Variant FCC SAR Test Report

APPLICANT	:	Motorola Solutions, Inc.
EQUIPMENT	:	Touch Computer
BRAND NAME	:	Motorola
MODEL NAME	:	TC55AH
FCC ID	:	UZ7TC55AH
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
FA322304-19	Rev. 01	Variant report to include verification of worst case found in the original report (Sporton Report No. FA322304-07) performed testing and difference which can be referred to Product Equality Declaration.	Jun. 16, 2014

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **Motorola Solutions, Inc., Touch Computer, TC55AH**, 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	LTE Band 4	**0.50**	1.32	**1.32**	1.57
	LTE Band 2	0.41	**1.32**	1.25	
Date of Testing:		05/27/2014 ~ 05/30/2014			

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 Solutions, Inc.
Address	One Motorola Plaza, Holtsville, NY 11742-1300 USA

Manufacturer	
Company Name	Motorola Solutions, Inc.
Address	One Motorola Plaza, Holtsville, NY 11742-1300 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 1528-2003
- FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r03
- FCC KDB 865664 D02 SAR Reporting v01r01
- FCC KDB 648474 D04 SAR Evaluation Considerations for Wireless Handsets v01r02
- FCC KDB 447498 D01 General RF Exposure Guidance v05r02
- 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	Touch Computer
Brand Name	Motorola
Model Name	TC55AH
FCC ID	UZ7TC55AH
IMEI Code	357404050000481
S/N	131495216D0014
Wireless Technology and Frequency Range	GSM850: 824.2 MHz ~ 848.8 MHz GSM1900: 1850.2 MHz ~ 1909.8 MHz WCDMA Band V: 826.4 MHz ~ 846.6 MHz WCDMA Band IV: 1712.4 MHz ~ 1752.6 MHz WCDMA Band II: 1852.4 MHz ~ 1907.6 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 LTE Band 2: 1850.7 MHz ~ 1909.3 MHz WLAN 2.4GHz Band: 2412 MHz ~ 2472 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 NFC : 13.56 MHz
Mode	• GSM/GPRS/EGPRS • WCDMA Rel 99 • HSDPA Rel 7, Cat14 • HSUPA Rel 6, Cat6 • LTE: QPSK, 16QAM • 802.11a/b/g/n HT20/HT40 • Bluetooth 2.0+EDR，Bluetooth 2.1+EDR，Bluetooth 3.0，Bluetooth 4.0 • NFC:ASK
HW Version	DV1
FW Version	Android 4.1.2
SW Version	BSP 1.27
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. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

4.2 Maximum Tune-up Limit

LTE Band 2						
Average Power (dBm)						
Modulation	BW (MHz)	RB size	Full power mode MPR	Full Power	Reduced power mode MPR	Reduced
QPSK	20	≤ 18	0	24.5	0	21.5
QPSK	20	> 18	1	23.5	0	21.5
16QAM	20	≤ 18	1	23.5	0	21.5
16QAM	20	> 18	2	22.5	0	21.5
QPSK	15	≤ 16	0	24.5	0	21.5
QPSK	15	> 16	1	23.5	0	21.5
16QAM	15	≤ 16	1	23.5	0	21.5
16QAM	15	> 16	2	22.5	0	21.5
QPSK	10	≤ 12	0	24.5	0	21.5
QPSK	10	> 12	1	23.5	0	21.5
16QAM	10	≤ 12	1	23.5	0	21.5
16QAM	10	> 12	2	22.5	0	21.5
QPSK	5	≤ 8	0	24.5	0	21.5
QPSK	5	> 8	1	23.5	0	21.5
16QAM	5	≤ 8	1	23.5	0	21.5
16QAM	5	> 8	2	22.5	0	21.5
QPSK	3	≤ 4	0	24.5	0	21.5
QPSK	3	> 4	1	23.5	0	21.5
16QAM	3	≤ 4	1	23.5	0	21.5
16QAM	3	> 4	2	22.5	0	21.5
QPSK	1.4	≤ 5	0	24.5	0	21.5
QPSK	1.4	> 5	1	23.5	0	21.5
16QAM	1.4	≤ 5	1	23.5	0	21.5
16QAM	1.4	> 5	2	22.5	0	21.5

LTE Band 4						
Average Power (dBm)						
Modulation	BW (MHz)	RB size	Full power mode MPR	Full Power	Reduced power mode MPR	Reduced
QPSK	20	≤ 18	0	24.5	0	21.5
QPSK	20	> 18	1	23.5	0	21.5
16QAM	20	≤ 18	1	23.5	0	21.5
16QAM	20	> 18	2	22.5	0	21.5
QPSK	15	≤ 16	0	24.5	0	21.5
QPSK	15	> 16	1	23.5	0	21.5
16QAM	15	≤ 16	1	23.5	0	21.5
16QAM	15	> 16	2	22.5	0	21.5
QPSK	10	≤ 12	0	24.5	0	21.5
QPSK	10	> 12	1	23.5	0	21.5
16QAM	10	≤ 12	1	23.5	0	21.5
16QAM	10	> 12	2	22.5	0	21.5
QPSK	5	≤ 8	0	24.5	0	21.5
QPSK	5	> 8	1	23.5	0	21.5
16QAM	5	≤ 8	1	23.5	0	21.5
16QAM	5	> 8	2	22.5	0	21.5
QPSK	3	≤ 4	0	24.5	0	21.5
QPSK	3	> 4	1	23.5	0	21.5
16QAM	3	≤ 4	1	23.5	0	21.5
16QAM	3	> 4	2	22.5	0	21.5
QPSK	1.4	≤ 5	0	24.5	0	21.5
QPSK	1.4	> 5	1	23.5	0	21.5
16QAM	1.4	≤ 5	1	23.5	0	21.5
16QAM	1.4	> 5	2	22.5	0	21.5

LTE Band 5				
Average Power (dBm)				
Modulation	BW (MHz)	RB size	power mode MPR	Power
QPSK	10	≤ 12	0	24.5
QPSK	10	> 12	1	23.5
16QAM	10	≤ 12	1	23.5
16QAM	10	> 12	2	22.5
QPSK	5	≤ 8	0	24.5
QPSK	5	> 8	1	23.5
16QAM	5	≤ 8	1	23.5
16QAM	5	> 8	2	22.5
QPSK	3	≤ 4	0	24.5
QPSK	3	> 4	1	23.5
16QAM	3	≤ 4	1	23.5
16QAM	3	> 4	2	22.5
QPSK	1.4	≤ 5	0	24.5
QPSK	1.4	> 5	1	23.5
16QAM	1.4	≤ 5	1	23.5
16QAM	1.4	> 5	2	22.5

4.3 General LTE SAR Test and Reporting Considerations

Summarized necessary items addressed in KDB 941225 D05 v02r03	
FCC ID	UZ7TC55AH
Equipment Name	Touch Computer
Operating Frequency Range of each LTE transmission band	LTE Band 5: 824.7 MHz ~ 848.3 MHz LTE Band 4: 1710.7 MHz ~ 1754.3 MHz LTE Band 2: 1850.7 MHz ~ 1909.3 MHz
Channel Bandwidth	LTE Band 5:1.4MHz, 3MHz, 5MHz, 10MHz LTE Band 4:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz LTE Band 2:1.4MHz, 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 2 and Ban4 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 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

LTE Band 2

	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	18607	1850.7	18615	1851.5	18625	1852.5	18650	1855	18675	1857.5	18700	1860
M	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880
H	19193	1909.3	19185	1908.5	19175	1907.5	19150	1905	19125	1902.5	19100	1900

Target Power reduction applied for each wireless mode

Exposure Position / wireless mode	Hotspot(1)
LTE band 4	3.0 dB
LTE band 2	3.0 dB

Remark:

1. (1): Reduced maximum limit applied by activation of Hotspot operation
2. When hotspot mode is enabled, power reduction will be activated to limit the maximum power of LTE band 2 and 4.
3. Power reduction is not applicable for WLAN and Bluetooth.

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:

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

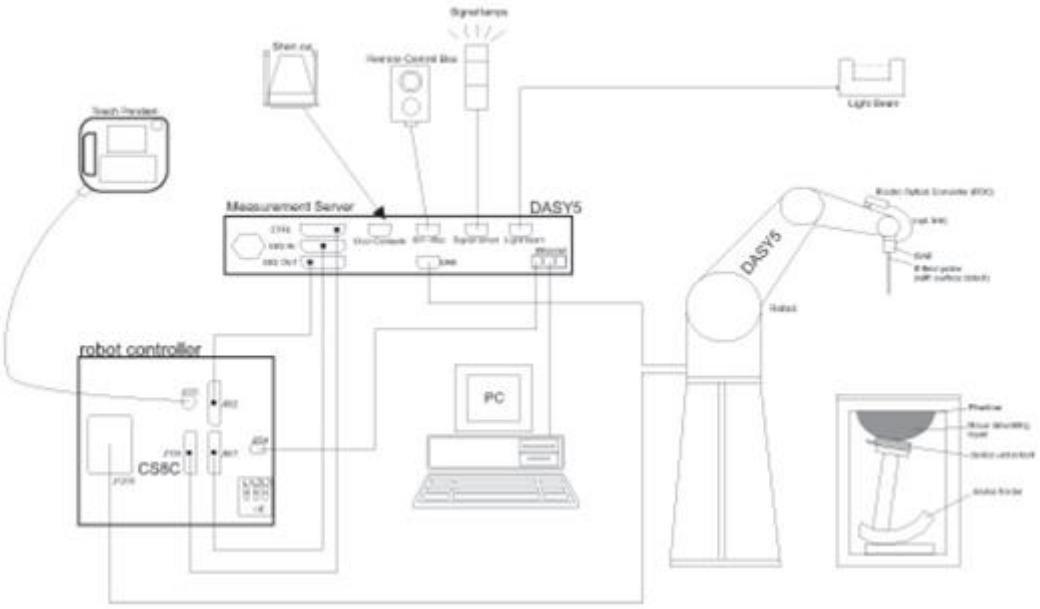
SAR is expressed in units of Watts per kilogram (W/kg)

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

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	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	Data Acquisition Electronics	DAE4	778	Aug. 21, 2013	Aug. 20, 2014
SPEAG	Data Acquisition Electronics	DAE4	1338	Nov. 05, 2013	Nov. 04, 2014
SPEAG	Data Acquisition Electronics	DAE4	1279	Jan. 30, 2014	Jan. 29, 2015
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	3954	Nov. 04, 2013	Nov. 03, 2014
Wisewind	Thermometer	ETP-101	TM560	Oct. 22, 2013	Oct. 21, 2014
Anritsu	Radio Communication Analyzer	MT8820C	6201074414	Feb. 11, 2014	Feb. 10, 2015
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	

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
1750	Head	22.6	1.409	39.382	1.40	40.00	0.64	-1.55	±5	2014/5/30
1900	Head	22.5	1.436	41.511	1.40	40.00	2.57	3.78	±5	2014/5/29
1750	Body	22.4	1.518	52.095	1.52	53.30	-0.13	-2.26	±5	2014/5/27
1750	Body	22.4	1.518	52.095	1.52	53.30	-0.13	-2.26	±5	2014/5/27
1900	Body	22.4	1.545	51.942	1.52	53.30	1.64	-2.55	±5	2014/5/29

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 (%)
2014/5/30	1750	Head	250	D1750V2-1068	3270	1279	8.85	37.30	35.4	-5.09
2014/5/29	1900	Head	250	D1900V2-5d041	3954	1279	9.45	41.00	37.8	-7.80
2014/5/27	1750	Body	250	D1750V2-1068	3270	778	8.88	37.50	35.52	-5.28
2014/5/27	1750	Body	250	D1750V2-1068	3935	1338	9.13	37.50	36.52	-2.61
2014/5/29	1900	Body	250	D1900V2-5d041	3954	1279	10.70	41.00	42.8	4.39

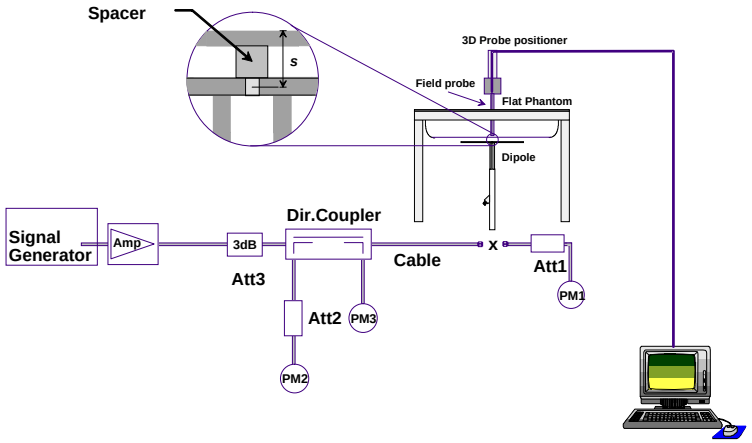


Fig 8.3.1 System Performance Check Setup

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.

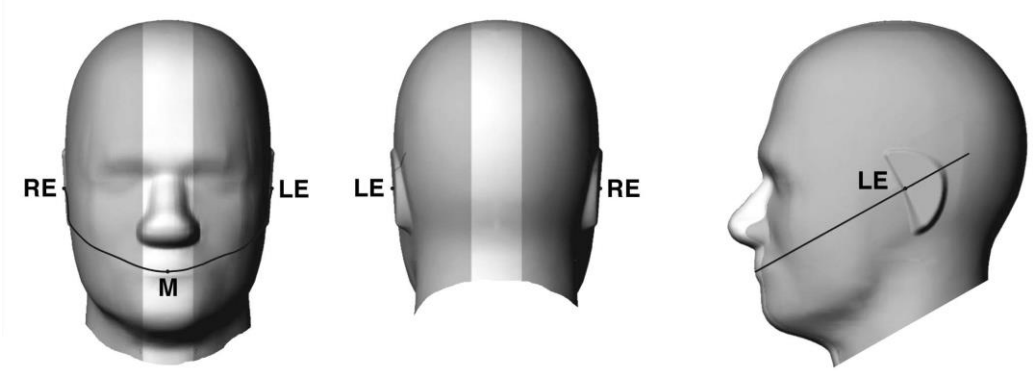


Fig 9.1.1 Front, back, and side views of SAM twin phantom

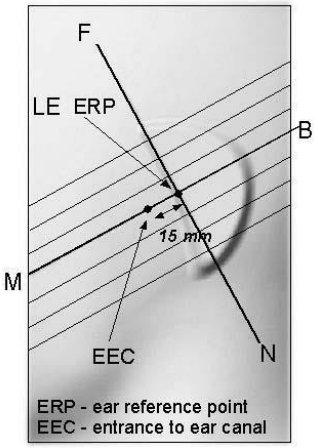


Fig 9.1.2 Close-up side view of phantom showing the ear region.

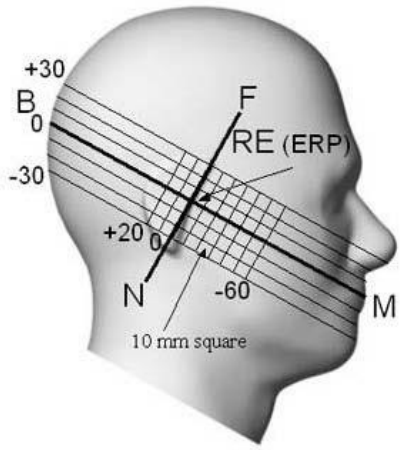


Fig 9.1.3 Side view of the phantom showing relevant markings and seven cross-sectional plane locations

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.

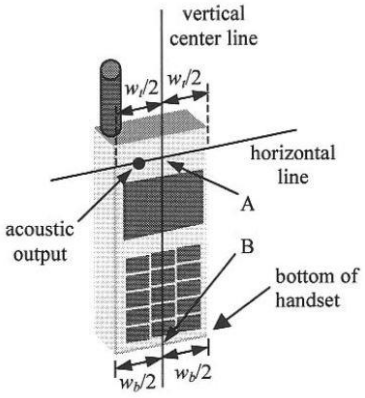


Fig 9.2.1 Handset vertical and horizontal reference lines—"fixed case

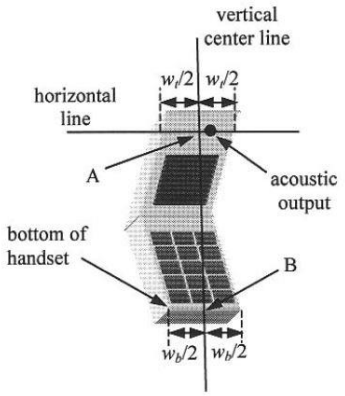


Fig 9.2.2 Handset vertical and horizontal reference lines—"clam-shell case"

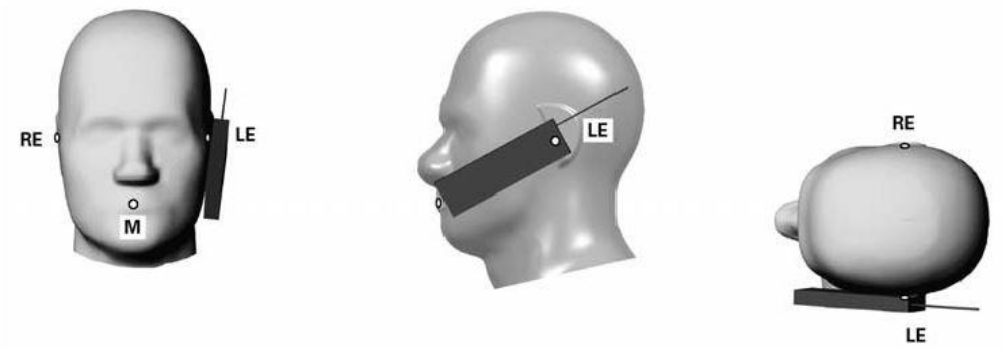


Fig 9.2.3 cheek or touch position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which establish the Reference Plane for handset positioning, are indicated.

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

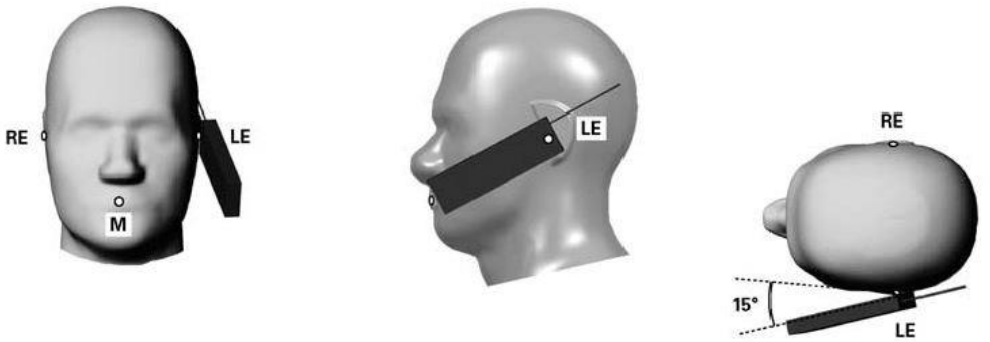


Fig 9.3.1 Tilt position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which define the Reference Plane for handset positioning, are indicated.

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.

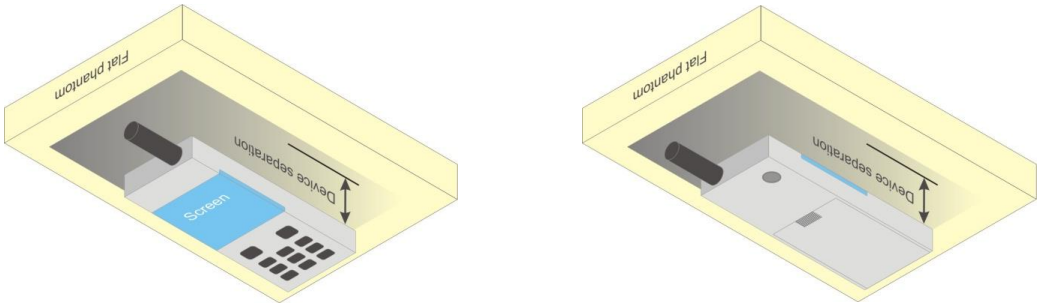


Fig 9.4 Body Worn Position

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 5 - full power mode>

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	24.36	24.30	24.09	24.5	0
10	QPSK	1	24	24.31	24.29	23.82		
10	QPSK	1	49	24.35	23.95	23.97		
10	QPSK	25	0	23.33	23.21	22.95	23.5	0-1
10	QPSK	25	12	23.26	23.25	22.83		
10	QPSK	25	24	23.24	23.09	22.81		
10	QPSK	50	0	23.24	23.10	22.86		
10	16QAM	1	0	23.33	23.31	23.11	23.5	0-1
10	16QAM	1	24	23.37	23.30	22.97		
10	16QAM	1	49	23.38	22.93	23.04		
10	16QAM	25	0	22.19	22.19	21.84	22.5	0-2
10	16QAM	25	12	22.20	22.13	21.79		
10	16QAM	25	24	22.19	22.00	21.76		
10	16QAM	50	0	22.09	21.99	21.76		
Channel				20425	20525	20625	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				826.5	836.5	846.5		
5	QPSK	1	0	24.30	24.28	23.90	24.5	0
5	QPSK	1	12	24.27	24.27	23.95		
5	QPSK	1	24	24.31	24.21	23.95		
5	QPSK	12	0	23.41	23.36	22.99	23.5	1
5	QPSK	12	6	23.36	23.20	23.01		
5	QPSK	12	11	23.30	23.15	23.04		
5	QPSK	25	0	23.35	23.20	22.92		
5	16QAM	1	0	23.23	23.30	22.93	23.5	1
5	16QAM	1	12	23.30	23.34	23.00		
5	16QAM	1	24	23.33	23.21	23.00		
5	16QAM	12	0	22.38	22.35	21.89	22.5	2
5	16QAM	12	6	22.34	22.21	21.95		
5	16QAM	12	11	22.29	22.16	21.99		
5	16QAM	25	0	22.23	22.15	21.81		
Channel				20415	20525	20635	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				825.5	836.5	847.5		
3	QPSK	1	0	24.32	24.26	24.05	24.5	0
3	QPSK	1	7	24.22	24.20	23.70		
3	QPSK	1	14	24.27	23.86	23.90		
3	QPSK	8	0	23.28	23.14	22.89	23.5	0-1
3	QPSK	8	4	23.21	23.17	22.70		
3	QPSK	8	7	23.13	22.96	22.73		
3	QPSK	15	0	23.11	23.03	22.81		
3	16QAM	1	0	23.24	23.22	22.99	23.5	0-1
3	16QAM	1	7	23.32	23.23	22.84		
3	16QAM	1	14	23.27	22.89	22.96		
3	16QAM	8	0	22.15	22.06	21.76	22.5	0-2
3	16QAM	8	4	22.11	22.09	21.75		
3	16QAM	8	7	22.07	21.91	21.72		
3	16QAM	15	0	22.03	21.92	21.69		

Channel				20407	20525	20643	Tune up Limit (dBm)	Target MPR (dB)
Frequency (MHz)				824.7	836.5	848.3		
1.4	QPSK	1	0	24.29	24.24	24.02	24.5	0
1.4	QPSK	1	2	24.18	24.15	23.70		
1.4	QPSK	1	5	24.25	23.80	23.90		
1.4	QPSK	3	0	23.25	23.06	22.88		
1.4	QPSK	3	1	23.14	23.11	22.77		
1.4	QPSK	3	2	23.18	22.95	22.75		
1.4	QPSK	6	0	23.14	22.96	22.72	23.5	0-1
1.4	16QAM	1	0	23.23	23.21	22.97	23.5	0-1
1.4	16QAM	1	2	23.30	23.22	22.85		
1.4	16QAM	1	5	23.28	22.81	22.88		
1.4	16QAM	3	0	22.06	22.03	21.77		
1.4	16QAM	3	1	22.09	22.01	21.65		
1.4	16QAM	3	2	22.10	21.85	21.69		
1.4	16QAM	6	0	22.02	21.93	21.60	22.5	0-2

<LTE Band 4 - Hotspot inactive - full power mode>

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	24.27	23.95	23.89	24.5	0
20	QPSK	1	49	24.25	23.94	23.88		
20	QPSK	1	99	24.23	23.90	23.87		
20	QPSK	50	0	23.30	22.92	22.92	23.5	0-1
20	QPSK	50	24	23.26	22.91	22.87		
20	QPSK	50	49	23.29	22.90	22.91		
20	QPSK	100	0	23.16	22.83	22.71		
20	16QAM	1	0	23.25	23.23	22.94	23.5	0-1
20	16QAM	1	49	23.28	23.02	23.03		
20	16QAM	1	99	23.17	22.93	22.92		
20	16QAM	50	0	22.16	21.95	21.82	22.5	0-2
20	16QAM	50	24	22.28	21.86	21.87		
20	16QAM	50	49	22.36	21.90	21.91		
20	16QAM	100	0	22.16	21.86	21.73		
Channel				20025	20175	20325	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				1717.5	1732.5	1747.5		
15	QPSK	1	0	24.23	24.19	23.93	24.5	0
15	QPSK	1	37	24.26	23.97	23.90		
15	QPSK	1	74	24.25	23.90	23.89		
15	QPSK	36	0	23.22	23.03	22.86	23.5	0-1
15	QPSK	36	18	23.23	22.95	22.98		
15	QPSK	36	37	23.32	22.88	22.95		
15	QPSK	75	0	23.12	22.86	22.79		
15	16QAM	1	0	23.29	23.23	23.00	23.5	0-1
15	16QAM	1	37	23.30	23.04	23.07		
15	16QAM	1	74	23.18	22.94	22.99		
15	16QAM	36	0	22.15	21.98	21.83	22.5	0-2
15	16QAM	36	18	22.26	21.87	21.95		
15	16QAM	36	37	22.36	21.90	22.44		
15	16QAM	75	0	22.13	21.83	21.81		
Channel				20000	20175	20350	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				1715	1732.5	1750		
10	QPSK	1	0	24.34	24.32	23.94	24.5	0
10	QPSK	1	24	24.40	24.10	23.92		
10	QPSK	1	49	24.39	24.01	23.93		
10	QPSK	25	0	23.33	23.14	22.88	23.5	0-1
10	QPSK	25	12	23.38	23.05	22.96		
10	QPSK	25	24	23.44	23.04	22.97		
10	QPSK	50	0	23.22	22.97	22.77		
10	16QAM	1	0	23.41	23.38	23.00	23.5	0-1
10	16QAM	1	24	23.42	23.19	23.09		
10	16QAM	1	49	23.32	23.07	22.98		
10	16QAM	25	0	22.30	22.10	21.85	22.5	0-2
10	16QAM	25	12	22.42	22.00	21.93		
10	16QAM	25	24	22.45	22.01	21.96		
10	16QAM	50	0	22.26	21.95	21.80		

Channel				19975	20175	20375	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				1712.5	1732.5	1752.5		
5	QPSK	1	0	24.32	24.15	23.87	24.5	0
5	QPSK	1	12	24.26	24.10	23.95		
5	QPSK	1	24	24.38	24.02	23.94		
5	QPSK	12	0	23.41	23.24	22.97	23.5	0-1
5	QPSK	12	6	23.32	23.13	22.99		
5	QPSK	12	11	23.32	23.11	22.94		
5	QPSK	25	0	23.28	23.09	22.93		
5	16QAM	1	0	23.35	23.18	22.90	23.5	0-1
5	16QAM	1	12	23.31	23.10	22.99		
5	16QAM	1	24	23.30	23.04	22.92		
5	16QAM	12	0	22.45	22.19	21.98	22.5	0-2
5	16QAM	12	6	22.37	22.21	22.02		
5	16QAM	12	11	22.40	22.16	22.03		
5	16QAM	25	0	22.32	22.07	21.92		
Channel				19965	20175	20385	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				1711.5	1732.5	1753.5		
3	QPSK	1	0	24.22	24.20	23.83	24.5	0
3	QPSK	1	7	24.26	24.02	23.79		
3	QPSK	1	14	24.24	23.89	23.82		
3	QPSK	8	0	23.19	22.99	22.74	23.5	0-1
3	QPSK	8	4	23.23	22.93	22.84		
3	QPSK	8	7	23.30	22.94	22.88		
3	QPSK	15	0	23.06	22.85	22.65		
3	16QAM	1	0	23.27	23.28	22.89	23.5	0-1
3	16QAM	1	7	23.29	23.09	22.97		
3	16QAM	1	14	23.18	22.96	22.86		
3	16QAM	8	0	22.18	21.98	21.76	22.5	0-2
3	16QAM	8	4	22.28	21.91	21.81		
3	16QAM	8	7	22.33	21.92	21.79		
3	16QAM	15	0	22.14	21.81	21.69		
Channel				19957	20175	20393	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				1710.7	1732.5	1754.3		
1.4	QPSK	1	0	24.23	24.21	23.86	24.5	0
1.4	QPSK	1	2	24.21	23.99	23.81		
1.4	QPSK	1	5	24.22	23.90	23.84		
1.4	QPSK	3	0	23.21	23.06	22.77		
1.4	QPSK	3	1	23.21	22.96	22.81		
1.4	QPSK	3	2	23.29	22.93	22.91		
1.4	QPSK	6	0	23.05	22.88	22.66	23.5	0-1
1.4	16QAM	1	0	23.25	23.27	22.95	23.5	0-1
1.4	16QAM	1	2	23.24	23.12	22.98		
1.4	16QAM	1	5	23.16	23.04	22.84		
1.4	16QAM	3	0	22.13	22.01	21.74		
1.4	16QAM	3	1	22.26	21.92	21.84		
1.4	16QAM	3	2	22.29	21.90	21.88		
1.4	16QAM	6	0	22.09	21.89	21.67	22.5	0-2

<LTE Band 4 - Hotspot active - reduced power mode>

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	21.26	21.05	20.78	21.5	0
20	QPSK	1	49	21.09	20.92	20.65		
20	QPSK	1	99	21.01	20.81	20.70		
20	QPSK	50	0	21.12	20.95	20.65	21.5	0-1
20	QPSK	50	24	21.08	20.80	20.58		
20	QPSK	50	49	21.10	20.76	20.62		
20	QPSK	100	0	21.08	20.76	20.75		
20	16QAM	1	0	21.16	21.04	20.76	21.5	0-1
20	16QAM	1	49	20.87	20.98	20.73		
20	16QAM	1	99	21.14	20.93	20.66		
20	16QAM	50	0	20.89	20.86	20.62	21.5	0-2
20	16QAM	50	24	21.09	20.76	20.68		
20	16QAM	50	49	21.04	20.63	20.63		
20	16QAM	100	0	21.07	20.79	20.57		
Channel				20025	20175	20325	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				1717.5	1732.5	1747.5		
15	QPSK	1	0	21.24	21.03	20.77	21.5	0
15	QPSK	1	37	21.12	20.95	20.67		
15	QPSK	1	74	21.01	20.77	20.65		
15	QPSK	36	0	21.03	21.02	20.66	21.5	0-1
15	QPSK	36	18	21.09	20.80	20.57		
15	QPSK	36	37	21.11	20.78	20.57		
15	QPSK	75	0	21.03	20.80	20.69		
15	16QAM	1	0	21.14	21.01	20.74	21.5	0-1
15	16QAM	1	37	20.88	21.00	20.64		
15	16QAM	1	74	21.13	20.92	20.60		
15	16QAM	36	0	20.90	20.84	20.57	21.5	0-2
15	16QAM	36	18	21.12	20.71	20.62		
15	16QAM	36	37	21.07	20.67	20.61		
15	16QAM	75	0	21.01	20.68	20.63		
Channel				20000	20175	20350	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				1715	1732.5	1750		
10	QPSK	1	0	21.38	21.18	20.91	21.5	0
10	QPSK	1	24	21.30	21.12	20.86		
10	QPSK	1	49	21.22	20.94	20.82		
10	QPSK	25	0	21.25	21.17	20.84	21.5	0-1
10	QPSK	25	12	21.27	21.02	20.80		
10	QPSK	25	24	21.25	20.91	20.75		
10	QPSK	50	0	21.22	20.93	20.90		
10	16QAM	1	0	21.31	21.16	20.88	21.5	0-1
10	16QAM	1	24	21.01	21.15	20.85		
10	16QAM	1	49	21.30	21.12	20.81		
10	16QAM	25	0	21.09	21.05	20.78	21.5	0-2
10	16QAM	25	12	21.28	20.88	20.80		
10	16QAM	25	24	21.20	20.84	20.79		
10	16QAM	50	0	21.20	20.91	20.77		

Channel				19975	20175	20375	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				1712.5	1732.5	1752.5		
5	QPSK	1	0	21.30	21.09	20.89	21.5	0
5	QPSK	1	12	21.13	21.01	20.80		
5	QPSK	1	24	21.17	20.90	20.79		
5	QPSK	12	0	21.29	21.03	20.81	21.5	0-1
5	QPSK	12	6	21.24	21.08	20.88		
5	QPSK	12	11	21.27	21.05	20.84		
5	QPSK	25	0	21.23	21.00	20.73		
5	16QAM	1	0	21.29	21.07	20.87	21.5	0-1
5	16QAM	1	12	20.96	21.01	20.80		
5	16QAM	1	24	20.94	21.04	20.74		
5	16QAM	12	0	21.28	21.06	20.86	21.5	0-2
5	16QAM	12	6	21.27	21.04	20.84		
5	16QAM	12	11	21.17	21.05	20.75		
5	16QAM	25	0	21.09	20.90	20.79		
Channel				19965	20175	20385	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				1711.5	1732.5	1753.5		
3	QPSK	1	0	21.21	21.02	20.74	21.5	0
3	QPSK	1	7	21.04	20.96	20.64		
3	QPSK	1	14	21.00	20.71	20.60		
3	QPSK	8	0	20.99	20.98	20.62	21.5	0-1
3	QPSK	8	4	21.03	20.85	20.55		
3	QPSK	8	7	21.00	20.69	20.51		
3	QPSK	15	0	20.97	20.72	20.72		
3	16QAM	1	0	21.12	20.91	20.65	21.5	0-1
3	16QAM	1	7	20.85	20.90	20.63		
3	16QAM	1	14	21.10	20.87	20.64		
3	16QAM	8	0	20.89	20.83	20.62	21.5	0-2
3	16QAM	8	4	21.05	20.68	20.61		
3	16QAM	8	7	21.02	20.63	20.54		
3	16QAM	15	0	21.00	20.71	20.60		
Channel				19957	20175	20393	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				1710.7	1732.5	1754.3		
1.4	QPSK	1	0	21.17	20.97	20.67	21.5	0
1.4	QPSK	1	2	21.00	20.83	20.59		
1.4	QPSK	1	5	20.97	20.73	20.56		
1.4	QPSK	3	0	20.97	20.91	20.58		
1.4	QPSK	3	1	21.01	20.74	20.56		
1.4	QPSK	3	2	20.99	20.64	20.54		
1.4	QPSK	6	0	20.97	20.64	20.60	21.5	0-1
1.4	16QAM	1	0	21.10	20.90	20.67	21.5	0-1
1.4	16QAM	1	2	20.73	20.92	20.59		
1.4	16QAM	1	5	21.03	20.86	20.50		
1.4	16QAM	3	0	20.87	20.74	20.48		
1.4	16QAM	3	1	20.99	20.62	20.58		
1.4	16QAM	3	2	20.92	20.62	20.56		
1.4	16QAM	6	0	20.98	20.63	20.52	21.5	0-2

<LTE Band 2 - Hotspot inactive - full power mode>

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				18700	18900	19100		
Frequency (MHz)				1860	1880	1900		
20	QPSK	1	0	24.24	24.13	24.10	24.5	0
20	QPSK	1	49	23.99	24.00	23.82		
20	QPSK	1	99	24.07	23.90	23.80		
20	QPSK	50	0	23.00	22.99	22.95	23.5	0-1
20	QPSK	50	24	22.85	22.92	22.90		
20	QPSK	50	49	22.94	22.96	22.94		
20	QPSK	100	0	22.90	22.89	22.76		
20	16QAM	1	0	22.93	23.08	22.95	23.5	0-1
20	16QAM	1	49	22.88	23.02	22.94		
20	16QAM	1	99	22.78	23.02	22.84		
20	16QAM	50	0	21.86	22.01	21.93	22.5	0-2
20	16QAM	50	24	21.90	21.97	21.79		
20	16QAM	50	49	21.81	21.98	21.90		
20	16QAM	100	0	21.70	21.89	21.75		
Channel				18675	18900	19125	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				1857.5	1880	1902.5		
15	QPSK	1	0	24.05	23.97	23.96	24.5	0
15	QPSK	1	37	23.91	23.92	23.68		
15	QPSK	1	74	23.95	23.76	23.76		
15	QPSK	36	0	22.83	22.93	22.75	23.5	0-1
15	QPSK	36	18	22.73	22.82	22.74		
15	QPSK	36	37	22.81	22.90	22.76		
15	QPSK	75	0	22.54	22.78	22.62		
15	16QAM	1	0	22.85	23.03	22.81	23.5	0-1
15	16QAM	1	37	22.69	22.90	22.87		
15	16QAM	1	74	22.76	22.90	22.71		
15	16QAM	36	0	21.82	21.86	21.79	22.5	0-2
15	16QAM	36	18	21.68	21.84	21.72		
15	16QAM	36	37	21.68	21.86	21.81		
15	16QAM	75	0	21.59	21.78	21.57		
Channel				18650	18900	19150	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				1855	1880	1905		
10	QPSK	1	0	24.41	24.33	24.32	24.5	0
10	QPSK	1	24	24.30	24.31	24.12		
10	QPSK	1	49	24.35	24.19	24.14		
10	QPSK	25	0	23.21	23.33	23.18	23.5	0-1
10	QPSK	25	12	23.09	23.24	23.17		
10	QPSK	25	24	23.18	23.30	23.19		
10	QPSK	50	0	22.96	23.15	23.01		
10	16QAM	1	0	23.22	23.41	23.24	23.5	0-1
10	16QAM	1	24	23.14	23.33	23.23		
10	16QAM	1	49	23.12	23.26	23.16		
10	16QAM	25	0	22.19	22.32	22.25	22.5	0-2
10	16QAM	25	12	22.14	22.30	22.13		
10	16QAM	25	24	22.13	22.29	22.17		
10	16QAM	50	0	21.96	22.14	22.02		

Channel				18625	18900	19175	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				1852.5	1880	1907.5		
5	QPSK	1	0	24.15	24.28	24.10	24.5	0
5	QPSK	1	12	24.19	24.25	24.11		
5	QPSK	1	24	24.05	24.20	24.07		
5	QPSK	12	0	23.28	23.34	23.14	23.5	0-1
5	QPSK	12	6	23.39	23.31	23.19		
5	QPSK	12	11	23.30	23.29	23.14		
5	QPSK	25	0	23.33	23.23	23.11		
5	16QAM	1	0	23.24	23.33	23.19	23.5	0-1
5	16QAM	1	12	23.26	23.33	23.14		
5	16QAM	1	24	23.13	23.33	23.14		
5	16QAM	12	0	22.33	22.36	22.27	22.5	0-2
5	16QAM	12	6	22.44	22.29	22.28		
5	16QAM	12	11	22.36	22.39	22.16		
5	16QAM	25	0	22.22	22.23	22.11		
Channel				18615	18900	19185	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				1851.5	1880	1908.5		
3	QPSK	1	0	24.23	24.19	24.19	24.5	0
3	QPSK	1	7	24.14	24.16	23.97		
3	QPSK	1	14	24.20	24.10	24.02		
3	QPSK	8	0	23.09	23.18	23.04	23.5	0-1
3	QPSK	8	4	22.94	23.11	23.02		
3	QPSK	8	7	23.03	23.15	23.07		
3	QPSK	15	0	22.81	22.97	22.86		
3	16QAM	1	0	23.08	23.25	23.10	23.5	0-1
3	16QAM	1	7	22.99	23.18	23.08		
3	16QAM	1	14	22.96	23.10	22.97		
3	16QAM	8	0	22.04	22.19	22.12	22.5	0-2
3	16QAM	8	4	21.97	22.15	21.98		
3	16QAM	8	7	21.98	22.17	21.98		
3	16QAM	15	0	21.85	22.00	21.87		
Channel				18607	18900	19193	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				1850.7	1880	1909.3		
1.4	QPSK	1	0	24.20	24.12	24.14	24.5	0
1.4	QPSK	1	2	24.10	24.09	23.91		
1.4	QPSK	1	5	23.84	23.95	23.94		
1.4	QPSK	3	0	23.00	23.12	22.97		
1.4	QPSK	3	1	22.90	23.00	22.99		
1.4	QPSK	3	2	22.94	23.09	22.98		
1.4	QPSK	6	0	22.75	22.97	22.84	23.5	0-1
1.4	16QAM	1	0	23.01	23.23	23.04	23.5	0-1
1.4	16QAM	1	2	22.96	23.12	23.00		
1.4	16QAM	1	5	22.90	23.07	22.95		
1.4	16QAM	3	0	21.98	22.11	22.09		
1.4	16QAM	3	1	21.94	22.09	21.94		
1.4	16QAM	3	2	21.92	22.06	21.96		
1.4	16QAM	6	0	21.80	21.97	21.82	22.5	0-2

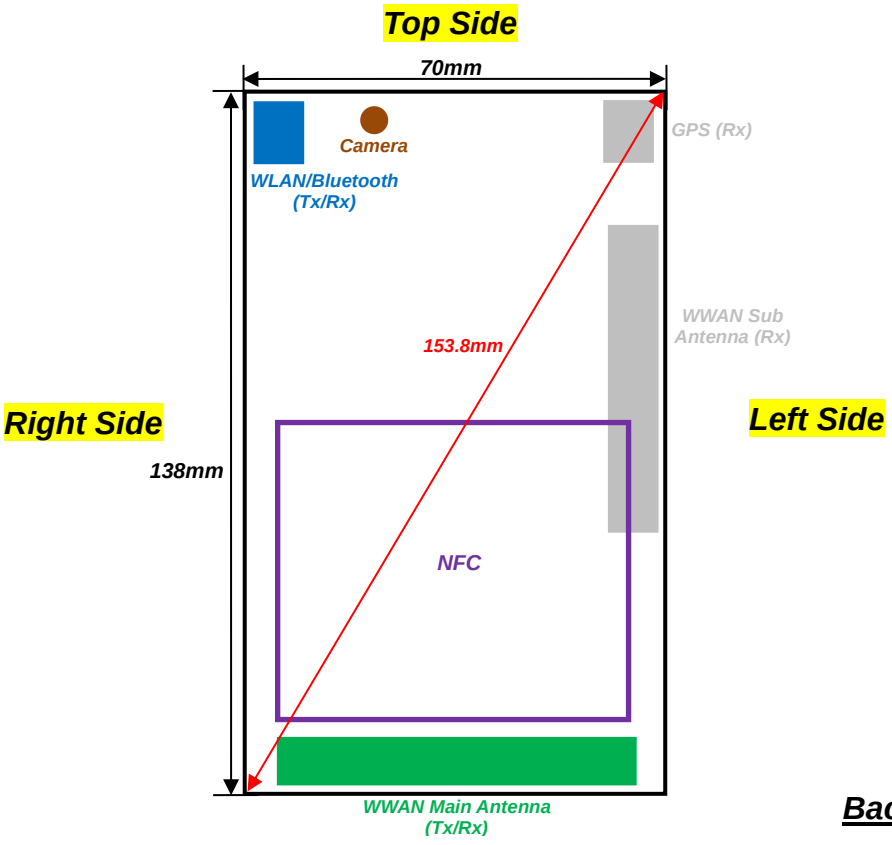
<LTE Band 2 - Hotspot active - reduced power mode>

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				18700	18900	19100		
Frequency (MHz)				1860	1880	1900		
20	QPSK	1	0	21.20	21.03	21.10	21.5	0
20	QPSK	1	49	20.77	20.83	20.96		
20	QPSK	1	99	20.74	20.81	20.88		
20	QPSK	50	0	20.96	20.73	20.95	21.5	0-1
20	QPSK	50	24	20.80	20.78	20.95		
20	QPSK	50	49	20.71	20.63	20.94		
20	QPSK	100	0	20.81	20.68	20.80		
20	16QAM	1	0	20.94	20.76	21.19	21.5	0-1
20	16QAM	1	49	20.79	20.74	20.97		
20	16QAM	1	99	20.80	20.65	20.86		
20	16QAM	50	0	20.79	20.72	20.97	21.5	0-2
20	16QAM	50	24	20.93	20.67	20.92		
20	16QAM	50	49	20.79	20.69	20.96		
20	16QAM	100	0	20.80	20.75	20.84		
Channel				18675	18900	19125	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				1857.5	1880	1902.5		
15	QPSK	1	0	20.93	20.95	21.18	21.5	0
15	QPSK	1	37	20.71	20.78	20.86		
15	QPSK	1	74	20.71	20.77	20.86		
15	QPSK	36	0	20.83	20.67	20.95	21.5	0-1
15	QPSK	36	18	20.80	20.71	20.87		
15	QPSK	36	37	20.77	20.69	20.94		
15	QPSK	75	0	20.78	20.64	20.75		
15	16QAM	1	0	20.92	20.76	21.11	21.5	0-1
15	16QAM	1	37	20.77	20.70	20.97		
15	16QAM	1	74	20.72	20.67	20.92		
15	16QAM	36	0	20.76	20.65	20.94	21.5	0-2
15	16QAM	36	18	20.84	20.62	20.83		
15	16QAM	36	37	20.77	20.69	20.98		
15	16QAM	75	0	20.78	20.75	20.78		
Channel				18650	18900	19150	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				1855	1880	1905		
10	QPSK	1	0	21.19	21.20	21.44	21.5	0
10	QPSK	1	24	21.03	21.06	21.20		
10	QPSK	1	49	21.03	21.05	21.14		
10	QPSK	25	0	21.12	21.01	21.23	21.5	0-1
10	QPSK	25	12	21.06	21.02	21.19		
10	QPSK	25	24	21.01	20.93	21.26		
10	QPSK	50	0	21.03	20.97	21.05		
10	16QAM	1	0	21.16	21.03	21.42	21.5	0-1
10	16QAM	1	24	21.06	20.95	21.25		
10	16QAM	1	49	21.05	20.93	21.16		
10	16QAM	25	0	21.03	20.98	21.20	21.5	0-2
10	16QAM	25	12	21.13	20.94	21.13		
10	16QAM	25	24	21.10	20.97	21.25		
10	16QAM	50	0	21.09	20.99	21.05		

Channel				18625	18900	19175	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				1852.5	1880	1907.5		
5	QPSK	1	0	20.98	20.95	21.27	21.5	0
5	QPSK	1	12	20.97	20.94	21.13		
5	QPSK	1	24	20.96	20.93	21.15		
5	QPSK	12	0	20.86	20.89	21.16	21.5	0-1
5	QPSK	12	6	20.87	20.87	21.18		
5	QPSK	12	11	20.83	20.84	21.26		
5	QPSK	25	0	20.79	20.91	21.21		
5	16QAM	1	0	20.96	20.92	21.37	21.5	0-1
5	16QAM	1	12	20.86	20.89	20.91		
5	16QAM	1	24	20.79	20.75	20.70		
5	16QAM	12	0	20.75	20.91	21.19	21.5	0-2
5	16QAM	12	6	20.87	20.83	21.20		
5	16QAM	12	11	20.83	20.82	21.17		
5	16QAM	25	0	20.74	20.79	21.18		
Channel				18615	18900	19185	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				1851.5	1880	1908.5		
3	QPSK	1	0	20.93	20.94	21.19	21.5	0
3	QPSK	1	7	20.76	20.78	20.96		
3	QPSK	1	14	20.75	20.78	20.81		
3	QPSK	8	0	20.85	20.70	20.92	21.5	0-1
3	QPSK	8	4	20.82	20.68	20.94		
3	QPSK	8	7	20.69	20.63	20.94		
3	QPSK	15	0	20.77	20.72	20.80		
3	16QAM	1	0	20.83	20.76	21.09	21.5	0-1
3	16QAM	1	7	20.76	20.67	20.99		
3	16QAM	1	14	20.72	20.61	20.90		
3	16QAM	8	0	20.73	20.72	20.94	21.5	0-2
3	16QAM	8	4	20.81	20.68	20.81		
3	16QAM	8	7	20.76	20.65	20.91		
3	16QAM	15	0	20.77	20.74	20.75		
Channel				18607	18900	19193	Tune up Limit (dBm)	MPR (dB)
Frequency (MHz)				1850.7	1880	1909.3		
1.4	QPSK	1	0	20.91	20.94	21.18	21.5	0
1.4	QPSK	1	2	20.70	20.81	20.95		
1.4	QPSK	1	5	20.73	20.75	20.85		
1.4	QPSK	3	0	20.86	20.76	20.93		
1.4	QPSK	3	1	20.79	20.76	20.86		
1.4	QPSK	3	2	20.67	20.61	20.97		
1.4	QPSK	6	0	20.76	20.70	20.75	21.5	0-1
1.4	16QAM	1	0	20.81	20.73	21.17	21.5	0-1
1.4	16QAM	1	2	20.73	20.62	20.90		
1.4	16QAM	1	5	20.75	20.68	20.89		
1.4	16QAM	3	0	20.72	20.68	20.92		
1.4	16QAM	3	1	20.79	20.60	20.85		
1.4	16QAM	3	2	20.76	20.72	20.90		
1.4	16QAM	6	0	20.80	20.67	20.73	21.5	0-2

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 Main	≤ 25mm	≤ 25mm	119mm	≤ 25mm	≤ 25mm	≤ 25mm
BT&WLAN	≤ 25mm	≤ 25mm	≤ 25mm	126mm	≤ 25mm	53mm
Positions for SAR tests; Hotspot mode						
Antennas	Back	Front	Top Side	Bottom Side	Right Side	Left Side
WWAN Main	Yes	Yes	No	Yes	Yes	Yes
BT&WLAN	Yes	Yes	Yes	No	Yes	No

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. As per worst configuration and at the worst position of original FCC SAR report, report No: FA322304-07, FCC ID: UZ7TC55AH, perform SAR testing.
2. 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: Reported SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor
3. 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
4. When hotspot mode is enabled, power reduction will be activated to limit the maximum power of LTE band 4 and 2.
5. 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.
6. Per KDB 941225 D05v02r03, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
7. 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.
8. 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.
9. 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.

14.1 Head SAR

<LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Battery	Scanner	Ch.	Freq. (MHz)	Hotspot	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
01	LTE Band 2	20M	QPSK	1	0	Right Cheek	Battery1	With Scanner	18700	1860	OFF	24.24	24.5	1.062	-0.1	0.388	**0.412**
	LTE Band 2	20M	QPSK	50	0	Right Cheek	Battery1	With Scanner	18700	1860	OFF	23	23.5	1.122	-0.14	0.309	0.347
	LTE Band 2	20M	QPSK	100	0	Right Cheek	Battery1	With Scanner	18700	1860	OFF	22.9	23.5	1.148	-0.12	0.306	0.351
02	LTE Band 4	20M	QPSK	1	0	Right Cheek	Battery1	With Scanner	20050	1720	OFF	24.27	24.5	1.054	0	0.476	**0.502**
	LTE Band 4	20M	QPSK	50	0	Right Cheek	Battery1	With Scanner	20050	1720	OFF	23.3	23.5	1.047	0.04	0.373	0.391
	LTE Band 4	20M	QPSK	100	0	Right Cheek	Battery1	With Scanner	20050	1720	OFF	23.16	23.5	1.081	-0.09	0.371	0.401

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 Main	≤ 25mm	≤ 25mm	119mm	≤ 25mm	≤ 25mm	≤ 25mm
BT&WLAN	≤ 25mm	≤ 25mm	≤ 25mm	126mm	≤ 25mm	53mm
Positions for SAR tests; Hotspot mode						
Antennas	Back	Front	Top Side	Bottom Side	Right Side	Left Side
WWAN Main	Yes	Yes	No	Yes	Yes	Yes
BT&WLAN	Yes	Yes	Yes	No	Yes	No

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

<LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (cm)	Battery	Scanner	Ch.	Freq. (MHz)	Hotspot	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 2	20M	QPSK	1	0	Back	1cm	Battery1	With Scanner	18700	1860	ON	21.2	21.5	1.072	-0.12	0.898	0.962
	LTE Band 2	20M	QPSK	1	0	Back	1cm	Battery1	With Scanner	18900	1880	ON	21.03	21.5	1.114	-0.14	1.070	1.192
	LTE Band 2	20M	QPSK	1	0	Back	1cm	Battery1	With Scanner	19100	1900	ON	21.1	21.5	1.096	-0.014	1.110	1.217
	LTE Band 2	20M	QPSK	50	0	Back	1cm	Battery1	With Scanner	18700	1860	ON	20.96	21.5	1.132	-0.12	0.858	0.972
	LTE Band 2	20M	QPSK	50	0	Back	1cm	Battery1	With Scanner	18900	1880	ON	20.73	21.5	1.194	-0.14	0.944	1.127
03	LTE Band 2	20M	QPSK	50	0	Back	1cm	Battery1	With Scanner	19100	1900	ON	20.95	21.5	1.135	-0.13	1.100	**1.249**
	LTE Band 2	20M	QPSK	100	0	Back	1cm	Battery1	With Scanner	18700	1860	ON	20.81	21.5	1.172	-0.14	0.811	0.951
04	LTE Band 4	20M	QPSK	1	0	Back	1cm	Battery1	With Scanner	20050	1720	ON	21.26	21.5	1.057	0	1.250	**1.321**
	LTE Band 4	20M	QPSK	1	0	Back	1cm	Battery1	With Scanner	20175	1732.5	ON	21.05	21.5	1.109	0.01	1.160	1.287
	LTE Band 4	20M	QPSK	1	0	Back	1cm	Battery1	With Scanner	20300	1745	ON	20.78	21.5	1.180	-0.13	1.080	1.275
	LTE Band 4	20M	QPSK	50	0	Back	1cm	Battery1	With Scanner	20050	1720	ON	21.12	21.5	1.091	-0.12	1.180	1.288
	LTE Band 4	20M	QPSK	50	0	Back	1cm	Battery1	With Scanner	20175	1732.5	ON	20.95	21.5	1.135	0.08	1.040	1.180
	LTE Band 4	20M	QPSK	50	0	Back	1cm	Battery1	With Scanner	20300	1745	ON	20.65	21.5	1.216	-0.12	1.010	1.228
	LTE Band 4	20M	QPSK	100	0	Back	1cm	Battery1	With Scanner	20050	1720	ON	21.08	21.5	1.102	-0.17	1.160	1.278

14.3 Body Worn Accessory SAR

<LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (cm)	Battery	Scanner	Headset	Ch.	Freq. (MHz)	Hotspot	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 2	20M	QPSK	1	0	Back	1.5cm	Battery1	With Scanner		18700	1860	OFF	24.24	24.5	1.062	-0.17	0.958	1.017
	LTE Band 2	20M	QPSK	1	0	Back	1.5cm	Battery1	With Scanner		18900	1880	OFF	24.13	24.5	1.089	-0.06	1.150	1.252
05	LTE Band 2	20M	QPSK	1	0	Back	1.5cm	Battery1	With Scanner		19100	1900	OFF	24.1	24.5	1.096	-0.15	1.20	**1.316**
	LTE Band 2	20M	QPSK	50	0	Back	1.5cm	Battery1	With Scanner		18700	1860	OFF	23	23.5	1.122	-0.16	0.741	0.831
	LTE Band 2	20M	QPSK	50	0	Back	1.5cm	Battery1	With Scanner		18900	1880	OFF	22.99	23.5	1.125	-0.14	0.824	0.927
	LTE Band 2	20M	QPSK	50	0	Back	1.5cm	Battery1	With Scanner		19100	1900	OFF	22.95	23.5	1.135	-0.14	0.932	1.058
	LTE Band 2	20M	QPSK	100	0	Back	1.5cm	Battery1	With Scanner		18700	1860	OFF	22.9	23.5	1.148	-0.12	0.795	0.913
	LTE Band 2	20M	QPSK	1	0	Back	1.5cm	Battery1	With Scanner	Headset	18700	1860	OFF	23	23.5	1.122	-0.11	0.899	1.009
	LTE Band 2	20M	QPSK	1	0	Back	1.5cm	Battery1	With Scanner	Headset	18900	1880	OFF	22.99	23.5	1.125	-0.13	1.050	1.181
	LTE Band 2	20M	QPSK	1	0	Back	1.5cm	Battery1	With Scanner	Headset	19100	1900	OFF	22.95	23.5	1.135	-0.11	1.110	1.260
	LTE Band 4	20M	QPSK	1	0	Back	1.5cm	Battery1	With Scanner		20050	1720	OFF	24.27	24.5	1.054	-0.055	1.230	1.297
	LTE Band 4	20M	QPSK	1	0	Back	1.5cm	Battery1	With Scanner		20175	1732.5	OFF	23.95	24.5	1.135	0.001	1.130	1.283
	LTE Band 4	20M	QPSK	1	0	Back	1.5cm	Battery1	With Scanner		20300	1745	OFF	23.89	24.5	1.151	0.02	1.080	1.243
	LTE Band 4	20M	QPSK	50	0	Back	1.5cm	Battery1	With Scanner		20050	1720	OFF	23.3	23.5	1.047	-0.01	0.902	0.945
	LTE Band 4	20M	QPSK	50	0	Back	1.5cm	Battery1	With Scanner		20175	1732.5	OFF	22.92	23.5	1.143	-0.07	0.838	0.958
	LTE Band 4	20M	QPSK	50	0	Back	1.5cm	Battery1	With Scanner		20300	1745	OFF	22.92	23.5	1.143	-0.01	0.802	0.917
	LTE Band 4	20M	QPSK	100	0	Back	1.5cm	Battery1	With Scanner		20050	1720	OFF	23.16	23.5	1.081	0.01	1.000	1.081
06	LTE Band 4	20M	QPSK	1	0	Back	1.5cm	Battery1	With Scanner	Headset	20050	1720	OFF	24.27	24.5	1.054	-0.06	1.250	**1.318**
	LTE Band 4	20M	QPSK	1	0	Back	1.5cm	Battery1	With Scanner	Headset	20175	1732.5	OFF	23.95	24.5	1.135	-0.03	1.140	1.294
	LTE Band 4	20M	QPSK	1	0	Back	1.5cm	Battery1	With Scanner	Headset	20300	1745	OFF	23.89	24.5	1.151	-0.19	1.140	1.312

14.4 Repeated SAR Measurement

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (cm)	Battery	Scanner	Ch.	Freq. (MHz)	Hotspot	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 2	20M	QPSK	1	0	Back	1.5cm	Battery1	With Scanner	19100	1900	OFF	24.1	24.5	1.096	-0.15	1.2	-	1.316
2nd	LTE Band 2	20M	QPSK	1	0	Back	1.5cm	Battery1	With Scanner	19100	1900	OFF	24.1	24.5	1.096	-0.17	1.18	1.01	1.294
1st	LTE Band 4	20M	QPSK	1	0	Back	1cm	Battery1	With Scanner	20050	1720	ON	21.26	21.5	1.057	0	1.250	-	1.321
2nd	LTE Band 4	20M	QPSK	1	0	Back	1cm	Battery1	With Scanner	20050	1720	ON	21.26	21.5	1.057	-0.06	1.200	1.04	1.268

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.	LTE(Data) + WLAN2.4GHz(data)	Yes	Yes	Yes	2.4GHz Hotspot
2.	LTE(Data) + Bluetooth(data)	Yes	Yes	Yes	Bluetooth Tethering

General Note:

1. WLAN and Bluetooth SAR test data is referred to original FCC SAR Report, Report No: FA322307-04, FCC ID:UZ7TC55AH for simultaneous transmission analysis
2. The Scaled SAR summation is calculated based on the same configuration and test position.
3. Per KDB 447498 D01v05r01, simultaneous transmission SAR is compliant if,
   i) Scalar SAR summation < 1.6W/kg.
   ii) SPLSR = $(SAR_1 + SAR_2)^{1.5}$ / (*min. separation distance, mm*), and the peak separation distance is determined from the square root of $[(x_1-x_2)^2 + (y_1-y_2)^2 + (z_1-z_2)^2]$, where (x_1, y_1, z_1) and (x_2, y_2, z_2) are the coordinates of the extrapolated peak SAR locations in the zoom scan
   If SPLSR ≤ 0.04, simultaneously transmission SAR measurement is not necessary
   iii) Simultaneously transmission SAR measurement, and the reported multi-band SAR < 1.6W/kg

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	WLAN 2.4GHz		2.4GHz Bluetooth		
			SAR (W/kg)	Band	SAR (W/kg)	Estimated SAR (W/kg)		
LTE	Band 2	Right Cheek	0.412	WLAN2.4GHz	0.509	0.067	**0.92**	**0.48**
	Band 4	Right Cheek	0.567	WLAN2.4GHz	0.509	0.067	**1.08**	**0.63**

15.2 Hotspot Exposure Conditions

WWAN Band		Exposure Position	1	2		3	1+2 Summed SAR (W/kg)	1+3 Summed SAR (W/kg)
			WWAN	WLAN 2.4GHz		2.4GHz Bluetooth		
			SAR (W/kg)	Band	SAR (W/kg)	Estimated SAR (W/kg)		
LTE	Band 4	Back	1.321	WLAN2.4GHz	0.250	0.033	**1.57**	**1.35**
	Band 2	Back	1.249	WLAN2.4GHz	0.250	0.033	**1.50**	**1.28**

15.3 Body-Worn Accessory Exposure Conditions

WWAN Band		Exposure Position	1	2		3	1+2 Summed SAR (W/kg)	1+3 Summed SAR (W/kg)
			WWAN	WLAN 2.4GHz		2.4GHz Bluetooth		
			SAR (W/kg)	Band	SAR (W/kg)	Estimated SAR (W/kg)		
LTE	Band 2	Back	1.316	WLAN2.4GHz	0.143	0.022	**1.46**	**1.34**
		Back with Headset	1.260	WLAN2.4GHz	0.136	0.022	**1.40**	**1.28**
	Band 4	Back	1.297	WLAN2.4GHz	0.143	0.022	**1.44**	**1.32**
		Back with Headset	1.318	WLAN2.4GHz	0.136	0.022	**1.45**	**1.34**

Test Engineer : Jerry Hu, San Lin, Nick Yu, Allen Tsui, and Jack Wu

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 14.1. 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 14.2. 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

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