FCC SAR Test Report

APPLICANT	**:**	**ZTE CORPORATION**
EQUIPMENT	**:**	**LTE Ufi**
BRAND NAME	**:**	**ZTE**
MODEL NAME	**:**	**MF97A**
FCC ID	**:**	**SRQ-ZTEMF97A**
STANDARD	**:**	**FCC 47 CFR Part 2 (2.1093)** **ANSI/IEEE C95.1-1992** **IEEE 1528-2003**

We, SPORTON INTERNATIONAL (KUNSHAN) INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and shown the 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 (KUNSHAN) INC., the test report shall not be reproduced except in full.

Eric Huang

Reviewed by: Eric Huang / Deputy Manager

Jones Tsai

Approved by: Jones Tsai / Manager

ilac-MRA

TAF Testing Laboratory 2627

SPORTON INTERNATIONAL (KUNSHAN) INC.
No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P.R.C.

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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA412609	Rev. 01	Initial issue of report	Apr. 11, 2014
FA412609	Rev. 02	1. Added test equipment and test firmware info. on page 34. 2. Revised the power drift of LTE Band 41 back position on page 48 3. Recalculated the report SAR value for LTE Band 41 on page 48 and re-summed simultaneous SAR value for LTE Band 41 on section 13.1.	Apr. 29, 2014

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **ZTE CORPORATION LTE Ufi, MF97A** are as follows.

<Highest SAR Summary>

Exposure Position	Frequency Band	Reported 1g-SAR (W/kg)	Equipment Class	Highest Reported 1g-SAR (W/kg)
Body (Separation 1cm)	CDMA 2000 BC0	0.82	PCB	1.27
	CDMA 2000 BC1	1.27		
	CDMA 2000 BC10	0.93		
	LTE Band 25	0.79		
	LTE Band 26	0.44		
	LTE Band 41	0.55		
	WLAN 2.4GHz Band	0.20	DTS	
	WLAN 5.8GHz Band	0.46		
	WLAN 5.2GHz Band	0.14	NII	

<Highest Simultaneous transmission SAR>

Exposure Position	Frequency Band	Equipment Class	Highest Reported Simultaneous Transmission 1g-SAR (W/kg)
Body (Separation 1cm)	CDMA 2000 BC1	PCB	1.27
	WLAN 2.4/5.8GHz Band	DTS	
Body (Separation 1cm)	CDMA 2000 BC1	PCB	1.06
	WLAN 5.2GHz Band	NII	
Body (Separation 1cm)	CDMA 2000 BC1	PCB	1.27
	Bluetooth	DSS	

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

2.1 Testing Laboratory

Test Site	SPORTON INTERNATIONAL (KUNSHAN) INC.
Test Site Location	No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P.R.C. TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958

2.2 Applicant

Company Name	ZTE CORPORATION
Address	ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R.China

2.3 Manufacturer

Company Name	ZTE CORPORATION
Address	ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R.China

2.4 Application Details

Test dates	Mar. 04, 2014 ~ Mar. 31, 2014

3. General Information

3.1 Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT	LTE Ufi
Brand Name	ZTE
Model Name	MF97A
FCC ID	SRQ-ZTEMF97A
Wireless Technology and Frequency Range	CDMA2000 BC0 : 824.7 MHz ~ 848.31 MHz CDMA 2000 BC1 : 1851.25 MHz ~ 1908.75 MHz CDMA 2000 BC10 : 817.9 MHz ~ 823.1 MHz LTE Band 25 : 1850.7MHz ~ 1914.3 MHz LTE Band 26 : 814.7 MHz ~ 848.3 MHz LTE Band 41 : 2498.5 MHz ~ 2687.5 MHz WLAN 2.4GHz Band : 2412 MHz ~ 2462 MHz WLAN 5.2GHz Band : 5180 MHz ~ 5240 MHz WLAN 5.8GHz Band : 5745 MHz ~ 5825 MHz Bluetooth : 2402 MHz ~ 2480 MHz
Mode	• CDMA2000 : 1xRTT/1xEv-Do(Rel.0)/1xEv-Do(Rev.A) • LTE : QPSK, 16QAM • 802.11a/b/g/n HT20/HT40 • Bluetooth v3.0+EDR, Bluetooth v4.0-LE
Antenna Type	WWAN: IFA Antenna WLAN Antenna 0: Dipole Antenna WLAN Antenna 1: PCB Antenna Bluetooth: Dipole Antenna
HW Version	MF97AV1.0.0B01
SW Version	xs9B
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.
2. This device 2.4GHz WLAN supports hotspot operation, and 2.4GHz / 5.8GHz WLAN supports WiFi Direct (GC/GO), and 5.2GHz supports WiFi Direct (GC only).
3. This device has no voice function.

3.2 Maximum RF output power among production units

Average Power (dBm)			
Band	CDMA2000 BC0	CDMA2000 BC1	CDMA2000 BC10
1xRTT RC1 SO55	25.2	24.7	25.0
1xRTT RC3 SO55	25.2	24.7	25.0
1xRTT RC3 SO32 (+ F-SCH)	25.2	24.7	25.0
1xRTT RC3 SO32 (+SCH)	25.2	24.7	25.0
1xEV-DO Rev 0 (RTAP 153.6kbps)	25.2	24.7	25.0
1xEV-DO Rev A (RETAP 4096bits)	25.2	24.7	25.0

LTE Band 25				
Modulation	BW (MHz)	RB size	Target MPR	Target Power (dBm)
QPSK	20	≤ 18	0	24
QPSK	20	> 18	1	23
16QAM	20	≤ 18	1	23
16QAM	20	> 18	2	22
QPSK	15	≤ 16	0	24
QPSK	15	> 16	1	23
16QAM	15	≤ 16	1	23
16QAM	15	> 16	2	22
QPSK	10	≤ 12	0	24
QPSK	10	> 12	1	23
16QAM	10	≤ 12	1	23
16QAM	10	> 12	2	22
QPSK	5	≤ 8	0	24
QPSK	5	> 8	1	23
16QAM	5	≤ 8	1	23
16QAM	5	> 8	2	22
QPSK	3	≤ 4	0	24
QPSK	3	> 4	1	23
16QAM	3	≤ 4	1	23
16QAM	3	> 4	2	22
QPSK	1.4	≤ 5	0	24
QPSK	1.4	> 5	1	23
16QAM	1.4	≤ 5	1	23
16QAM	1.4	> 5	2	22

LTE Band 26				
Modulation	BW (MHz)	RB size	Target MPR	Target Power (dBm)
QPSK	15	≤ 16	0	24
QPSK	15	> 16	1	23
16QAM	15	≤ 16	1	23
16QAM	15	> 16	2	22
QPSK	10	≤ 12	0	24
QPSK	10	> 12	1	23
16QAM	10	≤ 12	1	23
16QAM	10	> 12	2	22
QPSK	5	≤ 8	0	24
QPSK	5	> 8	1	23
16QAM	5	≤ 8	1	23
16QAM	5	> 8	2	22
QPSK	3	≤ 4	0	24
QPSK	3	> 4	1	23
16QAM	3	≤ 4	1	23
16QAM	3	> 4	2	22
QPSK	1.4	≤ 5	0	24
QPSK	1.4	> 5	1	23
16QAM	1.4	≤ 5	1	23
16QAM	1.4	> 5	2	22

LTE Band 41				
Modulation	BW (MHz)	RB size	Target MPR	Target Power (dBm)
QPSK	20	≤ 18	0	24
QPSK	20	> 18	1	23
16QAM	20	≤ 18	1	23
16QAM	20	> 18	2	22
QPSK	15	≤ 16	0	24
QPSK	15	> 16	1	23
16QAM	15	≤ 16	1	23
16QAM	15	> 16	2	22
QPSK	10	≤ 12	0	24
QPSK	10	> 12	1	23
16QAM	10	≤ 12	1	23
16QAM	10	> 12	2	22
QPSK	5	≤ 8	0	24
QPSK	5	> 8	1	23
16QAM	5	≤ 8	1	23
16QAM	5	> 8	2	22

Average Power (dBm)					
Mode / Band	IEEE 802.11				
	11a	11b	11g	11n-HT20	11n-HT40
WLAN 2.4 GHz Band Ant.0		16	10.5	10	9.5
WLAN 2.4 GHz Band Ant.1		16	10	8.5	8
WLAN 2.4 GHz Band Ant.0+1				12.5	12
WLAN 5.2 GHz Band Ant.0	9.5			8	8.5
WLAN 5.2 GHz Band Ant.1	9			9	8.5
WLAN 5.2 GHz Band Ant.0+1				12	12
WLAN 5.8 GHz Band Ant.0	14			13	14
WLAN 5.8 GHz Band Ant.1	11.5			10.5	10.5
WLAN 5.8 GHz Band Ant.0+1				15.5	15.5

Average Power (dBm)		
Mode / Band	v3.0+EDR	BT v4.0-LE
Bluetooth	1.0	2.0

The table below summarized necessary items addressed in KDB 941225 D05 v02r03.

FCC ID	SRQ-ZTEMF97A
EUT	LTE Ufi
Operating Frequency Range of each LTE transmission band	LTE Band 25 : 1850.7MHz ~ 1914.3 MHz LTE Band 26 : 814.7MHz ~ 848.3 MHz LTE Band 41 : 2498.5 MHz ~ 2687.5 MHz
Channel Bandwidth	1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz (LTE Band 25) 1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz (LTE Band 26) 5MHz, 10MHz, 15MHz, 20MHz (LTE Band 41)

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

LTE Band 25

	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	26047	1850.7	26055	1851.5	26065	1852.5	26090	1855	26115	1857.5	26140	1860
M	26340	1880	26340	1880	26340	1880	26340	1880	26340	1880	26340	1880
H	26683	1914.3	26675	1913.5	26665	1912.5	26640	1910	26615	1907.5	26590	1905

LTE Band 26

	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	26697	814.7	26705	815.5	26715	816.5	26740	819	26765	821.5
M	26865	831.5	26865	831.5	26865	831.5	26865	831.5	26865	831.5
H	27033	848.3	27025	847.5	27015	846.5	26990	844	26965	841.5

LTE Band 41

	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	39675	2498.5	39700	2501	39725	2503.5	39750	2506
LM	40148	2545.8	40160	2547	40173	2548.3	40185	2549.5
M	40620	2593	40620	2593	40620	2593	40620	2593
MH	41093	2640.3	41080	2639	41068	2637.8	41055	2636.5
H	41565	2687.5	41540	2685	41515	2682.5	41490	2680

LTE uplink modulations used	QPSK, and 16QAM
LTE Voice / Data requirements	Data only
LTE MPR permanently built-in by design	Yes, per 3GPP TS 36.101

Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3

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

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)
Base station simulator used for Testing	Anritsu MT8820C

3.3 Applied 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 248227 D01 SAR meas for 802 11abg v01r02
- FCC KDB 941225 D01 SAR test for 3G devices v02
- FCC KDB 941225 D05 SAR for LTE Devices v02r03
- FCC KDB 941225 D06 Hotspot Mode SAR v01r01

3.4 Device Category and SAR Limits

This device belongs to portable device category because its radiating structure is allowed to be used within 20 centimeters of the body of the user. Limit for General Population/Uncontrolled exposure should be applied for this device, it is 1.6 W/kg as averaged over any 1 gram of tissue.

3.5 Test Conditions

3.5.1 Ambient Condition

Ambient Temperature	20 to 24 ℃
Humidity	< 60 %

3.5.2 Test Configuration

For WWAN SAR testing, the device was controlled by using a base station emulator. Communication between the device and the emulator was established by air link. The distance between the EUT and the antenna of the emulator is larger than 50 cm and the output power radiated from the emulator antenna is at least 30 dB smaller than the output power of EUT.

During WLAN SAR testing EUT is configured with the WLAN continuous TX tool, and the transmission duty factor was monitored on the spectrum analyzer with zero-span setting

Duty factor observed as below:

WLAN 2.4GHz 802.11b, 1Mbps Ant. 0: 100%
WLAN 2.4GHz 802.11b, 1Mbps Ant. 1: 100%
WLAN 2.4GHz 802.11b, 5.5Mbps Ant. 1: 95.87%
WLAN 2.4GHz 802.11n HT20, MCS8 Ant. 0+1: 90.81%
WLAN 5.8GHz 802.11a, 6Mbps Ant. 0: 95.39%
WLAN 5.8GHz 802.11a, 6Mbps Ant. 1: 95.76%
WLAN 5.8GHz 802.11n HT20, MCS8 Ant. 0+1: 90.99%
WLAN 5.8GHz 802.11n HT40, MCS8 Ant. 0+1: 83.72%
WLAN 5.2GHz 802.11a, 6Mbps Ant. 0: 95.39%
WLAN 5.2GHz 802.11a, 6Mbps Ant. 1: 95.76%
WLAN 5.2GHz 802.11n HT20, MCS8 Ant. 0+1: 90.99%

For WLAN SAR testing, WLAN engineering testing software installed on the EUT can provide continuous transmitting RF signal.

4. Specific Absorption Rate (SAR)

4.1 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.

4.2 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)

SAR measurement can be either related to the temperature elevation in tissue by

$$\mathbf{SAR} = \mathbf{C}\left(\frac{\boldsymbol{\delta}\mathbf{T}}{\boldsymbol{\delta}\mathbf{t}}\right)$$

Where: C is the specific heat capacity, δT is the temperature rise and δt is the exposure duration, or related to the electrical field in the tissue by

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

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

However for evaluating SAR of low power transmitter, electrical field measurement is typically applied.

5. SAR Measurement System

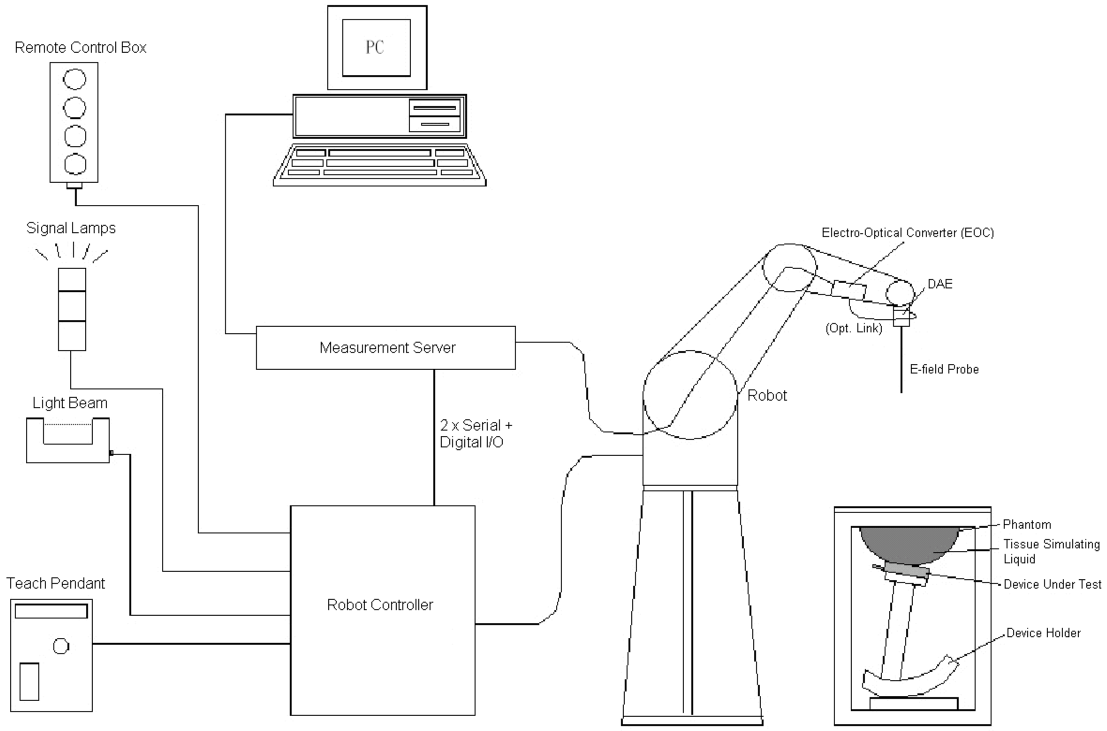


Fig 5.1 SPEAG DASY System Configurations

The DASY system for performance compliance tests is illustrated above graphically. This system consists of the following items:

- A standard high precision 6-axis robot with controller, a teach pendant and software
- A data acquisition electronic (DAE) attached to the robot arm extension
- A dosimetric probe equipped with an optical surface detector system
- The electro-optical converter (EOC) performs the conversion between optical and electrical signals
- A measurement server performs the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the accuracy of the probe positioning
- A computer operating Windows XP
- DASY software
- Remove control with teach pendant and additional circuitry for robot safety such as warming lamps, etc.
- The SAM twin phantom
- A device holder
- Tissue simulating liquid
- Dipole for evaluating the proper functioning of the system

Component details are described in in the following sub-sections.

5.1 E-Field Probe

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

<EX3DV4 Probe>

Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Frequency	10 MHz to 6 GHz; Linearity: ± 0.2 dB
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)
Dynamic Range	10 µW/g to 100 mW/g; Linearity: ± 0.2 dB (noise: typically < 1 µW/g)
Dimensions	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm

Fig 5.2 Photo of EX3DV4

5.1.1 E-Field Probe Calibration

Each probe needs to be calibrated according to a dosimetric assessment procedure with accuracy better than ± 10%. The spherical isotropy shall be evaluated and within ± 0.25dB. The sensitivity parameters (NormX, NormY, and NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe are tested. The calibration data can be referred to appendix C of this report.

5.2 Data Acquisition Electronics (DAE)

The data acquisition electronics (DAE) consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information as well as an optical uplink for commands and the clock.
The input impedance of the DAE is 200 MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

Fig 5.3 Photo of DAE

5.3 Robot

The SPEAG DASY system uses the high precision robots (DASY5: TX90XL) type from Stäubli SA (France). For the 6-axis controller system, the robot controller version (DASY5: CS8c) from Stäubli is used. The Stäubli robot series have many features that are important for our application:

- High precision (repeatability ±0.035 mm)
- High reliability (industrial design)
- Jerk-free straight movements
- Low ELF interference (the closed metallic construction shields against motor control fields)

Fig 5.4 Photo of DASY5

5.4 Measurement Server

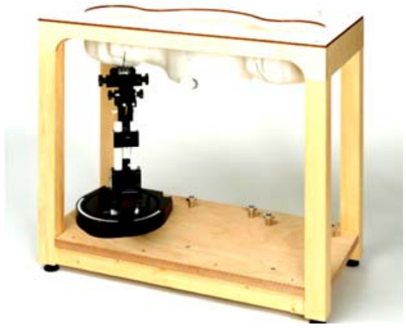
The measurement server is based on a PC/104 CPU board with CPU (DASY5: 400 MHz, Intel Celeron), chipdisk (DASY5: 128 MB), RAM (DASY5: 128 MB). The necessary circuits for communication with the DAE electronic box, as well as the 16 bit AD converter system for optical detection and digital I/O interface are contained on the DASY I/O board, which is directly connected to the PC/104 bus of the CPU board.

The measurement server performs all the real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operations.

Fig 5.5 Photo of Server for DASY5

5.5 Phantom

<SAM Twin Phantom>

Shell Thickness	2 ± 0.2 mm; Center ear point: 6 ± 0.2 mm	 **Fig 5.6 Photo of SAM Phantom**
Filling Volume	Approx. 25 liters	
Dimensions	Length: 1000 mm; Width: 500 mm; Height: adjustable feet	
Measurement Areas	Left Hand, Right Hand, Flat Phantom	

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

5.6 Device Holder

<Device Holder for SAM Twin Phantom>

The SAR in the phantom is approximately inversely proportional to the square of the distance between the source and the liquid surface. For a source at 5 mm distance, a positioning uncertainty of ± 0.5 mm would produce a SAR uncertainty of ± 20 %. Accurate device positioning is therefore crucial for accurate and repeatable measurements. The positions in which the devices must be measured are defined by the standards.

The DASY device holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation center for both scales is the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.

The DASY device holder is constructed of low-loss POM material having the following dielectric parameters: relative permittivity $\varepsilon = 3$ and loss tangent $\delta = 0.02$. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.

Fig 5.7 Device Holder

5.7 Data Storage and Evaluation

5.7.1 Data Storage

The DASY software stores the assessed data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all the necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files. The post-processing software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of erroneous parameter settings. For example, if a measurement has been performed with an incorrect crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be reevaluated.

The measured data can be visualized or exported in different units or formats, depending on the selected probe type (e.g., [V/m], [A/m], [mW/g]). Some of these units are not available in certain situations or give meaningless results, e.g., a SAR-output in a non-lose media, will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

5.7.2 Data Evaluation

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

Probe parameters：	- Sensitivity	$Norm_i$, a_{i0}, a_{i1}, a_{i2}
	- Conversion factor	$ConvF_i$
	- Diode compression point	dcp_i
Device parameters：	- Frequency	f
	- Crest factor	cf
Media parameters：	- Conductivity	σ
	- Density	ρ

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

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics. If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power.

The formula for each channel can be given as：

$$\mathbf{V_i = U_i + U_i^2 \cdot \frac{cf}{dcp_i}}$$

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

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

E-field Probes：$\mathbf{E_i = \sqrt{\frac{V_i}{Norm_i \cdot ConvF}}}$

H-field Probes：$\mathbf{H_i = \sqrt{V_i} \cdot \frac{a_{i0} + a_{i1} f + a_{i2} f^2}{f}}$

with V_i = compensated signal of channel i, (i = x, y, z)
$Norm_i$ = sensor sensitivity of channel i, (i = x, y, z), μV/(V/m)^2 for E-field Probes
ConvF = sensitivity enhancement in solution
a_{ij} = sensor sensitivity factors for H-field probes
f = carrier frequency [GHz]
E_i = electric field strength of channel i in V/m
H_i = magnetic field strength of channel i in A/m

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

$$\mathbf{E_{tot} = \sqrt{E_x^2 + E_y^2 + E_z^2}}$$

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

$$\mathbf{SAR = E_{tot}^2 \cdot \frac{\sigma}{\rho \cdot 1000}}$$

with SAR = local specific absorption rate in mW/g
E_{tot} = total field strength in V/m
σ = conductivity in [mho/m] or [Siemens/m]
ρ = equivalent tissue density in g/cm^3

Note that the density is set to 1, to account for actual head tissue density rather than the density of the tissue simulating liquid.

5.8 Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	835MHz System Validation Kit	D835V2	4d151	Mar. 25, 2013	Mar. 24, 2014
SPEAG	835MHz System Validation Kit	D835V2	4d091	Nov. 18, 2011	Nov. 14, 2014
SPEAG	1900MHz System Validation Kit	D1900V2	5d170	Mar. 27, 2013	Mar. 26, 2014
SPEAG	2450MHz System Validation Kit	D2450V2	736	Aug. 23, 2013	Aug. 22, 2014
SPEAG	2600MHz System Validation Kit	D2600V2	1061	Mar. 26, 2013	Mar. 25, 2014
SPEAG	5000MHz System Validation Kit	D5GHzV2	1128	Jul. 24, 2013	Jul. 23, 2014
SPEAG	Data Acquisition Electronics	DAE4	1358	Apr. 08, 2013	Apr. 07, 2014
SPEAG	Data Acquisition Electronics	DAE4	1210	Jun. 19, 2013	Jun. 18, 2014
SPEAG	Dosimetric E-Field Probe	EX3DV4	3911	Apr. 11, 2013	Apr. 10, 2014
SPEAG	Dosimetric E-Field Probe	EX3DV4	3857	Jun. 20, 2013	Jun. 19, 2014
SPEAG	SAM Twin Phantom	QD 000 P40 CD	TP-1753	NCR	NCR
SPEAG	SAM Twin Phantom	QD 000 P40 CB	TP-1477	NCR	NCR
SPEAG	SAM Twin Phantom	QD 000 P40 CB	TP-1479	NCR	NCR
SPEAG	Phone Positioner	N/A	N/A	NCR	NCR
Agilent	Wireless Communication Test Set	E5515C	MY52102600	Dec. 30, 2013	Dec. 29, 2014
Agilent	Wireless Communication Test Set	E5515C	MY52102706	May 04, 2013	May 03, 2014
Anritsu	Radio communication analyzer	MT8820C	6201074235	Nov. 05, 2013	Nov. 04, 2014
Anritsu	Radio communication analyzer	MT8820C	6201091028	Jul. 11, 2013	Jul. 10, 2014
R&S	Signal Generator	SMR40	100455	Jan. 17, 2014	Jan. 16, 2015
Agilent	Dielectric Probe Kit	85070E	MY44300751	NCR	NCR
Agilent	Dielectric Probe Kit	85070E	MY44300475	NCR	NCR
Agilent	ENA Series Network Analyzer	E5071C	MY46111157	Apr. 22, 2013	Apr. 21, 2014
Agilent	ENA Series Network Analyzer	E5071C	MY46317418	May 24, 2013	May 23, 2014
Anritsu	Power Meter	ML2495A	1005002	Feb. 27, 2014	Feb. 26, 2015
Anritsu	Power Senor	MA2411B	0917070	Feb. 27, 2014	Feb. 26, 2015
ARRA	Power Divider	A3200-2	N/A	NA	NA
Agilent	Dual Directional Coupler	778D	50422	Note 4	
Woken	Attenuator 1	WK0602-XX	N/A	Note 4	
PE	Attenuator 2	PE7005-10	N/A	Note 4	
PE	Attenuator 3	PE7005- 3	N/A	Note 4	
AR	Power Amplifier	5S1G4M2	328767	Note 5	
R&S	Spectrum Analyzer	FSP30	101399	May 23, 2013	May 22, 2014

Table 5.1 Test Equipment List

Note:

1. The calibration certificate of DASY can be referred to appendix C of this report.
2. Referring to KDB 865664 D01v01r03, the dipole calibration interval can be extended to 3 years with justification. The dipoles are also not physically damaged, or repaired during the interval.
3. The justification data of dipole D835V2, SN: 4d091 can be found in appendix C. The return loss is < -20dB, within 20% of prior calibration, the impedance is within 5 ohm of prior calibration.
4. The Insertion Loss calibration of Dual Directional Coupler and Attenuator were characterized via the network analyzer and compensated during system check.
5. In system check we need to monitor the level on the power meter, and adjust the power amplifier level to have precise power level to the dipole; the measured SAR will be normalized to 1W input power according to the ratio of 1W to the input power to the dipole. For system check, the calibration of the power amplifier is deemed not critically required for correct measurement; the power meter is critical and we do have calibration for it
6. Attenuator 1 insertion loss is calibrated by the network Analyzer, which the calibration is valid, before system check.

6. Tissue Simulating Liquids

For the measurement of the field distribution inside the SAM phantom with DASY, the phantom must be filled with around 25 liters of homogeneous body tissue simulating liquid. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm, which is shown in Fig. 6.1.

Fig 6.1 Photo of Liquid Height for Body SAR

The following table gives the recipes for tissue simulating liquid.

Frequency (MHz)	Water (%)	Sugar (%)	Cellulose (%)	Salt (%)	Preventol (%)	DGBE (%)	Conductivity (σ)	Permittivity (ε_r)
For Body								
835	50.8	48.2	0	0.9	0.1	0	0.97	55.2
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	68.6	0	0	0	0	31.4	2.16	52.5

Table 6.1 Recipes of Tissue Simulating Liquid

Simulating Liquid for 5G, Manufactured by SPEAG

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

The dielectric parameters of the liquids were verified prior to the SAR evaluation using an Agilent 85070E Dielectric Probe Kit and an Agilent E5071C Network Analyzer.

The following table shows the measuring results for simulating liquid.

Frequency (MHz)	Tissue Type	Liquid Temp. (℃)	Conductivity (σ)	Permittivity (ε_r)	Conductivity Target (σ)	Permittivity Target (ε_r)	Delta (σ) (%)	Delta (ε_r) (%)	Limit (%)	Date
835	Body	22.5	0.975	54.261	0.97	55.20	0.52	-1.70	±5	Mar. 05, 2014
835	Body	22.8	0.980	54.477	0.97	55.20	1.03	-1.31	±5	Mar. 11, 2014
1900	Body	22.4	1.528	53.974	1.52	53.30	0.53	1.26	±5	Mar. 04, 2014
2450	Body	22.7	1.940	50.930	1.95	52.70	-0.51	-3.36	±5	Mar. 31, 2014
2600	Body	22.9	2.201	52.823	2.16	52.50	1.90	0.62	±5	Mar. 11, 2014
5200	Body	22.6	5.373	48.526	5.30	49.00	1.38	-0.97	±5	Mar. 30, 2014
5800	Body	22.6	6.219	47.128	6.00	48.20	3.65	-2.22	±5	Mar. 30, 2014

Table 6.2 Measuring Results for Simulating Liquid

7. System Verification Procedures

Each DASY system is equipped with one or more system validation kits. These units, together with the predefined measurement procedures within the DASY software, enable the user to conduct the system performance check and system validation. System validation kit includes a dipole, tripod holder to fix it underneath the flat phantom and a corresponding distance holder.

7.1 Purpose of System Performance check

The system performance check verifies that the system operates within its specifications. System and operator errors can be detected and corrected. It is recommended that the system performance check be performed prior to any usage of the system in order to guarantee reproducible results. The system performance check uses normal SAR measurements in a simplified setup with a well characterized source. This setup was selected to give a high sensitivity to all parameters that might fail or vary over time. The system check does not intend to replace the calibration of the components, but indicates situations where the system uncertainty is exceeded due to drift or failure.

7.2 System Setup

In the simplified setup for system evaluation, the EUT is replaced by a calibrated dipole and the power source is replaced by a continuous wave that comes from a signal generator. The calibrated dipole must be placed beneath the flat phantom section of the SAM twin phantom with the correct distance holder. The distance holder should touch the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom. The equipment setup is shown below:

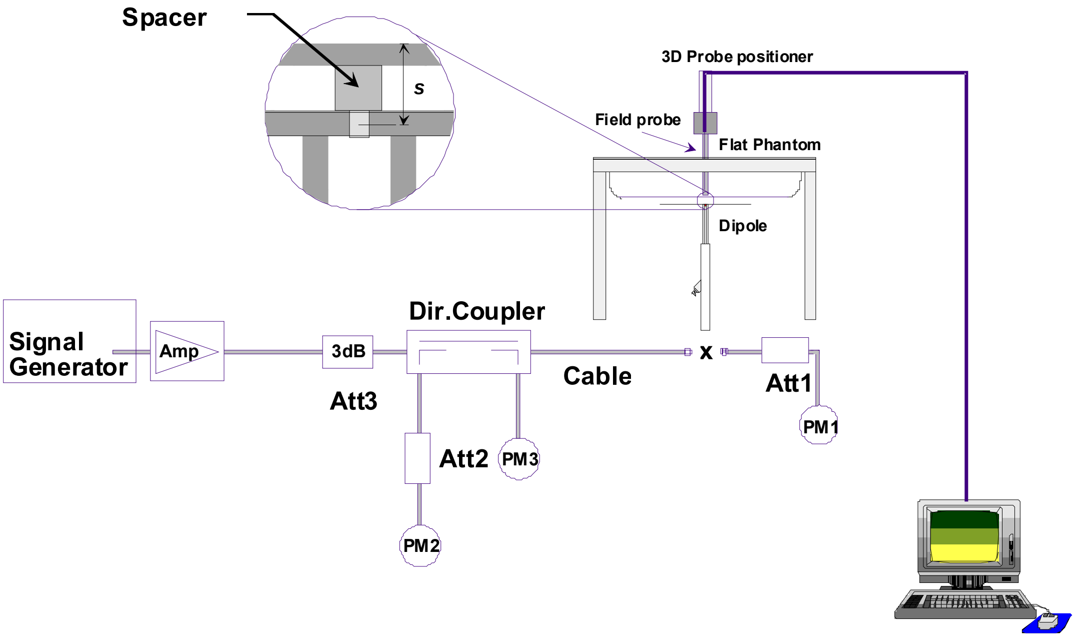


Fig 7.1 System Setup for System Evaluation

1. Signal Generator
2. Amplifier
3. Directional Coupler
4. Power Meter
5. Calibrated Dipole

Fig 7.2 Photo of Dipole Setup

7.3 SAR System Verification Results

Comparing to the original SAR value provided by SPEAG, the verification data should be within its specification of 10 %. Table 7.1 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 (%)
Mar. 05, 2014	835	Body	250	4d151	3911	1358	2.32	9.43	9.28	-1.59
Mar. 11, 2014	835	Body	250	4d091	3857	1210	2.24	9.42	8.96	-4.88
Mar. 04, 2014	1900	Body	250	5d170	3911	1358	10.60	41.20	42.4	2.91
Mar. 31, 2014	2450	Body	250	736	3857	1210	12.70	51.30	50.8	-0.97
Mar. 11, 2014	2600	Body	250	1061	3857	1210	13.50	55.60	54	-2.88
Mar. 30, 2014	5200	Body	100	1128	3857	1210	7.39	73.40	73.9	0.68
Mar. 30, 2014	5800	Body	100	1128	3857	1210	7.25	72.20	72.5	0.42

Table 7.1 Target and Measurement SAR after Normalized

8. EUT Testing Position

8.1 Body Position

(a) To position the device parallel to the phantom surface with all sides and either keypad up or down.
(b) To adjust the device parallel to the flat phantom.
(c) To adjust the distance between the device and the flat phantom to 1 cm.

<EUT Setup Photos>

Please refer to Appendix D for the test setup photos.

9. 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

9.1 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

9.2 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.

9.3 Area & Zoom Scan Procedures

First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR-distribution over 10 g. Area scan and zoom scan resolution setting follows KDB 865664 D01v01r03 quoted below.

When the 1-g SAR of the highest peak is within 2 dB of the SAR limit, additional zoom scans are required for other peaks within 2 dB of the highest peak that have not been included in any zoom scan to ensure there is no increase in SAR.

<table>
<tr><td colspan="3"></td><td>$\leq$ 3 GHz</td><td>> 3 GHz</td></tr>
<tr><td colspan="3">Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface</td><td>5 ± 1 mm</td><td>½·δ·ln(2) ± 0.5 mm</td></tr>
<tr><td colspan="3">Maximum probe angle from probe axis to phantom surface normal at the measurement location</td><td>30° ± 1°</td><td>20° ± 1°</td></tr>
<tr><td colspan="3" rowspan="2">Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}</td><td>$\leq$ 2 GHz: $\leq$ 15 mm
2 – 3 GHz: $\leq$ 12 mm</td><td>3 – 4 GHz: $\leq$ 12 mm
4 – 6 GHz: $\leq$ 10 mm</td></tr>
<tr><td colspan="2">When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be $\leq$ the corresponding x or y dimension of the test device with at least one measurement point on the test device.</td></tr>
<tr><td colspan="3">Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}</td><td>$\leq$ 2 GHz: $\leq$ 8 mm
2 – 3 GHz: $\leq$ 5 mm*</td><td>3 – 4 GHz: $\leq$ 5 mm*
4 – 6 GHz: $\leq$ 4 mm*</td></tr>
<tr><td rowspan="3">Maximum zoom scan spatial resolution, normal to phantom surface</td><td colspan="2">uniform grid: $\Delta z_{Zoom}(n)$</td><td>$\leq$ 5 mm</td><td>3 – 4 GHz: $\leq$ 4 mm
4 – 5 GHz: $\leq$ 3 mm
5 – 6 GHz: $\leq$ 2 mm</td></tr>
<tr><td rowspan="2">graded grid</td><td>$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface</td><td>$\leq$ 4 mm</td><td>3 – 4 GHz: $\leq$ 3 mm
4 – 5 GHz: $\leq$ 2.5 mm
5 – 6 GHz: $\leq$ 2 mm</td></tr>
<tr><td>$\Delta z_{Zoom}(n>1)$: between subsequent points</td><td colspan="2">$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$</td></tr>
<tr><td>Minimum zoom scan volume</td><td colspan="2">x, y, z</td><td>$\geq$ 30 mm</td><td>3 – 4 GHz: $\geq$ 28 mm
4 – 5 GHz: $\geq$ 25 mm
5 – 6 GHz: $\geq$ 22 mm</td></tr>
<tr><td colspan="5">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 $\leq$ 1.4 W/kg, $\leq$ 8 mm, $\leq$ 7 mm and $\leq$ 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.</td></tr>
</table>

9.4 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.

9.5 SAR Averaged Methods

In DASY, the interpolation and extrapolation are both based on the modified Quadratic Shepard’s method. The interpolation scheme combines a least-square fitted function method and a weighted average method which are the two basic types of computational interpolation and approximation.

Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. The uncertainty increases with the extrapolation distance. To keep the uncertainty within 1% for the 1 g and 10 g cubes, the extrapolation distance should not be larger than 5 mm.

9.6 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.

10. Conducted RF Output Power (Unit: dBm)

<CDMA2000 Conducted Power>

General Note:
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 less than 1/4dB higher than Re v0, SAR tests with those settings are not necessary.

Band	CDMA2000 BC10			CDMA2000 BC0			CDMA2000 BC1		
Channel	476	580	684	1013	384	777	25	600	1175
Frequency (MHz)	817.9	820.5	823.1	824.70	836.52	848.31	1851.25	1880.00	1908.75
1xRTT RC1 SO55	23.68	23.65	23.82	23.84	23.62	23.46	23.51	23.58	23.60
1xRTT RC3 SO55	23.79	23.77	**23.85**	**23.89**	23.64	23.48	23.56	23.59	**23.65**
1xRTT RC3 SO32(+ F-SCH)	23.74	23.68	23.82	23.87	23.57	23.46	23.54	23.58	23.60
1xRTT RC3 SO32(+SCH)	23.71	23.65	23.80	23.84	23.61	23.44	23.44	23.49	23.58
1xEVDO RTAP 153.6Kbps	23.73	23.68	23.83	23.85	23.68	23.53	23.53	23.60	23.61
1xEVDO RETAP 4096Bits	23.71	23.66	23.84	23.72	23.54	23.37	23.52	23.57	23.59

<FDD 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, when reported SAR of 1RB and 50%RB allocation for QPSK >0.8W/kg for any exposure position, SAR testing of 100%RB allocation for QPSK is performed at the highest power channel. And if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
6. 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. 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 25 Average Power (dBm)							
BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Target MPR (dB)
Channel				26140	26340	26590	
Frequency (MHz)				1860	1880	1905	
20	QPSK	1	0	23.43	23.47	23.49	0
20	QPSK	1	49	23.32	23.33	23.46	
20	QPSK	1	99	23.33	23.32	23.44	
20	QPSK	50	0	22.13	22.37	22.39	1
20	QPSK	50	24	21.99	22.33	22.28	
20	QPSK	50	49	22.05	22.27	22.36	
20	QPSK	100	0	22.16	22.38	22.34	
20	16QAM	1	0	22.70	22.82	22.85	1
20	16QAM	1	49	22.51	22.72	22.80	
20	16QAM	1	99	22.49	22.78	22.77	
20	16QAM	50	0	21.14	21.55	21.47	2
20	16QAM	50	24	21.09	21.53	21.34	
20	16QAM	50	49	21.09	21.44	21.48	
20	16QAM	100	0	21.19	21.49	21.47	
Channel				26115	26340	26615	Target MPR (dB)
Frequency (MHz)				1857.5	1880	1907.5	
15	QPSK	1	0	23.40	23.45	23.39	0
15	QPSK	1	37	23.31	23.35	23.31	
15	QPSK	1	74	23.30	23.38	23.29	
15	QPSK	36	0	22.17	22.31	22.29	1
15	QPSK	36	18	22.15	22.35	22.23	
15	QPSK	36	37	22.05	22.37	22.45	
15	QPSK	75	0	22.06	22.27	22.19	
15	16QAM	1	0	22.32	22.45	22.49	1
15	16QAM	1	37	22.15	22.41	22.41	
15	16QAM	1	74	22.24	22.39	22.45	
15	16QAM	36	0	21.09	21.36	21.45	2
15	16QAM	36	18	21.19	21.31	21.37	
15	16QAM	36	37	21.10	21.41	21.55	
15	16QAM	75	0	21.15	21.40	21.43	
Channel				26090	26340	26640	Target MPR (dB)
Frequency (MHz)				1855	1880	1910	
10	QPSK	1	0	23.27	23.45	23.46	0
10	QPSK	1	24	22.98	23.37	23.40	
10	QPSK	1	49	23.15	23.42	23.43	
10	QPSK	25	0	22.15	22.41	22.36	1
10	QPSK	25	12	22.14	22.30	22.48	
10	QPSK	25	24	22.19	22.43	22.51	
10	QPSK	50	0	22.07	22.25	22.36	
10	16QAM	1	0	22.32	22.07	22.29	1
10	16QAM	1	24	21.84	22.18	22.27	
10	16QAM	1	49	21.92	22.03	22.19	
10	16QAM	25	0	21.19	21.39	21.37	2
10	16QAM	25	12	21.14	21.29	21.49	
10	16QAM	25	24	21.13	21.44	21.52	
10	16QAM	50	0	21.06	21.29	21.22	

LTE Band 25 Average Power (dBm)							
BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Target MPR (dB)
Channel				26065	26340	26665	
Frequency (MHz)				1852.5	1880	1912.5	
5	QPSK	1	0	23.30	23.40	23.42	0
5	QPSK	1	12	23.10	23.36	23.38	
5	QPSK	1	24	23.18	23.38	23.23	
5	QPSK	12	0	22.36	22.41	22.47	1
5	QPSK	12	6	22.21	22.41	22.60	
5	QPSK	12	11	22.23	22.39	22.38	
5	QPSK	25	0	22.13	22.36	22.39	
5	16QAM	1	0	21.98	22.17	22.25	1
5	16QAM	1	12	21.82	22.11	22.19	
5	16QAM	1	24	21.88	22.02	22.06	
5	16QAM	12	0	21.35	21.56	21.46	2
5	16QAM	12	6	21.32	21.48	21.59	
5	16QAM	12	11	21.34	21.55	21.47	
5	16QAM	25	0	21.08	21.26	21.31	
Channel				26055	26340	26675	Target MPR (dB)
Frequency (MHz)				1851.5	1880	1913.5	
3	QPSK	1	0	23.33	23.44	23.39	0
3	QPSK	1	7	23.18	23.28	23.26	
3	QPSK	1	14	23.15	23.37	23.12	
3	QPSK	8	0	22.23	22.50	22.44	1
3	QPSK	8	4	22.24	22.43	22.43	
3	QPSK	8	7	22.22	22.37	22.24	
3	QPSK	15	0	22.21	22.32	22.42	
3	16QAM	1	0	22.31	22.45	22.42	1
3	16QAM	1	7	22.29	22.40	22.36	
3	16QAM	1	14	22.19	22.35	22.28	
3	16QAM	8	0	21.08	21.35	21.40	2
3	16QAM	8	4	21.04	21.26	21.31	
3	16QAM	8	7	21.09	21.22	21.14	
3	16QAM	15	0	21.34	21.37	21.48	
Channel				26047	26340	26683	Target MPR (dB)
Frequency (MHz)				1850.7	1880	1914.3	
1.4	QPSK	1	0	23.35	23.45	23.36	0
1.4	QPSK	1	2	23.28	23.40	23.27	
1.4	QPSK	1	5	23.21	23.37	23.35	
1.4	QPSK	3	0	23.34	23.40	23.26	
1.4	QPSK	3	1	23.34	23.41	23.30	
1.4	QPSK	3	2	23.32	23.42	23.33	
1.4	QPSK	6	0	22.31	22.38	22.42	1
1.4	16QAM	1	0	22.45	22.33	22.35	1
1.4	16QAM	1	2	22.44	22.25	22.26	
1.4	16QAM	1	5	22.26	22.27	22.21	
1.4	16QAM	3	0	22.40	22.17	22.33	
1.4	16QAM	3	1	22.35	22.29	22.27	
1.4	16QAM	3	2	22.32	22.19	22.24	
1.4	16QAM	6	0	21.25	21.45	21.48	2

LTE Band 26 Average Power (dBm)							
BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Target MPR (dB)
Channel				26765	26865	26965	
Frequency (MHz)				821.5	831.5	841.5	
15	QPSK	1	0	23.21	23.38	22.93	0
15	QPSK	1	37	22.93	23.01	22.84	
15	QPSK	1	74	23.18	23.10	22.73	
15	QPSK	36	0	21.88	21.97	21.81	1
15	QPSK	36	18	21.81	21.91	21.82	
15	QPSK	36	37	21.88	21.96	21.60	
15	QPSK	75	0	21.77	21.88	21.75	
15	16QAM	1	0	21.97	22.43	22.16	1
15	16QAM	1	37	21.96	22.24	21.78	
15	16QAM	1	74	21.88	21.95	21.66	
15	16QAM	36	0	20.78	20.96	20.95	2
15	16QAM	36	18	20.90	20.93	20.78	
15	16QAM	36	37	20.76	20.94	20.67	
15	16QAM	75	0	20.69	20.89	20.59	
Channel				26740	26865	26990	Target MPR (dB)
Frequency (MHz)				819	831.5	844	
10	QPSK	1	0	23.12	22.93	22.90	0
10	QPSK	1	24	23.02	22.91	22.79	
10	QPSK	1	49	23.08	22.88	22.78	
10	QPSK	25	0	21.94	21.88	21.70	1
10	QPSK	25	12	21.89	21.82	21.73	
10	QPSK	25	24	21.89	21.88	21.59	
10	QPSK	50	0	21.76	21.65	21.56	
10	16QAM	1	0	22.37	21.88	22.11	1
10	16QAM	1	24	22.19	21.74	21.73	
10	16QAM	1	49	22.21	21.75	21.71	
10	16QAM	25	0	21.03	20.71	20.66	2
10	16QAM	25	12	20.72	20.72	20.66	
10	16QAM	25	24	20.96	20.77	20.64	
10	16QAM	50	0	20.67	20.72	20.49	
Channel				26715	26865	27015	Target MPR (dB)
Frequency (MHz)				816.5	831.5	846.5	
5	QPSK	1	0	23.22	22.94	22.80	0
5	QPSK	1	12	22.83	22.90	22.64	
5	QPSK	1	24	22.93	22.93	22.53	
5	QPSK	12	0	22.20	21.91	21.77	1
5	QPSK	12	6	21.93	21.97	21.83	
5	QPSK	12	11	22.04	21.74	21.79	
5	QPSK	25	0	22.08	21.80	21.61	
5	16QAM	1	0	22.39	21.93	21.92	1
5	16QAM	1	12	21.86	21.59	21.90	
5	16QAM	1	24	22.07	21.65	21.72	
5	16QAM	12	0	21.18	20.94	20.77	2
5	16QAM	12	6	21.08	20.97	20.86	
5	16QAM	12	11	21.10	20.86	20.84	
5	16QAM	25	0	20.93	20.79	20.72	

LTE Band 26 Average Power (dBm)							
BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Target MPR (dB)
Channel				26705	26865	27025	
Frequency (MHz)				815.5	831.5	847.5	
3	QPSK	1	0	23.25	22.96	22.86	0
3	QPSK	1	7	22.70	22.89	22.68	
3	QPSK	1	14	22.98	22.92	22.65	
3	QPSK	8	0	22.19	21.90	21.71	1
3	QPSK	8	4	21.86	21.93	21.71	
3	QPSK	8	7	22.00	21.73	21.60	
3	QPSK	15	0	22.05	21.91	21.59	
3	16QAM	1	0	22.32	21.98	21.82	1
3	16QAM	1	7	22.11	21.91	21.63	
3	16QAM	1	14	22.05	21.76	21.65	
3	16QAM	8	0	21.06	20.82	20.60	2
3	16QAM	8	4	20.72	20.70	20.63	
3	16QAM	8	7	20.84	20.96	20.60	
3	16QAM	15	0	20.89	20.83	20.77	
Channel				26697	26865	27033	Target MPR (dB)
Frequency (MHz)				814.7	831.5	848.3	
1.4	QPSK	1	0	23.34	22.95	22.85	0
1.4	QPSK	1	2	23.25	22.87	22.78	
1.4	QPSK	1	5	23.09	22.88	22.65	
1.4	QPSK	3	0	23.12	22.75	22.62	
1.4	QPSK	3	1	23.23	22.90	22.76	
1.4	QPSK	3	2	23.13	22.81	22.66	
1.4	QPSK	6	0	22.22	21.96	21.73	1
1.4	16QAM	1	0	22.31	22.13	21.99	1
1.4	16QAM	1	2	22.23	22.02	21.96	
1.4	16QAM	1	5	22.07	21.78	21.98	
1.4	16QAM	3	0	22.28	22.01	21.79	
1.4	16QAM	3	1	22.26	22.06	21.78	
1.4	16QAM	3	2	22.16	21.84	21.73	
1.4	16QAM	6	0	21.25	20.87	20.79	2

TDD LTE configuration setup for SAR measurement

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

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

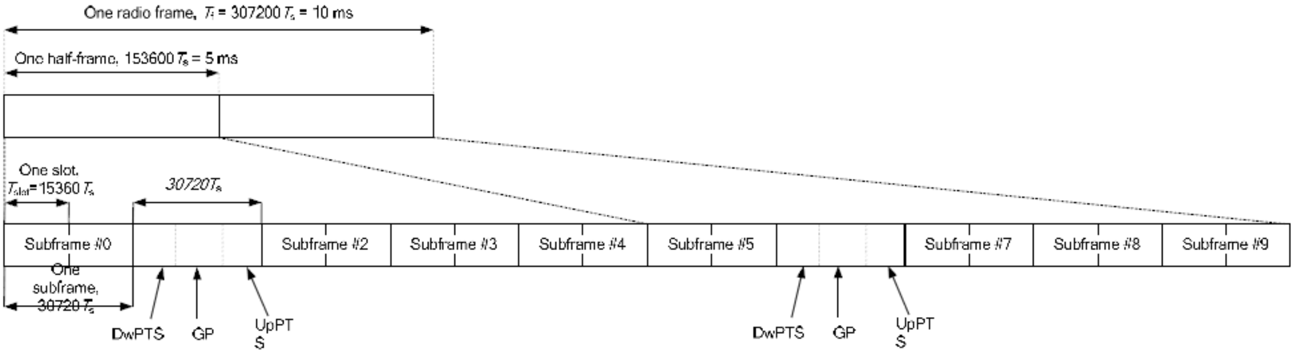


Figure 4.2-1: Frame structure type 2 (for 5 ms switch-point periodicity)

Table 4.2-2: Uplink-downlink configurations.

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

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

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

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

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

The highest duty factor is resulted from:

i. uplink-downlink configuration: 0. In a half-frame consisted of 5 subfames, uplink operation is in 3 uplink subframes and 1 special subframe.

ii. special subframe configuration: 5-9 for normal cyclic prefix in downlink, 4-7 for extended cyclic prefix in downlink

iii. for special subframe with extended cyclic prefix in uplink, the total uplink duty factor in one half-frame is:

(3+0.167)/5 = 63.3%

iv. for special subframe with normal cyclic prefix in uplink, the total uplink duty factor in one half-frame is:

(3+0.143)/5 = 62.9%

v. Considering the theoretical duty cycle of 63.3% for extended cyclic prefix in the uplink, and the theoretical duty cycle of 62.9% for normal cyclic prefix in uplink, a scaling factor of extended cyclic prefix 63.3%/62.9% = 1.01 is applied to scale-up the measured SAR result. The scaled TDD LTE SAR = (measured SAR) * (scaling factor for extended cyclic prefix).

LTE Band 41 Average Power (dBm)									
BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Low Middle Ch. / Freq.	Power Middle Ch. / Freq.	Power Middle High Ch. / Freq.	Power High Ch. / Freq.	Target MPR (dB)
Channel				39750	40185	40620	41055	41490	
Frequency (MHz)				2506	2549.5	2593	2636.5	2680	
20	QPSK	1	0	23.44	23.58	23.81	23.40	23.40	0
20	QPSK	1	49	23.42	23.54	23.54	23.29	23.15	
20	QPSK	1	99	23.42	23.49	23.52	23.38	23.05	
20	QPSK	50	0	22.09	22.10	22.52	22.18	22.11	1
20	QPSK	50	24	22.27	22.12	22.48	22.21	22.09	
20	QPSK	50	49	22.14	22.12	22.50	22.15	22.06	
20	QPSK	100	0	22.18	22.15	22.45	22.13	22.02	
20	16QAM	1	0	22.56	22.71	22.89	22.51	22.45	1
20	16QAM	1	49	22.47	22.62	22.76	22.32	22.43	
20	16QAM	1	99	22.52	22.70	22.88	22.50	22.40	
20	16QAM	50	0	21.34	21.23	21.22	20.95	21.17	2
20	16QAM	50	24	21.24	21.19	21.40	20.96	21.12	
20	16QAM	50	49	21.22	21.09	21.31	21.06	20.97	
20	16QAM	100	0	21.19	21.11	21.45	21.09	21.05	
Channel				39725	40173	40620	41068	41515	Target MPR (dB)
Frequency (MHz)				2503.5	2548.3	2593	2637.8	2682.5	
15	QPSK	1	0	23.55	23.32	23.07	23.44	23.25	0
15	QPSK	1	37	23.42	23.17	23.02	23.38	23.22	
15	QPSK	1	74	23.45	23.31	23.05	23.43	23.09	
15	QPSK	36	0	22.35	22.07	22.08	22.15	22.19	1
15	QPSK	36	18	22.40	22.11	21.96	22.12	22.16	
15	QPSK	36	37	22.36	22.21	21.89	22.22	22.01	
15	QPSK	75	0	22.22	22.03	21.82	22.14	21.98	
15	16QAM	1	0	22.78	22.42	22.31	22.34	22.40	1
15	16QAM	1	37	22.63	22.29	22.29	22.30	22.37	
15	16QAM	1	74	22.62	22.27	22.19	22.19	22.25	
15	16QAM	36	0	21.29	21.14	21.05	21.03	21.20	2
15	16QAM	36	18	21.25	21.08	20.94	20.91	21.13	
15	16QAM	36	37	21.32	21.20	20.88	21.13	20.98	
15	16QAM	75	0	21.47	21.15	21.14	21.08	21.11	

Note:
TDD LTE Band41 has 5 required test channels was according to KDB 447498 D01v05r02.

LTE Band 41 Average Power (dBm)									
BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Low Middle Ch. / Freq.	Power Middle Ch. / Freq.	Power Middle High Ch. / Freq.	Power High Ch. / Freq.	Target MPR (dB)
Channel				39700	40160	40620	41080	41540	
Frequency (MHz)				2501	2547	2593	2639	2685	
10	QPSK	1	0	23.68	23.34	23.50	23.38	23.40	0
10	QPSK	1	24	23.50	23.29	23.48	23.36	23.15	
10	QPSK	1	49	23.66	23.26	23.47	23.37	23.18	
10	QPSK	25	0	22.51	22.18	22.32	22.24	22.27	1
10	QPSK	25	12	22.62	22.18	22.20	22.36	22.14	
10	QPSK	25	24	22.60	22.16	22.30	22.28	22.13	
10	QPSK	50	0	22.41	22.10	21.96	22.23	21.95	
10	16QAM	1	0	22.88	22.35	22.86	22.45	22.78	1
10	16QAM	1	24	22.46	22.27	22.67	22.36	22.60	
10	16QAM	1	49	22.70	22.24	22.61	22.34	22.36	
10	16QAM	25	0	21.33	21.11	21.28	21.07	21.18	2
10	16QAM	25	12	21.43	21.12	21.13	21.19	21.07	
10	16QAM	25	24	21.41	21.10	21.07	21.05	20.93	
10	16QAM	50	0	21.43	21.04	21.34	21.10	21.10	
Channel				39675	40148	40620	41093	41565	Target MPR (dB)
Frequency (MHz)				2498.5	2545.8	2593	2640.3	2687.5	
5	QPSK	1	0	23.61	23.34	23.22	23.33	23.14	0
5	QPSK	1	12	23.59	23.26	23.09	23.32	23.13	
5	QPSK	1	24	23.52	23.28	23.20	23.32	23.08	
5	QPSK	12	0	22.60	22.25	22.35	22.35	22.15	1
5	QPSK	12	6	22.59	22.29	22.17	22.37	22.12	
5	QPSK	12	11	22.61	22.31	22.41	22.43	22.13	
5	QPSK	25	0	22.48	22.27	22.03	22.32	22.03	
5	16QAM	1	0	22.87	22.30	22.62	22.43	22.43	1
5	16QAM	1	12	22.82	22.26	22.59	22.41	22.37	
5	16QAM	1	24	22.86	22.25	22.55	22.42	22.39	
5	16QAM	12	0	21.91	21.29	21.57	21.23	21.62	2
5	16QAM	12	6	21.84	21.33	21.54	21.32	21.53	
5	16QAM	12	11	21.87	21.36	21.53	21.31	21.49	
5	16QAM	25	0	21.40	21.21	21.01	21.20	20.95	

Note:
TDD LTE Band41 has 5 required test channels was according to KDB 447498 D01v05r02.

Transmission Configuration	Antenna 0	Antenna 1	Antenna 0+1
802.11 b	Yes	Yes	
802.11 g	Yes	Yes	
802.11 a	Yes	Yes	
802.11 n	Yes	Yes	Yes

<WLAN 2.4GHz SISO mode Conducted Power>

<Antenna 0>

WLAN 2.4GHz 802.11b Average Power (dBm)						
Power vs. Channel			Power vs. Data Rate			
Channel	Frequency (MHz)	Data Rate 5.5M bps	Channel	1M bps	2M bps	11M bps
CH 01	2412	14.68	CH 06	15.32	15.20	15.18
CH 06	2437	**15.46**				
CH 11	2462	14.99				

WLAN 2.4GHz 802.11g Average Power (dBm)										
Power vs. Channel			Power vs. Data Rate							
Channel	Frequency (MHz)	Data Rate 6Mbps	Channel	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
CH 01	2412	9.73	CH 06	10.25	10.29	10.31	10.29	10.23	10.26	10.26
CH 06	2437	**10.39**								
CH 11	2462	10.06								

WLAN 2.4GHz 802.11n HT20 Average Power (dBm)										
Power vs. Channel			Power vs. Data Rate							
Channel	Frequency (MHz)	Data Rate MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 01	2412	8.94	CH 06	9.56	9.59	9.49	9.42	9.67	9.70	9.59
CH 06	2437	**9.72**								
CH 11	2462	9.37								

WLAN 2.4GHz 802.11n HT40 Average Power (dBm)										
Power vs. Channel			Power vs. Data Rate							
Channel	Frequency (MHz)	Data Rate MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 03	2422	8.98	CH 06	9.11	9.26	9.11	9.08	9.18	9.01	9.15
CH 06	2437	**9.28**								
CH 09	2452	8.98								

Note:

1. Per KDB 248227 D01 v01r02, choose the highest output power channel to test SAR and determine further SAR exclusion.
2. For each frequency band, testing at higher data rates and higher order modulations is not required when the maximum average output power for each of these configurations is less than 1/4dB higher than those measured at the lowest data rate.
3. Per KDB 248227 D01 v01r02, 802.11g/n HT20/HT40 output power is less than 1/4dB higher than 11b mode, thus the SAR can be excluded.

<Antenna 1>

WLAN 2.4GHz 802.11b Average Power (dBm)						
Power vs. Channel			Power vs. Data Rate			
Channel	Frequency (MHz)	Data Rate 5.5M bps	Channel	1M bps	2M bps	11M bps
CH 01	2412	15.07	CH 06	15.48	15.57	15.18
CH 06	2437	**15.78**				
CH 11	2462	15.23				

WLAN 2.4GHz 802.11g Average Power (dBm)										
Power vs. Channel			Power vs. Data Rate							
Channel	Frequency (MHz)	Data Rate 6Mbps	Channel	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
CH 01	2412	9.47	CH 11	9.51	9.53	9.31	9.31	9.24	9.41	9.52
CH 06	2437	8.92								
CH 11	2462	**9.61**								

WLAN 2.4GHz 802.11n HT20 Average Power (dBm)										
Power vs. Channel			Power vs. Data Rate							
Channel	Frequency (MHz)	Data Rate MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 01	2412	7.45	CH 06	8.12	8.17	7.91	8.06	8.13	8.08	8.08
CH 06	2437	**8.22**								
CH 11	2462	7.28								

WLAN 2.4GHz 802.11n HT40 Average Power (dBm)										
Power vs. Channel			Power vs. Data Rate							
Channel	Frequency (MHz)	Data Rate MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 03	2422	7.55	CH 06	7.74	7.83	7.55	7.91	7.92	7.82	7.89
CH 06	2437	**7.94**								
CH 09	2452	7.65								

Note:

1. Per KDB 248227 D01 v01r02, choose the highest output power channel to test SAR and determine further SAR exclusion.
2. For each frequency band, testing at higher data rates and higher order modulations is not required when the maximum average output power for each of these configurations is less than 1/4dB higher than those measured at the lowest data rate.
3. Per KDB 248227 D01 v01r02, 802.11g/n HT20/HT40 output power is less than 1/4dB higher than 11b mode, thus the SAR can be excluded.

<Antenna 0+1>

WLAN 2.4GHz 802.11n HT20 Average Power (dBm)										
Power vs. Channel			Power vs. Data Rate							
Channel	Frequency (MHz)	Data Rate MCS8	Channel	MCS9	MCS10	MCS11	MCS12	MCS13	MCS14	MCS15
CH 01	2412	11.28	CH 06	11.86	11.76	11.71	11.96	11.96	11.93	11.90
CH 06	2437	**12.05**								
CH 11	2462	11.45								

WLAN 2.4GHz 802.11n HT40 Average Power (dBm)										
Power vs. Channel			Power vs. Data Rate							
Channel	Frequency (MHz)	Data Rate MCS8	Channel	MCS9	MCS10	MCS11	MCS12	MCS13	MCS14	MCS15
CH 03	2422	11.54	CH 06	11.42	11.42	11.25	11.47	11.56	11.60	11.56
CH 06	2437	**11.81**								
CH 09	2452	11.60								

Note:

1. Per KDB 248227 D01 v01r02, choose the highest output power channel to test SAR and determine further SAR exclusion.
2. For each frequency band, testing at higher data rates and higher order modulations is not required when the maximum average output power for each of these configurations is less than 1/4dB higher than those measured at the lowest data rate.
3. Per KDB 248227 D01 v01r02, 802.11HT40 output power is less than 1/4dB higher than 802.11HT20 mode, thus the SAR can be excluded.

<WLAN 5GHz SISO mode Conducted Power>

<Antenna 0>

WLAN 5GHz 802.11a Average Power (dBm)										
Power vs. Channel			Power vs. Data Rate							
Channel	Frequency (MHz)	Data Rate 6Mbps	Channel	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
CH 36	5180	8.99	CH 48	9.16	9.18	9.08	9.14	8.95	9.18	9.10
CH 40	5200	9.00								
CH 44	5220	9.01								
CH 48	5240	**9.20**								
CH 149	5745	13.11	CH 157	13.19	13.46	13.26	13.30	13.44	13.28	13.36
CH 153	5765	13.24								
CH 157	5785	**13.52**								
CH 161	5805	13.28								
CH 165	5825	13.14								

WLAN 5GHz 802.11n-HT20 Average Power (dBm)										
Power vs. Channel			Power vs. Data Rate							
Channel	Frequency (MHz)	Data Rate MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 36	5180	7.52	CH 48	7.67	7.77	7.25	7.70	7.77	7.66	7.56
CH 40	5200	7.46								
CH 44	5220	7.62								
CH 48	5240	**7.82**								
CH 149	5745	12.60	CH 157	12.76	12.79	12.66	12.84	12.68	12.75	12.80
CH 153	5765	12.64								
CH 157	5785	**12.91**								
CH 161	5805	12.54								
CH 165	5825	12.49								

WLAN 5GHz 802.11n-HT40 Average Power (dBm)										
Power vs. Channel			Power vs. Data Rate							
Channel	Frequency (MHz)	Data Rate MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 38	5190	7.75	CH 46	7.79	7.93	7.78	7.96	7.90	7.95	7.99
CH 46	5230	**8.00**								
CH 151	5755	13.14	CH 159	13.24	13.41	13.40	13.46	13.52	13.52	13.51
CH 159	5795	**13.54**								

Note:

1. Per KDB 248227 D01 v01r02, choose the highest output power channel to test SAR and determine further SAR exclusion.
2. For each frequency band, testing at higher data rates and higher order modulations is not required when the maximum average output power for each of these configurations is less than 1/4dB higher than those measured at the lowest data rate.
3. Per KDB 248227 D01 v01r02, 802.11n HT20/HT40 output power is less than 1/4dB higher than 11a mode, thus the SAR can be excluded.

<Antenna 1>

WLAN 5GHz 802.11a Average Power (dBm)										
Power vs. Channel			Power vs. Data Rate							
Channel	Frequency (MHz)	Data Rate 6Mbps	Channel	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
CH 36	5180	7.97	CH 48	8.38	8.27	8.44	8.41	8.25	8.39	8.36
CH 40	5200	8.03								
CH 44	5220	8.24								
CH 48	5240	**8.47**								
CH 149	5745	11.03	CH 165	11.09	11.09	11.00	11.08	10.98	11.08	11.06
CH 153	5765	10.89								
CH 157	5785	11.11								
CH 161	5805	11.14								
CH 165	5825	**11.21**								

WLAN 5GHz 802.11n-HT20 Average Power (dBm)										
Power vs. Channel			Power vs. Data Rate							
Channel	Frequency (MHz)	Data Rate MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 36	5180	8.14	CH 48	8.19	8.22	8.20	8.37	8.35	8.37	8.44
CH 40	5200	8.09								
CH 44	5220	8.30								
CH 48	5240	**8.52**								
CH 149	5745	9.59	CH 165	10.04	10.15	9.80	10.05	10.20	10.18	10.21
CH 153	5765	9.44								
CH 157	5785	9.99								
CH 161	5805	10.14								
CH 165	5825	**10.24**								

WLAN 5GHz 802.11n-HT40 Average Power (dBm)										
Power vs. Channel			Power vs. Data Rate							
Channel	Frequency (MHz)	Data Rate MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 38	5190	7.98	CH 46	7.84	8.06	7.84	8.06	8.15	8.11	8.24
CH 46	5230	**8.36**								
CH 151	5755	9.90	CH 159	10.14	10.21	10.12	10.24	10.32	10.29	10.32
CH 159	5795	**10.35**								

Note:

1. Per KDB 248227 D01 v01r02, choose the highest output power channel to test SAR and determine further SAR exclusion.
2. For each frequency band, testing at higher data rates and higher order modulations is not required when the maximum average output power for each of these configurations is less than 1/4dB higher than those measured at the lowest data rate.
3. Per KDB 248227 D01 v01r02, 802.11n HT20/HT40 output power is less than 1/4dB higher than 11a mode, thus the SAR can be excluded.

<Antenna 0+1>

WLAN 5GHz 802.11n-HT20 Average Power (dBm)										
Power vs. Channel			Power vs. Data Rate							
Channel	Frequency (MHz)	Data Rate MCS8	Channel	MCS9	MCS10	MCS11	MCS12	MCS13	MCS14	MCS15
CH 36	5180	10.35	CH 48	11.22	11.27	11.11	11.19	11.22	11.33	11.36
CH 40	5200	10.98								
CH 44	5220	11.24								
CH 48	5240	**11.46**								
CH 149	5745	14.76	CH 157	14.87	14.87	14.84	14.99	14.91	14.83	14.78
CH 153	5765	14.93								
CH 157	5785	**15.08**								
CH 161	5805	14.93								
CH 165	5825	14.82								

WLAN 5GHz 802.11n-HT40 Average Power (dBm)										
Power vs. Channel			Power vs. Data Rate							
Channel	Frequency (MHz)	Data Rate MCS8	Channel	MCS9	MCS10	MCS11	MCS12	MCS13	MCS14	MCS15
CH 38	5190	11.06	CH 46	11.05	11.29	11.14	11.33	11.31	11.24	11.18
CH 46	5230	**11.44**								
CH 151	5755	**15.35**	CH 151	15.02	15.08	15.03	15.29	15.21	15.13	15.05
CH 159	5795	14.97								

Note:

1. Per KDB 248227 D01 v01r02, choose the highest output power channel to test SAR and determine further SAR exclusion.
2. For each frequency band, testing at higher data rates and higher order modulations is not required when the maximum average output power for each of these configurations is less than 1/4dB higher than those measured at the lowest data rate.
3. Per KDB 248227 D01 v01r02, 802.11n HT40 average output power is higher than 1/4dB higher than 802.11n HT20 mode, this mode SAR will be verified at the highest RF exposure position found in 802.11n HT20 SAR testing.

<Bluetooth Conducted Power>

Average Power (dBm)		
Mode / Band	v3.0+EDR	BT v4.0-LE
Bluetooth	1.0	2.0

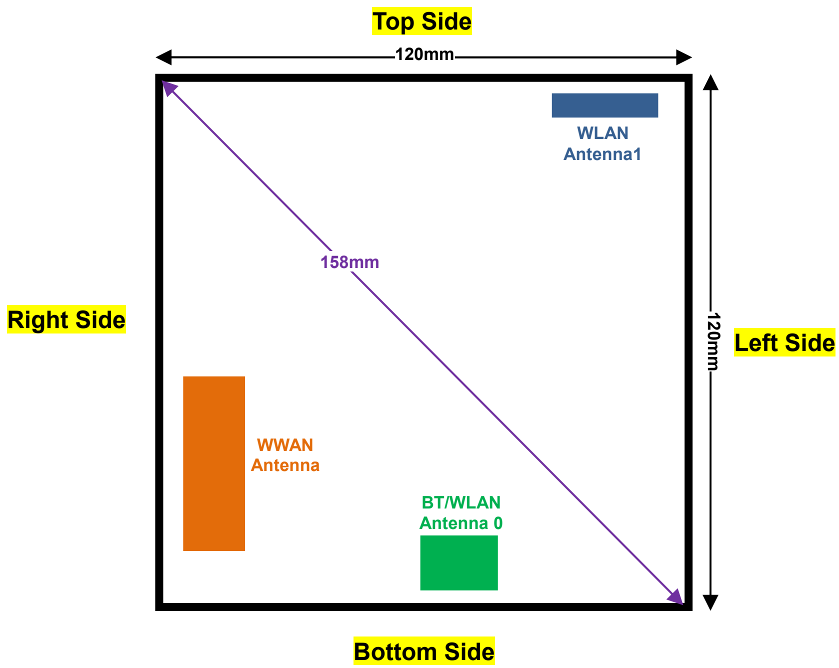
Note:

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*)] ·[$\sqrt{f(GHz)}$] ≤ 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)	mW	Distance (mm)	Frequency (GHz)	Exclusion Thresholds
2	2.00	10	2.48	0.31

2. 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.

11. EUT Antenna Location



<Transmission configuration>

Wireless Interface	SISO Mode		MIMO Mode
	Antenna 0 <Tx/Rx>	Antenna 1 <Tx/Rx>	Antenna 0+1 <Tx/Rx>
BT & WLAN 2.4GHz 802.11b/g	yes	yes	
WLAN 2.4GHz 802.11 HT20/HT40	yes	yes	yes
WLAN 5GHz 802.11a	yes	yes	
WLAN 5GHz 802.11 HT20/HT40	yes	yes	yes

Distance of the Antenna to the EUT surface/edge						
Antennas	Back	Front	Top Side	Bottom Side	Right Side	Left Side
WWAN Antenna	≤ 25mm	≤ 25mm	62mm	≤ 25mm	≤ 25mm	104mm
BT & WLAN Antenna 0	≤ 25mm	≤ 25mm	107mm	≤ 25mm	57mm	49mm
WLAN Antenna 1	≤ 25mm	≤ 25mm	≤ 25mm	115mm	101mm	≤ 25mm
Positions for SAR tests; Hotspot mode						
Antennas	Back	Front	Top Side	Bottom Side	Right Side	Left Side
WWAN Antenna	Yes	Yes	No	Yes	Yes	No
BT & WLAN Antenna 0	Yes	Yes	No	Yes	No	No
WLAN Antenna 1	Yes	Yes	Yes	No	No	Yes

Note:

1. This product has three transmitter antenna paths, WWAN Primary Antenna for CDMA2000 BC0/BC1/10 and LTE Band 25/26/41, Bluetooth & WLAN Antenna 0 for Bluetooth & WLAN, WLAN Antenna 1 for WLAN. Each antenna path can transmit simultaneously.
2. 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.

12. 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 WLAN SAR testing of signal with non-100% duty cycle, the measured SAR is scaled-up by the duty cycle scaling factor which is equal to "1/(duty cycle)".
   c) Duty cycle of TDD was fixed, therefore not require scaled to 100% of duty cycle. For SAR system, the crest factor 1:1.59 (62.9%) was used perform testing. Considering the theoretical duty cycle of 63.3% for extended cyclic prefix in the uplink, and the theoretical duty cycle of 62.9% for normal cyclic prefix in uplink, a scaling factor of extended cyclic prefix 63.3%/62.9% = 1.01 is applied to scale-up the measured SAR result.
   d) For WWAN: Reported SAR (W/kg) = Measured SAR (W/kg)*Tune-up Scaling Factor.
   e) For WLAN: Reported SAR (W/kg) = Measured SAR (W/kg)* Duty Cycle scaling factor * Tune-up scaling factor.
   f) For TDD LTE Band: Reported SAR(W/kg)= Measured SAR(W/kg)* scaling factor for extended cyclic prefix * 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. This device 2.4GHz WLAN supports Hotspot operation, 5.8GHz WLAN supports WiFi Direct (Group Client / Group Owner), and 5.2GHz supports WiFi Direct (Group Client only).
4. 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.
5. Per KDB 941225 D05v02r03, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
6. Per KDB 94122 D05v02r03, when reported SAR of 1RB and 50%RB allocation for QPSK ≤0.8W/kg, and 100%RB with QPSK output power is less than 1RB and 50%RB, 100%RB allocation for QPSK is not required.
7. 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.
8. 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.
9. LTE TDD is tested at the highest duty factor using UL-DL configuration 0 with special subframe configuration 5 and applying the FDD LTE procedures in KDB941225 D05v02r03. SAR testing was performed using the extended cyclic prefix listed in 3GPP TS36.211 Section 4.

12.1 Test Records for Body SAR Test

<CDMA2000 SAR>

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)
	CDMA2000 BC10	RTAP153.6Kbps	Front	1	684	823.1	23.83	25	1.309	0.06	0.649	0.850
#01	CDMA2000 BC10	RTAP153.6Kbps	Front	1	476	817.9	23.73	25	1.340	-0.06	0.697	**0.934**
	CDMA2000 BC10	RTAP153.6Kbps	Front	1	580	820.5	23.68	25	1.355	-0.02	0.590	0.800
	CDMA2000 BC10	RTAP153.6Kbps	Back	1	684	823.1	23.83	25	1.309	-0.03	0.463	0.606
	CDMA2000 BC10	RTAP153.6Kbps	Right side	1	684	823.1	23.83	25	1.309	-0.04	0.439	0.575
	CDMA2000 BC10	RTAP153.6Kbps	Bottom side	1	684	823.1	23.83	25	1.309	-0.07	0.247	0.323
#02	CDMA2000 BC0	RTAP153.6Kbps	Front	1	1013	824.7	23.85	25.2	1.365	-0.03	0.597	**0.815**
	CDMA2000 BC0	RTAP153.6Kbps	Front	1	384	836.52	23.68	25.2	1.419	-0.04	0.547	0.776
	CDMA2000 BC0	RTAP153.6Kbps	Front	1	777	848.31	23.53	25.2	1.469	-0.08	0.456	0.670
	CDMA2000 BC0	RTAP153.6Kbps	Back	1	1013	824.7	23.85	25.2	1.365	0.01	0.476	0.650
	CDMA2000 BC0	RTAP153.6Kbps	Right side	1	1013	824.7	23.85	25.2	1.365	0.01	0.483	0.659
	CDMA2000 BC0	RTAP153.6Kbps	Bottom side	1	1013	824.7	23.85	25.2	1.365	-0.06	0.298	0.407
	CDMA2000 BC1	RTAP153.6Kbps	Front	1	1175	1908.75	23.61	24.7	1.285	0.03	0.754	0.969
	CDMA2000 BC1	RTAP153.6Kbps	Back	1	1175	1908.75	23.61	24.7	1.285	-0.12	0.315	0.405
#03	CDMA2000 BC1	RTAP153.6Kbps	Right side	1	1175	1908.75	23.61	24.7	1.285	-0.06	0.990	**1.272**
	CDMA2000 BC1	RTAP153.6Kbps	Bottom side	1	1175	1908.75	23.61	24.7	1.285	-0.09	0.365	0.469
	CDMA2000 BC1	RTAP153.6Kbps	Front	1	25	1851.25	23.53	24.7	1.309	0.03	0.726	0.950
	CDMA2000 BC1	RTAP153.6Kbps	Front	1	600	1880	23.60	24.7	1.288	-0.01	0.802	1.033
	CDMA2000 BC1	RTAP153.6Kbps	Right side	1	25	1851.25	23.53	24.7	1.309	-0.04	0.833	1.091
	CDMA2000 BC1	RTAP153.6Kbps	Right side	1	600	1880	23.60	24.7	1.288	-0.05	0.887	1.143

<LTE SAR>

Plot No.	Band	Mode	BW (MHz)	RB Size	RB Offset	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)
	LTE Band 25	QPSK	20	1	0	Front	1	26590	1905	23.49	24	1.125	0.01	0.575	0.647
	LTE Band 25	QPSK	20	1	0	Back	1	26590	1905	23.49	24	1.125	-0.11	0.185	0.208
#04	LTE Band 25	QPSK	20	1	0	Right side	1	26590	1905	23.49	24	1.125	-0.01	0.700	**0.787**
	LTE Band 25	QPSK	20	1	0	Bottom side	1	26590	1905	23.49	24	1.125	-0.09	0.247	0.278
	LTE Band 25	QPSK	20	50	0	Front	1	26590	1905	22.39	23	1.151	0.14	0.468	0.539
	LTE Band 25	QPSK	20	50	0	Back	1	26590	1905	22.39	23	1.151	-0.15	0.156	0.180
	LTE Band 25	QPSK	20	50	0	Right side	1	26590	1905	22.39	23	1.151	-0.01	0.586	0.674
	LTE Band 25	QPSK	20	50	0	Bottom side	1	26590	1905	22.39	23	1.151	0.04	0.205	0.236
#05	LTE Band 26	QPSK	15	1	0	Front	1	26865	831.5	23.38	24	1.153	-0.07	0.378	**0.436**
	LTE Band 26	QPSK	15	1	0	Back	1	26865	831.5	23.38	24	1.153	0.04	0.293	0.338
	LTE Band 26	QPSK	15	1	0	Right side	1	26865	831.5	23.38	24	1.153	-0.02	0.309	0.356
	LTE Band 26	QPSK	15	1	0	Bottom side	1	26865	831.5	23.38	24	1.153	-0.03	0.215	0.248
	LTE Band 26	QPSK	15	36	0	Front	1	26865	831.5	21.97	23	1.268	-0.04	0.293	0.371
	LTE Band 26	QPSK	15	36	0	Back	1	26865	831.5	21.97	23	1.268	0.03	0.229	0.290
	LTE Band 26	QPSK	15	36	0	Right side	1	26865	831.5	21.97	23	1.268	-0.04	0.246	0.312
	LTE Band 26	QPSK	15	36	0	Bottom side	1	26865	831.5	21.97	23	1.268	0.01	0.155	0.196

Plot No.	Band	Mode	BW (MHz)	RB Size	RB Offset	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)
	LTE Band 41	QPSK	20	1	0	Front	1	40620	2593	23.81	24	1.045	62.9	1.01	0.07	0.417	0.440
	LTE Band 41	QPSK	20	1	0	Back	1	40620	2593	23.81	24	1.045	62.9	1.01	0.03	0.202	0.213
#06	LTE Band 41	QPSK	20	1	0	Right side	1	40620	2593	23.81	24	1.045	62.9	1.01	-0.05	0.520	0.549
	LTE Band 41	QPSK	20	1	0	Bottom side	1	40620	2593	23.81	24	1.045	62.9	1.01	0.03	0.039	0.041
	LTE Band 41	QPSK	20	50	0	Front	1	40620	2593	22.52	23	1.117	62.9	1.01	-0.01	0.368	0.415
	LTE Band 41	QPSK	20	50	0	Back	1	40620	2593	22.52	23	1.117	62.9	1.01	0.0067	0.177	0.200
	LTE Band 41	QPSK	20	50	0	Right side	1	40620	2593	22.52	23	1.117	62.9	1.01	-0.01	0.463	0.522
	LTE Band 41	QPSK	20	50	0	Bottom side	1	40620	2593	22.52	23	1.117	62.9	1.01	-0.02	0.037	0.042

<WLAN SAR DTS>

Plot No.	Band	Mode	Test Position	Gap (cm)	Antenna	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)
	WLAN 2.4GHz	802.11b, 1Mbps	Front	1	Ant. 0	6	2437	15.32	16	1.169	100	1.000	0.08	0.038	0.045
	WLAN 2.4GHz	802.11b, 1Mbps	Back	1	Ant. 0	6	2437	15.32	16	1.169	100	1.000	0.0089	0.041	0.048
	WLAN 2.4GHz	802.11b, 1Mbps	Bottom side	1	Ant. 0	6	2437	15.32	16	1.169	100	1.000	-0.06	0.081	0.095
	WLAN 2.4GHz	802.11b, 1Mbps	Front	1	Ant. 1	6	2437	15.48	16	1.127	100	1.000	0.02	0.082	0.092
	WLAN 2.4GHz	802.11b, 1Mbps	Back	1	Ant. 1	6	2437	15.48	16	1.127	100	1.000	0.02	0.084	0.095
#07	WLAN 2.4GHz	802.11b, 1Mbps	Left side	1	Ant. 1	6	2437	15.48	16	1.127	100	1.000	0.04	0.176	0.198
	WLAN 2.4GHz	802.11b, 1Mbps	Top side	1	Ant. 1	6	2437	15.48	16	1.127	100	1.000	-0.1	0.090	0.102
	WLAN 2.4GHz	802.11b, 5.5Mbps	Left side	1	Ant. 1	6	2437	15.78	16	1.052	95.87	1.043	-0.0028	0.171	0.188
	WLAN 2.4GHz	802.11n HT20, MCS8	Front	1	Ant. 0+1	6	2437	12.05	12.5	1.109	90.81	1.101	0.15	0.014	0.017
	WLAN 2.4GHz	802.11n HT20, MCS8	Back	1	Ant. 0+1	6	2437	12.05	12.5	1.109	90.81	1.101	0.13	0.016	0.019
	WLAN 2.4GHz	802.11n HT20, MCS8	Left side	1	Ant. 0+1	6	2437	12.05	12.5	1.109	90.81	1.101	0.18	0.032	0.039
	WLAN 2.4GHz	802.11n HT20, MCS8	Top side	1	Ant. 0+1	6	2437	12.05	12.5	1.109	90.81	1.101	-0.04	0.011	0.014
	WLAN 2.4GHz	802.11n HT20, MCS8	Bottom side	1	Ant. 0+1	6	2437	12.05	12.5	1.109	90.81	1.101	0.1	0.019	0.023
	WLAN 5.8GHz	802.11a, 6Mbps	Front	1	Ant. 0	157	5785	13.52	14	1.117	95.39	1.048	0.05	0.067	0.078
	WLAN 5.8GHz	802.11a, 6Mbps	Back	1	Ant. 0	157	5785	13.52	14	1.117	95.39	1.048	0.02	0.191	0.224
#08	WLAN 5.8GHz	802.11a, 6Mbps	Bottom side	1	Ant. 0	157	5785	13.52	14	1.117	95.39	1.048	0.04	0.393	0.460
	WLAN 5.8GHz	802.11a, 6Mbps	Front	1	Ant. 1	165	5825	11.21	11.5	1.069	95.76	1.044	-0.03	0.011	0.012
	WLAN 5.8GHz	802.11a, 6Mbps	Back	1	Ant. 1	165	5825	11.21	11.5	1.069	95.76	1.044	0.01	0.034	0.038
	WLAN 5.8GHz	802.11a, 6Mbps	Left side	1	Ant. 1	165	5825	11.21	11.5	1.069	95.76	1.044	0.01	0.00491	0.005
	WLAN 5.8GHz	802.11a, 6Mbps	Top side	1	Ant. 1	165	5825	11.21	11.5	1.069	95.76	1.044	0.05	0.094	0.105
	WLAN 5.8GHz	802.11n HT20, MCS8	Front	1	Ant. 0+1	157	5785	15.08	15.5	1.102	90.99	1.099	-0.09	0.026	0.031
	WLAN 5.8GHz	802.11n HT20, MCS8	Back	1	Ant. 0+1	157	5785	15.08	15.5	1.102	90.99	1.099	0.02	0.178	0.215
	WLAN 5.8GHz	802.11n HT20, MCS8	Left side	1	Ant. 0+1	157	5785	15.08	15.5	1.102	90.99	1.099	0.1	0.011	0.013
	WLAN 5.8GHz	802.11n HT20, MCS8	Top side	1	Ant. 0+1	157	5785	15.08	15.5	1.102	90.99	1.099	0.03	0.085	0.103
	WLAN 5.8GHz	802.11n HT20, MCS8	Bottom side	1	Ant. 0+1	157	5785	15.08	15.5	1.102	90.99	1.099	0.09	0.356	0.431
	WLAN 5.8GHz	802.11n HT40, MCS8	Bottom side	1	Ant. 0+1	151	5755	15.35	15.5	1.035	83.72	1.194	0.17	0.345	0.426

<WLAN SAR NII>

Plot No.	Band	Mode	Test Position	Gap (cm)	Antenna	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)
	WLAN 5.2GHz	802.11a, 6Mbps	Front	1	Ant. 0	48	5240	9.20	9.5	1.072	95.39	1.048	0.02	0.014	0.016
	WLAN 5.2GHz	802.11a, 6Mbps	Back	1	Ant. 0	48	5240	9.20	9.5	1.072	95.39	1.048	-0.05	0.067	0.076
	WLAN 5.2GHz	802.11a, 6Mbps	Front	1	Ant. 1	48	5240	8.47	9	1.130	95.76	1.044	0.07	0.017	0.020
	WLAN 5.2GHz	802.11a, 6Mbps	Back	1	Ant. 1	48	5240	8.47	9	1.130	95.76	1.044	-0.01	0.093	0.110
	WLAN 5.2GHz	802.11n HT20, MCS8	Front	1	Ant. 0+1	48	5240	11.46	12	1.132	90.99	1.099	0.09	0.020	0.025
#09	WLAN 5.2GHz	802.11n HT20, MCS8	Back	1	Ant. 0+1	48	5240	11.46	12	1.132	90.99	1.099	0.04	0.110	0.137

12.2 Repeated SAR Measurement

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR_{1g} (W/kg)	Ratio	Reported SAR_{1g} (W/kg)
1st	CDMA2000 BC1	RTAP153.6	Right side	1	1175	1908.75	23.61	24.7	1.285	-0.06	0.990	1	1.272
2nd	CDMA2000 BC1	RTAP153.6	Right side	1	1175	1908.75	23.61	24.7	1.285	-0.06	0.972	1.019	1.249

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 largest SAR to the smallest SAR among original and repeated measurement.
4. All measurement SAR result is scaled-up to account for tune-up tolerance and is compliant.

13. Simultaneous Transmission Analysis

NO.	Simultaneous Transmission Configurations	Body	Note
1.	WWAN + WLAN 2.4GHz 802.11b/g (SISO)	yes	2.4GHz Hotspot
2.	WWAN + WLAN 2.4GHz 802.11n HT20/HT40 (MIMO)	yes	2.4GHz Hotspot
3.	WWAN + WLAN 5.2GHz 802.11a (SISO)	yes	5GHz WiFi Direct(GC)
4.	WWAN + WLAN 5.2GHz 802.11an HT20/HT40 (MIMO)	yes	5GHz WiFi Direct(GC)
5.	WWAN + WLAN 5.8GHz 802.11a (SISO)	yes	5GHz WiFi Direct(GO/GC)
6.	WWAN + WLAN 5.8GHz 802.11an HT20/HT40 (MIMO)	yes	5GHz WiFi Direct(GO/GC)
7.	WWAN + Bluetooth	yes	-

Note:

1. This device 2.4GHz WLAN supports hotspot operation, 5.8GHz WLAN supports WiFi Direct (GC/GO) and 5.2GHz supports WiFi Direct (GC only).
2. EUT will choose either CDMA2000 or LTE according to the network signal condition; therefore, they will not transmit simultaneously.
3. EUT will choose either WLAN 2.4GHz or WLAN 5GHz according to the network signal condition; therefore, they will not transmit simultaneously.
4. Bluetooth and WLAN Antenna 0 share the same antenna, and cannot transmit simultaneously. And Bluetooth also cannot transmit simultaneously with WLAN Antenna 1.
5. The reported SAR summation is calculated based on the same configuration and test position.
6. Per KDB 447498 D01v05r02, 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
7. For simultaneous transmission analysis, Bluetooth SAR is estimated per KDB 447498 D01v05r02 based on the formula below.
   i) (*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)]·[$\sqrt{f(GHz)}/x$] W/kg for *test separation distances* ≤ 50 mm; where x = 7.5 for 1-g SAR, and x = 18.75 for 10-g SAR.
   ii) When the minimum test separation distance is < 5mm, the distance is used 5mm to determine SAR test exclusion.
   iii) 0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the *test separation distances* is > 50 mm.

Maximum Power	Exposure Position	Body
	Test separation	10 mm
2 dBm	Estimated SAR (W/kg)	0.042W/kg

13.1 Body Exposure Conditions

<PCB + DTS>

Position	PCB Band	PCB Max. WWAN SAR (W/kg)	DTS Mode	DTS Antenna	DTS Max. WLAN SAR (W/kg)	Summed SAR (W/kg)
Front	CDMA2000 BC0	0.815	SISO	Ant. 0	0.078	0.89
	CDMA2000 BC1	1.033	SISO	Ant. 0	0.078	1.11
	CDMA2000 BC10	0.934	SISO	Ant. 0	0.078	1.01
	LTE Band 25	0.647	SISO	Ant. 0	0.078	0.73
	LTE Band 26	0.436	SISO	Ant. 0	0.078	0.51
	LTE Band 41	0.440	SISO	Ant. 0	0.078	0.52
	CDMA2000 BC0	0.815	SISO	Ant. 1	0.092	0.91
	CDMA2000 BC1	1.033	SISO	Ant. 1	0.092	1.13
	CDMA2000 BC10	0.934	SISO	Ant. 1	0.092	1.03
	LTE Band 25	0.647	SISO	Ant. 1	0.092	0.74
	LTE Band 26	0.436	SISO	Ant. 1	0.092	0.53
	LTE Band 41	0.440	SISO	Ant. 1	0.092	0.53
	CDMA2000 BC0	0.815	MIMO	Ant. 0+1	0.031	0.85
	CDMA2000 BC1	1.033	MIMO	Ant. 0+1	0.031	1.06
	CDMA2000 BC10	0.934	MIMO	Ant. 0+1	0.031	0.97
	LTE Band 25	0.647	MIMO	Ant. 0+1	0.031	0.68
	LTE Band 26	0.436	MIMO	Ant. 0+1	0.031	0.47
	LTE Band 41	0.440	MIMO	Ant. 0+1	0.031	0.47
Back	CDMA2000 BC0	0.650	SISO	Ant. 0	0.224	0.87
	CDMA2000 BC1	0.405	SISO	Ant. 0	0.224	0.63
	CDMA2000 BC10	0.606	SISO	Ant. 0	0.224	0.83
	LTE Band 25	0.208	SISO	Ant. 0	0.224	0.43
	LTE Band 26	0.338	SISO	Ant. 0	0.224	0.56
	LTE Band 41	0.213	SISO	Ant. 0	0.224	0.44
	CDMA2000 BC0	0.650	SISO	Ant. 1	0.095	0.75
	CDMA2000 BC1	0.405	SISO	Ant. 1	0.095	0.50
	CDMA2000 BC10	0.606	SISO	Ant. 1	0.095	0.70
	LTE Band 25	0.208	SISO	Ant. 1	0.095	0.30
	LTE Band 26	0.338	SISO	Ant. 1	0.095	0.43
	LTE Band 41	0.213	SISO	Ant. 1	0.095	0.31
	CDMA2000 BC0	0.650	MIMO	Ant. 0+1	0.215	0.87
	CDMA2000 BC1	0.405	MIMO	Ant. 0+1	0.215	0.62
	CDMA2000 BC10	0.606	MIMO	Ant. 0+1	0.215	0.82
	LTE Band 25	0.208	MIMO	Ant. 0+1	0.215	0.42
	LTE Band 26	0.338	MIMO	Ant. 0+1	0.215	0.55
	LTE Band 41	0.213	MIMO	Ant. 0+1	0.215	0.43

Position	PCB		DTS			Summed SAR (W/kg)
	Band	Max. WWAN SAR (W/kg)	Mode	Antenna	Max. WLAN SAR (W/kg)	
Left Side	CDMA2000 BC0		SISO	Ant. 1	0.198	0.20
	CDMA2000 BC1		SISO	Ant. 1	0.198	0.20
	CDMA2000 BC10		SISO	Ant. 1	0.198	0.20
	LTE Band 25		SISO	Ant. 1	0.198	0.20
	LTE Band 26		SISO	Ant. 1	0.198	0.20
	LTE Band 41		SISO	Ant. 1	0.198	0.20
	CDMA2000 BC0		MIMO	Ant. 0+1	0.039	0.04
	CDMA2000 BC1		MIMO	Ant. 0+1	0.039	0.04
	CDMA2000 BC10		MIMO	Ant. 0+1	0.039	0.04
	LTE Band 25		MIMO	Ant. 0+1	0.039	0.04
	LTE Band 26		MIMO	Ant. 0+1	0.039	0.04
	LTE Band 41		MIMO	Ant. 0+1	0.039	0.04
Right Side	CDMA2000 BC0	0.659				0.66
	CDMA2000 BC1	1.272				**1.27**
	CDMA2000 BC10	0.575				0.58
	LTE Band 25	0.787				0.79
	LTE Band 26	0.356				0.36
	LTE Band 41	0.549				0.55
Top Side	CDMA2000 BC0		SISO	Ant. 1	0.105	0.11
	CDMA2000 BC1		SISO	Ant. 1	0.105	0.11
	CDMA2000 BC10		SISO	Ant. 1	0.105	0.11
	LTE Band 25		SISO	Ant. 1	0.105	0.11
	LTE Band 26		SISO	Ant. 1	0.105	0.11
	LTE Band 41		SISO	Ant. 1	0.105	0.11
	CDMA2000 BC0		MIMO	Ant. 0+1	0.103	0.10
	CDMA2000 BC1		MIMO	Ant. 0+1	0.103	0.10
	CDMA2000 BC10		MIMO	Ant. 0+1	0.103	0.10
	LTE Band 25		MIMO	Ant. 0+1	0.103	0.10
	LTE Band 26		MIMO	Ant. 0+1	0.103	0.10
	LTE Band 41		MIMO	Ant. 0+1	0.103	0.10
Bottom Side	CDMA2000 BC0	0.407	SISO	Ant. 0	0.460	0.87
	CDMA2000 BC1	0.469	SISO	Ant. 0	0.460	0.93
	CDMA2000 BC10	0.323	SISO	Ant. 0	0.460	0.78
	LTE Band 25	0.278	SISO	Ant. 0	0.460	0.74
	LTE Band 26	0.248	SISO	Ant. 0	0.460	0.71
	LTE Band 41	0.042	SISO	Ant. 0	0.460	0.50
	CDMA2000 BC0	0.407	MIMO	Ant. 0+1	0.431	0.84
	CDMA2000 BC1	0.469	MIMO	Ant. 0+1	0.431	0.90
	CDMA2000 BC10	0.323	MIMO	Ant. 0+1	0.431	0.75
	LTE Band 25	0.278	MIMO	Ant. 0+1	0.431	0.71
	LTE Band 26	0.248	MIMO	Ant. 0+1	0.431	0.68
	LTE Band 41	0.042	MIMO	Ant. 0+1	0.431	0.47

<PCB + NII>

	PCB		NII			Summed SAR (W/kg)
Position	Band	Max. WWAN SAR (W/kg)	Mode	Antenna	Max. WLAN SAR (W/kg)	
Front	CDMA2000 BC0	0.815	SISO	Ant. 0	0.016	0.83
	CDMA2000 BC1	1.033	SISO	Ant. 0	0.016	1.05
	CDMA2000 BC10	0.934	SISO	Ant. 0	0.016	0.95
	LTE Band 25	0.647	SISO	Ant. 0	0.016	0.66
	LTE Band 26	0.436	SISO	Ant. 0	0.016	0.45
	LTE Band 41	0.440	SISO	Ant. 0	0.016	0.46
	CDMA2000 BC0	0.815	SISO	Ant. 1	0.020	0.84
	CDMA2000 BC1	1.033	SISO	Ant. 1	0.020	1.05
	CDMA2000 BC10	0.934	SISO	Ant. 1	0.020	0.95
	LTE Band 25	0.647	SISO	Ant. 1	0.020	0.67
	LTE Band 26	0.436	SISO	Ant. 1	0.020	0.46
	LTE Band 41	0.440	SISO	Ant. 1	0.020	0.46
	CDMA2000 BC0	0.815	MIMO	Ant. 0+1	0.025	0.84
	CDMA2000 BC1	1.033	MIMO	Ant. 0+1	0.025	**1.06**
	CDMA2000 BC10	0.934	MIMO	Ant. 0+1	0.025	0.96
	LTE Band 25	0.647	MIMO	Ant. 0+1	0.025	0.67
	LTE Band 26	0.436	MIMO	Ant. 0+1	0.025	0.46
	LTE Band 41	0.440	MIMO	Ant. 0+1	0.025	0.47
Back	CDMA2000 BC0	0.650	SISO	Ant. 0	0.076	0.73
	CDMA2000 BC1	0.405	SISO	Ant. 0	0.076	0.48
	CDMA2000 BC10	0.606	SISO	Ant. 0	0.076	0.68
	LTE Band 25	0.208	SISO	Ant. 0	0.076	0.28
	LTE Band 26	0.338	SISO	Ant. 0	0.076	0.41
	LTE Band 41	0.213	SISO	Ant. 0	0.076	0.29
	CDMA2000 BC0	0.650	SISO	Ant. 1	0.110	0.76
	CDMA2000 BC1	0.405	SISO	Ant. 1	0.110	0.52
	CDMA2000 BC10	0.606	SISO	Ant. 1	0.110	0.72
	LTE Band 25	0.208	SISO	Ant. 1	0.110	0.32
	LTE Band 26	0.338	SISO	Ant. 1	0.110	0.45
	LTE Band 41	0.213	SISO	Ant. 1	0.110	0.32
	CDMA2000 BC0	0.650	MIMO	Ant. 0+1	0.137	0.79
	CDMA2000 BC1	0.405	MIMO	Ant. 0+1	0.137	0.54
	CDMA2000 BC10	0.606	MIMO	Ant. 0+1	0.137	0.74
	LTE Band 25	0.208	MIMO	Ant. 0+1	0.137	0.35
	LTE Band 26	0.338	MIMO	Ant. 0+1	0.137	0.48
	LTE Band 41	0.213	MIMO	Ant. 0+1	0.137	0.35

<PCB + DSS>

	PCB		DSS			Summed SAR (W/kg)
Position	Band	Max. WWAN SAR (W/kg)	Mode	Antenna	Bluetooth Estimated SAR (W/kg)	
Front	CDMA2000 BC0	0.815	SISO	Ant. 0	0.042	0.86
	CDMA2000 BC1	1.033	SISO	Ant. 0	0.042	1.08
	CDMA2000 BC10	0.934	SISO	Ant. 0	0.042	0.98
	LTE Band 25	0.647	SISO	Ant. 0	0.042	0.69
	LTE Band 26	0.436	SISO	Ant. 0	0.042	0.48
	LTE Band 41	0.440	SISO	Ant. 0	0.042	0.48
Back	CDMA2000 BC0	0.650	SISO	Ant. 0	0.042	0.69
	CDMA2000 BC1	0.405	SISO	Ant. 0	0.042	0.45
	CDMA2000 BC10	0.606	SISO	Ant. 0	0.042	0.65
	LTE Band 25	0.208	SISO	Ant. 0	0.042	0.25
	LTE Band 26	0.338	SISO	Ant. 0	0.042	0.38
	LTE Band 41	0.213	SISO	Ant. 0	0.042	0.26
Right Side	CDMA2000 BC0	0.659				0.66
	CDMA2000 BC1	1.272				1.27
	CDMA2000 BC10	0.575				0.58
	LTE Band 25	0.787				0.79
	LTE Band 26	0.356				0.36
	LTE Band 41	0.549				0.55
Bottom Side	CDMA2000 BC0	0.407	SISO	Ant. 0	0.042	0.45
	CDMA2000 BC1	0.469	SISO	Ant. 0	0.042	0.51
	CDMA2000 BC10	0.323	SISO	Ant. 0	0.042	0.37
	LTE Band 25	0.278	SISO	Ant. 0	0.042	0.32
	LTE Band 26	0.248	SISO	Ant. 0	0.042	0.29
	LTE Band 41	0.042	SISO	Ant. 0	0.042	0.08

Test Engineer： Fulu Hu

14. 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 14.1

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

Error Description	Uncertainty Value (±%)	Probability Distribution	Divisor	Ci (1g)	Ci (10g)	Standard Uncertainty (1g)	Standard Uncertainty (10g)
Measurement System							
Probe Calibration	6.55	Normal	1	1	1	± 6.55 %	± 6.55 %
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	2.0	Rectangular	√3	1	1	± 1.2 %	± 1.2 %
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	0.8	Rectangular	√3	1	1	± 0.5 %	± 0.5 %
Probe Positioning	9.9	Rectangular	√3	1	1	± 5.7 %	± 5.7 %
Max. SAR Eval.	4.0	Rectangular	√3	1	1	± 2.3 %	± 2.3 %
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						± 12.8 %	± 12.6 %
Coverage Factor for 95 %						K=2	
Expanded Uncertainty						**± 25.6 %**	**± 25.2 %**

Table 14.3 Uncertainty Budget for frequency range 3 GHz to 6 GHz

15. 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 865664 D01 v01r03 "SAR Measurement Requirements for 100 MHz to 6 GHz", February 2014.

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

[7] FCC KDB 447498 D01 v05r02 General RF Exposure Guidance “Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies”, February 2014.

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

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

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

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

Appendix A. Plots of System Performance Check

The plots are shown as follows.

Appendix B. Plots of SAR Measurement

The plots are shown as follows.

Appendix C. DASY Calibration Certificate

The DASY calibration certificates are shown as follows.