FCC SAR Test Report

APPLICANT	:	Motorola Mobility, LLC
EQUIPMENT	:	Mobile Cellular Phone
BRAND NAME	:	Motorola
MODEL NAME	:	8028
FCC ID	:	IHDT56VA2
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

Testing Laboratory
1190

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Table of Contents

Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA620325	Rev. 01	Initial issue of report	Apr. 12, 2016
FA620325	Rev. 02	1. Added Appendix D for System validation. 2. Added tissue dielectric parameter check on page 20. 3. Revised GSM note on page 31 and page 48. 4. Revised Bluetooth "column" in section 15.3.	Apr. 28, 2016
FA620325	Rev. 03	1. Added GSM SAR test results. 2. Corrected 2.4GHz WLAN duty cycle. 3. Updated Highest SAR Summary.	May. 09, 2016

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **Motorola Mobility, LLC, Mobile Cellular Phone, 8028** are as follows.

Equipment Class	Frequency Band	Highest SAR Summary				Highest Simultaneous Transmission 1g SAR (W/kg)
		Head (Separation 0mm)	Body-worn (Separation 10mm)	Hotspot (Separation 10mm)	Product specific (Separation 0mm)	
		1g SAR (W/kg)			10g SAR (W/kg)	
Licensed	GSM850	0.45	0.89	0.75		1.57
	GSM1900	0.38	0.68	0.68		
	WCDMA II	0.93	1.04	1.04		
	WCDMA V	0.40	0.80	0.89		
	LTE Band 5	0.39	0.72	0.74		
	LTE Band 7	0.66	1.01	1.01		
DTS	2.4GHz WLAN	1.12	0.18	0.18		1.56
NII	5GHz WLAN	0.63	0.37	0.37	0.67	1.57
DSS	Bluetooth		0.05			1.09
Date of Testing:		2016/2/14 ~ 2016/5/7				

This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg for Partial-Body, 4.0 W/kg for Product specific) 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	Motorola Mobility, LLC
Address	222 W. Merchandise Mart Plaza, Chicago IL 60654 USA

Manufacturer	
Company Name	Motorola Mobility, LLC
Address	222 W. Merchandise Mart Plaza, Chicago IL 60654 USA

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 v01r02
- FCC KDB 447498 D01 General RF Exposure Guidance v06
- FCC KDB 648474 D04 SAR Evaluation Considerations for Wireless Handsets v01r03
- FCC KDB 248227 D01 802.11 Wi-Fi SAR v02r02
- FCC KDB 941225 D01 3G SAR Procedures v03r01
- FCC KDB 941225 D05 SAR for LTE Devices v02r05
- FCC KDB 941225 D06 Hotspot Mode SAR v02r01

4. Equipment Under Test (EUT) Information

4.1 General Information

Product Feature & Specification	
Equipment Name	Mobile Cellular Phone
Brand Name	Motorola
Model Name	8028
FCC ID	IHDT56VA2
IMEI Code	Sample for WWAN SAR testing: 354117070006055 Sample for WLAN SAR testing: 354117070006194
Wireless Technology and Frequency Range	GSM850: 824.2 MHz ~ 848.8 MHz GSM1900: 1850.2 MHz ~ 1909.8 MHz WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz WCDMA Band V: 826.4 MHz ~ 846.6 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 7: 2500 MHz ~ 2570 MHz WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz WLAN 5.3GHz Band: 5260 MHz ~ 5320 MHz WLAN 5.5GHz Band: 5500 MHz ~ 5700 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Mode	· GSM/GPRS/EGPRS · RMC/AMR 12.2Kbps · HSDPA · HSUPA · DC-HSDPA · LTE: QPSK, 16QAM · 802.11a/b/g/n HT20/HT40 · Bluetooth v3.0+EDR，Bluetooth v4.0-LE
GSM / (E)GPRS Transfer mode	Class B – EUT cannot support Packet Switched and Circuit Switched Network simultaneously but can automatically switch between Packet and Circuit Switched Network.
EUT Stage	Identical Prototype

Remark:

1. This device 2.4GHz / 5.2GHz / 5.8GHz WLAN supports Hotspot operation and WiFi Direct (Group Client / Group Owner), and 5.3GHz / 5.5GHz WLAN supports WiFi Direct (Group Client).
2. While operating in “Front” and “Back” configuration by end user, the device will limit different maximum output powers on the WCDMA B2 and LTE B7 transmitter and detail descriptions of the power reduction mechanism are included in the operational description.
3. While operating in body-adjacent exposure configuration during a mobile hotspot session, the device will reduced output powers on the WCDMA B2 and LTE B7 transmitter and detail descriptions of the power reduction mechanism are included in the operational description.

4.2 General LTE SAR Test and Reporting Considerations

Summarized necessary items addressed in KDB 941225 D05 v02r05	
FCC ID	IHDT56VA2
Equipment Name	Mobile Cellular Phone
Operating Frequency Range of each LTE transmission band	LTE Band 05: 824 MHz ~ 849 MHz LTE Band 07: 2500 MHz ~ 2570 MHz
Channel Bandwidth	LTE Band 05:1.4MHz, 3MHz, 5MHz, 10MHz LTE Band 07: 5MHz, 10MHz, 15MHz, 20MHz
uplink modulations used	QPSK, and 16QAM
LTE Voice / Data requirements	Data only
LTE MPR permanently built-in by design	Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3
LTE A-MPR	In the base station simulator configuration, Network Setting value is set to NS_01 to disable A-MPR during SAR testing and the LTE SAR tests was transmitting on all TTI frames (Maximum TTI)
Spectrum plots for RB configuration	A properly configured base station simulator was used for the SAR and power measurement; therefore, spectrum plots for each RB allocation and offset configuration are not included in the SAR report.

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

Transmission (H, M, L) channel numbers and frequencies in each LTE band

LTE Band 5

	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	20407	824.7	20415	825.5	20425	826.5	20450	829
M	20525	836.5	20525	836.5	20525	836.5	20525	836.5
H	20643	848.3	20635	847.5	20625	846.5	20600	844

LTE Band 7

	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	20775	2502.5	20800	2505	20825	2507.5	20850	2510
M	21100	2535	21100	2535	21100	2535	21100	2535
H	21425	2567.5	21400	2565	21375	2562.5	21350	2560

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:

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

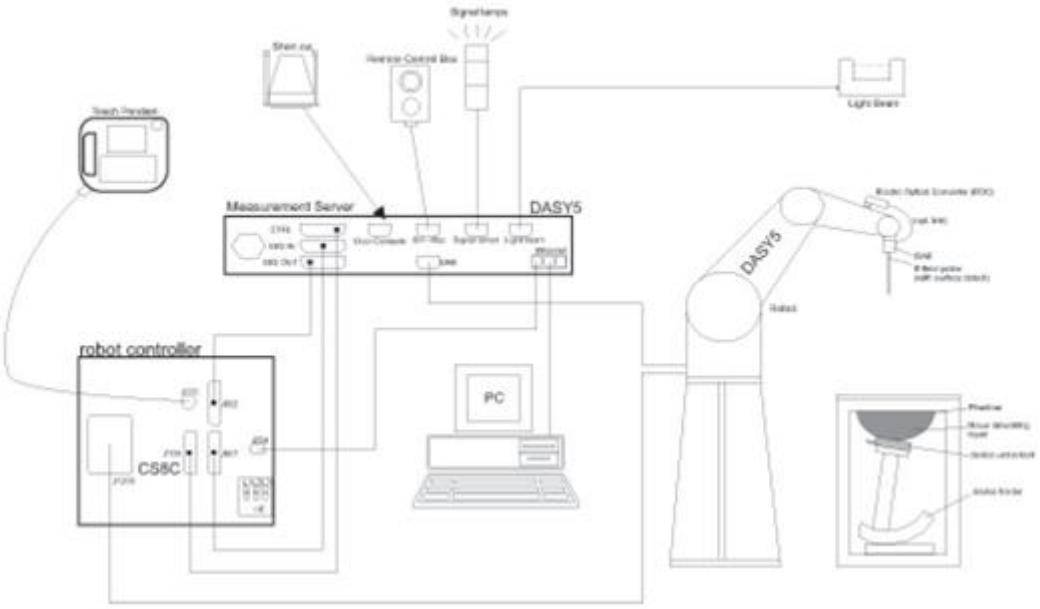
SAR is expressed in units of Watts per kilogram (W/kg)

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

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.

7.1 E-Field Probe

The SAR measurement is conducted with the dosimetric probe (manufactured by SPEAG).The probe is specially designed and calibrated for use in liquid with high permittivity. The dosimetric probe has special calibration in liquid at different frequency. This probe has a built in optical surface detection system to prevent from collision with phantom.

<ES3DV3 Probe>

Construction	Symmetric design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Frequency	10 MHz – 4 GHz; Linearity: ±0.2 dB (30 MHz – 4 GHz)	
Directivity	±0.2 dB in TSL (rotation around probe axis) ±0.3 dB in TSL (rotation normal to probe axis)	
Dynamic Range	5 µW/g – >100 mW/g; Linearity: ±0.2 dB	
Dimensions	Overall length: 337 mm (tip: 20 mm) Tip diameter: 3.9 mm (body: 12 mm) Distance from probe tip to dipole centers: 2.0 mm	

<EX3DV4 Probe>

Construction	Symmetric design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Frequency	10 MHz – >6 GHz Linearity: ±0.2 dB (30 MHz – 6 GHz)	
Directivity	±0.3 dB in TSL (rotation around probe axis) ±0.5 dB in TSL (rotation normal to probe axis)	
Dynamic Range	10 µW/g – >100 mW/g Linearity: ±0.2 dB (noise: typically <1 µW/g)	
Dimensions	Overall length: 337 mm (tip: 20 mm) Tip diameter: 2.5 mm (body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm	

7.2 Data Acquisition Electronics (DAE)

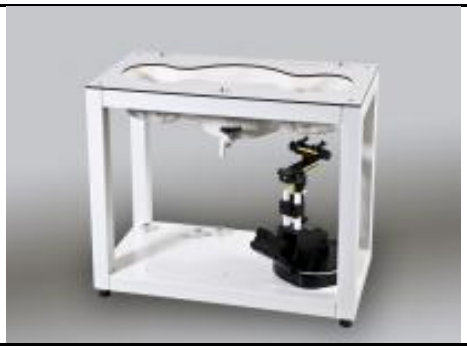
The data acquisition electronics (DAE) consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information as well as an optical uplink for commands and the clock.

The input impedance of the DAE is 200 MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

Fig 5.1 Photo of DAE

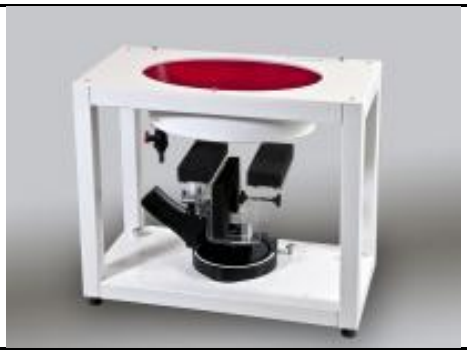
7.3 Phantom

<SAM Twin Phantom>

Shell Thickness	2 ± 0.2 mm; Center ear point: 6 ± 0.2 mm	
Filling Volume	Approx. 25 liters	
Dimensions	Length: 1000 mm; Width: 500 mm; Height: adjustable feet	
Measurement Areas	Left Hand, Right Hand, Flat Phantom	

The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. A white cover is provided to tap the phantom during off-periods to prevent water evaporation and changes in the liquid parameters. On the phantom top, three reference markers are provided to identify the phantom position with respect to the robot.

<ELI Phantom>

Shell Thickness	2 ± 0.2 mm (sagging: <1%)	
Filling Volume	Approx. 30 liters	
Dimensions	Major ellipse axis: 600 mm Minor axis: 400 mm	

The ELI phantom is intended for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI4 is fully compatible with standard and all known tissue simulating liquids.

7.4 Device Holder

<Mounting Device for Hand-Held Transmitter>

In combination with the Twin SAM V5.0/V5.0c or ELI phantoms, the Mounting Device for Hand-Held Transmitters enables rotation of the mounted transmitter device to specified spherical coordinates. At the heads, the rotation axis is at the ear opening. Transmitter devices can be easily and accurately positioned according to IEC 62209-1, IEEE 1528, FCC, or other specifications. The device holder can be locked for positioning at different phantom sections (left head, right head, flat). And upgrade kit to Mounting Device to enable easy mounting of wider devices like big smart-phones, e-books, small tablets, etc. It holds devices with width up to 140 mm.

Mounting Device for Hand-Held Transmitters

Mounting Device Adaptor for Wide-Phones

<Mounting Device for Laptops and other Body-Worn Transmitters>

The extension is lightweight and made of POM, acrylic glass and foam. It fits easily on the upper part of the mounting device in place of the phone positioned. The extension is fully compatible with the SAM Twin and ELI phantoms.

Mounting Device for Laptops

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 D 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 form 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	½·δ·ln(2) ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}	≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
	When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	

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: Δx_{Zoom}, Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	≤ 1.5·$\Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm

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

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

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	835MHz System Validation Kit	D835V2	4d092	Jun. 23, 2015	Jun. 22, 2016
SPEAG	1900MHz System Validation Kit	D1900V2	5d041	Oct. 22, 2015	Oct. 21, 2016
SPEAG	2450MHz System Validation Kit	D2450V2	736	Aug. 20, 2015	Aug. 19, 2016
SPEAG	2600MHz System Validation Kit	D2600V2	1008	Aug. 19, 2015	Aug. 18, 2016
SPEAG	5GHz System Validation Kit	D5GHzV2	1006	Oct. 06, 2015	Oct. 05, 2016
SPEAG	5GHz System Validation Kit	D5GHzV2	1128	Jul. 20, 2015	Jul. 19, 2016
SPEAG	Data Acquisition Electronics	DAE4	1338	Nov. 23, 2015	Nov. 22, 2016
SPEAG	Data Acquisition Electronics	DAE3	495	May. 22, 2015	May. 21, 2016
SPEAG	Data Acquisition Electronics	DAE4	778	Feb. 18, 2016	Feb. 17, 2017
SPEAG	Data Acquisition Electronics	DAE4	778	Aug. 25, 2015	Aug. 24, 2016
SPEAG	Data Acquisition Electronics	DAE4	1490	Sep. 14, 2015	Sep. 13, 2016
SPEAG	Data Acquisition Electronics	DAE3	577	Sep. 24, 2015	Sep. 23, 2016
SPEAG	Data Acquisition Electronics	DAE4	1399	Nov. 23, 2015	Nov. 22, 2016
SPEAG	Dosimetric E-Field Probe	EX3DV4	3935	Nov. 27, 2015	Nov. 26, 2016
SPEAG	Dosimetric E-Field Probe	EX3DV4	3925	May. 27, 2015	May. 26, 2016
SPEAG	Dosimetric E-Field Probe	ES3DV3	3270	Sep. 28, 2015	Sep. 27, 2016
SPEAG	Dosimetric E-Field Probe	EX3DV4	3931	Oct. 01, 2015	Sep. 30, 2016
SPEAG	Dosimetric E-Field Probe	EX3DV4	3955	Nov. 24, 2015	Nov. 23, 2016
WonDer	Thermometer	WD-5015	TM685	Oct. 16, 2015	Oct. 15, 2016
WonDer	Thermometer	WD-5015	TM642	Oct. 16, 2015	Oct. 15, 2016
WonDer	Thermometer	WD-5015	TM281	Oct. 16, 2015	Oct. 15, 2016
Wisewind	Thermometer	HTC-1	TM560	Oct. 16, 2015	Oct. 15, 2016
Wisewind	Thermometer	HTC-1	TM225	Oct. 16, 2015	Oct. 15, 2016
Anritsu	Radio Communication Analyzer	MT8820C	6201341950	Dec. 18, 2015	Dec. 17, 2016
Agilent	Wireless Communication Test Set	E5515C	MY50266977	May. 14, 2015	May. 13, 2016
R&S	Radio communication Tester	CMW500	149638	Aug. 04, 2015	Aug. 03, 2016
R&S	BT Base Station	CBT	101136	Sep. 17, 2015	Sep. 16, 2016
SPEAG	Device Holder	N/A	N/A	N/A	N/A
R&S	Signal Generator	MG3710A	6201502524	Dec. 18, 2015	Dec. 17, 2016
Agilent	ENA Network Analyzer	E5071C	MY46316648	Jan. 12, 2016	Jan. 11, 2017
SPEAG	Dielectric Probe Kit	DAK-3.5	1126	Jul. 21, 2015	Jul. 20, 2016
LINE SEIKI	Digital Thermometer	LKMelectronic	DTM3000SPEZIAL/90900	Aug. 26, 2015	Aug. 25, 2016
Anritsu	Power Meter	ML2495A	1419002	May. 13, 2015	May. 12, 2016
Anritsu	Power Sensor	MA2411B	1339124	May. 13, 2015	May. 12, 2016
Agilent	Spectrum Analyzer	E4408B	MY44211028	Aug. 24, 2015	Aug. 23, 2016
Anritsu	Spectrum Analyzer	MS2830A	6201396378	Jun. 17, 2015	Jun. 16, 2016
ATM	Dual Directional Coupler	C122H-10	P610410z-02	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 (εr)
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. (℃)	Conductivity (σ)	Permittivity (ε_r)	Conductivity Target (σ)	Permittivity Target (ε_r)	Delta (σ) (%)	Delta (ε_r) (%)	Limit (%)	Date
835	HSL	22.5	0.919	41.524	0.90	41.50	2.11	0.06	±5	2016/3/2
835	HSL	22.8	0.889	41.300	0.90	41.50	-1.22	-0.48	±5	2016/5/7
835	MSL	22.7	0.999	56.333	0.97	55.20	2.99	2.05	±5	2016/3/8
835	MSL	22.7	0.999	56.333	0.97	55.20	2.99	2.05	±5	2016/3/8
835	MSL	22.7	0.999	56.333	0.97	55.20	2.99	2.05	±5	2016/3/8
835	MSL	22.5	0.981	57.700	0.97	55.20	1.13	4.53	±5	2016/3/9
835	MSL	22.4	0.970	57.500	0.97	55.20	0.00	4.17	±5	2016/4/9
835	MSL	22.4	0.984	56.280	0.97	55.20	1.44	1.96	±5	2016/5/7
1900	HSL	22.6	1.445	40.021	1.40	40.00	3.21	0.05	±5	2016/3/3
1900	HSL	22.8	1.380	39.700	1.40	40.00	-1.43	-0.75	±5	2016/5/7
1900	MSL	22.6	1.553	53.336	1.52	53.30	2.17	0.07	±5	2016/2/14
1900	MSL	22.5	1.570	55.500	1.52	53.30	3.29	4.13	±5	2016/4/8
1900	MSL	22.8	1.560	55.100	1.52	53.30	2.63	3.38	±5	2016/5/7
2450	HSL	22.1	1.809	39.650	1.80	39.20	0.50	1.15	±5	2016/3/5
2450	MSL	22.1	1.979	53.435	1.95	52.70	1.49	1.39	±5	2016/3/6
2450	MSL	22.4	2.000	54.300	1.95	52.70	2.56	3.04	±5	2016/4/8
2600	HSL	22.5	2.053	38.007	1.96	39.00	4.74	-2.55	±5	2016/3/3
2600	MSL	22.5	2.210	53.700	2.16	52.50	2.31	2.29	±5	2016/4/8
5250	HSL	22.5	4.514	35.866	4.71	35.93	-4.16	-0.18	±5	2016/3/3
5250	MSL	22.6	5.531	47.065	5.36	48.95	3.19	-3.85	±5	2016/3/7
5300	HSL	22.5	4.732	34.637	4.76	35.90	-0.59	-3.52	±5	2016/3/7
5300	MSL	22.3	5.638	46.864	5.42	48.90	4.02	-4.16	±5	2016/3/8
5300	MSL	22.4	5.460	46.700	5.42	48.90	0.74	-4.50	±5	2016/4/9
5600	HSL	22.5	4.852	35.375	5.07	35.50	-4.30	-0.35	±5	2016/3/3
5600	HSL	22.5	5.024	34.199	5.07	35.50	-0.91	-3.66	±5	2016/3/7
5600	MSL	22.3	6.019	46.352	5.77	48.50	4.32	-4.43	±5	2016/3/8
5600	MSL	22.4	5.850	46.200	5.77	48.50	1.39	-4.74	±5	2016/4/9
5750	MSL	22.6	6.183	46.203	5.94	48.27	4.09	-4.28	±5	2016/3/7
5800	HSL	22.5	5.220	33.922	5.27	35.30	-0.95	-3.90	±5	2016/3/7

<Tissue Dielectric Parameter Check for Low / Middle / High Frequencies>

General Note:

The tissue measure results for low / middle / high frequencies list below, the results were used in the Dasy SAR system to perform interpolation to determine the dielectric parameters on the SAR test device. The SAR test plots may slightly difference between the tables below due to the digit rounding in the software calculated.

CH	Frequency (MHz)	Liquid Type	Conductivity (σ)	Permittivity (ε_r)	Conductivity Target (σ)	Permittivity Target (ε_r)	Delta (σ) (%)	Delta (ε_r) (%)	Limit (%)	Date
512	1850.2	MSL	1.50	53.56	1.52	53.30	-1.58	0.49	±5	Feb. 14, 2016
661	1880	MSL	1.53	53.43	1.52	53.30	0.59	0.24	±5	Feb. 14, 2016
810	1909.8	MSL	1.56	53.30	1.52	53.30	2.83	0.00	±5	Feb. 14, 2016
128	824.2	HSL	0.91	41.63	0.90	41.55	1.00	0.06	±5	Mar. 02, 2016
189	836.4	HSL	0.92	41.51	0.90	41.50	2.22	0.03	±5	Mar. 02, 2016
251	848.8	HSL	0.93	41.37	0.91	41.50	2.20	-0.31	±5	Mar. 02, 2016
4132	826.4	HSL	0.91	41.60	0.90	41.54	1.22	0.25	±5	Mar. 02, 2016
4182	836.4	HSL	0.92	41.51	0.90	41.50	2.22	0.03	±5	Mar. 02, 2016
4233	846.6	HSL	0.93	41.40	0.91	41.50	1.98	-0.23	±5	Mar. 02, 2016
20450	829	HSL	0.90	41.53	0.90	41.53	0.44	0.08	±5	Mar. 02, 2016
20525	836.5	HSL	0.92	41.51	0.90	41.50	2.22	0.03	±5	Mar. 02, 2016
20600	844	HSL	0.93	41.44	0.91	41.50	2.64	-0.16	±5	Mar. 02, 2016
9262	1852.4	HSL	1.40	40.24	1.40	40.00	-0.29	0.59	±5	Mar. 03, 2016
9400	1880	HSL	1.43	40.11	1.40	40.00	1.79	0.28	±5	Mar. 03, 2016
9538	1907.6	HSL	1.45	39.99	1.40	40.00	3.79	-0.03	±5	Mar. 03, 2016
512	1850.2	HSL	1.39	40.25	1.40	40.00	-0.43	0.61	±5	Mar. 03, 2016
661	1880	HSL	1.43	40.11	1.40	40.00	1.79	0.28	±5	Mar. 03, 2016
810	1909.8	HSL	1.46	39.98	1.40	40.00	3.93	-0.05	±5	Mar. 03, 2016
20850	2510	HSL	1.95	38.35	1.86	39.12	4.73	-1.92	±5	Mar. 03, 2016
21100	2535	HSL	1.98	38.29	1.89	39.09	4.66	-2.07	±5	Mar. 03, 2016
21350	2560	HSL	2.01	38.22	1.92	39.05	4.43	-2.25	±5	Mar. 03, 2016
52	5260	HSL	4.52	35.84	4.72	35.94	-4.24	-0.17	±5	Mar. 03, 2016
54	5270	HSL	4.53	35.81	4.73	35.93	-4.20	-0.25	±5	Mar. 03, 2016
56	5280	HSL	4.54	35.80	4.74	35.92	-4.13	-0.29	±5	Mar. 03, 2016
60	5300	HSL	4.56	35.78	4.76	35.90	-4.13	-0.34	±5	Mar. 03, 2016
62	5310	HSL	4.57	35.76	4.77	35.89	-4.15	-0.39	±5	Mar. 03, 2016
64	5320	HSL	4.58	35.75	4.78	35.87	-4.11	-0.43	±5	Mar. 03, 2016
100	5500	HSL	4.75	35.51	4.97	35.63	-4.42	-0.25	±5	Mar. 03, 2016
102	5510	HSL	4.76	35.50	4.98	35.62	-4.40	-0.28	±5	Mar. 03, 2016
104	5520	HSL	4.77	35.49	4.99	35.61	-4.40	-0.32	±5	Mar. 03, 2016
106	5530	HSL	4.78	35.47	5.00	35.59	-4.35	-0.35	±5	Mar. 03, 2016
108	5540	HSL	4.79	35.46	5.01	35.58	-4.32	-0.39	±5	Mar. 03, 2016
110	5550	HSL	4.81	35.45	5.02	35.57	-4.28	-0.42	±5	Mar. 03, 2016
112	5560	HSL	4.81	35.45	5.03	35.55	-4.29	-0.42	±5	Mar. 03, 2016
116	5580	HSL	4.83	35.41	5.05	35.53	-4.43	-0.25	±5	Mar. 03, 2016
132	5660	HSL	4.92	35.32	5.13	35.44	-4.12	-0.24	±5	Mar. 03, 2016
134	5670	HSL	4.92	35.31	5.14	35.43	-4.21	-0.24	±5	Mar. 03, 2016
136	5680	HSL	4.93	35.30	5.15	35.42	-4.33	-0.29	±5	Mar. 03, 2016
140	5700	HSL	4.95	35.25	5.17	35.40	-4.25	-0.44	±5	Mar. 03, 2016

Table of Low/Middle/High Channel for Liquid Validation

CH	Frequency (MHz)	Liquid Type	Conductivity (σ)	Permittivity (εr)	Conductivity Target (σ)	Permittivity Target (εr)	Delta (σ) (%)	Delta (εr) (%)	Limit (%)	Date
1	2412	HSL	1.77	39.81	1.77	39.27	-0.14	1.30	±5	Mar. 05, 2016
3	2422	HSL	1.78	39.76	1.78	39.25	-0.04	1.44	±5	Mar. 05, 2016
6	2437	HSL	1.80	39.71	1.79	39.22	0.32	1.29	±5	Mar. 05, 2016
9	2452	HSL	1.81	39.64	1.80	39.20	0.66	1.13	±5	Mar. 05, 2016
11	2462	HSL	1.82	39.60	1.81	39.18	0.75	1.02	±5	Mar. 05, 2016
1	2412	MSL	1.93	53.57	1.91	52.75	0.93	1.45	±5	Mar. 06, 2016
3	2422	MSL	1.94	53.53	1.92	52.74	1.15	1.58	±5	Mar. 06, 2016
6	2437	MSL	1.96	53.49	1.94	52.72	1.14	1.49	±5	Mar. 06, 2016
9	2452	MSL	1.98	53.43	1.95	52.70	1.61	1.38	±5	Mar. 06, 2016
11	2462	MSL	2.00	53.39	1.97	52.68	1.28	1.32	±5	Mar. 06, 2016
52	5260	HSL	4.69	34.69	4.72	35.94	-0.63	-3.36	±5	Mar. 07, 2016
54	5270	HSL	4.70	34.67	4.73	35.93	-0.56	-3.43	±5	Mar. 07, 2016
56	5280	HSL	4.72	34.66	4.74	35.92	-0.53	-3.46	±5	Mar. 07, 2016
60	5300	HSL	4.73	34.64	4.76	35.90	-0.59	-3.52	±5	Mar. 07, 2016
62	5310	HSL	4.74	34.62	4.77	35.89	-0.64	-3.57	±5	Mar. 07, 2016
64	5320	HSL	4.75	34.60	4.78	35.87	-0.61	-3.63	±5	Mar. 07, 2016
100	5500	HSL	4.92	34.35	4.97	35.63	-0.96	-3.51	±5	Mar. 07, 2016
102	5510	HSL	4.93	34.34	4.98	35.62	-0.98	-3.53	±5	Mar. 07, 2016
104	5520	HSL	4.94	34.33	4.99	35.61	-1.02	-3.58	±5	Mar. 07, 2016
106	5530	HSL	4.95	34.31	5.00	35.59	-0.99	-3.63	±5	Mar. 07, 2016
108	5540	HSL	4.96	34.29	5.01	35.58	-0.97	-3.67	±5	Mar. 07, 2016
110	5550	HSL	4.97	34.27	5.02	35.57	-0.92	-3.73	±5	Mar. 07, 2016
112	5560	HSL	4.98	34.27	5.03	35.55	-0.93	-3.73	±5	Mar. 07, 2016
116	5580	HSL	5.00	34.23	5.05	35.53	-1.05	-3.57	±5	Mar. 07, 2016
132	5660	HSL	5.09	34.13	5.13	35.44	-0.87	-3.59	±5	Mar. 07, 2016
134	5670	HSL	5.09	34.13	5.14	35.43	-0.93	-3.60	±5	Mar. 07, 2016
136	5680	HSL	5.10	34.10	5.15	35.42	-1.03	-3.66	±5	Mar. 07, 2016
140	5700	HSL	5.12	34.06	5.17	35.40	-0.92	-3.80	±5	Mar. 07, 2016
149	5745	HSL	5.17	34.01	5.22	35.36	-0.97	-3.92	±5	Mar. 07, 2016
151	5755	HSL	5.18	34.00	5.23	35.35	-0.96	-3.69	±5	Mar. 07, 2016
153	5765	HSL	5.19	33.99	5.24	35.34	-0.93	-3.73	±5	Mar. 07, 2016
157	5785	HSL	5.20	33.96	5.26	35.32	-1.08	-3.78	±5	Mar. 07, 2016
159	5795	HSL	5.21	33.94	5.27	35.31	-1.09	-3.87	±5	Mar. 07, 2016
161	5805	HSL	5.23	33.91	5.28	35.30	-1.01	-3.93	±5	Mar. 07, 2016
165	5825	HSL	5.25	33.90	5.30	35.28	-0.96	-3.97	±5	Mar. 07, 2016

Table of Low/Middle/High Channel for Liquid Validation

CH	Frequency (MHz)	Liquid Type	Conductivity (σ)	Permittivity (εr)	Conductivity Target (σ)	Permittivity Target (εr)	Delta (σ) (%)	Delta (εr) (%)	Limit (%)	Date
36	5180	MSL	5.44	47.18	5.28	49.03	3.09	-3.71	±5	Mar. 07, 2016
38	5190	MSL	5.46	47.17	5.29	49.01	3.12	-3.74	±5	Mar. 07, 2016
40	5200	MSL	5.47	47.15	5.30	49.00	3.14	-3.79	±5	Mar. 07, 2016
42	5210	MSL	5.48	47.12	5.31	48.99	3.20	-3.83	±5	Mar. 07, 2016
44	5220	MSL	5.49	47.10	5.32	48.98	3.26	-3.88	±5	Mar. 07, 2016
46	5230	MSL	5.51	47.08	5.34	48.97	3.37	-3.91	±5	Mar. 07, 2016
48	5240	MSL	5.52	47.08	5.35	48.96	3.22	-3.92	±5	Mar. 07, 2016
149	5745	MSL	6.18	46.21	5.94	48.28	3.98	-4.32	±5	Mar. 07, 2016
151	5755	MSL	6.19	46.19	5.95	48.27	4.05	-4.36	±5	Mar. 07, 2016
153	5765	MSL	6.21	46.18	5.96	48.25	4.13	-4.39	±5	Mar. 07, 2016
157	5785	MSL	6.23	46.15	5.98	48.22	4.18	-4.24	±5	Mar. 07, 2016
159	5795	MSL	6.24	46.13	5.99	48.21	4.24	-4.29	±5	Mar. 07, 2016
161	5805	MSL	6.26	46.12	6.00	48.20	4.34	-4.32	±5	Mar. 07, 2016
165	5825	MSL	6.29	46.10	6.00	48.20	4.76	-4.37	±5	Mar. 07, 2016
52	5260	MSL	5.59	46.94	5.37	48.94	4.03	-4.01	±5	Mar. 08, 2016
54	5270	MSL	5.60	46.91	5.38	48.93	4.04	-4.06	±5	Mar. 08, 2016
56	5280	MSL	5.61	46.89	5.39	48.92	4.10	-4.10	±5	Mar. 08, 2016
58	5290	MSL	5.62	46.88	5.40	48.91	4.14	-4.13	±5	Mar. 08, 2016
60	5300	MSL	5.64	46.86	5.42	48.90	4.03	-4.16	±5	Mar. 08, 2016
62	5310	MSL	5.65	46.84	5.43	48.79	4.13	-4.02	±5	Mar. 08, 2016
64	5320	MSL	5.67	46.82	5.44	48.67	4.25	-3.86	±5	Mar. 08, 2016
100	5500	MSL	5.88	46.53	5.65	48.60	4.12	-4.27	±5	Mar. 08, 2016
102	5510	MSL	5.90	46.51	5.66	48.59	4.17	-4.30	±5	Mar. 08, 2016
104	5520	MSL	5.91	46.48	5.67	48.58	4.23	-4.36	±5	Mar. 08, 2016
106	5530	MSL	5.93	46.46	5.69	48.57	4.33	-4.40	±5	Mar. 08, 2016
108	5540	MSL	5.94	46.44	5.70	48.56	4.25	-4.44	±5	Mar. 08, 2016
110	5550	MSL	5.96	46.42	5.71	48.55	4.39	-4.48	±5	Mar. 08, 2016
112	5560	MSL	5.97	46.42	5.72	48.54	4.45	-4.29	±5	Mar. 08, 2016
116	5580	MSL	5.99	46.39	5.74	48.52	4.42	-4.35	±5	Mar. 08, 2016
132	5660	MSL	6.10	46.25	5.84	48.41	4.52	-4.45	±5	Mar. 08, 2016
134	5670	MSL	6.12	46.24	5.85	48.40	4.54	-4.46	±5	Mar. 08, 2016
136	5680	MSL	6.13	46.22	5.86	48.38	4.55	-4.50	±5	Mar. 08, 2016
140	5700	MSL	6.16	46.18	5.88	48.35	4.70	-4.59	±5	Mar. 08, 2016
128	824.2	MSL	0.99	56.44	0.97	55.24	1.90	2.25	±5	Mar. 08, 2016
189	836.4	MSL	1.00	56.32	0.97	55.20	3.10	2.02	±5	Mar. 08, 2016
251	848.8	MSL	1.01	56.19	0.99	55.16	2.25	1.79	±5	Mar. 08, 2016
4132	826.4	MSL	0.99	56.42	0.97	55.23	2.13	2.20	±5	Mar. 08, 2016
4182	836.4	MSL	1.00	56.32	0.97	55.20	3.10	2.02	±5	Mar. 08, 2016
4233	846.6	MSL	1.01	56.21	0.98	55.16	3.08	1.83	±5	Mar. 08, 2016

Table of Low/Middle/High Channel for Liquid Validation

CH	Frequency (MHz)	Liquid Type	Conductivity (σ)	Permittivity (εr)	Conductivity Target (σ)	Permittivity Target (εr)	Delta (σ) (%)	Delta (εr) (%)	Limit (%)	Date
20450	829	MSL	0.99	56.39	0.97	55.22	2.38	2.16	±5	Mar. 08, 2016
20525	836.5	MSL	1.00	56.32	0.97	55.20	3.12	2.02	±5	Mar. 08, 2016
20600	844	MSL	1.01	56.24	0.98	55.17	2.83	1.88	±5	Mar. 08, 2016
20850	2510	MSL	2.08	54.10	2.03	52.62	2.46	2.85	±5	Apr. 08, 2016
21100	2535	MSL	2.12	54.00	2.07	52.59	2.42	2.66	±5	Apr. 08, 2016
21350	2560	MSL	2.15	53.90	2.10	52.55	2.38	2.47	±5	Apr. 08, 2016
20450	829	MSL	0.98	57.72	0.97	55.22	0.63	4.56	±5	Mar. 09, 2016
20525	836.5	MSL	0.98	57.66	0.97	55.20	1.29	4.46	±5	Mar. 09, 2016
20600	844	MSL	0.99	57.61	0.98	55.17	0.99	4.36	±5	Mar. 09, 2016
0	2402	MSL	1.93	54.50	1.90	52.76	1.58	3.22	±5	Apr. 08, 2016
39	2441	MSL	1.99	54.30	1.94	52.71	2.58	3.04	±5	Apr. 08, 2016
78	2480	MSL	2.04	54.20	1.95	52.70	4.62	2.85	±5	Apr. 08, 2016
20850	2510	Body	2.08	54.08	2.03	52.62	2.49	2.82	±5	Apr. 08, 2016
21100	2535	Body	2.12	53.99	2.07	52.59	2.25	2.63	±5	Apr. 08, 2016
21350	2560	Body	2.15	53.89	2.10	52.55	2.50	2.45	±5	Apr. 08, 2016
9262	1852.4	Body	1.52	55.67	1.52	53.30	-0.19	4.44	±5	Apr. 08, 2016
9400	1880	Body	1.55	55.58	1.52	53.30	1.74	4.28	±5	Apr. 08, 2016
9538	1907.6	Body	1.58	55.47	1.52	53.30	4.00	4.07	±5	Apr. 08, 2016
4132	826.4	Body	0.96	57.53	0.97	55.23	-0.83	4.23	±5	Apr. 09, 2016
4182	836.4	Body	0.97	57.44	0.97	55.20	0.13	4.07	±5	Apr. 09, 2016
4233	846.6	Body	0.98	57.35	0.98	55.16	0.12	3.90	±5	Apr. 09, 2016
128	824.2	Body	0.96	57.55	0.97	55.24	-1.03	4.26	±5	Apr. 09, 2016
189	836.4	Body	0.97	57.44	0.97	55.20	0.13	4.07	±5	Apr. 09, 2016
251	848.8	Body	0.98	57.33	0.99	55.16	-0.67	3.87	±5	Apr. 09, 2016
52	5260	Body	5.41	46.69	5.37	48.94	0.69	-4.51	±5	Apr. 09, 2016
54	5270	Body	5.42	46.67	5.38	48.93	0.79	-4.55	±5	Apr. 09, 2016
56	5280	Body	5.44	46.66	5.39	48.92	0.90	-4.57	±5	Apr. 09, 2016
58	5290	Body	5.45	46.66	5.40	48.91	0.94	-4.59	±5	Apr. 09, 2016
60	5300	Body	5.46	46.65	5.42	48.90	0.78	-4.60	±5	Apr. 09, 2016
62	5310	Body	5.47	46.63	5.43	48.79	0.77	-4.45	±5	Apr. 09, 2016
64	5320	Body	5.49	46.61	5.44	48.67	0.83	-4.29	±5	Apr. 09, 2016

Table of Low/Middle/High Channel for Liquid Validation

CH	Frequency (MHz)	Liquid Type	Conductivity (σ)	Permittivity (εr)	Conductivity Target (σ)	Permittivity Target (εr)	Delta (σ) (%)	Delta (εr) (%)	Limit (%)	Date
100	5500	Body	5.71	46.33	5.65	48.60	1.13	-4.66	±5	Apr. 09, 2016
102	5510	Body	5.73	46.33	5.66	48.59	1.16	-4.67	±5	Apr. 09, 2016
104	5520	Body	5.74	46.32	5.67	48.58	1.17	-4.70	±5	Apr. 09, 2016
106	5530	Body	5.75	46.30	5.68	48.57	1.23	-4.73	±5	Apr. 09, 2016
108	5540	Body	5.76	46.28	5.70	48.56	1.09	-4.77	±5	Apr. 09, 2016
110	5550	Body	5.78	46.26	5.71	48.55	1.18	-4.82	±5	Apr. 09, 2016
112	5560	Body	5.79	46.25	5.72	48.54	1.23	-4.64	±5	Apr. 09, 2016
116	5580	Body	5.81	46.20	5.74	48.52	1.27	-4.74	±5	Apr. 09, 2016
120	5600	Body	5.85	46.18	5.77	48.50	1.32	-4.79	±5	Apr. 09, 2016
122	5610	Body	5.86	46.17	5.78	48.49	1.38	-4.80	±5	Apr. 09, 2016
124	5620	Body	5.87	46.16	5.79	48.47	1.40	-4.82	±5	Apr. 09, 2016
126	5630	Body	5.88	46.15	5.80	48.46	1.43	-4.84	±5	Apr. 09, 2016
128	5640	Body	5.90	46.14	5.81	48.44	1.47	-4.68	±5	Apr. 09, 2016
132	5660	Body	5.92	46.10	5.84	48.41	1.40	-4.76	±5	Apr. 09, 2016
134	5670	Body	5.93	46.09	5.85	48.40	1.39	-4.78	±5	Apr. 09, 2016
136	5680	Body	5.94	46.07	5.86	48.38	1.38	-4.82	±5	Apr. 09, 2016
138	5690	Body	5.96	46.04	5.87	48.37	1.47	-4.88	±5	Apr. 09, 2016
140	5700	Body	5.97	46.02	5.88	48.35	1.61	-4.92	±5	Apr. 09, 2016
142	5710	Body	5.99	46.01	5.89	48.34	1.69	-4.74	±5	Apr. 09, 2016
144	5720	Body	6.00	46.01	5.91	48.32	1.58	-4.74	±5	Apr. 09, 2016
128	824.2	Head	0.88	41.41	0.90	41.55	-2.27	-0.46	±5	May. 07, 2016
189	836.4	Head	0.89	41.25	0.90	41.50	-1.05	-0.61	±5	May. 07, 2016
251	848.8	Head	0.90	41.09	0.91	41.50	-0.84	-0.99	±5	May. 07, 2016
512	1850.2	Head	1.34	39.94	1.40	40.00	-4.58	-0.14	±5	May. 07, 2016
661	1880	Head	1.36	39.82	1.40	40.00	-2.57	-0.44	±5	May. 07, 2016
810	1909.8	Head	1.39	39.67	1.40	40.00	-0.45	-0.82	±5	May. 07, 2016
128	824.2	Body	0.97	56.38	0.97	55.24	0.50	2.13	±5	May. 07, 2016
189	836.4	Body	0.99	56.27	0.97	55.20	1.63	1.93	±5	May. 07, 2016
251	848.8	Body	1.00	56.15	0.99	55.16	0.76	1.72	±5	May. 07, 2016
512	1850.2	Body	1.51	55.29	1.52	53.30	-0.65	3.73	±5	May. 07, 2016
661	1880	Body	1.54	55.20	1.52	53.30	1.40	3.57	±5	May. 07, 2016
810	1909.8	Body	1.58	55.09	1.52	53.30	3.68	3.37	±5	May. 07, 2016

Table of Low/Middle/High Channel for Liquid Validation

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.

<System Verification for 1g SAR Results >

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 (%)
2016/3/2	835	HSL	250	D835V2-4d092	EX3DV4 - SN3935	DAE4 Sn1338	2.42	9.26	9.68	4.54
2016/5/7	835	HSL	250	D835V2-4d092	ES3DV3 - SN3270	DAE4 Sn778	2.24	9.26	8.96	-3.24
2016/3/8	835	MSL	250	D835V2-4d092	EX3DV4 - SN3931	DAE3 Sn577	2.47	9.40	9.88	5.11
2016/3/8	835	MSL	250	D835V2-4d092	ES3DV3 - SN3270	DAE4 Sn778	2.55	9.40	10.20	8.51
2016/3/8	835	MSL	250	D835V2-4d092	EX3DV4 - SN3955	DAE4 Sn1399	2.35	9.40	9.40	0.00
2016/3/9	835	MSL	250	D835V2-4d092	ES3DV3 - SN3270	DAE4 Sn1490	2.46	9.40	9.84	4.68
2016/4/9	835	MSL	250	D835V2-4d092	EX3DV4 - SN3925	DAE3 Sn495	2.35	9.40	9.40	0.00
2016/5/7	835	MSL	250	D835V2-4d092	EX3DV4 - SN3931	DAE3 Sn577	2.45	9.40	9.80	4.26
2016/3/3	1900	HSL	250	D1900V2-5d041	EX3DV4 - SN3935	DAE4 Sn1338	9.61	39.80	38.44	-3.42
2016/5/7	1900	HSL	250	D1900V2-5d041	ES3DV3 - SN3270	DAE4 Sn778	9.77	39.80	39.08	-1.81
2016/2/14	1900	MSL	250	D1900V2-5d041	EX3DV4 - SN3931	DAE3 Sn577	10.00	40.00	40.00	0.00
2016/4/8	1900	MSL	250	D1900V2-5d041	EX3DV4 - SN3925	DAE3 Sn495	10.10	40.00	40.40	1.00
2016/5/7	1900	MSL	250	D1900V2-5d041	ES3DV3 - SN3270	DAE4 Sn778	10.50	40.00	42.00	5.00
2016/3/5	2450	HSL	250	D2450V2-736	EX3DV4 - SN3955	DAE4 Sn1399	13.40	53.40	53.60	0.37
2016/3/6	2450	MSL	250	D2450V2-736	EX3DV4 - SN3955	DAE4 Sn1399	12.40	51.90	49.60	-4.43
2016/4/8	2450	MSL	250	D2450V2-736	ES3DV3 - SN3270	DAE4 Sn778	12.50	51.90	50.00	-3.66
2016/3/3	2600	HSL	250	D2600V2-1008	EX3DV4 - SN3935	DAE4 Sn1338	15.10	56.30	60.40	7.28
2016/4/8	2600	MSL	250	D2600V2-1008	EX3DV4 - SN3925	DAE3 Sn495	14.60	55.80	58.40	4.66
2016/3/3	5250	HSL	100	D5GHzV2-1128-5250	EX3DV4 - SN3931	DAE3 Sn577	7.99	80.80	79.90	-1.11
2016/3/7	5250	MSL	100	D5GHzV2-1128-5250	EX3DV4 - SN3931	DAE3 Sn577	7.98	76.20	79.80	4.72
2016/3/7	5300	HSL	100	D5GHzV2-1006-5300	EX3DV4 - SN3925	DAE3 Sn495	7.99	84.50	79.90	-5.44
2016/3/8	5300	MSL	100	D5GHzV2-1006-5300	EX3DV4 - SN3925	DAE3 Sn495	7.82	79.50	78.20	-1.64
2016/4/9	5300	MSL	100	D5GHzV2-1006-5300	EX3DV4 - SN3925	DAE3 Sn495	8.08	79.50	80.80	1.64
2016/3/3	5600	HSL	100	D5GHzV2-1128-5600	EX3DV4 - SN3931	DAE3 Sn577	8.49	82.00	84.90	3.54
2016/3/7	5600	HSL	100	D5GHzV2-1006-5600	EX3DV4 - SN3925	DAE3 Sn495	8.99	84.80	89.90	6.01
2016/3/8	5600	MSL	100	D5GHzV2-1006-5600	EX3DV4 - SN3925	DAE3 Sn495	8.37	82.30	83.70	1.70
2016/4/9	5600	MSL	100	D5GHzV2-1006-5600	EX3DV4 - SN3925	DAE3 Sn495	8.41	82.30	84.10	2.19
2016/3/7	5750	MSL	100	D5GHzV2-1128-5750	EX3DV4 - SN3931	DAE3 Sn577	7.66	75.90	76.60	0.92
2016/3/7	5800	HSL	100	D5GHzV2-1006-5800	EX3DV4 - SN3925	DAE3 Sn495	8.19	82.00	81.90	-0.12

<System Verification for 10g SAR Results>

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 (%)
2016/3/8	5300	MSL	100	D5GHzV2-1006-5300	EX3DV4 - SN3925	DAE3 Sn495	2.14	22.40	21.40	-4.46
2016/3/8	5600	MSL	100	D5GHzV2-1006-5600	EX3DV4 - SN3925	DAE3 Sn495	2.22	23.00	22.20	-3.48

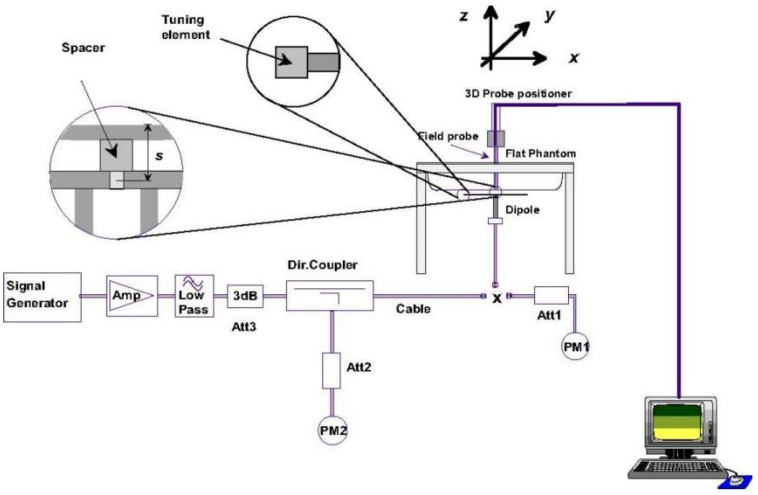


Fig 8.3.1 System Performance Check Setup

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.

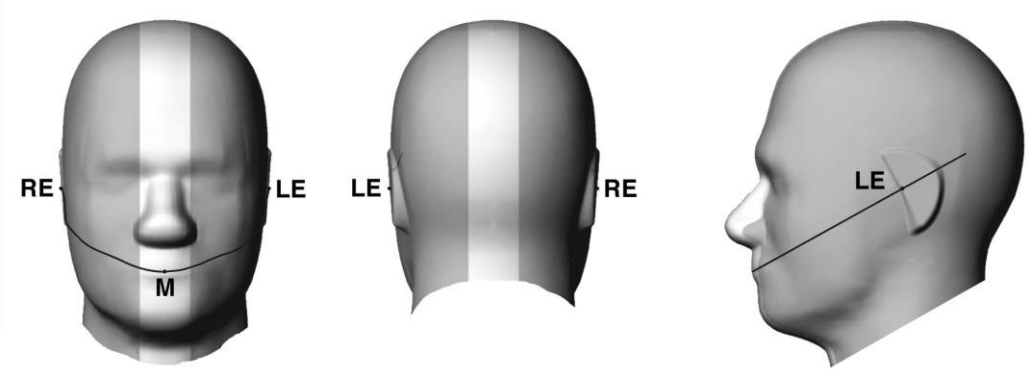


Fig 9.1.1 Front, back, and side views of SAM twin phantom

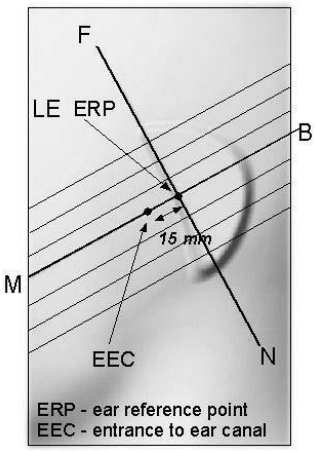


Fig 9.1.2 Close-up side view of phantom showing the ear region.

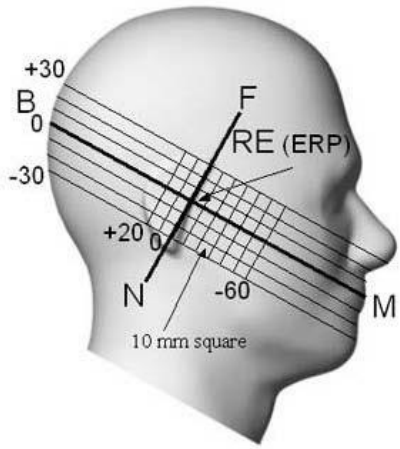


Fig 9.1.3 Side view of the phantom showing relevant markings and seven cross-sectional plane locations

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 wt 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 wb 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.

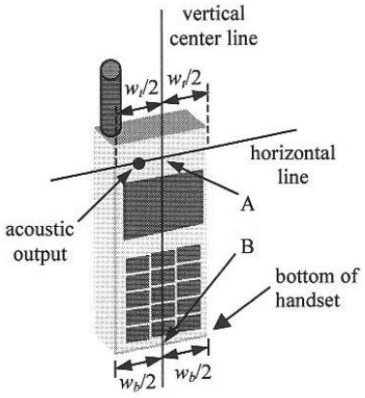


Fig 9.2.1 Handset vertical and horizontal reference lines—"fixed case

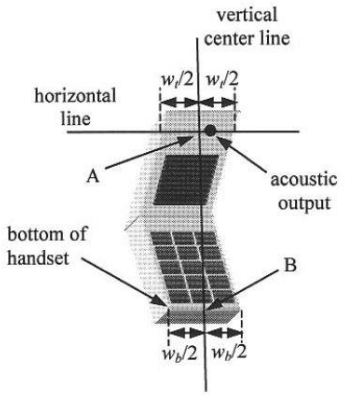


Fig 9.2.2 Handset vertical and horizontal reference lines—"clam-shell case"

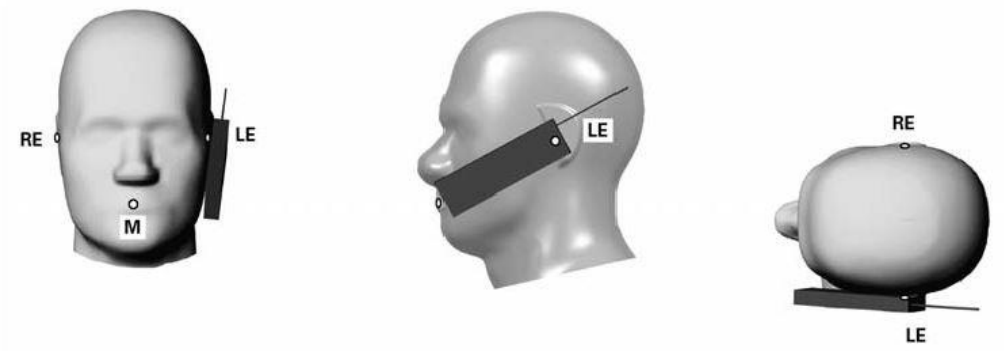


Fig 9.2.3 cheek or touch position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which establish the Reference Plane for handset positioning, are indicated.

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

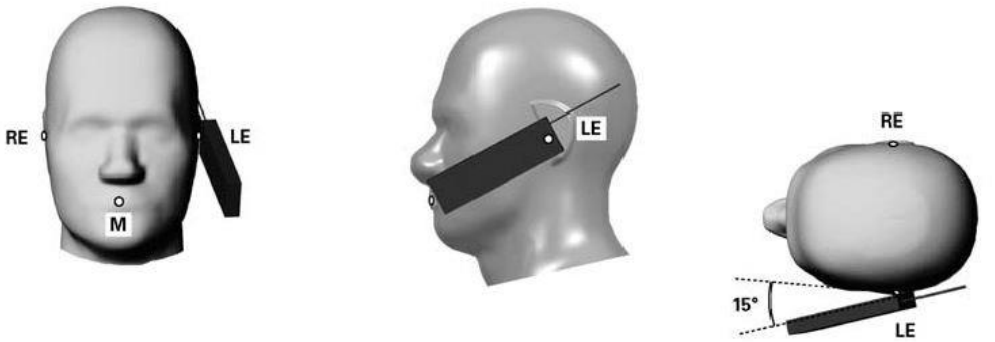


Fig 9.3.1 Tilt position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which define the Reference Plane for handset positioning, are indicated.

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 KDB648474 D04v01r03, 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 D01v06 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 handset 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 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 test 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.

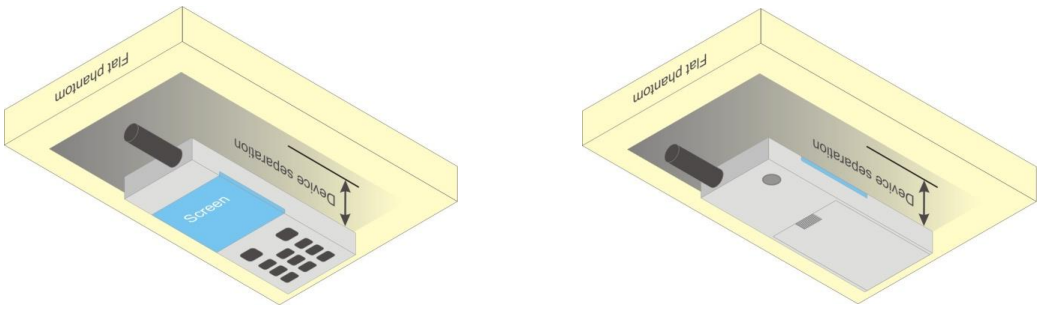


Fig 9.4 Body Worn Position

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 KDB Publication 941225 D06 v02r01 where SAR test considerations for handsets (L x W ≥ 9 cm x 5 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 form 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 D01v06 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.

11.6 Product specific Exposure Configurations

Devices that are designed or intended for use on extremities or mainly operated in product specific only exposure conditions; i.e., hands, wrists, feet and ankles, may require product specific SAR evaluation. When the device also operates in close proximity to the user’s body, SAR compliance for the body is also required. The 1-g body and 10-g product specific SAR exclusion thresholds found in KDB Publication 447498 D01v06 should be applied to determine SAR test requirements.

For smart phones with a display diagonal dimension > 15.0 cm or an overall diagonal dimension > 16.0 cm that provide similar mobile web access and multimedia support found in mini-tablets or UMPC mini-tablets that support voice calls next to the ear, unless it is confirmed otherwise through KDB inquiries, the following phablet procedures should be applied to evaluate SAR compliance for each applicable wireless mode and frequency band. Devices marketed as phablets, regardless of form factors and operating characteristics must be tested as a phablet to determine SAR compliance. The normally required head and body-worn accessory SAR test procedures for handsets, including hotspot mode, must be applied. The UMPC mini-tablet procedures must also be applied to test the SAR of all surfaces and edges with an antenna located at ≤ 25 mm from that surface or edge, in direct contact with a flat phantom, for 10-g product specific SAR according to the body-equivalent tissue dielectric parameters in KDB 865664 to address interactive hand use exposure conditions.6 The UMPC mini-tablet 1-g SAR at 5 mm is not required. When hotspot mode applies, 10-g product specific 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. The normal tablet procedures in KDB 616217 are required when the over diagonal dimension of the device is > 20.0 cm. Hotspot mode SAR is not required when normal tablet procedures are applied. Product specific 10-g SAR is also not required for the front (top) surface of large form factor full size tablets. The more conservative tablet SAR results can be used to support the 10-g product specific SAR for phablet mode. The simultaneous transmission operating configurations applicable to voice and data transmissions for both phone and mini-tablet modes must be taken into consideration separately for 1-g and 10-g SAR to determine the simultaneous transmission SAR test exclusion and measurement requirements for the relevant wireless mode and exposure conditions

12. Conducted RF Output Power (Unit: dBm)

<GSM Conducted Power>

General Note:

1. Per KDB 447498 D01v06, the maximum output power channel is used for SAR testing and for further SAR test reduction.
2. Per KDB 941225 D01v03r01, for head and body-worn is selected GSM voice to be tested and considering the possibility of e.g. 3rd party VoIP operation additional head and body-worn SAR test 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/GSM1900.
3. Per KDB 941225 D01v03r01, for Hotspot SAR test reduction for GPRS and EDGE modes is determined by the source-based time-averaged output power including tune-up tolerance, 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/GSM1900.

<For Head / Hotspot / Body-worn condition>

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 1 Tx slot	32.90	33.04	33.02	33.50	23.90	24.04	24.02	24.50
GPRS 1 Tx slot	32.90	33.06	33.05	33.50	23.90	24.06	24.05	24.50
GPRS 2 Tx slots	29.49	29.54	29.50	30.50	23.49	23.54	23.50	24.50
GPRS 3 Tx slots	27.38	27.48	27.40	28.75	23.12	23.22	23.14	24.49
GPRS 4 Tx slots	26.10	26.07	26.11	27.50	23.10	23.07	23.11	24.50
EDGE 1 Tx slot	26.70	26.79	26.77	28.50	17.70	17.79	17.77	19.50
EDGE 2 Tx slots	25.50	25.61	25.61	27.00	19.50	19.61	19.61	21.00
EDGE 3 Tx slots	22.44	22.52	22.42	23.75	18.18	18.26	18.16	19.49
EDGE 4 Tx slots	21.11	21.26	21.00	22.50	18.11	18.26	18.00	19.50

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 1 Tx slot	29.55	29.30	29.44	30.50	19.55	20.30	20.44	21.50
GPRS 1 Tx slot	29.57	29.32	29.47	30.50	20.57	20.32	20.47	21.50
GPRS 2 Tx slots	26.53	26.34	26.62	27.50	20.53	20.34	20.62	21.50
GPRS 3 Tx slots	24.68	24.39	24.67	25.75	20.42	20.13	20.41	21.49
GPRS 4 Tx slots	23.28	23.02	23.35	24.50	20.28	20.02	20.35	21.50
EDGE 1 Tx slot	25.74	25.54	25.76	27.50	16.74	16.54	16.76	18.50
EDGE 2 Tx slots	22.68	22.50	22.71	24.50	16.68	16.50	16.71	18.50
EDGE 3 Tx slots	20.89	20.79	20.94	22.75	16.63	16.53	16.68	18.49
EDGE 4 Tx slots	19.63	19.51	19.67	21.50	16.63	16.51	16.67	18.50

<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 D01v03r01 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 DC-HSDPA, the device was configured according to the H-Set 12, Fixed Reference Channel (FRC) configuration in Table C.8.1.12 of 3GPP TS 34.121-1, with the primary and the secondary serving HS-DSCH Cell enabled during the power measurement.

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} *(Note1, Note 2)*	**CM** (dB) *(Note 3)*	**MPR** (dB) *(Note 3)*
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15 *(Note 4)*	15/15 *(Note 4)*	64	12/15 *(Note 4)*	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

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

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

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

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

Setup Configuration

HSUPA Setup Configuration:

a. The EUT was connected to Base Station 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-TFCI
   viii. Confirm that E-TFCI is equal to the target E-TFCI of 75 for sub-test 1, and other subtest's E-TFCI
d. The transmitted maximum output power was recorded.

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

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

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c.
Note 2: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH, HS- DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.
Note 3: For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 10/15 and β_d = 15/15.
Note 4: For subtest 5 the β_c/β_d ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 14/15 and β_d = 15/15.
Note 5: In case of testing by UE using E-DPDCH Physical Layer category 1, Sub-test 3 is omitted according to TS25.306 Table 5.1g.
Note 6: β_{ed} can not be set directly, it is set by Absolute Grant Value.

Setup Configuration

DC-HSDPA 3GPP release 8 Setup Configuration:

a. The EUT was connected to Base Station Agilent E5515C referred to the Setup Configuration below
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 RMC 12.2Kbps + HSDPA mode.
   ii. Set Cell Power = -25 dBm
   iii. Set HS-DSCH Configuration Type to FRC (H-set 12, QPSK)
   iv. Select HSDPA Uplink Parameters
   v. Set Gain Factors (β_c and β_d) and parameters were set according to each Specific sub-test in the following table, C10.1.4, quoted from the TS 34.121
      a). Subtest 1: β_c/β_d=2/15
      b). Subtest 2: β_c/β_d=12/15
      c). Subtest 3: β_c/β_d=15/8
      d). Subtest 4: β_c/β_d=15/4
   vi. Set Delta ACK, Delta NACK and Delta CQI = 8
   vii. Set Ack-Nack Repetition Factor to 3
   viii. Set CQI Feedback Cycle (k) to 4 ms
   ix. Set CQI Repetition Factor to 2
   x. Power Ctrl Mode = All Up bits
d. The transmitted maximum output power was recorded.

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

C.8.1.12 Fixed Reference Channel Definition H-Set 12

Table C.8.1.12: Fixed Reference Channel H-Set 12

Parameter	Unit	Value
Nominal Avg. Inf. Bit Rate	kbps	60
Inter-TTI Distance	TTI's	1
Number of HARQ Processes	Proces ses	6
Information Bit Payload (N_{INF})	Bits	120
Number Code Blocks	Blocks	1
Binary Channel Bits Per TTI	Bits	960
Total Available SML's in UE	SML's	19200
Number of SML's per HARQ Proc.	SML's	3200
Coding Rate		0.15
Number of Physical Channel Codes	Codes	1
Modulation		QPSK
Note 1: The RMC is intended to be used for DC-HSDPA mode and both cells shall transmit with identical parameters as listed in the table.		
Note 2: Maximum number of transmission is limited to 1, i.e., retransmission is not allowed. The redundancy and constellation version 0 shall be used.		

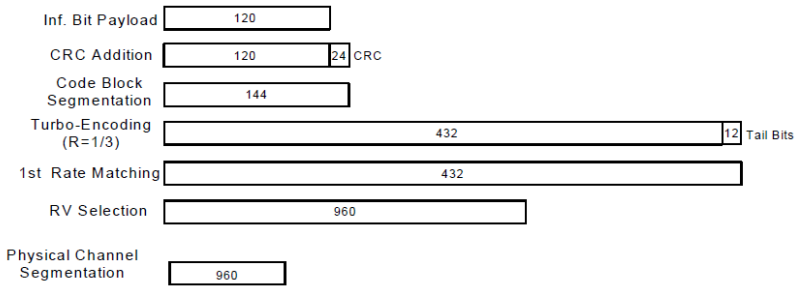


Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

Setup Configuration

<WCDMA Conducted Power>

General Note:

1. Per KDB 941225 D01v03r01, for SAR testing is measured using a 12.2 kbps RMC with TPC bits configured to all "1's".
2. Per KDB 941225 D01v03r01, RMC 12.2kbps setting is used to evaluate SAR. If the maximum output power and tune-up tolerance specified for production units in HSDPA / HSUPA / DC-HSDPA is ≤ ¼ dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio of specified maximum output power and tune-up tolerance of HSDPA / HSUPA / DC-HSDPA to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA / DC-HSDPA.

<WCDMA B5 for Head / Hotspot / Body-worn condition>

Band		WCDMA V			Tune-up Limit (dBm)
TX Channel		4132	4182	4233	
Rx Channel		4357	4407	4458	
Frequency (MHz)		826.4	836.4	846.6	
3GPP Rel 99	AMR 12.2Kbps	22.96	22.65	22.62	24.00
3GPP Rel 99	RMC 12.2Kbps	22.97	22.66	22.64	24.00
3GPP Rel 6	HSDPA Subtest-1	22.11	21.96	21.85	23.00
3GPP Rel 6	HSDPA Subtest-2	22.13	21.99	21.89	23.00
3GPP Rel 6	HSDPA Subtest-3	21.62	21.51	21.38	22.50
3GPP Rel 6	HSDPA Subtest-4	21.62	21.41	21.38	22.50
3GPP Rel 8	DC-HSDPA Subtest-1	22.10	21.95	21.84	23.00
3GPP Rel 8	DC-HSDPA Subtest-2	22.09	21.98	21.88	23.00
3GPP Rel 8	DC-HSDPA Subtest-3	21.61	21.50	21.36	22.50
3GPP Rel 8	DC-HSDPA Subtest-4	21.61	21.40	21.36	22.50
3GPP Rel 6	HSUPA Subtest-1	22.15	21.98	21.84	23.00
3GPP Rel 6	HSUPA Subtest-2	20.17	19.93	19.89	21.00
3GPP Rel 6	HSUPA Subtest-3	21.15	20.93	20.80	22.00
3GPP Rel 6	HSUPA Subtest-4	20.19	20.02	19.91	21.00
3GPP Rel 6	HSUPA Subtest-5	22.10	21.91	21.87	23.00

<WCDMA B2 for Head condition>

Band		WCDMA II			Tune-up Limit (dBm)
TX Channel		9262	9400	9538	
Rx Channel		9662	9800	9938	
Frequency (MHz)		1852.4	1880	1907.6	
3GPP Rel 99	AMR 12.2Kbps	22.85	22.91	22.70	24.00
3GPP Rel 99	RMC 12.2Kbps	22.87	22.92	22.72	24.00
3GPP Rel 6	HSDPA Subtest-1	22.04	22.11	21.82	23.00
3GPP Rel 6	HSDPA Subtest-2	22.03	22.16	21.88	23.00
3GPP Rel 6	HSDPA Subtest-3	21.45	21.58	21.21	22.50
3GPP Rel 6	HSDPA Subtest-4	21.42	21.55	21.27	22.50
3GPP Rel 8	DC-HSDPA Subtest-1	22.04	22.10	21.80	23.00
3GPP Rel 8	DC-HSDPA Subtest-2	22.03	22.15	21.86	23.00
3GPP Rel 8	DC-HSDPA Subtest-3	21.44	21.56	21.20	22.50
3GPP Rel 8	DC-HSDPA Subtest-4	21.41	21.54	21.25	22.50
3GPP Rel 6	HSUPA Subtest-1	21.93	22.08	21.88	23.00
3GPP Rel 6	HSUPA Subtest-2	20.01	20.07	19.91	21.00
3GPP Rel 6	HSUPA Subtest-3	20.98	21.05	20.76	22.00
3GPP Rel 6	HSUPA Subtest-4	19.93	20.04	19.88	21.00
3GPP Rel 6	HSUPA Subtest-5	22.02	22.06	21.83	23.00

<WCDMA B2 for Hotspot / Body-worn condition>

Band		WCDMA II			Tune-up Limit (dBm)
TX Channel		9262	9400	9538	
Rx Channel		9662	9800	9938	
Frequency (MHz)		1852.4	1880	1907.6	
3GPP Rel 99	AMR 12.2Kbps	20.10	19.22	19.75	21.00
3GPP Rel 99	RMC 12.2Kbps	20.10	19.21	19.75	21.00
3GPP Rel 6	HSDPA Subtest-1	19.65	18.84	19.34	20.00
3GPP Rel 6	HSDPA Subtest-2	19.14	18.33	18.83	20.00
3GPP Rel 6	HSDPA Subtest-3	19.18	18.37	18.87	19.50
3GPP Rel 6	HSDPA Subtest-4	19.12	18.31	18.81	19.50
3GPP Rel 8	DC-HSDPA Subtest-1	19.63	18.82	19.32	20.00
3GPP Rel 8	DC-HSDPA Subtest-2	19.12	18.31	18.81	20.00
3GPP Rel 8	DC-HSDPA Subtest-3	19.17	18.36	18.86	19.50
3GPP Rel 8	DC-HSDPA Subtest-4	19.14	18.33	18.83	19.50
3GPP Rel 6	HSUPA Subtest-1	19.66	18.85	19.35	20.00
3GPP Rel 6	HSUPA Subtest-2	17.82	17.01	17.51	18.00
3GPP Rel 6	HSUPA Subtest-3	18.67	17.86	18.36	19.00
3GPP Rel 6	HSUPA Subtest-4	17.82	17.01	17.51	18.00
3GPP Rel 6	HSUPA Subtest-5	19.63	18.82	19.32	20.00

<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 D05v02r05, 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 D05v02r05, 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 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
5. Per KDB 941225 D05v02r05, 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 D05v02r05, 16QAM output power for each RB allocation configuration is > not ½ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, 16QAM SAR testing is not required.
7. Per KDB 941225 D05v02r05, Smaller bandwidth output power for each RB allocation configuration is > not ½ 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 D05v02r05, smaller bandwidth SAR testing is not required.
8. For LTE B5 the maximum bandwidth does not support three non-overlapping channels, per KDB 941225 D05v02r05, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

<LTE Band 5 for Head / Hotspot / body-worn condition>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				20450	20525	20600		
Frequency (MHz)				829	836.5	844		
10	QPSK	1	0	22.53	22.73	22.72	24	0
10	QPSK	1	25	23.29	23.42	23.30		
10	QPSK	1	49	22.65	23.03	22.52		
10	QPSK	25	0	22.02	22.12	22.03	23	1
10	QPSK	25	12	21.96	22.07	22.00		
10	QPSK	25	25	22.01	22.08	21.97		
10	QPSK	50	0	21.96	22.09	21.99		
10	16QAM	1	0	21.64	21.79	21.76	23	1
10	16QAM	1	25	21.70	21.81	21.69		
10	16QAM	1	49	21.72	21.72	21.60		
10	16QAM	25	0	20.83	21.04	21.00	22	2
10	16QAM	25	12	20.91	21.07	20.92		
10	16QAM	25	25	21.03	21.16	20.90		
10	16QAM	50	0	20.96	21.06	20.83		
Channel				20425	20525	20625	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				826.5	836.5	846.5		
5	QPSK	1	0	22.45	22.53	22.68	24	0
5	QPSK	1	12	23.05	23.26	23.12		
5	QPSK	1	24	22.51	22.58	22.42		
5	QPSK	12	0	21.94	22.02	21.92	23	1
5	QPSK	12	7	21.99	22.06	21.93		
5	QPSK	12	13	21.97	22.09	21.94		
5	QPSK	25	0	21.95	22.06	21.97		
5	16QAM	1	0	21.65	21.72	21.64	23	1
5	16QAM	1	12	21.58	22.01	21.55		
5	16QAM	1	24	21.63	21.70	21.55		
5	16QAM	12	0	20.88	20.97	20.93	22	2
5	16QAM	12	7	20.99	21.13	20.98		
5	16QAM	12	13	20.88	21.03	21.09		
5	16QAM	25	0	20.90	21.01	20.80		
Channel				20415	20525	20635	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				825.5	836.5	847.5		
3	QPSK	1	0	22.78	22.59	22.62	24	0
3	QPSK	1	8	23.13	22.95	22.78		
3	QPSK	1	14	22.54	22.76	22.47		
3	QPSK	8	0	21.92	22.04	22.03	23	1
3	QPSK	8	4	21.89	22.06	21.98		
3	QPSK	8	7	21.94	21.98	21.88		
3	QPSK	15	0	21.92	21.96	21.91		
3	16QAM	1	0	21.55	21.62	21.69	23	1
3	16QAM	1	8	21.53	21.62	21.55		
3	16QAM	1	14	21.67	21.79	21.60		
3	16QAM	8	0	20.98	20.93	20.94	22	2
3	16QAM	8	4	21.10	21.03	20.94		
3	16QAM	8	7	21.01	21.14	20.96		
3	16QAM	15	0	20.89	20.90	20.67		

Channel				20407	20525	20643	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				824.7	836.5	848.3		
1.4	QPSK	1	0	22.72	22.79	22.64	24	0
1.4	QPSK	1	3	22.88	23.01	22.82		
1.4	QPSK	1	5	22.55	22.95	22.61		
1.4	QPSK	3	0	22.96	23.03	22.95		
1.4	QPSK	3	1	22.93	23.08	23.13		
1.4	QPSK	3	3	22.81	23.09	22.91		
1.4	QPSK	6	0	21.88	21.99	21.88	23	1
1.4	16QAM	1	0	21.69	21.77	21.68	23	1
1.4	16QAM	1	3	21.64	21.77	21.56		
1.4	16QAM	1	5	21.64	21.79	21.65		
1.4	16QAM	3	0	22.01	22.18	21.86		
1.4	16QAM	3	1	22.12	22.18	22.01		
1.4	16QAM	3	3	22.11	22.23	21.83		
1.4	16QAM	6	0	20.74	20.88	20.78	22	2

<LTE Band 7 for Head condition>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				20850	21100	21350		
Frequency (MHz)				2510	2535	2560		
20	QPSK	1	0	22.45	22.49	22.50	24	0
20	QPSK	1	49	23.10	22.97	23.09		
20	QPSK	1	99	22.84	22.28	22.76		
20	QPSK	50	0	21.90	21.82	21.97	23	1
20	QPSK	50	24	21.85	21.81	21.95		
20	QPSK	50	50	21.89	21.69	21.96		
20	QPSK	100	0	21.92	21.80	21.93		
20	16QAM	1	0	21.58	21.41	21.49	23	1
20	16QAM	1	49	21.78	21.38	21.51		
20	16QAM	1	99	21.65	21.22	21.57		
20	16QAM	50	0	20.95	20.87	21.03	22	2
20	16QAM	50	24	21.08	20.86	21.03		
20	16QAM	50	50	20.92	20.78	21.05		
20	16QAM	100	0	20.94	20.76	20.96		
Channel				20825	21100	21375	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				2507.5	2535	2562.5		
15	QPSK	1	0	22.65	22.85	22.94	24	0
15	QPSK	1	37	23.19	22.98	23.11		
15	QPSK	1	74	22.94	22.39	22.95		
15	QPSK	36	0	21.90	21.88	21.93	23	1
15	QPSK	36	20	21.97	21.85	21.95		
15	QPSK	36	39	21.96	21.73	22.06		
15	QPSK	75	0	21.97	21.72	22.05		
15	16QAM	1	0	21.67	21.57	21.65	23	1
15	16QAM	1	37	21.71	21.33	21.50		
15	16QAM	1	74	21.80	21.34	21.53		
15	16QAM	36	0	20.87	20.78	20.99	22	2
15	16QAM	36	20	21.02	20.86	20.99		
15	16QAM	36	39	20.98	20.70	21.12		
15	16QAM	75	0	21.03	20.71	21.13		
Channel				20800	21100	21400	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				2505	2535	2565		
10	QPSK	1	0	22.64	22.44	22.52	24	0
10	QPSK	1	25	22.97	22.93	23.15		
10	QPSK	1	49	22.67	22.31	22.81		
10	QPSK	25	0	21.95	21.83	21.95	23	1
10	QPSK	25	12	21.90	21.84	22.08		
10	QPSK	25	25	22.02	21.78	22.08		
10	QPSK	50	0	21.93	21.83	21.95		
10	16QAM	1	0	21.69	21.32	21.34	23	1
10	16QAM	1	25	21.67	21.30	21.51		
10	16QAM	1	49	21.76	21.20	21.56		
10	16QAM	25	0	21.02	20.94	20.95	22	2
10	16QAM	25	12	20.97	20.96	21.17		
10	16QAM	25	25	21.01	20.81	21.15		
10	16QAM	50	0	20.92	20.84	21.05		

Channel				20775	21100	21425	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				2502.5	2535	2567.5		
5	QPSK	1	0	22.53	22.57	22.89	24	0
5	QPSK	1	12	23.15	22.90	23.25		
5	QPSK	1	24	22.56	22.53	22.71		
5	QPSK	12	0	21.89	21.81	22.00	23	1
5	QPSK	12	7	21.88	21.84	22.08		
5	QPSK	12	13	21.86	21.82	22.10		
5	QPSK	25	0	21.88	21.83	22.09		
5	16QAM	1	0	21.67	21.05	21.76	23	1
5	16QAM	1	12	21.62	21.53	21.73		
5	16QAM	1	24	21.61	21.25	21.85		
5	16QAM	12	0	20.73	20.97	21.05	22	2
5	16QAM	12	7	20.85	20.80	21.01		
5	16QAM	12	13	20.91	20.83	21.05		
5	16QAM	25	0	20.93	20.93	21.17		

<LTE Band 7 for Hotspot / body-worn condition>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				20850	21100	21350		
Frequency (MHz)				2510	2535	2560		
20	QPSK	1	0	20.39	20.45	20.46	21.7	0
20	QPSK	1	49	21.38	20.94	21.07		
20	QPSK	1	99	20.53	20.39	20.85		
20	QPSK	50	0	20.93	20.74	20.91	21.7	0
20	QPSK	50	24	20.83	20.73	20.84		
20	QPSK	50	50	20.90	20.67	20.88		
20	QPSK	100	0	20.91	20.71	20.80		
20	16QAM	1	0	20.62	20.38	20.40	21.7	0
20	16QAM	1	49	20.76	20.33	20.43		
20	16QAM	1	99	20.66	20.16	20.44		
20	16QAM	50	0	20.92	20.82	20.98	21.7	0
20	16QAM	50	24	20.87	20.79	20.83		
20	16QAM	50	50	20.82	20.75	20.88		
20	16QAM	100	0	20.85	20.71	20.78		
Channel				20825	21100	21375	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				2507.5	2535	2562.5		
15	QPSK	1	0	20.60	20.69	20.77	21.7	0
15	QPSK	1	37	21.15	20.88	20.99		
15	QPSK	1	74	20.92	20.73	20.91		
15	QPSK	36	0	20.89	20.72	20.81	21.7	0
15	QPSK	36	20	20.97	20.70	20.84		
15	QPSK	36	39	20.94	20.66	20.93		
15	QPSK	75	0	20.94	20.67	20.92		
15	16QAM	1	0	20.73	20.50	20.43	21.7	0
15	16QAM	1	37	20.68	20.27	20.40		
15	16QAM	1	74	20.77	20.31	20.49		
15	16QAM	36	0	20.85	20.73	20.87	21.7	0
15	16QAM	36	20	20.94	20.79	20.81		
15	16QAM	36	39	20.91	20.63	20.99		
15	16QAM	75	0	20.87	20.69	20.91		
Channel				20800	21100	21400	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				2505	2535	2565		
10	QPSK	1	0	20.53	20.45	20.37	21.7	0
10	QPSK	1	25	20.75	20.86	21.05		
10	QPSK	1	49	20.66	20.45	20.70		
10	QPSK	25	0	20.80	20.69	20.82	21.7	0
10	QPSK	25	12	20.85	20.76	20.93		
10	QPSK	25	25	20.92	20.62	20.90		
10	QPSK	50	0	20.89	20.74	20.84		
10	16QAM	1	0	20.52	20.22	20.21	21.7	0
10	16QAM	1	25	20.63	20.22	20.42		
10	16QAM	1	49	20.68	20.11	20.38		
10	16QAM	25	0	20.86	20.79	21.09	21.7	0
10	16QAM	25	12	21.12	20.77	20.93		
10	16QAM	25	25	21.08	20.69	21.12		
10	16QAM	50	0	20.87	20.83	20.86		

Channel				20775	21100	21425	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				2502.5	2535	2567.5		
5	QPSK	1	0	20.56	20.41	20.45	21.7	0
5	QPSK	1	12	21.09	20.77	21.05		
5	QPSK	1	24	20.54	20.24	20.57		
5	QPSK	12	0	20.81	20.67	20.84	21.7	0
5	QPSK	12	7	20.83	20.73	20.87		
5	QPSK	12	13	20.79	20.67	20.83		
5	QPSK	25	0	20.75	20.66	20.85		
5	16QAM	1	0	20.52	19.99	20.54	21.7	0
5	16QAM	1	12	20.47	20.32	20.60		
5	16QAM	1	24	20.53	19.98	20.53		
5	16QAM	12	0	20.85	20.53	20.66	21.7	0
5	16QAM	12	7	20.83	20.58	20.76		
5	16QAM	12	13	21.02	20.66	20.88		
5	16QAM	25	0	20.87	20.67	20.86		

<WLAN Conducted Power>

General Note:

1. Per KDB 248227 D01v02r02, 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.
2. 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).
3. 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.
4. 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>

	Mode	Channel	Frequency (MHz)	Data Rate	Average power (dBm)	Tune-Up Limit	Duty Cycle %
2.4GHz WLAN	802.11b	CH 1	2412	1Mbps	17.62	18.50	97.16
		CH 6	2437		16.91	18.50	
		CH 11	2462		18.15	18.50	
	802.11g	CH 1	2412	6Mbps	15.78	16.00	87.18
		CH 6	2437		15.38	16.00	
		CH 11	2462		15.66	16.00	
	802.11n-HT20	CH 1	2412	MCS0	15.43	15.50	85.14
		CH 6	2437		14.90	15.50	
		CH 11	2462		14.95	15.50	

<5GHz WLAN>

	Mode	Channel	Frequency (MHz)	Data Rate	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.2GHz WLAN	802.11a	CH 36	5180	6Mbps	15.98	17.00	87.26
		CH 40	5200		15.97	17.00	
		CH 44	5220		16.25	17.00	
		CH 48	5240		16.04	17.00	
	802.11n-HT20	CH 36	5180	MCS0	15.12	16.00	86.49
		CH 40	5200		14.86	16.00	
		CH 44	5220		15.15	16.00	
		CH 48	5240		15.21	16.00	
	802.11n-HT40	CH 38	5190	MCS0	10.46	11.50	75.00
		CH 46	5230		14.92	15.50	

	Mode	Channel	Frequency (MHz)	Data Rate	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.3GHz WLAN	802.11a	CH 52	5260	6Mbps	16.42	17.00	87.26
		CH 56	5280		16.10	17.00	
		CH 60	5300		16.27	17.00	
		CH 64	5320		16.40	17.00	
	802.11n-HT20	CH 52	5260	MCS0	15.28	16.00	86.49
		CH 56	5280		15.08	16.00	
		CH 60	5300		15.36	16.00	
		CH 64	5320		15.69	16.00	
	802.11n-HT40	CH 54	5270	MCS0	14.79	15.50	75.00
		CH 62	5310		12.83	13.00	

	Mode	Channel	Frequency (MHz)	Data Rate	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.5GHz WLAN	802.11a	CH 100	5500	6Mbps	16.61	17.00	87.26
		CH 116	5580		17.44	17.50	
		CH 124	5620		17.09	17.50	
		CH 132	5660		17.02	17.50	
		CH 140	5700		14.28	14.50	
	802.11n-HT20	CH 100	5500	MCS0	15.76	16.00	86.49
		CH 116	5580		16.86	17.00	
		CH 124	5620		16.01	17.00	
		CH 132	5660		16.24	17.00	
		CH 140	5700		13.68	14.00	
	802.11n-HT40	CH 102	5510	MCS0	12.90	13.00	75.00
		CH 110	5550		16.05	17.00	
		CH 126	5630		15.85	17.00	
		CH 134	5670		16.57	17.00	

	Mode	Channel	Frequency (MHz)	Data Rate	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.8GHz WLAN	802.11a	CH 149	5745	MCS0	16.64	17.50	87.26
		CH 157	5785		17.47	17.50	
		CH 165	5825		16.94	17.50	
	802.11n-HT20	CH 149	5745	MCS0	16.50	17.00	86.49
		CH 157	5785		16.68	17.00	
		CH 165	5825		16.20	17.00	
	802.11n-HT40	CH 151	5755	MCS0	14.42	15.00	75.00
		CH 159	5795		16.50	17.00	

<2.4GHz Bluetooth>

General Note:

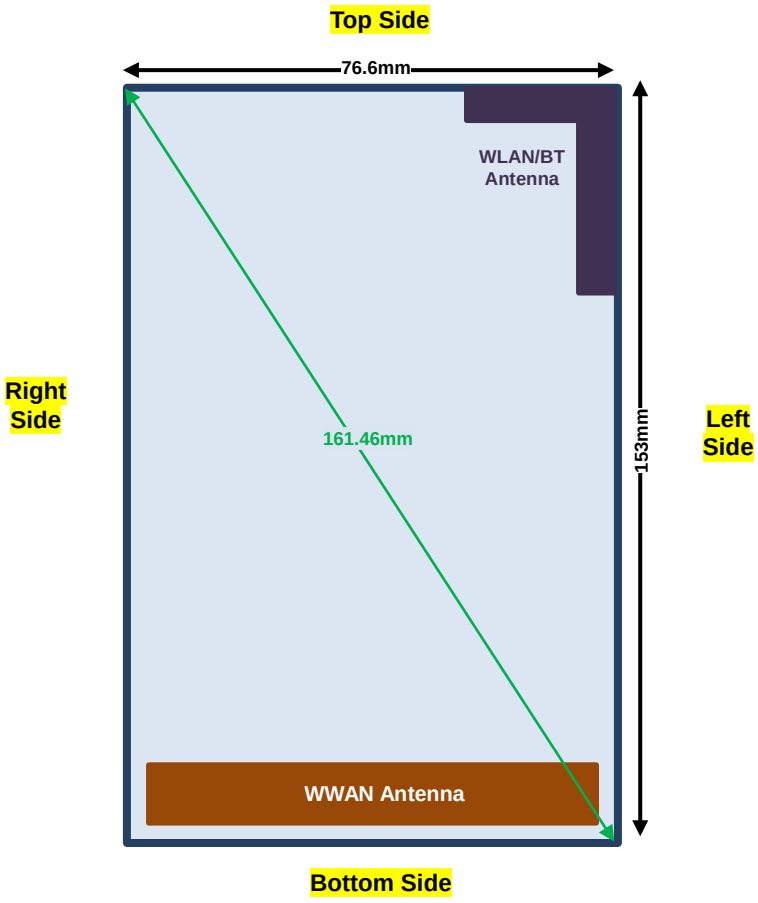
1. For 2.4GHz Bluetooth body-worn SAR testing was selected 1Mbps, due to its highest average power.
2. The duty factor is selected theoretical 83.3% perform Bluetooth SAR testing.
3. For Bluetooth product specific SAR is not necessary according KDB 447498 D01v06 exclusion.

Mode	Channel	Frequency (MHz)	Average power (dBm)		
			1Mbps	2Mbps	3Mbps
v3.0 with EDR	CH 00	2402	10.67	8.76	8.65
	CH 39	2441	12.01	10.14	10.06
	CH 78	2480	9.60	7.49	7.44
Tune-up Limit	CH 00	2402	11.00	9.00	9.00
	CH 39	2441	12.50	10.50	10.50
	CH 78	2480	11.00	9.00	9.00

Mode	Channel	Frequency (MHz)	Average power (dBm)
			GFSK
v4.0 with LE	CH 00	2402	1.58
	CH 19	2440	2.57
	CH 39	2480	0.80
Tune-up Limit			3.00

13. Antenna Location

<Mobile Phone>



Back View

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	No	Yes

General Note:

1. Referring to KDB 941225 D06 v02r01, 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

14. SAR Test Results

General Note:

1. Per KDB 447498 D01v06, 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/Bluetooth: 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
2. Per KDB 447498 D01v06, 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 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg.
4. Per KDB 648474 D04v01r03, 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.
5. Per KDB648474 D04v01r03, 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 product specific SAR is required only for the edges according to “operational description” 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 1.2W/kg SAR test reduction threshold, for this device all the edges SAR scaled to maximum output power is less than 1.2W/kg of UMTS B2 and LTE B7.
6. While operating in “Front” and “Back” configuration by end user, the device will limit different maximum output powers on the WCDMA B2 and LTE B7 transmitter and detail descriptions of the power reduction mechanism are included in the operational description.
7. While operating in body-adjacent exposure configuration during a mobile hotspot session, the device will reduced output powers on the WCDMA B2 and LTE B7 transmitter and detail descriptions of the power reduction mechanism are included in the operational description.

GSM Note:

1. Per KDB 941225 D01v03r01, for head and body-worn is selected GSM voice to be tested and considering the possibility of e.g. 3rd party VoIP operation additional head and body-worn SAR test 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/GSM1900.
2. Per KDB 941225 D01v03r01, for Hotspot SAR test reduction for GPRS and EDGE modes is determined by the source-based time-averaged output power including tune-up tolerance, 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/GSM1900.

UMTS Note:

1. Per KDB 941225 D01v03r01, for SAR testing is measured using a 12.2 kbps RMC with TPC bits configured to all “1’s”.
2. Per KDB 941225 D01v03r01, RMC 12.2kbps setting is used to evaluate SAR. If the maximum output power and tune-up tolerance specified for production units in HSDPA / HSUPA / DC-HSDPA is ≤ ¼ dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio of specified maximum output power and tune-up tolerance of HSDPA / HSUPA / DC-HSDPA to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA / DC-HSDPA.

LTE Note:

1. Per KDB 941225 D05v02r05, 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 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
3. Per KDB 941225 D05v02r05, 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 D05v02r05, 16QAM output power for each RB allocation configuration is > not ½ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, 16QAM SAR testing is not required.
5. Per KDB 941225 D05v02r05, Smaller bandwidth output power for each RB allocation configuration is > not ½ 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 D05v02r05, smaller bandwidth SAR testing is not required.
6. For LTE B5 the maximum bandwidth does not support three non-overlapping channels, per KDB 941225 D05v02r05, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

WLAN Note:

1. Per KDB 248227 D01v02r02, 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 D01v02r02, for U-NII-1 Head 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. This device 2.4GHz / 5.2GHz / 5.8GHz WLAN supports Hotspot operation and WiFi Direct (Group Client / Group Owner), and 5.3GHz / 5.5GHz WLAN supports WiFi Direct (Group Client).
6. During SAR testing the WLAN transmission was verified using a spectrum analyzer.

14.1 Head SAR

<GSM SAR>

Plot No.	Band	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)
	GSM850	GSM Voice	Right Cheek	0mm	189	836.4	33.04	33.50	1.112	0.109	0.296	0.329
	GSM850	GSM Voice	Right Tilted	0mm	189	836.4	33.04	33.50	1.112	0.024	0.195	0.217
	GSM850	GSM Voice	Left Cheek	0mm	189	836.4	33.04	33.50	1.112	0.015	0.342	0.380
	GSM850	GSM Voice	Left Cheek	0mm	128	824.2	32.90	33.50	1.148	0.021	0.306	0.351
	GSM850	GSM Voice	Left Cheek	0mm	251	848.8	33.02	33.50	1.117	-0.016	0.351	0.392
	GSM850	GSM Voice	Left Tilted	0mm	189	836.4	33.04	33.50	1.112	-0.017	0.211	0.235
	GSM850	GPRS(4 Tx slots)	Right Cheek	0mm	251	848.8	26.11	27.50	1.377	0.09	0.241	0.332
	GSM850	GPRS(4 Tx slots)	Right Tilted	0mm	251	848.8	26.11	27.50	1.377	0.04	0.177	0.244
	GSM850	GPRS(4 Tx slots)	Left Cheek	0mm	251	848.8	26.11	27.50	1.377	0.06	0.268	0.369
01	GSM850	GPRS(4 Tx slots)	Left Cheek	0mm	128	824.2	26.10	27.50	1.380	0.02	0.329	0.454
	GSM850	GPRS(4 Tx slots)	Left Cheek	0mm	189	836.4	26.07	27.50	1.390	0.01	0.315	0.438
	GSM850	GPRS(4 Tx slots)	Left Tilted	0mm	251	848.8	26.11	27.50	1.377	0.1	0.174	0.240
	GSM1900	GSM Voice	Right Cheek	0mm	512	1850.2	29.55	30.50	1.245	0.088	0.250	0.311
	GSM1900	GSM Voice	Right Cheek	0mm	661	1880	29.30	30.50	1.318	0.038	0.247	0.326
	GSM1900	GSM Voice	Right Cheek	0mm	810	1909.8	29.44	30.50	1.276	-0.025	0.272	0.347
	GSM1900	GSM Voice	Right Tilted	0mm	512	1850.2	29.55	30.50	1.245	0.058	0.163	0.203
	GSM1900	GSM Voice	Left Cheek	0mm	512	1850.2	29.55	30.50	1.245	-0.033	0.190	0.236
	GSM1900	GSM Voice	Left Tilted	0mm	512	1850.2	29.55	30.50	1.245	0.192	0.175	0.218
	GSM1900	GPRS(4 Tx slots)	Right Cheek	0mm	810	1909.8	23.35	24.50	1.303	0.12	0.285	0.371
	GSM1900	GPRS(4 Tx slots)	Right Cheek	0mm	512	1850.2	23.28	24.50	1.323	0.04	0.258	0.341
02	GSM1900	GPRS(4 Tx slots)	Right Cheek	0mm	661	1880	23.02	24.50	1.406	-0.01	0.267	0.375
	GSM1900	GPRS(4 Tx slots)	Right Tilted	0mm	810	1909.8	23.35	24.50	1.303	-0.01	0.188	0.245
	GSM1900	GPRS(4 Tx slots)	Left Cheek	0mm	810	1909.8	23.35	24.50	1.303	0.01	0.258	0.336
	GSM1900	GPRS(4 Tx slots)	Left Tilted	0mm	810	1909.8	23.35	24.50	1.303	0.06	0.193	0.252

<WCDMA SAR>

Plot No.	Band	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)
	WCDMA II	RMC 12.2Kbps	Right Cheek	0mm	9400	1880	22.92	24.00	1.282	0.03	0.705	0.904
03	WCDMA II	RMC 12.2Kbps	Right Cheek	0mm	9262	1852.4	22.87	24.00	1.297	0.02	0.719	0.933
	WCDMA II	RMC 12.2Kbps	Right Cheek	0mm	9538	1907.6	22.72	24.00	1.343	0.09	0.673	0.904
	WCDMA II	RMC 12.2Kbps	Right Tilted	0mm	9400	1880	22.92	24.00	1.282	0.06	0.459	0.589
	WCDMA II	RMC 12.2Kbps	Left Cheek	0mm	9400	1880	22.92	24.00	1.282	0.03	0.606	0.777
	WCDMA II	RMC 12.2Kbps	Left Tilted	0mm	9400	1880	22.92	24.00	1.282	0.01	0.517	0.663
	WCDMA V	RMC 12.2Kbps	Right Cheek	0mm	4132	826.4	22.97	24.00	1.268	0.07	0.283	0.359
04	WCDMA V	RMC 12.2Kbps	Right Cheek	0mm	4182	836.4	22.66	24.00	1.361	0.06	0.291	0.396
	WCDMA V	RMC 12.2Kbps	Right Cheek	0mm	4233	846.6	22.64	24.00	1.368	0.04	0.247	0.338
	WCDMA V	RMC 12.2Kbps	Right Tilted	0mm	4132	826.4	22.97	24.00	1.268	-0.02	0.207	0.262
	WCDMA V	RMC 12.2Kbps	Left Cheek	0mm	4132	826.4	22.97	24.00	1.268	0.05	0.278	0.352
	WCDMA V	RMC 12.2Kbps	Left Tilted	0mm	4132	826.4	22.97	24.00	1.268	0.04	0.172	0.218

<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)
	LTE Band 5	10M	QPSK	1	25	Right Cheek	0mm	20525	836.5	23.42	24.00	1.143	0.07	0.324	0.370
	LTE Band 5	10M	QPSK	25	0	Right Cheek	0mm	20525	836.5	22.12	23.00	1.225	0.02	0.217	0.266
	LTE Band 5	10M	QPSK	1	25	Right Tilted	0mm	20525	836.5	23.42	24.00	1.143	0.06	0.238	0.272
	LTE Band 5	10M	QPSK	25	0	Right Tilted	0mm	20525	836.5	22.12	23.00	1.225	0.04	0.162	0.198
05	LTE Band 5	10M	QPSK	1	25	Left Cheek	0mm	20525	836.5	23.42	24.00	1.143	0.06	0.344	0.393
	LTE Band 5	10M	QPSK	25	0	Left Cheek	0mm	20525	836.5	22.12	23.00	1.225	0.04	0.233	0.285
	LTE Band 5	10M	QPSK	1	25	Left Tilted	0mm	20525	836.5	23.42	24.00	1.143	0.03	0.238	0.272
	LTE Band 5	10M	QPSK	25	0	Left Tilted	0mm	20525	836.5	22.12	23.00	1.225	0.01	0.161	0.197
	LTE Band 7	20M	QPSK	1	49	Right Cheek	0mm	20850	2510	23.10	24.00	1.230	0.02	0.359	0.442
	LTE Band 7	20M	QPSK	50	0	Right Cheek	0mm	21350	2560	21.97	23.00	1.268	-0.01	0.212	0.269
	LTE Band 7	20M	QPSK	1	49	Right Tilted	0mm	20850	2510	23.10	24.00	1.230	0.08	0.338	0.416
	LTE Band 7	20M	QPSK	50	0	Right Tilted	0mm	21350	2560	21.97	23.00	1.268	0.05	0.192	0.243
	LTE Band 7	20M	QPSK	1	49	Left Cheek	0mm	20850	2510	23.10	24.00	1.230	0.05	0.529	0.651
	LTE Band 7	20M	QPSK	1	49	Left Cheek	0mm	21100	2535	22.97	24.00	1.268	0.05	0.501	0.635
06	LTE Band 7	20M	QPSK	1	49	Left Cheek	0mm	21350	2560	23.09	24.00	1.233	0.09	0.534	0.658
	LTE Band 7	20M	QPSK	50	0	Left Cheek	0mm	21350	2560	21.97	23.00	1.268	0.04	0.301	0.382
	LTE Band 7	20M	QPSK	1	49	Left Tilted	0mm	20850	2510	23.10	24.00	1.230	0.08	0.330	0.406
	LTE Band 7	20M	QPSK	50	0	Left Tilted	0mm	21350	2560	21.97	23.00	1.268	0.02	0.206	0.261

<WLAN SAR>

Plot No.	Band	Mode	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)
	WLAN2.4GHz	802.11b 1Mbps	Right Cheek	0mm	11	2462	18.15	18.50	1.084	97.16	1.029	0.05	0.792	0.883
07	WLAN2.4GHz	802.11b 1Mbps	Right Cheek	0mm	1	2412	17.62	18.50	1.225	97.16	1.029	0.06	0.887	1.118
	WLAN2.4GHz	802.11b 1Mbps	Right Cheek	0mm	6	2437	16.91	18.50	1.442	97.16	1.029	0.09	0.751	1.114
	WLAN2.4GHz	802.11b 1Mbps	Right Tilted	0mm	11	2462	18.15	18.50	1.084	97.16	1.029	-0.02	0.502	0.560
	WLAN2.4GHz	802.11b 1Mbps	Left Cheek	0mm	11	2437	18.15	18.50	1.084	97.16	1.029	0.07	0.476	0.531
	WLAN2.4GHz	802.11b 1Mbps	Left Tilted	0mm	11	2437	18.15	18.50	1.084	97.16	1.029	-0.04	0.472	0.526
08	WLAN5GHz	802.11a 6Mbps	Right Cheek	0mm	52	5260	16.42	17.00	1.143	87.26	1.146	0.08	0.269	0.352
	WLAN5GHz	802.11a 6Mbps	Right Cheek	0mm	64	5320	16.40	17.00	1.148	87.26	1.146	0	0.247	0.325
	WLAN5GHz	802.11a 6Mbps	Right Tilted	0mm	52	5260	16.42	17.00	1.143	87.26	1.146	-0.17	0.258	0.338
	WLAN5GHz	802.11a 6Mbps	Left Cheek	0mm	52	5260	16.42	17.00	1.143	87.26	1.146	-0.16	0.263	0.344
	WLAN5GHz	802.11a 6Mbps	Left Tilted	0mm	52	5260	16.42	17.00	1.143	87.26	1.146	0.17	0.255	0.334
	WLAN5GHz	802.11a 6Mbps	Right Cheek	0mm	116	5580	17.44	17.50	1.014	87.26	1.146	0.03	0.495	0.575
09	WLAN5GHz	802.11a 6Mbps	Right Cheek	0mm	100	5500	16.61	17.00	1.094	87.26	1.146	0.07	0.505	0.633
	WLAN5GHz	802.11a 6Mbps	Right Cheek	0mm	132	5660	17.02	17.00	0.995	87.26	1.146	-0.19	0.435	0.496
	WLAN5GHz	802.11a 6Mbps	Right Cheek	0mm	140	5700	14.28	14.50	1.052	87.26	1.146	0	0.125	0.151
	WLAN5GHz	802.11a 6Mbps	Right Tilted	0mm	116	5580	17.44	17.50	1.014	87.26	1.146	0.15	0.372	0.432
	WLAN5GHz	802.11a 6Mbps	Left Cheek	0mm	116	5580	17.44	17.50	1.014	87.26	1.146	0.126	0.415	0.482
	WLAN5GHz	802.11a 6Mbps	Left Tilted	0mm	116	5580	17.44	17.50	1.014	87.26	1.146	0.14	0.462	0.537
	WLAN5GHz	802.11a 6Mbps	Right Cheek	0mm	157	5785	17.47	17.50	1.007	87.26	1.146	0	0.426	0.492
	WLAN5GHz	802.11a 6Mbps	Right Cheek	0mm	149	5745	16.64	17.50	1.219	87.26	1.146	-0.12	0.390	0.545
10	WLAN5GHz	802.11a 6Mbps	Right Cheek	0mm	165	5825	16.94	17.50	1.138	87.26	1.146	-0.12	0.437	0.570
	WLAN5GHz	802.11a 6Mbps	Right Tilted	0mm	157	5785	17.47	17.50	1.007	87.26	1.146	-0.17	0.384	0.443
	WLAN5GHz	802.11a 6Mbps	Left Cheek	0mm	157	5785	17.47	17.50	1.007	87.26	1.146	0.1	0.337	0.389
	WLAN5GHz	802.11a 6Mbps	Left Tilted	0mm	157	5785	17.47	17.50	1.007	87.26	1.146	0.13	0.339	0.391

14.2 Hotspot SAR

<GSM SAR>

Plot No.	Band	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)
	GSM850	GPRS (4 Tx slots)	Front	10mm	251	848.8	26.11	27.50	1.377	0.07	0.381	0.525
	GSM850	GPRS (4 Tx slots)	Back	10mm	251	848.8	26.11	27.50	1.377	0.11	0.526	0.724
11	GSM850	GPRS (4 Tx slots)	Left Side	10mm	251	848.8	26.11	27.50	1.377	0.01	0.542	0.746
	GSM850	GPRS (4 Tx slots)	Left Side	10mm	128	824.2	26.10	27.50	1.380	-0.1	0.479	0.661
	GSM850	GPRS (4 Tx slots)	Left Side	10mm	189	836.4	26.07	27.50	1.390	-0.06	0.532	0.739
	GSM850	GPRS (4 Tx slots)	Right Side	10mm	251	848.8	26.11	27.50	1.377	-0.03	0.433	0.596
	GSM850	GPRS (4 Tx slots)	Bottom Side	10mm	251	848.8	26.11	27.50	1.377	0	0.041	0.056
	GSM1900	GPRS (4 Tx slots)	Front	10mm	810	1909.8	23.35	24.50	1.303	-0.03	0.428	0.558
12	GSM1900	GPRS (4 Tx slots)	Back	10mm	810	1909.8	23.35	24.50	1.303	-0.03	0.522	0.680
	GSM1900	GPRS (4 Tx slots)	Back	10mm	512	1850.2	23.28	24.50	1.323	0.08	0.487	0.645
	GSM1900	GPRS (4 Tx slots)	Back	10mm	661	1880	23.02	24.50	1.406	-0.19	0.418	0.588
	GSM1900	GPRS (4 Tx slots)	Left Side	10mm	810	1909.8	23.35	24.50	1.303	-0.16	0.182	0.237
	GSM1900	GPRS (4 Tx slots)	Right Side	10mm	810	1909.8	23.35	24.50	1.303	-0.01	0.152	0.198
	GSM1900	GPRS (4 Tx slots)	Bottom Side	10mm	810	1909.8	23.35	24.50	1.303	-0.07	0.258	0.336

<WCDMA SAR>

Plot No.	Band	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)
	WCDMA II	RMC 12.2Kbps	Front	10mm	9262	1852.4	20.10	21.00	1.230	0.142	0.450	0.554
	WCDMA II	RMC 12.2Kbps	Back	10mm	9262	1852.4	20.10	21.00	1.230	0.115	0.623	0.766
13	WCDMA II	RMC 12.2Kbps	Back	10mm	9400	1880	19.21	21.00	1.510	0.183	0.689	1.040
	WCDMA II	RMC 12.2Kbps	Back	10mm	9538	1907.6	19.75	21.00	1.334	0.109	0.618	0.824
	WCDMA II	RMC 12.2Kbps	Left Side	10mm	9262	1852.4	20.10	21.00	1.230	0.01	0.169	0.208
	WCDMA II	RMC 12.2Kbps	Right Side	10mm	9262	1852.4	20.10	21.00	1.230	0.156	0.263	0.324
	WCDMA II	RMC 12.2Kbps	Bottom Side	10mm	9262	1852.4	20.10	21.00	1.230	0.105	0.488	0.600
	WCDMA V	RMC 12.2Kbps	Front	10mm	4132	826.4	22.97	24.00	1.268	0.15	0.424	0.537
	WCDMA V	RMC 12.2Kbps	Back	10mm	4132	826.4	22.97	24.00	1.268	-0.03	0.494	0.626
	WCDMA V	RMC 12.2Kbps	Left Side	10mm	4132	826.4	22.97	24.00	1.268	0.11	0.553	0.701
14	WCDMA V	RMC 12.2Kbps	Left Side	10mm	4182	836.4	22.66	24.00	1.361	0.11	0.653	0.889
	WCDMA V	RMC 12.2Kbps	Left Side	10mm	4233	846.6	22.64	24.00	1.368	-0.02	0.650	0.889
	WCDMA V	RMC 12.2Kbps	Right Side	10mm	4132	826.4	22.97	24.00	1.268	0.02	0.410	0.520
	WCDMA V	RMC 12.2Kbps	Bottom Side	10mm	4132	826.4	22.97	24.00	1.268	0.04	0.069	0.087

<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)
	LTE Band 5	10M	QPSK	1	25	Front	10mm	20525	836.5	23.42	24.00	1.143	-0.1	0.552	0.631
	LTE Band 5	10M	QPSK	25	0	Front	10mm	20525	836.5	22.12	23.00	1.225	-0.03	0.356	0.436
	LTE Band 5	10M	QPSK	1	25	Back	10mm	20525	836.5	23.42	24.00	1.143	-0.111	0.628	0.718
	LTE Band 5	10M	QPSK	25	0	Back	10mm	20525	836.5	22.12	23.00	1.225	0.002	0.416	0.509
15	LTE Band 5	10M	QPSK	1	25	Left Side	10mm	20525	836.5	23.42	24.00	1.143	-0.039	0.644	0.736
	LTE Band 5	10M	QPSK	25	0	Left Side	10mm	20525	836.5	22.12	23.00	1.225	0.014	0.422	0.517
	LTE Band 5	10M	QPSK	1	25	Right Side	10mm	20525	836.5	23.42	24.00	1.143	0.11	0.485	0.554
	LTE Band 5	10M	QPSK	25	0	Right Side	10mm	20525	836.5	22.12	23.00	1.225	0.019	0.324	0.397
	LTE Band 5	10M	QPSK	1	25	Bottom Side	10mm	20525	836.5	23.42	24.00	1.143	-0.155	0.088	0.101
	LTE Band 5	10M	QPSK	25	0	Bottom Side	10mm	20525	836.5	22.12	23.00	1.225	-0.083	0.057	0.070
	LTE Band 7	20M	QPSK	1	49	Front	10mm	20850	2510	21.38	21.70	1.076	0.081	0.689	0.742
	LTE Band 7	20M	QPSK	50	0	Front	10mm	20850	2510	20.93	21.70	1.194	-0.062	0.675	0.806
	LTE Band 7	20M	QPSK	50	0	Front	10mm	21100	2535	20.74	21.70	1.247	0.128	0.633	0.790
	LTE Band 7	20M	QPSK	50	0	Front	10mm	21350	2560	20.91	21.70	1.199	0.091	0.634	0.760
	LTE Band 7	20M	QPSK	100	0	Front	10mm	20850	2510	20.91	21.70	1.199	0.069	0.688	0.825
	LTE Band 7	20M	QPSK	1	49	Back	10mm	20850	2510	21.38	21.70	1.076	-0.076	0.840	0.904
	LTE Band 7	20M	QPSK	1	49	Back	10mm	21100	2535	20.94	21.70	1.191	-0.111	0.772	0.920
	LTE Band 7	20M	QPSK	1	49	Back	10mm	21350	2560	21.07	21.70	1.156	0.085	0.784	0.906
	LTE Band 7	20M	QPSK	50	0	Back	10mm	20850	2510	20.93	21.70	1.194	0.159	0.809	0.966
	LTE Band 7	20M	QPSK	50	0	Back	10mm	21100	2535	20.74	21.70	1.247	-0.011	0.790	0.985
	LTE Band 7	20M	QPSK	50	0	Back	10mm	21350	2560	20.91	21.70	1.199	0.025	0.794	0.952
16	LTE Band 7	20M	QPSK	100	0	Back	10mm	20850	2510	20.91	21.70	1.199	0.099	0.838	1.005
	LTE Band 7	20M	QPSK	1	49	Left Side	10mm	20850	2510	21.38	21.70	1.076	0.094	0.321	0.346
	LTE Band 7	20M	QPSK	50	0	Left Side	10mm	20850	2510	20.93	21.70	1.194	0.001	0.316	0.377
	LTE Band 7	20M	QPSK	1	49	Right Side	10mm	20850	2510	21.38	21.70	1.076	0.159	0.129	0.139
	LTE Band 7	20M	QPSK	50	0	Right Side	10mm	20850	2510	20.93	21.70	1.194	-0.13	0.077	0.092
	LTE Band 7	20M	QPSK	1	49	Bottom Side	10mm	20850	2510	21.38	21.70	1.076	0.099	0.425	0.457
	LTE Band 7	20M	QPSK	50	0	Bottom Side	10mm	20850	2510	20.93	21.70	1.194	-0.017	0.418	0.499

<WLAN SAR>

Plot No.	Band	Mode	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)
	WLAN2.4GHz	802.11b 1Mbps	Front	10mm	11	2462	18.15	18.50	1.084	97.16	1.029	-0.08	0.130	0.145
	WLAN2.4GHz	802.11b 1Mbps	Back	10mm	11	2462	18.15	18.50	1.084	97.16	1.029	0	0.142	0.158
17	WLAN2.4GHz	802.11b 1Mbps	Back	10mm	1	2412	17.62	18.50	1.225	97.16	1.029	-0.08	0.146	0.184
	WLAN2.4GHz	802.11b 1Mbps	Back	10mm	6	2437	16.91	18.50	1.442	97.16	1.029	-0.01	0.108	0.160
	WLAN2.4GHz	802.11b 1Mbps	Left Side	10mm	11	2462	18.15	18.50	1.084	97.16	1.029	-0.04	0.083	0.093
	WLAN2.4GHz	802.11b 1Mbps	Top Side	10mm	11	2462	18.15	18.50	1.084	97.16	1.029	0.09	0.112	0.125
	WLAN5GHz	802.11a 6Mbps	Front	10mm	44	5220	16.25	17.00	1.189	87.26	1.146	0.13	0.046	0.063
	WLAN5GHz	802.11a 6Mbps	Back	10mm	44	5220	16.25	17.00	1.189	87.26	1.146	0.05	0.164	0.223
18	WLAN5GHz	802.11a 6Mbps	Back	10mm	36	5180	15.98	17.00	1.265	87.26	1.146	0.19	0.187	0.271
	WLAN5GHz	802.11a 6Mbps	Left Side	10mm	44	5220	16.25	17.00	1.189	87.26	1.146	-0.14	0.058	0.079
	WLAN5GHz	802.11a 6Mbps	Top Side	10mm	44	5220	16.25	17.00	1.189	87.26	1.146	-0.13	0.094	0.128
	WLAN5GHz	802.11a 6Mbps	Front	10mm	157	5785	17.47	17.50	1.007	87.26	1.146	0.02	0.058	0.067
	WLAN5GHz	802.11a 6Mbps	Back	10mm	157	5785	17.47	17.50	1.007	87.26	1.146	-0.04	0.279	0.322
	WLAN5GHz	802.11a 6Mbps	Back	10mm	149	5745	16.64	17.50	1.219	87.26	1.146	-0.11	0.212	0.296
19	WLAN5GHz	802.11a 6Mbps	Back	10mm	165	5825	16.94	17.50	1.138	87.26	1.146	-0.11	0.281	0.366
	WLAN5GHz	802.11a 6Mbps	Left Side	10mm	157	5785	17.47	17.50	1.007	87.26	1.146	-0.02	0.225	0.260
	WLAN5GHz	802.11a 6Mbps	Top Side	10mm	157	5785	17.47	17.50	1.007	87.26	1.146	-0.11	0.054	0.062

14.3 Product specific SAR

<WLAN SAR>

Plot No.	Band	Mode	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 10g SAR (W/kg)	Reported 10g SAR (W/kg)
	WLAN5GHz	802.11a 6Mbps	Front	0mm	52	5260	16.42	17.00	1.143	87.26	1.146	-0.1	0.128	0.168
	WLAN5GHz	802.11a 6Mbps	Back	0mm	52	5260	16.42	17.00	1.143	87.26	1.146	0.13	0.269	0.352
20	WLAN5GHz	802.11a 6Mbps	Back	0mm	64	5320	16.40	17.00	1.148	87.26	1.146	-0.03	0.293	0.386
	WLAN5GHz	802.11a 6Mbps	Left Side	0mm	52	5260	16.42	17.00	1.143	87.26	1.146	-0.14	0.163	0.213
	WLAN5GHz	802.11a 6Mbps	Top Side	0mm	52	5260	16.42	17.00	1.143	87.26	1.146	0.03	0.047	0.062
	WLAN5GHz	802.11a 6Mbps	Front	0mm	116	5580	17.44	17.50	1.014	87.26	1.146	-0.11	0.207	0.241
	WLAN5GHz	802.11a 6Mbps	Back	0mm	116	5580	17.44	17.50	1.014	87.26	1.146	0.05	0.479	0.557
21	WLAN5GHz	802.11a 6Mbps	Left Side	0mm	116	5580	17.44	17.50	1.014	87.26	1.146	-0.17	0.577	0.670
	WLAN5GHz	802.11a 6Mbps	Left Side	0mm	100	5500	16.61	17.00	1.094	87.26	1.146	0.09	0.449	0.563
	WLAN5GHz	802.11a 6Mbps	Left Side	0mm	132	5660	17.02	17.00	0.995	87.26	1.146	0.053	0.473	0.540
	WLAN5GHz	802.11a 6Mbps	Left Side	0mm	140	5700	14.28	14.50	1.052	87.26	1.146	0.181	0.168	0.203
	WLAN5GHz	802.11a 6Mbps	Top Side	0mm	116	5580	17.44	17.50	1.014	87.26	1.146	-0.04	0.180	0.209

14.4 Body Worn Accessory SAR

<GSM SAR>

Plot No.	Band	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)
	GSM850	GSM Voice	Front	10mm	189	836.4	33.04	33.50	1.112	-0.14	0.427	0.475
	GSM850	GSM Voice	Back	10mm	189	836.4	33.04	33.50	1.112	-0.07	0.578	0.643
	GSM850	GSM Voice	Back	10mm	128	824.2	32.90	33.50	1.148	-0.06	0.527	0.605
	GSM850	GSM Voice	Back	10mm	251	848.8	33.02	33.50	1.117	-0.05	0.600	0.670
	GSM850	GPRS (4 Tx slots)	Front	10mm	251	848.8	26.11	27.50	1.377	0.07	0.381	0.525
	GSM850	GPRS (4 Tx slots)	Back	10mm	251	848.8	26.11	27.50	1.377	0.11	0.526	0.724
	GSM850	GPRS (4 Tx slots)	Back	10mm	128	824.2	26.10	27.50	1.380	0.016	0.617	0.852
22	GSM850	GPRS (4 Tx slots)	Back	10mm	189	836.4	26.07	27.50	1.390	0.087	0.637	0.885
	GSM1900	GSM Voice	Front	10mm	512	1850.2	29.55	30.50	1.245	-0.034	0.335	0.417
	GSM1900	GSM Voice	Back	10mm	512	1850.2	29.55	30.50	1.245	0.103	0.469	0.584
	GSM1900	GSM Voice	Back	10mm	661	1880	29.30	30.50	1.318	0.032	0.434	0.572
	GSM1900	GSM Voice	Back	10mm	810	1909.8	29.44	30.50	1.276	0.025	0.521	0.665
	GSM1900	GPRS (4 Tx slots)	Front	10mm	810	1909.8	23.35	24.50	1.303	-0.03	0.428	0.558
23	GSM1900	GPRS (4 Tx slots)	Back	10mm	810	1909.8	23.35	24.50	1.303	-0.03	0.522	0.680
	GSM1900	GPRS (4 Tx slots)	Back	10mm	512	1850.2	23.28	24.50	1.323	0.08	0.487	0.645
	GSM1900	GPRS (4 Tx slots)	Back	10mm	661	1880	23.02	24.50	1.406	-0.19	0.418	0.588

<WCDMA SAR>

Plot No.	Band	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)
	WCDMA II	RMC 12.2Kbps	Front	10mm	9262	1852.4	20.10	21.00	1.230	0.142	0.450	0.554
	WCDMA II	RMC 12.2Kbps	Back	10mm	9262	1852.4	20.10	21.00	1.230	0.115	0.623	0.766
24	WCDMA II	RMC 12.2Kbps	Back	10mm	9400	1880	19.21	21.00	1.510	0.183	0.689	1.040
	WCDMA II	RMC 12.2Kbps	Back	10mm	9538	1907.6	19.75	21.00	1.334	0.109	0.618	0.824
	WCDMA V	RMC 12.2Kbps	Front	10mm	4132	826.4	22.97	24.00	1.268	0.15	0.424	0.537
	WCDMA V	RMC 12.2Kbps	Back	10mm	4132	826.4	22.97	24.00	1.268	-0.03	0.494	0.626
25	WCDMA V	RMC 12.2Kbps	Back	10mm	4182	836.4	22.66	24.00	1.361	0.068	0.589	0.802
	WCDMA V	RMC 12.2Kbps	Back	10mm	4233	846.6	22.64	24.00	1.368	0.026	0.468	0.640

<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)
	LTE Band 5	10M	QPSK	1	25	Front	10mm	20525	836.5	23.42	24.00	1.143	-0.1	0.552	0.631
	LTE Band 5	10M	QPSK	25	0	Front	10mm	20525	836.5	22.12	23.00	1.225	-0.03	0.356	0.436
26	LTE Band 5	10M	QPSK	1	25	Back	10mm	20525	836.5	23.42	24.00	1.143	-0.111	0.628	0.718
	LTE Band 5	10M	QPSK	25	0	Back	10mm	20525	836.5	22.12	23.00	1.225	0.002	0.416	0.509
	LTE Band 7	20M	QPSK	1	49	Front	10mm	20850	2510	21.38	21.70	1.076	0.081	0.689	0.742
	LTE Band 7	20M	QPSK	50	0	Front	10mm	20850	2510	20.93	21.70	1.194	-0.062	0.675	0.806
	LTE Band 7	20M	QPSK	50	0	Front	10mm	21100	2535	20.74	21.70	1.247	0.128	0.633	0.790
	LTE Band 7	20M	QPSK	50	0	Front	10mm	21350	2560	20.91	21.70	1.199	0.091	0.634	0.760
	LTE Band 7	20M	QPSK	100	0	Front	10mm	20850	2510	20.91	21.70	1.199	0.069	0.688	0.825
	LTE Band 7	20M	QPSK	1	49	Back	10mm	20850	2510	21.38	21.70	1.076	-0.076	0.840	0.904
	LTE Band 7	20M	QPSK	1	49	Back	10mm	21100	2535	20.94	21.70	1.191	-0.111	0.772	0.920
	LTE Band 7	20M	QPSK	1	49	Back	10mm	21350	2560	21.07	21.70	1.156	0.085	0.784	0.906
	LTE Band 7	20M	QPSK	50	0	Back	10mm	20850	2510	20.93	21.70	1.194	0.159	0.809	0.966
	LTE Band 7	20M	QPSK	50	0	Back	10mm	21100	2535	20.74	21.70	1.247	-0.011	0.790	0.985
	LTE Band 7	20M	QPSK	50	0	Back	10mm	21350	2560	20.91	21.70	1.199	0.025	0.794	0.952
27	LTE Band 7	20M	QPSK	1	100	Back	10mm	20850	2510	20.91	21.70	1.199	0.099	0.838	1.005

<WLAN SAR>

Plot No.	Band	Mode	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)
	WLAN2.4GHz	802.11b 1Mbps	Front	10mm	11	2462	18.15	18.50	1.084	97.16	1.029	-0.08	0.130	0.145
	WLAN2.4GHz	802.11b 1Mbps	Back	10mm	11	2462	18.15	18.50	1.084	97.16	1.029	0	0.142	0.158
28	WLAN2.4GHz	802.11b 1Mbps	Back	10mm	1	2412	17.62	18.50	1.225	97.16	1.029	-0.08	0.146	0.184
	WLAN2.4GHz	802.11b 1Mbps	Back	10mm	6	2437	16.91	18.50	1.442	97.16	1.029	-0.01	0.108	0.160
	WLAN5GHz	802.11a 6Mbps	Front	10mm	44	5220	16.25	17.00	1.189	87.26	1.146	0.13	0.046	0.063
	WLAN5GHz	802.11a 6Mbps	Back	10mm	44	5220	16.25	17.00	1.189	87.26	1.146	0.05	0.164	0.223
29	WLAN5GHz	802.11a 6Mbps	Back	10mm	36	5180	15.98	17.00	1.265	87.26	1.146	0.19	0.187	0.271
	WLAN5GHz	802.11a 6Mbps	Front	10mm	52	5260	16.42	17.00	1.143	87.26	1.146	-0.09	0.034	0.045
30	WLAN5GHz	802.11a 6Mbps	Back	10mm	52	5260	16.42	17.00	1.143	87.26	1.146	0.089	0.116	0.152
	WLAN5GHz	802.11a 6Mbps	Back	10mm	64	5320	16.40	17.00	1.148	87.26	1.146	0.063	0.110	0.145
	WLAN5GHz	802.11a 6Mbps	Front	10mm	116	5580	17.44	17.50	1.014	87.26	1.146	-0.157	0.041	0.048
31	WLAN5GHz	802.11a 6Mbps	Back	10mm	116	5580	17.44	17.50	1.014	87.26	1.146	0.042	0.260	0.302
	WLAN5GHz	802.11a 6Mbps	Back	10mm	100	5500	16.61	17.00	1.094	87.26	1.146	0.169	0.167	0.209
	WLAN5GHz	802.11a 6Mbps	Back	10mm	132	5660	17.02	17.00	0.995	87.26	1.146	0.086	0.226	0.258
	WLAN5GHz	802.11a 6Mbps	Back	10mm	140	5700	14.28	14.50	1.052	87.26	1.146	0.068	0.046	0.055
	WLAN5GHz	802.11a 6Mbps	Front	10mm	157	5785	17.47	17.50	1.007	87.26	1.146	0.02	0.058	0.067
	WLAN5GHz	802.11a 6Mbps	Back	10mm	157	5785	17.47	17.50	1.007	87.26	1.146	-0.04	0.279	0.322
	WLAN5GHz	802.11a 6Mbps	Back	10mm	149	5745	16.64	17.50	1.219	87.26	1.146	-0.11	0.212	0.296
32	WLAN5GHz	802.11a 6Mbps	Back	10mm	165	5825	16.94	17.50	1.138	87.26	1.146	-0.11	0.281	0.366

<Bluetooth SAR>

Plot No.	Band	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)
33	Bluetooth	1Mbps	Front	10mm	39	2441	12.01	12.50	1.119	-0.009	0.043	0.048
	Bluetooth	1Mbps	Front	10mm	0	2402	10.67	11.00	1.079	-0.129	0.012	0.013
	Bluetooth	1Mbps	Front	10mm	78	2480	9.60	11.00	1.380	0.119	0.018	0.025
	Bluetooth	1Mbps	Back	10mm	39	2441	12.01	12.50	1.119	-0.164	0.041	0.046

14.5 Repeated SAR Measurement

No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Mode	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)	Ratio	Reported 1g SAR (W/kg)
1st	WLAN2.4GHz	-	-	-	-	802.11b 1Mbps	Right Cheek	0mm	1	2412	17.62	18.50	1.225	97.16	1.029	0.06	0.887	-	1.118
2nd	WLAN2.4GHz	-	-	-	-	802.11b 1Mbps	Right Cheek	0mm	1	2412	17.62	18.50	1.225	97.16	1.029	0.03	0.861	1.03	1.085
1st	LTE Band 7	20M	QPSK	1	49	-	Back	10mm	20850	2510	21.38	21.70	1.076	-	-	-0.076	0.840	-	0.904
2nd	LTE Band 7	20M	QPSK	1	49	-	Back	10mm	20850	2510	21.38	21.70	1.076	-	-	-0.028	0.815	1.03	0.877

General Note:

1. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg.
2. Per KDB 865664 D01v01r04, if the ratio among the repeated measurement is ≤ 1.2 and the measured SAR <1.45W/kg, only one repeated measurement is required.
3. The ratio is the difference in percentage between original and repeated *measured SAR*.
4. All measurement SAR result is scaled-up to account for tune-up tolerance and is compliant.

15. Simultaneous Transmission Analysis

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

General Note:

1. This device supported VoIP in EGPRS, WCDMA, LTE (e.g. 3rd party VoIP).
2. WLAN and Bluetooth share the same antenna, and cannot transmit simultaneously.
3. This device 2.4GHz / 5.2GHz / 5.8GHz WLAN supports Hotspot operation and WiFi Direct (Group Client / Group Owner), and 5.3GHz / 5.5GHz WLAN supports WiFi Direct (Group Client).
4. 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.
5. The Scaled SAR summation is calculated based on the same configuration and test position.
6. The worst WWAN and WLAN reported SAR for each configuration was used for SAR summation, Therefore, the following summations represent the absolute worst cases for simultaneous transmission with WWAN and WLAN.
7. Per KDB 447498 D01v06, simultaneous transmission SAR is compliant if,
   i) Scalar SAR summation < 1.6W/kg.
   ii) SPLSR = (SAR1 + SAR2)^1.5 / (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.
   iii) If SPLSR ≤ 0.04, simultaneously transmission SAR measurement is not necessary.
   iv) Simultaneously transmission SAR measurement, and the reported multi-band SAR < 1.6W/kg.
   v) The SPLSR calculated results please refer to section 15.5.
8. For simultaneous transmission analysis, Bluetooth SAR is estimated per KDB 447498 D01v06 based on the formula below.
   i) (*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)]·[√f(GHz)/*x*] W/kg for *test separation distances* ≤ 50 mm; where *x* = 7.5 for 1-g SAR, and *x* = 18.75 for 10-g SAR.
   ii) When the minimum separation distance is < 5mm, the distance is used 5mm to determine SAR test exclusion.
   iii) 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	Product specific
12.5 dBm	Estimated SAR (W/kg)	0.302 W/kg

15.1 Head Exposure Conditions

WWAN Band		Exposure Position	1 WWAN 1g SAR (W/kg)	2 2.4GHz WLAN 1g SAR (W/kg)	3 5GHz WLAN 1g SAR (W/kg)	1+2 Summed 1g SAR (W/kg)	1+3 Summed 1g SAR (W/kg)	SPLSR	Case No
GSM	GSM850	Right Cheek	0.332	1.118	0.633	**1.45**	**0.97**		
		Right Tilted	0.244	0.560	0.443	**0.80**	**0.69**		
		Left Cheek	0.454	0.531	0.482	**0.99**	**0.94**		
		Left Tilted	0.240	0.526	0.537	**0.77**	**0.78**		
	GSM1900	Right Cheek	0.375	1.118	0.633	**1.49**	**1.01**		
		Right Tilted	0.245	0.560	0.443	**0.81**	**0.69**		
		Left Cheek	0.336	0.531	0.482	**0.87**	**0.82**		
		Left Tilted	0.252	0.526	0.537	**0.78**	**0.79**		
WCDMA	WCDMA II	Right Cheek	0.933	1.118	0.633	**2.05**	**1.57**	0.03	Case 1
		Right Tilted	0.589	0.560	0.443	**1.15**	**1.03**		
		Left Cheek	0.777	0.531	0.482	**1.31**	**1.26**		
		Left Tilted	0.663	0.526	0.537	**1.19**	**1.20**		
	WCDMA V	Right Cheek	0.396	1.118	0.633	**1.51**	**1.03**		
		Right Tilted	0.262	0.560	0.443	**0.82**	**0.71**		
		Left Cheek	0.352	0.531	0.482	**0.88**	**0.83**		
		Left Tilted	0.218	0.526	0.537	**0.74**	**0.76**		
LTE	LTE Band 5	Right Cheek	0.370	1.118	0.633	**1.49**	**1.00**		
		Right Tilted	0.272	0.560	0.443	**0.83**	**0.72**		
		Left Cheek	0.393	0.531	0.482	**0.92**	**0.88**		
		Left Tilted	0.272	0.526	0.537	**0.80**	**0.81**		
	LTE Band 7	Right Cheek	0.442	1.118	0.633	**1.56**	**1.08**		
		Right Tilted	0.416	0.560	0.443	**0.98**	**0.86**		
		Left Cheek	0.658	0.531	0.482	**1.19**	**1.14**		
		Left Tilted	0.406	0.526	0.537	**0.93**	**0.94**		

15.2 Hotspot Exposure Conditions

WWAN Band		Exposure Position	1 WWAN 1g SAR (W/kg)	2 2.4GHz WLAN 1g SAR (W/kg)	3 5GHz WLAN 1g SAR (W/kg)	1+2 Summed 1g SAR (W/kg)	1+3 Summed 1g SAR (W/kg)
GSM	GSM850	Front	0.525	0.145	0.067	**0.67**	**0.59**
		Back	0.724	0.184	0.366	**0.91**	**1.09**
		Left side	0.746	0.093	0.260	**0.84**	**1.01**
		Right side	0.596			**0.60**	**0.60**
		Top side		0.125	0.128	**0.13**	**0.13**
		Bottom side	0.056			**0.06**	**0.06**
	GSM1900	Front	0.558	0.145	0.067	**0.70**	**0.63**
		Back	0.680	0.184	0.366	**0.86**	**1.05**
		Left side	0.237	0.093	0.260	**0.33**	**0.50**
		Right side	0.198			**0.20**	**0.20**
		Top side		0.125	0.128	**0.13**	**0.13**
		Bottom side	0.336			**0.34**	**0.34**
WCDMA	WCDMA II	Front	0.554	0.145	0.067	**0.70**	**0.62**
		Back	1.040	0.184	0.366	**1.22**	**1.41**
		Left side	0.208	0.093	0.260	**0.30**	**0.47**
		Right side	0.324			**0.32**	**0.32**
		Top side		0.125	0.128	**0.13**	**0.13**
		Bottom side	0.600			**0.60**	**0.60**
	WCDMA V	Front	0.537	0.145	0.067	**0.68**	**0.60**
		Back	0.626	0.184	0.366	**0.81**	**0.99**
		Left side	0.889	0.093	0.260	**0.98**	**1.15**
		Right side	0.520			**0.52**	**0.52**
		Top side		0.125	0.128	**0.13**	**0.13**
		Bottom side	0.087			**0.09**	**0.09**
LTE	LTE Band 5	Front	0.631	0.145	0.067	**0.78**	**0.70**
		Back	0.718	0.184	0.366	**0.90**	**1.08**
		Left side	0.736	0.093	0.260	**0.83**	**1.00**
		Right side	0.554			**0.55**	**0.55**
		Top side		0.125	0.128	**0.13**	**0.13**
		Bottom side	0.101			**0.10**	**0.10**
	LTE Band 7	Front	0.825	0.145	0.067	**0.97**	**0.89**
		Back	1.005	0.184	0.366	**1.19**	**1.37**
		Left side	0.377	0.093	0.260	**0.47**	**0.64**
		Right side	0.139			**0.14**	**0.14**
		Top side		0.125	0.128	**0.13**	**0.13**
		Bottom side	0.499			**0.50**	**0.50**

15.3 Product specific Exposure Conditions

1	2	3	4	1+2 Summed 10g SAR (W/kg)	1+3 Summed 10g SAR (W/kg)	1+4 Summed 10g SAR (W/kg)
WWAN	2.4GHz WLAN	5GHz WLAN	2.4GHz Bluetooth			
10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)	Estimated 10g SAR (W/kg)			
-	-	0.670	0.302	-	**0.67**	**0.30**

Remark:

1. According to KDB 648474 D04v01r03, for WWAN / 2.4GHz WLAN hand SAR ("-") was excluded, due to SAR was < 1.2W/kg.

15.4 Body-Worn Accessory Exposure Conditions

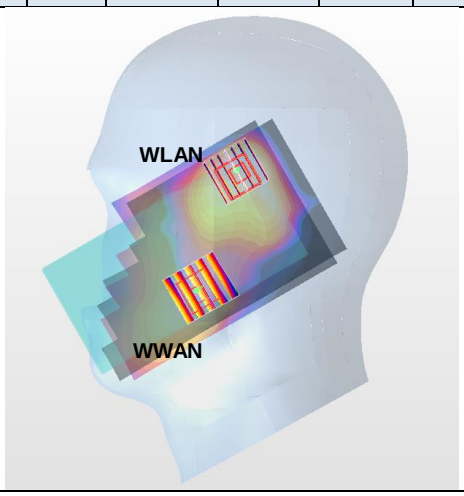
WWAN Band		Exposure Position	1 WWAN 1g SAR (W/kg)	2 2.4GHz WLAN 1g SAR (W/kg)	3 5GHz WLAN 1g SAR (W/kg)	4 2.4GHz Bluetooth 1g SAR (W/kg)	1+2 Summed 1g SAR (W/kg)	1+3 Summed 1g SAR (W/kg)	1+4 Summed 1g SAR (W/kg)
GSM	GSM850	Front	0.525	0.145	0.067	0.048	**0.67**	**0.59**	**0.57**
		Back	0.885	0.184	0.366	0.046	**1.07**	**1.25**	**0.93**
	GSM1900	Front	0.558	0.145	0.067	0.048	**0.70**	**0.63**	**0.61**
		Back	0.680	0.184	0.366	0.046	**0.86**	**1.05**	**0.73**
WCDMA	WCDMA II	Front	0.554	0.145	0.067	0.048	**0.70**	**0.62**	**0.60**
		Back	1.040	0.184	0.366	0.046	**1.22**	**1.41**	**1.09**
	WCDMA V	Front	0.537	0.145	0.067	0.048	**0.68**	**0.60**	**0.59**
		Back	0.802	0.184	0.366	0.046	**0.99**	**1.17**	**0.85**
LTE	LTE Band 5	Front	0.631	0.145	0.067	0.048	**0.78**	**0.70**	**0.68**
		Back	0.718	0.184	0.366	0.046	**0.90**	**1.08**	**0.76**
	LTE Band 7	Front	0.825	0.145	0.067	0.048	**0.97**	**0.89**	**0.87**
		Back	1.005	0.184	0.366	0.046	**1.19**	**1.37**	**1.05**

15.5 SPLSR Evaluation and Analysis

General Note:

1. SPLSR = $(SAR_1 + SAR_2)^{1.5}$ / (*min. separation distance, mm*). If SPLSR ≤ 0.04, simultaneously transmission SAR measurement is not necessary

Case 1	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
	WCDMA II	Right Cheek	0.933	0	0.0472	0.0588	-0.0018	87.9	2.05	0.03	Not required
	WLAN2.4GHz		1.118	0	0.0172	-0.0238	-0.0013				



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16. Uncertainty Assessment

The component of uncertainly may generally be categorized according to the methods used to evaluate them. The evaluation of uncertainly by the statistical analysis of a series of observations is termed a Type An 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]	$1/\sqrt{3}$	$1/\sqrt{6}$	$1/\sqrt{2}$

(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 16.1. 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 16.2. 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	7.0	N	1	1	1	7.0	7.0
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	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						12.8%	12.7%
Coverage Factor for 95 %						K=2	K=2
Expanded STD Uncertainty						25.5%	25.4%

Table 16.3. Uncertainty Budget for frequency range 3 GHz to 6 GHz

17. References

[1] FCC 47 CFR Part 2 “Frequency Allocations and Radio Treaty Matters; General Rules and Regulations”

[2] ANSI/IEEE Std. C95.1-1992, “IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz”, September 1992

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[4] SPEAG DASY System Handbook

[5] FCC KDB 248227 D01 v02r02, “SAR Guidance for IEEE 802.11 (WiFi) Transmitters”, Oct 2015.

[6] FCC KDB 447498 D01 v06, “Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies”, Oct 2015

[7] FCC KDB 648474 D04 v01r03, “SAR Evaluation Considerations for Wireless Handsets”, Oct 2015.

[8] FCC KDB 941225 D01 v03r01, “3G SAR MEAUREMENT PROCEDURES”, Oct 2015

[9] FCC KDB 941225 D05 v02r05, “SAR Evaluation Considerations for LTE Devices”, Dec 2015

[10] FCC KDB 941225 D06 v02r01, "SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities", Oct 2015.

[11] FCC KDB 865664 D01 v01r04, "SAR Measurement Requirements for 100 MHz to 6 GHz", Aug 2015.

[12] FCC KDB 865664 D02 v01r02, “RF Exposure Compliance Reporting and Documentation Considerations” Oct 2015.