FCC SAR Test Report

APPLICANT	:	**Motorola Mobility, LLC**
EQUIPMENT	:	**Mobile Cellular Phone**
BRAND NAME	:	**Motorola Mobility, LLC**
MODEL NAME	:	**4009**
FCC ID	:	**IHDT56PH2**
STANDARD	:	**FCC 47 CFR Part 2 (2.1093)** **ANSI/IEEE C95.1-1992** **IEEE 1528-2003**

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

SPORTON INTERNATIONAL INC.
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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA450533A	Rev. 01	Initial issue of report	Jun. 06, 2014
FA450533A	Rev. 02	1. Corrected high simultaneous transmission SAR on page4. 2. Corrected plot number in appendix B.	Jun. 19, 2014

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **Motorola Mobility, LLC, Mobile Cellular Phone, 4009** are as follows.

Equipment Class	Frequency Band	Highest SAR Summary			
		Head (Separation 0mm) 1g SAR (W/kg)	Body-worn (Separation 15mm) 1g SAR (W/kg)	Wireless Router (Separation 10mm) 1g SAR (W/kg)	Simultaneous Transmission 1g SAR (W/kg)
PCE	CDMA 2000 BC0	0.41	0.60	**0.73**	1.54
	CDMA 2000 BC1	0.40	**1.53**	0.64	
	LTE Band 12	0.24	0.30	0.35	
	LTE Band 17	0.41	0.35	0.43	
	LTE Band 5	0.34	0.41	0.63	
	LTE Band 4	**1.19**	0.75	0.71	
DTS	WLAN 2.4GHz Band	0.40	0.14	0.24	1.43
DSS	Bluetooth	0.02	0.01	0.02	1.54
Date of Testing:		05/10/2014 ~ 05/19/2014			

This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1992, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2003.

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 Hsiang, Tao Yuan Hsien, 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, Suite 1800, Chicago, IL 60654, United States

Manufacturer	
Company Name	Motorola Mobility, LLC
Address	222 W Merchandise Mart Plaza, Suite 1800, Chicago, IL 60654, United States

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 1528-2003
- FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r03
- FCC KDB 865664 D02 SAR Reporting v01r01
- FCC KDB 447498 D01 General RF Exposure Guidance v05r02
- FCC KDB 648474 D04 SAR Evaluation Considerations for Wireless Handsets v01r02
- FCC KDB 248227 D01 SAR meas for 802 11abg v01r02
- FCC KDB 941225 D01 SAR test for 3G devices v02
- FCC KDB 941225 D02 HSPA and 1x Advanced v02r02
- FCC KDB 941225 D05 SAR for LTE Devices v02r03
- FCC KDB 941225 D06 Hotspot Mode SAR v01r01

4. Equipment Under Test (EUT)

4.1 General Information

Product Feature & Specification	
Equipment Name	Mobile Cellular Phone
Brand Name	Motorola Mobility, LLC
Model Name	4009
FCC ID	IHDT56PH2
S/N	NDGW370001
Wireless Technology and Frequency Range	CDMA2000 BC0: 824.7 MHz ~ 848.31 MHz CDMA 2000 BC1: 1851.25 MHz ~ 1908.75 MHz LTE Band 12: 699.7 MHz ~ 715.3 MHz LTE Band 17: 706.5 MHz ~ 713.5 MHz LTE Band 5: 824.7 MHz ~ 848.3 MHz LTE Band 4: 1710.7 MHz ~ 1754.3 MHz WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Mode	・CDMA2000 : 1xRTT/1xEv-Do(Rev.0)/1xEv-Do(Rev.A) ・LTE: QPSK, 16QAM ・802.11b/g/n HT20 ・Bluetooth v3.0+EDR，Bluetooth v4.0-LE
HW Version	P3
SW Version	peregrine_usc_userdebug_4.4.3_KXB21.14-L1.12_14_intcfg_test-keys_usc_US
EUT Stage	Production Unit

Remark:

1. This device supported VoIP in CDMA and LTE (e.g. 3rd party VoIP).
2. While operating in body-adjacent exposure configurations during a mobile hotspot session, reduced power limits are enforced on the CDMA BC1 and LTE Band 4 transmitter. More detailed information which can be referred to “operational description”.

4.2 Maximum Tune-up Limit

Band / Mode		Average Power (dBm)
CDMA	BC 0	25.0
	BC 1	25.0
LTE	Band 12	24.0
	Band 17	24.0
	Band 5	24.0
	Band 4	24.0
2.4GHz WLAN	802.11b	18.0
	802.11g	16.0
	802.11n	15.0
2.4GHz Bluetooth	v3.0+EDR	10.0
	v4.0-LE	1.0

4.3 General LTE SAR Test and Reporting Considerations

Summarized necessary items addressed in KDB 941225 D05 v02r03	
FCC ID	IHDT56PH2
Equipment Name	Mobile Cellular Phone
Operating Frequency Range of each LTE transmission band	LTE Band 12: 699.7 MHz ~ 715.3 MHz LTE Band 17: 706.5 MHz ~ 713.5 MHz LTE Band 05: 824.7 MHz ~ 848.3 MHz LTE Band 04: 1710.7 MHz ~ 1754.3 MHz
Channel Bandwidth	LTE Band 12: 1.4MHz, 3MHz, 5MHz, 10MHz LTE Band 17: 5MHz, 10MHz LTE Band 05: 1.4MHz, 3MHz, 5MHz, 10MHz LTE Band 04: 1.4MHz, 3MHz, 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.
Power reduction applied to satisfy SAR compliance	Yes, When operating in hotspot mode that LTE band 4 power reduction applied to satisfy SAR compliance.

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 12

	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	23017	699.7	23025	700.5	23035	701.5	23060	704
M	23095	707.5	23095	707.5	23095	707.5	23095	707.5
H	23173	715.3	23165	714.5	23155	713.5	23130	711

LTE Band 17

	Bandwidth 5 MHz		Bandwidth 10 MHz	
	Channel #	Freq.(MHz)	Channel #	Freq. (MHz)
L	23755	706.5	23780	709
M	23790	710	23790	710
H	23825	713.5	23800	711

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 4

	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	19957	1710.7	19965	1711.5	19975	1712.5	20000	1715	20025	1717.5	20050	1720
M	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5
H	20393	1754.3	20385	1753.5	20375	1752.5	20350	1750	20325	1747.5	20300	1745

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:

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

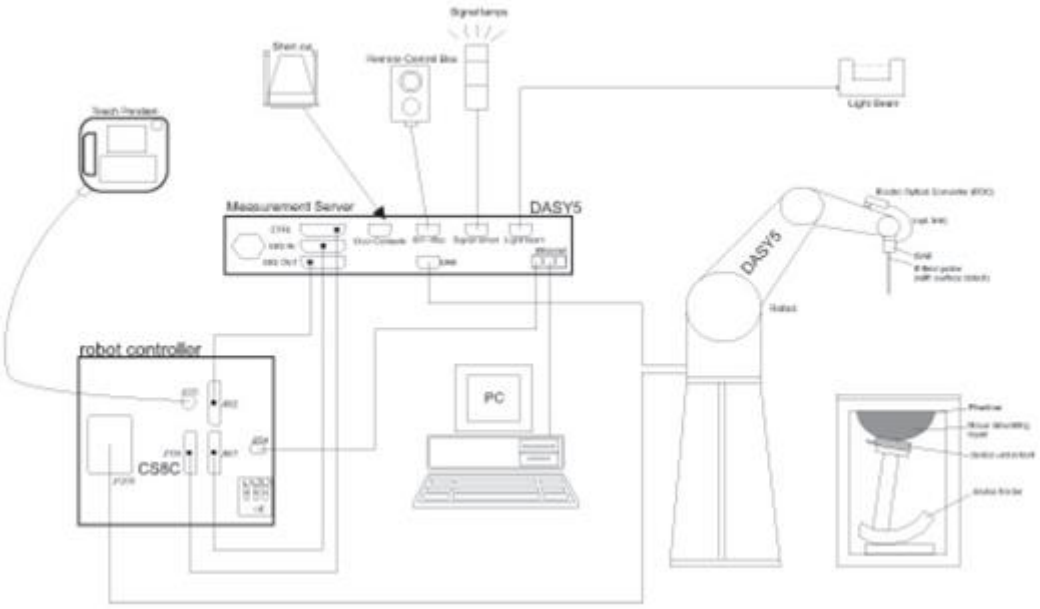
SAR is expressed in units of Watts per kilogram (W/kg)

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

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.

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 D01v01r03 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 D01v01r03 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	750MHz System Validation Kit	D750V3	1004	Jan. 28, 2014	Jan. 27, 2015
SPEAG	835MHz System Validation Kit	D835V2	499	Mar. 24, 2014	Mar. 23, 2015
SPEAG	1750MHz System Validation Kit	D1750V2	1068	Nov. 27, 2013	Nov. 26, 2014
SPEAG	1900MHz System Validation Kit	D1900V2	5d041	Mar. 21, 2014	Mar. 20, 2015
SPEAG	2450MHz System Validation Kit	D2450V2	924	Nov. 13, 2013	Nov. 12, 2014
SPEAG	Data Acquisition Electronics	DAE4	1338	Nov. 05, 2013	Nov. 04, 2014
SPEAG	Data Acquisition Electronics	DAE4	1425	Mar. 03, 2014	Mar. 02, 2015
SPEAG	Data Acquisition Electronics	DAE4	1279	Jan. 30, 2014	Jan. 29, 2015
SPEAG	Data Acquisition Electronics	DAE4	914	Dec. 18, 2013	Dec. 17, 2014
SPEAG	Data Acquisition Electronics	DAE4	1399	Nov. 07, 2013	Nov. 06, 2014
SPEAG	Dosimetric E-Field Probe	ES3DV3	3270	Sep. 24, 2013	Sep. 23, 2014
SPEAG	Dosimetric E-Field Probe	EX3DV4	3935	Nov. 04, 2013	Nov. 03, 2014
SPEAG	Dosimetric E-Field Probe	EX3DV4	3931	Sep. 10, 2013	Sep. 09, 2014
SPEAG	Dosimetric E-Field Probe	EX3DV4	3954	Nov. 04, 2013	Nov. 03, 2014
SPEAG	Dosimetric E-Field Probe	EX3DV4	3770	Apr. 24, 2014	Apr. 23, 2015
SPEAG	Dosimetric E-Field Probe	EX3DV4	3955	Nov. 12, 2013	Nov. 11, 2014
Wisewind	Thermometer	ETP-101	TM560	Oct. 22, 2013	Oct. 21, 2014
Wisewind	Thermometer	ETP-101	TM685	Oct. 22, 2013	Oct. 21, 2014
Wisewind	Thermometer	HTC-1	TM642	Oct. 22, 2013	Oct. 21, 2014
Wisewind	Thermometer	HTC-1	TM281	Oct. 22, 2013	Oct. 21, 2014
H.M.IRIS	Thermometer	TH-08	TM658	Oct. 22, 2013	Oct. 21, 2014
Anritsu	Radio Communication Analyzer	MT8820C	6201074414	Feb. 11, 2014	Feb. 10, 2015
Anritsu	Radio Communication Analyzer	MT8820C	6201341950	Dec. 25, 2013	Dec. 24, 2015
Agilent	Wireless Communication Test Set	E5515C	MY48360820	Jan. 10, 2014	Jan. 09, 2016
SPEAG	Device Holder	N/A	N/A	NCR	NCR
Agilent	Signal Generator	E4438C	MY49070755	Oct. 08, 2013	Oct. 07, 2014
SPEAG	Dielectric Probe Kit	DAK-3.5	1126	Jul. 23, 2013	Jul. 22, 2014
Agilent	ENA Network Analyzer	E5071C	MY46316648	Feb. 07, 2014	Feb. 06, 2015
Anritsu	Power Meter	ML2495A	1349001	Dec. 04, 2013	Dec. 03, 2014
Anritsu	Power Sensor	MA2411B	1306099	Dec. 03, 2013	Dec. 02, 2014
R&S	Spectrum Analyzer	FSP 7	101131	Jul. 09, 2013	Jul. 08, 2014
Agilent	Dual Directional Coupler	778D	50422	Note 2	
Woken	Attenuator	WK0602-XX	N/A	Note 2	
PE	Attenuator	PE7005-10	N/A	Note 2	
PE	Attenuator	PE7005- 3	N/A	Note 2	
AR	Power Amplifier	5S1G4M2	0328767	Note 2	
Mini-Circuits	Power Amplifier	ZVE-3W	162601250	Note 2	
Mini-Circuits	Power Amplifier	ZHL-42W+	13440021344	Note 2	

General Note:

1. The calibration certificate of DASY can be referred to appendix C of this report.
2. 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
750	Head	22.6	0.893	41.008	0.89	41.90	0.34	-2.13	±5	2014/5/16
750	Head	22.7	0.889	40.887	0.89	41.90	-0.11	-2.42	±5	2014/5/17
750	Body	22.2	0.970	54.642	0.96	55.50	1.04	-1.55	±5	2014/5/11
750	Body	22.7	0.975	55.039	0.96	55.50	1.56	-0.83	±5	2014/5/17
835	Head	22.4	0.907	42.345	0.90	41.50	0.78	2.04	±5	2014/5/14
835	Head	22.4	0.907	42.345	0.90	41.50	0.78	2.04	±5	2014/5/14
835	Head	22.6	0.886	41.339	0.90	41.50	-1.56	-0.39	±5	2014/5/16
835	Body	22.4	0.963	54.540	0.97	55.20	-0.72	-1.20	±5	2014/5/11
835	Body	22.4	0.995	56.715	0.97	55.20	2.58	2.74	±5	2014/5/18
1750	Head	22.2	1.409	39.382	1.40	40.00	0.64	-1.55	±5	2014/5/17
1750	Body	22.5	1.509	52.010	1.52	53.30	-0.72	-2.42	±5	2014/5/11
1750	Body	22.5	1.546	51.744	1.52	53.30	1.71	-2.92	±5	2014/5/18
1900	Head	22.3	1.432	39.344	1.40	40.00	2.29	-1.64	±5	2014/5/18
1900	Body	22.7	1.534	51.986	1.52	53.30	0.92	-2.47	±5	2014/5/10
1900	Body	22.5	1.516	53.631	1.52	53.30	-0.26	0.62	±5	2014/5/18
2450	Head	22.3	1.848	38.347	1.80	39.20	2.67	-2.18	±5	2014/5/16
2450	Head	22.6	1.845	39.275	1.80	39.20	2.50	0.19	±5	2014/5/19
2450	Body	22.2	2.015	53.957	1.95	52.70	3.33	2.39	±5	2014/5/17
2450	Body	22.6	1.927	53.408	1.95	52.70	-1.18	1.34	±5	2014/5/19

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.

Date	Frequency (MHz)	Tissue Type	Input Power (mW)	Dipole S/N	Probe S/N	DAE S/N	Measured SAR (W/kg)	Targeted SAR (W/kg)	Normalized SAR (W/kg)	Deviation (%)
2014/5/16	750	Head	250	D750V3-1004	3770	914	2.16	8.34	8.64	3.60
2014/5/17	750	Head	250	D750V3-1004	3770	914	2.14	8.34	8.56	2.64
2014/5/11	750	Body	250	D750V3-1004	3955	1399	2.16	8.65	8.64	-0.12
2014/5/17	750	Body	250	D750V3-1004	3770	914	2.33	8.65	9.32	7.75
2014/5/14	835	Head	250	D835V2-499	3955	1399	2.32	9.13	9.28	1.64
2014/5/14	835	Head	250	D835V2-499	3270	1399	2.44	9.13	9.76	6.90
2014/5/16	835	Head	250	D835V2-499	3931	1425	2.37	9.13	9.48	3.83
2014/5/11	835	Body	250	D835V2-499	3935	1338	2.40	9.46	9.60	1.48
2014/5/18	835	Body	250	D835V2-499	3770	914	2.18	9.46	8.72	-7.82
2014/5/17	1750	Head	250	D1750V2-1068	3770	914	8.94	37.30	35.76	-4.13
2014/5/11	1750	Body	250	D1750V2-1068	3935	1338	10.00	37.50	40.00	6.67
2014/5/18	1750	Body	250	D1750V2-1068	3770	914	9.53	37.50	38.12	1.65
2014/5/18	1900	Head	250	D1900V2-5d041	3954	1279	10.00	41.00	40.00	-2.44
2014/5/10	1900	Body	250	D1900V2-5d041	3935	1338	9.92	41.00	39.68	-3.22
2014/5/18	1900	Body	250	D1900V2-5d041	3955	1399	9.78	41.00	39.12	-4.59
2014/5/16	2450	Head	250	D2450V2-924	3770	914	13.40	52.40	53.60	2.29
2014/5/19	2450	Head	250	D2450V2-924	3931	1425	14.10	52.40	56.40	7.63
2014/5/17	2450	Body	250	D2450V2-924	3770	914	12.40	50.20	49.60	-1.20
2014/5/19	2450	Body	250	D2450V2-924	3931	1425	12.60	50.20	50.40	0.40

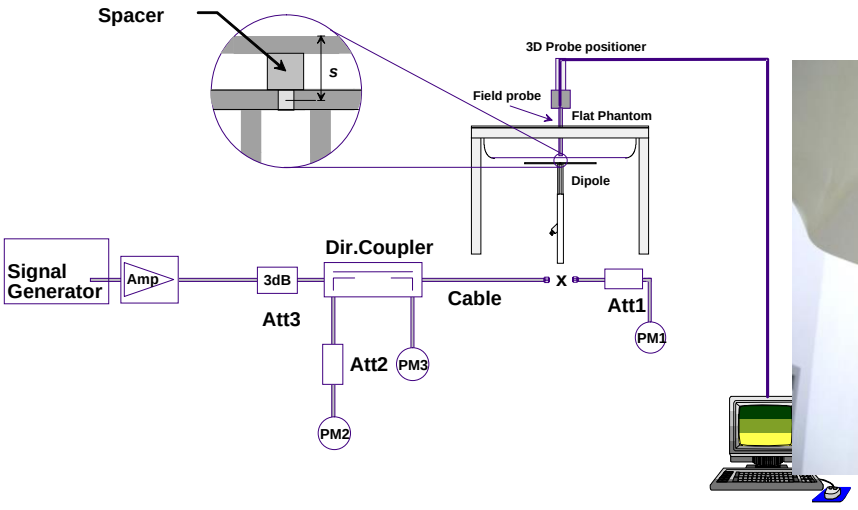


Fig 8.3.1 System Performance Check Setup

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.

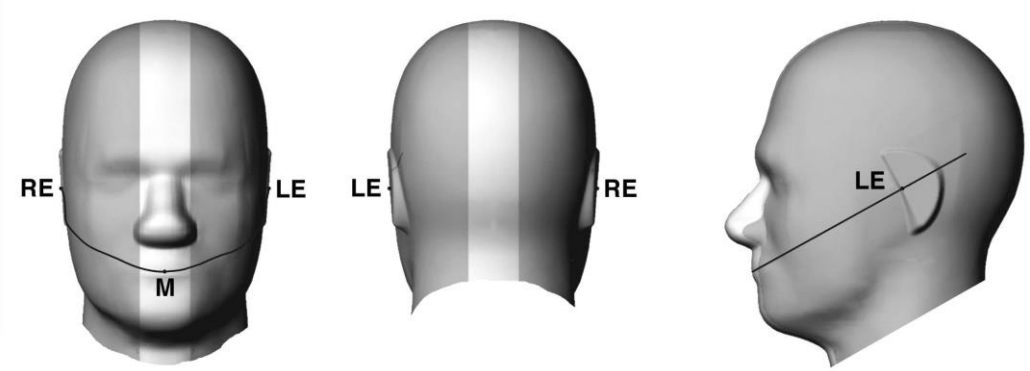


Fig 9.1.1 Front, back, and side views of SAM twin phantom

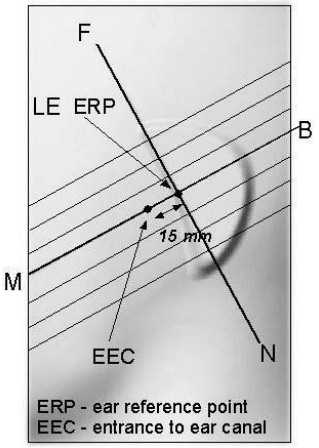


Fig 9.1.2 Close-up side view of phantom showing the ear region.

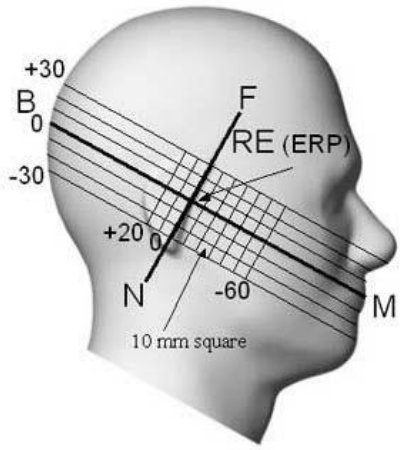


Fig 9.1.3 Side view of the phantom showing relevant markings and seven cross-sectional plane locations

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.

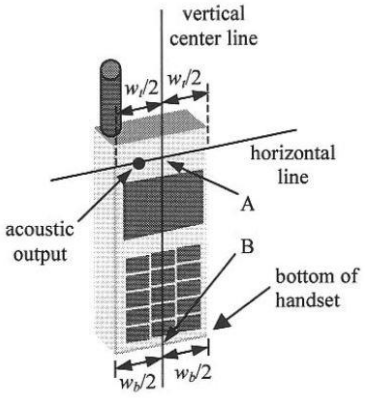


Fig 9.2.1 Handset vertical and horizontal reference lines—"fixed case

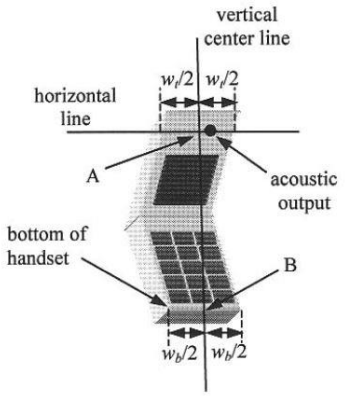


Fig 9.2.2 Handset vertical and horizontal reference lines—"clam-shell case"

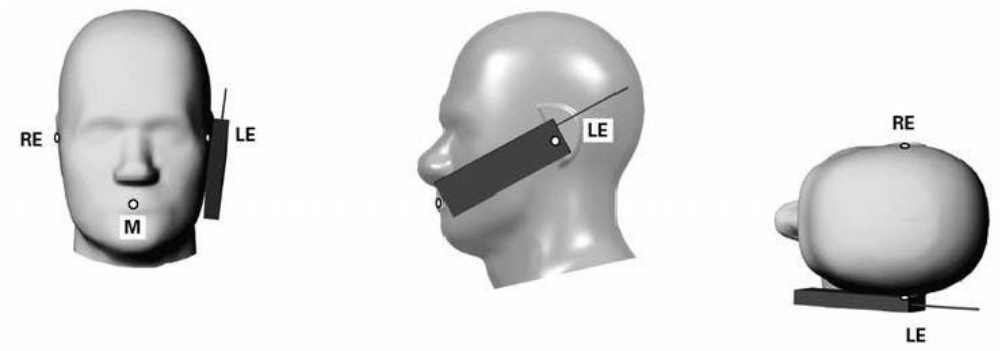


Fig 9.2.3 cheek or touch position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which establish the Reference Plane for handset positioning, are indicated.

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

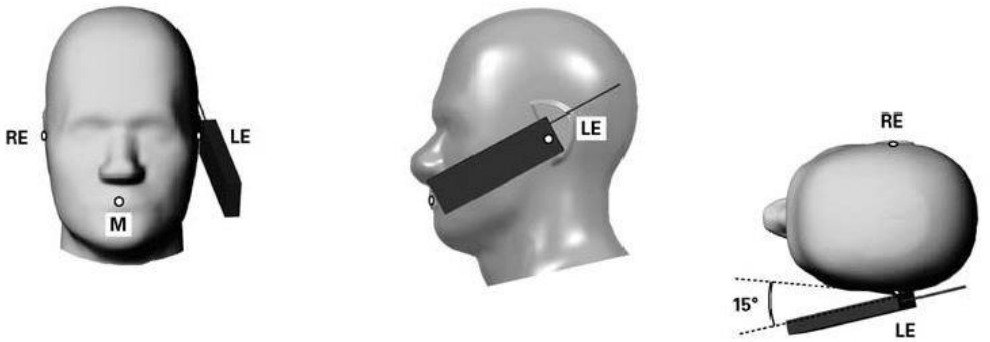


Fig 9.3.1 Tilt position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which define the Reference Plane for handset positioning, are indicated.

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 KDB 648474 D04v01r02, body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in FCC KDB 447498 D01v05r02 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode, when applicable. When the reported SAR for body-worn accessory, measured without a headset connected to the handset is < 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a 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.

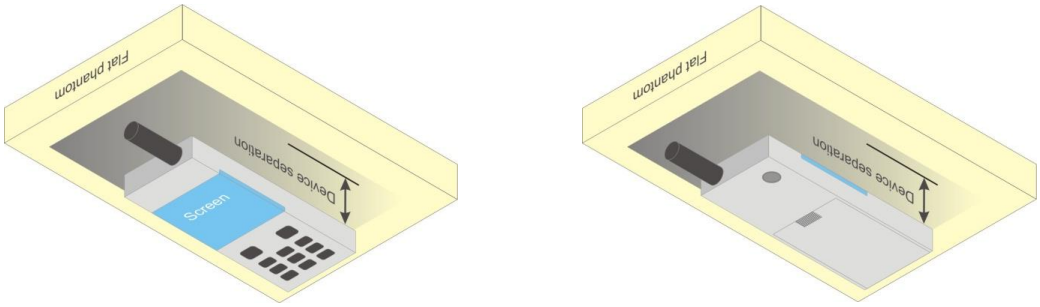


Fig 9.4 Body Worn Position

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 HDB Publication 941225 D06v01r01 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 D01v05r02 publication procedures. The “Portable Hotspot” feature on the handset was NOT activated during SAR assessments, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal at a time.

12. Conducted RF Output Power (Unit: dBm)

<LTE Conducted Power>

General Note:

1. Anritsu MT8820C base station simulator was used to setup the connection with EUT; the frequency band, channel bandwidth, RB allocation configuration, modulation type are set in the base station simulator to configure EUT transmitting at maximum power and at different configurations which are requested to be reported to FCC, for conducted power measurement and SAR testing.
2. Per KDB 941225 D05v02r03, when a properly configured base station simulator is used for the SAR and power measurements, spectrum plots for each RB allocation and offset configuration is not required.
3. Per KDB 941225 D05v02r03, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
4. Per KDB 941225 D05v02r03, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
5. Per KDB 941225 D05v02r03, For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
6. Per KDB 941225 D05v02r03, 16QAM output power for each RB allocation configuration is > not 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 D05v02r03, 16QAM SAR testing is not required.
7. Per KDB 941225 D05v02r03, 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 D05v02r03, smaller bandwidth SAR testing is not required.

<LTE Band 12>

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				23060	23095	23130		
Frequency (MHz)				704	707.5	711		
10	QPSK	1	0	22.92	22.88	22.77	24	0
10	QPSK	1	24	22.88	22.76	22.67		
10	QPSK	1	49	22.78	22.78	22.56		
10	QPSK	25	0	21.98	21.82	21.79	23	1
10	QPSK	25	12	21.89	21.74	21.76		
10	QPSK	25	24	21.80	21.86	21.72		
10	QPSK	50	0	21.93	21.90	21.85		
10	16QAM	1	0	21.90	21.85	21.75	23	1
10	16QAM	1	24	21.89	21.74	21.72		
10	16QAM	1	49	21.78	21.80	21.59		
10	16QAM	25	0	21.07	20.81	20.77	22	2
10	16QAM	25	12	20.88	20.76	20.78		
10	16QAM	25	24	20.80	20.87	20.81		
10	16QAM	50	0	20.93	20.93	20.88		
Channel				23035	23095	23155	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				701.5	707.5	713.5		
5	QPSK	1	0	22.90	22.60	22.57	24	0
5	QPSK	1	12	22.69	22.55	22.47		
5	QPSK	1	24	22.77	22.53	22.29		
5	QPSK	12	0	21.81	21.59	21.37	23	1
5	QPSK	12	6	21.79	21.58	21.45		
5	QPSK	12	11	21.87	21.62	21.39		
5	QPSK	25	0	21.74	21.63	21.35		
5	16QAM	1	0	21.79	21.60	21.50	23	1
5	16QAM	1	12	21.63	21.52	21.41		
5	16QAM	1	24	21.72	21.52	21.29		
5	16QAM	12	0	20.90	20.63	20.47	22	2
5	16QAM	12	6	20.88	20.63	20.61		
5	16QAM	12	11	20.93	20.61	20.51		
5	16QAM	25	0	20.86	20.58	20.49		
Channel				23035	23095	23155	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				701.5	707.5	713.5		
3	QPSK	1	0	22.87	22.73	22.53	24	0
3	QPSK	1	7	22.78	22.49	22.36		
3	QPSK	1	14	22.65	22.68	22.43		
3	QPSK	8	0	21.74	21.63	21.44	23	1
3	QPSK	8	4	21.73	21.56	21.34		
3	QPSK	8	7	21.73	21.58	21.27		
3	QPSK	15	0	21.85	21.58	21.39		
3	16QAM	1	0	21.76	21.68	21.47	23	1
3	16QAM	1	7	21.74	21.56	21.30		
3	16QAM	1	14	21.66	21.61	21.26		
3	16QAM	8	0	20.82	20.62	20.61	22	2
3	16QAM	8	4	20.83	20.63	20.46		
3	16QAM	8	7	20.84	20.65	20.42		
3	16QAM	15	0	20.90	20.62	20.42		

Channel				23017	23095	23173	Tune up Limit (dBm)	Target MPR (dB)
Frequency (MHz)				699.7	707.5	715.3		
1.4	QPSK	1	0	22.84	22.62	22.41	24	0
1.4	QPSK	1	2	22.74	22.57	22.30		
1.4	QPSK	1	5	22.64	22.59	22.38		
1.4	QPSK	3	0	22.77	22.45	22.32		
1.4	QPSK	3	1	22.75	22.38	22.32		
1.4	QPSK	3	2	22.81	22.57	22.35		
1.4	QPSK	6	0	21.72	21.62	21.24	23	1
1.4	16QAM	1	0	21.82	21.61	21.40	23	1
1.4	16QAM	1	2	21.73	21.58	21.30		
1.4	16QAM	1	5	21.79	21.55	21.29		
1.4	16QAM	3	0	21.69	21.60	21.24		
1.4	16QAM	3	1	21.74	21.59	21.27		
1.4	16QAM	3	2	21.65	21.54	21.39		
1.4	16QAM	6	0	20.65	20.53	20.26	22	2

<LTE Band 17 Conducted Power>

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				23780	23790	23800		
Frequency (MHz)				709	710	711		
10	QPSK	1	0	22.80	22.81	22.82	24	0
10	QPSK	1	24	22.79	22.75	22.75		
10	QPSK	1	49	22.65	22.72	22.42		
10	QPSK	25	0	21.77	21.83	21.76	23	1
10	QPSK	25	12	21.81	21.83	21.80		
10	QPSK	25	24	21.85	21.75	21.71		
10	QPSK	50	0	21.93	21.88	21.78		
10	16QAM	1	0	21.79	21.76	21.80	23	1
10	16QAM	1	24	21.78	21.75	21.71		
10	16QAM	1	49	21.50	21.70	21.45		
10	16QAM	25	0	20.79	20.80	20.76	22	2
10	16QAM	25	12	20.84	20.85	20.90		
10	16QAM	25	24	20.89	20.82	20.81		
10	16QAM	50	0	20.86	20.91	20.81		
Channel				23755	23790	23825	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				706.5	710	713.5		
5	QPSK	1	0	22.76	22.63	22.58	24	0
5	QPSK	1	12	22.67	22.60	22.57		
5	QPSK	1	24	22.58	22.48	22.34		
5	QPSK	12	0	21.70	21.69	21.58	23	1
5	QPSK	12	6	21.77	21.71	21.54		
5	QPSK	12	11	21.71	21.72	21.49		
5	QPSK	25	0	21.80	21.69	21.46		
5	16QAM	1	0	21.71	21.63	21.62	23	1
5	16QAM	1	12	21.68	21.57	21.51		
5	16QAM	1	24	21.59	21.46	21.24		
5	16QAM	12	0	20.73	20.71	20.67	22	2
5	16QAM	12	6	20.81	20.72	20.66		
5	16QAM	12	11	20.71	20.77	20.60		
5	16QAM	25	0	20.73	20.64	20.51		

<LTE Band 5>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune up Limit (dBm)	MPR (dB)
Channel				20450	20525	20600		
Frequency (MHz)				829	836.5	844		
10	QPSK	1	0	22.65	22.55	22.46	24	0
10	QPSK	1	24	22.52	22.44	22.41		
10	QPSK	1	49	22.48	22.48	22.44		
10	QPSK	25	0	21.44	21.54	21.44	23	1
10	QPSK	25	12	21.37	21.52	21.44		
10	QPSK	25	24	21.48	21.57	21.51		
10	QPSK	50	0	21.42	21.59	21.48		
10	16QAM	1	0	21.65	21.53	21.44	23	1
10	16QAM	1	24	21.43	21.43	21.39		
10	16QAM	1	49	21.56	21.47	21.43		
10	16QAM	25	0	20.48	20.63	20.45	22	2
10	16QAM	25	12	20.48	20.57	20.46		
10	16QAM	25	24	20.59	20.56	20.53		
10	16QAM	50	0	20.43	20.56	20.47		
Channel				20425	20525	20625	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				826.5	836.5	846.5		
5	QPSK	1	0	22.55	22.43	22.49	24	0
5	QPSK	1	12	22.48	22.40	22.35		
5	QPSK	1	24	22.45	22.40	22.33		
5	QPSK	12	0	21.49	21.51	21.44	23	1
5	QPSK	12	6	21.46	21.50	21.55		
5	QPSK	12	11	21.42	21.46	21.50		
5	QPSK	25	0	21.45	21.44	21.53		
5	16QAM	1	0	21.48	21.43	21.44	23	1
5	16QAM	1	12	21.39	21.40	21.35		
5	16QAM	1	24	21.39	21.32	21.30		
5	16QAM	12	0	20.53	20.59	20.52	22	2
5	16QAM	12	6	20.51	20.51	20.59		
5	16QAM	12	11	20.47	20.44	20.53		
5	16QAM	25	0	20.47	20.47	20.56		
Channel				20415	20525	20635	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				825.5	836.5	847.5		
3	QPSK	1	0	22.56	22.50	22.49	24	0
3	QPSK	1	7	22.44	22.39	22.46		
3	QPSK	1	14	22.54	22.32	22.30		
3	QPSK	8	0	21.52	21.49	21.55	23	1
3	QPSK	8	4	21.43	21.50	21.54		
3	QPSK	8	7	21.40	21.41	21.50		
3	QPSK	15	0	21.46	21.48	21.45		
3	16QAM	1	0	21.47	21.51	21.52	23	1
3	16QAM	1	7	21.38	21.42	21.44		
3	16QAM	1	14	21.46	21.32	21.32		
3	16QAM	8	0	20.57	20.56	20.54	22	2
3	16QAM	8	4	20.51	20.49	20.62		
3	16QAM	8	7	20.47	20.47	20.50		
3	16QAM	15	0	20.49	20.49	20.44		

Channel				20407	20525	20643	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				824.7	836.5	848.3		
1.4	QPSK	1	0	22.60	22.52	22.50	24	0
1.4	QPSK	1	2	22.50	22.48	22.45		
1.4	QPSK	1	5	22.59	22.45	22.38		
1.4	QPSK	3	0	22.54	22.51	22.45		
1.4	QPSK	3	1	22.51	22.47	22.45		
1.4	QPSK	3	2	22.51	22.48	22.40		
1.4	QPSK	6	0	21.56	21.52	21.51	23	1
1.4	16QAM	1	0	21.51	21.54	21.49	23	1
1.4	16QAM	1	2	21.48	21.50	21.42		
1.4	16QAM	1	5	21.50	21.46	21.34		
1.4	16QAM	3	0	21.43	21.50	21.45		
1.4	16QAM	3	1	21.45	21.44	21.46		
1.4	16QAM	3	2	21.49	21.45	21.41		
1.4	16QAM	6	0	20.44	20.44	20.41	22	2

<LTE Band 4>

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				20050	20175	20300		
Frequency (MHz)				1720	1732.5	1745		
20	QPSK	1	0	22.88	22.88	23.10	24	0
20	QPSK	1	49	22.74	22.85	22.88		
20	QPSK	1	99	22.81	22.79	22.76		
20	QPSK	50	0	21.93	21.96	21.91	23	1
20	QPSK	50	24	21.88	21.92	21.90		
20	QPSK	50	49	21.94	21.84	21.97		
20	QPSK	100	0	21.99	21.91	21.90		
20	16QAM	1	0	21.81	21.82	21.97	23	1
20	16QAM	1	49	21.66	21.80	21.87		
20	16QAM	1	99	21.76	21.75	21.90		
20	16QAM	50	0	20.89	20.91	20.89	22	2
20	16QAM	50	24	20.78	20.86	20.85		
20	16QAM	50	49	20.86	20.80	20.89		
20	16QAM	100	0	20.92	20.90	20.87		
Channel				20025	20175	20325	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				1717.5	1732.5	1747.5		
15	QPSK	1	0	22.92	22.90	23.01	24	0
15	QPSK	1	37	22.85	22.83	22.99		
15	QPSK	1	74	22.80	22.78	22.85		
15	QPSK	36	0	21.99	21.93	21.98	23	1
15	QPSK	36	18	22.02	21.91	21.89		
15	QPSK	36	37	21.86	21.90	22.04		
15	QPSK	75	0	21.96	21.98	22.01		
15	16QAM	1	0	21.91	21.86	21.94	23	1
15	16QAM	1	37	21.84	21.80	21.88		
15	16QAM	1	74	21.73	21.74	21.92		
15	16QAM	36	0	20.87	20.87	20.92	22	2
15	16QAM	36	18	20.91	20.82	20.85		
15	16QAM	36	37	20.78	20.85	21.01		
15	16QAM	75	0	20.92	20.87	20.98		
Channel				20000	20175	20350	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				1715	1732.5	1750		
10	QPSK	1	0	22.92	22.91	23.05	24	0
10	QPSK	1	24	22.91	22.88	22.95		
10	QPSK	1	49	22.75	22.75	22.86		
10	QPSK	25	0	21.90	21.96	21.94	23	1
10	QPSK	25	12	21.98	21.94	21.99		
10	QPSK	25	24	21.96	21.90	21.98		
10	QPSK	50	0	21.95	21.97	21.98		
10	16QAM	1	0	21.89	21.91	22.06	23	1
10	16QAM	1	24	21.84	21.86	21.89		
10	16QAM	1	49	21.73	21.75	21.84		
10	16QAM	25	0	20.88	20.94	20.92	22	2
10	16QAM	25	12	20.95	20.88	20.85		
10	16QAM	25	24	20.96	20.91	20.73		
10	16QAM	50	0	20.93	20.88	20.69		

Channel				19975	20175	20375	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				1712.5	1732.5	1752.5		
5	QPSK	1	0	22.81	22.86	23.03	24	0
5	QPSK	1	12	22.80	22.81	22.97		
5	QPSK	1	24	22.78	22.84	22.65		
5	QPSK	12	0	21.80	21.90	21.97	23	1
5	QPSK	12	6	21.89	21.92	21.96		
5	QPSK	12	11	21.92	21.87	22.04		
5	QPSK	25	0	21.87	21.92	22.00		
5	16QAM	1	0	21.79	21.81	22.02	23	1
5	16QAM	1	12	21.78	21.78	21.90		
5	16QAM	1	24	21.73	21.78	21.83		
5	16QAM	12	0	20.79	20.85	20.96	22	2
5	16QAM	12	6	20.82	20.86	20.93		
5	16QAM	12	11	20.84	20.84	21.07		
5	16QAM	25	0	20.81	20.88	20.93		
Channel				19965	20175	20385	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				1711.5	1732.5	1753.5		
3	QPSK	1	0	22.85	22.86	23.02	24	0
3	QPSK	1	7	22.80	22.82	23.01		
3	QPSK	1	14	22.83	22.83	22.85		
3	QPSK	8	0	21.94	21.89	22.06	23	1
3	QPSK	8	4	21.80	21.86	22.02		
3	QPSK	8	7	21.84	21.88	22.02		
3	QPSK	15	0	21.84	21.89	22.09		
3	16QAM	1	0	21.81	21.78	22.00	23	1
3	16QAM	1	7	21.75	21.76	21.94		
3	16QAM	1	14	21.78	21.77	21.89		
3	16QAM	8	0	20.85	20.88	21.07	22	2
3	16QAM	8	4	20.81	20.90	21.02		
3	16QAM	8	7	20.85	20.85	21.04		
3	16QAM	15	0	20.77	20.82	21.05		
Channel				19957	20175	20393	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				1710.7	1732.5	1754.3		
1.4	QPSK	1	0	22.94	22.92	23.06	24	0
1.4	QPSK	1	2	22.92	22.89	23.03		
1.4	QPSK	1	5	22.86	22.90	23.01		
1.4	QPSK	3	0	22.88	22.90	23.02		
1.4	QPSK	3	1	22.92	22.88	23.05		
1.4	QPSK	3	2	22.92	22.90	23.04		
1.4	QPSK	6	0	21.93	21.92	22.18	23	1
1.4	16QAM	1	0	21.88	21.89	22.08	23	1
1.4	16QAM	1	2	21.85	21.86	22.00		
1.4	16QAM	1	5	21.87	21.88	22.07		
1.4	16QAM	3	0	21.83	21.86	22.03		
1.4	16QAM	3	1	21.86	21.87	22.05		
1.4	16QAM	3	2	21.81	21.86	22.05		
1.4	16QAM	6	0	20.73	20.77	21.07	22	2

<CDMA2000 Conducted Power>

General Note:

1. Per KDB 941225 D01v02, Head SAR for RC1+SO55 is not required because the maximum average output power of RC1 is less than 1/4 dB higher than RC3+SO55.
2. Per KDB 941225 D01v02, in Hotspot mode EUT is treated as data device and SAR is tested with Ev-Do Rev 0 (RTAP 153.6kbps). If 1xRTT and Ev-Do Rev A (RETAP 4096 bits) power is high than 1/4dB higher than Re v0, SAR tests with those settings are necessary.
3. Per KDB 941225 D01v02, SAR for body-worn exposure configurations is measured in RC3 with the DUT configured to transmit at full rate on FCH with all other code channels disabled using TDSO / SO32. SAR for multiple code channels (FCH + SCH) is not required when the maximum average output of each RF channel is less than ¼ dB higher than that measured with FCH only.

Band	CDMA2000 BC0			CDMA2000 BC1		
TX Channel	1013	384	777	25	600	1175
Frequency (MHz)	824.7	836.52	848.31	1851.25	1880	1908.75
1xRTT RC1 SO55	23.98	24.00	23.93	23.18	23.35	23.50
1xRTT RC3 SO55	23.99	23.93	23.98	23.20	23.37	23.52
1xRTT RC3 SO32(+ F-SCH)	24.08	23.99	24.01	23.21	23.35	23.48
1xRTT RC3 SO32(+SCH)	24.09	23.92	23.93	23.17	23.38	23.54
1xEVDO RTAP 153.6 Kbps	24.17	23.94	24.09	23.25	23.44	23.56
1xEVDO RETAP 4096 bits	24.16	24.08	24.05	23.20	23.37	23.49

<2.4GHz Bluetooth v3.0+EDR>

General Note:

1. For 2.4GHz Bluetooth v3.0+EDR SAR testing was selected 1Mbps, due to its highest average power.
2. The duty factor was used theoretical 83.3% perform Bluetooth v3.0+EDR SAR testing.

Mode	Channel	Frequency (MHz)	Average power (dBm)		
			1Mbps	2Mbps	3Mbps
v3.0+EDR	CH 00	2402	9.29	6.94	7.07
	CH 39	2441	9.19	7.07	7.00
	CH 78	2480	9.64	7.59	7.45

<2.4GHz Bluetooth v4.0-LE>

Mode	Maximum Average power(dBm)
v4.0+LE	1.0

General Note:

1. Per KDB 447498 D01v05r02, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at *test separation distances* ≤ 50 mm are determined by:
   [(*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)] ·[√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR
   - f(GHz) is the RF channel transmit frequency in GHz
   - Power and distance are rounded to the nearest mW and mm before calculation
   - The result is rounded to one decimal place for comparison

Bluetooth Max Power (dBm)	Separation Distance (mm)	Frequency (GHz)	exclusion thresholds
1.0	5	2.48	0.31

General Note:

Per KDB 447498 D01v05r02, when the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion. The test exclusion threshold is 0.31 which is <= 3, SAR testing is not required.

<2.4GHz WLAN >

General Note:

1. For 2.4GHz WLAN SAR testing, highest average RF output power channel for the lowest data rate for 802.11b were selected for SAR evaluation. 802.11g/n HT20 were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of 802.11b mode.

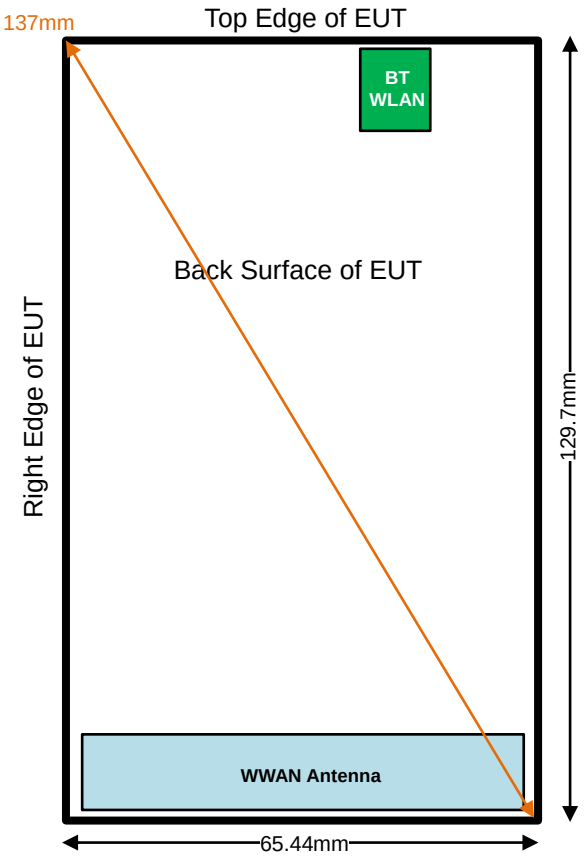
Mode	Channel	Frequency (MHz)	Average power (dBm)			
			Data Rate			
			1Mbps	2Mbps	5.5Mbps	11Mbps
802.11b	CH 1	2412	17.57	17.64	17.66	17.60
	CH 6	2437	17.77	17.53	17.57	17.58
	CH 11	2462	17.72	17.54	17.58	17.54

Mode	Channel	Frequency (MHz)	Average power (dBm)							
			Data Rate							
			6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
802.11g	CH 1	2412	15.58	15.73	15.50	15.56	15.54	15.72	15.65	15.54
	CH 6	2437	15.69	15.41	15.44	15.40	15.45	15.40	15.48	15.39
	CH 11	2462	15.75	15.64	15.69	15.70	15.59	15.67	15.48	15.46

Mode	Channel	Frequency (MHz)	Average power (dBm)							
			MCS Index							
			MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
802.11n-HT20	CH 1	2412	14.58	14.55	14.52	14.51	14.39	14.35	14.51	14.48
	CH 6	2437	14.56	14.59	14.57	14.57	14.59	14.43	14.51	14.46
	CH 11	2462	14.75	14.53	14.69	14.56	14.50	14.71	14.65	14.73

13. Antenna Location

<Mobile Phone>



Distance of the Antenna to the EUT surface/edge						
Antennas	Back	Front	Top Side	Bottom Side	Right Side	Left Side
WWAN	≤ 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	Yes	Yes	No	Yes	Yes	Yes
BT / WLAN	Yes	Yes	Yes	No	No	Yes

General Note:

1. Referring to KDB 941225 D06 v01r01, 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 D01v05r02, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
   a. Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
   b. For WWAN/WLAN: Reported SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor
2. Per KDB 447498 D01v05r02, for each exposure position, testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is:
   - ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
   - ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
   - ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz
3. Per KDB 941225 D01v02, Head SAR for RC3+SO55 is not required because the maximum average output power of RC1 is less than 1/4 dB higher than RC3+SO55 and considering the possibility of e.g. 3rd party VoIP was additional Ev-Do Rev A (RETAP 4096 bits) SAR testing performed on RC3+SO55 worse case.
4. Per KDB 941225 D01v02, in Hotspot mode EUT is treated as data device and SAR is tested with Ev-Do Rev 0 (RTAP 153.6kbps). If 1xRTT and Ev-Do Rev A (RETAP 4096 bits) power is high than 1/4dB higher than Re v0, SAR tests with those settings are necessary.
5. Per KDB 941225 D01v02, SAR for body-worn exposure configurations is measured in RC3 with the DUT configured to transmit at full rate on FCH with all other code channels disabled using TDSO / SO32. SAR for multiple code channels (FCH + SCH) is not required when the maximum average output of each RF channel is less than ¼ dB higher than that measured with FCH only. To account for VOIP operation, Ev-Do Rev. A (RETAP 4096 bits) SAR testing was performed at the worst position identified by 1xRTT SAR test results, for both head and body-worn accessory exposure conditions.
6. Per KDB 941225 D05v02r03, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
7. Per KDB 941225 D05v02r03, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
8. Per KDB 941225 D05v02r03, For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
9. Per KDB 941225 D05v02r03, 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 D05v02r03, 16QAM SAR testing is not required.
10. Per KDB 941225 D05v02r03, 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 D05v02r03, smaller bandwidth SAR testing is not required.
11. Per KDB 648474 D04v01r02, when the reported SAR for a body-worn accessory measured without a headset connected to the handset is > 1.2 W/kg, SAR testing with a headset connected to the handset is required.
12. Additional Back with headset Bluetooth and WLAN SAR testing was performed for simultaneous transmission analysis.
13. During SAR testing the WLAN transmission was verified using a spectrum analyzer.

14.1 Head SAR

<CDMA SAR>

Plot No.	Band	Mode	Test Position	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)
	CDMA2000 BC0	RC3+SO55	Right Cheek	1013	824.7	23.99	25.00	1.262	0.08	0.264	0.333
	CDMA2000 BC0	RC3+SO55	Right Tilted	1013	824.7	23.99	25.00	1.262	0.04	0.217	0.274
01	CDMA2000 BC0	RC3+SO55	Left Cheek	1013	824.7	23.99	25.00	1.262	0.03	0.324	**0.409**
	CDMA2000 BC0	RETAP 4096 bits	Left Cheek	1013	824.7	24.16	25.00	1.213	0.08	0.326	0.396
	CDMA2000 BC0	RC3+SO55	Left Tilted	1013	824.7	23.99	25.00	1.262	0.02	0.234	0.295
	CDMA2000 BC1	RC3+SO55	Right Cheek	1175	1908.75	23.52	25.00	1.406	-0.06	0.240	0.337
	CDMA2000 BC1	RC3+SO55	Right Tilted	1175	1908.75	23.52	25.00	1.406	-0.03	0.150	0.211
	CDMA2000 BC1	RC3+SO55	Left Cheek	1175	1908.75	23.52	25.00	1.406	0.01	0.273	0.384
02	CDMA2000 BC1	RETAP 4096 bits	Left Cheek	1175	1908.75	23.49	25.00	1.416	-0.05	0.285	**0.404**
	CDMA2000 BC1	RC3+SO55	Left Tilted	1175	1908.75	23.52	25.00	1.406	0.05	0.158	0.222

<LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	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)
03	LTE Band 12	10M	QPSK	1	0	Right Cheek	23060	704	22.92	24.00	1.282	0.03	0.188	**0.241**
	LTE Band 12	10M	QPSK	25	0	Right Cheek	23060	704	21.98	23.00	1.265	0.01	0.120	0.152
	LTE Band 12	10M	QPSK	1	0	Right Tilted	23060	704	22.92	24.00	1.282	0.01	0.110	0.141
	LTE Band 12	10M	QPSK	25	0	Right Tilted	23060	704	21.98	23.00	1.265	0.03	0.072	0.091
	LTE Band 12	10M	QPSK	1	0	Left Cheek	23060	704	22.92	24.00	1.282	0.07	0.145	0.186
	LTE Band 12	10M	QPSK	25	0	Left Cheek	23060	704	21.98	23.00	1.265	-0.02	0.093	0.118
	LTE Band 12	10M	QPSK	1	0	Left Tilted	23060	704	22.92	24.00	1.282	-0.1	0.130	0.167
	LTE Band 12	10M	QPSK	25	0	Left Tilted	23060	704	21.98	23.00	1.265	-0.03	0.079	0.100
04	LTE Band 17	10M	QPSK	1	0	Right Cheek	23800	711	22.82	24.00	1.312	-0.02	0.310	**0.407**
	LTE Band 17	10M	QPSK	25	24	Right Cheek	23780	709	21.85	23.00	1.303	0.05	0.162	0.211
	LTE Band 17	10M	QPSK	1	0	Right Tilted	23800	711	22.82	24.00	1.312	0.02	0.193	0.253
	LTE Band 17	10M	QPSK	25	24	Right Tilted	23780	709	21.85	23.00	1.303	0.07	0.098	0.128
	LTE Band 17	10M	QPSK	1	0	Left Cheek	23800	711	22.82	24.00	1.312	0.08	0.215	0.282
	LTE Band 17	10M	QPSK	25	24	Left Cheek	23780	709	21.85	23.00	1.303	0.04	0.112	0.146
	LTE Band 17	10M	QPSK	1	0	Left Tilted	23800	711	22.82	24.00	1.312	0	0.148	0.194
	LTE Band 17	10M	QPSK	25	24	Left Tilted	23780	709	21.85	23.00	1.303	0	0.075	0.098
05	LTE Band 5	10M	QPSK	1	0	Right Cheek	20450	829	22.65	24.00	1.365	0.04	0.250	**0.341**
	LTE Band 5	10M	QPSK	25	24	Right Cheek	20525	836.5	21.57	23.00	1.390	0.02	0.152	0.211
	LTE Band 5	10M	QPSK	1	0	Right Tilted	20450	829	22.65	24.00	1.365	0.03	0.187	0.255
	LTE Band 5	10M	QPSK	25	24	Right Tilted	20525	836.5	21.57	23.00	1.390	0.14	0.103	0.143
	LTE Band 5	10M	QPSK	1	0	Left Cheek	20450	829	22.65	24.00	1.365	0.16	0.197	0.269
	LTE Band 5	10M	QPSK	25	24	Left Cheek	20525	836.5	21.57	23.00	1.390	0.18	0.109	0.152
	LTE Band 5	10M	QPSK	1	0	Left Tilted	20450	829	22.65	24.00	1.365	0.02	0.174	0.237
	LTE Band 5	10M	QPSK	25	24	Left Tilted	20525	836.5	21.57	23.00	1.390	0.06	0.101	0.140
	LTE Band 4	20M	QPSK	1	0	Right Cheek	20300	1745	23.10	24.00	1.230	-0.07	0.430	0.529
	LTE Band 4	20M	QPSK	50	49	Right Cheek	20300	1745	21.97	23.00	1.268	-0.07	0.249	0.316
	LTE Band 4	20M	QPSK	1	0	Right Tilted	20300	1745	23.10	24.00	1.230	0.01	0.332	0.408
	LTE Band 4	20M	QPSK	50	49	Right Tilted	20300	1745	21.97	23.00	1.268	-0.03	0.205	0.260
	LTE Band 4	20M	QPSK	1	0	Left Cheek	20300	1745	23.10	24.00	1.230	-0.01	0.786	0.967
06	LTE Band 4	20M	QPSK	1	0	Left Cheek	20050	1720	22.88	24.00	1.294	-0.03	0.916	**1.185**
	LTE Band 4	20M	QPSK	1	0	Left Cheek	20175	1732.5	22.88	24.00	1.294	-0.03	0.742	0.960
	LTE Band 4	20M	QPSK	50	49	Left Cheek	20300	1745	21.97	23.00	1.268	0.02	0.447	0.567
	LTE Band 4	20M	QPSK	100	0	Left Cheek	20050	1720	21.99	23.00	1.262	0.05	0.472	0.596
	LTE Band 4	20M	QPSK	1	0	Left Tilted	20300	1745	23.10	24.00	1.230	0.08	0.361	0.444
	LTE Band 4	20M	QPSK	50	49	Left Tilted	20300	1745	21.97	23.00	1.268	0.08	0.210	0.266

<2.4GHz WLAN SAR>

Plot No.	Band	Mode	Test Position	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)
	WLAN 2.4GHz	802.11b 1Mbps	Right Cheek	6	2437	17.77	18.00	1.053	0.04	0.379	0.399
07	WLAN 2.4GHz	802.11b 1Mbps	Right Tilted	6	2437	17.77	18.00	1.053	-0.01	0.384	**0.404**
	WLAN 2.4GHz	802.11b 1Mbps	Left Cheek	6	2437	17.77	18.00	1.053	0.07	0.235	0.248
	WLAN 2.4GHz	802.11b 1Mbps	Left Tilted	6	2437	17.77	18.00	1.053	0.01	0.306	0.322

<2.4GHz Bluetooth SAR>

Plot No.	Band	Mode	Test Position	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)
08	Bluetooth	1Mbps	Right Cheek	78	2480	9.64	10.00	1.086	0.16	0.021	**0.023**
	Bluetooth	1Mbps	Right Tilted	78	2480	9.64	10.00	1.086	0.12	0.013	0.014
	Bluetooth	1Mbps	Left Cheek	78	2480	9.64	10.00	1.086	0.18	0.013	0.014
	Bluetooth	1Mbps	Left Tilted	78	2480	9.64	10.00	1.086	0.13	0.008	0.009

14.2 Hotspot SAR

Distance of the Antenna to the EUT surface/edge						
Antennas	Back	Front	Top Side	Bottom Side	Right Side	Left Side
WWAN	≤ 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	Yes	Yes	No	Yes	Yes	Yes
BT / WLAN	Yes	Yes	Yes	No	No	Yes

General Note:
Referring to KDB 941225 D06 v01r01, 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

<CDMA SAR>

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Power Reduction	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	CDMA2000 BC0	RTAP 153.6 Kbps	Front	1cm	1013	824.7	OFF	24.17	25.00	1.211	-0.01	0.382	0.462
09	CDMA2000 BC0	RTAP 153.6 Kbps	Back	1cm	1013	824.7	OFF	24.17	25.00	1.211	-0.01	0.604	**0.731**
	CDMA2000 BC0	RTAP 153.6 Kbps	Left Side	1cm	1013	824.7	OFF	24.17	25.00	1.211	0	0.556	0.673
	CDMA2000 BC0	RTAP 153.6 Kbps	Right Side	1cm	1013	824.7	OFF	24.17	25.00	1.211	0.03	0.328	0.397
	CDMA2000 BC0	RTAP 153.6 Kbps	Bottom Side	1cm	1013	824.7	OFF	24.17	25.00	1.211	0	0.188	0.228
	CDMA2000 BC1	RTAP 153.6 Kbps	Front	1cm	1175	1908.75	ON		21.00	1.000	0.01	0.380	0.380
	CDMA2000 BC1	RTAP 153.6 Kbps	Back	1cm	1175	1908.75	ON		21.00	1.000	-0.09	0.519	0.519
	CDMA2000 BC1	RTAP 153.6 Kbps	Left Side	1cm	1175	1908.75	ON		21.00	1.000	-0.1	0.074	0.074
	CDMA2000 BC1	RTAP 153.6 Kbps	Right Side	1cm	1175	1908.75	ON		21.00	1.000	-0.07	0.043	0.043
10	CDMA2000 BC1	RTAP 153.6 Kbps	Bottom Side	1cm	1175	1908.75	ON		21.00	1.000	-0.15	0.643	**0.643**

<LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Power Reduction	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 12	10M	QPSK	1	0	Front	1cm	23060	704	OFF	22.92	24.00	1.282	-0.01	0.247	0.317
	LTE Band 12	10M	QPSK	25	0	Front	1cm	23060	704	OFF	21.98	23.00	1.265	0.06	0.148	0.187
	LTE Band 12	10M	QPSK	1	0	Back	1cm	23060	704	OFF	22.92	24.00	1.282	0.02	0.265	0.340
	LTE Band 12	10M	QPSK	25	0	Back	1cm	23060	704	OFF	21.98	23.00	1.265	0.09	0.169	0.214
	LTE Band 12	10M	QPSK	1	0	Left Side	1cm	23060	704	OFF	22.92	24.00	1.282	-0.03	0.085	0.109
	LTE Band 12	10M	QPSK	25	0	Left Side	1cm	23060	704	OFF	21.98	23.00	1.265	-0.04	0.058	0.073
11	LTE Band 12	10M	QPSK	1	0	Right Side	1cm	23060	704	OFF	22.92	24.00	1.282	0.01	0.274	**0.351**
	LTE Band 12	10M	QPSK	25	0	Right Side	1cm	23060	704	OFF	21.98	23.00	1.265	0.05	0.174	0.220
	LTE Band 12	10M	QPSK	1	0	Bottom Side	1cm	23060	704	OFF	22.92	24.00	1.282	-0.03	0.161	0.206
	LTE Band 12	10M	QPSK	25	0	Bottom Side	1cm	23060	704	OFF	21.98	23.00	1.265	0.01	0.114	0.144
	LTE Band 17	10M	QPSK	1	0	Front	1cm	23800	711	OFF	22.82	24.00	1.312	-0.03	0.317	0.416
	LTE Band 17	10M	QPSK	25	24	Front	1cm	23780	709	OFF	21.85	23.00	1.303	0.03	0.174	0.227
12	LTE Band 17	10M	QPSK	1	0	Back	1cm	23800	711	OFF	22.82	24.00	1.312	-0.06	0.325	**0.426**
	LTE Band 17	10M	QPSK	25	24	Back	1cm	23780	709	OFF	21.85	23.00	1.303	-0.04	0.174	0.227
	LTE Band 17	10M	QPSK	1	0	Left Side	1cm	23800	711	OFF	22.82	24.00	1.312	0.01	0.113	0.148
	LTE Band 17	10M	QPSK	25	24	Left Side	1cm	23780	709	OFF	21.85	23.00	1.303	-0.01	0.057	0.074
	LTE Band 17	10M	QPSK	1	0	Right Side	1cm	23800	711	OFF	22.82	24.00	1.312	0	0.107	0.140
	LTE Band 17	10M	QPSK	25	24	Right Side	1cm	23780	709	OFF	21.85	23.00	1.303	0.02	0.054	0.070
	LTE Band 17	10M	QPSK	1	0	Bottom Side	1cm	23800	711	OFF	22.82	24.00	1.312	-0.09	0.237	0.311
	LTE Band 17	10M	QPSK	25	24	Bottom Side	1cm	23780	709	OFF	21.85	23.00	1.303	-0.04	0.130	0.169
	LTE Band 5	10M	QPSK	1	0	Front	1cm	20450	829	OFF	22.65	24.00	1.365	-0.06	0.295	0.403
	LTE Band 5	10M	QPSK	25	24	Front	1cm	20525	836.5	OFF	21.57	23.00	1.390	0.01	0.204	0.284
	LTE Band 5	10M	QPSK	1	0	Back	1cm	20450	829	OFF	22.65	24.00	1.365	-0.03	0.405	0.553
	LTE Band 5	10M	QPSK	25	24	Back	1cm	20525	836.5	OFF	21.57	23.00	1.390	-0.16	0.239	0.332
	LTE Band 5	10M	QPSK	1	0	Left Side	1cm	20450	829	OFF	22.65	24.00	1.365	-0.08	0.276	0.377
	LTE Band 5	10M	QPSK	25	24	Left Side	1cm	20525	836.5	OFF	21.57	23.00	1.390	-0.06	0.156	0.217
13	LTE Band 5	10M	QPSK	1	0	Right Side	1cm	20450	829	OFF	22.65	24.00	1.365	-0.04	0.461	**0.629**
	LTE Band 5	10M	QPSK	25	24	Right Side	1cm	20525	836.5	OFF	21.57	23.00	1.390	-0.07	0.256	0.356
	LTE Band 5	10M	QPSK	1	0	Bottom Side	1cm	20450	829	OFF	22.65	24.00	1.365	-0.08	0.267	0.364
	LTE Band 5	10M	QPSK	25	24	Bottom Side	1cm	20525	836.5	OFF	21.57	23.00	1.390	-0.03	0.169	0.235
	LTE Band 4	20M	QPSK	1	0	Front	1cm	20300	1745	ON		21.50	1.000	-0.11	0.606	0.606
	LTE Band 4	20M	QPSK	50	49	Front	1cm	20300	1745	ON		21.50	1.000	-0.12	0.599	0.599
	LTE Band 4	20M	QPSK	1	0	Back	1cm	20300	1745	ON		21.50	1.000	-0.06	0.537	0.537
	LTE Band 4	20M	QPSK	50	49	Back	1cm	20300	1745	ON		21.50	1.000	-0.09	0.556	0.556
	LTE Band 4	20M	QPSK	1	0	Left Side	1cm	20300	1745	ON		21.50	1.000	-0.06	0.236	0.236
	LTE Band 4	20M	QPSK	50	49	Left Side	1cm	20300	1745	ON		21.50	1.000	-0.06	0.245	0.245
	LTE Band 4	20M	QPSK	1	0	Right Side	1cm	20300	1745	ON		21.50	1.000	-0.12	0.089	0.089
	LTE Band 4	20M	QPSK	50	49	Right Side	1cm	20300	1745	ON		21.50	1.000	-0.12	0.096	0.096
	LTE Band 4	20M	QPSK	1	0	Bottom Side	1cm	20300	1745	ON		21.50	1.000	-0.03	0.640	0.640
14	LTE Band 4	20M	QPSK	50	49	Bottom Side	1cm	20300	1745	ON		21.50	1.000	-0.02	0.710	**0.710**

<2.4GHz WLAN SAR>

Plot No.	Band	Mode	Test Position	Gap (cm)	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)
	WLAN2.4GHz	802.11b 1Mbps	Front	1cm	6	2437	17.77	18.00	1.053	-0.03	0.128	0.135
15	WLAN2.4GHz	802.11b 1Mbps	Back	1cm	6	2437	17.77	18.00	1.053	-0.03	0.232	**0.244**
	WLAN2.4GHz	802.11b 1Mbps	Left Side	1cm	6	2437	17.77	18.00	1.053	0.01	0.069	0.073
	WLAN2.4GHz	802.11b 1Mbps	Top Side	1cm	6	2437	17.77	18.00	1.053	-0.01	0.203	0.214

<2.4GHz Bluetooth SAR>

Plot No.	Band	Mode	Test Position	Gap (cm)	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)
	Bluetooth	1Mbps	Front	1cm	78	2480	9.64	10.00	1.086	0.16	0.010	0.011
	Bluetooth	1Mbps	Back	1cm	78	2480	9.64	10.00	1.086	0.12	0.017	0.018
	Bluetooth	1Mbps	Left Side	1cm	78	2480	9.64	10.00	1.086	0.14	0.007	0.008
16	Bluetooth	1Mbps	Top Side	1cm	78	2480	9.64	10.00	1.086	0.15	0.018	**0.020**

14.3 Body Worn Accessory SAR

<CDMA SAR>

Plot No.	Band	Mode	Test Position	Gap (cm)	Headset	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)
	CDMA2000 BC0	1xRTT RC3 SO32	Front	1.5cm		1013	824.7	24.08	25.00	1.236	-0.03	0.352	0.435
17	CDMA2000 BC0	1xRTT RC3 SO32	Back	1.5cm		1013	824.7	24.08	25.00	1.236	-0.01	0.485	**0.599**
	CDMA2000 BC0	RETAP 4096 bits	Back	1.5cm		1013	824.7	24.16	25.00	1.213	-0.03	0.482	0.585
	CDMA2000 BC1	1xRTT RC3 SO32	Front	1.5cm		1175	1908.75	23.48	25.00	1.419	-0.07	0.694	0.985
	CDMA2000 BC1	1xRTT RC3 SO32	Front	1.5cm		25	1851.25	23.21	25.00	1.510	-0.07	0.664	1.003
	CDMA2000 BC1	1xRTT RC3 SO32	Front	1.5cm		600	1880	23.35	25.00	1.462	-0.05	0.711	1.040
	CDMA2000 BC1	1xRTT RC3 SO32	Back	1.5cm		1175	1908.75	23.48	25.00	1.419	-0.05	1.040	1.476
	CDMA2000 BC1	1xRTT RC3 SO32	Back	1.5cm		25	1851.25	23.21	25.00	1.510	-0.1	0.902	1.362
	CDMA2000 BC1	1xRTT RC3 SO32	Back	1.5cm		600	1880	23.35	25.00	1.462	-0.05	1.040	1.521
	CDMA2000 BC1	1xRTT RC3 SO32	Back	1.5cm	Headset	1175	1908.75	23.48	25.00	1.419	-0.01	1.030	1.462
	CDMA2000 BC1	1xRTT RC3 SO32	Back	1.5cm	Headset	25	1851.25	23.21	25.00	1.510	0	0.990	1.495
	CDMA2000 BC1	1xRTT RC3 SO32	Back	1.5cm	Headset	600	1880	23.35	25.00	1.462	0.02	1.020	1.491
	CDMA2000 BC1	RETAP 4096 bits	Back	1.5cm		1175	1908.75	23.49	25.00	1.416	-0.12	1.060	1.501
	CDMA2000 BC1	RETAP 4096 bits	Back	1.5cm		25	1851.25	23.20	25.00	1.514	-0.07	0.903	1.367
18	CDMA2000 BC1	RETAP 4096 bits	Back	1.5cm		600	1880	23.37	25.00	1.455	-0.05	1.050	**1.528**
	CDMA2000 BC1	RETAP 4096 bits	Back	1.5cm	Headset	1175	1908.75	23.49	25.00	1.416	-0.02	0.999	1.414
	CDMA2000 BC1	RETAP 4096 bits	Back	1.5cm	Headset	25	1851.25	23.20	25.00	1.514	-0.01	1.000	1.514
	CDMA2000 BC1	RETAP 4096 bits	Back	1.5cm	Headset	600	1880	23.37	25.00	1.455	0.01	1.030	1.499

<LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (cm)	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 12	10M	QPSK	1	0	Front	1.5cm	23060	704	22.92	24.00	1.282	-0.02	0.209	0.268
	LTE Band 12	10M	QPSK	25	0	Front	1.5cm	23060	704	21.98	23.00	1.265	0.03	0.120	0.152
19	LTE Band 12	10M	QPSK	1	0	Back	1.5cm	23060	704	22.92	24.00	1.282	0.01	0.235	**0.301**
	LTE Band 12	10M	QPSK	25	0	Back	1.5cm	23060	704	21.98	23.00	1.265	0.04	0.138	0.175
	LTE Band 17	10M	QPSK	1	0	Front	1.5cm	23800	711	22.82	24.00	1.312	-0.02	0.220	0.289
	LTE Band 17	10M	QPSK	25	24	Front	1.5cm	23780	709	21.85	23.00	1.303	0.02	0.113	0.147
20	LTE Band 17	10M	QPSK	1	0	Back	1.5cm	23800	711	22.82	24.00	1.312	-0.02	0.266	**0.349**
	LTE Band 17	10M	QPSK	25	24	Back	1.5cm	23780	709	21.85	23.00	1.303	0.01	0.133	0.173
	LTE Band 5	10M	QPSK	1	0	Front	1.5cm	20450	829	22.65	24.00	1.365	-0.04	0.240	0.327
	LTE Band 5	10M	QPSK	25	24	Front	1.5cm	20525	836.5	21.57	23.00	1.390	0.02	0.128	0.178
21	LTE Band 5	10M	QPSK	1	0	Back	1.5cm	20450	829	22.65	24.00	1.365	0	0.300	**0.409**
	LTE Band 5	10M	QPSK	25	24	Back	1.5cm	20525	836.5	21.57	23.00	1.390	-0.03	0.155	0.215
22	LTE Band 4	20M	QPSK	1	0	Front	1.5cm	20300	1745	23.10	24.00	1.230	-0.01	0.608	**0.748**
	LTE Band 4	20M	QPSK	50	49	Front	1.5cm	20300	1745	21.97	23.00	1.268	0	0.336	0.426
	LTE Band 4	20M	QPSK	1	0	Back	1.5cm	20300	1745	23.10	24.00	1.230	-0.01	0.569	0.700
	LTE Band 4	20M	QPSK	50	49	Back	1.5cm	20300	1745	21.97	23.00	1.268	-0.1	0.333	0.422

<2.4GHz WLAN SAR>

Plot No.	Band	Mode	Test Position	Gap (cm)	Headset	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)
	WLAN2.4GHz	802.11b 1Mbps	Front	1.5cm		6	2437	17.77	18.00	1.053	0.04	0.074	0.078
	WLAN2.4GHz	802.11b 1Mbps	Back	1.5cm		6	2437	17.77	18.00	1.053	-0.01	0.094	0.099
23	WLAN2.4GHz	802.11b 1Mbps	Back	1.5cm	Headset	6	2437	17.77	18.00	1.053	0.03	0.136	**0.143**

<2.4GHz Bluetooth SAR>

Plot No.	Band	Mode	Test Position	Gap (cm)	Headset	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)
	Bluetooth	1Mbps	Front	1.5cm		78	2480	9.64	10.00	1.086	-0.1	0.008	0.008
	Bluetooth	1Mbps	Back	1.5cm		78	2480	9.64	10.00	1.086	0.08	0.008	0.009
24	Bluetooth	1Mbps	Back	1.5cm	Headset	78	2480	9.64	10.00	1.086	0.04	0.009	**0.009**

14.4 Repeated SAR Measurement

No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Ratio	Reported 1g SAR (W/kg)
1st	LTE Band 4	20M	QPSK	1	0	-	Left Cheek	-	20050	1720	22.88	24.00	1.294	-0.03	0.916	-	1.185
2nd	LTE Band 4	20M	QPSK	1	0	-	Left Cheek	-	20050	1720	22.88	24.00	1.294	0.01	0.886	1.03	1.147
1st	CDMA2000 BC1	-	-	-	-	RETAP 4096 bits	Back	1.5cm	1175	1908.75	23.49	25.00	1.416	-0.12	1.060	-	1.501
2nd	CDMA2000 BC1	-	-	-	-	RETAP 4096 bits	Back	1.5cm	1175	1908.75	23.49	25.00	1.416	-0.16	1.020	1.04	1.444

General Note:

1. Per KDB 865664 D01v01r03, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg
2. Per KDB 865664 D01v01r03, 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	
1.	CDMA(Voice) + WLAN2.4GHz(data)	Yes	Yes		
2.	CDMA((Voice) + Bluetooth(data)	Yes	Yes		
3.	CDMA(Data) + WLAN2.4GHz(data)	Yes	Yes	Yes	2.4GHz Hotspot
4.	LTE(Data) + WLAN2.4GHz(data)	Yes	Yes	Yes	2.4GHz Hotspot
5.	CDMA(Data) + Bluetooth(data)	Yes	Yes	Yes	Bluetooth Tethering
6.	LTE(Data) + Bluetooth(data)	Yes	Yes	Yes	Bluetooth Tethering

General Note:

1. WLAN and Bluetooth share the same antenna, and cannot transmit simultaneously.
2. The Scaled SAR summation is calculated based on the same configuration and test position.
3. Per KDB 447498 D01v05r02, 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 15.4.

15.1 Head Exposure Conditions

WWAN Band		Exposure Position	1	2	3	1+2 Summed SAR (W/kg)	1+3 Summed SAR (W/kg)
			WWAN	2.4GHz WLAN	2.4GHz Bluetooth		
			SAR (W/kg)	SAR (W/kg)	SAR (W/kg)		
CDMA	BC0	Right Cheek	0.333	0.399	0.023	**0.73**	**0.36**
		Right Tilted	0.274	0.404	0.014	**0.68**	**0.29**
		Left Cheek	0.409	0.248	0.014	**0.66**	**0.42**
		Left Tilted	0.295	0.322	0.009	**0.62**	**0.30**
	BC1	Right Cheek	0.337	0.399	0.023	**0.74**	**0.36**
		Right Tilted	0.211	0.404	0.014	**0.62**	**0.23**
		Left Cheek	0.404	0.248	0.014	**0.65**	**0.42**
		Left Tilted	0.222	0.322	0.009	**0.54**	**0.23**
LTE	Band 12	Right Cheek	0.241	0.399	0.023	**0.64**	**0.26**
		Right Tilted	0.141	0.404	0.014	**0.55**	**0.16**
		Left Cheek	0.186	0.248	0.014	**0.43**	**0.20**
		Left Tilted	0.167	0.322	0.009	**0.49**	**0.18**
	Band 17	Right Cheek	0.407	0.399	0.023	**0.81**	**0.43**
		Right Tilted	0.253	0.404	0.014	**0.66**	**0.27**
		Left Cheek	0.282	0.248	0.014	**0.53**	**0.30**
		Left Tilted	0.194	0.322	0.009	**0.52**	**0.20**
	Band 5	Right Cheek	0.341	0.399	0.023	**0.74**	**0.36**
		Right Tilted	0.255	0.404	0.014	**0.66**	**0.27**
		Left Cheek	0.269	0.248	0.014	**0.52**	**0.28**
		Left Tilted	0.237	0.322	0.009	**0.56**	**0.25**
	Band 4	Right Cheek	0.529	0.399	0.023	**0.93**	**0.55**
		Right Tilted	0.408	0.404	0.014	**0.81**	**0.42**
		Left Cheek	1.185	0.248	0.014	**1.43**	**1.20**
		Left Tilted	0.444	0.322	0.009	**0.77**	**0.45**

15.2 Hotspot Exposure Conditions

WWAN Band		Exposure Position	1 WWAN SAR (W/kg)	2 2.4GHz WLAN SAR (W/kg)	3 2.4GHz Bluetooth SAR (W/kg)	1+2 Summed SAR (W/kg)	1+3 Summed SAR (W/kg)
CDMA	BC0	Front	0.462	0.135	0.135	**0.60**	**0.60**
		Back	0.731	0.244	0.244	**0.98**	**0.98**
		Left side	0.673	0.073	0.073	**0.75**	**0.75**
		Right side	0.397			**0.40**	**0.40**
		Top side		0.214	0.214	**0.21**	**0.21**
		Bottom side	0.228			**0.23**	**0.23**
	BC1	Front	0.380	0.135	0.135	**0.52**	**0.52**
		Back	0.519	0.244	0.244	**0.76**	**0.76**
		Left side	0.074	0.073	0.073	**0.15**	**0.15**
		Right side	0.043			**0.04**	**0.04**
		Top side		0.214	0.214	**0.21**	**0.21**
		Bottom side	0.643			**0.64**	**0.64**
LTE	Band 12	Front	0.317	0.135	0.135	**0.45**	**0.45**
		Back	0.340	0.244	0.244	**0.58**	**0.58**
		Left side	0.109	0.073	0.073	**0.18**	**0.18**
		Right side	0.351			**0.35**	**0.35**
		Top side		0.214	0.214	**0.21**	**0.21**
		Bottom side	0.206			**0.21**	**0.21**
	Band 17	Front	0.416	0.135	0.135	**0.55**	**0.55**
		Back	0.426	0.244	0.244	**0.67**	**0.67**
		Left side	0.148	0.073	0.073	**0.22**	**0.22**
		Right side	0.140			**0.14**	**0.14**
		Top side		0.214	0.214	**0.21**	**0.21**
		Bottom side	0.311			**0.31**	**0.31**
	Band 5	Front	0.403	0.135	0.135	**0.54**	**0.54**
		Back	0.553	0.244	0.244	**0.80**	**0.80**
		Left side	0.377	0.073	0.073	**0.45**	**0.45**
		Right side	0.629			**0.63**	**0.63**
		Top side		0.214	0.214	**0.21**	**0.21**
		Bottom side	0.364			**0.36**	**0.36**
	Band 4	Front	0.606	0.135	0.135	**0.74**	**0.74**
		Back	0.556	0.244	0.244	**0.80**	**0.80**
		Left side	0.245	0.073	0.073	**0.32**	**0.32**
		Right side	0.096			**0.10**	**0.10**
		Top side		0.214	0.214	**0.21**	**0.21**
		Bottom side	0.710			**0.71**	**0.71**

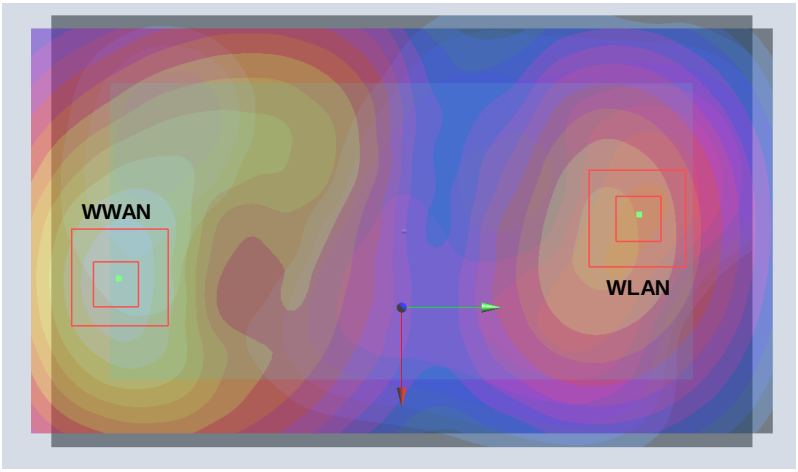
15.3 Body-Worn Accessory Exposure Conditions

WWAN Band		Exposure Position	WWAN SAR (W/kg)	2.4GHz WLAN SAR (W/kg)	Summed SAR (W/kg)	SPLSR	Case No
CDMA	BC0	Front	0.435	0.078	**0.51**		
		Back	0.599	0.099	**0.70**		
	BC1	Front	1.040	0.078	**1.12**		
		Back	1.528	0.099	**1.63**	0.02	Case 1
		Back with Headset	1.514	0.143	**1.66**	0.02	Case 2
LTE	Band 12	Front	0.268	0.078	**0.35**		
		Back	0.301	0.099	**0.40**		
	Band 17	Front	0.289	0.078	**0.37**		
		Back	0.349	0.099	**0.45**		
	Band 5	Front	0.327	0.078	**0.41**		
		Back	0.409	0.099	**0.51**		
	Band 4	Front	0.748	0.078	**0.83**		
		Back	0.700	0.099	**0.80**		

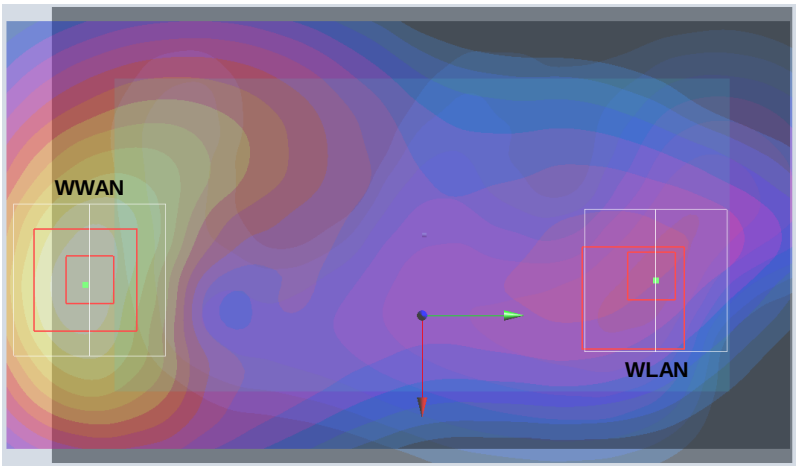
WWAN Band		Exposure Position	WWAN SAR (W/kg)	2.4GHz Bluetooth SAR (W/kg)	Summed SAR (W/kg)	SPLSR	Case No
CDMA	BC0	Front	0.435	0.008	**0.44**		
		Back	0.599	0.009	**0.61**		
	BC1	Front	1.040	0.008	**1.05**		
		Back	1.528	0.009	**1.54**		
		Back with Headset	1.514	0.009	**1.52**		
LTE	Band 12	Front	0.268	0.008	**0.28**		
		Back	0.301	0.009	**0.31**		
	Band 17	Front	0.289	0.008	**0.30**		
		Back	0.349	0.009	**0.36**		
	Band 5	Front	0.327	0.008	**0.34**		
		Back	0.409	0.009	**0.42**		
	Band 4	Front	0.748	0.008	**0.76**		
		Back	0.700	0.009	**0.71**		

15.4 SPLSR Evaluation and Analysis

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
	CDMA BC1	Back	1.528	1.5	-0.0075	-0.062	-0.204	115.5	1.63	0.02	Not required
	2.4GHz WLAN		0.099	1.5	-0.0206	0.0528	-0.205				



Case 2	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
	CDMA BC1	Back with Headset	1.514	1.5	-0.0075	-0.07	-0.205	119.2	1.66	0.02	Not required
	2.4GHz WLAN		0.143	1.5	-0.0074	0.0492	-0.205				



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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/√3	1/√6	1/√2

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

(b) κ is the coverage factor

Table 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 Distribution	Divisor	Ci (1g)	Ci (10g)	Standard Uncertainty (1g)	Standard Uncertainty (10g)
Measurement System							
Probe Calibration	6.0	Normal	1	1	1	± 6.0 %	± 6.0 %
Axial Isotropy	4.7	Rectangular	√3	0.7	0.7	± 1.9 %	± 1.9 %
Hemispherical Isotropy	9.6	Rectangular	√3	0.7	0.7	± 3.9 %	± 3.9 %
Boundary Effects	1.0	Rectangular	√3	1	1	± 0.6 %	± 0.6 %
Linearity	4.7	Rectangular	√3	1	1	± 2.7 %	± 2.7 %
System Detection Limits	1.0	Rectangular	√3	1	1	± 0.6 %	± 0.6 %
Readout Electronics	0.3	Normal	1	1	1	± 0.3 %	± 0.3 %
Response Time	0.8	Rectangular	√3	1	1	± 0.5 %	± 0.5 %
Integration Time	2.6	Rectangular	√3	1	1	± 1.5 %	± 1.5 %
RF Ambient Noise	3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %
RF Ambient Reflections	3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %
Probe Positioner	0.4	Rectangular	√3	1	1	± 0.2 %	± 0.2 %
Probe Positioning	2.9	Rectangular	√3	1	1	± 1.7 %	± 1.7 %
Max. SAR Eval.	1.0	Rectangular	√3	1	1	± 0.6 %	± 0.6 %
Test Sample Related							
Device Positioning	2.9	Normal	1	1	1	± 2.9 %	± 2.9 %
Device Holder	3.6	Normal	1	1	1	± 3.6 %	± 3.6 %
Power Drift	5.0	Rectangular	√3	1	1	± 2.9 %	± 2.9 %
Phantom and Setup							
Phantom Uncertainty	4.0	Rectangular	√3	1	1	± 2.3 %	± 2.3 %
Liquid Conductivity (Target)	5.0	Rectangular	√3	0.64	0.43	± 1.8 %	± 1.2 %
Liquid Conductivity (Meas.)	2.5	Normal	1	0.64	0.43	± 1.6 %	± 1.1 %
Liquid Permittivity (Target)	5.0	Rectangular	√3	0.6	0.49	± 1.7 %	± 1.4 %
Liquid Permittivity (Meas.)	2.5	Normal	1	0.6	0.49	± 1.5 %	± 1.2 %
Combined Standard Uncertainty						± 11.0 %	± 10.8 %
Coverage Factor for 95 %						K=2	
Expanded Uncertainty						**± 22.0 %**	**± 21.5 %**

Table 16.2. Uncertainty Budget for frequency range 300 MHz to 3 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

[3] IEEE Std. 1528-2003, “Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques”, December 2003

[4] SPEAG DASY System Handbook

[5] FCC KDB 248227 D01 v01r02, “SAR Measurement Procedures for 802.11 a/b/g Transmitters”, May 2007

[6] FCC KDB 447498 D01 v05r02, “Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies”, Feb 2014

[7] FCC KDB 648474 D04 v01r02, “SAR Evaluation Considerations for Wireless Handsets”, Dec 2013.

[8] FCC KDB 941225 D01 v02, “SAR Measurement Procedures for 3G Devices – CDMA 2000 / Ev-Do / WCDMA / HSDPA / HSPA”, October 2007

[9] FCC KDB 941225 D02 v02r02, “SAR Guidance for HSPA, HSPA+, DC-HSDPA and 1x-Advanced”, May 2013.

[10] FCC KDB 941225 D05 v02r03, “SAR Evaluation Considerations for LTE Devices”, Dec 2013

[11] FCC KDB 941225 D06 v01r01, "SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities", May 2013.

[12] FCC KDB 865664 D01 v01r03, "SAR Measurement Requirements for 100 MHz to 6 GHz", Feb 2014.

[13] FCC KDB 865664 D02 v01r01, “RF Exposure Compliance Reporting and Documentation Considerations” May 2013.