20.91	20.88	21.01	21.50
		25	0	20.90	21.04	20.98	21.50
		25	13	20.91	20.88	21.01	21.50
	16QAM	1	0	23.71	23.89	23.71	24.50
		1	25	23.74	23.60	23.61	24.50
		1	49	23.70	23.75	23.65	24.50
		25	0	22.87	22.95	22.79	23.50
		25	13	22.70	22.79	22.88	23.50
		25	25	22.92	22.81	22.81	23.50
		50	0	22.67	22.79	22.72	23.50
	64QAM	1	0	22.85	22.84	22.77	23.50
		1	25	22.87	22.86	22.85	23.50
		1	49	22.84	22.82	22.80	23.50
		25	0	21.92	21.86	21.96	22.50
		25	13	21.88	21.82	21.78	22.50
		25	25	21.88	21.90	21.86	22.50
		50	0	21.89	21.88	21.91	22.50
	64QAM	1	0	21.84	21.79	21.88	22.50
		1	25	21.77	21.92	21.84	22.50
		1	49	21.87	21.90	21.96	22.50
		25	0	20.86	20.95	20.91	21.50
		25	13	21.05	20.96	20.94	21.50
		25	25	20.93	21.05	20.95	21.50
		50	0	20.92	20.99	21.05	21.50



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**8.1.4 Conducted Power of WIFI**

WIFI 2.4G				Ant 6		Ant 7		Ant 6+7	
Mode	Channel	Frequency(MHz)	Data Rate(Mbps)	Average Power (dBm)	Tune up	Average Power (dBm)	Tune up	Average Power (dBm)	Tune up
802.11b	1	2412	1	16.96	17.50	17.03	17.50	<b>20.01</b>	20.50
	6	2437		16.88	17.50	16.68	17.50	19.79	20.50
	11	2462		16.94	17.50	17.22	17.50	20.09	20.50
802.11g	1	2412	6	15.31	16.50	15.71	16.50	18.52	19.50
	6	2437		15.52	16.50	15.30	16.50	18.42	19.50
	11	2462		15.18	16.50	15.91	16.50	18.57	19.50
802.11n HT20	1	2412	6.5	15.04	16.50	15.54	16.50	18.31	19.50
	6	2437		15.30	16.50	15.20	16.50	18.26	19.50
	11	2462		14.89	16.50	15.75	16.50	18.35	19.50

WIFI 5G					Ant 6		Ant 7		Ant 6+7	
5GHz	mode	Channel	Frequency (MHz)	Data Rate(Mbps)	Average Power (dBm)	Tune up	Average Power (dBm)	Tune up	Average Power (dBm)	Tune up
802.11a	U-NII-1	36	5180	6	9.59	11.00	9.25	11.00	12.43	14.00
		40	5200		9.84	11.00	9.42	11.00	12.65	14.00
		44	5220		9.47	11.00	9.16	11.00	12.33	14.00
		48	5240		9.74	11.00	9.18	11.00	12.48	14.00
	U-NII-2A	52	5260		9.59	11.00	9.45	11.00	12.53	14.00
		56	5280		9.73	11.00	9.12	11.00	12.45	14.00
		60	5300		10.22	11.00	9.65	11.00	12.95	14.00
		64	5320		10.29	11.00	9.40	11.00	12.88	14.00
	U-NII-2C	100	5500		9.81	11.00	9.68	11.00	12.76	14.00
		104	5520		9.81	11.00	9.37	11.00	12.61	14.00
		108	5540		9.87	11.00	9.16	11.00	12.54	14.00
		112	5560		9.91	11.00	9.45	11.00	12.70	14.00
		116	5580		10.04	11.00	9.22	11.00	12.66	14.00
		120	5600		9.98	11.00	9.25	11.00	12.64	14.00
		124	5620		10.22	11.00	9.14	11.00	12.72	14.00
		128	5640		10.03	11.00	9.27	11.00	12.68	14.00
		132	5660		10.03	11.00	9.06	11.00	12.58	14.00
		136	5680		9.82	11.00	9.23	11.00	12.55	14.00
		140	5700		9.41	11.00	9.18	11.00	12.31	14.00
		144	5720		9.47	11.00	9.20	11.00	12.35	14.00
	U-NII-3	149	5745		9.96	11.00	9.22	11.00	12.62	14.00
		153	5765		9.96	11.00	9.34	11.00	12.67	14.00
		157	5785		10.39	11.00	9.43	11.00	12.95	14.00
		161	5805		10.29	11.00	9.26	11.00	12.82	14.00
		165	5825	10.14	11.00	9.30	11.00	12.75	14.00	
5GHz	mode	Channel	Frequency (MHz)	Data Rate(Mbps)	Average Power (dBm)	Tune up	Average Power (dBm)	Tune up	Average Power (dBm)	Tune up



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5GHz	mode	Channel	Frequency (MHz)	Data Rate(Mbps)	Average Power (dBm)	Tune up	Average Power (dBm)	Tune up	Average Power (dBm)	Tune up		
802.11n- HT20	U-NII-1	36	5180	MCS0	9.31	11.00	9.43	11.00	12.38	14.00		
		40	5200		9.20	11.00	9.38	11.00	12.30	14.00		
		44	5220		9.04	11.00	9.05	11.00	12.06	14.00		
		48	5240		9.16	11.00	9.11	11.00	12.15	14.00		
	U-NII-2A	52	5260		9.45	11.00	9.18	11.00	12.33	14.00		
		56	5280		9.16	11.00	9.20	11.00	12.19	14.00		
		60	5300		9.88	11.00	9.21	11.00	12.57	14.00		
		64	5320		10.00	11.00	9.29	11.00	12.67	14.00		
	U-NII-2C	100	5500		9.81	11.00	9.21	11.00	12.53	14.00		
		104	5520		9.88	11.00	9.28	11.00	12.60	14.00		
		108	5540		10.01	11.00	9.08	11.00	12.58	14.00		
		112	5560		9.73	11.00	9.27	11.00	12.52	14.00		
		116	5580		9.94	11.00	9.31	11.00	12.65	14.00		
		120	5600		10.17	11.00	9.18	11.00	12.71	14.00		
		124	5620		9.98	11.00	9.16	11.00	12.60	14.00		
		128	5640		10.22	11.00	9.15	11.00	12.73	14.00		
		132	5660		10.07	11.00	9.12	11.00	12.63	14.00		
		136	5680		9.90	11.00	9.14	11.00	12.55	14.00		
	U-NII-3	140	5700		9.43	11.00	9.14	11.00	12.30	14.00		
		144	5720		9.59	11.00	9.27	11.00	12.44	14.00		
		149	5745		9.93	11.00	9.35	11.00	12.66	14.00		
		153	5765		9.34	11.00	9.18	11.00	12.27	14.00		
		157	5785		10.33	11.00	9.15	11.00	12.79	14.00		
			161		5805	10.18	11.00	9.23	11.00	12.74	14.00	
			165		5825	10.06	11.00	9.23	11.00	12.68	14.00	
	802.11n- HT40	U-NII-1	38		5190	MCS0	9.35	11.00	9.22	11.00	12.30	14.00
			46		5230		9.40	11.00	9.21	11.00	12.32	14.00
U-NII-2A	54	5270	10.46	11.00	9.07		11.00	12.83	14.00			
	62	5310	10.66	11.00	9.33		11.00	13.06	14.00			
U-NII-2C	102	5510	10.55	11.00	9.97		11.00	13.28	14.00			
	110	5550	10.66	11.00	9.90		11.00	13.31	14.00			
	118	5590	10.43	11.00	10.02		11.00	13.24	14.00			
	126	5630	9.68	11.00	9.98		11.00	12.84	14.00			
	134	5670	10.19	11.00	9.48		11.00	12.86	14.00			
U-NII-3	142	5710	10.58	11.00	9.28		11.00	12.99	14.00			
	151	5755	10.32	11.00	9.21		11.00	12.81	14.00			
	159	5795	10.17	11.00	9.21		11.00	12.73	14.00			
802.11ac -20	U-NII-1	36	5180	MCS0	9.08		11.00	9.86	11.00	12.50	14.00	
	40	5200	9.32		11.00		10.00	11.00	12.68	14.00		
	44	5220	9.23		11.00	9.89	11.00	12.58	14.00			



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5GHz	mode	Channel	Frequency (MHz)	Data Rate(Mbps)	Average Power (dBm)	Tune up	Average Power (dBm)	Tune up	Average Power (dBm)	Tune up
	U-NII-2A	48	5240	MCS0	9.30	11.00	9.96	11.00	12.65	14.00
		52	5260		9.34	11.00	9.99	11.00	12.69	14.00
		56	5280		9.36	11.00	10.12	11.00	12.77	14.00
		60	5300		9.55	11.00	10.27	11.00	12.94	14.00
		64	5320		9.97	11.00	10.16	11.00	13.08	14.00
	U-NII-2C	100	5500		9.94	11.00	9.10	11.00	12.55	14.00
		104	5520		9.68	11.00	9.14	11.00	12.43	14.00
		108	5540		9.60	11.00	9.17	11.00	12.40	14.00
		112	5560		9.79	11.00	9.12	11.00	12.48	14.00
		116	5580		9.65	11.00	9.16	11.00	12.42	14.00
		120	5600		9.71	11.00	9.09	11.00	12.42	14.00
		124	5620		10.10	11.00	9.14	11.00	12.66	14.00
		128	5640		10.04	11.00	9.19	11.00	12.65	14.00
		132	5660		10.06	11.00	9.14	11.00	12.63	14.00
		136	5680		10.05	11.00	9.26	11.00	12.68	14.00
	U-NII-3	140	5700		9.82	11.00	9.03	11.00	12.45	14.00
		144	5720		9.36	11.00	9.02	11.00	12.20	14.00
		149	5745		10.26	11.00	9.32	11.00	12.83	14.00
		153	5765		10.03	11.00	9.23	11.00	12.66	14.00
		157	5785		10.19	11.00	9.19	11.00	12.73	14.00
		161	5805	10.21	11.00	9.51	11.00	12.88	14.00	
		165	5825	10.26	11.00	9.31	11.00	12.82	14.00	
802.11ac -40	U-NII-1	38	5190	9.47	11.00	9.15	11.00	12.32	14.00	
		46	5230	9.67	11.00	9.12	11.00	12.41	14.00	
	U-NII-2A	54	5270	9.97	11.00	9.44	11.00	12.72	14.00	
		62	5310	9.74	11.00	9.63	11.00	12.70	14.00	
	U-NII-2C	102	5510	10.77	11.00	10.05	11.00	13.44	14.00	
			110	5550	10.15	11.00	9.80	11.00	12.99	14.00
			118	5590	10.60	11.00	9.90	11.00	13.27	14.00
			126	5630	9.91	11.00	9.67	11.00	12.80	14.00
			134	5670	10.14	11.00	9.48	11.00	12.83	14.00
		142	5710	10.19	11.00	9.37	11.00	12.81	14.00	
	U-NII-3	151	5755	10.35	11.00	9.13	11.00	12.79	14.00	
			159	5795	10.16	11.00	9.04	11.00	12.65	14.00
802.11ac 80M	U-NII-1	42	5210	10.05	11.00	10.04	11.00	13.06	14.00	
	U-NII-2A	58	5290	10.71	11.00	10.23	11.00	13.49	14.00	
	U-NII-2C	106	5530	10.26	11.00	10.75	11.00	13.52	14.00	
			122	5610	10.54	11.00	10.51	11.00	13.54	14.00
		138	5690	10.32	11.00	10.55	11.00	13.45	14.00	
	U-NII-3	155	5775	10.22	11.00	9.84	11.00	13.04	14.00	



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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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### 8.1.5 Conducted Power of BT

BT DH5 Duty Cycle=76.80%



BT		Average Conducted Power(dBm)			Tune up
Band	Channel	0	39	78	
BT	GFSK	11.15	11.37	11.33	13.00
	π/4DQPSK	8.25	8.34	8.64	10.00
	8DPSK	8.26	8.40	8.71	10.00
Band	Channel	0	19	39	Tune up
BLE_1M	GFSK	8.47	8.85	8.96	10.00
Band	Channel	1	19	38	Tune up
BLE_2M	GFSK	8.27	8.64	8.82	10.00

Note:

1)The conducted power of BT is measured with RMS detector.



## 8.2 Stand-alone SAR test evaluation

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

Freq. Band	Frequency (GHz)	Position	Average Power		Test Separation (mm)	Calculate Value	Exclusion Threshold	Exclusion (Y/N)
			dBm	mW				
Wi-Fi 2.4G	2.462	Head	20.5	112.2	5	35.21	3	N
		Body-worn	20.5	112.2	10	17.61	3	N
		Hotspot	20.5	112.2	10	17.61	3	N
Wi-Fi 5G	5.85	Head	14	25.12	5	12.15	3	N
		Body-worn	14	25.12	10	6.08	3	N
		Hotspot	14	25.12	10	6.08	3	N
Bluetooth	2.48	Head	13	19.95	5	6.28	3	N
		Body-worn	13	19.95	10	3.14	3	N
		Hotspot	13	19.95	10	3.14	3	N

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances  $\leq 50$  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  $\leq 7.5$  for 10-g extremity SAR, where

- $f(\text{GHz})$  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  $\leq 50$  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

**Note:**

- 1) According to the declaration letter from manufacturer, for the Sample 2 variant test at the worst-case SAR in Head/Body worn and Hotspot.
- 2) The maximum Scaled SAR value is marked in bold. Graph results refer to Appendix B.
- 3) Per KDB447498 D01, testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is:
  - $\leq 0.8\text{W/kg}$  for 1-g or  $2.0\text{W/kg}$  for 10-g respectively, when the transmission band is  $\leq 100\text{MHz}$ .
  - $\leq 0.6\text{ W/kg}$  or  $1.5\text{ W/kg}$ , for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz.
  - $\leq 0.4\text{ W/kg}$  or  $1.0\text{ W/kg}$ , for 1-g or 10-g respectively, when the transmission band is  $\geq 200\text{ MHz}$ .

**WiFi 2.4G:**

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

**WiFi 5G:**

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



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**8.3.1 SAR Result of GSM 850**

GSM850 SAR Test Record										
Ant 0 Test Record										
Test position	Test mode	Test ch./Freq.	Duty Cycle	SAR (W/kg) 1-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Liquid Temp.(°C)
Head Test Data										
Left cheek	GPRS 3TS	190/836.6	1:2.77	0.275	-0.01	28.81	30.00	1.315	0.362	22.3
Left tilted	GPRS 3TS	190/836.6	1:2.77	0.221	0.19	28.81	30.00	1.315	0.291	22.3
Right cheek	GPRS 3TS	190/836.6	1:2.77	0.308	0.14	28.81	30.00	1.315	<b>0.405</b>	22.3
Right tilted	GPRS 3TS	190/836.6	1:2.77	0.263	-0.06	28.81	30.00	1.315	0.346	22.3
Body worn Test data(Separate 10mm)										
Front side	GPRS 3TS	190/836.6	1:2.77	0.387	0.11	28.81	30.00	1.315	0.509	22.3
Back side	GPRS 3TS	190/836.6	1:2.77	0.499	-0.12	28.81	30.00	1.315	<b>0.656</b>	22.3
Hotspot Test data(Separate 10mm)										
Front side	GPRS 3TS	190/836.6	1:2.77	0.387	0.11	28.81	30.00	1.315	0.509	22.3
Back side	GPRS 3TS	190/836.6	1:2.77	0.499	-0.12	28.81	30.00	1.315	<b>0.656</b>	22.3
Left side	GPRS 3TS	190/836.6	1:2.77	0.313	0.03	28.81	30.00	1.315	0.412	22.3
Right side	GPRS 3TS	190/836.6	1:2.77	0.487	-0.01	28.81	30.00	1.315	0.641	22.3
Bottom side	GPRS 3TS	190/836.6	1:2.77	0.326	0.08	28.81	30.00	1.315	0.429	22.3

Table 10: SAR of GSM 850 for Head and Body(original report SEWM2311000475RG02).



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**8.3.1 SAR Result of GSM 1900**

GSM1900 SAR Test Record										
Ant 1 Test Record										
Test position	Test mode	Test ch./Freq.	Duty Cycle	SAR (W/kg) 1-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Liquid Temp.(°C)
Head Test Data										
Left cheek	GPRS 4TS	661/1880	1:2.075	0.180	0.03	23.25	24.00	1.189	<b>0.214</b>	22.2
Left tilted	GPRS 4TS	661/1880	1:2.075	0.144	0.01	23.25	24.00	1.189	0.171	22.2
Right cheek	GPRS 4TS	661/1880	1:2.075	0.168	-0.15	23.25	24.00	1.189	0.200	22.2
Right tilted	GPRS 4TS	661/1880	1:2.075	0.088	-0.10	23.25	24.00	1.189	0.105	22.2
Body worn Test data(Separate 10mm)										
Front side	GPRS 4TS	661/1880	1:2.075	0.360	-0.19	23.25	24.00	1.189	0.428	22.2
Back side	GPRS 4TS	661/1880	1:2.075	0.437	0.10	23.25	24.00	1.189	<b>0.519</b>	22.2
Hotspot Test data(Separate 10mm)										
Front side	GPRS 4TS	661/1880	1:2.075	0.360	-0.19	23.25	24.00	1.189	0.428	22.2
Back side	GPRS 4TS	661/1880	1:2.075	0.437	0.10	23.25	24.00	1.189	<b>0.519</b>	22.2
Left side	GPRS 4TS	661/1880	1:2.075	0.232	0.13	23.25	24.00	1.189	0.276	22.2
Bottom side	GPRS 4TS	661/1880	1:2.075	0.422	0.02	23.25	24.00	1.189	0.502	22.2

Table 11: SAR of GSM 1900 for Head and Body(original report SEWM2311000475RG02).



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**8.3.2 SAR Result of WCDMA Band IV**

W B4 SAR Test Record										
Ant 1 Test Record										
Test position	Test mode	Test ch./Freq.	Duty Cycle	SAR (W/kg) 1-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Liquid Temp.(°C)
Head Test Data										
Left cheek	RMC	1412/1732.4	1:1	0.181	0.19	22.27	23.00	1.183	<b>0.214</b>	22.3
Left tilted	RMC	1412/1732.4	1:1	0.121	-0.18	22.27	23.00	1.183	0.143	22.3
Right cheek	RMC	1412/1732.4	1:1	0.122	0.08	22.27	23.00	1.183	0.144	22.3
Right tilted	RMC	1412/1732.4	1:1	0.094	-0.04	22.27	23.00	1.183	0.111	22.3
Body worn Test data(Separate 10mm)										
Front side	RMC	1412/1732.4	1:1	0.457	0.18	22.27	23.00	1.183	0.541	22.3
Back side	RMC	1412/1732.4	1:1	0.656	-0.19	22.27	23.00	1.183	<b>0.776</b>	22.3
Hotspot Test data(Separate 10mm)										
Front side	RMC	1412/1732.4	1:1	0.457	0.18	22.27	23.00	1.183	0.541	22.3
Back side	RMC	1412/1732.4	1:1	0.656	-0.19	22.27	23.00	1.183	<b>0.776</b>	22.3
Left side	RMC	1412/1732.4	1:1	0.277	0.05	22.27	23.00	1.183	0.328	22.3
Bottom side	RMC	1412/1732.4	1:1	0.457	-0.03	22.27	23.00	1.183	0.541	22.3

Table 12: SAR of WCDMA IV for Head and Body.



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**8.3.3 SAR Result of LTE Band 4**

LTE Band 4 SAR Test Record											
Ant 1 Test Record											
Test position	BW.	Test mode	Test ch./Freq.	Duty Cycle	SAR (W/kg) 1-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Liquid Temp.(°C)
Head Test Data(1RB)											
Left cheek	20	QPSK 1_0	20175/1732.5	1:1	0.097	0.01	20.39	21.00	1.151	<b>0.112</b>	22.3
Left tilted	20	QPSK 1_0	20175/1732.5	1:1	0.080	0.13	20.39	21.00	1.151	0.092	22.3
Right cheek	20	QPSK 1_0	20175/1732.5	1:1	0.056	-0.15	20.39	21.00	1.151	0.064	22.3
Right tilted	20	QPSK 1_0	20175/1732.5	1:1	0.051	-0.09	20.39	21.00	1.151	0.059	22.3
Head Test Data(50%RB)											
Left cheek	20	QPSK 50_0	20175/1732.5	1:1	0.093	0.01	20.35	21.00	1.161	0.108	22.3
Left tilted	20	QPSK 50_0	20175/1732.5	1:1	0.067	0.17	20.35	21.00	1.161	0.078	22.3
Right cheek	20	QPSK 50_0	20175/1732.5	1:1	0.060	0.17	20.35	21.00	1.161	0.070	22.3
Right tilted	20	QPSK 50_0	20175/1732.5	1:1	0.008	-0.13	20.35	21.00	1.161	0.009	22.3
Body worn Test data(Separate 10mm 1RB)											
Front side	20	QPSK 1_0	20175/1732.5	1:1	0.536	0.12	20.39	21.00	1.151	0.617	22.3
Back side	20	QPSK 1_0	20175/1732.5	1:1	0.654	0.06	20.39	21.00	1.151	<b>0.753</b>	22.3
Body worn Test data(Separate 10mm 50%RB)											
Front side	20	QPSK 50_0	20175/1732.5	1:1	0.497	0.18	20.35	21.00	1.161	0.577	22.3
Back side	20	QPSK 50_0	20175/1732.5	1:1	0.633	0.09	20.35	21.00	1.161	0.735	22.3
Hotspot Test data(Separate 10mm 1RB)											
Front side	20	QPSK 1_0	20175/1732.5	1:1	0.536	0.12	20.39	21.00	1.151	0.617	22.3
Back side	20	QPSK 1_0	20175/1732.5	1:1	0.654	0.06	20.39	21.00	1.151	<b>0.753</b>	22.3
Left side	20	QPSK 1_0	20175/1732.5	1:1	0.313	-0.03	20.39	21.00	1.151	0.360	22.3
Bottom side	20	QPSK 1_0	20175/1732.5	1:1	0.638	-0.02	20.39	21.00	1.151	0.734	22.3
Hotspot Test data(Separate 10mm 50%RB)											
Front side	20	QPSK 50_0	20175/1732.5	1:1	0.497	0.18	20.35	21.00	1.161	0.577	22.3
Back side	20	QPSK 50_0	20175/1732.5	1:1	0.633	0.09	20.35	21.00	1.161	0.735	22.3
Left side	20	QPSK 50_0	20175/1732.5	1:1	0.238	0.06	20.35	21.00	1.161	0.276	22.3
Bottom side	20	QPSK 50_0	20175/1732.5	1:1	0.506	0.19	20.35	21.00	1.161	0.588	22.3

Table 13: SAR of LTE band 4 for Head and Body.



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**8.3.4 SAR Result of LTE Band 12**

LTE Band 12 SAR Test Record											
Ant 0 Test Record											
Test position	BW.	Test mode	Test ch./Freq.	Duty Cycle	SAR (W/kg) 1-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Liquid Temp.(°C)
Head Test Data(1RB)											
Left cheek	10	QPSK 1_0	23095/707.5	1:1	0.183	0.09	23.89	24.50	1.151	0.211	22.1
Left tilted	10	QPSK 1_0	23095/707.5	1:1	0.162	0.13	23.89	24.50	1.151	0.186	22.1
Right cheek	10	QPSK 1_0	23095/707.5	1:1	0.225	0.11	23.89	24.50	1.151	<b>0.259</b>	22.1
Right tilted	10	QPSK 1_0	23095/707.5	1:1	0.173	-0.15	23.89	24.50	1.151	0.199	22.1
Head Test Data(50%RB)											
Left cheek	10	QPSK 25_0	23095/707.5	1:1	0.143	0.03	22.95	23.50	1.135	0.162	22.1
Left tilted	10	QPSK 25_0	23095/707.5	1:1	0.117	0.01	22.95	23.50	1.135	0.133	22.1
Right cheek	10	QPSK 25_0	23095/707.5	1:1	0.178	0.17	22.95	23.50	1.135	0.202	22.1
Right tilted	10	QPSK 25_0	23095/707.5	1:1	0.141	-0.06	22.95	23.50	1.135	0.160	22.1
Body worn Test data(Separate 10mm 1RB)											
Front side	10	QPSK 1_0	23095/707.5	1:1	0.148	-0.07	23.89	24.50	1.151	0.170	22.1
Back side	10	QPSK 1_0	23095/707.5	1:1	0.214	0.01	23.89	24.50	1.151	<b>0.246</b>	22.1
Body worn Test data(Separate 10mm 50%RB)											
Front side	10	QPSK 25_0	23095/707.5	1:1	0.129	0.01	22.95	23.50	1.135	0.146	22.1
Back side	10	QPSK 25_0	23095/707.5	1:1	0.208	0.02	22.95	23.50	1.135	0.236	22.1
Hotspot Test data(Separate 10mm 1RB)											
Front side	10	QPSK 1_0	23095/707.5	1:1	0.148	-0.07	23.89	24.50	1.151	0.170	22.1
Back side	10	QPSK 1_0	23095/707.5	1:1	0.214	0.01	23.89	24.50	1.151	<b>0.246</b>	22.1
Left side	10	QPSK 1_0	23095/707.5	1:1	0.154	-0.02	23.89	24.50	1.151	0.177	22.1
Right side	10	QPSK 1_0	23095/707.5	1:1	0.209	0.06	23.89	24.50	1.151	0.241	22.1
Bottom side	10	QPSK 1_0	23095/707.5	1:1	0.084	0.17	23.89	24.50	1.151	0.097	22.1
Hotspot Test data(Separate 10mm 50%RB)											
Front side	10	QPSK 25_0	23095/707.5	1:1	0.129	0.01	22.95	23.50	1.135	0.146	22.1
Back side	10	QPSK 25_0	23095/707.5	1:1	0.208	0.02	22.95	23.50	1.135	0.236	22.1
Left side	10	QPSK 25_0	23095/707.5	1:1	0.141	0.06	22.95	23.50	1.135	0.160	22.1
Right side	10	QPSK 25_0	23095/707.5	1:1	0.183	-0.12	22.95	23.50	1.135	0.208	22.1
Bottom side	10	QPSK 25_0	23095/707.5	1:1	0.074	-0.12	22.95	23.50	1.135	0.084	22.1

Table 14: SAR of LTE band 12 for Head and Body(original report SEWM2311000475RG02).



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**8.3.5 SAR Result of WIFI 2.4G**

Wi-Fi 2.4G SAR Test Record											
Ant6 Test Record											
Test position	Test mode	Test ch./Freq.	Duty Cycle	Duty Cycle Scaled factor	SAR (W/kg) 1-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Liquid Temp.(°C)
Head Test data											
Left cheek	802.11b	1/2412	98.73%	1.013	0.348	-0.10	16.96	17.50	1.132	0.399	22.2
Left tilted	802.11b	1/2412	98.73%	1.013	0.419	0.15	16.96	17.50	1.132	0.481	22.2
Right cheek	802.11b	1/2412	98.73%	1.013	0.634	-0.02	16.96	17.50	1.132	<b>0.727</b>	22.2
Right cheek	802.11b	6/2437	98.57%	1.015	0.607	0.02	16.88	17.50	1.153	0.710	22.2
Right cheek	802.11b	11/2462	98.65%	1.014	0.603	0.01	16.94	17.50	1.138	0.695	22.2
Right tilted	802.11b	1/2412	98.73%	1.013	0.606	0.07	16.96	17.50	1.132	0.695	22.2
Body worn Test data(Separate 10mm)											
Front side	802.11b	1/2412	98.73%	1.013	0.054	-0.12	16.96	17.50	1.132	0.062	22.2
Back side	802.11b	1/2412	98.73%	1.013	0.154	0.01	16.96	17.50	1.132	0.177	22.2
Hotspot Test data (Separate 10mm)											
Front side	802.11b	1/2412	98.73%	1.013	0.054	-0.12	16.96	17.50	1.132	0.062	22.2
Back side	802.11b	1/2412	98.73%	1.013	0.154	0.01	16.96	17.50	1.132	0.177	22.2
Left side	802.11b	1/2412	98.73%	1.013	0.078	0.15	16.96	17.50	1.132	0.089	22.2
Top side	802.11b	1/2412	98.73%	1.013	0.118	0.19	16.96	17.50	1.132	0.135	22.2
Ant7 Test Record											
Test position	Test mode	Test ch./Freq.	Duty Cycle	Duty Cycle Scaled factor	SAR (W/kg) 1-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Liquid Temp.(°C)
Head Test data											
Left cheek	802.11b	11/2462	98.89%	1.011	0.487	0.12	17.22	17.50	1.067	0.525	22.2
Left tilted	802.11b	11/2462	98.89%	1.011	0.139	0.02	17.22	17.50	1.067	0.150	22.2
Right cheek	802.11b	11/2462	98.89%	1.011	0.264	0.16	17.22	17.50	1.067	0.285	22.2
Right tilted	802.11b	11/2462	98.89%	1.011	0.089	-0.08	17.22	17.50	1.067	0.096	22.2
Body worn Test data(Separate 10mm)											
Front side	802.11b	11/2462	98.89%	1.011	0.040	-0.19	17.22	17.50	1.067	0.043	22.2
Back side	802.11b	11/2462	98.89%	1.011	0.175	0.07	17.22	17.50	1.067	0.189	22.2
Hotspot Test data (Separate 10mm)											
Front side	802.11b	11/2462	98.89%	1.011	0.040	-0.19	17.22	17.50	1.067	0.043	22.2
Back side	802.11b	11/2462	98.89%	1.011	0.175	0.07	17.22	17.50	1.067	0.189	22.2
Right side	802.11b	11/2462	98.89%	1.011	0.076	0.03	17.22	17.50	1.067	0.082	22.2
Top side	802.11b	11/2462	98.89%	1.011	0.064	-0.09	17.22	17.50	1.067	0.069	22.2
MIMO Test Record											
Test position	Test mode	Test ch./Freq.	Duty Cycle	Duty Cycle Scaled factor	SAR (W/kg) 1-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Liquid Temp.(°C)
Head Test data											
Left cheek	802.11b	11/2462	98.89%	1.011	0.469	-0.04	20.09	20.50	1.098	0.521	22.2
Left tilted	802.11b	11/2462	98.89%	1.011	0.483	-0.14	20.09	20.50	1.098	0.536	22.2
Right cheek	802.11b	11/2462	98.89%	1.011	0.493	-0.10	20.09	20.50	1.098	0.548	22.2
Right tilted	802.11b	11/2462	98.89%	1.011	0.485	0.03	20.09	20.50	1.098	0.539	22.2
Body worn Test data(Separate 10mm)											
Front side	802.11b	11/2462	98.89%	1.011	0.087	0.02	20.09	20.50	1.098	0.097	22.2
Back side	802.11b	11/2462	98.89%	1.011	0.263	-0.14	20.09	20.50	1.098	<b>0.292</b>	22.2
Hotspot Test data (Separate 10mm)											
Front side	802.11b	11/2462	98.89%	1.011	0.087	0.02	20.09	20.50	1.098	0.097	22.2
Back side	802.11b	11/2462	98.89%	1.011	0.263	-0.14	20.09	20.50	1.098	<b>0.292</b>	22.2
Left side	802.11b	11/2462	98.89%	1.011	0.019	0.02	20.09	20.50	1.098	0.021	22.2
Right side	802.11b	11/2462	98.89%	1.011	0.065	0.17	20.09	20.50	1.098	0.072	22.2



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Top side	802.11b	11/2462	98.89%	1.011	0.148	0.07	20.09	20.50	1.098	0.164	22.2
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Table 15: SAR of WIFI 2.4G for Head and Body(original report SEWM2311000471RG02).

Note:

- 1) As the 802.11b highest reported SAR is smaller than 1.2 W/kg , and the tune-up of the other 802.11 modes are not higher than 802.11b,therefore the adjusted SAR is  $\leq 1.2$  W/kg for other 802.11 modes, SAR test for the other 802.11 modes are not required.



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**8.3.6 SAR Result of WIFI 5G**

Wi-Fi 5G SAR Test Record											
Ant6 Test Record											
Test position	Test mode	Test ch./Freq.	Duty Cycle	Duty Cycle Scaled factor	SAR (W/kg) 1-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Liquid Temp.(°C)
Head Test data of U-NII-2A											
Left cheek	802.11ac 80M	58/5290	94.00%	1.064	0.411	-0.11	10.71	11.00	1.069	0.467	22.2
Left tilted	802.11ac 80M	58/5290	94.00%	1.064	0.559	-0.19	10.71	11.00	1.069	0.636	22.2
Right cheek	802.11ac 80M	58/5290	94.00%	1.064	0.515	0.15	10.71	11.00	1.069	0.586	22.2
Right tilted	802.11ac 80M	58/5290	94.00%	1.064	0.605	-0.15	10.71	11.00	1.069	<b>0.688</b>	22.2
Head Test data of U-NII-2C											
Left cheek	802.11ac 80M	122/5610	94.00%	1.064	0.193	0.09	10.54	11.00	1.112	0.228	22.2
Left tilted	802.11ac 80M	122/5610	94.00%	1.064	0.232	0.17	10.54	11.00	1.112	0.274	22.2
Right cheek	802.11ac 80M	122/5610	94.00%	1.064	0.278	0.07	10.54	11.00	1.112	0.329	22.2
Right tilted	802.11ac 80M	122/5610	94.00%	1.064	0.321	-0.16	10.54	11.00	1.112	<b>0.380</b>	22.2
Head Test data of U-NII-3											
Left cheek	802.11ac 80M	155/5775	94.00%	1.064	0.173	0.14	10.22	11.00	1.197	0.220	22.3
Left tilted	802.11ac 80M	155/5775	94.00%	1.064	0.210	0.15	10.22	11.00	1.197	0.267	22.3
Right cheek	802.11ac 80M	155/5775	94.00%	1.064	0.250	0.14	10.22	11.00	1.197	0.318	22.3
Right tilted	802.11ac 80M	155/5775	94.00%	1.064	0.264	-0.18	10.22	11.00	1.197	0.336	22.3
Body worn Test data of U-NII-2A(Separate 10mm)											
Front side	802.11ac 80M	58/5290	94.00%	1.064	0.095	0.10	10.71	11.00	1.069	0.108	22.2
Back side	802.11ac 80M	58/5290	94.00%	1.064	0.153	0.03	10.71	11.00	1.069	0.174	22.2
Body worn Test data of U-NII-2C(Separate 10mm)											
Front side	802.11ac 80M	122/5610	94.00%	1.064	0.068	0.08	10.54	11.00	1.112	0.080	22.2
Back side	802.11ac 80M	122/5610	94.00%	1.064	0.134	-0.05	10.54	11.00	1.112	0.158	22.2
Body worn Test data of U-NII-3(Separate 10mm)											
Front side	802.11ac 80M	155/5775	94.00%	1.064	0.063	0.07	10.22	11.00	1.197	0.080	22.3
Back side	802.11ac 80M	155/5775	94.00%	1.064	0.162	-0.07	10.22	11.00	1.197	0.206	22.3
Hotspot Test data of U-NII(Separate 10mm)											
Front side	802.11ac 80M	42/5210	94.00%	1.064	0.088	0.10	10.05	11.00	1.245	0.117	22.2
Back side	802.11ac 80M	42/5210	94.00%	1.064	0.146	0.04	10.05	11.00	1.245	0.193	22.2
Left side	802.11ac 80M	42/5210	94.00%	1.064	0.029	0.01	10.05	11.00	1.245	0.038	22.2
Top side	802.11ac 80M	42/5210	94.00%	1.064	0.229	-0.09	10.05	11.00	1.245	<b>0.303</b>	22.2
Hotspot Test data of U-NII-3(Separate 10mm)											
Front side	802.11ac 80M	155/5775	94.00%	1.064	0.063	0.07	10.22	11.00	1.197	0.080	22.3
Back side	802.11ac 80M	155/5775	94.00%	1.064	0.162	-0.07	10.22	11.00	1.197	0.206	22.3
Left side	802.11ac 80M	155/5775	94.00%	1.064	0.031	-0.13	10.22	11.00	1.197	0.039	22.3
Top side	802.11ac 80M	155/5775	94.00%	1.064	0.145	-0.15	10.22	11.00	1.197	0.185	22.3
Test position	Test mode	Test ch./Freq.	Duty Cycle	Duty Cycle Scaled factor	SAR (W/kg) 10-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 10-g (W/kg)	Liquid Temp.(°C)
Product specific 10gSAR Test data of U-NII-2A(Separate 0mm)											
Front side	802.11ac 80M	58/5290	94.00%	1.064	0.232	0.03	10.71	11.00	1.069	0.264	22.2
Back side	802.11ac 80M	58/5290	94.00%	1.064	0.646	-0.06	10.71	11.00	1.069	<b>0.735</b>	22.2
Left side	802.11ac 80M	58/5290	94.00%	1.064	0.098	-0.18	10.71	11.00	1.069	0.111	22.2
Top side	802.11ac 80M	58/5290	94.00%	1.064	0.369	0.06	10.71	11.00	1.069	0.420	22.2
Product specific 10gSAR Test data of U-NII-2C(Separate 0mm)											
Front side	802.11ac 80M	122/5610	94.00%	1.064	0.189	-0.10	10.54	11.00	1.112	0.224	22.2
Back side	802.11ac 80M	122/5610	94.00%	1.064	0.463	0.05	10.54	11.00	1.112	0.548	22.2
Left side	802.11ac 80M	122/5610	94.00%	1.064	0.067	-0.15	10.54	11.00	1.112	0.079	22.2
Top side	802.11ac 80M	122/5610	94.00%	1.064	0.321	0.11	10.54	11.00	1.112	0.380	22.2
Wi-Fi 5G SAR Test Record											
Ant7 Test Record											



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Test position	Test mode	Test ch./Freq.	Duty Cycle	Duty Cycle Scaled factor	SAR (W/kg) 1-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Liquid Temp.(°C)
Head Test data of U-NII-2A											
Left cheek	802.11ac 80M	58/5290	94.00%	1.064	0.044	-0.06	10.23	11.00	1.194	0.056	22.2
Left tilted	802.11ac 80M	58/5290	94.00%	1.064	0.022	-0.04	10.23	11.00	1.194	0.028	22.2
Right cheek	802.11ac 80M	58/5290	94.00%	1.064	0.022	-0.01	10.23	11.00	1.194	0.028	22.2
Right tilted	802.11ac 80M	58/5290	94.00%	1.064	0.017	0.07	10.23	11.00	1.194	0.022	22.2
Head Test data of U-NII-2C											
Left cheek	802.11ac 80M	106/5530	94.00%	1.064	0.028	0.04	10.75	11.00	1.059	0.032	22.2
Left tilted	802.11ac 80M	106/5530	94.00%	1.064	0.016	0.04	10.75	11.00	1.059	0.018	22.2
Right cheek	802.11ac 80M	106/5530	94.00%	1.064	0.027	-0.14	10.75	11.00	1.059	0.030	22.2
Right tilted	802.11ac 80M	106/5530	94.00%	1.064	0.025	0.06	10.75	11.00	1.059	0.028	22.2
Head Test data of U-NII-3											
Left cheek	802.11ac 80M	155/5775	94.00%	1.064	0.015	-0.10	9.84	11.00	1.306	0.021	22.3
Left tilted	802.11ac 80M	155/5775	94.00%	1.064	0.016	0.15	9.84	11.00	1.306	0.022	22.3
Right cheek	802.11ac 80M	155/5775	94.00%	1.064	0.015	0.13	9.84	11.00	1.306	0.021	22.3
Right tilted	802.11ac 80M	155/5775	94.00%	1.064	0.003	0.01	9.84	11.00	1.306	0.004	22.3
Body worn Test data of U-NII-2A(Separate 10mm)											
Front side	802.11ac 80M	58/5290	94.00%	1.064	0.026	0.09	10.23	11.00	1.194	0.033	22.2
Back side	802.11ac 80M	58/5290	94.00%	1.064	0.114	-0.07	10.23	11.00	1.194	0.145	22.2
Body worn Test data of U-NII-2C(Separate 10mm)											
Front side	802.11ac 80M	106/5530	94.00%	1.064	0.031	0.01	10.75	11.00	1.059	0.035	22.2
Back side	802.11ac 80M	106/5530	94.00%	1.064	0.147	0.02	10.75	11.00	1.059	<b>0.166</b>	22.2
Body worn Test data of U-NII-3(Separate 10mm)											
Front side	802.11ac 80M	155/5775	94.00%	1.064	0.021	-0.04	9.84	11.00	1.306	0.029	22.3
Back side	802.11ac 80M	155/5775	94.00%	1.064	0.153	-0.08	9.84	11.00	1.306	0.213	22.3
Hotspot Test data of U-NII(Separate 10mm)											
Front side	802.11ac 80M	42/5210	94.00%	1.064	0.016	-0.08	10.04	11.00	1.247	0.021	22.2
Back side	802.11ac 80M	42/5210	94.00%	1.064	0.049	0.17	10.04	11.00	1.247	0.065	22.2
Right side	802.11ac 80M	42/5210	94.00%	1.064	0.021	0.19	10.04	11.00	1.247	0.028	22.2
Top side	802.11ac 80M	42/5210	94.00%	1.064	0.011	0.08	10.04	11.00	1.247	0.015	22.2
Hotspot Test data of U-NII-3(Separate 10mm)											
Front side	802.11ac 80M	155/5775	94.00%	1.064	0.021	-0.04	9.84	11.00	1.306	0.029	22.3
Back side	802.11ac 80M	155/5775	94.00%	1.064	0.153	-0.08	9.84	11.00	1.306	0.213	22.3
Right side	802.11ac 80M	155/5775	94.00%	1.064	0.051	0.01	9.84	11.00	1.306	0.071	22.3
Top side	802.11ac 80M	155/5775	94.00%	1.064	0.015	-0.17	9.84	11.00	1.306	0.021	22.3
Test position	Test mode	Test ch./Freq.	Duty Cycle	Duty Cycle Scaled factor	SAR (W/kg) 10-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 10-g (W/kg)	Liquid Temp.(°C)
Product specific 10gSAR Test data of U-NII-2A(Separate 0mm)											
Front side	802.11ac 80M	58/5290	94.00%	1.064	0.007	0.05	10.23	11.00	1.194	0.009	22.2
Back side	802.11ac 80M	58/5290	94.00%	1.064	0.225	-0.04	10.23	11.00	1.194	0.286	22.2
Right side	802.11ac 80M	58/5290	94.00%	1.064	0.052	0.00	10.23	11.00	1.194	0.066	22.2
Top side	802.11ac 80M	58/5290	94.00%	1.064	0.003	0.11	10.23	11.00	1.194	0.004	22.2
Product specific 10gSAR Test data of U-NII-2C(Separate 0mm)											
Front side	802.11ac 80M	106/5530	94.00%	1.064	0.014	0.14	10.75	11.00	1.059	0.016	22.2
Back side	802.11ac 80M	106/5530	94.00%	1.064	0.294	-0.08	10.75	11.00	1.059	0.331	22.2
Right side	802.11ac 80M	106/5530	94.00%	1.064	0.095	-0.10	10.75	11.00	1.059	0.107	22.2
Top side	802.11ac 80M	106/5530	94.00%	1.064	0.004	0.03	10.75	11.00	1.059	0.005	22.2
<b>Wi-Fi 5G SAR Test Record</b>											
<b>MIMO Test Record</b>											
Test position	Test mode	Test ch./Freq.	Duty Cycle	Duty Cycle Scaled factor	SAR (W/kg) 1-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Liquid Temp.(°C)



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Head Test data of U-NII-2A											
Left cheek	802.11ac 80M	58/5290	94.00%	1.064	0.386	-0.14	13.49	14.00	1.125	0.462	22.2
Left tilted	802.11ac 80M	58/5290	94.00%	1.064	0.470	-0.13	13.49	14.00	1.125	0.562	22.2
Right cheek	802.11ac 80M	58/5290	94.00%	1.064	0.400	0.07	13.49	14.00	1.125	0.479	22.2
Right tilted	802.11ac 80M	58/5290	94.00%	1.064	0.496	0.07	13.49	14.00	1.125	0.593	22.2
Head Test data of U-NII-2C											
Left cheek	802.11ac 80M	122/5610	94.00%	1.064	0.196	-0.19	13.54	14.00	1.112	0.232	22.2
Left tilted	802.11ac 80M	122/5610	94.00%	1.064	0.220	0.08	13.54	14.00	1.112	0.260	22.2
Right cheek	802.11ac 80M	122/5610	94.00%	1.064	0.281	0.19	13.54	14.00	1.112	0.332	22.2
Right tilted	802.11ac 80M	122/5610	94.00%	1.064	0.289	-0.03	13.54	14.00	1.112	0.342	22.2
Head Test data of U-NII-3											
Left cheek	802.11ac 80M	155/5775	94.00%	1.064	0.154	0.01	13.04	14.00	1.247	0.204	22.3
Left tilted	802.11ac 80M	155/5775	94.00%	1.064	0.197	-0.07	13.04	14.00	1.247	0.261	22.3
Right cheek	802.11ac 80M	155/5775	94.00%	1.064	0.242	-0.13	13.04	14.00	1.247	0.321	22.3
Right tilted	802.11ac 80M	155/5775	94.00%	1.064	0.295	0.01	13.04	14.00	1.247	<b>0.391</b>	22.3
Body worn Test data of U-NII-2A(Separate 10mm)											
Front side	802.11ac 80M	58/5290	94.00%	1.064	0.096	0.03	13.49	14.00	1.125	0.115	22.2
Back side	802.11ac 80M	58/5290	94.00%	1.064	0.161	0.09	13.49	14.00	1.125	<b>0.193</b>	22.2
Body worn Test data of U-NII-2C(Separate 10mm)											
Front side	802.11ac 80M	122/5610	94.00%	1.064	0.068	0.06	13.54	14.00	1.112	0.080	22.2
Back side	802.11ac 80M	122/5610	94.00%	1.064	0.122	-0.01	13.54	14.00	1.112	0.144	22.2
Body worn Test data of U-NII-3(Separate 10mm)											
Front side	802.11ac 80M	155/5775	94.00%	1.064	0.052	-0.08	13.04	14.00	1.247	0.069	22.3
Back side	802.11ac 80M	155/5775	94.00%	1.064	0.182	0.15	13.04	14.00	1.247	<b>0.242</b>	22.3
Hotspot Test data of U-NII(Separate 10mm)											
Front side	802.11ac 80M	42/5210	94.00%	1.064	0.092	0.10	13.06	14.00	1.242	0.122	22.2
Back side	802.11ac 80M	42/5210	94.00%	1.064	0.128	-0.03	13.06	14.00	1.242	0.169	22.2
Left side	802.11ac 80M	42/5210	94.00%	1.064	0.031	-0.12	13.06	14.00	1.242	0.041	22.2
Right side	802.11ac 80M	42/5210	94.00%	1.064	0.040	0.12	13.06	14.00	1.242	0.053	22.2
Top side	802.11ac 80M	42/5210	94.00%	1.064	0.175	-0.13	13.06	14.00	1.242	0.231	22.2
Hotspot Test data of U-NII-3(Separate 10mm)											
Front side	802.11ac 80M	155/5775	94.00%	1.064	0.052	-0.08	13.04	14.00	1.247	0.069	22.3
Back side	802.11ac 80M	155/5775	94.00%	1.064	0.182	0.15	13.04	14.00	1.247	<b>0.242</b>	22.3
Left side	802.11ac 80M	155/5775	94.00%	1.064	0.033	0.00	13.04	14.00	1.247	0.044	22.3
Right side	802.11ac 80M	155/5775	94.00%	1.064	0.063	0.02	13.04	14.00	1.247	0.084	22.3
Top side	802.11ac 80M	155/5775	94.00%	1.064	0.161	0.13	13.04	14.00	1.247	0.214	22.3
Test position	Test mode	Test ch./Freq.	Duty Cycle	Duty Cycle Scaled factor	SAR (W/kg) 10-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 10-g (W/kg)	Liquid Temp.(°C)
Product specific 10gSAR Test data of U-NII-2A(Separate 0mm)											
Front side	802.11ac 80M	58/5290	94.00%	1.064	0.193	-0.16	13.49	14.00	1.125	0.231	22.2
Back side	802.11ac 80M	58/5290	94.00%	1.064	0.474	0.04	13.49	14.00	1.125	0.567	22.2
Left side	802.11ac 80M	58/5290	94.00%	1.064	0.077	0.06	13.49	14.00	1.125	0.092	22.2
Right side	802.11ac 80M	58/5290	94.00%	1.064	0.062	-0.11	13.49	14.00	1.125	0.074	22.2
Top side	802.11ac 80M	58/5290	94.00%	1.064	0.386	-0.03	13.49	14.00	1.125	0.462	22.2
Product specific 10gSAR Test data of U-NII-2C(Separate 0mm)											
Front side	802.11ac 80M	122/5610	94.00%	1.064	0.177	0.15	13.54	14.00	1.112	0.209	22.2
Back side	802.11ac 80M	122/5610	94.00%	1.064	0.507	-0.05	13.54	14.00	1.112	<b>0.600</b>	22.2
Left side	802.11ac 80M	122/5610	94.00%	1.064	0.067	0.07	13.54	14.00	1.112	0.079	22.2
Right side	802.11ac 80M	122/5610	94.00%	1.064	0.085	-0.06	13.54	14.00	1.112	0.101	22.2
Top side	802.11ac 80M	122/5610	94.00%	1.064	0.310	0.18	13.54	14.00	1.112	0.367	22.2

Table 16: SAR of WIFI 5G for Head and Body(original report SEWM2311000471RG02).



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Note:

- 1) As the 802.11a highest reported SAR is smaller than 1.2 W/kg , and the tune-up of the other 802.11 modes are not higher than 802.11a,therefore the adjusted SAR is  $\leq 1.2$  W/kg for other 802.11 modes, SAR test for the other 802.11 modes are not required. For Product specific 10gSAR the highest reported SAR is smaller than 3.0 W/kg, SAR test for the other 802.11 modes are also not required.
- 2) For Wi-Fi 5G, U-NII-2A (5250-5350 MHz) and U-NII-2C (5470-5725 MHz) bands does not support hotspot function.



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**8.3.7 SAR Result of BT**

Bluetooth SAR Test Record											
Ant6 Test Record											
Test position	Test mode	Test ch./Freq.	Duty Cycle	Duty Cycle Scaled factor	SAR (W/kg) 1-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Liquid Temp.(°C)
Head Test data											
Left cheek	DH5	39/2441	76.80%	1.302	0.078	0.03	11.37	13.00	1.455	0.148	22.2
Left tilted	DH5	39/2441	76.80%	1.302	0.062	-0.09	11.37	13.00	1.455	0.117	22.2
Right cheek	DH5	39/2441	76.80%	1.302	0.103	0.04	11.37	13.00	1.455	0.195	22.2
Right tilted	DH5	39/2441	76.80%	1.302	0.075	0.01	11.37	13.00	1.455	0.142	22.2
Body worn Test data(Separate 15mm)											
Front side	DH5	39/2441	76.80%	1.302	0.065	0.04	11.37	13.00	1.455	0.123	22.2
Back side	DH5	39/2441	76.80%	1.302	0.087	0.08	11.37	13.00	1.455	0.164	22.2
Hotspot Test data (Separate 10mm)											
Front side	DH5	39/2441	76.80%	1.302	0.065	0.04	11.37	13.00	1.455	0.123	22.2
Back side	DH5	39/2441	76.80%	1.302	0.087	0.08	11.37	13.00	1.455	0.164	22.2
Left side	DH5	39/2441	76.80%	1.302	0.000	0.05	11.37	13.00	1.455	0.000	22.2
Top side	DH5	39/2441	76.80%	1.302	0.062	0.01	11.37	13.00	1.455	0.117	22.2

Table 17: SAR of BT for Head and Body(original report SEWM2311000471RG02).



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**8.3.8 SAR Result of NFC**

Ant8 Test Record									
Test position	Test mode	Test ch./Freq.	Duty Cycle	Duty Cycle Scaled factor	SAR (W/kg) 10-g	Power drift (dB)	Scaled factor	Scaled SAR 10-g (W/kg)	Liquid Temp.(°C)
NFC Test data (Separate 0mm)									
Front side	NFC	13.56MHz	100.00%	1.000	0.001	0.02	1.000	0.001	22.3
Back side	NFC	13.56MHz	100.00%	1.000	0.047	-0.04	1.000	0.047	22.3
Left side	NFC	13.56MHz	100.00%	1.000	0.001	-0.03	1.000	0.001	22.3
Right side	NFC	13.56MHz	100.00%	1.000	0.001	0.01	1.000	0.001	22.3
Top side	NFC	13.56MHz	100.00%	1.000	0.001	0.03	1.000	0.001	22.3
Bottom side	NFC	13.56MHz	100.00%	1.000	0.001	0.09	1.000	0.001	22.3

Table 18: SAR of NFC for Body(original report SEWM2311000471RG02).

Note:

- 1) NFC mainly operate in hand-held extremity exposure conditions and NFC sensing distance with other device or reading tag is about 20cm, therefore Standalone 10-g extremity SAR testing for NFC will be performed with active mode and max power mode, with 100% duty cycle at 0mmseparation distance.
- 2) NFC SAR is measured for all edges and surfaces of the device.
- 3) NFC 13.56MHz antenna por is not available on the device to support conducted power measurement, therefore the measured results are referred to as reported SAR.



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## 8.4 Multiple Transmitter Evaluation

### 8.4.1 Simultaneous SAR test evaluation

#### • Simultaneous Transmission Possibilities

NO	Simultaneous TX Combination	Head	Body-worn	Hotspot	Product specific 10g SAR
1	WWAN+BT	Y	Y	Y	Y
2	WWAN+WIFI 2.4G Ant6	Y	Y	Y	Y
3	WWAN+WIFI 2.4G Ant7	Y	Y	Y	Y
4	WWAN+WIFI 2.4G MIMO	Y	Y	Y	Y
5	WWAN+WIFI 5G Ant6	Y	Y	Y	Y
6	WWAN+WIFI 5G Ant7	Y	Y	Y	Y
7	WWAN+WIFI 5G MIMO	Y	Y	Y	Y
8	WIFI 5G Ant6+BT	Y	Y	Y	Y
9	WIFI 5G Ant7+BT	Y	Y	Y	Y
10	WIFI 5G MIMO+BT	Y	Y	Y	Y
11	WWAN+WIFI 5G Ant6+BT	Y	Y	Y	Y
12	WWAN+WIFI 5G Ant7+BT	Y	Y	Y	Y
13	WWAN+WIFI 5G MIMO+BT	Y	Y	Y	Y
14	WWAN+NFC	Y	Y	Y	Y
15	WWAN+BT+NFC	Y	Y	Y	Y
16	WWAN+WIFI 2.4G Ant6+NFC	Y	Y	Y	Y
17	WWAN+WIFI 2.4G Ant7+NFC	Y	Y	Y	Y
18	WWAN+WIFI 2.4G MIMO+NFC	Y	Y	Y	Y
19	WWAN+WIFI 5G Ant6+NFC	Y	Y	Y	Y
20	WWAN+WIFI 5G Ant7+NFC	Y	Y	Y	Y
21	WWAN+WIFI 5G MIMO+NFC	Y	Y	Y	Y
22	WIFI 5G Ant6+BT+NFC	Y	Y	Y	Y
23	WIFI 5G Ant7+BT+NFC	Y	Y	Y	Y
24	WIFI 5G MIMO+BT+NFC	Y	Y	Y	Y
25	WWAN+WIFI 5G Ant6+BT+NFC	Y	Y	Y	Y
26	WWAN+WIFI 5G Ant7+BT+NFC	Y	Y	Y	Y
27	WWAN+WIFI 5G MIMO+BT+NFC	Y	Y	Y	Y

**Note:**

- 1) The device support DTM function.
- 2) For Wi-Fi 5G, U-NII-2A (5250-5350 MHz) and U-NII-2C (5470-5725 MHz) bands does not support hotspot function.
- 3) NFC is different from the working scenario of WWAN/WIFI(Head/Body-worn/Hotspot) and does not participate in the simultaneous transmission.
- 4) Per FCC KDB Publication 648474 D04 Handset SAR, Phablet SAR tests were not required it wireless router 1g SAR(Scaled to the maximum output power ,including tolerance) < 1.2 W/Kg. Therefore, no



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further analysis beyond tables included in this section was required to determine that possible Simultaneous transmission scenarios would not exceed the SAR limit.



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**8.4.2 Simultaneous Transmission SAR Summation Scenario**  
**Simultaneous Transmission SAR Summation Scenario for WLAN Head:**

Test position		SARmax (W/kg)								Summed SAR					
		Main	WiFi 2.4G Ant6	WiFi 2.4G Ant7	WiFi 2.4G Ant6+7	WiFi 5G Ant6	WiFi 5G Ant7	WiFi 5G Ant6+7	BT						
		1	2	3	4	5	6	7	8	1+2	1+3	1+4	1+5+8	1+6+8	1+7+8
GSM850	Left cheek	0.362	0.399	0.525	0.521	0.467	0.056	0.462	0.148	0.761	0.887	0.883	0.977	0.566	0.972
	Left tilted	0.291	0.481	0.150	0.536	0.636	0.028	0.562	0.117	0.772	0.441	0.827	1.044	0.436	0.970
	Right cheek	0.405	0.727	0.285	0.548	0.586	0.030	0.479	0.195	1.132	0.690	0.953	1.186	0.630	1.079
	Right tilted	0.346	0.695	0.096	0.539	0.688	0.028	0.593	0.142	1.041	0.442	0.885	1.176	0.516	1.081
GSM1900	Left cheek	0.214	0.399	0.525	0.521	0.467	0.056	0.462	0.148	0.613	0.739	0.735	0.829	0.418	0.824
	Left tilted	0.171	0.481	0.150	0.536	0.636	0.028	0.562	0.117	0.652	0.321	0.707	0.924	0.316	0.850
	Right cheek	0.200	0.727	0.285	0.548	0.586	0.030	0.479	0.195	0.927	0.485	0.748	0.981	0.425	0.874
	Right tilted	0.105	0.695	0.096	0.539	0.688	0.028	0.593	0.142	0.800	0.201	0.644	0.935	0.275	0.840
WCDMA IV	Left cheek	0.214	0.399	0.525	0.521	0.467	0.056	0.462	0.148	0.613	0.739	0.735	0.829	0.418	0.824
	Left tilted	0.143	0.481	0.150	0.536	0.636	0.028	0.562	0.117	0.624	0.293	0.679	0.896	0.288	0.822
	Right cheek	0.144	0.727	0.285	0.548	0.586	0.030	0.479	0.195	0.871	0.429	0.692	0.925	0.369	0.818
	Right tilted	0.111	0.695	0.096	0.539	0.688	0.028	0.593	0.142	0.806	0.207	0.650	0.941	0.281	0.846
LTE Band 4	Left cheek	0.112	0.399	0.525	0.521	0.467	0.056	0.462	0.148	0.511	0.637	0.633	0.727	0.316	0.722
	Left tilted	0.092	0.481	0.150	0.536	0.636	0.028	0.562	0.117	0.573	0.242	0.628	0.845	0.237	0.771
	Right cheek	0.070	0.727	0.285	0.548	0.586	0.030	0.479	0.195	0.797	0.355	0.618	0.851	0.295	0.744
	Right tilted	0.059	0.695	0.096	0.539	0.688	0.028	0.593	0.142	0.754	0.155	0.598	0.889	0.229	0.794
LTE Band 12	Left cheek	0.211	0.399	0.525	0.521	0.467	0.056	0.462	0.148	0.610	0.736	0.732	0.826	0.415	0.821
	Left tilted	0.186	0.481	0.150	0.536	0.636	0.028	0.562	0.117	0.667	0.336	0.722	0.939	0.331	0.865
	Right cheek	0.259	0.727	0.285	0.548	0.586	0.030	0.479	0.195	0.986	0.544	0.807	1.040	0.484	0.933
	Right tilted	0.199	0.695	0.096	0.539	0.688	0.028	0.593	0.142	0.894	0.295	0.738	1.029	0.369	0.934



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**Simultaneous Transmission SAR Summation Scenario for WLAN Body-worn:**

Test position		SARmax (W/kg)								Summed SAR					
		Main	WiFi 2.4G Ant6	WiFi 2.4G Ant7	WiFi 2.4G Ant6+7	WiFi 5G Ant6	WiFi 5G Ant7	WiFi 5G Ant6+7	BT						
		1	2	3	4	5	6	7	8	1+2	1+3	1+4	1+5+8	1+6+8	1+7+8
GSM850	Front side	0.509	0.062	0.043	0.097	0.108	0.035	0.115	0.123	0.571	0.552	0.606	0.740	0.667	0.747
	Back side	0.656	0.177	0.189	0.292	0.206	0.213	0.242	0.164	0.833	0.845	0.948	1.026	1.033	1.062
GSM1900	Front side	0.428	0.062	0.043	0.097	0.108	0.035	0.115	0.123	0.490	0.471	0.525	0.659	0.586	0.666
	Back side	0.519	0.177	0.189	0.292	0.206	0.213	0.242	0.164	0.696	0.708	0.811	0.889	0.896	0.925
WCDMA IV	Front side	0.541	0.062	0.043	0.097	0.108	0.035	0.115	0.123	0.603	0.584	0.638	0.772	0.699	0.779
	Back side	0.776	0.177	0.189	0.292	0.206	0.213	0.242	0.164	0.953	0.965	1.068	1.146	1.153	1.182
LTE Band 4	Front side	0.617	0.062	0.043	0.097	0.108	0.035	0.115	0.123	0.679	0.660	0.714	0.848	0.775	0.855
	Back side	0.753	0.177	0.189	0.292	0.206	0.213	0.242	0.164	0.930	0.942	1.045	1.123	1.130	1.159
LTE Band 12	Front side	0.170	0.062	0.043	0.097	0.108	0.035	0.115	0.123	0.232	0.213	0.267	0.401	0.328	0.408
	Back side	0.246	0.177	0.189	0.292	0.206	0.213	0.242	0.164	0.423	0.435	0.538	0.616	0.623	0.652



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**Simultaneous Transmission SAR Summation Scenario for WLAN Hotspot:**

Test position		SARmax (W/kg)								Summed SAR					
		Main	WiFi 2.4G Ant6	WiFi 2.4G Ant7	WiFi 2.4G Ant6+7	WiFi 5G Ant6	WiFi 5G Ant7	WiFi 5G Ant6+7	BT						
		1	2	3	4	5	6	7	8	1+2	1+3	1+4	1+5+8	1+6+8	1+7+8
GSM850	Front side	0.509	0.062	0.043	0.097	0.117	0.029	0.122	0.123	0.571	0.552	0.606	0.749	0.661	0.754
	Back side	0.656	0.177	0.189	0.292	0.206	0.213	0.242	0.164	0.833	0.845	0.948	1.026	1.033	1.062
	Left side	0.412	0.089	0.000	0.021	0.039	0.000	0.044	0.000	0.501	0.412	0.433	0.451	0.412	0.456
	Right side	0.641	0.000	0.082	0.072	0.000	0.071	0.084	0.000	0.641	0.723	0.713	0.641	0.712	0.725
	Top side	0.000	0.135	0.069	0.164	0.303	0.021	0.231	0.117	0.135	0.069	0.164	0.420	0.138	0.348
	Bottom side	0.429	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.429	0.429	0.429	0.429	0.429	0.429
GSM1900	Front side	0.428	0.062	0.043	0.097	0.117	0.029	0.122	0.123	0.490	0.471	0.525	0.668	0.580	0.673
	Back side	0.519	0.177	0.189	0.292	0.206	0.213	0.242	0.164	0.696	0.708	0.811	0.889	0.896	0.925
	Left side	0.276	0.089	0.000	0.021	0.039	0.000	0.044	0.000	0.365	0.276	0.297	0.315	0.276	0.320
	Right side	0.000	0.000	0.082	0.072	0.000	0.071	0.084	0.000	0.000	0.082	0.072	0.000	0.071	0.084
	Top side	0.000	0.135	0.069	0.164	0.303	0.021	0.231	0.117	0.135	0.069	0.164	0.420	0.138	0.348
	Bottom side	0.502	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.502	0.502	0.502	0.502	0.502	0.502
WCDMA IV	Front side	0.541	0.062	0.043	0.097	0.117	0.029	0.122	0.123	0.603	0.584	0.638	0.781	0.693	0.786
	Back side	0.776	0.177	0.189	0.292	0.206	0.213	0.242	0.164	0.953	0.965	1.068	1.146	1.153	1.182
	Left side	0.328	0.089	0.000	0.021	0.039	0.000	0.044	0.000	0.417	0.328	0.349	0.367	0.328	0.372
	Right side	0.000	0.000	0.082	0.072	0.000	0.071	0.084	0.000	0.000	0.082	0.072	0.000	0.071	0.084
	Top side	0.000	0.135	0.069	0.164	0.303	0.021	0.231	0.117	0.135	0.069	0.164	0.420	0.138	0.348
	Bottom side	0.541	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.541	0.541	0.541	0.541	0.541	0.541
LTE Band 4	Front side	0.617	0.062	0.043	0.097	0.117	0.029	0.122	0.123	0.679	0.660	0.714	0.857	0.769	0.862
	Back side	0.753	0.177	0.189	0.292	0.206	0.213	0.242	0.164	0.930	0.942	1.045	1.123	1.130	1.159
	Left side	0.360	0.089	0.000	0.021	0.039	0.000	0.044	0.000	0.449	0.360	0.381	0.399	0.360	0.404
	Right side	0.000	0.000	0.082	0.072	0.000	0.071	0.084	0.000	0.000	0.082	0.072	0.000	0.071	0.084
	Top side	0.000	0.135	0.069	0.164	0.303	0.021	0.231	0.117	0.135	0.069	0.164	0.420	0.138	0.348
	Bottom side	0.734	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.734	0.734	0.734	0.734	0.734	0.734
LTE Band 12	Front side	0.170	0.062	0.043	0.097	0.117	0.029	0.122	0.123	0.232	0.213	0.267	0.410	0.322	0.415
	Back side	0.246	0.177	0.189	0.292	0.206	0.213	0.242	0.164	0.423	0.435	0.538	0.616	0.623	0.652
	Left side	0.177	0.089	0.000	0.021	0.039	0.000	0.044	0.000	0.266	0.177	0.198	0.216	0.177	0.221
	Right side	0.241	0.000	0.082	0.072	0.000	0.071	0.084	0.000	0.241	0.323	0.313	0.241	0.312	0.325
	Top side	0.000	0.135	0.069	0.164	0.303	0.021	0.231	0.117	0.135	0.069	0.164	0.420	0.138	0.348
	Bottom side	0.097	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.097	0.097	0.097	0.097	0.097	0.097



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**Simultaneous Transmission SAR Summation Scenario for WLAN Product specific 10gSAR:**

Test position	SARmax (W/kg)				Summed SAR		
	WiFi 5G Ant6	WiFi 5G Ant7	WiFi 5G MIMO	NFC			
	1	2	3	4	1+4	2+4	3+4
Front side	0.264	0.016	0.231	0.001	0.265	0.017	0.232
Back side	0.735	0.331	0.600	0.047	0.782	0.378	0.647
Left side	0.111	0.000	0.092	0.001	0.112	0.001	0.093
Right side	0.000	0.107	0.101	0.001	0.001	0.108	0.102
Top side	0.420	0.005	0.462	0.001	0.421	0.006	0.463
Bottom side	0.000	0.000	0.000	0.001	0.001	0.001	0.001



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## 9 Equipment list

Test Platform		SPEAG DASY5 Professional				
Description		SAR Test System (Frequency range 10MHz-6GHz)				
Software Reference		DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)				
Hardware Reference						
Equipment	Manufacturer	Model	Serial Number	Calibration Date	Due date of calibration	
<input checked="" type="checkbox"/>	Twin Phantom	SPEAG	SAM 3	1770	NCR	NCR
<input checked="" type="checkbox"/>	DAE	SPEAG	DAE4	1374	2023-06-05	2024-06-04
<input checked="" type="checkbox"/>	E-Field Probe	SPEAG	EX3DV4	3962	2023-06-29	2024-06-28
<input checked="" type="checkbox"/>	Validation Kits	SPEAG	D1750V2	1038	2021-11-16	2024-11-15
<input checked="" type="checkbox"/>	Dielectric parameter probes	SPEAG	DAKS-3.5	1120	2023-06-06	2024-06-05
<input checked="" type="checkbox"/>	Vector Network Analyzer and Vector Reflectometer	SPEAG	DAKS_VNA R140	0050920	2023-06-06	2024-06-05
<input checked="" type="checkbox"/>	Universal Radio Communication Tester	R&S	CMW500	111637	2023-09-13	2024-09-12
<input checked="" type="checkbox"/>	RF Bi-Directional Coupler	Agilent	86205-60001	MY31400031	NCR	NCR
<input checked="" type="checkbox"/>	Signal Generator	R&S	SMB100A	182393	2023-02-06	2024-02-05
<input checked="" type="checkbox"/>	Preamplifier	Qiji	YX28980933	202104001	NCR	NCR
<input checked="" type="checkbox"/>	Power Sensor	Keysight	U2002H	121251	2023-09-13	2024-09-12
<input checked="" type="checkbox"/>	Attenuator	SHX	TS2-3dB	30704	NCR	NCR
<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"/>	DC POWER SUPPLY	SAKO	SK1730SL5A	NA	NCR	NCR
<input checked="" type="checkbox"/>	Speed reading thermometer	LKM	DTM3000	NA	2023-09-15	2024-09-14
<input checked="" type="checkbox"/>	Humidity and Temperature Indicator	MingGao	MingGao	NA	2023-09-15	2024-09-14

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



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中国·苏州·中国(江苏)自由贸易试验区苏州片区苏州工业园区润胜路1号的6号厂房南楼 邮编: 215000 t (86-512) 62992980 sgs.china@sgs.com

## 10 Calibration certificate

Please see the Appendix C

## 11 Photographs

Please see the Appendix D

## Appendix A: Detailed System Check Results

## Appendix B: Detailed Test Results

## Appendix C: Calibration certificate

## Appendix D: Photographs

---END---



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t (86-512) 62992980 [sgs.china@sgs.com](mailto:sgs.china@sgs.com)