TEST REPORT

APPLICANT	:	Reliance Communications LLC
PRODUCT NAME	:	Orbic Turbo 4G MHS
MODEL NAME	:	RC440L
BRAND NAME	:	Orbic
FCC ID	:	2ABGH-RC440L
STANDARD(S)	:	FCC 47 CFR Part 2(2.1093) IEEE 1528-2013
RECEIPT DATE	:	2021-11-24
TEST DATE	:	2021-11-24 to 2021-12-30
ISSUE DATE	:	2022-01-27

Edited by : Gan Yueming (Rapporteur)

Approved by: Shen Junsheng (Supervisor)

DIRECTORY

1. SAR Results Summary 5
2. Technical Information 6
2.1. Applicant and Manufacturer Information 6
2.2. Equipment under Test (EUT) Description 6
2.3. Environment of Test Site/Conditions 8
3. Specific Absorption Rate (SAR) 9
3.1. Introduction 9
3.2. SAR Definition 9
4. RF Exposure Limits 10
4.1. Uncontrolled Environment 10
4.2. Controlled Environment 10
5. Applied Reference Documents 11
6. SAR Measurement System 12
6.1. E-Field Probe 13
6.2. Data Acquisition Electronics (DAE) 14
6.3. Robot 14
6.4. Measurement Server 15
6.5. Light Beam Unit 15
6.6. Phantom 15
6.7. Device Holder 16
6.8. Data Storage and Evaluation 17
6.9. Test Equipment List 19
7. Tissue Simulating Liquids 21
8. SAR System Verification 23
8.1. Purpose of System Performance check 23
8.2. System Setup 23

8.3. Validation Results 24
9. EUT Testing Position 27
9.1. SAR Evaluation near the Mouth/Jaw Regions of the Phantom 27
9.2. Hotspot Mode Exposure Position Conditions 27
10. Measurement Procedures 28
10.1. Spatial Peak SAR Evaluation 29
10.2. Power Reference Measurement 29
10.3. Area Scan Procedures 29
10.4. Zoom Scan Procedures 30
10.5. SAR Averaged Methods 30
10.6. Power Drift Monitoring 30
11. SAR Test Procedure 31
11.1. General Scan Requirements 31
11.2. Test Procedure 32
11.3. Description of Interpolation/Extrapolation Scheme 32
11.4. Wireless Router 32
12. SAR Test Configuration 34
13. Conducted Power List 44
14. LTE Carrier Aggregation 44
15. Hotspot Mode Evaluation Procedure 45
16. Block Diagram of the Tests to be Performed 46
17. Test Results List 47
17.1. Test Guidance 47
17.2. Body SAR Data 49
17.3. Repeated SAR Assessment 56
18. Simultaneous Transmission Evaluation 57
18.1. Simultaneous Transmission Consideration 57
18.2. Simultaneous Transmission Analysis 58

19. Uncertainty Assessment **64**

Annex A General Information **65**
Annex B Test Setup Photos
Annex C Plots of System Performance Check
Annex D Plots of Maximum SAR Test Results
Annex E Conducted Power
Annex F DASY Calibration Certificate

Changed History		
Version	**Date**	**Reason for Change**
1.0	2022-01-27	First edition

1. SAR Results Summary

The maximum results of Specific Absorption Rate (SAR) found during test as bellows:

<Highest Reported SAR Summary>

Frequency Band		Highest SAR Summary
		Hotspot (Gap 10mm)
		1g SAR (W/kg)
WCDMA	WCDMA II	0.709
	WCDMA IV	0.526
	WCDMA V	0.473
LTE	LTE Band 2	0.647
	LTE Band 4	0.641
	LTE Band 5	0.586
	LTE Band 7	0.965
	LTE Band 12	0.589
	LTE Band 13	0.473
	LTE Band 14	0.444
	LTE Band 17	0.871
	LTE Band 25	0.557
	LTE Band 26	0.581
	LTE Band 41	0.491
	LTE Band 48	0.659
	LTE Band 66	0.689
	LTE Band 71	0.312
WLAN	2.4GHz WLAN	0.053
	5GHz WLAN	0.360

Highest Simultaneous Transmission SAR_{1g} (W/Kg):	1.177 W/kg	Limit(W/kg): 1.6 W/kg

Note:

1. This device is in compliance with Specific Absorption Rate (SAR) for general population or uncontrolled exposure limits (1.6W/kg as averaged over any 1 gram of tissue; specified in FCC 47 CFR part 1 (1.1310) and IEEE C95.1-1991), and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2013 and FCC KDB publications.
2. When the test result is a critical value, we will use the measurement uncertainty give the judgment result based on the 95% confidence intervals.

2. Technical Information

Note: Provide by applicant.

2.1. Applicant and Manufacturer Information

Applicant:	Reliance Communications LLC
Applicant Address:	91 Colin Drive, Unit 1, HOLBROOK, New York 11741, United States
Manufacturer:	Unimaxcomm
Manufacturer Address:	Room 602, Floor 6th, Building B, Software Park T3,Hi-Tech Park South, Nanshan District, Shenzhen, P.R. China

2.2. Equipment under Test (EUT) Description

Product Name:	Orbic Turbo 4G MHS
EUT NO.:	1#
Hardware Version:	V1.0
Software Version:	ORB440L_v1.0.1_BVT-NA
Frequency Bands:	WCDMA Band II: 1850 MHz ~ 1910 MHz WCDMA Band IV: 1710 MHz ~ 1755 MHz WCDMA Band V: 824 MHz ~ 849 MHz LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 7: 2500 MHz ~ 2570 MHz LTE Band 12: 699 MHz ~ 716 MHz LTE Band 13: 777 MHz ~ 787 MHz LTE Band 14: 788 MHz ~ 798 MHz LTE Band 17: 704 MHz ~ 716 MHz LTE Band 25: 1850 MHz ~ 1915 MHz LTE Band 26: 814 MHz ~ 849 MHz LTE Band 41: 2496 MHz ~ 2690 MHz LTE Band 48: 3550 MHz ~ 3700 MHz LTE Band 66: 1710 MHz ~ 1780 MHz LTE Band 71: 663 MHz ~ 698 MHz WLAN 2.4GHz: 2412 MHz ~ 2462 MHz WLAN 5.2GHz: 5180 MHz ~ 5240 MHz WLAN 5.8GHz: 5745 MHz ~ 5825 MHz
Modulation Mode:	WCDMA: QPSK, 16QAM

	LTE: QPSK, 16QAM, 64QAM 802.11b: DSSS 802.11a/g/n-HT20/HT40/ac-VHT20/40/80: OFDM
Operation Class:	Class B
Carrier Aggregation:	Uplink: 7C, 41C
Antenna Type:	WWAN: PIFA Antenna WLAN: PIFA Antenna
SIM Cards Description:	WCDMA+LTE

Note: For more detailed description, please refer to specification or user manual supplied by the applicant and/or manufacturer.

2.3. Environment of Test Site/Conditions

Normal Temperature (NT):	20-25 °C
Relative Humidity:	30-75 %
Air Pressure:	980-1020 hPa

Test Frequency:	WCDMA Band II/IV/V FDD-LTE Band 2/4/5/7/12/13/14/17/25/26/66/71 TDD-LTE Band 41/48 WLAN 2.4GHz WLAN 5GHz
Operation Mode:	Call established
Power Level:	WCDMA Band II/IV/V (All Up Bits) FDD-LTE Band 2/4/5/7/12/13/14/17/25/26/66/71 (Maximum output power) TDD-LTE Band 41/48 (Maximum output power) WLAN 2.4GHz WLAN 5GHz

During SAR test, EUT is in Traffic Mode (Channel Allocated) at Normal Voltage Condition. A communication link is set up with a System Simulator (SS) by air link, and a call is established.

The EUT shall use its internal transmitter. The antenna(s), battery and accessories shall be those specified by the Factory. The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power output. If a wireless link is used, the antenna connected to the output of the base station simulator shall be placed at least 50 cm away from the handset.
The signal transmitted by the simulator to the antenna feeding point shall be lower than the output power level of the handset by at least 35 dB.

3. Specific Absorption Rate (SAR)

3.1. 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 or controlled and general population or uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational or controlled exposure limits are Middle than the limits for general population or uncontrolled.

3.2. 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:

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

SAR is expressed in units of Watts per kilogram (W/kg).
SAR measurement can be either related to the temperature elevation in tissue by,

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

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

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

Where σ is the conductivity of the tissue, ρ is the mass density of the tissue and $|E|$ is the rmselectrical field strength.

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

Shenzhen Morlab Communications Technology Co., Ltd.
FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road,
Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China

Tel: 86-755-36698555 Fax: 86-755-36698525
Http://www.morlab.cn E-mail: service@morlab.cn

4. RF Exposure Limits

4.1. Uncontrolled Environment

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

4.2. Controlled Environment

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

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

Type Exposure	Uncontrolled Environment Limit
Spatial Peak SAR (1g cube tissue for head and trunk)	1.6 W/kg
Spatial Peak SAR (10g cube tissue for limbs)	4.0 W/kg
Spatial Peak SAR (1g cube tissue for whole body)	0.08 W/kg

Note:

1. Occupational/Uncontrolled Environments are defined as locations where there is exposure that may be incurred by people who are aware of the potential for exposure (i.e. as a result of employment or occupation).
2. Whole-Body SAR is averaged over the entire body, partial-body SAR is averaged over any 1gram of tissue defined as a tissue volume in the shape of a cube. SAR for hands, wrists, feet and ankles is averaged over any 10 grams of tissue defined as a tissue volume in the shape of a cube.

5. Applied Reference Documents

Leading reference documents for testing:

Identity	Document Title	Method Determination /Remark
FCC 47CFR Part 2(2.1093)	Radio Frequency Radiation Exposure Evaluation: Portable Devices	No deviation
IEEE 1528-2013	IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques	No deviation
KDB 447498 D01v06	General RF Exposure Guidance	No deviation
KDB 248227 D01v02r02	SAR Measurement Procedures for 802.11 Transmitters	No deviation
KDB 865664 D01v01r04	SAR Measurement 100 MHz to 6 GHz	No deviation
KDB 865664 D02v01r02	RF Exposure Reporting	No deviation
KDB 648474 D04v01r03	Handset SAR	No deviation
KDB 941225 D01v03r01	3G SAR MEAUREMENT PROCEDURES	No deviation
KDB 941225 D05v02r05	SAR Evaluation Consideration for LTE Devices	No deviation
KDB 941225 D06v02r01	SAR Evaluation Procedures For Portable Devices With Wireless Router Capabilities	No deviation

Note 1: The test item is not applicable.
Note 2: Additions to, deviation, or exclusions from the method shall be judged in the "method determination" column of add, deviate or exclude from the specific method shall be explained in the "Remark" of the above table.

6. SAR Measurement System

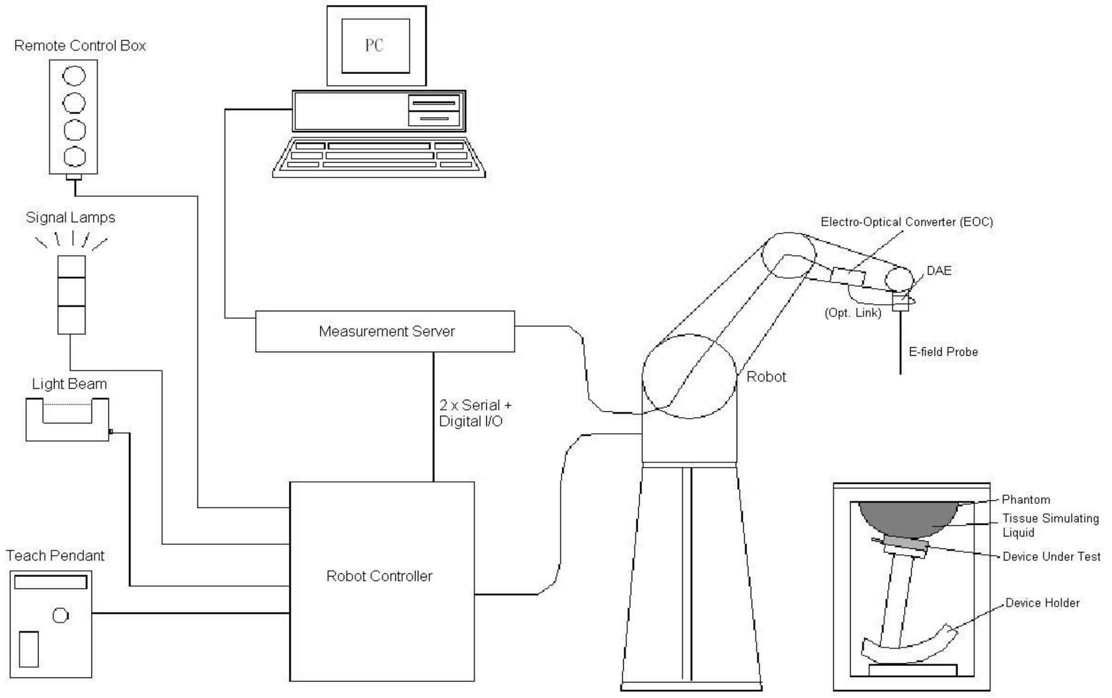


Fig 6.1 SPEAG DASY System Configurations

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 (ECO) 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.
- Some of the components are described in details in the following sub-sections.

6.1. 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.

➢ **E-Field Probe Specification**

<ES3DV3 Probe>

Construction	Symmetrical design with triangular core Built-in optical fiber for surface detection system. Built-in shielding against static charges. PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	 **Fig 6.2 Photo of ES3DV3**
Frequency	10 MHz to 3 GHz; Linearity: ± 0.2 dB	
Directivity	± 0.2 dB in HSL (rotation around probe axis) ± 0.4 dB in HSL (rotation normal to probe axis)	
Dynamic Range	5 µW/g to 100 mW/g; Linearity: ± 0.2 dB	
Dimensions	Overall length: 330 mm (Tip: 16 mm) Tip diameter: 6.8 mm (Body: 12 mm) Distance from probe tip to dipole centers: 2.7 mm	

<EX3DV4 Probe>

Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	 **Fig 6.3 Photo of EX3DV4**
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	
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	

➢ **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 ± 0.25 dB. 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.

6.2. 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 fast16 bit AD-converter and a command decoder and control logic unit. 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 200MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

Fig 6.4 Photo of DAE

6.3. Robot

The SPEAG DASY system uses the high precision robots (DASY4: RX90BL; DASY5: TX90XL) type from Stäubli SA (France). For the 6-axis controller system, the robot controller version (DASY4: CS7MB; 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 6.5 Photo of DASY5

6.4. Measurement Server

The measurement server is based on a PC/104 CPU board with CPU (DASY4: 166 MHz, Intel Pentium; DASY5: 400 MHz, Intel Celeron), chip disk (DASY4: 32 MB; DASY5: 128 MB), RAM (DASY4: 64 MB, 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 6.6 Photo of Server for DASY5

6.5. Light Beam Unit

The light beam switch allows automatic "tooling" of the probe. During the process, the actual position of the probe tip with respect to the robot arm is measured, as well as the probe length and the horizontal probe offset. The software then corrects all movements, such that the robot coordinates are valid for the probe tip.

The repeatability of this process is better than 0.1 mm. If a position has been taught with an aligned probe, the same position will be reached with another aligned probe within 0.1 mm, even if the other probe has different dimensions. During probe rotations, the probe tip will keep its actual position.

Fig. 6.7 Photo of Light Beam

6.6. Phantom

<SAM Twin Phantom>

Shell Thickness	2 ± 0.2 mm (sagging: <1%) Center ear point: 6 ± 0.2 mm
Filling Volume	Approx. 25 liters
Dimensions	Length: 1000 mm; Width: 500 mm; Height: adjustable feet
Measurement Areas	Left Head, Right Head, Flat Phantom

Fig. 6.8 Photo of SAM 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.

6.7. 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 (EPR). 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.

<Laptop Extension Kit>

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

Fig 6.9 Device Holder

Fig 6.10 Laptop Extension Kit

6.8. Data Storage and Evaluation

➢ **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.

➢ **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	dcpi
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:

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

With Vi = compensated signal of channel i, (i = x, y, z)
Ui = input signal of channel i, (i = x, y, z)
cf = crest factor of exciting field (DASY parameter)
dcpi = diode compression point (DASY parameter)

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

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

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

With V_i = compensated signal of channel i, (i = x, y, z)
$Norm_i$ = sensor sensitivity of channel i, (i = x, y, z), $\mu V/(V/m)^2$ forE-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):

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

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

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

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.

6.9. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	750MHz System Validation Kit	D750V3	1173	2021.06.21	2024.06.20
SPEAG	900MHz System Validation Kit	D900V2	1d064	2021.12.17	2024.12.16
SPEAG	1800MHz System Validation Kit	D1800V2	2d158	2021.12.17	2024.12.16
SPEAG	2000MHz System Validation Kit	D2000V2	1050	2021.12.18	2024.12.17
SPEAG	2450MHz System Validation Kit	D2450V2	805	2021.12.17	2024.12.16
SPEAG	2600MHz System Validation Kit	D2600V2	1139	2021.6.25	2024.6.24
SPEAG	3500MHz System Validation Kit	D3500V2	1104	2020.6.3	2023.6.2
SPEAG	5000MHz System Validation Kit	D5GHzV2	1176	2021.12.19	2024.12.18
SPEAG	DOSIMETRIC ASSESSMENT SYSTEM	DASY52	52.10.4.1527	NCR	NCR
SPEAG	Dosimetric E-Field Probe	EX3DV4	3753	2021.07.26	2022.07.25
SPEAG	Data Acquisition Electronics	DAE4	1353	2021.10.19	2022.10.18
SPEAG	Dielectric Assessment KIT	DAK-3.5	1279	2021.11.03	2022.11.02
SPEAG	Twin-SAM	QD 000 P40 Ax	2020	NCR	NCR
SPEAG	Phone Positioner	N/A	N/A	NCR	NCR
R&S	Network Emulator	CMW500	165755	2021.02.25	2022.02.24
Agilent	Network Analyzer	E5071B	MY42404762	2021.03.29	2022.03.28
mini-circuits	Amplifier	ZHL-42W+	608501717	NCR	NCR
mini-circuits	Amplifier	ZVE-8G+	754401735	NCR	NCR
Agilent	Signal Generator	N5182B	MY53050509	2021.03.25	2022.03.24
Agilent	Power Senor	N8482A	MY41090849	2021.10.21	2022.10.20
Agilent	Power Meter	E4416A	MY45102093	2021.10.21	2022.10.20
Anritsu	Power Sensor	MA2411B	N/A	2021.10.21	2022.10.20
Anritsu	Power Meter	NRVD	101066	2021.10.21	2022.10.20
Agilent	Dual Directional Coupler	778D	50422	NA	NA
MCL	Attenuation1	351-218-010	N/A	NA	NA
KTJ	Thermo meter	TA298	N/A	2021.01.15	2022.01.14
SPEAG	Tissue Simulating Liquids	HBBL600-10000V6		24H	

Note:

1. The calibration certificate of DASY can be referred to appendix E of this report.
2. The Insertion Loss calibration of Dual Directional Coupler and Attenuator were characterized via the network analyzer and compensated during system check.

3. The dielectric probe kit was calibrated via the network analyzer, with the specified procedure (calibrated in pure water) and calibration kit (standard) short circuit, before the dielectric measurement. The specific procedure and calibration kit are provided by Speag.
4. 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 of1W 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.
5. Attenuator insertion loss is calibrated by the network Analyzer, which the calibration is valid, before system check.
6. N.C.R means No Calibration Requirement.

7. Tissue Simulating Liquids

For SAR measurement of the field distribution inside the phantom, the phantom must be filled with homogeneous tissue simulating liquid to a depth of at least 15cm.For head SAR testing, the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15cm. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15cm, which is shown in Fig. 7.1. 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. 7.2.Thenominaldielectricvaluesofthe tissue simulating liquids in the phantom and the tolerance of 5%are listed in below table.

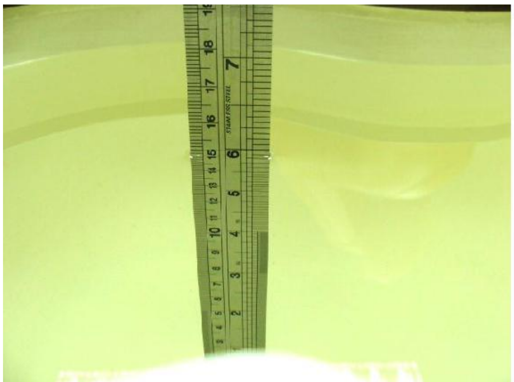


Fig 7.1 Photo of Liquid Height for Head SAR

Fig 7.2 Photo of Liquid Height for Body SAR

The following table gives the recipes for tissue simulating liquids

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

Simulating Liquid for 5GHz, Manufactured by SPEAG.

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

Note: Please refer to the validation results for dielectric parameters of each frequency band.
The dielectric properties of the tissue simulating liquids were verified prior to the SAR evaluation using a SPEAG Dielectric Assessment KIT and an Agilent Network Analyzer.

Table 1: Dielectric Performance of Tissue Simulating Liquid

Frequency (MHz)	Tissue Type	Liquid Temp.(℃)	Conductivity (σ)	Conductivity Target (σ)	Delta (σ) (%)	Limit (%)	Date
750	HSL	22.3	0.874	0.89	-1.80	±5	2021.11.24
900	HSL	22.3	0.950	0.97	-2.06	±5	2021.12.24
1800	HSL	22.1	1.449	1.40	3.50	±5	2021.12.30
2000	HSL	22.1	1.456	1.40	4.00	±5	2021.12.30
2450	HSL	22.3	1.817	1.80	0.94	±5	2021.12.23
2600	HSL	22.3	1.983	1.96	1.17	±5	2021.12.12
3500	HSL	22.2	2.922	2.91	0.41	±5	2021.12.22
5250	HSL	22.1	4.699	4.71	-0.23	±5	2021.12.20
5750	HSL	22.2	5.298	5.22	1.49	±5	2021.12.21
Frequency (MHz)	**Tissue Type**	**Liquid Temp.(℃)**	**Permittivity (εr)**	**Permittivity Target (εr)**	**Delta (εr) (%)**	**Limit (%)**	**Date**
750	HSL	22.3	42.122	41.90	0.53	±5	2021.11.24
900	HSL	22.3	41.581	41.50	0.20	±5	2021.12.24
1800	HSL	22.1	40.235	40.00	0.59	±5	2021.12.30
2000	HSL	22.1	39.792	40.00	-0.52	±5	2021.12.30
2450	HSL	22.3	38.890	39.20	-0.79	±5	2021.12.23
2600	HSL	22.3	39.534	39.00	1.37	±5	2021.12.12
3500	HSL	22.2	38.149	37.90	0.66	±5	2021.12.22
5250	HSL	22.1	37.510	35.95	4.34	±5	2021.12.20
5750	HSL	22.2	36.660	35.35	3.71	±5	2021.12.21

8. SAR System Verification

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.

8.1. 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.

8.2. System Setup

The output power on dipole port must be calibrated to 24 dBm (250 mW) before dipole is connected. In the simplified setup for system evaluation, the DUT is replaced by a calibrated dipole and the power source is replaced by a continuous wave which 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 system check verifies that the system operates within its specifications. It is performed daily or before every SAR measurement. The system check uses normal SAR measurements in the flat section of the phantom with a matched dipole at a specified distance. The system verification setup is shown as below.

Fig 8.1 Photo of Dipole Setup

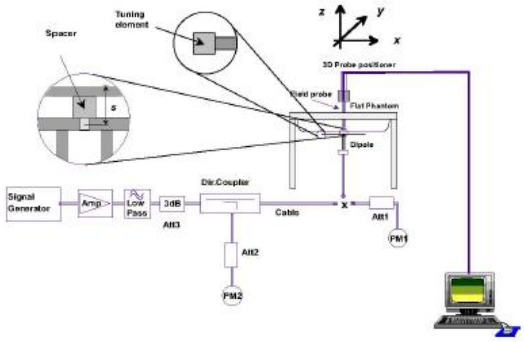


Fig 8.2 System Setup for System Evaluation

8.3. Validation Results

After system check testing, the SAR result will be normalized to 1W forward input power and compared with the reference SAR value derived from validation dipole certificate report. The deviation of system check should be within 10%.

<Validation Setup>

Frequency (MHz)	Tissue Type	Input Power(mW)	Dipole S/N	Probe S/N	DAE S/N
750	HSL	250	D750V3-1173	3753	1353
900	HSL	250	D900V2-1d064	3753	1353
1800	HSL	250	D1800V2-2d158	3753	1353
2000	HSL	250	D2000V2-1050	3753	1353
2450	HSL	250	D2450V2-805	3753	1353
2600	HSL	250	D2600V2-1139	3753	1353
3500	HSL	100	D3500V2-1104	3753	1353
5250	HSL	100	D5GHzV2-1176-5750	3753	1353
5750	HSL	100	D5GHzV2-1176-5750	3753	1353

<System Validation>

Frequency (MHz)	Tissue Type	Conductivity (σ)	Permittivity (εr)	CW Signal Validation		
				Sensitivity	Probe Linearity	Probe Isotropy
750	HSL	0.851	42.43	PASS	PASS	PASS
835	HSL	0.898	41.88	PASS	PASS	PASS
1750	HSL	1.386	39.91	PASS	PASS	PASS
1800	HSL	1.449	41.26	PASS	PASS	PASS
1900	HSL	1.435	39.65	PASS	PASS	PASS
2000	HSL	1.451	39.42	PASS	PASS	PASS
2300	HSL	1.764	38.99	PASS	PASS	PASS
2450	HSL	1.863	38.85	PASS	PASS	PASS
2600	HSL	1.973	38.58	PASS	PASS	PASS
3400	HSL	2.88	38.10	PASS	PASS	PASS
3500	HSL	2.91	37.90	PASS	PASS	PASS
3700	HSL	3.05	37.70	PASS	PASS	PASS
3900	HSL	3.15	37.50	PASS	PASS	PASS
4100	HSL	3.25	37.20	PASS	PASS	PASS
4200	HSL	3.34	37.00	PASS	PASS	PASS
4400	HSL	3.58	36.70	PASS	PASS	PASS

4600	HSL	3.70	36.60	PASS	PASS	PASS
4800	HSL	3.82	36.40	PASS	PASS	PASS
4900	HSL	3.96	36.20	PASS	PASS	PASS
5250	HSL	4.528	35.32	PASS	PASS	PASS
5600	HSL	4.905	34.89	PASS	PASS	PASS
5750	HSL	5.077	34.28	PASS	PASS	PASS

Frequency (MHz)	**Tissue Type**	**Conductivity (σ)**	**Permittivity (εr)**	**Modulation Signal Validation**		
				Mod. Type	**Duty Factor**	**PAR**
750	HSL	0.851	42.43	N/A	N/A	N/A
835	HSL	0.898	41.88	GMSK	PASS	N/A
1750	HSL	1.386	39.91	N/A	N/A	N/A
1800	HSL	1.449	41.26	N/A	N/A	N/A
1900	HSL	1.435	39.65	GMSK	PASS	N/A
2000	HSL	1.451	39.42	GMSK	PASS	N/A
2300	HSL	1.764	38.99	OFDM	PASS	PASS
2450	HSL	1.863	38.85	OFDM	PASS	PASS
2600	HSL	1.973	38.58	TDD	PASS	N/A
3400	HSL	2.88	38.10	OFDM	PASS	PASS
3500	HSL	2.91	37.90	OFDM	PASS	PASS
3700	HSL	3.05	37.70	OFDM	PASS	PASS
3900	HSL	3.15	37.50	OFDM	PASS	PASS
4100	HSL	3.25	37.20	OFDM	PASS	PASS
4200	HSL	3.34	37.00	OFDM	PASS	PASS
4400	HSL	3.58	36.70	OFDM	PASS	PASS
4600	HSL	3.70	36.60	OFDM	PASS	PASS
4800	HSL	3.82	36.40	OFDM	PASS	PASS
4900	HSL	3.96	36.20	OFDM	PASS	PASS
5250	HSL	4.528	35.32	OFDM	N/A	PASS
5600	HSL	4.905	34.89	OFDM	N/A	PASS
5750	HSL	5.077	34.28	OFDM	N/A	PASS

<Validation Results>

Date	Frequency (MHz)	Tissue Type	Input Power (mW)	Measured 1g SAR (W/kg)	Targeted 1g SAR (W/kg)	Normalized 1g SAR (W/kg)	Deviation (%)
2021.11.24	750	HSL	250	2.09	8.26	8.36	1.21
2021.12.24	900	HSL	250	2.71	11.20	10.844	-3.18
2021.12.30	1800	HSL	250	9.73	39.20	38.92	-0.71
2021.12.30	2000	HSL	250	10.21	41.60	40.84	-1.83
2021.12.23	2450	HSL	250	13.13	52.30	52.52	0.42
2021.12.12	2600	HSL	250	13.56	54.00	54.24	0.44
2021.12.22	3500	HSL	100	6.77	67.20	67.7	0.74
2021.12.20	5250	HSL	100	7.79	76.70	77.9	1.56
2021.12.21	5750	HSL	100	8.11	78.70	81.1	3.05

Date	Frequency (MHz)	Tissue Type	Input Power (mW)	Measured 10g SAR (W/kg)	Targeted 10g SAR (W/kg)	Normalized 10g SAR (W/kg)	Deviation (%)
2021.11.24	750	HSL	250	1.35	5.45	5.4	-0.92
2021.12.24	900	HSL	250	1.75	7.19	7	-2.64
2021.12.30	1800	HSL	250	5.12	20.10	20.48	1.89
2021.12.30	2000	HSL	250	5.23	20.70	20.92	1.06
2021.12.23	2450	HSL	250	6.05	23.90	24.2	1.26
2021.12.12	2600	HSL	250	6.42	24.50	25.68	4.82
2021.12.22	3500	HSL	100	2.52	25.10	25.2	0.40
2021.12.20	5250	HSL	100	2.36	22.10	23.6	6.79
2021.12.21	5750	HSL	100	2.29	22.50	22.9	1.78

Note: System checks the specific test data please see Annex C.

9. EUT Testing Position

This EUT was tested in six different positions. They are right cheek/right tilted/left cheek/left tilted for head, Front/Back of the EUT with phantom 10 mm gap, as illustrated below, please refer to Appendix B for the test setup photos.

9.1. SAR Evaluation near the Mouth/Jaw Regions of the Phantom

Antennas located near the bottom of a phone may require SAR measurements around the mouth and jaw regions of the SAM head phantom. This typically applies to clam-shell style phones that are generally longer in the unfolded normal use positions or to certain older style long rectangular phones.

Under these circumstances, the following procedures apply, adopted from the FCC guidance on SAR handsets document FCC KDB Publication 648474 D04v01r03. The SAR required in these regions of SAM should be measured using a flat phantom. The phone should be positioned with a separation distance of 4 mm between the ear reference point (ERP) and the outer surface of the flat phantom shell. While maintaining this distance at the ERP location, the low (bottom) edge of the phone should be lowered from the phantom to establish the same separation distance between the peak SAR locations identified by the truncated partial SAR distribution measured with the SAM phantom. The distance from the peak SAR location to the phone is determined by the straight line passing perpendicularly through the phantom surface. When it is not feasible to maintain 4 mm separation at the ERP while also establishing the required separation at the peak SAR location, the top edge of the phone will be allowed to touch the phantom with a separation < 4 mm at the ERP. The phone should not be tilted to the left or right while placed in this inclined position to the flat phantom.

9.2. Hotspot Mode Exposure Position Conditions

For handsets that support hotspot mode operations, with wireless router capabilities and various web browsing functions, the relevant hand and body exposure conditions are tested according to the hotspot SAR procedures in KDB 941225. A test separation distance of 10 mm is required between the phantom and all surfaces and edges with a transmitting antenna located within 25 mm from that surface or edge. When the form factor of a handset is smaller than 9 cm x 5 cm, a test separation distance of 5 mm (instead of 10 mm) is required for testing hotspot mode. When the separation distance required for body-worn accessory testing is larger than or equal to that tested for hotspot mode, in the same wireless mode and for the same surface of the phone, the hotspot mode SAR data may be used to support body-worn accessory SAR compliance for that particular configuration (surface).

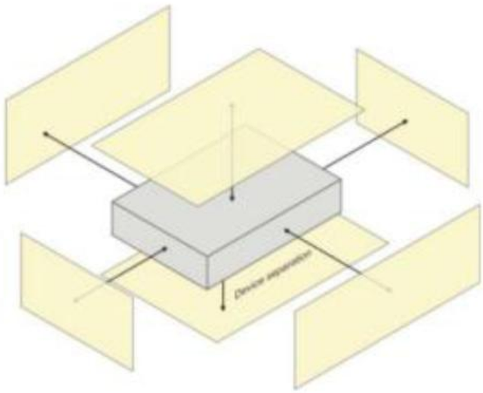


Fig 9.1 Illustration for Hotspot Position

10. 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.

10.1. 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.

10.2. 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.

10.3. Area Scan Procedures

Area scans are defined prior to the measurement process being executed with a user defined variable spacing between each measurement point (integral) allowing low uncertainty measurements to be conducted. Scans defined for FCC applications utilize a10mm^2 step integral, with 1mm interpolation used to locate the peak SAR area used for zoom scan assessments.

When an Area Scan has measured all reachable points, it computes the field maxima founding the scanned area, within a range of the global maximum. The range (in dB) is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE1528-2003.

10.4. Zoom Scan Procedures

Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. A density of 1000 kg/m³ is used to represent the head and body tissue density and not the phantom liquid density, in order to be consistent with the definition of the liquid dielectric properties, i.e. the side length of the 1g cube is 10mm, with the side length of the 10 g cube 21,5mm.The zoom scan integer steps can be user defined so as to reduce uncertainty, but normal practice for typical test applications utilize a physical step of 5x5x7 (8mmx8mmx5mm) providing a volume of 32mm in the X & Y axis, and 30mm in the Z axis.

10.5. SAR Averaged Methods

In DASY, the interpolation and extrapolation are both based on the modified Quadratic Sheppard'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.

10.6. Power Drift Monitoring

All SAR testing is under the DUT 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 DUT 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 drift more than 5%, the SAR will be retested.

11. SAR Test Procedure

11.1. General Scan Requirements

Probe boundary effect error compensation is required for measurements with the probe tip closer than half a probe tip diameter to the phantom surface. Both the probe tip diameter and sensor offset distance must satisfy measurement protocols; to ensure probe boundary effect errors are minimized and the higher fields closest to the phantom surface can be correctly measured and extrapolated to the phantom surface for computing 1-g SAR. Tolerances of the post-processing algorithms must be verified by the test laboratory for the scan resolutions used in the SAR measurements, according to the reference distribution functions specified in IEEE Std. 1528-2013.

<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 mm ± 1 mm</td><td>$\frac{1}{2}\cdot\delta\cdot\ln(2)$ mm ± 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">$\leq 1.5\cdot\Delta z_{Zoom}(n-1)$ mm</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 IEEE Std 1528-2013 for details.
* When zoom scan is required and the <u>*reported*</u> SAR from the *area scan based 1-g SAR estimation* procedures of KDB Publication 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>

11.2. Test Procedure

The Following steps are used for each test position

1. Establish a call with the maximum output power with a base station simulator. The connection between the mobile and the base station simulator is established via air interface.
2. Measurement of the local E-field value at a fixed location. This value serves as a reference value for calculating a possible power drift.
3. Measurement of the SAR distribution with a grid of 8 to 16mm * 8 to16 mm and a constant distance to the inner surface of the phantom. Since the sensors cannot directly measure at the inner phantom surface, the values between the sensors and the inner phantom surface are extrapolated. With these values the area of the maximum SAR is calculated by an interpolation scheme.
4. Around this point, a cube of 30 * 30 * 30 mm or 32 * 32 * 32 mm is assessed by measuring 5 or 8 * 5 or 8*4 or 5 mm. With these data, the peak spatial-average SAR value can be calculated.

11.3. Description of Interpolation/Extrapolation Scheme

The local SAR inside the phantom is measured using small dipole sensing elements inside a probe body. The probe tip must not be in contact with the phantom surface in order to minimize measurements errors, but the highest local SAR will occur at the surface of the phantom.

An extrapolation is using to determinate this highest local SAR values. The extrapolation is based on a fourth-order least-square polynomial fit of measured data. The local SAR value is then extrapolated from the liquid surface with a 1mm step.

The measurements have to be performed over a limited time (due to the duration of the battery) so the step of measurement is high. It could vary between 5 and 8 mm. To obtain an accurate assessment of the maximum SAR averaged over 10 grams and 1 gram requires a very fine resolution in the three dimensional scanned data array.

11.4. Wireless Router

Some battery-operated handsets have the capability to transmit and receive user through simultaneous transmission of WIFI simultaneously with a separate licensed transmitter. The FCC has provided guidance in FCC KDB Publication 941225 D06 v02r01 where SAR test considerations for handsets (L x W ≥ 9 cm x 5 cm) are based on a composite test separation distance of 10 from the front, back and edges of the device containing transmitting antennas within 2.5cm of their edges, determined form general mixed use conditions for this type of devices. Since the hotspot SAR results may overlap with the body-worn accessory SAR requirements, the more conservative configurations can be considered, thus excluding some body-worn accessory SAR tests.

When the user enables the personal wireless router functions for the handset, actual operations include simultaneous transmission of both the WIFI transmitter and another licensed transmitter. Both transmitters often do not transmit at the same transmitting frequency and thus cannot be evaluated for SAR under actual use conditions due to the limitations of the SAR assessment probes. Therefore, SAR must be evaluated for each frequency transmission and mode separately and spatially summed with the WIFI transmitter according to FCC KDB Publication 447498 D01v06 publication procedures. The “Portable Hotspot” feature on the handset was NOT activated during SAR assessments, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal at a time.

12. SAR Test Configuration

<WCDMA Mode>

Summary of UMTS conducted power measurement:

1. The 3G SAR test reduction procedure is applied, when the maximum output power and tune-up tolerance specified for production units in a secondary mode is ≤ ¼ dB higher than the primary mode, SAR measurement is not required for the secondary mode.
2. The following tests were conducted according to the test requirements outlines in 3GPP TS 34.121 specification.
3. The procedures in KDB 941225 D01v03r01 are applied for 3GPP Rel. 6 HSPA to configure the device in the required sub-test mode(s) to determine SAR test exclusion.
4. For HSPA+ devices supporting 16 QAM in the uplink, power measurements procedure is according to the configurations in Table C.11.1.4 of 3GPP TS 34.121-1.
5. Per KDB 941225 D01v03r01, RMC 12.2kbps setting is used to evaluate SAR. The maximum output power and tune-up tolerance specified for production units in HSDPA / HSUPA / DC-HSDPA / HSPA+ is ≤ ¼ dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio of specified maximum output power and tune-up tolerance of HSDPA / HSUPA / DC-HSDPA / HSPA+ to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA / DC-HSDPA / HSPA+, and according to the following RF output power, the output power results of the secondary modes (HSDPA / HSUPA / DC-HSDPA / HSPA+) are less than ¼ dB higher than the primary modes; therefore, SAR measurement is not required for HSDPA / HSUPA / DC-HSDPA / HSPA+.
6. A fixed level power reduction is applied for WCDMA Band II when handset open Hotspot mode, the power reduction triggered.

HSDPA Setup Configuration

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

Note 1: Δ_{ACK}, Δ_{NACK} and $\Delta_{CQI} = 8 \Leftrightarrow A_{hs} = \beta_{hs}/\beta_c = 30/15 \Leftrightarrow \beta_{hs} = 30/15 * \beta_c$

Note 2: CM = 1 for $\beta_c/\beta_d = 12/15$, $\beta_{hs}/\beta_c = 24/15$.

Note 3: For subtest 2 the β_c/β_d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 11/15$ and $\beta_d = 15/15$.

HSUPA Setup Configuration

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (1)	β_{ec}	β_{ed}	β_{ed} (SF)	β_{ed} (codes)	CM (2) (dB)	MPR (dB)	AG (4) Index	E-TFCI
1	11/15 (3)	15/15 (3)	64	11/15 (3)	22/15	209/225	1039/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed1}: 47/15 β_{ed2}: 47/15	4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15 (4)	15/15 (4)	64	15/15 (4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 8 ⇔ $A_{hs} = \beta_{hs}/\beta_c = 30/15$ ⇔ $\beta_{hs} = 30/15 * \beta_c$.

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

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

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

Note 5: Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Table 5.1g.

Note 6: β_{ed} cannot be set directly; it is set by Absolute Grant Value.

HSPA+ 3GPP release 7 (uplink category 7) 16QAM, Setup Configuration:

Table C.11.1.4: β values for transmitter characteristics tests with HS-DPCCH and E-DCH with 16QAM

Sub-test	β_c (Note3)	β_d	β_{HS} (Note1)	β_{ec}	β_{ed} (2xSF2) (Note 4)	β_{ed} (2xSF4) (Note 4)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 4)	E-TFCI (Note 5)	E-TFCI (boost)
1	1	0	30/15	30/15	β_{ed}1: 30/15 β_{ed}2: 30/15	β_{ed}3: 24/15 β_{ed}4: 24/15	3.5	2.5	14	105	105

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

Note 2: CM = 3.5 and the MPR is based on the relative CM difference, MPR = MAX(CM-1,0).

Note 3: DPDCH is not configured, therefore the β_c is set to 1 and β_d = 0 by default.

Note 4: β_{ed} can not be set directly; it is set by Absolute Grant Value.

Note 5: All the sub-tests require the UE to transmit 2SF2+2SF4 16QAM EDCH and they apply for UE using E-DPDCH category 7. E-DCH TTI is set to 2ms TTI and E-DCH table index = 2. To support these E-DCH configurations DPDCH is not allocated. The UE is signaled to use the extrapolation algorithm.

DC-HSDPA Setup Configuration

The following tests were completed according to procedures in section 7.3.13 of 3GPP TS34.108 v9.5.0. A summary of these settings are illustrated below:
Downlink Physical Channels are set as per 3GPP TS34.121-1 v9.0.0 E.5.

Table E.5.0: Levels for HSDPA connection setup

Parameter During Connection setup	Unit	Value
P-CPICH_Ec/Ior	dB	-10
P-CCPCH and SCH_Ec/Ior	dB	-12
PICH _Ec/Ior	dB	-15
HS-PDSCH	dB	off
HS-SCCH_1	dB	off
DPCH_Ec/Ior	dB	-5
OCNS_Ec/Ior	dB	-3.1

Call is set up as per 3GPP TS34.108 v9.5.0 sub clause 7.3.13

The configurations of the fixed reference channels for HSDPA RF tests are described in 3GPP TS 34.121, annex C for FDD and 3GPP TS 34.122.

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

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

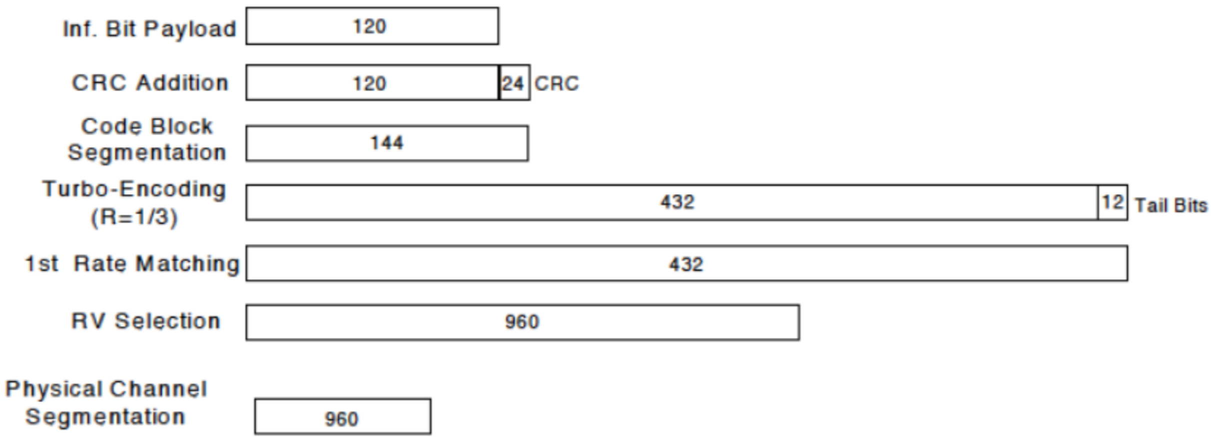


Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

<LTE Mode>

LTE Target MPR level

The device implements maximum power reduction per 3GPP 36.101 requirements where the MPR target is as below table. The MPR settings are implemented configured into firmware and cannot be disabled by the end user or LTE carrier network.

Modulation	Channel bandwidth / Transmission bandwidth configuration [RB]						MPR Target (dB)	3GPP MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz		
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	1	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	1	≤ 1
64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	2	≤ 2

Note: The measurement result showed some difference from the target MPR level, due to expected 0.5dBmeasurement tolerance

LTE Bands

LTE Bands	Channel bandwidth / Transmission bandwidth configuration [RB]					
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz
2	√	√	√	√	√	√
4	√	√	√	√	√	√
5	√	√	√	√	N/A	N/A
7	N/A	N/A	√	√	√	√
12	N/A	N/A	√	√	N/A	N/A
13	N/A	N/A	√	√	N/A	N/A
14	N/A	N/A	√	√	N/A	N/A
17	N/A	N/A	√	√	N/A	N/A
25	√	√	√	√	√	√
26	√	√	√	√	√	N/A
41	N/A	N/A	√	√	√	√
48	N/A	N/A	√	√	√	√
66	√	√	√	√	√	√
71	N/A	N/A	√	√	√	√

Note:

1. Per KDB 941225 D05v02r05, when a properly configured base station simulator is used for the SAR and power measurements, spectrum plots for each RB allocation and offset configuration is not required.
2. Per KDB 941225 D05v02r05, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each

required test channel.

3. Per KDB 941225 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
4. Per KDB 941225 D05v02r05, for QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
5. Per KDB 941225 D05v02r05, 16QAM/64QAM 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 KDB941225 D05v02r05, 16QAM/64QAM SAR testing is not required.
6. Per KDB 941225 D05v02r05, smaller bandwidth output power for each RB allocation configuration is > not ½ Db higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported band width is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
7. For LTE B4 / B5 / B7 / B17 the maximum bandwidth does not support three non-overlapping channels, per KDB941225 D05v02r05, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.
8. LTE band 2 / 12 SAR test was covered by Band 25 / 17; according to April 2015 TCB workshop, SAR test for overlapping LTE bands can be reduced if
    a. The maximum output power, including tolerance, for the smaller band is ≤ the larger band to qualify for the SAR test exclusion.
    b. The channel bandwidth and other operating parameters for the smaller band are fully supported by the larger band.
9. According to 2017 TCB workshop, for 64 QAM and 16 QAM should be verified by checking the signal constellation with a call box to avoid incorrect maximum power levels due to MPR and other requirements associated with signal modulation, and the following figure is taken from the "Fundamental Measurement >> Modulation Analysis >>constellation" mode of the device connect to the CMW500 base station, therefore, the device 64QAM and 16QAMsignal modulation are correct. Identify if Maximum Power Reduction (MPR) is optional or mandatory, i.e. built-in by design: only mandatory MPR may be considered during SAR testing, when the maximum output power is permanently limited by the MPR implemented within the UE; and only for the applicable RB (resource block) configurations specified in LTE standards: b) A-MPR (additional MPR) must be disabled.
10. Per KDB 447498 D01v06, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
    a. Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up

limit is the maximum rated power among all production units.

b. For SAR testing of WLAN signal with non-100% duty cycle, the measured SAR is scaled-up by the duty cycle scaling factor which is equal to "1/(duty cycle)"

c. For WWAN: Reported SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor

d. For WLAN/Bluetooth: Reported SAR(W/kg)= Measured SAR(W/kg)* Duty Cycle scaling factor * Tune-up scaling factor

e. For TDD LTE SAR measurement, the duty cycle 1:1.59 (62.9 %) was used perform testing and considering the theoretical duty cycle of 63.3% for extended cyclic prefix in the uplink, and the theoretical duty cycle of 62.9% for normal cyclic prefix in uplink, a scaling factor of extended cyclic prefix 63.3%/62.9% = 1.006 is applied to scale-up the measured SAR result. The Reported TDD LTE SAR = measured SAR (W/kg)* Tune-up Scaling Factor* scaling factor for extended cyclic prefix.

11. Per KDB 447498 D01v06, for each exposure position, testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is:≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz
12. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg.
13. Per KDB 648474 D04v01r03, when the reported SAR for a body-worn accessory measured without a headset connected to the handset is ≤ 1.2 W/kg, SAR testing with a headset connected to the handset is not required.

<WLAN 2.4GHz>

1. SAR is measured for 2.4 GHz 802.11b DSSS using either the fixed test position or, when applicable, the initial test position procedure. SAR test reduction is determined according to the following:
   a. When the reported SAR of the highest measured maximum output power channel for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.
   b. When the reported SAR is > 0.8 W/kg, SAR is required for that position using the next highest measured output power channel. When any reported SAR is > 1.2 W/kg, SAR is required for the third channel; i.e., all channels require testing.
2. 2.4 GHz 802.11 g/n OFDM are additionally evaluated for SAR if the highest reported SAR for 802.11b, adjusted by the ratio of the OFDM to DSSS specified maximum output power, is > 1.2 W/kg. When SAR is required for OFDM modes in 2.4 GHz band, the Initial Test configuration Procedures should be followed.
3. For held-to-ear and hotspot operations, the initial test position procedures were applied. The test

position with the highest extrapolated peak SAR will be used as the initial test position. When reported SAR for the initial test position is ≤ 0.4 W/kg, no additional testing for the remaining test positions was required. Otherwise, SAR is evaluated at the subsequent highest peak SAR positions until the reported SAR result is ≤ 0.8 W/kg or all test positions are measured.

4. Justification for test configurations for WLAN per KDB Publication 248227 D02DR02-41929 for 2.4 GHz WI-FI single transmission chain operations, the highest measured maximum output power channel for DSSS was selected for SAR measurement. SAR for OFDM modes (2.4 GHz802.11g/n) was not required due to the maximum allowed powers and the highest reported DSSSSAR.
5. A fixed level power reduction is applied for WiFi when handset operates "held to the body" condition or "held to the ear" condition, the power reduction triggered by audio receiver detection and call establish status.
6. Per KDB 248227 D01v02r02, In the 2.4 GHz band, separate SAR procedures are applied to DSSS and OFDM configurations to simplify DSSS test requirements.SAR is not required for the following 2.4 GHz OFDM conditions:
   a. When KDB Publication 447498 SAR test exclusion applies to the OFDM configuration.
   b. When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.

<WLAN 5GHz>

A) U-NII-1 and U-NII-2A Bands

For devices that operate in only one of the U-NII-1 and U-NII-2A bands, the normally required SAR procedures for OFDM configurations are applied. For devices that operate in both U-NII bands using the same transmitter and antenna(s), SAR test reduction is determined according to the following:

1. When the same maximum output power is specified for both bands, begin SAR measurement in U-NII-2A band by applying the OFDM SAR requirements. If the highest reported SAR for a test configuration is ≤ 1.2 W/kg, SAR is not required for U-NII-1 band for that configuration (802.11 mode and exposure condition); otherwise, both bands are tested independently for SAR.
2. When different maximum output power is specified for the bands, begin SAR measurement in the band with higher specified maximum output power. The highest reported SAR for the tested configuration is adjusted by the ratio of lower to higher specified maximum output power for the two bands. When the adjusted SAR is ≤ 1.2 W/kg, SAR is not required for the band with lower maximum output power in that test configuration; otherwise, both bands are tested independently for SAR.
3. The two U-NII bands may be aggregated to support a 160 MHz channel on channel number 50.
4. Without additional testing, the maximum output power for this is limited to the lower of the maximum output power certified for the two bands. When SAR measurement is required for at least one of the bands and the highest reported SAR adjusted by the ratio of specified maximum output power of aggregated to standalone band is > 1.2 W/kg, SAR is required for the 160 MHz

channel. This procedure does not apply to an aggregated band with maximum output higher than the standalone band(s); the aggregated band must be tested independently for SAR. SAR is not required when the 160 MHz channel is operating at a reduced maximum power and also qualifies for SAR test exclusion.

B) U-NII-2C and U-NII-3 Bands

The frequency range covered by these bands is 380 MHz (5.47 – 5.85 GHz), which requires a minimum of at least two SAR probe calibration frequency points to support SAR measurements. when Terminal Doppler Weather Radar (TDWR) restriction applies, all channels that operate at 5.60 – 5.65 GHz must be included to apply the SAR test reduction and measurement procedures.
When the same transmitter and antenna(s) are used for U-NII-2C band and U-NII-3 band or 5.8 GHz band of §15.247, the bands may be aggregated to enable additional channels with 20, 40 or 80 MHz bandwidth to span across the band gap, as illustrated in Appendix B. The maximum output power for the additional band gap channels is limited to the lower of those certified for the bands. Unless band gap channels are permanently disabled, they must be considered for SAR testing. The frequency range covered by these bands is 380 MHz (5.47 – 5.85 GHz), which requires a minimum of at least two SAR probe calibration frequency points to support SAR measurements. To maintain SAR measurement accuracy and to facilitate test reduction, the channels in U-NII-2C band above 5.65 GHz may be grouped with the 5.8 GHz channels in U-NII-3 or §15.247 band to enable two SAR probe calibration frequency points to cover the bands, including the band gap channels. When band gap channels are supported and the bands are not aggregated for SAR testing, band gap channels must be considered independently in each band according to the normally required OFDM SAR measurement and probe calibration frequency points requirements.

C) OFDM Transmission Mode SAR Test Configuration and Channel Selection Requirements

The initial test configuration for 5 GHz OFDM transmission modes is determined by the 802.11 configuration with the highest maximum output power specified for production units, including tune-up tolerance, in each standalone and aggregated frequency band. SAR for the initial test configuration is measured using the highest maximum output power channel determined by the default power measurement procedures. When multiple configurations in a frequency band have the same specified maximum output power, the initial test configuration is determined according to the following steps applied sequentially.

1. The largest channel bandwidth configuration is selected among the multiple configurations with the same specified maximum output power.
2. If multiple configurations have the same specified maximum output power and largest channel bandwidth, the lowest order modulation among the largest channel bandwidth configurations is selected.

3. If multiple configurations have the same specified maximum output power, largest channel band width and lowest order modulation, the lowest data rate configuration among these configurations is selected.
4. When multiple transmission modes (802.11a/g/n/ac) have the same specified maximum output power, largest channel bandwidth, lowest order modulation and lowest data rate, the lowest order 802.11 mode is selected; i.e., 802.11a is chosen over 802.11n then 802.11ac or 802.11g is chosen over 802.11n. After an initial test configuration is determined, if multiple test channels have the same measured maximum output power, the channel chosen for SAR measurement is determined according to the following. These channel selection procedures apply to both the initial test configuration and subsequent test configuration(s), with respect to the default power measurement procedures or additional power measurements required for further SAR test reduction. The same procedures also apply to subsequent highest output power channel(s) selection.
5. The channel closest to mid-band frequency is selected for SAR measurement.
6. For channels with equal separation from mid-band frequency; for example, high and low channels or two mid-band channels, the higher frequency (number) channel is selected for SAR measurement.

D) SAR Test Requirements for OFDM configurations

When SAR measurement is required for 802.11 a/n/ac OFDM configurations, each standalone and frequency aggregated band is considered separately for SAR test reduction. When the sametransmitter and antenna(s) are used for U-NII-1 and U-NII-2A bands, additional SAR test reduction Vapplies. When band gap channels between U-NII-2C band and 5.8 GHz U-NII-3 or §15.247 bandare supported, the highest maximum output power transmission mode configuration and maximumoutput power channel across the bands must be used to determine SAR test reduction, accordingto the initial test configuration and subsequent test configuration requirements. In applying theinitial test configuration and subsequent test configuration procedures, the 802.11 transmissionconfiguration with the highest specified maximum output power and the channel within a testconfiguration with the highest measured maximum output power should be clearly distinguished toapply the procedures.

13. Conducted Power List

Remark: The output power of WCDMA/LTE refers to the annex E of this report.

14. LTE Carrier Aggregation

➢ **Carrier Aggregation Configuration**

For the device supports bands and bandwidths and configurations are provided as follow table was according to 3GPP.

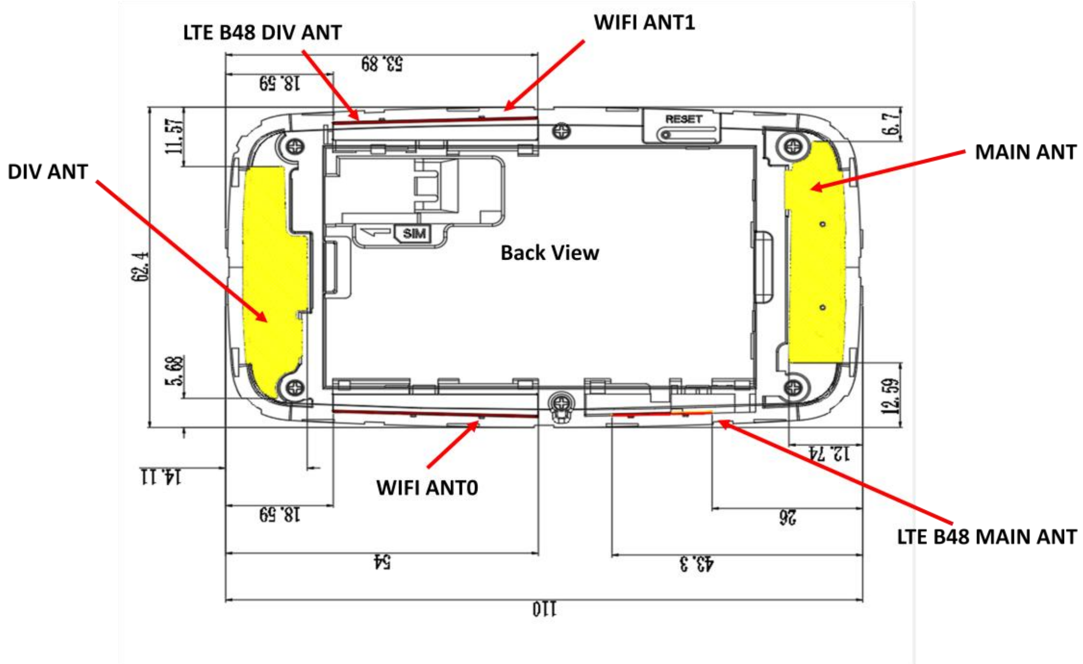
2CC Uplink Carrier Aggregation for Intra-band				
No.	Combination	MIMO	Restriction	Completely Covered by Measurement Superset
1	CA_7C	7C	-	No
2	CA_41C	41C	-	No

➢ **LTE Downlink Carrier Aggregation Conducted Power**

1. According to the 3GPP 36.101 table 6.2.2A-1 specifics that the aggregation maximum allowed output power is equivalent to the signal carrier scenario for intra-band contiguous carrier aggregation scenarios. When the non-contiguous RB allocation is applied the MPR shell complies with the table 6.2.3A defined in 3GPP 36.101.
2. According to the TCB Workshop publication, the output power of uplink CA would be measured with the wideband signal integration over the component carriers. And SAR measurement would be performed at the worst exposure condition of each band.
3. Additional SAR measurement for LTE UL CA with other DL CA combinations are not required when the maximum output power of this configuration is not ＞1/4 dB higher than the maximum output power for UL CA active.

15. Hotspot Mode Evaluation Procedure

➢ **EUT Antenna Location**



Antenna supports TX bands:
MAIN ANT: UMTS Band II/IV/V, LTE Band 2/4/5/7/12/13/14/17/25/26/41/66/71
LTE B48 MAIN ANT: LTE B48
WIFI ANT0: WLAN 2.4GHz/5GHz
WIFI ANT1: WLAN 2.4GHz/5GHz

Antenna supports RX bands:
DIV ANT: UMTS Band II/IV/V, LTE Band 2/4/5/7/12/13/14/17/25/26/41/66/71
LTE B48 DIV ANT (only RX): LTE B48

Note :

1. The SAR evaluation procedures for Portable Devices with Wireless Router function is according to KDB 941225 D06 Hotspot SAR v02r01.
2. Hotspot mode SAR assessments are required.
3. Referring to KDB 941225 D06, 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.

16. Block Diagram of the Tests to be Performed

➢ **Body**

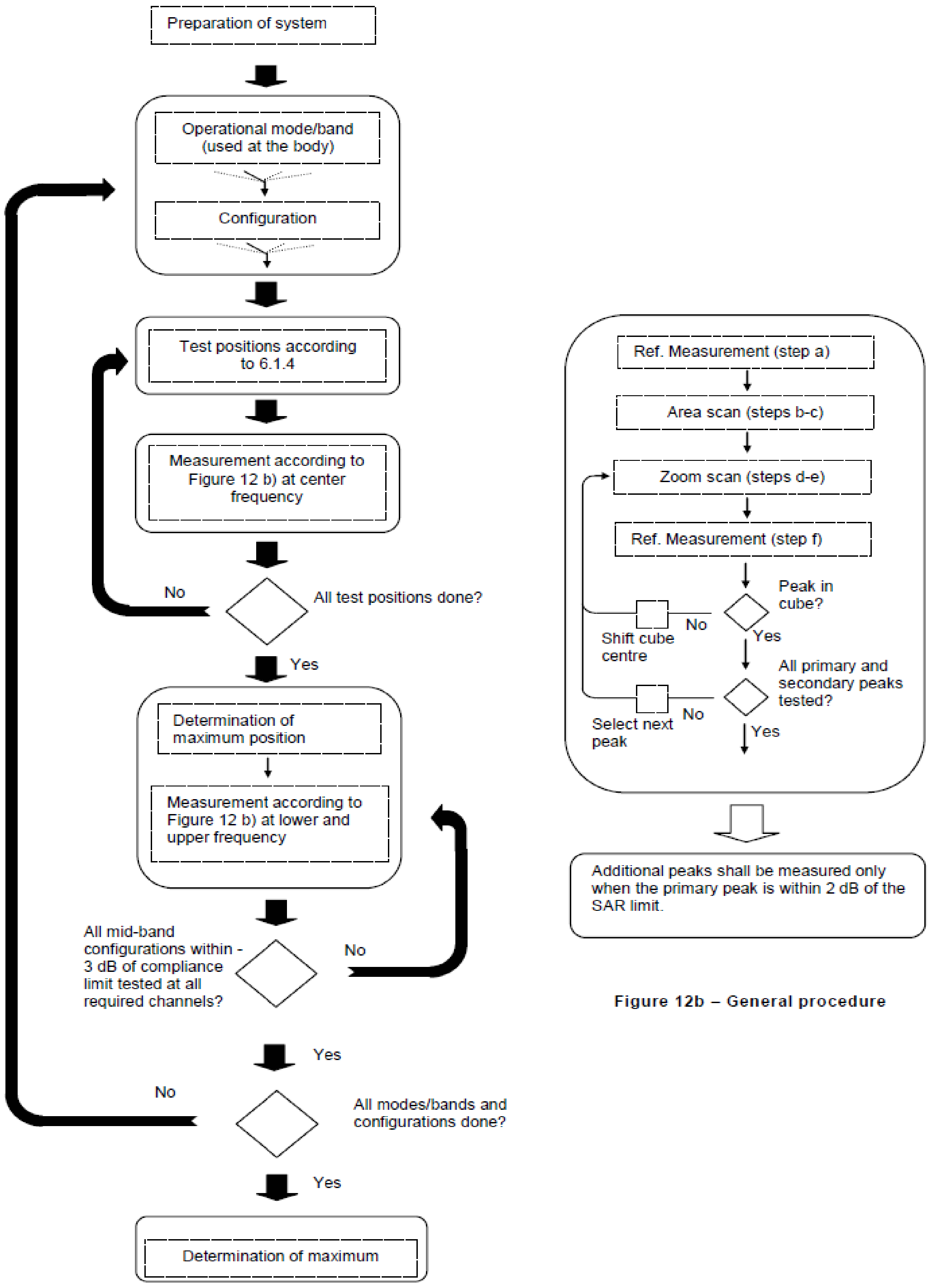


Figure 12b – General procedure

17. Test Results List

17.1. Test Guidance

1. Per KDB 447498 D01v06, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
   a. Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
   b. For SAR testing of WLAN signal with non-100% duty cycle, the measured SAR is scaled-up by the duty cycle scaling factor which is equal to "1/(duty cycle)".
   c. For WWAN: Reported SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor.
   d. For WLAN/Bluetooth: Reported SAR(W/kg)= Measured SAR(W/kg)* Duty Cycle scaling factor * Tune-up scaling factor.
2. Per KDB 447498 D01v06, for each exposure position, testing of other required channels within the operating mode of a frequency band is not required when the *reported* 1-g or 10-g SAR for the mid-band or highest output power channel is:
   a. ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
   b. ≤ 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
   c. ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz
3. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg.
4. Per KDB 648474 D04v01r03, when the reported SAR for a body-worn accessory measured without a headset connected to the handset is ≤ 1.2 W/kg, SAR testing with a headset connected to the handset is not required.
5. Per KDB648474 D04v01r03, for smart phones with a display diagonal dimension > 15.0 cm or an overall diagonal dimension > 16.0 cm, when hotspot mode applies, 10-g extremity SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg, however, when power reduction applies to hotspot mode the measured SAR must be scaled to the maximum output power, including tolerance, allowed for tablet modes to compare with the 1.2 W/kg SAR test reduction threshold.
6. Per KDB248227 D01v02r02, a Wi-Fi device must be configured to transmit continuously at the required data rate, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools for SAR measurement. The test frequencies established using test mode must correspond to the actual channel frequencies required for operations in the U.S. When 802.11 frame gaps are accounted for in the transmission, a maximum transmission duty factor of 92 - 96% is typically achievable in most test mode configurations. A minimum transmission duty factor of 85% is required to avoid certain hardware and device implementation issues related to wide range SAR scaling. In addition, a periodic

transmission duty factor is required for current generation SAR systems to measure SAR correctly. Unless it is permitted by specific KDB procedures or continuous transmission is specifically restricted by the device, the reported SAR must be scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit. When a device is not capable of sustaining continuous transmission or the output can become nonlinear, and it is limited by hardware design and unable to transmit at higher than 85% duty factor, a periodic duty factor within 15% of the maximum duty factor the device is capable of transmitting should be used. The reported SAR must be scaled to the maximum transmission duty factor to determine compliance. Descriptions of the procedures applied to establish the specific duty factor used for SAR testing are required in SAR reports to support the test results.

17.2. Body SAR Data

- **WCDMA Body SAR**

Plot No.	Band/Mode	Test Position	CH.	Ave. Power (dBm)	Tune-up Limit (dBm)	Tune-up Scaling Factor	Meas. SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)
	Band II/RMC 12.2Kbps	Front Side	9400	20.96	21.5	1.132	0.281	0.318
	Band II/RMC 12.2Kbps	Back Side	9400	20.96	21.5	1.132	0.496	0.562
	Band II/RMC 12.2Kbps	Left Side	9400	20.96	21.5	1.132	0.231	0.262
1#	Band II/RMC 12.2Kbps	Top Side	9400	20.96	21.5	1.132	0.626	0.709
	Band II/RMC 12.2Kbps	Right Side	9400	20.96	21.5	1.132	0.456	0.516
	Band II/RMC 12.2Kbps	Bottom Side	9400	20.96	21.5	1.132	0.291	0.330
	Band IV/RMC 12.2Kbps	Front Side	1413	20.34	21	1.164	0.267	0.311
	Band IV/RMC 12.2Kbps	Back Side	1413	20.34	21	1.164	0.422	0.491
	Band IV/RMC 12.2Kbps	Left Side	1413	20.34	21	1.164	0.057	0.066
2#	Band IV/RMC 12.2Kbps	Right Side	1413	20.34	21	1.164	0.452	0.526
	Band IV/RMC 12.2Kbps	Top Side	1413	20.34	21	1.164	0.109	0.127
	Band IV/RMC 12.2Kbps	Bottom Side	1413	20.34	21	1.164	0.057	0.066
3#	Band V/RMC 12.2Kbps	Front Side	4233	21.66	22	1.081	0.437	0.473
	Band V/RMC 12.2Kbps	Back Side	4233	21.66	22	1.081	0.367	0.397
	Band V/RMC 12.2Kbps	Left Side	4233	21.66	22	1.081	0.028	0.030
	Band V/RMC 12.2Kbps	Right Side	4233	21.66	22	1.081	0.023	0.025
	Band V/RMC 12.2Kbps	Top Side	4233	21.66	22	1.081	0.176	0.190
	Band V/RMC 12.2Kbps	Bottom Side	4233	21.66	22	1.081	0.180	0.195

- **LTE QPSK Body SAR**

Plot No.	Band/Mode	Test Position	CH.	Ave. Power (dBm)	Tune-up Limit (dBm)	Tune-up Scaling Factor	Meas. SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)
	LTE Band 2/1RB#0 20M	Front Side	18900	21.5	22	1.122	0.308	0.346
	LTE Band 2/1RB#0 20M	Back Side	18900	21.5	22	1.122	0.531	0.596
	LTE Band 2/1RB#0 20M	Left Side	18900	21.5	22	1.122	0.052	0.058
	LTE Band 2/1RB#0 20M	Right Side	18900	21.5	22	1.122	0.554	0.622
	LTE Band 2/1RB#0 20M	Top Side	18900	21.5	22	1.122	0.341	0.383
	LTE Band 2/1RB#0 20M	Bottom Side	18900	21.5	22	1.122	0.447	0.502
4#	LTE Band 2/1RB#0 20M	Right Side	18700	21.39	22	1.151	0.562	0.647
	LTE Band 2/1RB#0 20M	Right Side	19100	21.33	22	1.167	0.450	0.525

	LTE Band 2/50RB#0 20M	Front Side	18900	20.37	21	1.156	0.215	0.249
	LTE Band 2/50RB#0 20M	Back Side	18900	20.37	21	1.156	0.465	0.538
	LTE Band 2/50RB#0 20M	Left Side	18900	20.37	21	1.156	0.035	0.040
	LTE Band 2/50RB#0 20M	Right Side	18900	20.37	21	1.156	0.408	0.472
	LTE Band 2/50RB#0 20M	Top Side	18900	20.37	21	1.156	0.101	0.117
	LTE Band 2/50RB#0 20M	Bottom Side	18900	20.37	21	1.156	0.136	0.157
	LTE Band 4/1RB#0 20M	Front Side	20175	21.32	22.00	1.169	0.288	0.337
	LTE Band 4/1RB#0 20M	Back Side	20175	21.32	22.00	1.169	0.504	0.589
	LTE Band 4/1RB#0 20M	Left Side	20175	21.32	22.00	1.169	0.061	0.071
5#	LTE Band 4/1RB#0 20M	Right Side	20175	21.32	22.00	1.169	0.548	0.641
	LTE Band 4/1RB#0 20M	Top Side	20175	21.32	22.00	1.169	0.263	0.308
	LTE Band 4/1RB#0 20M	Bottom Side	20175	21.32	22.00	1.169	0.292	0.341
	LTE Band 4/50RB#0 20M	Front Side	20175	20.24	21.00	1.191	0.245	0.292
	LTE Band 4/50RB#0 20M	Back Side	20175	20.24	21.00	1.191	0.430	0.512
	LTE Band 4/50RB#0 20M	Left Side	20175	20.24	21.00	1.191	0.032	0.038
	LTE Band 4/50RB#0 20M	Right Side	20175	20.24	21.00	1.191	0.454	0.541
	LTE Band 4/50RB#0 20M	Top Side	20175	20.24	21.00	1.191	0.090	0.107
	LTE Band 4/50RB#0 20M	Bottom Side	20175	20.24	21.00	1.191	0.081	0.096
	LTE Band 5/1RB#0 10M	Front Side	20525	22.6	23	1.096	0.330	0.362
	LTE Band 5/1RB#0 10M	Back Side	20525	22.6	23	1.096	0.315	0.345
	LTE Band 5/1RB#0 10M	Left Side	20525	22.6	23	1.096	0.032	0.035
	LTE Band 5/1RB#0 10M	Right Side	20525	22.6	23	1.096	0.022	0.024
	LTE Band 5/1RB#0 10M	Top Side	20525	22.6	23	1.096	0.198	0.217
	LTE Band 5/1RB#0 10M	Bottom Side	20525	22.6	23	1.096	0.195	0.214
6#	LTE Band 5/1RB#0 10M	Front Side	20450	22.5	23	1.122	0.522	0.586
	LTE Band 5/1RB#0 10M	Front Side	20600	22.57	23	1.104	0.250	0.276
	LTE Band 5/25RB#0 10M	Front Side	20525	21.4	22	1.148	0.249	0.286
	LTE Band 5/25RB#0 10M	Back Side	20525	21.4	22	1.148	0.309	0.355
	LTE Band 5/25RB#0 10M	Left Side	20525	21.4	22	1.148	0.019	0.022
	LTE Band 5/25RB#0 10M	Right Side	20525	21.4	22	1.148	0.021	0.024
	LTE Band 5/25RB#0 10M	Top Side	20525	21.4	22	1.148	0.194	0.223
	LTE Band 5/25RB#0 10M	Bottom Side	20525	21.4	22	1.148	0.189	0.217
	LTE Band 7/1RB#0 20M	Front Side	21100	21.95	22.5	1.135	0.836	0.949
	LTE Band 7/1RB#0 20M	Back Side	21100	21.95	22.5	1.135	0.737	0.837
	LTE Band 7/1RB#0 20M	Left Side	21100	21.95	22.5	1.135	0.058	0.066

	LTE Band 7/1RB#0 20M	Right Side	21100	21.95	22.5	1.135	0.602	0.683
	LTE Band 7/1RB#0 20M	Top Side	21100	21.95	22.5	1.135	0.164	0.186
	LTE Band 7/1RB#0 20M	Bottom Side	21100	21.95	22.5	1.135	0.644	0.731
7#	LTE Band 7/1RB#0 20M	Front Side	20850	21.84	22.5	1.164	0.829	0.965
	LTE Band 7/1RB#0 20M	Front Side	21350	21.76	22.5	1.186	0.705	0.836
	LTE Band 7/50RB#0 20M	Front Side	21100	20.98	21.5	1.127	0.639	0.720
	LTE Band 7/50RB#0 20M	Back Side	21100	20.98	21.5	1.127	0.545	0.614
	LTE Band 7/50RB#0 20M	Left Side	21100	20.98	21.5	1.127	0.041	0.046
	LTE Band 7/50RB#0 20M	Right Side	21100	20.98	21.5	1.127	0.533	0.601
	LTE Band 7/50RB#0 20M	Top Side	21100	20.98	21.5	1.127	0.129	0.145
	LTE Band 7/50RB#0 20M	Bottom Side	21100	20.98	21.5	1.127	0.502	0.566
	LTE Band 7/**100RB**#0 20M	Front Side	21100	21.07	21.5	1.104	0.647	0.714
	LTE Band 7C/100RB#0 20M+20M	Front Side	20850	20.01	21.0	1.256	0.712	0.894
Full Power for ANT 0								
	LTE Band 12/1RB#0 10M	Front Side	23095	22.65	23.00	1.084	0.519	0.563
	LTE Band 12/1RB#0 10M	Back Side	23095	22.65	23.00	1.084	0.503	0.545
	LTE Band 12/1RB#0 10M	Left Side	23095	22.65	23.00	1.084	0.045	0.049
	LTE Band 12/1RB#0 10M	Right Side	23095	22.65	23.00	1.084	0.132	0.143
	LTE Band 12/1RB#0 10M	Top Side	23095	22.65	23.00	1.084	0.402	0.436
	LTE Band 12/1RB#0 10M	Bottom Side	23095	22.65	23.00	1.084	0.405	0.439
8#	LTE Band 12/1RB#0 10M	Front Side	23060	22.58	23.00	1.102	0.535	0.589
	LTE Band 12/1RB#0 10M	Front Side	23130	22.54	23.00	1.112	0.525	0.584
	LTE Band 12/25RB#0 10M	Front Side	23095	21.64	22.00	1.086	0.494	0.537
	LTE Band 12/25RB#0 10M	Back Side	23095	21.64	22.00	1.086	0.485	0.527
	LTE Band 12/25RB#0 10M	Left Side	23095	21.64	22.00	1.086	0.025	0.027
	LTE Band 12/25RB#0 10M	Right Side	23095	21.64	22.00	1.086	0.110	0.120
	LTE Band 12/25RB#0 10M	Top Side	23095	21.64	22.00	1.086	0.268	0.291
	LTE Band 12/25RB#0 10M	Bottom Side	23095	21.64	22.00	1.086	0.324	0.352
9#	LTE Band 13/1RB#0 10M	Front Side	23230	22.65	23.00	1.084	0.436	0.473
	LTE Band 13/1RB#0 10M	Back Side	23230	22.65	23.00	1.084	0.398	0.431
	LTE Band 13/1RB#0 10M	Left Side	23230	22.65	23.00	1.084	0.023	0.025
	LTE Band 13/1RB#0 10M	Right Side	23230	22.65	23.00	1.084	0.176	0.191
	LTE Band 13/1RB#0 10M	Top Side	23230	22.65	23.00	1.084	0.172	0.186
	LTE Band 13/1RB#0 10M	Bottom Side	23230	22.65	23.00	1.084	0.208	0.225
	LTE Band 13/25RB#0 10M	Front Side	23230	21.60	22.00	1.096	0.333	0.365
	LTE Band 13/25RB#0 10M	Back Side	23230	21.60	22.00	1.096	0.330	0.362

	LTE Band 13/25RB#0 10M	Left Side	23230	21.60	22.00	1.096	0.013	0.014
	LTE Band 13/25RB#0 10M	Right Side	23230	21.60	22.00	1.096	0.132	0.145
	LTE Band 13/25RB#0 10M	Top Side	23230	21.60	22.00	1.096	0.141	0.155
	LTE Band 13/25RB#0 10M	Bottom Side	23230	21.60	22.00	1.096	0.178	0.195
10#	LTE Band 14/1RB#0 10M	Front Side	23330	22.54	23.00	1.112	0.399	0.444
	LTE Band 14/1RB#0 10M	Back Side	23330	22.54	23.00	1.112	0.314	0.349
	LTE Band 14/1RB#0 10M	Left Side	23330	22.54	23.00	1.112	0.021	0.023
	LTE Band 14/1RB#0 10M	Right Side	23330	22.54	23.00	1.112	0.165	0.183
	LTE Band 14/1RB#0 10M	Top Side	23330	22.54	23.00	1.112	0.176	0.196
	LTE Band 14/1RB#0 10M	Bottom Side	23330	22.54	23.00	1.112	0.228	0.253
	LTE Band 14/25RB#0 10M	Front Side	23330	21.16	22.00	1.213	0.332	0.403
	LTE Band 14/25RB#0 10M	Back Side	23330	21.16	22.00	1.213	0.324	0.393
	LTE Band 14/25RB#0 10M	Left Side	23330	21.16	22.00	1.213	0.025	0.030
	LTE Band 14/25RB#0 10M	Right Side	23330	21.16	22.00	1.213	0.164	0.199
	LTE Band 14/25RB#0 10M	Top Side	23330	21.16	22.00	1.213	0.138	0.167
	LTE Band 14/25RB#0 10M	Bottom Side	23330	21.16	22.00	1.213	0.180	0.218
11#	LTE Band 17/1RB#0 10M	Front Side	23790	22.78	23.50	1.180	0.738	0.871
	LTE Band 17/1RB#0 10M	Back Side	23790	22.78	23.50	1.180	0.639	0.754
	LTE Band 17/1RB#0 10M	Left Side	23790	22.78	23.50	1.180	0.019	0.022
	LTE Band 17/1RB#0 10M	Right Side	23790	22.78	23.50	1.180	0.152	0.179
	LTE Band 17/1RB#0 10M	Top Side	23790	22.78	23.50	1.180	0.328	0.387
	LTE Band 17/1RB#0 10M	Bottom Side	23790	22.78	23.50	1.180	0.399	0.471
	LTE Band 17/1RB#0 10M	Front Side	23780	22.74	23.50	1.191	0.328	0.391
	LTE Band 17/1RB#0 10M	Front Side	23800	22.60	23.50	1.230	0.399	0.491
	LTE Band 17/25RB#0 10M	Front Side	23790	21.57	22.50	1.239	0.517	0.640
	LTE Band 17/25RB#0 10M	Back Side	23790	21.57	22.50	1.239	0.498	0.617
	LTE Band 17/25RB#0 10M	Left Side	23790	21.57	22.50	1.239	0.010	0.012
	LTE Band 17/25RB#0 10M	Right Side	23790	21.57	22.50	1.239	0.102	0.126
	LTE Band 17/25RB#0 10M	Top Side	23790	21.57	22.50	1.239	0.259	0.321
	LTE Band 17/25RB#0 10M	Bottom Side	23790	21.57	22.50	1.239	0.308	0.382
	LTE Band 25/1RB#0 20M	Front Side	26365	21.86	22.50	1.159	0.268	0.311
	LTE Band 25/1RB#0 20M	Back Side	26365	21.86	22.50	1.159	0.464	0.538
	LTE Band 25/1RB#0 20M	Left Side	26365	21.86	22.50	1.159	0.056	0.065
12#	LTE Band 25/1RB#0 20M	Right Side	26365	21.86	22.50	1.159	0.481	0.557
	LTE Band 25/1RB#0 20M	Top Side	26365	21.86	22.50	1.159	0.238	0.276

	LTE Band 25/1RB#0 20M	Bottom Side	26365	21.86	22.50	1.159	0.329	0.381
	LTE Band 25/50RB#0 20M	Front Side	26365	20.87	21.50	1.156	0.206	0.238
	LTE Band 25/50RB#0 20M	Back Side	26365	20.87	21.50	1.156	0.399	0.461
	LTE Band 25/50RB#0 20M	Left Side	26365	20.87	21.50	1.156	0.030	0.035
	LTE Band 25/50RB#0 20M	Right Side	26365	20.87	21.50	1.156	0.297	0.343
	LTE Band 25/50RB#0 20M	Top Side	26365	20.87	21.50	1.156	0.090	0.104
	LTE Band 25/50RB#0 20M	Bottom Side	26365	20.87	21.50	1.156	0.130	0.150
13#	LTE Band 26/1RB#0 15M	Front Side	26865	22.56	23.00	1.107	0.525	0.581
	LTE Band 26/1RB#0 15M	Back Side	26865	22.56	23.00	1.107	0.445	0.492
	LTE Band 26/1RB#0 15M	Left Side	26865	22.56	23.00	1.107	0.056	0.062
	LTE Band 26/1RB#0 15M	Right Side	26865	22.56	23.00	1.107	0.023	0.025
	LTE Band 26/1RB#0 15M	Top Side	26865	22.56	23.00	1.107	0.191	0.211
	LTE Band 26/1RB#0 15M	Bottom Side	26865	22.56	23.00	1.107	0.198	0.219
	LTE Band 26/36RB#0 15M	Front Side	26865	21.58	22.00	1.102	0.409	0.451
	LTE Band 26/36RB#0 15M	Back Side	26865	21.58	22.00	1.102	0.348	0.383
	LTE Band 26/36RB#0 15M	Left Side	26865	21.58	22.00	1.102	0.021	0.023
	LTE Band 26/36RB#0 15M	Right Side	26865	21.58	22.00	1.102	0.018	0.020
	LTE Band 26/36RB#0 15M	Top Side	26865	21.58	22.00	1.102	0.166	0.183
	LTE Band 26/36RB#0 15M	Bottom Side	26865	21.58	22.00	1.102	0.158	0.174
14#	LTE Band 41/1RB#0 20M	Front Side	40185	23.85	24.5	1.161	0.420	0.491
	LTE Band 41/1RB#0 20M	Back Side	40185	23.85	24.5	1.161	0.415	0.485
	LTE Band 41/1RB#0 20M	Left Side	40185	23.85	24.5	1.161	0.061	0.071
	LTE Band 41/1RB#0 20M	Right Side	40185	23.85	24.5	1.161	0.386	0.451
	LTE Band 41/1RB#0 20M	Top Side	40185	23.85	24.5	1.161	0.144	0.168
	LTE Band 41/1RB#0 20M	Bottom Side	40185	23.85	24.5	1.161	0.413	0.483
	LTE Band 41/50RB#0 20M	Front Side	40185	23.79	24	1.050	0.307	0.324
	LTE Band 41/50RB#0 20M	Back Side	40185	23.79	24	1.050	0.322	0.340
	LTE Band 41/50RB#0 20M	Left Side	40185	23.79	24	1.050	0.032	0.034
	LTE Band 41/50RB#0 20M	Right Side	40185	23.79	24	1.050	0.317	0.335
	LTE Band 41/50RB#0 20M	Top Side	40185	23.79	24	1.050	0.080	0.084
	LTE Band 41/50RB#0 20M	Bottom Side	40185	23.79	24	1.050	0.293	0.309
	LTE Band 41C/100RB#0 20M+20M	Front Side	39750	20.34	21	1.164	0.272	0.319
	LTE Band 48/1RB#0 20M	Front Side	55340	23.29	24	1.178	0.503	0.596
	LTE Band 48/1RB#0 20M	Back Side	55340	23.29	24	1.178	0.335	0.397

	LTE Band 48/1RB#0 20M	Left Side	55340	23.29	24	1.178	0.072	0.085
	LTE Band 48/1RB#0 20M	Right Side	55340	23.29	24	1.178	0.243	0.288
	LTE Band 48/1RB#0 20M	Top Side	55340	23.29	24	1.178	0.554	0.656
15#	LTE Band 48/1RB#0 20M	Bottom Side	55340	23.29	24	1.178	0.556	0.659
	LTE Band 48/50RB#0 20M	Front Side	55340	21.79	23	1.321	0.378	0.502
	LTE Band 48/50RB#0 20M	Back Side	55340	21.79	23	1.321	0.272	0.362
	LTE Band 48/50RB#0 20M	Left Side	55340	21.79	23	1.321	0.057	0.076
	LTE Band 48/50RB#0 20M	Right Side	55340	21.79	23	1.321	0.195	0.259
	LTE Band 48/50RB#0 20M	Top Side	55340	21.79	23	1.321	0.438	0.582
	LTE Band 48/50RB#0 20M	Bottom Side	55340	21.79	23	1.321	0.064	0.085
	LTE Band 66/1RB#0 20M	Front Side	132322	21.54	22.00	1.112	0.408	0.454
	LTE Band 66/1RB#0 20M	Back Side	132322	21.54	22.00	1.112	0.606	0.674
	LTE Band 66/1RB#0 20M	Left Side	132322	21.54	22.00	1.112	0.058	0.064
16#	LTE Band 66/1RB#0 20M	Right Side	132322	21.54	22.00	1.112	0.620	0.689
	LTE Band 66/1RB#0 20M	Top Side	132322	21.54	22.00	1.112	0.144	0.160
	LTE Band 66/1RB#0 20M	Bottom Side	132322	21.54	22.00	1.112	0.114	0.127
	LTE Band 66/50RB#0 20M	Front Side	132322	20.53	21.00	1.114	0.263	0.293
	LTE Band 66/50RB#0 20M	Back Side	132322	20.53	21.00	1.114	0.463	0.516
	LTE Band 66/50RB#0 20M	Left Side	132322	20.53	21.00	1.114	0.045	0.050
	LTE Band 66/50RB#0 20M	Right Side	132322	20.53	21.00	1.114	0.538	0.599
	LTE Band 66/50RB#0 20M	Top Side	132322	20.53	21.00	1.114	0.109	0.121
	LTE Band 66/50RB#0 20M	Bottom Side	132322	20.53	21.00	1.114	0.090	0.100
	LTE Band 71/1RB#0 20M	Front Side	133322	22.97	23.50	1.130	0.254	0.287
17#	LTE Band 71/1RB#0 20M	Back Side	133322	22.97	23.50	1.130	0.276	0.312
	LTE Band 71/1RB#0 20M	Left Side	133322	22.97	23.50	1.130	0.042	0.047
	LTE Band 71/1RB#0 20M	Right Side	133322	22.97	23.50	1.130	0.040	0.045
	LTE Band 71/1RB#0 20M	Top Side	133322	22.97	23.50	1.130	0.129	0.146
	LTE Band 71/1RB#0 20M	Bottom Side	133322	22.97	23.50	1.130	0.146	0.165
	LTE Band 71/50RB#0 20M	Front Side	133322	22.13	23.00	1.222	0.191	0.233
	LTE Band 71/50RB#0 20M	Back Side	133322	22.13	23.00	1.222	0.196	0.239
	LTE Band 71/50RB#0 20M	Left Side	133322	22.13	23.00	1.222	0.023	0.028
	LTE Band 71/50RB#0 20M	Right Side	133322	22.13	23.00	1.222	0.031	0.038
	LTE Band 71/1RB#0 20M	Top Side	133322	22.13	23.00	1.222	0.101	0.123
	LTE Band 71/50RB#0 20M	Bottom Side	133322	22.13	23.00	1.222	0.102	0.125

- **WLAN Body SAR**

Plot No.	Band/Mode	Test Position	CH.	Ave. Power (dBm)	Tune-up Limit (dBm)	Tune-up Scaling Factor	Meas. SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)
ANT 1								
18#	WLAN2.4GHz/802.11b	Front Side	1	13.63	14	1.089	0.048	0.053
	WLAN2.4GHz/802.11b	Back Side	1	13.63	14	1.089	0.036	0.040
	WLAN2.4GHz/802.11b	Left Side	1	13.63	14	1.089	0.007	0.008
	WLAN2.4GHz/802.11b	Top Side	1	13.63	14	1.089	0.005	0.006
	WLAN2.4GHz/802.11b	Right Side	1	13.63	14	1.089	0.041	0.045
	WLAN2.4GHz/802.11b	Bottom Side	1	13.63	14	1.089	0.009	0.010
ANT 0								
19#	WLAN2.4GHz/802.11b	Front Side	6	12.79	13.5	1.178	0.033	0.040
	WLAN2.4GHz/802.11b	Back Side	6	12.79	13.5	1.178	0.021	0.025
	WLAN2.4GHz/802.11b	Left Side	6	12.79	13.5	1.178	0.005	0.006
	WLAN2.4GHz/802.11b	Right Side	6	12.79	13.5	1.178	0.001	0.001
	WLAN2.4GHz/802.11b	Top Side	6	12.79	13.5	1.178	0.002	0.002
	WLAN2.4GHz/802.11b	Bottom Side	6	12.79	13.5	1.178	0.028	0.034
ANT 1								
	WLAN 5.2GHz/802.11ac-40	Front Side	48	12.37	13	1.156	0.083	0.106
	WLAN 5.2GHz/802.11ac-40	Back Side	48	12.37	13	1.156	0.049	0.063
	WLAN 5.2GHz/802.11ac-40	Left Side	48	12.37	13	1.156	0.007	0.009
	WLAN 5.2GHz/802.11ac-40	Right Side	48	12.37	13	1.156	0.010	0.013
20#	WLAN 5.2GHz/802.11ac-40	Top Side	48	12.37	13	1.156	0.131	0.167
	WLAN 5.2GHz/802.11ac-40	Bottom Side	48	12.37	13	1.156	0.027	0.034
ANT 0								
	WLAN 5.2GHz/802.11ac-40	Front Side	48	12.1	12.5	1.096	0.058	0.070
	WLAN 5.2GHz/802.11ac-40	Back Side	48	12.1	12.5	1.096	0.097	0.118
	WLAN 5.2GHz/802.11ac-40	Left Side	48	12.1	12.5	1.096	0.013	0.016
	WLAN 5.2GHz/802.11ac-40	Right Side	48	12.1	12.5	1.096	0.002	0.002
	WLAN 5.2GHz/802.11ac-40	Top Side	48	12.1	12.5	1.096	0.004	0.005
21#	WLAN 5.2GHz/802.11ac-40	Bottom Side	48	12.1	12.5	1.096	0.297	0.360
ANT 1								
	WLAN 5.8GHz/802.11ac-40	Front Side	151	15.57	16	1.104	0.033	0.040
	WLAN 5.8GHz/802.11ac-40	Back Side	151	15.57	16	1.104	0.041	0.050
	WLAN 5.8GHz/802.11ac-40	Left Side	151	15.57	16	1.104	0.030	0.037
	WLAN 5.8GHz/802.11ac-40	Right Side	151	15.57	16	1.104	0.011	0.013
22#	WLAN 5.8GHz/802.11ac-40	Top Side	151	15.57	16	1.104	0.111	0.135
	WLAN 5.8GHz/802.11ac-40	Bottom Side	151	15.57	16	1.104	0.021	0.026

Shenzhen Morlab Communications Technology Co., Ltd.
FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road,
Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China

Tel: 86-755-36698555 Fax: 86-755-36698525
Http://www.morlab.cn E-mail: service@morlab.cn

ANT 0								
	WLAN 5.8GHz/802.11ac-40	Front Side	151	13.17	13.5	1.079	0.089	0.106
	WLAN 5.8GHz/802.11ac-40	Back Side	151	13.17	13.5	1.079	0.089	0.106
	WLAN 5.8GHz/802.11ac-40	Left Side	151	13.17	13.5	1.079	0.026	0.031
	WLAN 5.8GHz/802.11ac-40	Right Side	151	13.17	13.5	1.079	0.014	0.017
	WLAN 5.8GHz/802.11ac-40	Top Side	151	13.17	13.5	1.079	0.008	0.010
23#	WLAN 5.8GHz/802.11ac-40	Bottom Side	151	13.17	13.5	1.079	0.257	0.306

Note:

1. For TDD-LTE, the reported SAR should be scaled with the duty cycle scaling factor 1.006.
2. The 2.4G WLAN reported 1g SAR (W/kg) should be scaled with the duty cycle scaling factor 1.018, 5G WLAN 802.11ac-VHT40 with 1.105.

17.3. Repeated SAR Assessment

➢ **General Note**

In accordance with published RF Exposure KDB procedure 865664 D01 SAR measurement 100 MHz to 6 GHz. These additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

1. Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg;
2. When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.
3. Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).
4. Perform a third repeated measurement only if the original, first or second repeated measurement is ≥1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

➢ **Test Results**

Plot No.	Band/Mode	Test Position	CH.	Ave. Power (dBm)	Tune-up Limit (dBm)	Tune-up Scaling Factor	Meas. SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)
OR.	LTE Band 7/1RB#0 20M	Front Side	20850	21.84	22.5	1.164	0.829	0.965
1^{st}	LTE Band 7/1RB#0 20M	Front Side	20850	21.84	22.5	1.164	0.807	0.939

18. Simultaneous Transmission Evaluation

18.1. Simultaneous Transmission Consideration

No.	Simultaneous Transmission Consideration	Hotspot
1	WWAN+WLAN 2.4GHz/5GHz SISO	Yes
2	WWAN+WLAN 2.4GHz/5GHz MIMO	Yes

Note:

1. When the user enables the personal wireless router functions for the handset, actual operations include simultaneous transmission of the WWAN and WLAN transmitters. The "Portable Hotspot" feature on the handset was NOT activated, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal.
2. Per KDB 447498D01v06, simultaneous transmission SAR evaluation procedures is as followed:
   Step 1: If sum of 1 g SAR < 1.6 W/kg, Simultaneous SAR measurement is not required.
   Step 2: If sum of 1 g SAR > 1.6 W/kg, ratio of SAR to peak separation distance for pair of transmitters calculated.
   Step 3: If the ratio of SAR to peak separation distance is ≤ 0.04, Simultaneous SAR measurement is not required.
   Step 4: If the ratio of SAR to peak separation distance is > 0.04, Simultaneous SAR measurement is required and simultaneous transmission SAR value is calculated.
   (The ratio is determined by: (SAR1 + SAR2) ^ 1.5/Ri ≤ 0.04,
   Ri is the separation distance between the peak SAR locations for the antenna pair in mm.
3. This device does not support the combination of WWAN+WLAN 2.4GHz+WLAN 5GHz.
4. For the co-location of WWAN+WLAN SISO, it was not recorded in this report since it is less than the combination of WWAN+WLAN MIMO

18.2. Simultaneous Transmission Analysis

➢ **Body Simultaneous Transmission for WWAN+WLAN 2.4G MIMO**

WWAN Band	Exposure Position	1	2	3	1+2+3 Summed 1g SAR (W/kg)
		WWAN	2.4GHz WLAN ANT 0	2.4GHz WLAN ANT 1	
		1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	
WCDMA II	Front Side	0.318	0.053	0.040	0.411
	Back Side	0.562	0.040	0.025	0.627
	Left Side	0.262	0.008	0.006	0.276
	Right Side	0.709	0.006	0.001	0.716
	Top Side	0.516	0.045	0.002	0.563
	Bottom Side	0.330	0.010	0.034	0.374
WCDMA IV	Front Side	0.311	0.053	0.040	0.404
	Back Side	0.491	0.040	0.025	0.556
	Left Side	0.066	0.008	0.006	0.080
	Right Side	0.526	0.006	0.001	0.533
	Top Side	0.127	0.045	0.002	0.174
	Bottom Side	0.066	0.010	0.034	0.110
WCDMA V	Front Side	0.473	0.053	0.040	0.566
	Back Side	0.397	0.040	0.025	0.462
	Left Side	0.030	0.008	0.006	0.044
	Right Side	0.025	0.006	0.001	0.032
	Top Side	0.190	0.045	0.002	0.237
	Bottom Side	0.195	0.010	0.034	0.239
LTE Band 2	Front Side	0.346	0.053	0.040	0.439
	Back Side	0.596	0.040	0.025	0.661
	Left Side	0.058	0.008	0.006	0.072
	Right Side	0.647	0.006	0.001	0.654
	Top Side	0.383	0.045	0.002	0.430
	Bottom Side	0.502	0.010	0.034	0.546
LTE Band 4	Front Side	0.337	0.053	0.040	0.430
	Back Side	0.589	0.040	0.025	0.654
	Left Side	0.071	0.008	0.006	0.085
	Right Side	0.641	0.006	0.001	0.648
	Top Side	0.308	0.045	0.002	0.355
	Bottom Side	0.341	0.010	0.034	0.385

LTE Band 5	Front Side	0.586	0.053	0.040	0.679
	Back Side	0.345	0.040	0.025	0.410
	Left Side	0.355	0.008	0.006	0.369
	Right Side	0.024	0.006	0.001	0.031
	Top Side	0.223	0.045	0.002	0.270
	Bottom Side	0.217	0.010	0.034	0.261
LTE Band 7	Front Side	0.965	0.053	0.040	1.058
	Back Side	0.837	0.040	0.025	0.902
	Left Side	0.066	0.008	0.006	0.080
	Right Side	0.683	0.006	0.001	0.690
	Top Side	0.186	0.045	0.002	0.233
	Bottom Side	0.731	0.010	0.034	0.775
LTE Band 12	Front Side	0.589	0.053	0.040	0.682
	Back Side	0.545	0.040	0.025	0.610
	Left Side	0.049	0.008	0.006	0.063
	Right Side	0.143	0.006	0.001	0.150
	Top Side	0.436	0.045	0.002	0.483
	Bottom Side	0.439	0.010	0.034	0.483
LTE Band 13	Front Side	0.473	0.053	0.040	0.566
	Back Side	0.431	0.040	0.025	0.496
	Left Side	0.025	0.008	0.006	0.039
	Right Side	0.191	0.006	0.001	0.198
	Top Side	0.186	0.045	0.002	0.233
	Bottom Side	0.225	0.010	0.034	0.269
LTE Band 14	Front Side	0.444	0.053	0.040	0.537
	Back Side	0.393	0.040	0.025	0.458
	Left Side	0.030	0.008	0.006	0.044
	Right Side	0.199	0.006	0.001	0.206
	Top Side	0.196	0.045	0.002	0.243
	Bottom Side	0.253	0.010	0.034	0.297
LTE Band 17	Front Side	0.871	0.053	0.040	0.964
	Back Side	0.754	0.040	0.025	0.819
	Left Side	0.022	0.008	0.006	0.036
	Right Side	0.179	0.006	0.001	0.186
	Top Side	0.387	0.045	0.002	0.434
	Bottom Side	0.471	0.010	0.034	0.515
LTE Band 25	Front Side	0.311	0.053	0.040	0.404
	Back Side	0.538	0.040	0.025	0.603

	Left Side	0.065	0.008	0.006	0.079
	Right Side	0.557	0.006	0.001	0.564
	Top Side	0.276	0.045	0.002	0.323
	Bottom Side	0.381	0.010	0.034	0.425
LTE Band 26	Front Side	0.581	0.053	0.040	0.674
	Back Side	0.492	0.040	0.025	0.557
	Left Side	0.062	0.008	0.006	0.076
	Right Side	0.025	0.006	0.001	0.032
	Top Side	0.211	0.045	0.002	0.258
	Bottom Side	0.219	0.010	0.034	0.263
LTE Band 41	Front Side	0.491	0.053	0.040	0.584
	Back Side	0.485	0.040	0.025	0.550
	Left Side	0.071	0.008	0.006	0.085
	Right Side	0.451	0.006	0.001	0.458
	Top Side	0.168	0.045	0.002	0.215
	Bottom Side	0.483	0.010	0.034	0.527
LTE Band 48	Front Side	0.596	0.053	0.040	0.689
	Back Side	0.397	0.040	0.025	0.462
	Left Side	0.085	0.008	0.006	0.099
	Right Side	0.288	0.006	0.001	0.295
	Top Side	0.656	0.045	0.002	0.703
	Bottom Side	0.659	0.010	0.034	0.703
LTE Band 66	Front Side	0.454	0.053	0.040	0.547
	Back Side	0.674	0.040	0.025	0.739
	Left Side	0.064	0.008	0.006	0.078
	Right Side	0.689	0.006	0.001	0.696
	Top Side	0.160	0.045	0.002	0.207
	Bottom Side	0.127	0.010	0.034	0.171
LTE Band 71	Front Side	0.287	0.053	0.040	0.380
	Back Side	0.312	0.040	0.025	0.377
	Left Side	0.047	0.008	0.006	0.061
	Right Side	0.045	0.006	0.001	0.052
	Top Side	0.146	0.045	0.002	0.193
	Bottom Side	0.165	0.010	0.034	0.209

➢ **Body Simultaneous Transmission for WWAN+ WLAN 5G MIMO**

WWAN Band	Exposure Position	1	2	3	1+2+3 Summed 1g SAR (W/kg)
		WWAN	5GHz WLAN ANT 0	5GHz WLAN ANT 1	
		1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	
WCDMA II	Front Side	0.318	0.106	0.106	0.530
	Back Side	0.562	0.063	0.118	0.743
	Left Side	0.262	0.037	0.031	0.330
	Right Side	0.709	0.013	0.017	0.739
	Top Side	0.516	0.167	0.010	0.693
	Bottom Side	0.330	0.034	0.360	0.724
WCDMA IV	Front Side	0.311	0.106	0.106	0.523
	Back Side	0.491	0.063	0.118	0.672
	Left Side	0.066	0.037	0.031	0.134
	Right Side	0.526	0.013	0.017	0.556
	Top Side	0.127	0.167	0.010	0.304
	Bottom Side	0.066	0.034	0.360	0.460
WCDMA V	Front Side	0.473	0.106	0.106	0.685
	Back Side	0.397	0.063	0.118	0.578
	Left Side	0.030	0.037	0.031	0.098
	Right Side	0.025	0.013	0.017	0.055
	Top Side	0.190	0.167	0.010	0.367
	Bottom Side	0.195	0.034	0.360	0.589
LTE Band 2	Front Side	0.346	0.106	0.106	0.558
	Back Side	0.596	0.063	0.118	0.777
	Left Side	0.058	0.037	0.031	0.126
	Right Side	0.647	0.013	0.017	0.677
	Top Side	0.383	0.167	0.010	0.560
	Bottom Side	0.502	0.034	0.360	0.896
LTE Band 4	Front Side	0.337	0.106	0.106	0.549
	Back Side	0.589	0.063	0.118	0.770
	Left Side	0.071	0.037	0.031	0.139
	Right Side	0.641	0.013	0.017	0.671
	Top Side	0.308	0.167	0.010	0.485
	Bottom Side	0.341	0.034	0.360	0.735
LTE Band 5	Front Side	0.586	0.106	0.106	0.798
	Back Side	0.345	0.063	0.118	0.526

	Left Side	0.355	0.037	0.031	0.423
	Right Side	0.024	0.013	0.017	0.054
	Top Side	0.223	0.167	0.010	0.400
	Bottom Side	0.217	0.034	0.360	0.611
LTE Band 7	Front Side	0.965	0.106	0.106	1.177
	Back Side	0.837	0.063	0.118	1.018
	Left Side	0.066	0.037	0.031	0.134
	Right Side	0.683	0.013	0.017	0.713
	Top Side	0.186	0.167	0.010	0.363
	Bottom Side	0.731	0.034	0.360	1.125
LTE Band 12	Front Side	0.589	0.106	0.106	0.801
	Back Side	0.545	0.063	0.118	0.726
	Left Side	0.049	0.037	0.031	0.117
	Right Side	0.143	0.013	0.017	0.173
	Top Side	0.436	0.167	0.010	0.613
	Bottom Side	0.439	0.034	0.360	0.833
LTE Band 13	Front Side	0.473	0.106	0.106	0.685
	Back Side	0.431	0.063	0.118	0.612
	Left Side	0.025	0.037	0.031	0.093
	Right Side	0.191	0.013	0.017	0.221
	Top Side	0.186	0.167	0.010	0.363
	Bottom Side	0.225	0.034	0.360	0.619
LTE Band 14	Front Side	0.444	0.106	0.106	0.656
	Back Side	0.393	0.063	0.118	0.574
	Left Side	0.030	0.037	0.031	0.098
	Right Side	0.199	0.013	0.017	0.229
	Top Side	0.196	0.167	0.010	0.373
	Bottom Side	0.253	0.034	0.360	0.647
LTE Band 17	Front Side	0.871	0.106	0.106	1.083
	Back Side	0.754	0.063	0.118	0.935
	Left Side	0.022	0.037	0.031	0.090
	Right Side	0.179	0.013	0.017	0.209
	Top Side	0.387	0.167	0.010	0.564
	Bottom Side	0.471	0.034	0.360	0.865
LTE Band 25	Front Side	0.311	0.106	0.106	0.523
	Back Side	0.538	0.063	0.118	0.719
	Left Side	0.065	0.037	0.031	0.133
	Right Side	0.557	0.013	0.017	0.587

	Top Side	0.276	0.167	0.010	0.453
	Bottom Side	0.381	0.034	0.360	0.775
LTE Band 26	Front Side	0.581	0.106	0.106	0.793
	Back Side	0.492	0.063	0.118	0.673
	Left Side	0.062	0.037	0.031	0.130
	Right Side	0.025	0.013	0.017	0.055
	Top Side	0.211	0.167	0.010	0.388
	Bottom Side	0.219	0.034	0.360	0.613
LTE Band 41	Front Side	0.491	0.106	0.106	0.703
	Back Side	0.485	0.063	0.118	0.666
	Left Side	0.071	0.037	0.031	0.139
	Right Side	0.451	0.013	0.017	0.481
	Top Side	0.168	0.167	0.010	0.345
	Bottom Side	0.483	0.034	0.360	0.877
LTE Band 48	Front Side	0.596	0.106	0.106	0.808
	Back Side	0.397	0.063	0.118	0.578
	Left Side	0.085	0.037	0.031	0.153
	Right Side	0.288	0.013	0.017	0.318
	Top Side	0.656	0.167	0.010	0.833
	Bottom Side	0.659	0.034	0.360	1.053
LTE Band 66	Front Side	0.454	0.106	0.106	0.666
	Back Side	0.674	0.063	0.118	0.855
	Left Side	0.064	0.037	0.031	0.132
	Right Side	0.689	0.013	0.017	0.719
	Top Side	0.160	0.167	0.010	0.337
	Bottom Side	0.127	0.034	0.360	0.521
LTE Band 71	Front Side	0.287	0.106	0.106	0.499
	Back Side	0.312	0.063	0.118	0.493
	Left Side	0.047	0.037	0.031	0.115
	Right Side	0.045	0.013	0.017	0.075
	Top Side	0.146	0.167	0.010	0.323
	Bottom Side	0.165	0.034	0.360	0.559

19. Uncertainty Assessment

According to KDB 865664 D01 SAR measurement 100 MHz to 6GHz, when the highest measured 1-g SAR is less than 1.5 W/kg and 10-g extremity SAR less than 3.75 W/kg, the expanded SAR measurement uncertainty must be less than 30% with a confidence interval of k=2. When these conditions are met, extensive SAR measurement uncertainty analysis described in IEEE 1528-2013 is not required in the SAR report and submitted for equipment approval. For this device, both the 1-g SAR is less than 1.5 W/kg and 10-g extremity SAR less than 3.75 W/kg. Therefore the measurement uncertainty table is not required in this report.

Annex A General Information

1. Identification of the Responsible Testing Laboratory

Laboratory Name:	Shenzhen Morlab Communications Technology Co., Ltd.
Laboratory Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China
Telephone:	+86 755 36698555
Facsimile:	+86 755 36698525

2. Identification of the Responsible Testing Location

Name:	Shenzhen Morlab Communications Technology Co., Ltd.
Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China

3. Facilities and Accreditations

The FCC designation number is CN1192, the test firm registration number is 226174.

Note：

The main report is end here and the other Annex (B,C,D,E,F) will be submitted separately.

****** END OF MAIN REPORT ******