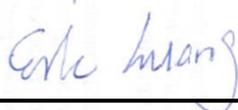


FCC SAR Test Report

APPLICANT : Sony Mobile Communications Inc.
BRAND NAME : Sony
FCC ID : PY7-PM0903
STANDARD : FCC 47 CFR Part 2 (2.1093)
ANSI/IEEE C95.1-1992
IEEE 1528-2013

We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and had been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.



Reviewed by: Eric Huang / Deputy Manager



Approved by: Jones Tsai / Manager



SPORTON INTERNATIONAL INC.

No.52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Taoyuan City, Taiwan (R.O.C.)



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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA571615	Rev. 01	Initial issue of report	Sep. 01, 2015
FA571615	Rev. 02	Additional LTE B7 results	Sep. 14, 2015



1. Attestation of Test Results

Applicant Name	Sony Mobile Communications Inc.		
EUT Description	GSM/WCDMA/LTE Phone + Bluetooth, DTS/UNII a/b/g/n/ac, ANT+, and NFC		
Brand Name	Sony		
FCC ID	PY7-PM0903		
HW Version	A		
SW Version	32.0.D.0.132		
RF Exposure Conditions	Equipment Class		
	Licensed	DTS	U-NII
Head (1g SAR W/kg)	0.40	0.54	0.39
Body-Worn (1g SAR W/kg)	0.46	0.05	0.04
Wireless Router (1g SAR W/kg)	0.79	0.09	NA
Highest Simultaneous Transmission (1g SAR W/kg)	Head: 1.05 Body-worn: 0.71 Hotspot: 0.79	Head: 1.05 Body-worn: 0.52 Hotspot: 0.79	Head: 0.85 Body-worn: 0.71 Hotspot: NA
Date Tested	2015/07/31 ~ 2015/09/11		
Test Result	Pass		
Remark:			
<ol style="list-style-type: none"> This device 2.4GHz WLAN supports Hotspot operation, and 2.4GHz / 5.2GHz / 5.3GHz / 5.5GHz / 5.8GHz WLAN supports WiFi Direct. WCDMA B2 power reduction is activated in hotspot mode. The FCC ID PY7-PM0900 and FCC ID: PY7-PM0903 is similar device, in this report all the WLAN SAR test results are referred to PY7-PM0900, Sporton Report No: FA571610 and spot checks were performed on FCC ID: PY7-PM0903 to ensure that the SAR measurements for both devices are the same. 			

This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1992, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2013 and FCC KDB publications.



2. Administration Data

Testing Laboratory	
Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No.52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978

Applicant	
Company Name	Sony Mobile Communications Inc.
Address	Nya Vattentornet, 22188 Lund, Sweden

Manufacturer	
Company Name	Sony Mobile Communications Inc.
Address	1-8-15 Konan, Minato-ku, Tokyo, 108-0075, Japan

3. Guidance Standard

The Specific Absorption Rate (SAR) testing specification, method, and procedure for this device is in accordance with the following standards:

- FCC 47 CFR Part 2 (2.1093)
- ANSI/IEEE C95.1-1992
- IEEE 1528-2013
- FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04
- FCC KDB 865664 D02 SAR Reporting v01r01
- FCC KDB 447498 D01 General RF Exposure Guidance v05r02
- FCC KDB 648474 D04 SAR Evaluation Considerations for Wireless Handsets v01r02
- FCC KDB 248227 D01 802.11 Wi-Fi SAR v02r01
- FCC KDB 941225 D01 3G SAR Procedures v03
- FCC KDB 941225 D05 SAR for LTE Devices v02r03
- FCC KDB 941225 D06 Hotspot Mode SAR v02



4. Equipment Under Test (EUT) Information

4.1 Wireless Technologies

Wireless Technologies	Frequency	Operating Mode	
GSM	850 1900	· GSM Voice · GPRS (GMSK) · EDGE (8PSK)	Multi-Slot Class: Class 33
	Does device support dual transfer mode? (Yes)		
W-CDMA (UMTS)	Band 5 Band 2	· AMR / RMC 12.2Kbps · HSDPA · HSUPA	
LTE (FDD)	Band 17 Band 5 Band 7 Band 41	· QPSK · 16QAM	
WiFi	2.4GHz: 2412 MHz ~ 2472 MHz	· 11b · 11g · 11n (HT20)	
	5GHz: 5.2GHz: 5180 MHz ~ 5240 MHz 5.3GHz: 5260 MHz ~ 5320 MHz 5.5GHz: 5500 MHz ~ 5720 MHz 5.8GHz: 5745 MHz ~ 5825 MHz	· 11a · 11n (HT20) · 11n (HT40) · 11ac (VHT20) · 11ac (VHT40) · 11ac (VHT80)	
Bluetooth	2.4GHz	Version 4.1 with LE	



4.2 Maximum Tune-up Limit

<WWAN Tune-up Limit>

Mode		Burst Average Power (dBm)	
		GSM 850	GSM 1900
GSM (GMSK, 1 Tx slot)		32.20	28.70
GPRS/EDGE (GMSK, 1 Tx slot)		32.20	28.70
GPRS/EDGE (GMSK, 2 Tx slots)		30.70	25.70
GPRS/EDGE (GMSK, 3 Tx slots)		28.90	23.70
GPRS/EDGE (GMSK, 4 Tx slots)		27.70	22.20
EDGE (8PSK, 1 Tx slot)		28.00	27.00
EDGE (8PSK, 2 Tx slots)		26.50	25.50
EDGE (8PSK, 3 Tx slots)		24.70	23.70
EDGE (8PSK, 4 Tx slots)		23.50	21.00
DTM 5	GSM (GMSK, 1 Tx slot)	30.70	25.70
	GPRS (GMSK, 1 Tx slot)	30.70	25.70
DTM 9	GSM (GMSK, 1 Tx slot)	30.70	25.70
	GPRS (GMSK, 1 Tx slot)	30.70	25.70
DTM11	GSM (GMSK, 1 Tx slot)	28.90	23.70
	GPRS (GMSK, 2 Tx slots)	28.90	23.70
DTM 5	GSM (GMSK, 1 Tx slot)	30.70	25.70
	EDGE (8PSK, 1 Tx slot)	26.50	25.50
DTM 9	GSM (GMSK, 1 Tx slot)	30.70	25.70
	EDGE (8PSK, 1 Tx slot)	26.50	25.50
DTM 11	GSM (GMSK, 1 Tx slot)	28.90	23.70
	EDGE (8PSK, 2 Tx slots)	24.70	23.70

Mode		Average Power (dBm)	
		Full Power mode	Reduce Power mode
WCDMA	Band V	24.70	
	Band II	21.50	19.00
LTE	Band 17	24.00	
	Band 5	24.00	
	Band 7	18.20	
	Band 41	24.00	

<WLAN and Bluetooth Tune-up Limit>

Remark:

1. The table applies to both SISO and MIMO operation.

Band	Channel	Average Power (dBm)					
		11b		11g		11n (HT20)	
		Chain 0	Chan 1	Chain 0	Chan 1	Chain 0	Chan 1
2.4GHz WLAN	CH 1	14.00	14.00	14.00	14.00	14.00	14.00
	CH 6	14.00	14.00	14.00	14.00	14.00	14.00
	CH 11	14.00	14.00	14.00	14.00	14.00	14.00
	CH 12	14.00	14.00	10.75	9.75	9.00	8.00
	CH 13	13.25	12.75	4.25	3.25	3.50	2.50

Band	Average Power (dBm)					
	11a		11n (HT20)		11n (HT40)	
	Chain 0	Chan 1	Chain 0	Chan 1	Chain 0	Chan 1
5.2GHz WLAN	10.00	10.00	10.00	10.00	10.00	10.00
5.3GHz WLAN	10.00	10.00	10.00	10.00	10.00	10.00
5.5GHz WLAN	10.00	10.00	10.00	10.00	10.00	10.00
5.8GHz WLAN	10.00	10.00	10.00	10.00	10.00	10.00

Band	Average Power (dBm)					
	11ac (VHT20)		11ac (VHT40)		11ac (VHT80)	
	Chain 0	Chan 1	Chain 0	Chan 1	Chain 0	Chan 1
5.2GHz WLAN	10.00	10.00	10.00	10.00	10.00	10.00
5.3GHz WLAN	10.00	10.00	10.00	10.00	10.00	10.00
5.5GHz WLAN	10.00	10.00	10.00	10.00	10.00	10.00
5.8GHz WLAN	10.00	10.00	10.00	10.00	10.00	10.00

Mode Band	Average power(dBm)		
2.4GHz Bluetooth Version 4.1 with LE	BR	EDR	BLE
	11.50	8.50	7.50



5. RF Exposure Limits

5.1 Uncontrolled Environment

Uncontrolled Environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

5.2 Controlled Environment

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). In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. The exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Limits for Occupational/Controlled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.4	8.0	20.0

Limits for General Population/Uncontrolled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.08	1.6	4.0

1. Whole-Body SAR is averaged over the entire body, partial-body SAR is averaged over any 1gram of tissue defined as a tissue volume in the shape of a cube. SAR for hands, wrists, feet and ankles is averaged over any 10 grams of tissue defined as a tissue volume in the shape of a cube.

6. Specific Absorption Rate (SAR)

6.1 Introduction

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

6.2 SAR Definition

The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density (ρ). The equation description is as below:

$$\text{SAR} = \frac{d}{dt} \left(\frac{dW}{dm} \right) = \frac{d}{dt} \left(\frac{dW}{\rho dv} \right)$$

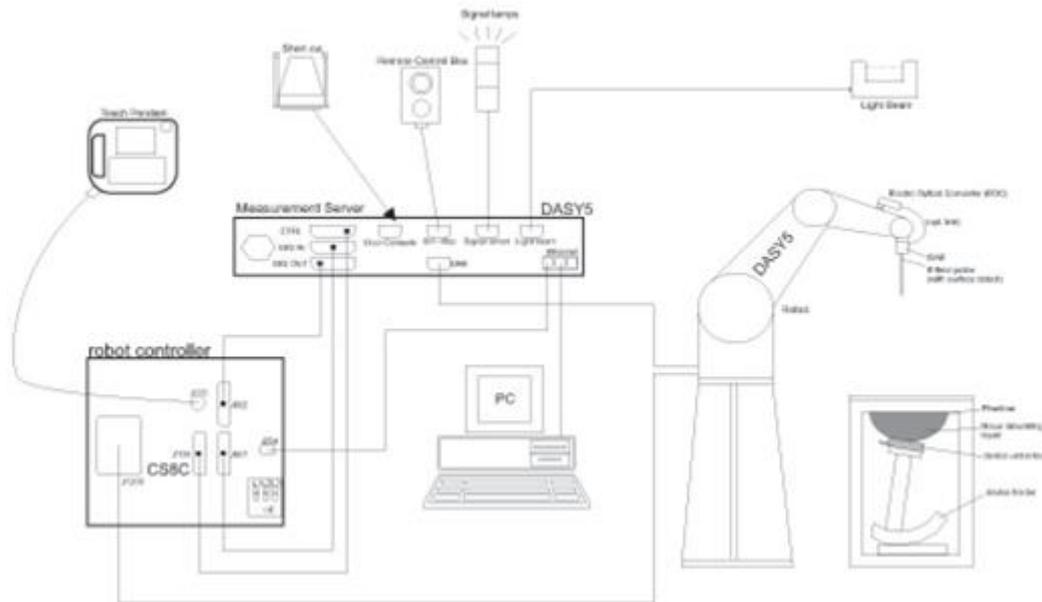
SAR is expressed in units of Watts per kilogram (W/kg)

$$\text{SAR} = \frac{\sigma |E|^2}{\rho}$$

Where: σ is the conductivity of the tissue, ρ is the mass density of the tissue and E is the RMS electrical field strength.

7. System Description and Setup

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



- A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic Field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- 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.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running WinXP or Win7 and the DASY5 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.



8. Measurement Procedures

The measurement procedures are as follows:

<Conducted power measurement>

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

<SAR measurement>

- (a) Use base station simulator to configure EUT WWAN transmission in radiated connection, and engineering software to configure EUT WLAN/BT continuously transmission, at maximum RF power, in the highest power channel.
- (b) Place the EUT in the positions as Appendix E demonstrates.
- (c) Set scan area, grid size and other setting on the DASY software.
- (d) Measure SAR results for the highest power channel on each testing position.
- (e) Find out the largest SAR result on these testing positions of each band
- (f) Measure SAR results for other channels in worst SAR testing position if the reported SAR of highest power channel is larger than 0.8 W/kg

According to the test standard, the recommended procedure for assessing the peak spatial-average SAR value consists of the following steps:

- (a) Power reference measurement
- (b) Area scan
- (c) Zoom scan
- (d) Power drift measurement

8.1 Spatial Peak SAR Evaluation

The procedure for spatial peak SAR evaluation has been implemented according to the test standard. It can be conducted for 1g and 10g, as well as for user-specific masses. The DASY software includes all numerical procedures necessary to evaluate the spatial peak SAR value.

The base for the evaluation is a "cube" measurement. The measured volume must include the 1g and 10g cubes with the highest averaged SAR values. For that purpose, the center of the measured volume is aligned to the interpolated peak SAR value of a previously performed area scan.

The entire evaluation of the spatial peak values is performed within the post-processing engine (SEMCAD). The system always gives the maximum values for the 1g and 10g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

- (a) Extraction of the measured data (grid and values) from the Zoom Scan
- (b) Calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters)
- (c) Generation of a high-resolution mesh within the measured volume
- (d) Interpolation of all measured values from the measurement grid to the high-resolution grid
- (e) Extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface
- (f) Calculation of the averaged SAR within masses of 1g and 10g



8.2 Power Reference Measurement

The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. This distance cannot be smaller than the distance of sensor calibration points to probe tip as defined in the probe properties.

8.3 Area Scan

The area scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASY software can find the maximum found in the scanned area, within a range of the global maximum. The range (in dB0 is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE standard 1528 and IEC 62209 standards, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan), if only one zoom scan follows the area scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of zoom scans has to be increased accordingly.

Area scan parameters extracted from FCC KDB 865664 D01v01r04 SAR measurement 100 MHz to 6 GHz.

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 ± 1 mm	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5$ mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: $\Delta x_{Area}, \Delta y_{Area}$	≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
	When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	

8.4 Zoom Scan

Zoom scans are used assess the peak spatial SAR values within a cubic averaging volume containing 1 gram and 10 gram of simulated tissue. The zoom scan measures points (refer to table below) within a cube shoes base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the zoom scan evaluates the averaged SAR for 1 gram and 10 gram and displays these values next to the job's label.

Zoom scan parameters extracted from FCC KDB 865664 D01v01r04 SAR measurement 100 MHz to 6 GHz.

		≤ 3 GHz	> 3 GHz	
Maximum zoom scan spatial resolution: $\Delta x_{Zoom}, \Delta y_{Zoom}$		≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*	
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$	≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm	
	graded grid	$\Delta z_{Zoom}(1)$: between 1 st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z	≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm	
Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details. * When zoom scan is required and the <i>reported</i> SAR from the <i>area scan based 1-g SAR estimation</i> procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.				

8.5 Volume Scan Procedures

The volume scan is used for assess overlapping SAR distributions for antennas transmitting in different frequency bands. It is equivalent to an oversized zoom scan used in standalone measurements. The measurement volume will be used to enclose all the simultaneous transmitting antennas. For antennas transmitting simultaneously in different frequency bands, the volume scan is measured separately in each frequency band. In order to sum correctly to compute the 1g aggregate SAR, the EUT remain in the same test position for all measurements and all volume scan use the same spatial resolution and grid spacing. When all volume scan were completed, the software, SEMCAD postprocessor can combine and subsequently superpose these measurement data to calculating the multiband SAR.

8.6 Power Drift Monitoring

All SAR testing is under the EUT install full charged battery and transmit maximum output power. In DASy measurement software, the power reference measurement and power drift measurement procedures are used for monitoring the power drift of EUT during SAR test. Both these procedures measure the field at a specified reference position before and after the SAR testing. The software will calculate the field difference in dB. If the power drifts more than 5%, the SAR will be retested.



9. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	750MHz System Validation Kit	D750V3	1012	May. 28, 2015	May. 27, 2016
SPEAG	835MHz System Validation Kit	D835V2	499	Mar. 20, 2015	Mar. 19, 2016
SPEAG	1900MHz System Validation Kit	D1900V2	5d041	Mar. 24, 2015	Mar. 23, 2016
SPEAG	2450MHz System Validation Kit	D2450V2	736	Aug. 21, 2014	Aug. 20, 2015
SPEAG	2600MHz System Validation Kit	D2600V2	1058	Jun. 19, 2015	Jun. 18, 2016
SPEAG	5GHz System Validation Kit	D5GHZV2	1040	Jun. 22, 2015	Jun. 21, 2016
SPEAG	Data Acquisition Electronics	DAE3	577	Oct. 06, 2014	Oct. 05, 2015
SPEAG	Data Acquisition Electronics	DAE4	1279	Jul. 21, 2015	Jul. 20, 2016
SPEAG	Data Acquisition Electronics	DAE3	495	May. 22, 2015	May. 21, 2016
SPEAG	Data Acquisition Electronics	DAE4	1399	Nov. 13, 2014	Nov. 12, 2015
SPEAG	Data Acquisition Electronics	DAE4	1388	Sep. 24, 2014	Sep. 23, 2015
SPEAG	Dosimetric E-Field Probe	EX3DV4	3697	Sep. 29, 2014	Sep. 28, 2015
SPEAG	Dosimetric E-Field Probe	EX3DV4	3931	Sep. 25, 2014	Sep. 24, 2015
SPEAG	Dosimetric E-Field Probe	EX3DV4	3954	Nov. 21, 2014	Nov. 20, 2015
SPEAG	Dosimetric E-Field Probe	EX3DV4	3925	May. 27, 2015	May. 26, 2016
SPEAG	Dosimetric E-Field Probe	EX3DV4	3955	Nov. 21, 2014	Nov. 20, 2015
WonDer	Thermometer	WD-5015	TM685	Oct. 21, 2014	Oct. 20, 2015
Wisewind	Thermometer	HTC-1	TM642	Oct. 21, 2014	Oct. 20, 2015
Wisewind	Thermometer	HTC-1	TM281	Oct. 21, 2014	Oct. 20, 2015
H.M.IRIS	Thermometer	TH-08	TM658	Oct. 21, 2014	Oct. 20, 2015
Wisewind	Thermometer	ETP-101	TM225	Oct. 21, 2014	Oct. 20, 2015
Anritsu	Radio Communication Analyzer	MT8820C	6201074414	Feb. 06, 2015	Feb. 05, 2016
Agilent	Wireless Communication Test Set	E5515C	MY50266977	May. 14, 2015	May. 13, 2016
R&S	Radio communication Tester	CMW500	113998	Sep. 30, 2014	Sep. 29, 2015
SPEAG	Device Holder	N/A	N/A	N/A	N/A
R&S	Signal Generator	MG3710A	6201502524	May. 25, 2015	May. 24, 2016
Agilent	ENA Network Analyzer	E5071C	MY46316648	Feb. 11, 2015	Feb. 10, 2016
SPEAG	Dielectric Probe Kit	DAK-3.5	1126	Jul. 21, 2015	Jul. 20, 2016
LINE SEIKI	Digital Thermometer	LKMelectronic	DTM3000SPEZIAL	Jul. 17, 2015	Jul. 16, 2016
Anritsu	Power Meter	ML2495A	1419002	May. 13, 2015	May. 12, 2016
Anritsu	Power Sensor	MA2411B	1339124	May. 13, 2015	May. 12, 2016
Anritsu	Spectrum Analyzer	MS2830A	6201396378	Jun. 17, 2015	Jun. 16, 2016
Agilent	Dual Directional Coupler	778D	50422	Note 1	
Woken	Attenuator 1	WK0602-XX	N/A	Note 1	
PE	Attenuator 2	PE7005-10	N/A	Note 1	
PE	Attenuator 3	PE7005- 3	N/A	Note 1	
AR	Power Amplifier	5S1G4M2	0328767	Note 1	
Mini-Circuits	Power Amplifier	ZVE-3W	162601250	Note 1	

General Note:

1. Prior to system verification and validation, the path loss from the signal generator to the system check source and the power meter, which includes the amplifier, cable, attenuator and directional coupler, was measured by the network analyzer. The reading of the power meter was offset by the path loss difference between the path to the power meter and the path to the system check source to monitor the actual power level fed to the system check source.



10. System Verification

10.1 Tissue Verification

The following tissue formulations are provided for reference only as some of the parameters have not been thoroughly verified. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation.

Frequency (MHz)	Water (%)	Sugar (%)	Cellulose (%)	Salt (%)	Preventol (%)	DGBE (%)	Conductivity (σ)	Permittivity (ϵ_r)
For Head								
750	41.1	57.0	0.2	1.4	0.2	0	0.89	41.9
835	40.3	57.9	0.2	1.4	0.2	0	0.90	41.5
900	40.3	57.9	0.2	1.4	0.2	0	0.97	41.5
1800, 1900, 2000	55.2	0	0	0.3	0	44.5	1.40	40.0
2450	55.0	0	0	0	0	45.0	1.80	39.2
2600	54.8	0	0	0.1	0	45.1	1.96	39.0
For Body								
750	51.7	47.2	0	0.9	0.1	0	0.96	55.5
835	50.8	48.2	0	0.9	0.1	0	0.97	55.2
900	50.8	48.2	0	0.9	0.1	0	1.05	55.0
1800, 1900, 2000	70.2	0	0	0.4	0	29.4	1.52	53.3
2450	68.6	0	0	0	0	31.4	1.95	52.7
2600	68.1	0	0	0.1	0	31.8	2.16	52.5

Simulating Liquid for 5GHz, Manufactured by SPEAG

Ingredients	(% by weight)
Water	64~78%
Mineral oil	11~18%
Emulsifiers	9~15%
Additives and Salt	2~3%



<Tissue Dielectric Parameter Check Results>

Frequency (MHz)	Tissue Type	Liquid Temp. (°C)	Conductivity (σ)	Permittivity (ϵ_r)	Conductivity Target (σ)	Permittivity Target (ϵ_r)	Delta (σ) (%)	Delta (ϵ_r) (%)	Limit (%)	Date
750	HSL	22.2	0.895	43.300	0.89	41.90	0.56	3.34	±5	2015/8/25
750	MSL	22.2	0.971	56.300	0.96	55.50	1.15	1.44	±5	2015/8/26
835	HSL	22.4	0.880	42.900	0.90	41.50	-2.22	3.37	±5	2015/8/25
835	HSL	22.4	0.880	42.900	0.90	41.50	-2.22	3.37	±5	2015/8/25
835	MSL	22.2	0.990	54.400	0.97	55.20	2.06	-1.45	±5	2015/8/26
1900	HSL	22.2	1.430	39.400	1.40	40.00	2.14	-1.50	±5	2015/8/26
1900	MSL	22.3	1.521	53.218	1.52	53.30	0.07	-0.15	±5	2015/8/25
1900	MSL	22.2	1.550	51.100	1.52	53.30	1.97	-4.13	±5	2015/8/25
2450	HSL	22.4	1.849	40.256	1.80	39.20	2.72	2.69	±5	2015/8/1
2450	MSL	22.4	1.992	52.040	1.95	52.70	2.15	-1.25	±5	2015/7/31
2600	HSL	22.3	1.970	38.200	1.96	39.00	0.51	-2.05	±5	2015/8/27
2600	HSL	22.6	2.020	39.600	1.96	39.00	3.06	1.54	±5	2015/9/11
2600	MSL	22.2	2.200	52.800	2.16	52.50	1.85	0.57	±5	2015/8/26
2600	MSL	22.3	2.190	52.790	2.16	52.50	1.39	0.55	±5	2015/9/11
5300	HSL	22.5	4.646	36.039	4.76	35.90	-2.39	0.39	±5	2015/8/7
5300	HSL	22.5	4.646	36.039	4.76	35.90	-2.39	0.39	±5	2015/8/7
5300	MSL	22.5	5.270	47.255	5.42	48.90	-2.77	-3.36	±5	2015/8/2
5600	HSL	22.5	4.939	35.620	5.07	35.50	-2.58	0.34	±5	2015/8/7
5600	MSL	22.5	5.653	46.801	5.77	48.50	-2.03	-3.50	±5	2015/8/2
5800	HSL	22.5	5.077	36.693	5.27	35.30	-3.66	3.95	±5	2015/8/8
5800	MSL	22.5	5.991	46.521	6.00	48.20	-0.15	-3.48	±5	2015/8/2



10.2 System Performance Check Results

Comparing to the original SAR value provided by SPEAG, the verification data should be within its specification of 10 %. Below table shows the target SAR and measured SAR after normalized to 1W input power. The table below indicates the system performance check can meet the variation criterion and the plots can be referred to Appendix A of this report.

Table with 11 columns: Date, Frequency (MHz), Tissue Type, Input Power (mW), Dipole S/N, Probe S/N, DAE S/N, Measured 1g SAR (W/kg), Targeted 1g SAR (W/kg), Normalized 1g SAR (W/kg), Deviation (%). Rows include test data for various frequencies (750, 835, 1900, 2450, 2600, 5300, 5600, 5800 MHz) and power levels (100, 250 mW).

Date	Frequency (MHz)	Tissue Type	Input Power (mW)	Dipole S/N	Probe S/N	DAE S/N	Measured 10g SAR (W/kg)	Targeted 10g SAR (W/kg)	Normalized 10g SAR (W/kg)	Deviation (%)
2015/8/25	750	HSL	250	D750V3-1012	EX3DV4 - SN3697	DAE3 Sn495	1.33	5.41	5.32	-1.66
2015/8/26	750	MSL	250	D750V3-1012	EX3DV4 - SN3697	DAE3 Sn495	1.38	5.72	5.52	-3.50
2015/8/25	835	HSL	250	D835V2-499	EX3DV4 - SN3697	DAE3 Sn495	1.51	6.02	6.04	0.33
2015/8/25	835	HSL	250	D835V2-499	EX3DV4 - SN3931	DAE3 Sn577	1.52	6.02	6.08	1.00
2015/8/26	835	MSL	250	D835V2-499	EX3DV4 - SN3697	DAE3 Sn495	1.58	6.12	6.32	3.27
2015/8/26	1900	HSL	250	D1900V2-5d041	EX3DV4 - SN3697	DAE3 Sn495	5.09	20.90	20.36	-2.58
2015/8/25	1900	MSL	250	D1900V2-5d041	EX3DV4 - SN3954	DAE4 Sn1279	5.45	21.20	21.80	2.83
2015/8/25	1900	MSL	250	D1900V2-5d041	EX3DV4 - SN3697	DAE3 Sn495	5.14	21.20	20.56	-3.02
2015/8/1	2450	HSL	250	D2450V2-736	EX3DV4 - SN3954	DAE4 Sn1388	6.22	24.00	24.88	3.67
2015/7/31	2450	MSL	250	D2450V2-736	EX3DV4 - SN3954	DAE4 Sn1388	6.05	23.60	24.20	2.54
2015/8/27	2600	HSL	250	D2600V2-1058	EX3DV4 - SN3697	DAE3 Sn495	5.85	25.90	23.40	-9.65
2015/9/11	2600	HSL	250	D2600V2-1058	EX3DV4 - SN3925	DAE3 Sn495	6.43	25.90	25.72	-0.69
2015/8/26	2600	MSL	250	D2600V2-1058	EX3DV4 - SN3697	DAE3 Sn495	6.37	25.50	25.48	-0.08
2015/9/11	2600	MSL	250	D2600V2-1058	EX3DV4 - SN3931	DAE3 Sn577	6.41	25.50	25.64	0.55
2015/8/7	5300	HSL	100	D5GHzV2-1040-5300	EX3DV4 - SN3925	DAE3 Sn495	2.25	24.00	22.50	-6.25
2015/8/7	5300	HSL	100	D5GHzV2-1040-5300	EX3DV4 - SN3954	DAE4 Sn1388	2.23	24.00	22.30	-7.08
2015/8/2	5300	MSL	100	D5GHzV2-1040-5300	EX3DV4 - SN3955	DAE4 Sn1399	2.05	21.10	20.50	-2.84
2015/8/7	5600	HSL	100	D5GHzV2-1040-5600	EX3DV4 - SN3954	DAE4 Sn1388	2.36	23.40	23.60	0.85
2015/8/2	5600	MSL	100	D5GHzV2-1040-5600	EX3DV4 - SN3955	DAE4 Sn1399	2.26	21.90	22.60	3.20
2015/8/8	5800	HSL	100	D5GHzV2-1040-5800	EX3DV4 - SN3955	DAE4 Sn1399	2.24	22.90	22.40	-2.18
2015/8/2	5800	MSL	100	D5GHzV2-1040-5800	EX3DV4 - SN3955	DAE4 Sn1399	2.02	21.10	20.20	-4.27

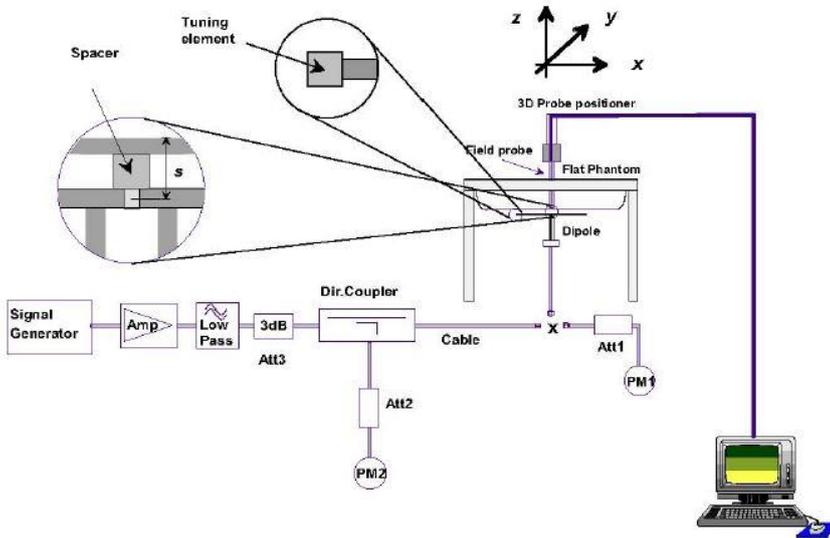


Fig 8.3.1 System Performance Check Setup



Fig 8.3.2 Setup Photo

11. RF Exposure Positions

11.1 Ear and handset reference point

Figure 9.1.1 shows the front, back, and side views of the SAM phantom. The center-of-mouth reference point is labeled “M,” the left ear reference point (ERP) is marked “LE,” and the right ERP is marked “RE.” Each ERP is 15 mm along the B-M (back-mouth) line behind the entrance-to-ear-canal (EEC) point, as shown in Figure 9.1.2 The Reference Plane is defined as passing through the two ear reference points and point M. The line N-F (neck-front), also called the reference pivoting line, is normal to the Reference Plane and perpendicular to both a line passing through RE and LE and the B-M line (see Figure 9.1.3). Both N-F and B-M lines should be marked on the exterior of the phantom shell to facilitate handset positioning. Posterior to the N-F line the ear shape is a flat surface with 6 mm thickness at each ERP, and forward of the N-F line the ear is truncated, as illustrated in Figure 9.1.2. The ear truncation is introduced to preclude the ear lobe from interfering with handset tilt, which could lead to unstable positioning at the cheek.

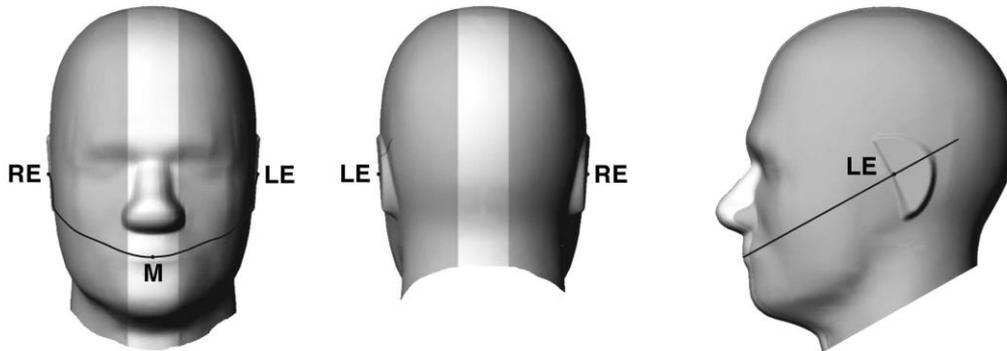


Fig 9.1.1 Front, back, and side views of SAM twin phantom

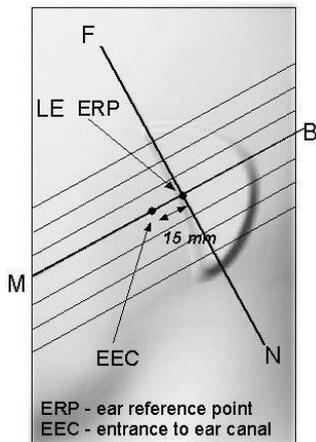


Fig 9.1.2 Close-up side view of phantom showing the ear region.

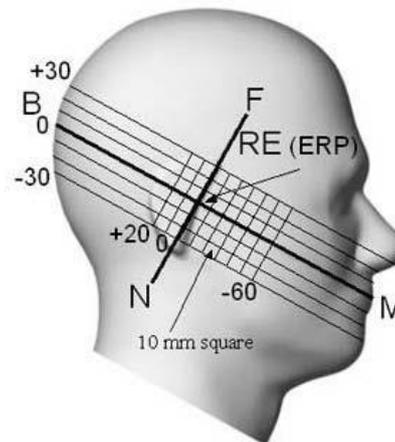


Fig 9.1.3 Side view of the phantom showing relevant markings and seven cross-sectional plane locations

11.2 Definition of the cheek position

1. Ready the handset for talk operation, if necessary. For example, for handsets with a cover piece (flip cover), open the cover. If the handset can transmit with the cover closed, both configurations must be tested.
2. Define two imaginary lines on the handset—the vertical centerline and the horizontal line. The vertical centerline passes through two points on the front side of the handset—the midpoint of the width w_t of the handset at the level of the acoustic output (point A in Figure 9.2.1 and Figure 9.2.2), and the midpoint of the width w_b of the bottom of the handset (point B). The horizontal line is perpendicular to the vertical centerline and passes through the center of the acoustic output (see Figure 9.2.1). The two lines intersect at point A. Note that for many handsets, point A coincides with the center of the acoustic output; however, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical centerline is not necessarily parallel to the front face of the handset (see Figure 9.2.2), especially for clamshell handsets, handsets with flip covers, and other irregularly-shaped handsets.
3. Position the handset close to the surface of the phantom such that point A is on the (virtual) extension of the line passing through points RE and LE on the phantom (see Figure 9.2.3), such that the plane defined by the vertical centerline and the horizontal line of the handset is approximately parallel to the sagittal plane of the phantom.
4. Translate the handset towards the phantom along the line passing through RE and LE until handset point A touches the pinna at the ERP.
5. While maintaining the handset in this plane, rotate it around the LE-RE line until the vertical centerline is in the plane normal to the plane containing B-M and N-F lines, i.e., the Reference Plane.
6. Rotate the handset around the vertical centerline until the handset (horizontal line) is parallel to the N-F line.
7. While maintaining the vertical centerline in the Reference Plane, keeping point A on the line passing through RE and LE, and maintaining the handset contact with the pinna, rotate the handset about the N-F line until any point on the handset is in contact with a phantom point below the pinna on the cheek. See Figure 9.2.3. The actual rotation angles should be documented in the test report.

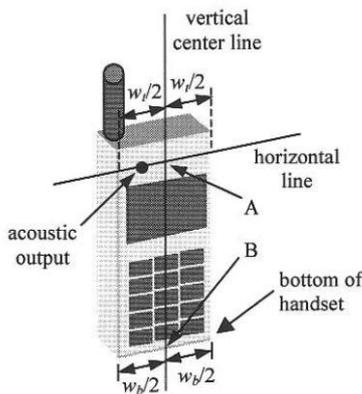


Fig 9.2.1 Handset vertical and horizontal reference lines—“fixed case”

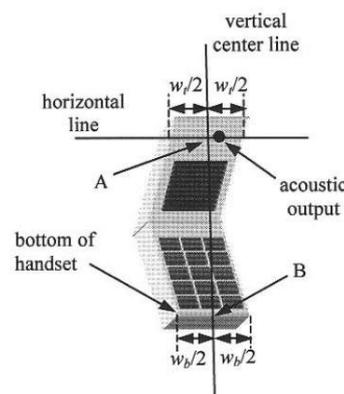


Fig 9.2.2 Handset vertical and horizontal reference lines—“clam-shell case”

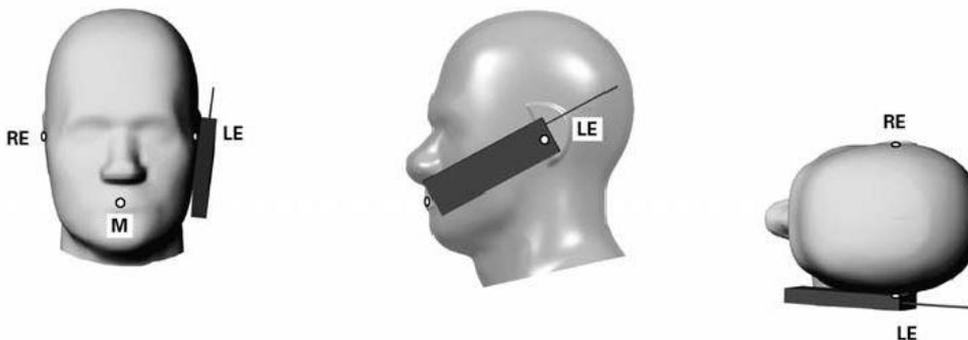


Fig 9.2.3 cheek or touch position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which establish the Reference Plane for handset positioning, are indicated.

11.3 Definition of the tilt position

1. Ready the handset for talk operation, if necessary. For example, for handsets with a cover piece (flip cover), open the cover. If the handset can transmit with the cover closed, both configurations must be tested.
2. While maintaining the orientation of the handset, move the handset away from the pinna along the line passing through RE and LE far enough to allow a rotation of the handset away from the cheek by 15°.
3. Rotate the handset around the horizontal line by 15°.
4. While maintaining the orientation of the handset, move the handset towards the phantom on the line passing through RE and LE until any part of the handset touches the ear. The tilt position is obtained when the contact point is on the pinna. See Figure 9.3.1. If contact occurs at any location other than the pinna, e.g., the antenna at the back of the phantom head, the angle of the handset should be reduced. In this case, the tilt position is obtained if any point on the handset is in contact with the pinna and a second point

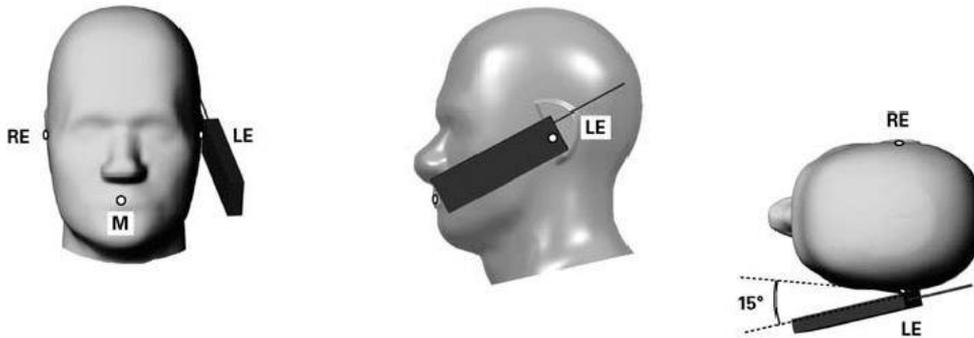


Fig 9.3.1 Tilt position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which define the Reference Plane for handset positioning, are indicated.

11.4 Body Worn Accessory

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 (see Figure 9.4). Per KDB 648474 D04v01r02, 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 447498 D01v05r02 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 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-chip used with different holsters with no other metallic components) only the accessory that dictates the closest spacing to the body is tested.

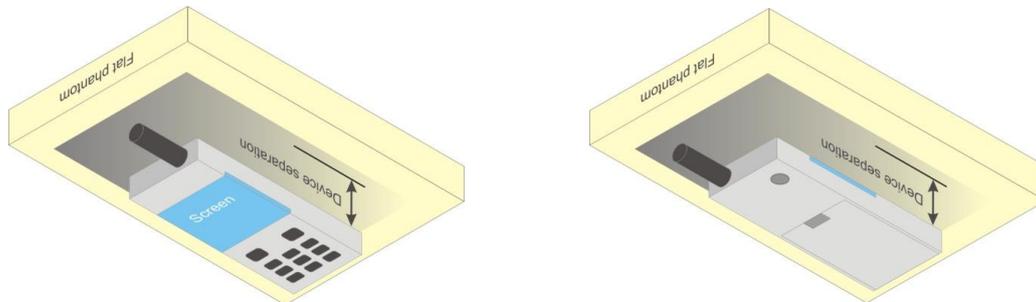


Fig 9.4 Body Worn Position

11.5 Wireless Router

Some battery-operated handsets have the capability to transmit and receive user through simultaneous transmission of WIFI simultaneously with a separate licensed transmitter. The FCC has provided guidance in FCC HDB Publication 941225 D06 v02 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 10mm from the front, back and edges of the device containing transmitting antennas within 2.5cm of their edges, determined from general mixed use conditions for this type of devices. Since the hotspot SAR results may overlap with the body-worn accessory SAR requirements, the more conservative configurations can be considered, thus excluding some body-worn accessory SAR tests.

When the user enables the personal wireless router functions for the handset, actual operations include simultaneous transmission of both the WIFI transmitter and another licensed transmitter. Both transmitters often do not transmit at the same transmitting frequency and thus cannot be evaluated for SAR under actual use conditions due to the limitations of the SAR assessment probes. Therefore, SAR must be evaluated for each frequency transmission and mode separately and spatially summed with the WIFI transmitter according to FCC KDB Publication 447498 D01v05r02 publication procedures. The "Portable Hotspot" feature on the handset was NOT activated during SAR assessments, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal at a time.



12. Conducted RF Output Power (Unit: dBm)

<GSM Conducted Power>

General Note:

- For DTM multi-slot class mode, the device was linked with base station simulator (Agilent E5515C) and transmit maximum power on maximum number of TX slots, i.e. one CS timeslot, and additional PS timeslots (1 for DTM class 5 and 9, 2 for DTM class 11) in one TDMA frame.
- Agilent E5515C 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.

$$DTM \text{ frame average power (dBm)} = 10 * \log [\sum (\text{power of each slot, in mW}) / 8]$$

- Per KDB 447498 D01v05r02, the maximum output power channel is used for SAR testing and for further SAR test reduction.
- Per KDB 941225 D01v03, Head / Hotspot / Body-worn SAR test reduction for GSM and GPRS and EDGE modes is determined by the source-based time-averaged output power including tune-up tolerance. The 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. Therefore, the EUT was set in GPRS (4Tx slots) for GSM850, GPRS (2Tx slots) for GSM1900.

Band GSM850		Burst Average Power (dBm)			Tune-up Limit (dBm)	Frame-Average Power (dBm)			Tune-up Limit (dBm)
TX Channel		128	189	251		128	189	251	
Frequency (MHz)		824.2	836.4	848.8	824.2	836.4	848.8		
GSM (GMSK, 1 Tx slot)		31.85	31.94	31.96	32.20	22.85	22.94	22.96	23.20
GPRS (GMSK, 1 Tx slot)		31.87	31.97	31.98	32.20	22.87	22.97	22.98	23.20
GPRS (GMSK, 2 Tx slots)		29.86	29.93	30.00	30.70	23.86	23.93	24.00	24.70
GPRS (GMSK, 3 Tx slots)		28.33	28.44	27.98	28.90	24.07	24.18	23.72	24.64
GPRS (GMSK, 4 Tx slots)		27.33	27.45	27.46	27.70	24.33	24.45	24.46	24.70
EDGE (8PSK, 1 Tx slot)		27.38	27.41	27.40	28.00	18.38	18.41	18.40	19.00
EDGE (8PSK, 2 Tx slots)		26.15	26.21	26.21	26.50	20.15	20.21	20.21	20.50
EDGE (8PSK, 3 Tx slots)		24.33	24.37	24.35	24.70	20.07	20.11	20.09	20.44
EDGE (8PSK, 4 Tx slots)		23.46	23.48	23.50	23.50	20.46	20.48	20.50	20.50
DTM 5 (2Tx slots)	GSM (GMSK, 1 Tx slot)	29.81	29.92	30.03	30.70	23.74	23.86	23.94	24.68
	GPRS (GMSK, 1 Tx slot)	29.71	29.84	29.88	30.70				
DTM 9 (2Tx slots)	GSM (GMSK, 1 Tx slot)	29.86	29.93	30.00	30.70	23.78	23.86	23.92	24.68
	GPRS (GMSK, 1 Tx slot)	29.75	29.84	29.89	30.70				
DTM 11 (3Tx slots)	GSM (GMSK, 1 Tx slot)	28.40	28.48	28.50	28.90	24.08	24.17	24.18	24.64
	GPRS (GMSK, 2 Tx slots)	28.31	28.40	28.41	28.90				
DTM 5 (2Tx slots)	GSM (GMSK, 1 Tx slot)	29.81	29.90	29.97	30.70	22.32	22.40	22.44	23.07
	EDGE (8PSK, 1 Tx slot)	26.10	26.15	26.14	26.50				
DTM 9 (2Tx slots)	GSM (GMSK, 1 Tx slot)	29.89	29.99	30.07	30.70	22.36	22.45	22.50	23.07
	EDGE (8PSK, 1 Tx slot)	26.06	26.10	26.09	26.50				
DTM 11 (3Tx slots)	GSM (GMSK, 1 Tx slot)	28.41	28.51	28.30	28.90	21.84	21.93	21.80	22.33
	EDGE (8PSK, 2 Tx slots)	24.23	24.29	24.28	24.70				



Band GSM1900		Burst Average Power (dBm)			Tune-up Limit (dBm)	Frame-Average Power (dBm)			Tune-up Limit (dBm)
TX Channel		512	661	810		512	661	810	
Frequency (MHz)		1850.2	1880	1909.8		1850.2	1880	1909.8	
GSM (GMSK, 1 Tx slot)		28.59	28.66	28.67	28.70	19.59	19.66	19.67	19.70
GPRS (GMSK, 1 Tx slot)		28.65	28.67	28.69	28.70	19.65	19.67	19.69	19.70
GPRS (GMSK, 2 Tx slots)		25.62	25.60	25.63	25.70	19.62	19.60	19.63	19.70
GPRS (GMSK, 3 Tx slots)		23.51	23.52	23.65	23.70	19.25	19.26	19.39	19.44
GPRS (GMSK, 4 Tx slots)		21.98	21.97	22.05	22.20	18.98	18.97	19.05	19.20
EDGE (8PSK, 1 Tx slot)		26.40	26.56	26.70	27.00	17.40	17.56	17.70	18.00
EDGE (8PSK, 2 Tx slots)		25.21	25.13	25.29	25.50	19.21	19.13	19.29	19.50
EDGE (8PSK, 3 Tx slots)		23.30	23.21	23.37	23.70	19.04	18.95	19.11	19.44
EDGE (8PSK, 4 Tx slots)		20.69	20.64	20.68	21.00	17.69	17.64	17.68	18.00
DTM 5 (2Tx slots)	GSM (GMSK, 1 Tx slot)	25.64	25.60	25.63	25.70	19.64	19.61	19.64	19.68
	GPRS (GMSK, 1 Tx slot)	25.69	25.66	25.69	25.70				
DTM 9 (2Tx slots)	GSM (GMSK, 1 Tx slot)	25.64	25.60	25.67	25.70	19.62	19.61	19.66	19.68
	GPRS (GMSK, 1 Tx slot)	25.65	25.66	25.69	25.70				
DTM 11 (3Tx slots)	GSM (GMSK, 1 Tx slot)	23.55	23.55	23.59	23.70	19.31	19.32	19.36	19.44
	GPRS (GMSK, 2 Tx slots)	23.58	23.59	23.63	23.70				
DTM 5 (2Tx slots)	GSM (GMSK, 1 Tx slot)	25.67	25.64	25.66	25.70	19.41	19.40	19.44	19.58
	EDGE (8PSK, 1 Tx slot)	25.18	25.18	25.26	25.50				
DTM 9 (2Tx slots)	GSM (GMSK, 1 Tx slot)	25.69	25.65	25.69	25.70	19.38	19.35	19.41	19.58
	EDGE (8PSK, 1 Tx slot)	25.10	25.08	25.16	25.50				
DTM 11 (3Tx slots)	GSM (GMSK, 1 Tx slot)	23.52	23.52	23.65	23.70	19.11	19.10	19.16	19.44
	EDGE (8PSK, 2 Tx slots)	23.29	23.27	23.30	23.70				

<WCDMA Conducted Power>

1. The following tests were conducted according to the test requirements outlines in 3GPP TS 34.121 specification.
2. The procedures in KDB 941225 D01 are applied for 3GPP Rel. 6 HSPA to configure the device in the required sub-test mode(s) to determine SAR test exclusion.
3. For HSPA+ devices supporting 16 QAM in the uplink, power measurements procedure is according to the configurations in Table C.11.1.4 of 3GPP TS 34.121-1.

A summary of these settings are illustrated below:

HSDPA Setup Configuration:

- a. The EUT was connected to Base Station Agilent E5515C referred to the Setup Configuration.
- b. The RF path losses were compensated into the measurements.
- c. A call was established between EUT and Base Station with following setting:
 - i. Set Gain Factors (β_c and β_d) and parameters were set according to each
 - ii. Specific sub-test in the following table, C10.1.4, quoted from the TS 34.121
 - iii. Set RMC 12.2Kbps + HSDPA mode.
 - iv. Set Cell Power = -86 dBm
 - v. Set HS-DSCH Configuration Type to FRC (H-set 1, QPSK)
 - vi. Select HSDPA Uplink Parameters
 - vii. Set Delta ACK, Delta NACK and Delta CQI = 8
 - viii. Set Ack-Nack Repetition Factor to 3
 - ix. Set CQI Feedback Cycle (k) to 4 ms
 - x. Set CQI Repetition Factor to 2
 - xi. Power Ctrl Mode = All Up bits
- d. The transmitted maximum output power was recorded.

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

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

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

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

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

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

Setup Configuration

HSUPA Setup Configuration:

- a. The EUT was connected to Base Station Agilent E5515C referred to the Setup Configuration.
- b. The RF path losses were compensated into the measurements.
- c. A call was established between EUT and Base Station with following setting * :
 - i. Call Configs = 5.2B, 5.9B, 5.10B, and 5.13.2B with QPSK
 - ii. Set the Gain Factors (β_c and β_d) and parameters (AG Index) were set according to each specific sub-test in the following table, C11.1.3, quoted from the TS 34.121
 - iii. Set Cell Power = -86 dBm
 - iv. Set Channel Type = 12.2k + HSPA
 - v. Set UE Target Power
 - vi. Power Ctrl Mode= Alternating bits
 - vii. Set and observe the E-TFCl
 - viii. Confirm that E-TFCl is equal to the target E-TFCl of 75 for sub-test 1, and other subtest's E-TFCl
- d. The transmitted maximum output power was recorded.

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

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note 1)	β_{ec}	β_{ed} (Note 5) (Note 6)	β_{ed} (SF)	β_{ed} (Codes)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 6)	E-TFCl
1	11/15 (Note 3)	15/15 (Note 3)	64	11/15 (Note 3)	22/15	209/25	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	$\beta_{ed1}: 47/15$ $\beta_{ed2}: 47/15$	4 4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15 (Note 4)	15/15 (Note 4)	64	15/15 (Note 4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81

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

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

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

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

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

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

Setup Configuration



<WCDMA Conducted Power>

General Note:

1. Per KDB 941225 D01v03, SAR for Head / Hotspot / Body-worn exposure is measured using a 12.2 kbps RMC with TPC bits configured to all "1"s".
2. Per 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 ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA.

<Full Power Mode>

Band		WCDMA V			WCDMA II		
TX Channel		4132	4182	4233	9262	9400	9538
Rx Channel		4357	4407	4458	9662	9800	9938
Frequency (MHz)		826.4	836.4	846.6	1852.4	1880	1907.6
3GPP Rel 99	AMR 12.2Kbps	24.55	24.51	24.57	21.48	21.38	21.49
3GPP Rel 99	RMC 12.2Kbps	24.57	24.53	24.64	21.49	21.44	21.50
3GPP Rel 6	HSDPA Subtest-1	23.60	23.56	23.66	20.47	20.56	20.65
3GPP Rel 6	HSDPA Subtest-2	23.65	23.61	23.78	20.52	20.58	20.70
3GPP Rel 6	HSDPA Subtest-3	23.11	23.05	23.18	20.01	20.12	20.16
3GPP Rel 6	HSDPA Subtest-4	23.07	23.04	23.17	20.00	20.06	20.16
3GPP Rel 6	HSUPA Subtest-1	23.18	23.15	23.20	20.18	20.17	20.31
3GPP Rel 6	HSUPA Subtest-2	22.67	22.54	22.69	19.60	19.51	19.72
3GPP Rel 6	HSUPA Subtest-3	22.49	22.35	22.52	19.15	19.10	19.24
3GPP Rel 6	HSUPA Subtest-4	23.07	22.98	23.17	19.98	19.97	19.99
3GPP Rel 6	HSUPA Subtest-5	23.57	23.57	23.55	20.51	20.46	20.61

<Reduced Power Mode>

Band		WCDMA II		
TX Channel		9262	9400	9538
Rx Channel		9662	9800	9938
Frequency (MHz)		1852.4	1880	1907.6
3GPP Rel 99	AMR 12.2Kbps	18.73	18.76	18.88
3GPP Rel 99	RMC 12.2Kbps	18.74	18.79	18.91
3GPP Rel 6	HSDPA Subtest-1	17.81	17.79	17.95
3GPP Rel 6	HSDPA Subtest-2	17.80	17.81	17.98
3GPP Rel 6	HSDPA Subtest-3	17.31	17.34	17.39
3GPP Rel 6	HSDPA Subtest-4	17.26	17.32	17.45
3GPP Rel 6	HSUPA Subtest-1	17.20	17.21	17.33
3GPP Rel 6	HSUPA Subtest-2	16.61	16.84	16.76
3GPP Rel 6	HSUPA Subtest-3	16.75	16.78	16.77
3GPP Rel 6	HSUPA Subtest-4	16.92	16.89	17.00
3GPP Rel 6	HSUPA Subtest-5	17.90	17.91	18.02



<LTE Conducted Power>

General Note:

1. Anritsu MT8820C base station simulator was used to setup the connection with EUT; the frequency band, channel bandwidth, RB allocation configuration, modulation type are set in the base station simulator to configure EUT transmitting at maximum power and at different configurations which are requested to be reported to FCC, for conducted power measurement and SAR testing.
2. Per KDB 941225 D05v02r03, when a properly configured base station simulator is used for the SAR and power measurements, spectrum plots for each RB allocation and offset configuration is not required.
3. Per KDB 941225 D05v02r03, 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.
4. Per KDB 941225 D05v02r03, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
5. Per KDB 941225 D05v02r03, 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 are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
6. Per KDB 941225 D05v02r03, 16QAM output power for each RB allocation configuration is $>$ not $\frac{1}{2}$ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r03, 16QAM SAR testing is not required.
7. Per KDB 941225 D05v02r03, Smaller bandwidth output power for each RB allocation configuration is $>$ not $\frac{1}{2}$ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r03, smaller bandwidth SAR testing is not required.



<LTE Band 17>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel			Channel	23780	23790	23800	
Frequency (MHz)			Frequency (MHz)	709	710	711	
10	QPSK	1	0	22.54	22.73	22.61	24
10	QPSK	1	24	22.51	22.69	22.50	
10	QPSK	1	49	22.53	22.69	22.59	
10	QPSK	25	0	21.49	21.63	21.47	23
10	QPSK	25	12	21.48	21.54	21.42	
10	QPSK	25	24	21.37	21.50	21.46	
10	QPSK	50	0	21.44	21.56	21.48	23
10	16QAM	1	0	21.91	21.97	21.77	
10	16QAM	1	24	21.86	21.89	21.75	
10	16QAM	1	49	21.89	21.90	21.87	22
10	16QAM	25	0	20.38	20.56	20.41	
10	16QAM	25	12	20.43	20.51	20.43	
10	16QAM	25	24	20.40	20.49	20.43	22
10	16QAM	50	0	20.41	20.51	20.45	
Channel			Channel	23755	23790	23825	
Frequency (MHz)			Frequency (MHz)	706.5	710	713.5	
5	QPSK	1	0	22.63	22.54	22.52	24
5	QPSK	1	12	22.64	22.51	22.49	
5	QPSK	1	24	22.68	22.47	22.58	
5	QPSK	12	0	21.64	21.51	21.32	23
5	QPSK	12	6	21.75	21.55	21.45	
5	QPSK	12	11	21.62	21.51	21.53	
5	QPSK	25	0	21.60	21.51	21.41	23
5	16QAM	1	0	21.94	21.81	21.81	
5	16QAM	1	12	22.14	21.95	21.89	
5	16QAM	1	24	21.97	21.77	21.86	22
5	16QAM	12	0	20.54	20.50	20.43	
5	16QAM	12	6	20.67	20.54	20.47	
5	16QAM	12	11	20.53	20.49	20.52	22
5	16QAM	25	0	20.59	20.47	20.39	



<LTE Band 5>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				20450	20525	20600	
Frequency (MHz)				829	836.5	844	
10	QPSK	1	0	22.55	22.67	22.55	24
10	QPSK	1	24	22.55	22.56	22.47	
10	QPSK	1	49	22.48	22.53	22.42	
10	QPSK	25	0	21.46	21.47	21.42	23
10	QPSK	25	12	21.44	21.46	21.41	
10	QPSK	25	24	21.37	21.46	21.34	
10	QPSK	50	0	21.42	21.47	21.41	
10	16QAM	1	0	21.82	21.93	21.83	23
10	16QAM	1	24	21.78	21.75	21.71	
10	16QAM	1	49	21.73	21.86	21.74	
10	16QAM	25	0	20.46	20.41	20.34	22
10	16QAM	25	12	20.47	20.42	20.37	
10	16QAM	25	24	20.38	20.44	20.31	
10	16QAM	50	0	20.40	20.41	20.42	
Channel				20425	20525	20625	
Frequency (MHz)				826.5	836.5	846.5	
5	QPSK	1	0	22.34	22.41	22.39	24
5	QPSK	1	12	22.29	22.36	22.38	
5	QPSK	1	24	22.21	22.35	22.37	
5	QPSK	12	0	21.24	21.29	21.38	23
5	QPSK	12	6	21.31	21.34	21.38	
5	QPSK	12	11	21.21	21.29	21.33	
5	QPSK	25	0	21.28	21.32	21.39	23
5	16QAM	1	0	21.58	21.61	21.63	
5	16QAM	1	12	21.72	21.84	21.89	
5	16QAM	1	24	21.52	21.68	21.67	22
5	16QAM	12	0	20.23	20.25	20.35	
5	16QAM	12	6	20.25	20.30	20.34	
5	16QAM	12	11	20.12	20.24	20.34	22
5	16QAM	12	11	20.12	20.24	20.34	
5	16QAM	25	0	20.23	20.27	20.35	
Channel				20415	20525	20635	
Frequency (MHz)				825.5	836.5	847.5	
3	QPSK	1	0	22.34	22.37	22.56	24
3	QPSK	1	7	22.31	22.39	22.61	
3	QPSK	1	14	22.31	22.35	22.56	
3	QPSK	8	0	21.29	21.34	21.63	23
3	QPSK	8	4	21.25	21.35	21.65	
3	QPSK	8	7	21.20	21.31	21.60	
3	QPSK	15	0	21.24	21.34	21.62	
3	16QAM	1	0	21.51	21.58	21.77	23
3	16QAM	1	7	21.51	21.67	21.88	
3	16QAM	1	14	21.52	21.63	21.85	
3	16QAM	8	0	20.29	20.37	20.68	22
3	16QAM	8	4	20.26	20.35	20.62	
3	16QAM	8	7	20.20	20.34	20.62	
3	16QAM	8	7	20.20	20.34	20.62	
3	16QAM	15	0	20.23	20.31	20.61	



Channel				20407	20525	20643	Tune-up limit (dBm)
Frequency (MHz)				824.7	836.5	848.3	
1.4	QPSK	1	0	22.39	22.55	22.61	24
1.4	QPSK	1	2	22.43	22.63	22.61	
1.4	QPSK	1	5	22.33	22.50	22.60	
1.4	QPSK	3	0	22.20	22.36	22.58	
1.4	QPSK	3	1	22.29	22.45	22.61	
1.4	QPSK	3	2	22.19	22.39	22.60	
1.4	QPSK	6	0	21.32	21.37	21.56	23
1.4	16QAM	1	0	21.70	21.79	22.01	23
1.4	16QAM	1	2	21.63	21.84	22.00	
1.4	16QAM	1	5	21.69	21.80	21.98	
1.4	16QAM	3	0	21.23	21.48	21.71	
1.4	16QAM	3	1	21.32	21.43	21.65	
1.4	16QAM	3	2	21.39	21.45	21.69	
1.4	16QAM	6	0	20.31	20.44	20.66	22



<LTE Band 7>

BW [MHz]	Modulation	RB Size	RB Offset	Measured Power			Tune-up limit (dBm)
				Channel	20850	21100	
Frequency (MHz)				2510	2535	2560	
20	QPSK	1	0	16.71	16.58	16.84	18.2
20	QPSK	1	49	16.60	16.53	16.73	
20	QPSK	1	99	16.57	16.77	16.83	
20	QPSK	50	0	16.66	16.55	16.81	18.2
20	QPSK	50	24	16.69	16.57	16.77	
20	QPSK	50	49	16.74	16.57	16.78	
20	QPSK	100	0	16.75	16.60	16.88	18.2
20	16QAM	1	0	17.00	16.84	16.98	
20	16QAM	1	49	16.87	16.78	16.99	
20	16QAM	1	99	16.89	16.90	16.97	18.2
20	16QAM	50	0	16.72	16.63	16.86	
20	16QAM	50	24	16.73	16.66	16.83	
20	16QAM	50	49	16.79	16.64	16.87	18.2
20	16QAM	100	0	16.83	16.61	16.89	
Channel				20825	21100	21375	
Frequency (MHz)				2507.5	2535	2562.5	
15	QPSK	1	0	16.64	16.52	16.86	18.2
15	QPSK	1	37	16.55	16.49	16.79	
15	QPSK	1	74	16.74	16.75	16.81	
15	QPSK	36	0	16.67	16.49	16.82	18.2
15	QPSK	36	18	16.66	16.59	16.88	
15	QPSK	36	37	16.69	16.60	16.86	
15	QPSK	75	0	16.73	16.62	16.82	18.2
15	16QAM	1	0	16.82	16.76	16.95	
15	16QAM	1	37	16.84	16.74	16.96	
15	16QAM	1	74	16.88	16.98	16.91	18.2
15	16QAM	36	0	16.75	16.55	16.88	
15	16QAM	36	18	16.61	16.60	16.90	
15	16QAM	36	37	16.71	16.66	16.90	18.2
15	16QAM	75	0	16.77	16.66	16.82	
Channel				20800	21100	21400	
Frequency (MHz)				2505	2535	2565	
10	QPSK	1	0	16.78	16.73	16.82	18.2
10	QPSK	1	24	16.66	16.74	16.80	
10	QPSK	1	49	16.71	16.81	16.81	
10	QPSK	25	0	16.65	16.60	16.77	18.2
10	QPSK	25	12	16.75	16.71	16.75	
10	QPSK	25	24	16.65	16.70	16.73	
10	QPSK	50	0	16.58	16.69	16.74	18.2
10	16QAM	1	0	16.90	16.98	16.90	
10	16QAM	1	24	16.93	16.95	16.95	
10	16QAM	1	49	16.99	16.94	16.94	18.2
10	16QAM	25	0	16.70	16.63	16.76	
10	16QAM	25	12	16.83	16.80	16.82	
10	16QAM	25	24	16.71	16.73	16.76	18.2
10	16QAM	50	0	16.64	16.81	16.83	



Channel				20775	21100	21425	Tune-up limit (dBm)
Frequency (MHz)				2502.5	2535	2567.5	
5	QPSK	1	0	16.69	16.62	16.70	18.2
5	QPSK	1	12	16.58	16.64	16.63	
5	QPSK	1	24	16.74	16.70	16.72	
5	QPSK	12	0	16.60	16.62	16.66	18.2
5	QPSK	12	6	16.66	16.72	16.72	
5	QPSK	12	11	16.69	16.68	16.69	
5	QPSK	25	0	16.61	16.67	16.72	
5	16QAM	1	0	16.91	16.81	16.92	18.2
5	16QAM	1	12	16.98	16.97	16.94	
5	16QAM	1	24	16.95	16.98	16.93	
5	16QAM	12	0	16.66	16.67	16.75	18.2
5	16QAM	12	6	16.69	16.74	16.78	
5	16QAM	12	11	16.75	16.76	16.78	
5	16QAM	25	0	16.65	16.68	16.73	

<TDD LTE SAR Measurement>

TDD LTE configuration setup for SAR measurement

SAR was tested with a fixed periodic duty factor according to the highest transmission duty factor implemented for the device and supported by 3GPP.

- a. 3GPP TS 36.211 section 4.2 for Type 2 Frame Structure and Table 4.2-2 for uplink-downlink configurations
- b. "special subframe S" contains both uplink and downlink transmissions, it has been taken into consideration to determine the transmission duty factor according to the worst case uplink and downlink cyclic prefix requirements for UpPTS
- c. Establishing connections with base station simulators ensure a consistent means for testing SAR and recommended for evaluating SAR. The Anritsu MT8820C (firmware: #22.52#004) was used for LTE output power measurements and SAR testing.

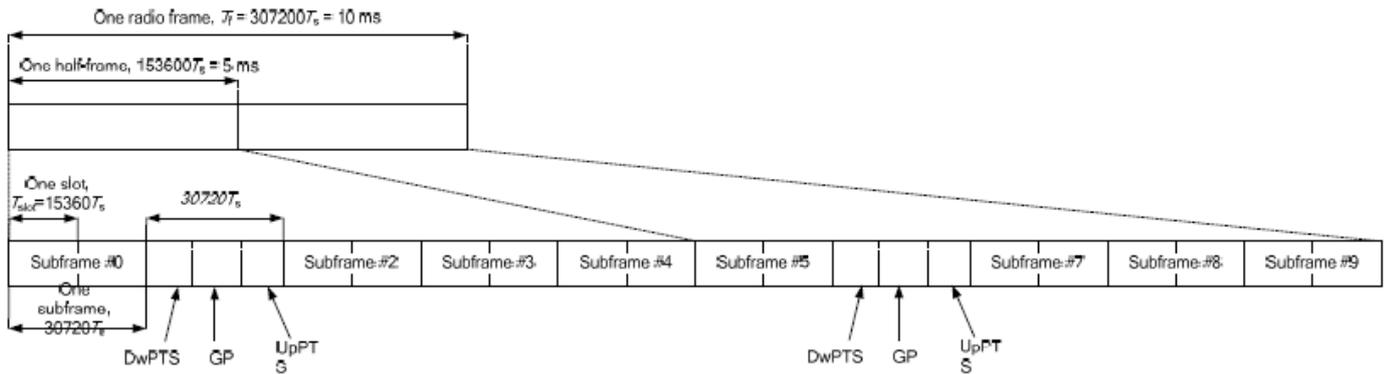


Figure 4.2-1: Frame structure type 2 (for 5 ms switch-point periodicity).

Table 4.2-2: Uplink-downlink configurations.

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

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

Special subframe configuration	Normal cyclic prefix in downlink			Extended cyclic prefix in downlink		
	DwPTS	UpPTS		DwPTS	UpPTS	
		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink
0	6592 · Ts	2192 · Ts	2560 · Ts	7680 · Ts	2192 · Ts	2560 · Ts
1	19760 · Ts			20480 · Ts		
2	21952 · Ts			23040 · Ts		
3	24144 · Ts			25600 · Ts		
4	26336 · Ts			7680 · Ts	4384 · Ts	5120 · Ts
5	6592 · Ts	4384 · Ts	5120 · Ts	20480 · Ts		
6	19760 · Ts			23040 · Ts		
7	21952 · Ts			12800 · Ts		
8	24144 · Ts			-	-	
9	13168 · Ts			-	-	-

Special subframe (30720·T_s): Normal cyclic prefix in downlink (UpPTS)			
	Special subframe configuration	Normal cyclic prefix in uplink	Extended cyclic prefix in uplink
Uplink duty factor in one special subframe	0~4	7.13%	8.33%
	5~9	14.3%	16.7%

Special subframe(30720·T_s): Extended cyclic prefix in downlink (UpPTS)			
	Special subframe configuration	Normal cyclic prefix in uplink	Extended cyclic prefix in uplink
Uplink duty factor in one special subframe	0~3	7.13%	8.33%
	4~7	14.3%	16.7%

The highest duty factor is resulted from:

- i. Uplink-downlink configuration: 0. In a half-frame consisted of 5 subframes, uplink operation is in 3 uplink subframes and 1 special subframe.
- ii. special subframe configuration: 5-9 for normal cyclic prefix in downlink, 4-7 for extended cyclic prefix in downlink
- iii. for special subframe with extended cyclic prefix in uplink, the total uplink duty factor in one half-frame is: $(3+0.167)/5 = 63.3\%$
- iv. for special subframe with normal cyclic prefix in uplink, the total uplink duty factor in one half-frame is: $(3+0.143)/5 = 62.9\%$
- v. For TDD LTE SAR measurement, the duty cycle 1:1.59 (62.9 %) was used perform testing and considering the theoretical duty cycle of 63.3% for extended cyclic prefix in the uplink, and the theoretical duty cycle of 62.9% for normal cyclic prefix in uplink, a scaling factor of extended cyclic prefix $63.3\%/62.9\% = 1.006$ is applied to scale-up the measured SAR result. The scaled TDD LTE SAR = measured SAR (W/kg)* Tune-up Scaling Factor* scaling factor for extended cyclic prefix.



<LTE Band 41>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Low Middle Ch. / Freq.	Power Middle Ch. / Freq.	Power High Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				39750	40185	40620	41055	41490	
Frequency (MHz)				2506	2549.5	2593	2636.5	2680	
20	QPSK	1	0	22.73	22.67	22.76	22.90	23.01	24
20	QPSK	1	49	22.45	22.06	22.55	22.66	22.83	
20	QPSK	1	99	22.57	22.36	22.70	22.80	22.92	
20	QPSK	50	0	21.72	21.86	21.75	21.80	21.93	23
20	QPSK	50	24	21.69	21.80	21.74	21.78	21.91	
20	QPSK	50	49	21.71	21.78	21.72	21.76	21.92	
20	QPSK	100	0	21.65	21.84	21.70	21.83	21.95	
20	16QAM	1	0	21.97	21.93	22.02	22.15	22.20	23.5
20	16QAM	1	49	21.78	21.51	21.89	22.00	22.05	
20	16QAM	1	99	21.94	22.09	22.04	22.11	22.21	
20	16QAM	50	0	20.63	20.60	20.76	20.80	20.92	22.5
20	16QAM	50	24	20.75	20.53	20.73	20.89	20.97	
20	16QAM	50	49	20.76	20.92	20.84	20.81	21.02	
20	16QAM	100	0	20.71	20.80	20.76	20.87	20.95	
Channel				39725	40173	40620	41068	41515	Tune-up limit (dBm)
Frequency (MHz)				2503.5	2548.3	2593	2637.8	2682.5	
15	QPSK	1	0	22.64	22.50	22.75	22.70	22.88	24
15	QPSK	1	37	22.77	22.69	22.61	22.96	22.73	
15	QPSK	1	74	22.67	22.73	22.66	22.81	22.95	
15	QPSK	36	0	21.60	21.73	21.64	21.77	21.85	23
15	QPSK	36	18	21.61	21.58	21.70	21.85	21.91	
15	QPSK	36	37	21.67	21.73	21.72	21.76	21.89	
15	QPSK	75	0	21.62	21.82	21.68	21.76	21.92	
15	16QAM	1	0	21.89	21.92	22.05	22.07	22.12	23.5
15	16QAM	1	37	21.78	21.91	21.90	21.97	22.09	
15	16QAM	1	74	21.97	22.04	22.01	22.14	22.12	
15	16QAM	36	0	20.61	20.56	20.63	20.78	20.85	22.5
15	16QAM	36	18	20.67	20.36	20.67	20.86	20.92	
15	16QAM	36	37	20.72	20.82	20.75	20.77	20.91	
15	16QAM	75	0	20.66	20.55	20.71	20.80	20.94	
Channel				39700	40160	40620	41080	41540	Tune-up limit (dBm)
Frequency (MHz)				2501	2547	2593	2639	2685	
10	QPSK	1	0	22.70	22.56	22.67	22.70	22.92	24
10	QPSK	1	24	22.69	22.72	22.80	22.76	23.00	
10	QPSK	1	49	22.66	22.73	22.80	22.70	22.97	
10	QPSK	25	0	21.58	21.64	21.75	21.74	21.91	23
10	QPSK	25	12	21.68	21.65	21.72	21.71	22.01	
10	QPSK	25	24	21.59	21.62	21.75	21.66	21.99	
10	QPSK	50	0	21.67	21.64	21.75	21.73	21.98	
10	16QAM	1	0	22.06	22.01	22.24	22.19	22.30	23.5
10	16QAM	1	24	22.12	22.01	22.25	22.24	22.40	
10	16QAM	1	49	22.00	22.07	22.18	22.08	22.32	
10	16QAM	25	0	20.74	20.69	20.81	20.85	21.01	22.5
10	16QAM	25	12	20.77	20.70	20.82	20.83	21.09	
10	16QAM	25	24	20.75	20.73	20.82	20.78	21.05	
10	16QAM	50	0	20.69	20.64	20.75	20.78	21.03	



Channel				39675	40148	40620	41093	41565	Tune-up limit (dBm)
Frequency (MHz)				2498.5	2545.8	2593	2640.3	2687.5	
5	QPSK	1	0	22.65	22.65	22.65	22.77	22.81	24
5	QPSK	1	12	22.48	22.52	22.48	22.74	22.77	
5	QPSK	1	24	22.48	22.54	22.53	22.68	22.73	
5	QPSK	12	0	21.70	21.69	21.69	21.86	21.87	23
5	QPSK	12	6	21.68	21.71	21.77	21.91	21.88	
5	QPSK	12	11	21.67	21.67	21.79	21.82	21.94	
5	QPSK	25	0	21.65	21.67	21.77	21.88	21.85	
5	16QAM	1	0	21.96	22.00	22.02	22.12	22.07	
5	16QAM	1	12	21.94	22.00	21.98	22.17	22.23	23.5
5	16QAM	1	24	21.84	21.96	21.96	22.07	22.13	
5	16QAM	12	0	20.76	20.70	20.78	20.93	20.95	22.5
5	16QAM	12	6	20.71	20.78	20.82	20.98	20.92	
5	16QAM	12	11	20.69	20.70	20.87	20.89	20.99	
5	16QAM	25	0	20.75	20.71	20.77	20.92	20.96	

<WLAN Conducted Power>

General Note:

1. For WLAN, the transmit power of each chain transmit power in SISO mode is equal or higher than that in MIMO operation, and the assessment for MIMO mode can be performed in the simultaneous transmission analysis of standalone SAR of each chain tested in SISO mode.
2. Per KDB 248227 D01v02r01, the simultaneous SAR provisions in KDB publication 447498 should be applied to determine simultaneous transmission SAR test exclusion for WiFi MIMO. If the sum of 1g single transmission chain SAR measurements is < 1.6W/kg and SAR peak to location ratio < 0.04, no additional SAR measurements for MIMO.
3. Per KDB 248227 D01v02r01, SAR test reduction is determined according to 802.11 transmission mode configurations and certain exposure conditions with multiple test positions. In the 2.4 GHz band, separate SAR procedures are applied to DSSS and OFDM configurations to simplify DSSS test requirements. For OFDM, in both 2.4 and 5 GHz bands, an initial test configuration must be determined for each standalone and aggregated frequency band, according to the transmission mode configuration with the highest maximum output power specified for production units to perform SAR measurements. If the same highest maximum output power applies to different combinations of channel bandwidths, modulations and data rates, additional procedures are applied to determine which test configurations require SAR measurement. When applicable, an initial test position may be applied to reduce the number of SAR measurements required for next to the ear, UMPC mini-tablet or hotspot mode configurations with multiple test positions.
4. For 2.4 GHz 802.11b DSSS, either the initial test position procedure for multiple exposure test positions or the DSSS procedure for fixed exposure position is applied; these are mutually exclusive. For 2.4 GHz and 5 GHz OFDM configurations, the initial test configuration is applied to measure SAR using either the initial test position procedure for multiple exposure test position configurations or the initial test configuration procedures for fixed exposure test conditions. Based on the reported SAR of the measured configurations and maximum output power of the transmission mode configurations that are not included in the initial test configuration, the subsequent test configuration and initial test position procedures are applied to determine if SAR measurements are required for the remaining OFDM transmission configurations. In general, the number of test channels that require SAR measurement is minimized based on maximum output power measured for the test sample(s).
5. For OFDM transmission configurations in the 2.4 GHz and 5 GHz bands, When the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11a/g/n/ac mode is used for SAR measurement, on the highest measured output power channel for each frequency band.
6. 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.¹⁸ The initial test position procedure is described in the following:
 - a. When the reported SAR of the initial test position is ≤ 0.4 W/kg, further SAR measurement is not required for the other test positions in that exposure configuration and 802.11 transmission mode combinations within the frequency band or aggregated band.
 - b. When the reported SAR of the test position is > 0.4 W/kg, SAR is repeated for the 802.11 transmission mode configuration tested in the initial test position to measure the subsequent next closet/smallest test separation distance and maximum coupling test position on the highest maximum output power channel, until the report SAR is ≤ 0.8 W/kg or all required test position are tested.
 - c. For all positions/configurations, when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions/configurations on the subsequent next highest measured output power channel(s) until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.



<2.4GHz WLAN Chain 0>

Mode	Channel	Frequency (MHz)	Data Rate	Average power (dBm)	Duty Cycle %
802.11b	CH 1	2412	1Mbps	13.55	99.10
	CH 6	2437		13.49	
	CH 11	2462		13.21	
	CH 12	2467		13.41	
	CH 13	2472		13.21	
802.11g	CH 1	2412	6Mbps	13.63	100.00
	CH 6	2437		13.66	
	CH 11	2462		13.58	
	CH 12	2467		10.19	
	CH 13	2472		3.86	
802.11n-HT20	CH 1	2412	MCS0	13.17	98.65
	CH 6	2437		13.53	
	CH 11	2462		13.57	
	CH 12	2467		8.57	
	CH 13	2472		3.43	

<2.4GHz WLAN Chain 1>

Mode	Channel	Frequency (MHz)	Data Rate	Average power (dBm)	Duty Cycle %
802.11b	CH 1	2412	1Mbps	13.90	99.11
	CH 6	2437		13.50	
	CH 11	2462		13.64	
	CH 12	2467		13.63	
	CH 13	2472		12.69	
802.11g	CH 1	2412	6Mbps	13.83	100.00
	CH 6	2437		13.70	
	CH 11	2462		13.93	
	CH 12	2467		9.74	
	CH 13	2472		3.23	
802.11n-HT20	CH 1	2412	MCS0	13.73	97.97
	CH 6	2437		13.49	
	CH 11	2462		13.71	
	CH 12	2467		7.75	
	CH 13	2472		2.41	

<2.4GHz WLAN Chain 0+1>

Mode	Channel	Frequency (MHz)	Data Rate	Average power (dBm)	Duty Cycle %
802.11g	CH 1	2412	6Mbps	16.95	100.00
	CH 6	2437		16.65	
	CH 11	2462		16.79	
	CH 12	2467		13.16	
	CH 13	2472		5.87	
802.11n-HT20	CH 1	2412	MCS0	16.68	98.67
	CH 6	2437		16.65	
	CH 11	2462		16.76	
	CH 12	2467		11.15	
	CH 13	2472		5.11	



<5GHz WLAN Chain 0>

	Mode	Channel	Frequency (MHz)	Data Rate	Average power (dBm)	Duty Cycle %
5.2GHz WLAN Chain 0	802.11a	CH 36	5180	6Mbps	9.73	98.74
		CH 40	5200		9.52	
		CH 44	5220		9.54	
		CH 48	5240		9.44	
	802.11n-HT20	CH 36	5180	MCS0	9.83	98.39
		CH 40	5200		9.38	
		CH 44	5220		9.32	
		CH 48	5240		9.34	
	802.11n-HT40	CH 38	5190	MCS0	9.51	96.60
		CH 46	5230		9.29	
	802.11ac-VHT20	CH 36	5180	MCS0	9.51	97.86
		CH 40	5200		9.44	
		CH 44	5220		9.35	
		CH 48	5240		9.18	
802.11ac-VHT40	CH 38	5190	MCS0	9.65	96.62	
	CH 46	5230		9.53		
802.11ac-VHT80	CH 42	5210	MCS0	9.64	93.44	

	Mode	Channel	Frequency (MHz)	Data Rate	Average power (dBm)	Duty Cycle %
5.3GHz WLAN Chain 0	802.11a	CH 52	5260	6Mbps	9.54	98.74
		CH 56	5280		9.85	
		CH 60	5300		9.56	
		CH 64	5320		9.24	
	802.11n-HT20	CH 52	5260	MCS0	9.53	98.39
		CH 56	5280		9.46	
		CH 60	5300		9.60	
		CH 64	5320		9.63	
	802.11n-HT40	CH 54	5270	MCS0	9.74	96.60
		CH 62	5310		9.46	
	802.11ac-VHT20	CH 52	5260	MCS0	9.61	97.86
		CH 56	5280		9.56	
		CH 60	5300		9.52	
		CH 64	5320		9.55	
802.11ac-VHT40	CH 54	5270	MCS0	9.70	96.62	
	CH 62	5310		9.56		
802.11ac-VHT80	CH 58	5290	MCS0	9.52	93.44	



5.5GHz WLAN Chain 0	Mode	Channel	Frequency (MHz)	Data Rate	Average power (dBm)	Duty Cycle %
	802.11a	6Mbps	CH 100	5500	98.74	9.67
			CH 116	5580		9.62
			CH 124	5620		9.06
			CH 132	5660		9.32
			CH 144	5720		8.94
	802.11n-HT20	MCS0	CH 100	5500	98.39	9.45
			CH 116	5580		9.61
			CH 124	5620		9.33
			CH 132	5660		8.98
802.11n-HT40	MCS0	CH 102	5510	96.60	9.61	
		CH 110	5550		9.54	
		CH 126	5630		9.30	
		CH 134	5670		9.08	
802.11ac-VHT20	MCS0	CH 100	5500	97.86	9.41	
		CH 116	5580		9.74	
		CH 124	5620		9.29	
		CH 132	5660		9.38	
802.11ac-VHT40	MCS0	CH 102	5510	96.62	9.54	
		CH 110	5550		9.49	
		CH 126	5630		9.42	
		CH 134	5670		9.45	
802.11ac-VHT80	MCS0	CH 142	5710	93.44	9.14	
		CH 106	5530		9.61	
		CH 122	5610		9.21	
		CH 138	5690		9.17	

5.8GHz WLAN Chain 0	Mode	Channel	Frequency (MHz)	Data Rate	Average power (dBm)	Duty Cycle %
	802.11a	MCS0	CH 149	5745	98.74	9.35
			CH 157	5785		9.22
			CH 165	5825		9.29
	802.11n-HT20	MCS0	CH 149	5745	98.39	9.32
			CH 157	5785		9.27
			CH 165	5825		8.96
	802.11n-HT40	MCS0	CH 151	5755	96.60	9.68
			CH 159	5795		9.04
	802.11ac-VHT20	MCS0	CH 149	5745	97.86	9.45
CH 157			5785	9.02		
CH 165			5825	9.07		
802.11ac-VHT40	MCS0	CH 151	5755	96.62	9.55	
		CH 159	5795		8.97	
802.11ac-VHT80	MCS0	CH 155	5775	93.44	9.65	



<5GHz WLAN Chain 1>

5.2GHz WLAN Chain 1	Mode	Channel	Frequency (MHz)	Data Rate	Average power (dBm)	Duty Cycle %
	802.11a	CH 36	5180	6Mbps	9.68	98.12
		CH 40	5200		9.43	
		CH 44	5220		9.47	
		CH 48	5240		9.60	
	802.11n-HT20	CH 36	5180	MCS0	9.62	98.65
		CH 40	5200		9.49	
		CH 44	5220		9.43	
		CH 48	5240		9.64	
	802.11n-HT40	CH 38	5190	MCS0	9.62	96.60
CH 46		5230	9.58			
802.11ac-VHT20	CH 36	5180	MCS0	9.51	98.65	
	CH 40	5200		9.42		
	CH 44	5220		9.74		
	CH 48	5240		9.38		
802.11ac-VHT40	CH 38	5190	MCS0	9.44	96.62	
	CH 46	5230		9.56		
802.11ac-VHT80	CH 42	5210	MCS0	9.54	93.44	

5.3GHz WLAN Chain 1	Mode	Channel	Frequency (MHz)	Data Rate	Average power (dBm)	Duty Cycle %
	802.11a	CH 52	5260	6Mbps	9.54	98.12
		CH 56	5280		9.46	
		CH 60	5300		9.34	
		CH 64	5320		9.42	
	802.11n-HT20	CH 52	5260	MCS0	9.63	98.65
		CH 56	5280		9.48	
		CH 60	5300		9.23	
		CH 64	5320		9.68	
	802.11n-HT40	CH 54	5270	MCS0	9.62	96.60
		CH 62	5310		9.58	
	802.11ac-VHT20	CH 52	5260	MCS0	9.63	98.65
		CH 56	5280		9.55	
		CH 60	5300		9.51	
CH 64		5320	9.32			
802.11ac-VHT40	CH 54	5270	MCS0	9.54	96.62	
	CH 62	5310		9.63		
802.11ac-VHT80	CH 58	5290	MCS0	9.48	93.44	



	Mode	Channel	Frequency (MHz)	Data Rate	Average power (dBm)	Duty Cycle %
5.5GHz WLAN Chain 1	802.11a	CH 100	5500	6Mbps	9.16	98.12
		CH 116	5580		9.07	
		CH 124	5620		9.20	
		CH 132	5660		8.94	
		CH 144	5720		9.34	
	802.11n-HT20	CH 100	5500	MCS0	9.42	98.65
		CH 116	5580		9.12	
		CH 124	5620		9.19	
		CH 132	5660		9.12	
	802.11n-HT40	CH 102	5510	MCS0	9.21	96.60
		CH 110	5550		9.10	
		CH 126	5630		9.03	
		CH 134	5670		8.97	
	802.11ac-VHT20	CH 100	5500	MCS0	9.47	98.65
		CH 116	5580		9.25	
		CH 124	5620		9.18	
		CH 132	5660		9.14	
	802.11ac-VHT40	CH 102	5510	MCS0	9.17	96.62
		CH 110	5550		9.11	
		CH 126	5630		9.07	
CH 134		5670	9.20			
802.11ac-VHT80	CH 106	5530	MCS0	9.43	93.44	
	CH 122	5610		9.35		
	CH 138	5690		9.23		

	Mode	Channel	Frequency (MHz)	Data Rate	Average power (dBm)	Duty Cycle %
5.8GHz WLAN Chain 1	802.11a	CH 149	5745	MCS0	9.24	98.12
		CH 157	5785		9.23	
		CH 165	5825		9.13	
	802.11n-HT20	CH 149	5745	MCS0	9.43	98.65
		CH 157	5785		9.08	
		CH 165	5825		9.34	
	802.11n-HT40	CH 151	5755	MCS0	8.27	96.60
		CH 159	5795		9.22	
	802.11ac-VHT20	CH 149	5745	MCS0	9.34	98.65
		CH 157	5785		9.32	
		CH 165	5825		9.35	
	802.11ac-VHT40	CH 151	5755	MCS0	9.24	96.62
		CH 159	5795		9.38	
802.11ac-VHT80	CH 155	5775	MCS0	9.63	93.44	



<5GHz WLAN Chain 0+1>

5.2GHz WLAN Chain 0+1	Mode	Channel	Frequency (MHz)	Data Rate	Average power (dBm)	Duty Cycle %
	802.11a	CH 36	5180	6Mbps	12.80	100.00
		CH 40	5200		12.70	
		CH 44	5220		12.62	
		CH 48	5240		12.56	
	802.11n-HT20	CH 36	5180	MCS0	12.64	98.67
		CH 40	5200		12.60	
		CH 44	5220		12.58	
		CH 48	5240		12.45	
	802.11n-HT40	CH 38	5190	MCS0	12.62	96.83
CH 46		5230	12.57			
802.11ac-VHT20	CH 36	5180	MCS0	12.60	100.00	
	CH 40	5200		12.57		
	CH 44	5220		12.57		
	CH 48	5240		12.40		
802.11ac-VHT40	CH 38	5190	MCS0	12.66	96.85	
	CH 46	5230		12.77		
802.11ac-VHT80	CH 42	5210	MCS0	12.64	94.79	

5.3GHz WLAN Chain 0+1	Mode	Channel	Frequency (MHz)	Data Rate	Average power (dBm)	Duty Cycle %
	802.11a	CH 52	5260	6Mbps	12.63	100.00
		CH 56	5280		12.44	
		CH 60	5300		12.41	
		CH 64	5320		12.40	
	802.11n-HT20	CH 52	5260	MCS0	12.70	98.67
		CH 56	5280		12.67	
		CH 60	5300		12.72	
		CH 64	5320		12.83	
	802.11n-HT40	CH 54	5270	MCS0	12.71	96.83
		CH 62	5310		12.65	
	802.11ac-VHT20	CH 52	5260	MCS0	12.68	100.00
		CH 56	5280		12.64	
		CH 60	5300		12.67	
CH 64		5320	12.68			
802.11ac-VHT40	CH 54	5270	MCS0	12.84	96.85	
	CH 62	5310		12.82		
802.11ac-VHT80	CH 58	5290	MCS0	12.87	94.79	



5.5GHz WLAN Chain 0+1	Mode	Channel	Frequency (MHz)	Data Rate	Average power (dBm)	Duty Cycle %
	802.11a	CH 100	5500	6Mbps	12.51	100.00
		CH 116	5580		12.74	
		CH 124	5620		12.76	
		CH 132	5660		12.64	
		CH 144	5720		12.17	
	802.11n-HT20	CH 100	5500	MCS0	12.92	98.67
		CH 116	5580		12.65	
		CH 124	5620		12.60	
		CH 132	5660		12.60	
CH 144		5720	12.43			
802.11n-HT40	CH 102	5510	MCS0	12.72	96.83	
	CH 110	5550		12.68		
	CH 126	5630		12.64		
	CH 134	5670		12.52		
	CH 142	5710		12.13		
802.11ac-VHT20	CH 100	5500	MCS0	12.73	100.00	
	CH 116	5580		12.64		
	CH 124	5620		12.60		
	CH 132	5660		12.59		
	CH 144	5720		12.44		
802.11ac-VHT40	CH 102	5510	MCS0	12.81	96.85	
	CH 110	5550		12.72		
	CH 126	5630		12.68		
	CH 134	5670		12.73		
	CH 142	5710		12.29		
802.11ac-VHT80	CH 106	5530	MCS0	12.94	94.79	
	CH 122	5610		12.91		
	CH 138	5690		12.54		

5.8GHz WLAN Chain 0+1	Mode	Channel	Frequency (MHz)	Data Rate	Average power (dBm)	Duty Cycle %
	802.11a	CH 149	5745	MCS0	12.42	100.00
		CH 157	5785		12.09	
		CH 165	5825		12.17	
	802.11n-HT20	CH 149	5745	MCS0	12.79	98.67
		CH 157	5785		12.57	
		CH 165	5825		12.45	
	802.11n-HT40	CH 151	5755	MCS0	12.80	96.83
		CH 159	5795		12.47	
	802.11ac-VHT20	CH 149	5745	MCS0	12.56	100.00
CH 157		5785	12.40			
CH 165		5825	12.47			
802.11ac-VHT40	CH 151	5755	MCS0	12.63	96.85	
	CH 159	5795		12.35		
802.11ac-VHT80	CH 155	5775	MCS0	12.85	94.79	

13. Bluetooth Exclusions Applied

Mode Band	Average power(dBm)		
	BR	EDR	BLE
2.4GHz Bluetooth Version 4.1 with LE	11.50	8.50	7.50

Note:

1. Per KDB 447498 D01v05r02, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

$$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0 \text{ for 1-g SAR and } \leq 7.5 \text{ for 10-g extremity SAR}$$

- f(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison

Exposure position: body-worn accessory			
Bluetooth Max Power (dBm)	Separation Distance (mm)	Frequency (GHz)	exclusion thresholds
11.5	15mm	2.48	1.47

Note:

Per KDB 447498 D01v05r02, The test exclusion threshold is 1.47 which is ≤ 3, SAR testing is not required.

14. RF Exposure Conditions

Distance of the Antenna to the EUT surface/edge						
Antennas	Back	Front	Top Side	Bottom Side	Right Side	Left Side
WWAN Main	≤ 25mm	≤ 25mm	> 25mm	≤ 25mm	≤ 25mm	≤ 25mm
BT&WLAN	≤ 25mm	≤ 25mm	≤ 25mm	> 25mm	≤ 25mm	≤ 25mm

Positions for SAR tests; Hotspot mode						
Antennas	Back	Front	Top Side	Bottom Side	Right Side	Left Side
WWAN Main	Yes	Yes	No	Yes	Yes	Yes
BT&WLAN	Yes	Yes	Yes	No	Yes	Yes

General Note:

1. Referring to KDB 941225 D06 v02, when the overall device length and width are ≥ 9cm*5cm, the test distance is 10 mm. SAR must be measured for all sides and surfaces with a transmitting antenna located within 25mm from that surface or edge.
2. The detail antenna location please refers to Appendix D.



15. SAR Test Results

General Note:

1. Per KDB 447498 D01v05r02, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
 - a. Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
 - b. For SAR testing of WLAN signal with non-100% duty cycle, the measured SAR is scaled-up by the duty cycle scaling factor which is equal to "1/(duty cycle)"
 - c. For WWAN: Reported SAR (W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor
 - d. For WLAN: Reported SAR (W/kg)= Measured SAR(W/kg)* Duty Cycle scaling factor * Tune-up scaling factor.
 - e. For TDD LTE SAR measurement, the duty cycle 1:1.59 (62.9 %) was used perform testing and considering the theoretical duty cycle of 63.3% for extended cyclic prefix in the uplink, and the theoretical duty cycle of 62.9% for normal cyclic prefix in uplink, a scaling factor of extended cyclic prefix 63.3%/62.9% = 1.006 is applied to scale-up the measured SAR result. The Reported TDD LTE SAR = measured SAR (W/kg)* Tune-up Scaling Factor* scaling factor for extended cyclic prefix.
2. Per KDB 447498 D01v05r02, for each exposure position, testing of other required channels within the operating mode of a frequency band is not required when the *reported* 1-g or 10-g SAR for the mid-band or highest output power channel is:
 - ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
 - ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
 - ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz
3. Per KDB 648474 D04v01r02, when the reported SAR for a body-worn accessory measured without a headset connected to the handset is ≤ 1.2 W/kg, SAR testing with a headset connected to the handset is not required.
4. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥ 0.8 W/kg.

GSM Note:

1. Per KDB 941225 D01v03, Head / Hotspot / Body-worn SAR test reduction for GSM and GPRS and EDGE modes is determined by the source-based time-averaged output power including tune-up tolerance. The 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. Therefore, the EUT was set in GPRS (4Tx slots) for GSM850, GPRS (2Tx slots) for GSM1900.

UMTS Note:

1. Per KDB 941225 D01v03, SAR for next to the ear head / Hotspot / Body-worn exposure is measured using a 12.2 kbps RMC with TPC bits configured to all "1's".
2. Per 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 ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA

**LTE Note:**

1. Per KDB 941225 D05v02r03, 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.
2. Per KDB 941225 D05v02r03, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
3. Per KDB 941225 D05v02r03, 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 are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
4. Per KDB 941225 D05v02r03, 16QAM output power for each RB allocation configuration is $>$ not $\frac{1}{2}$ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r03, 16QAM SAR testing is not required.
5. Per KDB 941225 D05v02r03, Smaller bandwidth output power for each RB allocation configuration is $>$ not $\frac{1}{2}$ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r03, smaller bandwidth SAR testing is not required.

WLAN Note:

1. Per KDB 248227 D01v02r01, for 2.4GHz 802.11g/n SAR testing is not required when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.
2. Per KDB 248227 D01v02r01, for U-NII-1 SAR testing is not required when the U-NII-2A band highest reported SAR for a test configuration is ≤ 1.2 W/kg, SAR is not required for U-NII-1 band.
3. When the reported SAR of the test position is > 0.4 W/kg, SAR is repeated for the 802.11 transmission mode configuration tested in the initial test position to measure the subsequent next closet/smallest test separation distance and maximum coupling test position on the highest maximum output power channel, until the report SAR is ≤ 0.8 W/kg or all required test position are tested.
4. For all positions / configurations, when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions / configurations on the subsequent next highest measured output power channel(s) until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.
5. For WLAN, the transmit power of each chain transmit power in SISO mode is equal or higher than that in MIMO operation, and the assessment for MIMO mode can be performed in the simultaneous transmission analysis of standalone SAR of each chain tested in SISO mode.
6. Per KDB 248227 D01v02r01, the simultaneous SAR provisions in KDB publication 447498 should be applied to determine simultaneous transmission SAR test exclusion for WiFi MIMO. If the sum of 1g single transmission chain SAR measurements is < 1.6 W/kg and SAR peak to location ratio < 0.04 , no additional SAR measurements for MIMO.
7. During SAR testing the WLAN transmission was verified using a spectrum analyzer.



15.1 Head SAR

<GSM SAR>

Plot No.	Band	Modulation	Mode	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
	GSM850	GMSK	GPRS (4 Tx slots)	Right Cheek	0mm	251	848.8	27.46	27.70	1.057	-0.073	0.258	0.273	0.196	0.207
	GSM850	GMSK	GPRS (4 Tx slots)	Right Tilted	0mm	251	848.8	27.46	27.70	1.057	0.16	0.093	0.098	0.071	0.075
01	GSM850	GMSK	GPRS (4 Tx slots)	Left Cheek	0mm	251	848.8	27.46	27.70	1.057	0.133	0.301	0.318	0.225	0.238
	GSM850	GMSK	GPRS (4 Tx slots)	Left Tilted	0mm	251	848.8	27.46	27.70	1.057	0.001	0.119	0.126	0.088	0.093
	GSM1900	GMSK	GPRS (2 Tx slots)	Right Cheek	0mm	810	1909.8	25.63	25.70	1.016	0.159	0.054	0.055	0.035	0.036
	GSM1900	GMSK	GPRS (2 Tx slots)	Right Tilted	0mm	810	1909.8	25.63	25.70	1.016	-0.144	0.016	0.016	0.008	0.008
02	GSM1900	GMSK	GPRS (2 Tx slots)	Left Cheek	0mm	810	1909.8	25.63	25.70	1.016	0.143	0.099	0.101	0.059	0.060
	GSM1900	GMSK	GPRS (2 Tx slots)	Left Tilted	0mm	810	1909.8	25.63	25.70	1.016	-0.152	0.038	0.039	0.021	0.021

<WCDMA SAR>

Plot No.	Band	Modulation	Mode	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
	WCDMA V	QPSK	RMC 12.2Kbps	Right Cheek	0mm	4233	846.6	24.64	24.70	1.014	-0.004	0.262	0.266	0.197	0.200
	WCDMA V	QPSK	RMC 12.2Kbps	Right Tilted	0mm	4233	846.6	24.64	24.70	1.014	-0.008	0.185	0.188	0.112	0.114
03	WCDMA V	QPSK	RMC 12.2Kbps	Left Cheek	0mm	4233	846.6	24.64	24.70	1.014	0.112	0.291	0.295	0.217	0.220
	WCDMA V	QPSK	RMC 12.2Kbps	Left Tilted	0mm	4233	846.6	24.64	24.70	1.014	0.122	0.172	0.174	0.107	0.108
	WCDMA II	QPSK	RMC 12.2Kbps	Right Cheek	0mm	9538	1907.6	21.50	21.50	1.000	-0.173	0.103	0.103	0.064	0.064
	WCDMA II	QPSK	RMC 12.2Kbps	Right Tilted	0mm	9538	1907.6	21.50	21.50	1.000	0.107	0.073	0.073	0.040	0.040
04	WCDMA II	QPSK	RMC 12.2Kbps	Left Cheek	0mm	9538	1907.6	21.50	21.50	1.000	0.153	0.194	0.194	0.117	0.117
	WCDMA II	QPSK	RMC 12.2Kbps	Left Tilted	0mm	9538	1907.6	21.50	21.50	1.000	-0.03	0.065	0.065	0.037	0.037

<FDD LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
05	LTE Band 17	10M	QPSK	1	0	Right Cheek	0mm	23790	710	22.73	24.00	1.340	-0.006	0.143	0.192	0.112	0.150
	LTE Band 17	10M	QPSK	25	0	Right Cheek	0mm	23790	710	21.63	23.00	1.371	0.084	0.105	0.144	0.079	0.108
	LTE Band 17	10M	QPSK	1	0	Right Tilted	0mm	23790	710	22.73	24.00	1.340	0.014	0.058	0.078	0.040	0.054
	LTE Band 17	10M	QPSK	25	0	Right Tilted	0mm	23790	710	21.63	23.00	1.371	-0.009	0.042	0.058	0.029	0.040
	LTE Band 17	10M	QPSK	1	0	Left Cheek	0mm	23790	710	22.73	24.00	1.340	-0.009	0.126	0.169	0.098	0.131
	LTE Band 17	10M	QPSK	25	0	Left Cheek	0mm	23790	710	21.63	23.00	1.371	0.162	0.096	0.132	0.075	0.103
	LTE Band 17	10M	QPSK	1	0	Left Tilted	0mm	23790	710	22.73	24.00	1.340	0.037	0.053	0.071	0.036	0.048
	LTE Band 17	10M	QPSK	25	0	Left Tilted	0mm	23790	710	21.63	23.00	1.371	0.105	0.039	0.053	0.027	0.037
	LTE Band 5	10M	QPSK	1	0	Right Cheek	0mm	20525	836.5	22.67	24.00	1.358	-0.043	0.253	0.344	0.193	0.262
	LTE Band 5	10M	QPSK	25	0	Right Cheek	0mm	20525	836.5	21.47	24.00	1.791	-0.083	0.187	0.335	0.144	0.258
	LTE Band 5	10M	QPSK	1	0	Right Tilted	0mm	20525	836.5	22.67	24.00	1.358	0.012	0.125	0.170	0.094	0.128
	LTE Band 5	10M	QPSK	25	0	Right Tilted	0mm	20525	836.5	21.47	24.00	1.791	-0.117	0.098	0.175	0.073	0.131
06	LTE Band 5	10M	QPSK	1	0	Left Cheek	0mm	20525	836.5	22.67	24.00	1.358	0.109	0.281	0.382	0.209	0.284
	LTE Band 5	10M	QPSK	25	0	Left Cheek	0mm	20525	836.5	21.47	24.00	1.791	0.013	0.212	0.380	0.156	0.279
	LTE Band 5	10M	QPSK	1	0	Left Tilted	0mm	20525	836.5	22.67	24.00	1.358	0.035	0.128	0.174	0.098	0.133
	LTE Band 5	10M	QPSK	25	0	Left Tilted	0mm	20525	836.5	21.47	24.00	1.791	-0.031	0.095	0.170	0.073	0.131
	LTE Band 7	20M	QPSK	1	0	Right Cheek	0mm	21350	2560	16.84	18.20	1.368	-0.062	0.041	0.056	0.014	0.019
	LTE Band 7	20M	QPSK	50	0	Right Cheek	0mm	21350	2560	16.81	18.20	1.377	0.041	0.042	0.058	0.015	0.021
	LTE Band 7	20M	QPSK	1	0	Right Tilted	0mm	21350	2560	16.84	18.20	1.368	-0.131	0.027	0.037	0.010	0.014
	LTE Band 7	20M	QPSK	50	0	Right Tilted	0mm	21350	2560	16.81	18.20	1.377	-0.04	0.028	0.039	0.010	0.014
	LTE Band 7	20M	QPSK	1	0	Left Cheek	0mm	21350	2560	16.84	18.20	1.368	0.072	0.081	0.111	0.043	0.059
07	LTE Band 7	20M	QPSK	50	0	Left Cheek	0mm	21350	2560	16.81	18.20	1.377	0.076	0.084	0.116	0.044	0.061
	LTE Band 7	20M	QPSK	1	0	Left Tilted	0mm	21350	2560	16.84	18.20	1.368	-0.088	0.021	0.029	0.008	0.011
	LTE Band 7	20M	QPSK	50	0	Left Tilted	0mm	21350	2560	16.81	18.20	1.377	0.145	0.020	0.028	0.008	0.010



<TDD LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
	LTE Band 41	20M	QPSK	1	0	Right Cheek	0mm	41490	2680	23.01	24.00	1.256	62.9	1.006	0.073	0.225	0.284	0.086	0.109
	LTE Band 41	20M	QPSK	50	0	Right Cheek	0mm	41490	2680	21.93	23.00	1.279	62.9	1.006	0.101	0.179	0.230	0.061	0.079
	LTE Band 41	20M	QPSK	1	0	Right Tilted	0mm	41490	2680	23.01	24.00	1.256	62.9	1.006	0.135	0.102	0.129	0.035	0.044
	LTE Band 41	20M	QPSK	50	0	Right Tilted	0mm	41490	2680	21.93	23.00	1.279	62.9	1.006	0.122	0.072	0.093	0.023	0.030
08	LTE Band 41	20M	QPSK	1	0	Left Cheek	0mm	41490	2680	23.01	24.00	1.256	62.9	1.006	0.162	0.313	0.395	0.161	0.203
	LTE Band 41	20M	QPSK	50	0	Left Cheek	0mm	41490	2680	21.93	23.00	1.279	62.9	1.006	0.111	0.249	0.320	0.118	0.152
	LTE Band 41	20M	QPSK	1	0	Left Tilted	0mm	41490	2680	23.01	24.00	1.256	62.9	1.006	0.145	0.051	0.064	0.019	0.024
	LTE Band 41	20M	QPSK	50	0	Left Tilted	0mm	41490	2680	21.93	23.00	1.279	62.9	1.006	0.11	0.046	0.059	0.020	0.026

<WLAN SAR>

Plot No.	Band	Modulation	Mode	Test Position	Gap (mm)	Chain	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
	WLAN2.4GHz	DSSS	802.11b 1Mbps	Right Cheek	0mm	Chain 0	1	2412	13.55	14.00	1.109	99.1	1.009	0	0.151	0.169	0.063	0.071
	WLAN2.4GHz	DSSS	802.11b 1Mbps	Right Tilted	0mm	Chain 0	1	2412	13.55	14.00	1.109	99.1	1.009	0.06	0.056	0.063	0.031	0.035
	WLAN2.4GHz	DSSS	802.11b 1Mbps	Left Cheek	0mm	Chain 0	1	2412	13.55	14.00	1.109	99.1	1.009	-0.07	0.319	0.357	0.159	0.178
	WLAN2.4GHz	DSSS	802.11b 1Mbps	Left Tilted	0mm	Chain 0	1	2412	13.55	14.00	1.109	99.1	1.009	-0.14	0.108	0.121	0.050	0.056
	WLAN2.4GHz	DSSS	802.11b 1Mbps	Right Cheek	0mm	Chain 1	1	2412	13.90	14.00	1.023	99.11	1.009	0.19	0.387	0.400	0.171	0.177
	WLAN2.4GHz	DSSS	802.11b 1Mbps	Right Cheek	0mm	Chain 1	6	2437	13.50	14.00	1.122	99.11	1.009	0.03	0.467	0.529	0.197	0.223
09	WLAN2.4GHz	DSSS	802.11b 1Mbps	Right Cheek	0mm	Chain 1	11	2462	13.64	14.00	1.086	99.11	1.009	0.12	0.488	0.535	0.206	0.226
	WLAN2.4GHz	DSSS	802.11b 1Mbps	Right Cheek	0mm	Chain 1	13	2472	12.69	12.75	1.014	99.11	1.009	-0.16	0.338	0.346	0.148	0.151
	WLAN2.4GHz	DSSS	802.11b 1Mbps	Right Tilted	0mm	Chain 1	1	2412	13.90	14.00	1.023	99.11	1.009	0.1	0.149	0.154	0.067	0.069
	WLAN2.4GHz	DSSS	802.11b 1Mbps	Left Cheek	0mm	Chain 1	1	2412	13.90	14.00	1.023	99.11	1.009	-0.07	0.120	0.124	0.063	0.065
	WLAN2.4GHz	DSSS	802.11b 1Mbps	Left Tilted	0mm	Chain 1	1	2412	13.90	14.00	1.023	99.11	1.009	-0.13	0.047	0.049	0.022	0.023
	WLAN5GHz	OFDM	802.11ac-VHT80 MCS0	Right Cheek	0mm	Chain 0	58	5290	9.52	10.00	1.117	93.44	1.070	-0.13	0.044	0.053	0.016	0.019
	WLAN5GHz	OFDM	802.11ac-VHT80 MCS0	Right Tilted	0mm	Chain 0	58	5290	9.52	10.00	1.117	93.44	1.070	0.01	0.016	0.019	0.006	0.007
	WLAN5GHz	OFDM	802.11ac-VHT80 MCS0	Left Cheek	0mm	Chain 0	58	5290	9.52	10.00	1.117	93.44	1.070	0.1	0.229	0.274	0.066	0.079
	WLAN5GHz	OFDM	802.11ac-VHT80 MCS0	Left Tilted	0mm	Chain 0	58	5290	9.52	10.00	1.117	93.44	1.070	0.1	0.117	0.140	0.041	0.049
10	WLAN5GHz	OFDM	802.11ac-VHT80 MCS0	Right Cheek	0mm	Chain 1	58	5290	9.48	10.00	1.127	93.44	1.070	0.11	0.285	0.344	0.069	0.083
	WLAN5GHz	OFDM	802.11ac-VHT80 MCS0	Right Tilted	0mm	Chain 1	58	5290	9.48	10.00	1.127	93.44	1.070	0.16	0.162	0.195	0.040	0.048
	WLAN5GHz	OFDM	802.11ac-VHT80 MCS0	Left Cheek	0mm	Chain 1	58	5290	9.48	10.00	1.127	93.44	1.070	-0.09	0.069	0.083	0.018	0.022
	WLAN5GHz	OFDM	802.11ac-VHT80 MCS0	Left Tilted	0mm	Chain 1	58	5290	9.48	10.00	1.127	93.44	1.070	-0.1	0.043	0.052	0.011	0.013
	WLAN5GHz	OFDM	802.11ac-VHT80 MCS0	Right Cheek	0mm	Chain 0	106	5530	9.61	10.00	1.094	93.44	1.070	-0.16	0.018	0.021	0.006	0.007
	WLAN5GHz	OFDM	802.11ac-VHT80 MCS0	Right Tilted	0mm	Chain 0	106	5530	9.61	10.00	1.094	93.44	1.070	-0.12	0.009	0.011	0.002	0.002
	WLAN5GHz	OFDM	802.11ac-VHT80 MCS0	Left Cheek	0mm	Chain 0	106	5530	9.61	10.00	1.094	93.44	1.070	-0.08	0.197	0.231	0.055	0.064
	WLAN5GHz	OFDM	802.11ac-VHT80 MCS0	Left Tilted	0mm	Chain 0	106	5530	9.61	10.00	1.094	93.44	1.070	-0.14	0.061	0.071	0.020	0.023
11	WLAN5GHz	OFDM	802.11ac-VHT80 MCS0	Right Cheek	0mm	Chain 1	106	5530	9.43	10.00	1.140	93.44	1.070	0.16	0.318	0.388	0.079	0.096
	WLAN5GHz	OFDM	802.11ac-VHT80 MCS0	Right Tilted	0mm	Chain 1	106	5530	9.43	10.00	1.140	93.44	1.070	0.12	0.174	0.212	0.043	0.052
	WLAN5GHz	OFDM	802.11ac-VHT80 MCS0	Left Cheek	0mm	Chain 1	106	5530	9.43	10.00	1.140	93.44	1.070	-0.13	0.097	0.118	0.027	0.033
	WLAN5GHz	OFDM	802.11ac-VHT80 MCS0	Left Tilted	0mm	Chain 1	106	5530	9.43	10.00	1.140	93.44	1.070	-0.19	0.051	0.062	0.016	0.020
	WLAN5GHz	OFDM	802.11ac-VHT80 MCS0	Right Cheek	0mm	Chain 0	155	5775	9.65	10.00	1.084	93.44	1.070	0.15	0.009	0.011	0.002	0.002
	WLAN5GHz	OFDM	802.11ac-VHT80 MCS0	Right Tilted	0mm	Chain 0	155	5775	9.65	10.00	1.084	93.44	1.070	0	0.001	0.001	0.001	0.001
	WLAN5GHz	OFDM	802.11ac-VHT80 MCS0	Left Cheek	0mm	Chain 0	155	5775	9.65	10.00	1.084	93.44	1.070	-0.12	0.070	0.081	0.022	0.026
	WLAN5GHz	OFDM	802.11ac-VHT80 MCS0	Left Tilted	0mm	Chain 0	155	5775	9.65	10.00	1.084	93.44	1.070	-0.19	0.039	0.045	0.009	0.011
12	WLAN5GHz	OFDM	802.11ac-VHT80 MCS0	Right Cheek	0mm	Chain 1	155	5775	9.63	10.00	1.089	93.44	1.070	0.12	0.307	0.358	0.076	0.089
	WLAN5GHz	OFDM	802.11ac-VHT80 MCS0	Right Tilted	0mm	Chain 1	155	5775	9.63	10.00	1.089	93.44	1.070	0.18	0.171	0.199	0.041	0.048
	WLAN5GHz	OFDM	802.11ac-VHT80 MCS0	Left Cheek	0mm	Chain 1	155	5775	9.63	10.00	1.089	93.44	1.070	0	0.153	0.178	0.040	0.047
	WLAN5GHz	OFDM	802.11ac-VHT80 MCS0	Left Tilted	0mm	Chain 1	155	5775	9.63	10.00	1.089	93.44	1.070	-0.05	0.108	0.126	0.029	0.034



15.2 Phablet SAR Test Considerations

Plot No.	Band	Modulation	Mode	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WCDMA II	QPSK	RMC 12.2Kbps	Bottom Side	10mm	ON	9538	1907.6	18.91	21.50	1.816	-0.13	0.445	0.808

General Note:

- When hotspot mode is enabled, power reduction will be activated to limit the maximum output power of WCDMA B2. The scaled SAR above is used to determine the phablet SAR test reduction, not for reporting
- Per KDB648474 D04v01r02, for smart phones with a display diagonal dimension > 15.0 cm or an overall diagonal dimension > 16.0 cm, when hotspot mode applies, 10-g extremity 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.
- Extremity SAR test is not required as all hotspot mode 1-g reported SAR is ≤ 1.2 W/kg

15.3 Hotspot SAR

<GSM SAR>

Plot No.	Band	Modulation	Mode	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
	GSM850	GMSK	GPRS (4 Tx slots)	Front	10mm	251	848.8	27.46	27.70	1.057	-0.003	0.326	0.345	0.247	0.261
13	GSM850	GMSK	GPRS (4 Tx slots)	Back	10mm	251	848.8	27.46	27.70	1.057	-0.013	0.396	0.418	0.296	0.313
	GSM850	GMSK	GPRS (4 Tx slots)	Left Side	10mm	251	848.8	27.46	27.70	1.057	-0.012	0.197	0.208	0.134	0.142
	GSM850	GMSK	GPRS (4 Tx slots)	Right Side	10mm	251	848.8	27.46	27.70	1.057	-0.037	0.343	0.362	0.218	0.230
	GSM850	GMSK	GPRS (4 Tx slots)	Bottom Side	10mm	251	848.8	27.46	27.70	1.057	-0.17	0.063	0.067	0.033	0.035
	GSM1900	GMSK	GPRS (2 Tx slots)	Front	10mm	810	1909.8	25.63	25.70	1.016	-0.03	0.333	0.338	0.167	0.170
	GSM1900	GMSK	GPRS (2 Tx slots)	Back	10mm	810	1909.8	25.63	25.70	1.016	-0.093	0.339	0.345	0.170	0.173
	GSM1900	GMSK	GPRS (2 Tx slots)	Left Side	10mm	810	1909.8	25.63	25.70	1.016	-0.059	0.120	0.122	0.069	0.070
	GSM1900	GMSK	GPRS (2 Tx slots)	Right Side	10mm	810	1909.8	25.63	25.70	1.016	-0.04	0.024	0.024	0.009	0.009
43	GSM1900	GMSK	GPRS (2 Tx slots)	Bottom Side	10mm	810	1909.8	25.63	25.70	1.016	-0.021	0.545	0.554	0.282	0.287

<WCDMA SAR>

Plot No.	Band	Modulation	Mode	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
	WCDMA V	QPSK	RMC 12.2Kbps	Front	10mm	4233	846.6	24.64	24.70	1.014	-0.008	0.402	0.408	0.305	0.309
	WCDMA V	QPSK	RMC 12.2Kbps	Back	10mm	4233	846.6	24.64	24.70	1.014	-0.011	0.449	0.455	0.339	0.344
	WCDMA V	QPSK	RMC 12.2Kbps	Left Side	10mm	4233	846.6	24.64	24.70	1.014	0.001	0.135	0.137	0.095	0.096
15	WCDMA V	QPSK	RMC 12.2Kbps	Right Side	10mm	4233	846.6	24.64	24.70	1.014	-0.04	0.522	0.529	0.350	0.355
	WCDMA V	QPSK	RMC 12.2Kbps	Bottom Side	10mm	4233	846.6	24.64	24.70	1.014	-0.139	0.058	0.059	0.031	0.031
	WCDMA II	QPSK	RMC 12.2Kbps	Front	10mm	9538	1907.6	18.91	19.00	1.021	0.02	0.346	0.353	0.177	0.181
	WCDMA II	QPSK	RMC 12.2Kbps	Back	10mm	9538	1907.6	18.91	19.00	1.021	-0.13	0.330	0.337	0.166	0.169
	WCDMA II	QPSK	RMC 12.2Kbps	Left Side	10mm	9538	1907.6	18.91	19.00	1.021	-0.13	0.104	0.106	0.063	0.064
	WCDMA II	QPSK	RMC 12.2Kbps	Right Side	10mm	9538	1907.6	18.91	19.00	1.021	0.07	0.013	0.013	0.006	0.006
16	WCDMA II	QPSK	RMC 12.2Kbps	Bottom Side	10mm	9538	1907.6	18.91	19.00	1.021	-0.13	0.445	0.454	0.240	0.245



<FDD LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
	LTE Band 17	10M	QPSK	1	0	Front	10mm	23790	710	22.73	24.00	1.340	-0.113	0.287	0.384	0.220	0.295
	LTE Band 17	10M	QPSK	25	0	Front	10mm	23790	710	21.63	23.00	1.371	-0.08	0.217	0.297	0.166	0.228
17	LTE Band 17	10M	QPSK	1	0	Back	10mm	23790	710	22.73	24.00	1.340	-0.098	0.326	0.437	0.246	0.330
	LTE Band 17	10M	QPSK	25	0	Back	10mm	23790	710	21.63	23.00	1.371	-0.067	0.258	0.354	0.193	0.265
	LTE Band 17	10M	QPSK	1	0	Left Side	10mm	23790	710	22.73	24.00	1.340	-0.113	0.158	0.212	0.113	0.151
	LTE Band 17	10M	QPSK	25	0	Left Side	10mm	23790	710	21.63	23.00	1.371	-0.114	0.122	0.167	0.087	0.119
	LTE Band 17	10M	QPSK	1	0	Right Side	10mm	23790	710	22.73	24.00	1.340	-0.062	0.223	0.299	0.155	0.208
	LTE Band 17	10M	QPSK	25	0	Right Side	10mm	23790	710	21.63	23.00	1.371	-0.066	0.178	0.244	0.123	0.169
	LTE Band 17	10M	QPSK	1	0	Bottom Side	10mm	23790	710	22.73	24.00	1.340	-0.182	0.048	0.064	0.028	0.038
	LTE Band 17	10M	QPSK	25	0	Bottom Side	10mm	23790	710	21.63	23.00	1.371	-0.177	0.040	0.055	0.023	0.032
	LTE Band 5	10M	QPSK	1	0	Front	10mm	20525	836.5	22.67	24.00	1.358	-0.038	0.344	0.467	0.262	0.356
	LTE Band 5	10M	QPSK	25	0	Front	10mm	20525	836.5	21.47	23.00	1.422	-0.073	0.255	0.363	0.194	0.276
	LTE Band 5	10M	QPSK	1	0	Back	10mm	20525	836.5	22.67	24.00	1.358	0.045	0.420	0.570	0.286	0.388
	LTE Band 5	10M	QPSK	25	0	Back	10mm	20525	836.5	21.47	23.00	1.422	0.001	0.315	0.448	0.233	0.331
	LTE Band 5	10M	QPSK	1	0	Left Side	10mm	20525	836.5	22.67	24.00	1.358	-0.1	0.163	0.221	0.116	0.158
	LTE Band 5	10M	QPSK	25	0	Left Side	10mm	20525	836.5	21.47	23.00	1.422	-0.04	0.119	0.169	0.084	0.119
18	LTE Band 5	10M	QPSK	1	0	Right Side	10mm	20525	836.5	22.67	24.00	1.358	-0.092	0.442	0.600	0.296	0.402
	LTE Band 5	10M	QPSK	25	0	Right Side	10mm	20525	836.5	21.47	23.00	1.422	-0.004	0.335	0.476	0.225	0.320
	LTE Band 5	10M	QPSK	1	0	Bottom Side	10mm	20525	836.5	22.67	24.00	1.358	-0.113	0.041	0.056	0.021	0.029
	LTE Band 5	10M	QPSK	25	0	Bottom Side	10mm	20525	836.5	21.47	23.00	1.422	-0.077	0.032	0.046	0.017	0.024
	LTE Band 7	20M	QPSK	1	0	Front	10mm	21350	2560	16.84	18.20	1.368	0.012	0.117	0.160	0.054	0.074
	LTE Band 7	20M	QPSK	50	0	Front	10mm	21350	2560	16.81	18.20	1.377	-0.015	0.117	0.161	0.054	0.074
	LTE Band 7	20M	QPSK	1	0	Back	10mm	21350	2560	16.84	18.20	1.368	-0.015	0.147	0.201	0.066	0.090
	LTE Band 7	20M	QPSK	50	0	Back	10mm	21350	2560	16.81	18.20	1.377	-0.029	0.133	0.183	0.069	0.095
	LTE Band 7	20M	QPSK	1	0	Left Side	10mm	21350	2560	16.84	18.20	1.368	-0.078	0.097	0.133	0.050	0.068
	LTE Band 7	20M	QPSK	50	0	Left Side	10mm	21350	2560	16.81	18.20	1.377	-0.097	0.109	0.150	0.055	0.076
	LTE Band 7	20M	QPSK	1	0	Right Side	10mm	21350	2560	16.84	18.20	1.368	-0.089	0.009	0.012	0.004	0.006
	LTE Band 7	20M	QPSK	50	0	Right Side	10mm	21350	2560	16.81	18.20	1.377	-0.146	0.010	0.013	0.005	0.007
	LTE Band 7	20M	QPSK	1	0	Bottom Side	10mm	21350	2560	16.84	18.20	1.368	-0.1	0.193	0.264	0.086	0.118
19	LTE Band 7	20M	QPSK	50	0	Bottom Side	10mm	21350	2560	16.81	18.20	1.377	-0.14	0.194	0.267	0.086	0.118



<TDD LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
	LTE Band 41	20M	QPSK	1	0	Front	10mm	41490	2680	23.01	24.00	1.256	62.9	1.006	0.1	0.427	0.540	0.195	0.246
	LTE Band 41	20M	QPSK	50	0	Front	10mm	41490	2680	21.93	23.00	1.279	62.9	1.006	0.014	0.323	0.416	0.146	0.188
	LTE Band 41	20M	QPSK	1	0	Back	10mm	41490	2680	23.01	24.00	1.256	62.9	1.006	-0.074	0.477	0.603	0.214	0.270
	LTE Band 41	20M	QPSK	1	0	Back	10mm	39750	2506	22.73	24.00	1.340	62.9	1.006	-0.095	0.316	0.426	0.150	0.202
	LTE Band 41	20M	QPSK	1	0	Back	10mm	40185	2549.5	22.67	24.00	1.358	62.9	1.006	-0.152	0.326	0.445	0.152	0.208
	LTE Band 41	20M	QPSK	1	0	Back	10mm	40620	2593	22.76	24.00	1.330	62.9	1.006	-0.027	0.400	0.535	0.184	0.246
	LTE Band 41	20M	QPSK	1	0	Back	10mm	41055	2636.5	22.90	24.00	1.288	62.9	1.006	-0.063	0.448	0.581	0.203	0.263
	LTE Band 41	20M	QPSK	50	0	Back	10mm	41490	2680	21.93	23.00	1.279	62.9	1.006	-0.03	0.337	0.434	0.148	0.190
	LTE Band 41	20M	QPSK	100	0	Back	10mm	41490	2680	21.95	23.00	1.274	62.9	1.006	-0.01	0.332	0.425	0.146	0.187
	LTE Band 41	20M	QPSK	1	0	Left Side	10mm	41490	2680	23.01	24.00	1.256	62.9	1.006	-0.116	0.363	0.459	0.181	0.229
	LTE Band 41	20M	QPSK	50	0	Left Side	10mm	41490	2680	21.93	23.00	1.279	62.9	1.006	-0.137	0.288	0.371	0.141	0.181
	LTE Band 41	20M	QPSK	1	0	Right Side	10mm	41490	2680	23.01	24.00	1.256	62.9	1.006	-0.129	0.041	0.052	0.019	0.024
	LTE Band 41	20M	QPSK	50	0	Right Side	10mm	41490	2680	21.93	23.00	1.279	62.9	1.006	-0.06	0.027	0.035	0.011	0.014
	LTE Band 41	20M	QPSK	1	0	Bottom Side	10mm	41490	2680	23.01	24.00	1.256	62.9	1.006	-0.017	0.588	0.743	0.264	0.334
	LTE Band 41	20M	QPSK	1	0	Bottom Side	10mm	39750	2506	22.73	24.00	1.340	62.9	1.006	-0.051	0.422	0.569	0.204	0.275
	LTE Band 41	20M	QPSK	1	0	Bottom Side	10mm	40185	2549.5	22.67	24.00	1.358	62.9	1.006	-0.066	0.466	0.637	0.223	0.305
	LTE Band 41	20M	QPSK	1	0	Bottom Side	10mm	40620	2593	22.76	24.00	1.330	62.9	1.006	0.01	0.573	0.767	0.268	0.359
20	LTE Band 41	20M	QPSK	1	0	Bottom Side	10mm	41055	2636.5	22.90	24.00	1.288	62.9	1.006	-0.073	0.608	0.788	0.285	0.369
	LTE Band 41	20M	QPSK	50	0	Bottom Side	10mm	41490	2680	21.93	23.00	1.279	62.9	1.006	-0.022	0.463	0.596	0.221	0.284
	LTE Band 41	20M	QPSK	100	0	Bottom Side	10mm	41490	2680	21.95	23.00	1.274	62.9	1.006	-0.036	0.460	0.589	0.215	0.275

<WLAN SAR>

Plot No.	Band	Modulation	Mode	Test Position	Gap (mm)	Chain	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
	WLAN2.4GHz	DSSS	802.11b 1Mbps	Front	10mm	Chain 0	1	2412	13.55	14.00	1.109	99.1	1.009	-0.16	0.061	0.068	0.035	0.039
21	WLAN2.4GHz	DSSS	802.11b 1Mbps	Back	10mm	Chain 0	1	2412	13.55	14.00	1.109	99.1	1.009	-0.11	0.081	0.091	0.046	0.051
	WLAN2.4GHz	DSSS	802.11b 1Mbps	Back	10mm	Chain 0	6	2437	13.49	14.00	1.125	99.1	1.009	-0.14	0.043	0.049	0.021	0.024
	WLAN2.4GHz	DSSS	802.11b 1Mbps	Back	10mm	Chain 0	11	2462	13.21	14.00	1.199	99.1	1.009	-0.13	0.052	0.063	0.025	0.030
	WLAN2.4GHz	DSSS	802.11b 1Mbps	Left Side	10mm	Chain 0	1	2412	13.55	14.00	1.109	99.1	1.009	-0.14	0.003	0.003	0.001	0.001
	WLAN2.4GHz	DSSS	802.11b 1Mbps	Right Side	10mm	Chain 0	1	2412	13.55	14.00	1.109	99.1	1.009	-0.19	0.023	0.026	0.009	0.010
	WLAN2.4GHz	DSSS	802.11b 1Mbps	Top Side	10mm	Chain 0	1	2412	13.55	14.00	1.109	99.1	1.009	-0.18	0.019	0.021	0.009	0.010
	WLAN2.4GHz	DSSS	802.11b 1Mbps	Front	10mm	Chain 1	1	2412	13.90	14.00	1.023	99.11	1.009	-0.07	0.063	0.065	0.031	0.032
	WLAN2.4GHz	DSSS	802.11b 1Mbps	Back	10mm	Chain 1	1	2412	13.90	14.00	1.023	99.11	1.009	-0.18	0.044	0.045	0.022	0.023
	WLAN2.4GHz	DSSS	802.11b 1Mbps	Left Side	10mm	Chain 1	1	2412	13.90	14.00	1.023	99.11	1.009	-0.17	0.028	0.029	0.011	0.011
	WLAN2.4GHz	DSSS	802.11b 1Mbps	Right Side	10mm	Chain 1	1	2412	13.90	14.00	1.023	99.11	1.009	0	0.001	0.001	0.001	0.001
	WLAN2.4GHz	DSSS	802.11b 1Mbps	Top Side	10mm	Chain 1	1	2412	13.90	14.00	1.023	99.11	1.009	-0.1	0.010	0.010	0.004	0.004



15.4 Body Worn Accessory SAR

<GSM SAR>

Plot No.	Band	Modulation	Mode	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
	GSM850	GMSK	GPRS (4 Tx slots)	Front	15mm	251	848.8	27.46	27.70	1.057	-0.07	0.284	0.300	0.215	0.227
22	GSM850	GMSK	GPRS (4 Tx slots)	Back	15mm	251	848.8	27.46	27.70	1.057	-0.029	0.305	0.322	0.223	0.236
	GSM1900	GMSK	GPRS (2 Tx slots)	Front	15mm	810	1909.8	25.63	25.70	1.016	-0.159	0.136	0.138	0.074	0.075
23	GSM1900	GMSK	GPRS (2 Tx slots)	Back	15mm	810	1909.8	25.63	25.70	1.016	-0.049	0.153	0.155	0.082	0.083

<WCDMA SAR>

Plot No.	Band	Modulation	Mode	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
	WCDMA V	QPSK	RMC 12.2Kbps	Front	15mm	4233	846.6	24.64	24.70	1.014	-0.051	0.374	0.379	0.283	0.287
24	WCDMA V	QPSK	RMC 12.2Kbps	Back	15mm	4233	846.6	24.64	24.70	1.014	0.005	0.396	0.402	0.304	0.308
	WCDMA II	QPSK	RMC 12.2Kbps	Front	15mm	9538	1907.6	21.50	21.50	1.000	0.01	0.243	0.243	0.135	0.135
25	WCDMA II	QPSK	RMC 12.2Kbps	Back	15mm	9538	1907.6	21.50	21.50	1.000	-0.13	0.272	0.272	0.150	0.150

<FDD LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
	LTE Band 17	10M	QPSK	1	0	Front	15mm	23790	710	22.73	24.00	1.340	0.008	0.234	0.313	0.180	0.241
	LTE Band 17	10M	QPSK	25	0	Front	15mm	23790	710	21.63	23.00	1.371	-0.065	0.185	0.254	0.142	0.195
26	LTE Band 17	10M	QPSK	1	0	Back	15mm	23790	710	22.73	24.00	1.340	-0.011	0.270	0.362	0.206	0.276
	LTE Band 17	10M	QPSK	25	0	Back	15mm	23790	710	21.63	23.00	1.371	-0.046	0.210	0.288	0.161	0.221
	LTE Band 5	10M	QPSK	1	0	Front	15mm	20525	836.5	22.67	24.00	1.358	-0.052	0.298	0.405	0.229	0.311
	LTE Band 5	10M	QPSK	25	0	Front	15mm	20525	836.5	21.47	23.00	1.422	-0.01	0.224	0.319	0.171	0.243
27	LTE Band 5	10M	QPSK	1	0	Back	15mm	20525	836.5	22.67	24.00	1.358	0.083	0.338	0.459	0.255	0.346
	LTE Band 5	10M	QPSK	25	0	Back	15mm	20525	836.5	21.47	23.00	1.422	-0.046	0.250	0.356	0.190	0.270
	LTE Band 7	20M	QPSK	1	0	Front	15mm	21350	2560	16.84	18.20	1.368	-0.105	0.056	0.077	0.030	0.041
	LTE Band 7	20M	QPSK	50	0	Front	15mm	21350	2560	16.81	18.20	1.377	0.078	0.060	0.083	0.030	0.041
	LTE Band 7	20M	QPSK	1	0	Back	15mm	21350	2560	16.84	18.20	1.368	-0.123	0.059	0.081	0.029	0.040
28	LTE Band 7	20M	QPSK	50	0	Back	15mm	21350	2560	16.81	18.20	1.377	-0.126	0.065	0.090	0.034	0.047



<TDD LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
29	LTE Band 41	20M	QPSK	1	0	Front	15mm	41490	2680	23.01	24.00	1.256	62.9	1.006	0.088	0.189	0.239	0.090	0.114
	LTE Band 41	20M	QPSK	50	0	Front	15mm	41490	2680	21.93	23.00	1.279	62.9	1.006	-0.095	0.144	0.185	0.069	0.089
	LTE Band 41	20M	QPSK	1	0	Back	15mm	41490	2680	23.01	24.00	1.256	62.9	1.006	-0.187	0.186	0.235	0.089	0.112
	LTE Band 41	20M	QPSK	50	0	Back	15mm	41490	2680	21.93	23.00	1.279	62.9	1.006	-0.142	0.140	0.180	0.068	0.088

<WLAN SAR>

Plot No.	Band	Modulation	Mode	Test Position	Gap (mm)	Chain	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
	WLAN2.4GHz	DSSS	802.11b 1Mbps	Front	15mm	Chain 0	1	2412	13.55	14.00	1.109	99.1	1.009	-0.19	0.035	0.039	0.019	0.021
30	WLAN2.4GHz	DSSS	802.11b 1Mbps	Back	15mm	Chain 0	1	2412	13.55	14.00	1.109	99.1	1.009	-0.18	0.043	0.048	0.024	0.027
	WLAN2.4GHz	DSSS	802.11b 1Mbps	Back	15mm	Chain 0	6	2437	13.49	14.00	1.125	99.1	1.009	-0.13	0.021	0.024	0.011	0.012
	WLAN2.4GHz	DSSS	802.11b 1Mbps	Back	15mm	Chain 0	11	2462	13.21	14.00	1.199	99.1	1.009	-0.13	0.022	0.027	0.011	0.013
	WLAN2.4GHz	DSSS	802.11b 1Mbps	Back	15mm	Chain 0	13	2402	13.21	13.25	1.009	99.1	1.009	0.15	0.022	0.022	0.012	0.012
	WLAN2.4GHz	DSSS	802.11b 1Mbps	Front	15mm	Chain 1	1	2412	13.90	14.00	1.023	99.11	1.009	-0.1	0.021	0.022	0.010	0.010
	WLAN2.4GHz	DSSS	802.11b 1Mbps	Back	15mm	Chain 1	1	2412	13.90	14.00	1.023	99.11	1.009	-0.13	0.014	0.014	0.005	0.005
	WLAN5GHz	OFDM	802.11ac-VHT80 MCS0	Front	15mm	Chain 0	58	5290	9.52	10.00	1.117	93.44	1.070	-0.08	0.009	0.010	0.003	0.004
	WLAN5GHz	OFDM	802.11ac-VHT80 MCS0	Back	15mm	Chain 0	58	5290	9.52	10.00	1.117	93.44	1.070	0.02	0.012	0.014	0.004	0.005
31	WLAN5GHz	OFDM	802.11ac-VHT80 MCS0	Front	15mm	Chain 1	58	5290	9.48	10.00	1.127	93.44	1.070	-0.07	0.026	0.031	0.009	0.010
	WLAN5GHz	OFDM	802.11ac-VHT80 MCS0	Back	15mm	Chain 1	58	5290	9.48	10.00	1.127	93.44	1.070	0	0.017	0.021	0.007	0.008
	WLAN5GHz	OFDM	802.11ac-VHT80 MCS0	Front	15mm	Chain 0	106	5530	9.61	10.00	1.094	93.44	1.070	-0.19	0.021	0.025	0.009	0.011
	WLAN5GHz	OFDM	802.11ac-VHT80 MCS0	Back	15mm	Chain 0	106	5530	9.61	10.00	1.094	93.44	1.070	-0.09	0.019	0.022	0.008	0.009
32	WLAN5GHz	OFDM	802.11ac-VHT80 MCS0	Front	15mm	Chain 1	106	5530	9.43	10.00	1.140	93.44	1.070	0.14	0.031	0.038	0.011	0.013
	WLAN5GHz	OFDM	802.11ac-VHT80 MCS0	Back	15mm	Chain 1	106	5530	9.43	10.00	1.140	93.44	1.070	0.03	0.019	0.023	0.007	0.009
	WLAN5GHz	OFDM	802.11ac-VHT80 MCS0	Front	15mm	Chain 0	155	5725	9.65	10.00	1.084	93.44	1.070	0.03	0.009	0.010	0.003	0.004
	WLAN5GHz	OFDM	802.11ac-VHT80 MCS0	Back	15mm	Chain 0	155	5725	9.65	10.00	1.084	93.44	1.070	-0.07	0.006	0.007	0.004	0.005
	WLAN5GHz	OFDM	802.11ac-VHT80 MCS0	Front	15mm	Chain 1	155	5725	9.63	10.00	1.089	93.44	1.070	-0.09	0.025	0.029	0.009	0.011
33	WLAN5GHz	OFDM	802.11ac-VHT80 MCS0	Back	15mm	Chain 1	155	5725	9.63	10.00	1.089	93.44	1.070	0.19	0.025	0.029	0.011	0.013

16. Simultaneous Transmission Analysis

NO.	Simultaneous Transmission Configurations	Portable Handset			Note
		Head	Body-worn	Hotspot	
1.	GSM Voice + WLAN2.4GHz	Yes	Yes		
2.	GPRS/EDGE + WLAN2.4GHz	Yes	Yes	Yes	Hotspot
3.	WCDMA + WLAN2.4GHz	Yes	Yes	Yes	Hotspot
4.	LTE + WLAN2.4GHz	Yes	Yes	Yes	Hotspot
5.	GSM Voice + Bluetooth		Yes		
6.	GPRS/EDGE + Bluetooth		Yes		WWAN VoIP
7.	WCDMA+ Bluetooth		Yes		WWAN VoIP
8.	LTE + Bluetooth		Yes		WWAN VoIP
9.	GSM Voice + WLAN5GHz	Yes	Yes		
10.	GPRS/EDGE + WLAN5GHz	Yes	Yes		WWAN VoIP
11.	WCDMA + WLAN5GHz	Yes	Yes		WWAN VoIP
12.	LTE + WLAN5GHz	Yes	Yes		WWAN VoIP
13.	GSM Voice + WLAN5GHz + Bluetooth		Yes		
14.	GPRS/EDGE + WLAN5GHz + Bluetooth		Yes		
15.	WCDMA + WLAN5GHz + Bluetooth		Yes		
16.	LTE + WLAN5GHz + Bluetooth		Yes		
17.	WLAN Chain 0 + WLAN Chain 1	Yes	Yes	Yes	

General Note:

- The worst case WLAN reported SAR for each configuration was used for SAR summation. Therefore, the following summations represent the absolute worst cases for simultaneous transmission with WLAN.
- For WLAN, the transmit power of each chain transmit power in SISO mode is equal or higher than that in MIMO operation, and the assessment for MIMO mode can be performed in the simultaneous transmission analysis of standalone SAR of each chain tested in SISO mode. In this report, the assessment was performed in the simultaneous transmission analysis of WWAN and WLAN transmitters.
- EUT will choose either WLAN 2.4GHz or WLAN 5GHz according to the network signal condition; therefore, 2.4GHz WLAN and 5GHz WLAN will not operate simultaneously at any moment.
- Standalone SAR in the same exposure positions are summed
- Per KDB 447498 D01v05r02, simultaneous transmission SAR is compliant if,
 - Scalar SAR summation < 1.6W/kg.
 - $SPLSR = (SAR1 + SAR2)^{1.5} / (\text{min. separation distance, mm})$, and the peak separation distance is determined from the square root of $[(x1-x2)^2 + (y1-y2)^2 + (z1-z2)^2]$, where (x1, y1, z1) and (x2, y2, z2) are the coordinates of the extrapolated peak SAR locations in the zoom scan.
 - If $SPLSR \leq 0.04$, simultaneously transmission SAR measurement is not necessary.
 - Simultaneously transmission SAR measurement, and the reported multi-band SAR < 1.6W/kg.
- For simultaneous transmission analysis, Bluetooth SAR is estimated per KDB 447498 D01v05r02 based on the formula below.
 - $(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm}) \cdot [\sqrt{f(\text{GHz})} / x] \text{ W/kg}$ for test separation distances $\leq 50 \text{ mm}$; where $x = 7.5$ for 1-g SAR, and $x = 18.75$ for 10-g SAR.
 - When the minimum separation distance is < 5mm, the distance is used 5mm to determine SAR test exclusion.
 - 0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the test separation distances is > 50 mm.

Bluetooth Max Power	Exposure Position	Body-worn
	Test separation	15 mm
11.5dBm	Estimated 1g SAR (W/kg)	0.196 W/kg



16.1 Head Exposure Conditions

WWAN Band	Exposure Position	1	2	3	5	6	1+2+3 Summed 1g SAR (W/kg)	1+5+6 Summed 1g SAR (W/kg)	
		WWAN	2.4GHz WLAN Chan 0	2.4GHz WLAN Chan 1	5GHz WLAN Chan 0	5GHz WLAN Chan 1			
		1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)			
GSM	GSM850	Right Cheek	0.273	0.169	0.535	0.053	0.388	0.98	0.71
		Right Tilted	0.098	0.063	0.154	0.019	0.212	0.32	0.33
		Left Cheek	0.318	0.357	0.124	0.274	0.178	0.80	0.77
		Left Tilted	0.126	0.121	0.049	0.140	0.126	0.30	0.39
	GSM1900	Right Cheek	0.055	0.169	0.535	0.053	0.388	0.76	0.50
		Right Tilted	0.016	0.063	0.154	0.019	0.212	0.23	0.25
		Left Cheek	0.101	0.357	0.124	0.274	0.178	0.58	0.55
		Left Tilted	0.039	0.121	0.049	0.140	0.126	0.21	0.31
WCDMA	WCDMA V	Right Cheek	0.266	0.169	0.535	0.053	0.388	0.97	0.71
		Right Tilted	0.188	0.063	0.154	0.019	0.212	0.41	0.42
		Left Cheek	0.295	0.357	0.124	0.274	0.178	0.78	0.75
		Left Tilted	0.174	0.121	0.049	0.140	0.126	0.34	0.44
	WCDMA II	Right Cheek	0.103	0.169	0.535	0.053	0.388	0.81	0.54
		Right Tilted	0.073	0.063	0.154	0.019	0.212	0.29	0.30
		Left Cheek	0.194	0.357	0.124	0.274	0.178	0.68	0.65
		Left Tilted	0.065	0.121	0.049	0.140	0.126	0.24	0.33
LTE	LTE Band 17	Right Cheek	0.192	0.169	0.535	0.053	0.388	0.90	0.63
		Right Tilted	0.078	0.063	0.154	0.019	0.212	0.30	0.31
		Left Cheek	0.169	0.357	0.124	0.274	0.178	0.65	0.62
		Left Tilted	0.071	0.121	0.049	0.140	0.126	0.24	0.34
	LTE Band 5	Right Cheek	0.344	0.169	0.535	0.053	0.388	1.05	0.79
		Right Tilted	0.175	0.063	0.154	0.019	0.212	0.39	0.41
		Left Cheek	0.382	0.357	0.124	0.274	0.178	0.86	0.83
		Left Tilted	0.174	0.121	0.049	0.140	0.126	0.34	0.44
	LTE Band 7	Right Cheek	0.058	0.169	0.535	0.053	0.388	0.76	0.50
		Right Tilted	0.039	0.063	0.154	0.019	0.212	0.26	0.27
		Left Cheek	0.116	0.357	0.124	0.274	0.178	0.60	0.57
		Left Tilted	0.029	0.121	0.049	0.140	0.126	0.20	0.30
	LTE Band 41	Right Cheek	0.284	0.169	0.535	0.053	0.388	0.99	0.73
		Right Tilted	0.129	0.063	0.154	0.019	0.212	0.35	0.36
		Left Cheek	0.395	0.357	0.124	0.274	0.178	0.88	0.85
		Left Tilted	0.064	0.121	0.049	0.140	0.126	0.23	0.33



WWAN Band		Exposure Position	1	2	3	5	6	1+2+3 Summed 10g SAR (W/kg)	1+5+6 Summed 10g SAR (W/kg)
			WWAN 10g SAR (W/kg)	2.4GHz WLAN Chan 0 10g SAR (W/kg)	2.4GHz WLAN Chan 1 10g SAR (W/kg)	5GHz WLAN Chan 0 10g SAR (W/kg)	5GHz WLAN Chan 1 10g SAR (W/kg)		
GSM	GSM850	Right Cheek	0.207	0.071	0.226	0.019	0.096	0.50	0.32
		Right Tilted	0.075	0.035	0.069	0.007	0.052	0.18	0.13
		Left Cheek	0.238	0.178	0.065	0.079	0.047	0.48	0.36
		Left Tilted	0.093	0.056	0.023	0.049	0.034	0.17	0.18
	GSM1900	Right Cheek	0.036	0.071	0.226	0.019	0.096	0.33	0.15
		Right Tilted	0.008	0.035	0.069	0.007	0.052	0.11	0.07
		Left Cheek	0.060	0.178	0.065	0.079	0.047	0.30	0.19
		Left Tilted	0.021	0.056	0.023	0.049	0.034	0.10	0.10
WCDMA	WCDMA V	Right Cheek	0.200	0.071	0.226	0.019	0.096	0.50	0.32
		Right Tilted	0.114	0.035	0.069	0.007	0.052	0.22	0.17
		Left Cheek	0.220	0.178	0.065	0.079	0.047	0.46	0.35
		Left Tilted	0.108	0.056	0.023	0.049	0.034	0.19	0.19
	WCDMA II	Right Cheek	0.064	0.071	0.226	0.019	0.096	0.36	0.18
		Right Tilted	0.040	0.035	0.069	0.007	0.052	0.14	0.10
		Left Cheek	0.117	0.178	0.065	0.079	0.047	0.36	0.24
		Left Tilted	0.037	0.056	0.023	0.049	0.034	0.12	0.12
LTE	LTE Band 17	Right Cheek	0.150	0.071	0.226	0.019	0.096	0.45	0.27
		Right Tilted	0.054	0.035	0.069	0.007	0.052	0.16	0.11
		Left Cheek	0.131	0.178	0.065	0.079	0.047	0.37	0.26
		Left Tilted	0.048	0.056	0.023	0.049	0.034	0.13	0.13
	LTE Band 5	Right Cheek	0.262	0.071	0.226	0.019	0.096	0.56	0.38
		Right Tilted	0.131	0.035	0.069	0.007	0.052	0.24	0.19
		Left Cheek	0.284	0.178	0.065	0.079	0.047	0.53	0.41
		Left Tilted	0.133	0.056	0.023	0.049	0.034	0.21	0.22
	LTE Band 7	Right Cheek	0.021	0.071	0.226	0.019	0.096	0.32	0.14
		Right Tilted	0.014	0.035	0.069	0.007	0.052	0.12	0.07
		Left Cheek	0.061	0.178	0.065	0.079	0.047	0.30	0.19
		Left Tilted	0.011	0.056	0.023	0.049	0.034	0.09	0.09
	LTE Band 41	Right Cheek	0.109	0.071	0.226	0.019	0.096	0.41	0.22
		Right Tilted	0.044	0.035	0.069	0.007	0.052	0.15	0.10
		Left Cheek	0.203	0.178	0.065	0.079	0.047	0.45	0.33
		Left Tilted	0.026	0.056	0.023	0.049	0.034	0.11	0.11



16.2 Hotspot Exposure Conditions

WWAN Band		Exposure Position	1	2	3	1+2+3 Summed 1g SAR (W/kg)
			WWAN 1g SAR (W/kg)	2.4GHz WLAN Chan 0 1g SAR (W/kg)	2.4GHz WLAN Chan 1 1g SAR (W/kg)	
GSM	GSM850	Front	0.345	0.068	0.065	0.48
		Back	0.418	0.091	0.045	0.55
		Left side	0.208	0.003	0.029	0.24
		Right side	0.362	0.026	0.001	0.39
		Top side		0.021	0.010	0.03
		Bottom side	0.067			0.07
	GSM1900	Front	0.338	0.068	0.065	0.47
		Back	0.345	0.091	0.045	0.48
		Left side	0.122	0.003	0.029	0.15
		Right side	0.024	0.026	0.001	0.05
		Top side		0.021	0.010	0.03
		Bottom side	0.554			0.55
WCDMA	WCDMA V	Front	0.408	0.068	0.065	0.54
		Back	0.455	0.091	0.045	0.59
		Left side	0.137	0.003	0.029	0.17
		Right side	0.529	0.026	0.001	0.56
		Top side		0.021	0.010	0.03
		Bottom side	0.059			0.06
	WCDMA II	Front	0.353	0.068	0.065	0.49
		Back	0.337	0.091	0.045	0.47
		Left side	0.106	0.003	0.029	0.14
		Right side	0.013	0.026	0.001	0.04
		Top side		0.021	0.010	0.03
		Bottom side	0.454			0.45
LTE	LTE Band 17	Front	0.384	0.068	0.065	0.52
		Back	0.437	0.091	0.045	0.57
		Left side	0.212	0.003	0.029	0.24
		Right side	0.299	0.026	0.001	0.33
		Top side		0.021	0.010	0.03
		Bottom side	0.064			0.06
	LTE Band 5	Front	0.467	0.068	0.065	0.60
		Back	0.570	0.091	0.045	0.71
		Left side	0.221	0.003	0.029	0.25
		Right side	0.600	0.026	0.001	0.63
		Top side		0.021	0.010	0.03
		Bottom side	0.056			0.06
	LTE Band 7	Front	0.161	0.068	0.065	0.29
		Back	0.201	0.091	0.045	0.34
		Left side	0.150	0.003	0.029	0.18
		Right side	0.013	0.026	0.001	0.04
		Top side		0.021	0.010	0.03
		Bottom side	0.267			0.27
	LTE Band 41	Front	0.540	0.068	0.065	0.67
		Back	0.603	0.091	0.045	0.74
		Left side	0.459	0.003	0.029	0.49
		Right side	0.052	0.026	0.001	0.08
		Top side		0.021	0.010	0.03
		Bottom side	0.788			0.79



WWAN Band		Exposure Position	1	2	3	1+2+3 Summed 10g SAR (W/kg)
			WWAN 10g SAR (W/kg)	2.4GHz WLAN Chan 0 10g SAR (W/kg)	2.4GHz WLAN Chan 1 10g SAR (W/kg)	
GSM	GSM850	Front	0.261	0.039	0.032	0.33
		Back	0.313	0.051	0.023	0.39
		Left side	0.142	0.001	0.011	0.15
		Right side	0.230	0.010	0.001	0.24
		Top side		0.010	0.004	0.01
	Bottom side	0.035			0.04	
	GSM1900	Front	0.170	0.039	0.032	0.24
		Back	0.173	0.051	0.023	0.25
		Left side	0.070	0.001	0.011	0.08
		Right side	0.009	0.010	0.001	0.02
Top side			0.010	0.004	0.01	
Bottom side	0.287			0.29		
WCDMA	WCDMA V	Front	0.309	0.039	0.032	0.38
		Back	0.344	0.051	0.023	0.42
		Left side	0.096	0.001	0.011	0.11
		Right side	0.355	0.010	0.001	0.37
		Top side		0.010	0.004	0.01
	Bottom side	0.031			0.03	
	WCDMA II	Front	0.181	0.039	0.032	0.25
		Back	0.169	0.051	0.023	0.24
		Left side	0.064	0.001	0.011	0.08
		Right side	0.006	0.010	0.001	0.02
Top side			0.010	0.004	0.01	
Bottom side	0.245			0.25		
LTE	LTE Band 17	Front	0.295	0.039	0.032	0.37
		Back	0.330	0.051	0.023	0.40
		Left side	0.151	0.001	0.011	0.16
		Right side	0.208	0.010	0.001	0.22
		Top side		0.010	0.004	0.01
		Bottom side	0.038			0.04
	LTE Band 5	Front	0.356	0.039	0.032	0.43
		Back	0.388	0.051	0.023	0.46
		Left side	0.158	0.001	0.011	0.17
		Right side	0.402	0.010	0.001	0.41
		Top side		0.010	0.004	0.01
		Bottom side	0.029			0.03
	LTE Band 7	Front	0.074	0.039	0.032	0.15
		Back	0.095	0.051	0.023	0.17
		Left side	0.076	0.001	0.011	0.09
		Right side	0.007	0.010	0.001	0.02
		Top side		0.010	0.004	0.01
		Bottom side	0.118			0.12
	LTE Band 41	Front	0.246	0.039	0.032	0.32
		Back	0.270	0.051	0.023	0.34
		Left side	0.229	0.001	0.011	0.24
		Right side	0.024	0.010	0.001	0.04
		Top side		0.010	0.004	0.01
		Bottom side	0.369			0.37



16.3 Body-Worn Accessory Exposure Conditions

WWAN Band		Exposure Position	1	2	3	4	5	6	1+2+3 Summed 1g SAR (W/kg)	1+4 Summed 1g SAR (W/kg)	1+4+5+6 Summed 1g SAR (W/kg)
			WWAN	2.4GHz WLAN Chan 0	2.4GHz WLAN Chan 1	2.4GHz Bluetooth	5GHz WLAN Chan 0	5GHz WLAN Chan 1			
			1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	Estimated 1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)			
GSM	GSM850	Front	0.300	0.039	0.022	0.196	0.025	0.038	0.36	0.50	0.56
		Back	0.322	0.048	0.014	0.196	0.022	0.029	0.38	0.52	0.57
	GSM1900	Front	0.138	0.039	0.022	0.196	0.025	0.038	0.20	0.33	0.40
		Back	0.155	0.048	0.014	0.196	0.022	0.029	0.22	0.35	0.40
WCDMA	WCDMA V	Front	0.379	0.039	0.022	0.196	0.025	0.038	0.44	0.58	0.64
		Back	0.402	0.048	0.014	0.196	0.022	0.029	0.46	0.60	0.65
	WCDMA II	Front	0.243	0.039	0.022	0.196	0.025	0.038	0.30	0.44	0.50
		Back	0.272	0.048	0.014	0.196	0.022	0.029	0.33	0.47	0.52
LTE	LTE Band 17	Front	0.313	0.039	0.022	0.196	0.025	0.038	0.37	0.51	0.57
		Back	0.362	0.048	0.014	0.196	0.022	0.029	0.42	0.56	0.61
	LTE Band 5	Front	0.405	0.039	0.022	0.196	0.025	0.038	0.47	0.60	0.66
		Back	0.459	0.048	0.014	0.196	0.022	0.029	0.52	0.66	0.71
	LTE Band 7	Front	0.083	0.039	0.022	0.196	0.025	0.038	0.14	0.28	0.34
		Back	0.090	0.048	0.014	0.196	0.022	0.029	0.15	0.29	0.34
	LTE Band 41	Front	0.239	0.039	0.022	0.196	0.025	0.038	0.30	0.44	0.50
		Back	0.235	0.048	0.014	0.196	0.022	0.029	0.30	0.43	0.48

WWAN Band		Exposure Position	1	2	3	5	6	1+2+3 Summed 10g SAR (W/kg)	1+5+6 Summed 10g SAR (W/kg)
			WWAN	2.4GHz WLAN Chan 0	2.4GHz WLAN Chan 1	5GHz WLAN Chan 0	5GHz WLAN Chan 1		
			10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)		
GSM	GSM850	Front	0.227	0.021	0.010	0.011	0.013	0.26	0.25
		Back	0.236	0.027	0.005	0.009	0.013	0.27	0.26
	GSM1900	Front	0.075	0.021	0.010	0.011	0.013	0.11	0.10
		Back	0.083	0.027	0.005	0.009	0.013	0.12	0.11
WCDMA	WCDMA V	Front	0.287	0.021	0.010	0.011	0.013	0.32	0.31
		Back	0.308	0.027	0.005	0.009	0.013	0.34	0.33
	WCDMA II	Front	0.135	0.021	0.010	0.011	0.013	0.17	0.16
		Back	0.150	0.027	0.005	0.009	0.013	0.18	0.17
LTE	LTE Band 17	Front	0.241	0.021	0.010	0.011	0.013	0.27	0.27
		Back	0.276	0.027	0.005	0.009	0.013	0.31	0.30
	LTE Band 5	Front	0.311	0.021	0.010	0.011	0.013	0.34	0.34
		Back	0.346	0.027	0.005	0.009	0.013	0.38	0.37
	LTE Band 7	Front	0.041	0.021	0.010	0.011	0.013	0.07	0.07
		Back	0.047	0.027	0.005	0.009	0.013	0.08	0.07
	LTE Band 41	Front	0.114	0.021	0.010	0.011	0.013	0.15	0.14
		Back	0.112	0.027	0.005	0.009	0.013	0.14	0.13

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17. Uncertainty Assessment

The component of uncertainty may generally be categorized according to the methods used to evaluate them. The evaluation of uncertainty by the statistical analysis of a series of observations is termed a Type A evaluation of uncertainty. The evaluation of uncertainty by means other than the statistical analysis of a series of observation is termed a Type B evaluation of uncertainty. Each component of uncertainty, however evaluated, is represented by an estimated standard deviation, termed standard uncertainty, which is determined by the positive square root of the estimated variance.

A Type A evaluation of standard uncertainty may be based on any valid statistical method for treating data. This includes calculating the standard deviation of the mean of a series of independent observations; using the method of least squares to fit a curve to the data in order to estimate the parameter of the curve and their standard deviations; or carrying out an analysis of variance in order to identify and quantify random effects in certain kinds of measurement.

A type B evaluation of standard uncertainty is typically based on scientific judgment using all of the relevant information available. These may include previous measurement data, experience, and knowledge of the behavior and properties of relevant materials and instruments, manufacture’s specification, data provided in calibration reports and uncertainties assigned to reference data taken from handbooks. Broadly speaking, the uncertainty is either obtained from an outdoor source or obtained from an assumed distribution, such as the normal distribution, rectangular or triangular distributions indicated in table below.

Uncertainty Distributions	Normal	Rectangular	Triangular	U-Shape
Multi-plying Factor ^(a)	1/k ^(b)	1/√3	1/√6	1/√2

(a) standard uncertainty is determined as the product of the multiplying factor and the estimated range of variations in the measured quantity

(b) κ is the coverage factor

Table 17.1. Standard Uncertainty for Assumed Distribution

The combined standard uncertainty of the measurement result represents the estimated standard deviation of the result. It is obtained by combining the individual standard uncertainties of both Type A and Type B evaluation using the usual “root-sum-squares” (RSS) methods of combining standard deviations by taking the positive square root of the estimated variances.

Expanded uncertainty is a measure of uncertainty that defines an interval about the measurement result within which the measured value is confidently believed to lie. It is obtained by multiplying the combined standard uncertainty by a coverage factor. Typically, the coverage factor ranges from 2 to 3. Using a coverage factor allows the true value of a measured quantity to be specified with a defined probability within the specified uncertainty range. For purpose of this document, a coverage factor two is used, which corresponds to confidence interval of about 95 %. The DASY uncertainty Budget is shown in the following tables.



Error Description	Uncertainty Value (±%)	Probability	Divisor	(Ci) 1g	(Ci) 10g	Standard Uncertainty (1g) (±%)	Standard Uncertainty (10g) (±%)
Measurement System							
Probe Calibration	6.0	N	1	1	1	6.0	6.0
Axial Isotropy	4.7	R	1.732	0.7	0.7	1.9	1.9
Hemispherical Isotropy	9.6	R	1.732	0.7	0.7	3.9	3.9
Boundary Effects	1.0	R	1.732	1	1	0.6	0.6
Linearity	4.7	R	1.732	1	1	2.7	2.7
System Detection Limits	1.0	R	1.732	1	1	0.6	0.6
Modulation Response	3.2	R	1.732	1	1	1.8	1.8
Readout Electronics	0.3	N	1	1	1	0.3	0.3
Response Time	0.0	R	1.732	1	1	0.0	0.0
Integration Time	2.6	R	1.732	1	1	1.5	1.5
RF Ambient Noise	3.0	R	1.732	1	1	1.7	1.7
RF Ambient Reflections	3.0	R	1.732	1	1	1.7	1.7
Probe Positioner	0.4	R	1.732	1	1	0.2	0.2
Probe Positioning	2.9	R	1.732	1	1	1.7	1.7
Max. SAR Eval.	2.0	R	1.732	1	1	1.2	1.2
Test Sample Related							
Device Positioning	3.0	N	1	1	1	3.0	3.0
Device Holder	3.6	N	1	1	1	3.6	3.6
Power Drift	5.0	R	1.732	1	1	2.9	2.9
Power Scaling	0.0	R	1.732	1	1	0.0	0.0
Phantom and Setup							
Phantom Uncertainty	6.1	R	1.732	1	1	3.5	3.5
SAR correction	0.0	R	1.732	1	0.84	0.0	0.0
Liquid Conductivity Repeatability	0.2	N	1	0.78	0.71	0.1	0.1
Liquid Conductivity (target)	5.0	R	1.732	0.78	0.71	2.3	2.0
Liquid Conductivity (mea.)	2.5	R	1.732	0.78	0.71	1.1	1.0
Temp. unc. - Conductivity	3.4	R	1.732	0.78	0.71	1.5	1.4
Liquid Permittivity Repeatability	0.15	N	1	0.23	0.26	0.0	0.0
Liquid Permittivity (target)	5.0	R	1.732	0.23	0.26	0.7	0.8
Liquid Permittivity (mea.)	2.5	R	1.732	0.23	0.26	0.3	0.4
Temp. unc. - Permittivity	0.83	R	1.732	0.23	0.26	0.1	0.1
Combined Std. Uncertainty						11.4%	11.4%
Coverage Factor for 95 %						K=2	K=2
Expanded STD Uncertainty						22.9%	22.7%

Table 17.1. Uncertainty Budget for frequency range 300 MHz to 3 GHz



Error Description	Uncertainty Value (±%)	Probability	Divisor	(Ci) 1g	(Ci) 10g	Standard Uncertainty (1g) (±%)	Standard Uncertainty (10g) (±%)
Measurement System							
Probe Calibration	6.55	N	1	1	1	6.6	6.6
Axial Isotropy	4.7	R	1.732	0.7	0.7	1.9	1.9
Hemispherical Isotropy	9.6	R	1.732	0.7	0.7	3.9	3.9
Boundary Effects	2.0	R	1.732	1	1	1.2	1.2
Linearity	4.7	R	1.732	1	1	2.7	2.7
System Detection Limits	1.0	R	1.732	1	1	0.6	0.6
Modulation Response	3.2	R	1.732	1	1	1.8	1.8
Readout Electronics	0.3	N	1	1	1	0.3	0.3
Response Time	0.0	R	1.732	1	1	0.0	0.0
Integration Time	2.6	R	1.732	1	1	1.5	1.5
RF Ambient Noise	3.0	R	1.732	1	1	1.7	1.7
RF Ambient Reflections	3.0	R	1.732	1	1	1.7	1.7
Probe Positioner	0.4	R	1.732	1	1	0.2	0.2
Probe Positioning	6.7	R	1.732	1	1	3.9	3.9
Max. SAR Eval.	4.0	R	1.732	1	1	2.3	2.3
Test Sample Related							
Device Positioning	3.0	N	1	1	1	3.0	3.0
Device Holder	3.6	N	1	1	1	3.6	3.6
Power Drift	5.0	R	1.732	1	1	2.9	2.9
Power Scaling	0.0	R	1.732	1	1	0.0	0.0
Phantom and Setup							
Phantom Uncertainty	6.6	R	1.732	1	1	3.8	3.8
SAR correction	0.0	R	1.732	1	0.84	0.0	0.0
Liquid Conductivity Repeatability	0.2	N	1	0.78	0.71	0.1	0.1
Liquid Conductivity (target)	5.0	R	1.732	0.78	0.71	2.3	2.0
Liquid Conductivity (mea.)	2.5	R	1.732	0.78	0.71	1.1	1.0
Temp. unc. - Conductivity	3.4	R	1.732	0.78	0.71	1.5	1.4
Liquid Permittivity Repeatability	0.15	N	1	0.23	0.26	0.0	0.0
Liquid Permittivity (target)	5.0	R	1.732	0.23	0.26	0.7	0.8
Liquid Permittivity (mea.)	2.5	R	1.732	0.23	0.26	0.3	0.4
Temp. unc. - Permittivity	0.83	R	1.732	0.23	0.26	0.1	0.1
Combined Std. Uncertainty						12.5%	12.5%
Coverage Factor for 95 %						K=2	K=2
Expanded STD Uncertainty						25.0%	24.9%

Table 17.2. Uncertainty Budget for frequency range 3 GHz to 6 GHz



18. References

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- [11] FCC KDB 865664 D01 v01r04, "SAR Measurement Requirements for 100 MHz to 6 GHz", Aug 2015.
- [12] FCC KDB 865664 D02 v01r01, "RF Exposure Compliance Reporting and Documentation Considerations" May 2013.