TEST REPORT

APPLICANT	**:**	Reliance Communications LLC
PRODUCT NAME	**:**	Orbic AirSurf 5G UW
MODEL NAME	**:**	R141TL5
BRAND NAME	**:**	Orbic
FCC ID	**:**	2ABGH-R141TL5
STANDARD(S)	**:**	FCC 47CFR Part 2(2.1093) IEEE 1528-2013
RECEIPT DATE	**:**	2021-10-09
TEST DATE	**:**	2021-11-06 to 2021-11-12
ISSUE DATE	**:**	2021-12-13

Edited by: Gan Yueming (Rapporteur)

Approved by: Shen Junsheng (Supervisor)

DIRECTORY

Change History		
Version	**Date**	**Reason for Change**
1.0	2021-12-13	First edition

1 SAR Results Summary

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

Frequency Band		Highest SAR Summary	
		Body	Extremity
		1g SAR (W/kg)	10g SAR (W/kg)
WCDMA	Band II	0.113	0.147
	Band IV	0.173	0.171
	Band V	0.205	0.246
LTE	Band 2	0.103	0.144
	Band 4	0.178	0.247
	Band 5	0.185	0.232
	Band 12	0.139	0.174
	Band 13	0.165	0.217
	Band 48	0.121	0.046
	Band 66	0.167	0.168
5G NR	n2	0.165	0.206
	n5 (NSA)	0.231	0.273
	n66	0.163	0.172
	n77 (NSA)	0.127	0.071
	n78	0.123	0.078
WLAN	2.4GHz WLAN	0.379	0.094
	5G WLAN	0.619	0.092
2.4GHz Band	Bluetooth	0.482	0.091

Max. Scaled SAR_{1g} (W/Kg):	Body:	0.619 W/kg	Limit(W/kg): 1.6 W/kg
Max. Scaled SAR_{10g} (W/Kg):	Extremity	0.247 W/kg	Limit(W/kg): 4.0 W/kg

Highest Simultaneous $Transmission_{1g}$ (W/Kg):	1.46 W/kg	Limit(W/kg): 1.6 W/kg
Highest Simultaneous $Transmission_{10g}$ (W/Kg):	0.656 W/kg	Limit(W/kg): 4.0 W/kg

Note:

1. This device is compliance with Specific Absorption Rate (SAR) for general population or uncontrolled exposure limits (1.6 W/kg) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-2005, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2013.
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:	35F,HBC HuiLong Center Building-II Minzhi Street,Longhua, Shenzhen, P.R. China 518110

2.2 Equipment under Test (EUT) Description

Product Name:	Orbic AirSurf 5G UW
EUT No.:	28#
Hardware Version:	R141-REV12
Software Version:	ORB141TL5_V1.1.9_SVZ
Operation Frequency:	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 12: 699 MHz ~ 716 MHz LTE Band 13: 777 MHz ~ 787 MHz LTE Band 48: 3550 MHz ~ 3700 MHz LTE Band 66: 1710 MHz ~ 1780 MHz 5G NR n2: 1850 MHz ~ 1910 MHz 5G NR n5: 824 MHz ~ 849 MHz 5G NR n66: 1710 MHz ~ 1780 MHz 5G NR n77: 3700 MHz ~ 3980 MHz 5G NR n78: 3300 MHz ~ 3800 MHz WLAN 2.4GHz: 2412 MHz ~ 2472 MHz WLAN 5.2GHz: 5180 MHz ~ 5240 MHz WLAN 5.3GHz: 5260 MHz ~ 5320 MHz WLAN 5.6GHz: 5500 MHz ~ 5720 MHz

	WLAN 5.8GHz: 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Modulation technology:	WCDMA: QPSK, 16QAM LTE: QPSK, 16QAM, 64QAM 5G NR (FR1): CP-OFDM/DFT-s-OFDM, PI/2 BPSK QPSK, 16QAM, 64QAM, 256QAM 5G NR (FR2): QPSK, 16QAM, 64QAM for CP-OFDM 802.11b: DSSS 802.11a/g/n-HT20/HT40/ac-VHT20/40/80: OFDM 802.11ax-VHT20/40/80: OFDM BR+EDR: GFSK(1Mbps), π/4-DQPSK(2Mbps), 8-DPSK(3Mbps) Bluetooth LE: GFSK(1Mbps)
5G NR (FR1) Operation:	SA & NSA
5G NR (FR2) Operation:	NSA
WLAN MIMO:	Support
Antenna Type:	Fixed Internal Antenna
SIM Cards Description:	WCDMA+LTE+5G NR
	Single SIM card

Note:

1. For 5G mmWave, the test results refer to the PD Test report (Report No. SZ21070331S03).
2. For more detailed description, please refer to specification or user manual supplied by the applicant and/or manufacturer.

2.3 Environment of Test Site

Temperature:	18°C ~25°C
Humidity:	35%~75% RH
Atmospheric Pressure:	1010 mbar

Test Frequency:	WCDMA Band II/IV/V FDD-LTE Band 2/4/5/12/13/66 TDD-LTE Band 48 5G NR n2/5/66/77/78 WLAN 2.4GHz; WLAN 5GHz; Bluetooth.
Power Level:	WCDMA Band II/IV/V (All Up Bits) FDD-LTE Band 2/4/5/12/13/66 (Maximum output power) TDD-LTE Band 48 (Maximum output power) 5G NR n2/5/66/77/78 (Maximum output power) WLAN 2.4GHz WLAN 5GHz; Bluetooth.
Operation Mode:	Call established

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 Introduction

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 higher 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:

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

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

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

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

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

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

Where: σ is the conductivity of the tissue, ρ is the mass density of the tissue and E is the RMS electrical field strength. However for evaluating SAR of low power transmitter, electrical field measurement is typically applied.

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. This 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 valuation: 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 616217 D04 v01r01	SAR Evaluation Considerations for Laptop, Notebook, Notebook and Tablet Computers	No deviation
KDB 865664 D01v01r04	SAR Measurement 100 MHz to 6 GHz	No deviation
KDB 865664 D02v01r02	RF Exposure Reporting	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

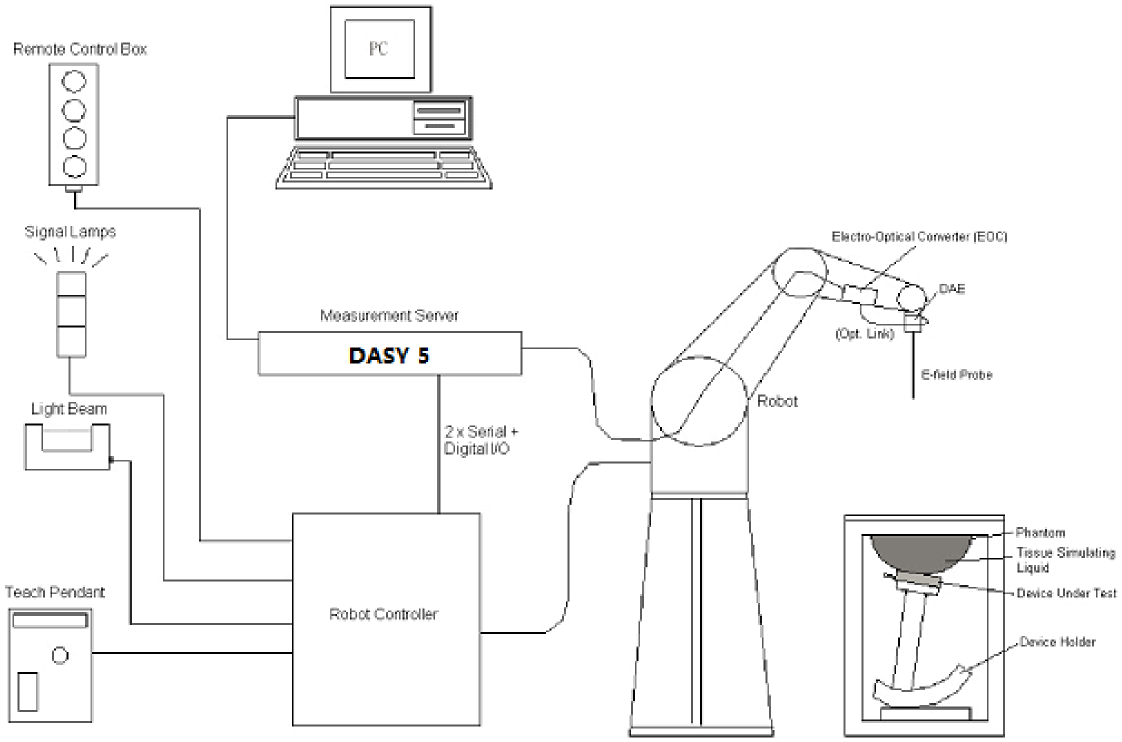


Fig.6.1 SPEAG DASY System Configurations

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 (EOC) performs the conversion between optical and electrical signals.
- A measurement server performs the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the accuracy of the probe positioning.
- A computer operating Windows XP.
- DASY software.
- Remove control with teach pendant and additional circuitry for robot safety such as warming lamps, etc.
- The SAM twin phantom.
- A device holder.
- Tissue simulating liquid.

➢ Dipole for evaluating the proper functioning of the system.

Component details are described in 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**

<EX3DV4 Probe>

Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Frequency	10 MHz to 6 GHz; Linearity: ± 0.2 dB	
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)	
Dynamic Range	10 µW/g to 100 mW/g; Linearity: ± 0.2 dB	
Dimensions	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm	**Fig 6.2 Photo of EX3DV4**

➢ **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 (Norm X, Norm Y and Norm Z), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe are tested. The calibration data can be referred to Annex E 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 fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information as well as an optical uplink for commands and the clock. The input impedance of the DAE is 200 MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

Fig 6.2 Photo of DAE

6.3 Robot

The SPEAG DASY system uses the high precision robots (DASY5: TX60XL) type from Stäubli SA (France). For the 6-axis controller system, the robot controller version (DASY5: CS8c) from Stäubliis used. The Stäublirobot series have many features that are important for our application:

- High precision (repeatability 0.02 mm)
- High reliability (industrial design)
- Low maintenance costs (virtually maintenance free due to direct drive gears; nobelt drives)
- Jerk-free straight movements
- Low ELF interference (motor control fields shielded via the closed metallic construction shields)

Fig. 6.3 Photo of Robot

6.4 Measurement Server

The measurement server is based on a PC/104 CPU board with CPU (DASY 5: 400MHz, Intel Celeron), chip-disk (DASY5: 128 MB), RAM (DASY5: 128 MB). The necessary circuits for communication with the DAE electronic box, as well as the 16 bit AD converter system for optical detection and digital I/O interface are contained on the DASY I/O board, which is directly connected to the PC/104 bus of the CPU board.

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

Fig. 6.4 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. 6.5 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 **Dimensions**	Approx. 25 liters Length: 1000 mm; Width: 500 mm; Height: adjustable feet
Measurement Areas	Left Head, Right Head, Flat phantom

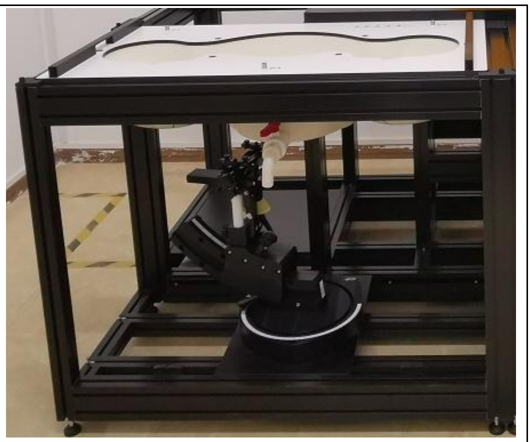


Fig. 6.6 Photo of SAM Phantom

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 (ERP).

Thus the device needs no repositioning when changing the angles.

The DASY device holder is constructed of low-low POM material having the following dielectric parameters: relative permittivity ε = 3 and loss tangent δ = 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 6.7 Device Holder

Fig 6.8 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 verifications 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], [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	$ConvF_i$
	- Diode compression point	dcp_i
Device Parameters:	- Frequency	f
	- Crest	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:

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

With V_i = compensated signal of channel i, (i = x, y, z)
U_i= input signal of channel i, (i = x, y, z)
cf = crest factor of exciting field (DASY parameter)
dcp^i= diode compression point (DASY parameter)
From the compensated input signals, the primary field data for each channel can be evaluated:

E- Field Probes: $E_i = \sqrt{\frac{v_i}{Norm_i \cdot ConvF}}$

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

With V_i = compensated signal of channel i, (i = x, y, z)
$Norm_i$= senor sensitivity of channel i, (i = x, y, z), µV/ (V/m) ^{2}
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
Hi = 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.

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

With SAR = local specific absorption rate in mW/g
Etot= total field strength in V/m
σ = conductivity in (mho/m) or (Siemens/m)
ρ= equipment tissue density in g/cm3
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 No.	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	2018.10.29	2021.12.28
SPEAG	1800MHz System Validation Kit	D1800V2	2d185	2018.10.31	2021.12.30
SPEAG	2000MHz System Validation Kit	D2000V2	1050	2018.10.31	2021.12.30
SPEAG	2450MHz System Validation Kit	D2450V2	805	2018.10.26	2021.12.25
SPEAG	3500MHz System Validation Kit	D3500V2	1104	2020.06.03	2023.06.02
SPEAG	3700MHz System Validation Kit	D3700V2	1076	2020.06.03	2023.06.02
SPEAG	3900MHz System Validation Kit	D3900V2	1046	2020.06.02	2023.06.02
SPEAG	5GHz System Validation Kit	D5GHzV2	1176	2018.11.06	2022.01.05
SPEAG	DOSIMETRIC ASSESSMENT SYSTEM	DASY52	52.10.4.1527	NCR	NCR
SPEAG	Dosimetric E-Field Probe	EX3DV4	7608	2020.11.27	2021.11.26
SPEAG	Data Acquisition Electronics	DAE4	1643	2020.11.30	2021.11.29
SPEAG	Dielectric Assessment KIT	DAK-3.5	1279	2021.11.02	2022.11.01
SPEAG	Twin-SAM	Twin-SAM	QD 000 P41 Ax	2020	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	2021.03.29	2022.03.28
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	Attenuation	351-218-010	N/A	NA	NA
KTJ	Thermo meter	TA298	N/A	2021.01.15	2022.01.14
N/A	Tissue Simulating Liquids	HBBL600-10000V6		24H	

Note:

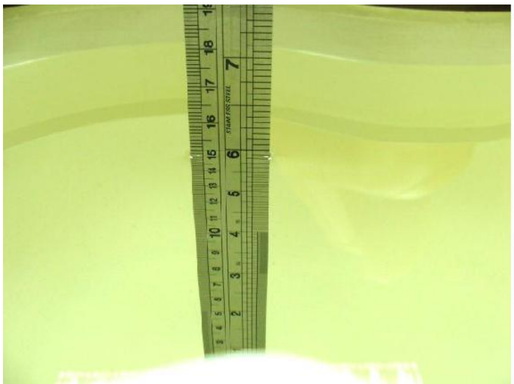
1. The calibration certificate of DASY can be referred to Annex F of this report.
2. Referring to KDB 865664 D01v01r04, the dipole calibration interval can be extended to 3 years

with justification. The dipoles are also not physically damaged, or repaired during the interval.

3. The Insertion Loss calibration of Dual Directional Coupler and Attenuator were characterized via the network analyzer and compensated during system check.
4. 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.
5. In system check we need to monitor the level on the power meter, and adjust the power amplifier level to have precise power level to the dipole; the measured SAR will be normalized to 1W input power according to the ratio 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
6. Attenuator insertion loss is calibrated by the network Analyzer, which the calibration is valid, before system check.
7. N.C.R means No Calibration Requirement.

7 Tissue Simulating Liquids

For the measurement of the field distribution inside the SAM phantom with DASY, the phantom must be filled with around 25 liters of homogeneous body tissue simulating liquid. For head SAR testing, the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15 cm, which is shown in Fig. 7.1, for body SAR testing, the liquid height from the centre of the flat phantom to liquid top surface is larger than 15 cm, which is shown in Fig. 7.2.



. 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

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%

The relative permittivity and conductivity of the tissue material should be within ±5% of the values given in the table below recommended by the FCC OET 65supplement C and RSS 102 Issue 5.

Target Frequency	Head		Body	
(MHz)	ε r	σ (S/m)	ε r	σ (S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800-2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95
3000	38.5	2.40	52.0	2.73
5800	35.3	5.27	48.2	6.00

(ε r = relative permittivity, σ = conductivity and ρ = 1000 kg/m^3)

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

The following table shows the measuring results for simulating liquid.

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	0.911	0.89	2.36	±5	2021.11.6
900	HSL	22.3	0.965	0.97	-0.52	±5	2021.11.6
1800	HSL	22.2	1.407	1.40	0.50	±5	2021.11.7
2000	HSL	22.2	1.415	1.40	1.07	±5	2021.11.7
2450	HSL	22.1	1.814	1.80	0.78	±5	2021.11.10
3500	HSL	22.2	2.912	2.91	0.07	±5	2021.11.12
3700	HSL	22.2	3.212	3.12	2.95	±5	2021.11.12
3900	HSL	22.2	3.422	3.33	2.76	±5	2021.11.12
5250	HSL	22.1	4.821	4.71	2.36	±5	2021.11.11
5600	HSL	22.1	5.222	5.07	3.00	±5	2021.11.11
5750	HSL	22.1	5.341	5.22	2.32	±5	2021.11.11

Frequency (MHz)	Tissue Type	Liquid Temp.(℃)	Permittivity (εr)	Permittivity Target (εr)	Delta (εr) (%)	Limit (%)	Date
750	HSL	22.3	41.745	41.90	-0.37	±5	2021.11.6
900	HSL	22.3	41.816	41.50	0.76	±5	2021.11.6
1800	HSL	22.2	40.111	40.00	0.28	±5	2021.11.7
2000	HSL	22.2	40.268	40.00	0.67	±5	2021.11.7
2450	HSL	22.1	39.266	39.20	0.17	±5	2021.11.10
3500	HSL	22.2	38.351	37.90	1.19	±5	2021.11.12
3700	HSL	22.2	38.426	37.70	1.93	±5	2021.11.12
3900	HSL	22.2	38.566	37.50	2.84	±5	2021.11.12
5250	HSL	22.1	36.128	35.95	0.50	±5	2021.11.11
5600	HSL	22.1	35.259	35.50	-0.68	±5	2021.11.11
5750	HSL	22.1	35.476	35.35	0.36	±5	2021.11.11

Note:

According to April 2019 TCB Workshop that FCC has permitted the use of single head-tissue simulating liquid specified in IEC 62209-1 for all SAR tests.

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.

- **System Validation**

According to FCC KDB 865664 D02, SAR system verification is required to confirm measurement accuracy. The SAR systems (including SAR probes, system components and software versions) used for this device were validated against its performance specifications prior to the SAR measurements. Reference dipoles are used with the required tissue-equivalent media for system validation, according to the procedures outlined in FCC KDB 865664 D01 and IEEE 1528-2013. Since SAR probe calibrations are frequency dependent, each probe calibration point must be validated at a frequency within the valid frequency range of the probe calibration point, using the system that normally operates with the probe for routine SAR measurements and according to the required tissue-equivalent media. A tabulated summary of the system validation status, measurement frequencies, SAR probes, calibrated signal type(s) and tissue dielectric parameters has been included.

- **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.

- **System Setup**

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

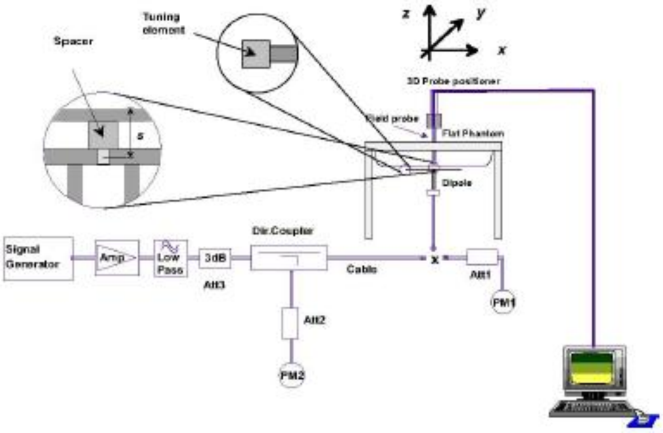


Fig 8.1 Photo of Dipole Setup Fig 8.2 System Setup for System Evaluation

- **System Verification Results**

Comparing to the original SAR value provided by SPEAG, the verification data should be within its specification of 10%. Below table shows the target SAR and measured SAR after normalized to 1W input power. The table as below indicates the system performance check can meet the variation criterion and the plots can be referred to Annex C of this report.

Dipole S/N	**Probe S/N**	**DAE S/N**
D750V3-1173	7608	1643
D900V2-1d064	7608	1643
D1800V2-2d158	7608	1643
D2000V2-1050	7608	1643
D2450V2-805	7608	1643
D3500V2-1104	7608	1643
D3700V2-1034	7608	1643
D3900V2-1046	7608	1643
D5GHzV2-1176-5250	7608	1643
D5GHzV2-1176-5600	7608	1643
D5GHzV2-1176-5750	7608	1643

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
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
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	Freq. (MHz)	Tissue Type	Input Power (mW)	Measured 1g SAR (W/kg)	Targeted 1g SAR (W/kg)	Normalized 1g SAR (W/kg)	Deviation (%)
2021.11.6	750	HSL	250	2.11	8.26	8.44	2.18
2021.11.6	900	HSL	250	2.77	10.90	11.08	1.65
2021.11.7	1800	HSL	250	9.72	39.30	38.88	-1.07
2021.11.7	2000	HSL	250	10.44	40.90	41.76	2.10
2021.11.10	2450	HSL	250	13.36	52.00	53.44	2.77
2021.11.12	3500	HSL	100	6.85	67.20	68.5	1.93
2021.11.12	3700	HSL	100	6.92	67.50	69.2	2.52
2021.11.12	3900	HSL	100	6.81	66.90	68.1	1.79
2021.11.11	5250	HSL	100	7.85	78.90	78.5	-0.51
2021.11.11	5600	HSL	100	8.21	80.90	82.1	1.48
2021.11.11	5750	HSL	100	8.29	80.00	82.9	3.62

Date	Freq. (MHz)	Tissue Type	Input Power (mW)	Measured 10g SAR (W/kg)	Targeted 10g SAR (W/kg)	Normalized 10g SAR (W/kg)	Deviation (%)
2021.11.6	750	HSL	250	1.36	5.45	5.44	-0.18
2021.11.6	900	HSL	250	1.82	6.97	7.28	4.45
2021.11.7	1800	HSL	250	5.33	20.60	21.32	3.50
2021.11.7	2000	HSL	250	5.41	20.90	21.64	3.54
2021.11.10	2450	HSL	250	6.11	24.10	24.44	1.41
2021.11.12	3500	HSL	100	2.48	25.10	24.8	-1.20
2021.11.12	3700	HSL	100	2.55	24.50	25.5	4.08
2021.11.12	3900	HSL	100	2.41	24.10	24.1	0.00
2021.11.11	5250	HSL	100	2.33	22.50	23.3	3.56
2021.11.11	5600	HSL	100	2.39	23.10	23.9	3.46
2021.11.11	5750	HSL	100	2.33	22.60	23.3	3.10

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 15 mm gap, as illustrated below, please refer to Annex B for the test setup photos.

According to KDB 616217 D04, SAR measurement is required for the bottom surface of the keyboard of the laptop PC and positioned against the flat phantom. The required minimum test separation distance for incorporating transmitters and antennas into laptop computer display is determined with the display screen opened at an angle of 90° to the keyboard compartment.

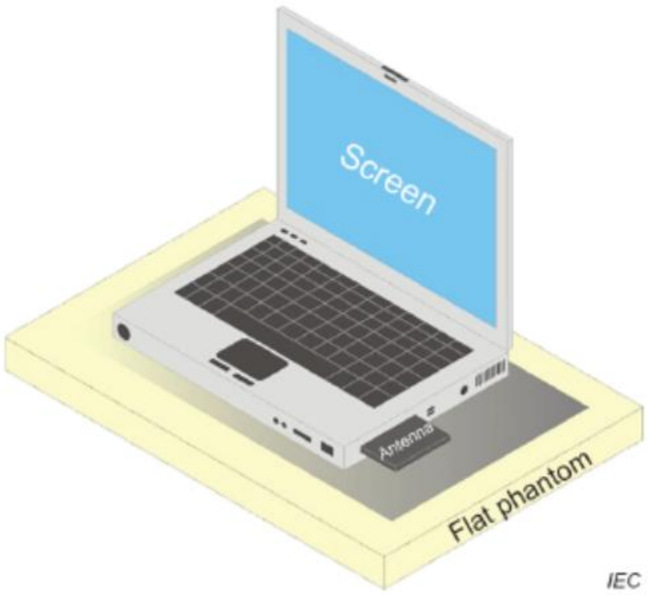


Fig.9.1 Illustration for Body Position

10 Measurement Procedures

The measurement procedures are as bellows:

<Conducted power measurement>

- For WWAN power measurement, use base station simulator to configure EUT WWAN transition in conducted connection with RF cable, at maximum power in each supported wireless interface and frequency band.
- Read the WWAN RF power level from the base station simulator.
- 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.
- Connect EUT RF port through RF cable to the power meter or spectrum analyzer, and measure WLAN/BT output power.

<Conducted power measurement>

- 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.
- Place the EUT in positions as Annex B demonstrates.
- Set scan area, grid size and other setting on the DASY software.
- Measure SAR results for the highest power channel on each testing position.
- Find out the largest SAR result on these testing positions of each band.
- Measure SAR results for other channels in worst SAR testing position if the Reported SAR or 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:

- Power reference measurement.
- Area scan.
- Zoom scan.
- 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 10 g 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 1g and 10g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

- Extraction of the measured data (grid and values) from the Zoom Scan.
- Calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters).
- Generation of a high-resolution mesh within the measured volume.
- Interpolation of all measured values form the measurement grid to the high-resolution grid
- Extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface
- Calculation of the averaged SAR within masses of 1g and 10g.

10.2 Power Reference Measurement

The Power Reference Measurement and Power Drift Measurement 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 found in the scanned area, within a range of the global maximum. The range (in dB) is specified in the standards for compliance testing.

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/m^3 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 1g and 10g cubes, the extrapolation distance should not be larger than 5 mm.

10.6 Power Drift Monitoring

All SAR testing is under the EUT install full charged battery and transmit maximum output power. In DASY measurement software, the power reference measurement and power drift measurement procedures are used for monitoring the power drift of EUT during SAR test. Both these procedures measure the field at a specified reference position before and after the SAR testing. The software will calculate the field difference in dB. If the power drifts more than 5%, the SAR will be retested.

11 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 β_c/β_d =12/15, β_{hs}/β_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 β_c = 11/15 and β_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 ⇔ β_{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.		

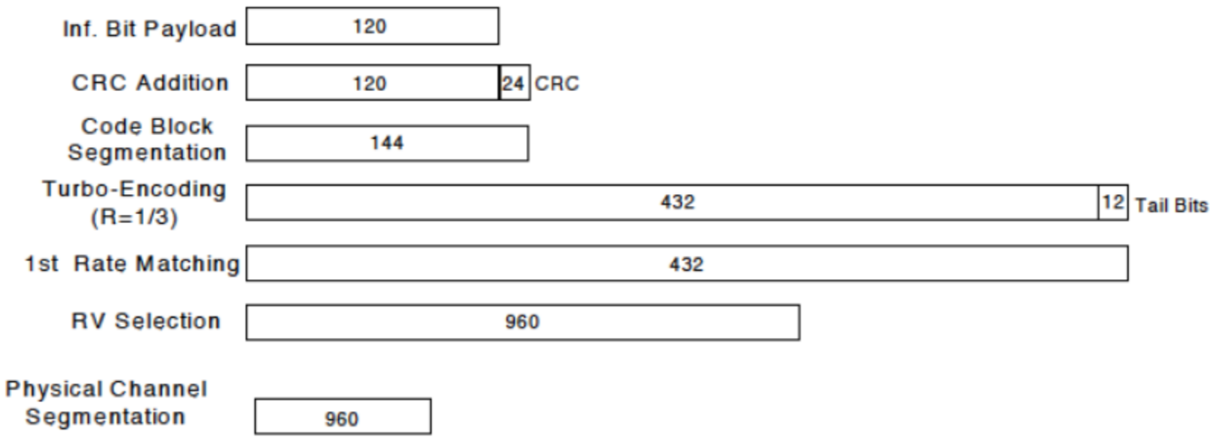


Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

<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	el bandwidth / Transmission bandwidth configuration [RB]						MPR Target (dB)	3GPP
	1.4 MHz	3.0 MHz	5	10	15	20		
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	el 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
12	√	√	√	√	N/A	N/A
13	√	√	√	√	N/A	N/A
48	N/A	N/A	√	√	√	√
66	√	√	√	√	√	√

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 SAR.
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.

12 LTE Carrier Aggregation

12.1 LTE Uplink Carrier Aggregation

<Intra-band>

2CC Uplink Carrier Aggregation for Intra-band				
No.	Combination	4X4 MIMO	Restriction	Completely Covered by Measurement Superset
1	CA_66B	66B	-	No
2	CA_66C	66C	-	No

Note:

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.

<Inter-band>

2CC Uplink Carrier Aggregation for Inter-band				
No.	Combination	UL MIMO	Restriction	Completely Covered by Measurement Superset
1	CA_2A-4A	2A	-	No
2	CA_2A-5A	2A	-	No
3	CA_2A-12A	2A	-	No
4	CA_2A-13A	2A	-	No
5	CA_2A-66A	2A	-	No
6	CA_4A-5A	4A	-	No
7	CA_4A-12A	4A	-	No
8	CA_4A-13A	4A	-	No
9	CA_5A-66A	66A	-	No
10	CA_12A-66A	66A	-	No
11	CA_13A-66A	66A	-	No

Note:

According to October 2018 TCB Workshop publication, LTE uplink CA SAR assessment should follow:

a. If the signal uplink 1-g SAR values for each band are both less than 0.8 W/kg and the algebraic summation of the 1-g SAR values are less than 1.45 W/kg no additional measurements need to be performed.
b. If one or the signal uplink 1-g SAR values is greater than 0.8 W/kg, instead of algebraically summing the 1-g SAR values, sum up the SAR distributions, similar to the enlarged zoom scan (volume scan) procedures found in FCC KDB Publication 865664 D01. And PAG is required for this case.
c. If the algebraic sum of the 1-g SAR values is > 1.45 W/kg additional measurements may have to be made. Submit a KDB inquiry for additional guidance. And PAG is required for this case.

12.2 LTE Downlink Carrier Aggregation

➢ **Carrier Aggregation Configuration**

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

2CC Downlink Carrier Aggregation				
No.	Combination	DL MIMO	Restriction	Completely Covered by Measurement Superset
1	CA_2A-2A	2A-2A	-	3CC-1
2	CA_2A-4A	2A, 4A, 2A-4A	-	3CC-6
3	CA_2A-5A	2A	-	3CC-2
4	CA_2A-13A	2A	-	3CC-4
5	CA_2A-48A	2A-48A	-	3CC-15
6	CA_2A-66A	2A, 66A, 2A-66A	-	3CC-16
7	CA_4A-4A	4A-4A	-	3CC-17
8	CA_4A-5A	4A	-	3CC-17
9	CA_4A-13A	4A	-	3CC19
10	CA_5A-5A	-	-	-
11	CA_5A-12A	-	-	-
12	CA_5A-48A	48A		No
13	CA_5A-66A	66A	-	3CC-23
14	12B	-	-	-
15	CA_13A-48A	48A	-	3CC-27
16	CA_13A-66A	66A	-	3CC-29
17	CA_48A-48A	48A-48A	-	No
18	CA_66A-66A	66A-66A	-	No
19	CA_66B	66B	-	No
20	CA_66C	66C	-	No

3CC Downlink Carrier Aggregation				
No.	Combination	DL MIMO	Restriction	Completely Covered by Measurement Superset
1	CA_2A-2A-4A	2A-2A, 2A-4A	-	4CC-1
2	CA_2A-2A-5A	2A-2A	-	4CC-2
3	CA_2A-2A-12A	2A-2A	-	No
4	CA_2A-2A-13A	2A-2A	-	No
5	CA_2A-2A-66A	2A-2A, 2A-66A	-	4CC-7
6	CA_2A-4A-4A	2A-4A, 4A-4A	-	4CC-3
7	CA_2A-4A-5A	2A, 4A, 2A-4A	-	4CC-11
8	CA_2A-4A-12A	2A-4A	-	4CC-12
9	CA_2A-4A-13A	2A, 4A, 2A-4A	-	No
10	CA_2A-5B	2A	-	4CC-11
11	CA_2A-5A-12A	2A	-	No
12	CA_2A-5A-66A	2A, 66A, 2A-66A	-	4CC-14
13	CA_2A-12A-66A	2A-66A	-	4CC-15
14	CA_2A-13A-66A	2A, 66A, 2A-66A	-	4CC-16
15	CA_2A-48A-48A	48A-48A	-	No
16	CA_2A-66A-66A	2A-66A, 66A-66A	-	4CC-14
17	CA_4A-4A-5A	4A-4A	-	4CC-17
18	CA_4A-4A-12A	4A-4A	-	4CC-18
19	CA_4A-4A-13A	4A-4A	-	No
20	CA_4A-5B	4A	-	4CC-17
21	CA_4A-5A-12A	4A	-	4CC-18
22	CA_4A-12B	4A	-	4CC-18
23	CA_5A-5A-66A	66A	-	No
24	CA_5B-66A	66A	-	4CC-19
25	CA_5A-66A-66A	66A-66A	-	4CC-19
26	CA_12A-66A-66A	66A-66A	-	4CC-20
27	CA_13A-48A-48A	48A-48A	-	4CC-21
28	CA_13A-48C	48C	-	4CC-21
29	CA_13A-66A-66A	66A-66A	-	4CC-19
30	CA_48B-66A	48B-66A	-	4CC-22

4CC Downlink Carrier Aggregation				
No.	Combination	DL MIMO	Restriction	Completely Covered by Measurement Superset
1	CA_2A-2A-4A-4A	2A-2A	-	No
2	CA_2A-2A-4A-5A	2A-2A	-	No
3	CA_2A-2A-4A-12A	2A-2A-4A	-	No
4	CA_2A-2A-5A-12A	2A-2A	-	No
5	CA_2A-2A-5A-66A	2A-2A	-	No
6	CA_2A-2A-5B	2A-2A	-	No
7	CA_2A-2A-12A-66A	2A-2A-66A	-	No
8	CA_2A-2A-13A-66A	2A-2A	-	No
9	CA_2A-2A-66A-66A	2A,66A-66A	-	No
10	CA_2A-4A-4A-5A	4A-4A	-	No
11	CA_2A-4A-5B	2A,4A,2A-4A	-	No
12	CA_2A-4A-12B	2A-4A	-	No
13	CA_2A-5A-66A-66A	66A-66A	-	No
14	CA_2A-5B-66A	2A,66A,2A-66A	-	No
15	CA_2A-12A-66A-66A	2A-66A-66A	-	No
16	CA_2A-13A-66A-66A	66A-66A	-	No
17	CA_4A-4A-5B	4A-4A	-	No
18	CA_4A-4A-12B	4A-4A	-	No
19	CA_5A-5A-66A-66A	66A-66A	-	No
20	CA_12B-66A-66A	66A-66A	-	No
21	CA_13A-48C-66A	48C,66A	-	No
22	CA_48C-66A-66A	48C-66A-66A	-	No

➢ **LTE Downlink Carrier Aggregation Conducted Power**

1. According to KDB941225 D05A v01r02, Uplink maximum output power measurement with downlink carrier aggregation active should be measured, using the highest output channel measured without downlink carrier aggregation, to confirm that uplink maximum output power with downlink carrier aggregation active remains within the specified tune-up tolerance limits and not more than ¼ dB higher than the maximum output measured without downlink carrier aggregation active.
2. Uplink maximum output power with downlink carrier aggregation active does not show more than ¼ dB higher than the maximum output power without downlink carrier aggregation active, therefore SAR evaluation with downlink carrier aggregation active can be excluded.
3. For power measurement were control and acknowledge data is sent on uplink channels that operate identical to specifications when downlink carrier aggregation is inactive.
4. Selected highest measured power when downlink carrier aggregation is inactive for conducted power comparison with downlink carrier aggregation is active, to confirm that when downlink carrier aggregation is active uplink maximum output power remains within the specified tune-up

tolerance limits and not more than ¼ dB higher than the maximum output power measured when downlink carrier aggregation inactive.

5. For non-contiguous intra-band CA, the SCC selected to provide maximum separation from the PCC and must remain fully within the downlink transmission band.
6. For Intra-band, contiguous CA, the downlink channels selected to perform the uplink power measurement must satisfy
7. 3GPP channel spacing (5.4.1A of 3GPP TS 36.521 or equivalent) and channel bandwidth (5.4.2A) requirements.

$$\text{Nominal channel spacing} = \left\lfloor \frac{BW_{Channel(1)} + BW_{Channel(2)} - 0.1\left|BW_{Channel(1)} - BW_{Channel(2)}\right|}{0.6} \right\rfloor 0.3 \ \ [\text{MHz}]$$

8. The output power of CA downlink refers to the annex E of this report.

13 5G NR EN-DC Consideration

➢ **General Guidance**

1. It is only limited to operate at EN-DC (NSA) for 5G NR implementation According to the character of the device. SAR measurement should be performed separately for the limitations of the probe calculation factors.
2. When the EN-DC is active the output power of the LTE anchors is equal or less than the standalone carrier, therefore the LTE output power and SAR were estimated based on the standalone carrier to performed sim-TX analysis with 5G NR, WLAN and Bluetooth.
3. According to October 2020 TCB Workshop publication, EN-DC SAR assessment should follow:
   a. If the signal uplink 1-g SAR values for each band are both less than 0.8 W/kg and the algebraic summation of the 1-g SAR values are less than 1.45 W/kg no additional measurements need to be performed.
   b. If one or the signal uplink 1-g SAR values is greater than 0.8 W/kg, instead of algebraically summing the 1-g SAR values, sum up the SAR distributions, similar to the enlarged zoom scan (volume scan) procedures found in FCC KDB Publication 865664 D01. And PAG is required for this case.
   c. If the algebraic sum of the 1-g SAR values is > 1.45 W/kg additional measurements may have to be made. Submit a KDB inquiry for additional guidance and PAG is required for this case.
   d. When the algebraic sum of the 1-g SAR values is > 1.6 W/kg, SPLSR analysis procedure should be applied.

➢ **5G NR Anchor Combination**

EN-DC Combination	**Sub-6GHz TDD <= 100MHz FDD <= 20MHz 4G DL 4x4 MIMO (20L)**	**5G-NR DL 4x4 MIMO**	**4G UL**	**5G-NR UL**
DC_2A-5A_n5A	2A	-	2A	n5A
DC_2A-66A_n5A	2A-66A	-	2A, 66A	n5A
DC_2A_n5A	2A	-	2A	n5A
DC_66A_n5A	66A	-	66A	n5A
DC_2A_n66A	2A	n66A	2A	n66A
DC_2A-2A_n5A	2A-2A	-	2A	n5A
DC_5A-66A_n5A	66A	-	66A	n5A
DC_66A-66A_n5A	66A-66A	-	66A	n5A
DC_2A-66A_n66A	2A, 66A	n66A	2A	n66A

DC_2A-2A-5A_n5A	2A-2A	-	2A	n5A
DC_2A-2A-66A_n5A	2A, 66A, 2A-2A	-	2A, 66A	n5A
DC_2A-66A-66A_n5A	2A, 66A, 66A-66A	-	2A, 66A	n5A
DC_5A-66A-66A_n5A	66A-66A	-	66A	n5A
DC_2A-2A-66A-66A_n5A	2A, 66A	-	2A, 66A	n5A
DC_66A_n2A	66A	n2A	66A	n2A
DC_2A-66A_n2A	2A, 66A	n2A	66A	n2A
DC_66A_n78A	66A	n78A	66A	n78A
DC_66A-66A_n78A	66A	n78A	66A	n78A
DC_2A_n78A	2A	n78A	2A	n78A
DC_13A-66A_n2A	66A	n2A	13A, 66A	n2A
DC_13A-66A_n5A	66A	-	66A	n5A
DC_2A-13A_n5A	2A	-	2A	n5A
DC_13A-66A-66A_n5A	66A-66A	-	66A	n5A
DC_2A-2A-13A_n5A	2A-2A	-	2A	n5A
DC_2A-2A_n66A	2A	n66A	2A	n66A
DC_13A_n66A	.	n66A	13A	n66A
DC_2A-13A_n66A	2A	n66A	2A, 13A	n66A
DC_13A-66A_n66A	66A	n66A	13A	n66A
DC_13A-66A-66A_n66A	66A-66A	n66A	13A	n66A
DC_48E-66A_n5A	48E-66A	n5A	48A, 66A	n5A
DC_13A-48E_n66A	48E	n66A	13A, 48A	n66A
DC_13A-48E_n2A	48E	n2A	13A, 48A	n2A
DC_2A-2A-13A-66A-66A_n5A	2A-2A-66A-66A	n5A	2A, 66A	n5A
DC_2A-2A-5A-66A-66A_n5A	2A-2A-66A-66A	n5A	2A, 66A	n5A
DC_2A-2A-13A-66A-66A_n66A	2A-2A-66A-66A	n66A	2A, 13A	n66A
DC_2A-2A-5A-66A-66A_n66A	2A-2A-66A-66A	n66A	2A, 5A	n66A
DC_2A-5B-66A-66A_n66A	2A-66A-66A	n66A	2A, 5A	n66A
DC_2A-5B-66A-66A_n2A	2A-66A-66A	n2A	5A, 66A	n2A
DC_2A_n77A	2A	n77A	2A	n77A
DC_5A_n77A	5A	n77A	5A	n77A
DC_13A_n77A	.	n77A	13A	n77A
DC_66A_n77A	66A	n77A	66A	n77A
DC_2A-5A_n77A	2A-5A	n77A	2A, 5A	n77A
DC_2A-13A_n77A	2A	n77A	2A, 13A	n77A
DC_2A-66A_n77A	2A-66A	n77A	2A, 66A	n77A
DC_5A-66A_n77A	5A-66A	n77A	5A, 66A	n77A
DC_13A-66A_n77A	66A	n77A	13A, 66A	n77A

DC_66A-66A_n77A	66A-66A	n77A	66A	n77A
DC_2A-2A_n77A	2A-2A	n77A	2A	n77A
DC_2A-48A_n77A	2A-48A	n77A	2A	n77A
DC_13A-48A_n77A	13A-48A	n77A	13A	n77A
DC_48A-66A_n77A	48A-66A	n77A	66A	n77A
DC_2A-5A-66A_n77A	2A-66A	n77A	2A, 5A, 66A	n77A
DC_2A-13A-66A_n77A	2A-66A	n77A	2A, 13A, 66A	n77A
DC_2A-66A-66A_n77A	2A-66A-66A	n77A	2A, 66A	n77A
DC_5A-66A-66A_n77A	66A-66A	n77A	5A, 66A	n77A
DC_13A-66A-66A_n77A	66A-66A	n77A	13A, 66A	n77A
DC_2A-2A-13A_n77A	2A-2A	n77A	2A, 13A	n77A
DC_2A-2A-66A_n77A	2A-2A-66A	n77A	2A, 66A	n77A
DC_66A-66A-66A_n77A	66A-66A-66A	n77A	66A	n77A
DC_2A-2A-5A_n77A	2A-2A	n77A	2A, 5A	n77A

➢ **Maximum Power for EN-DC**

EN-DC Configuration	LTE Signal Carrier				5G NR		
	Band	BW (MHz)	Maximum Power(dBm)		Band	BW (MHz)	Maximum Power(dBm)
			Standalone	EN-DC Active			EN-DC Active
EN-DC_13A-n2	2	20	24.0	25.0	n2	20	23.0
EN-DC_48A-n2	48	20	24.0	25.0	n2	20	23.0
EN-DC_66A-n2	66	20	24.0	25.0	n2	20	23.0
EN-DC_2A-n5	2	20	24.0	23.5	n5	20	23.5
EN-DC_48A-n5	48	20	24.0	23.5	n5	20	23.5
EN-DC_66A-n5	66	20	24.0	24.0	n2	20	24.0
EN-DC_2A-n66	2	20	24.0	25.0	n66	20	24.0
EN-DC_13A-n66	13	10	24.0	25.0	n66	20	24.0
EN-DC_48A-n66	48	20	24.0	25.0	n66	20	24.0
EN-DC_2A-n77	66	20	24.0	25.0	n77	100	24.0
EN-DC_5A-n77	5	10	23.0	23.0	n77	100	23.0
EN-DC_13A-n77	13	10	24.0	23.0	n77	100	23.5
EN-DC_66A-n77	66	20	24.0	23.0	n77	100	23.5

14 Conducted Output Power

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

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15 Exposure Positions Consideration

15.1 EUT Antenna Locations

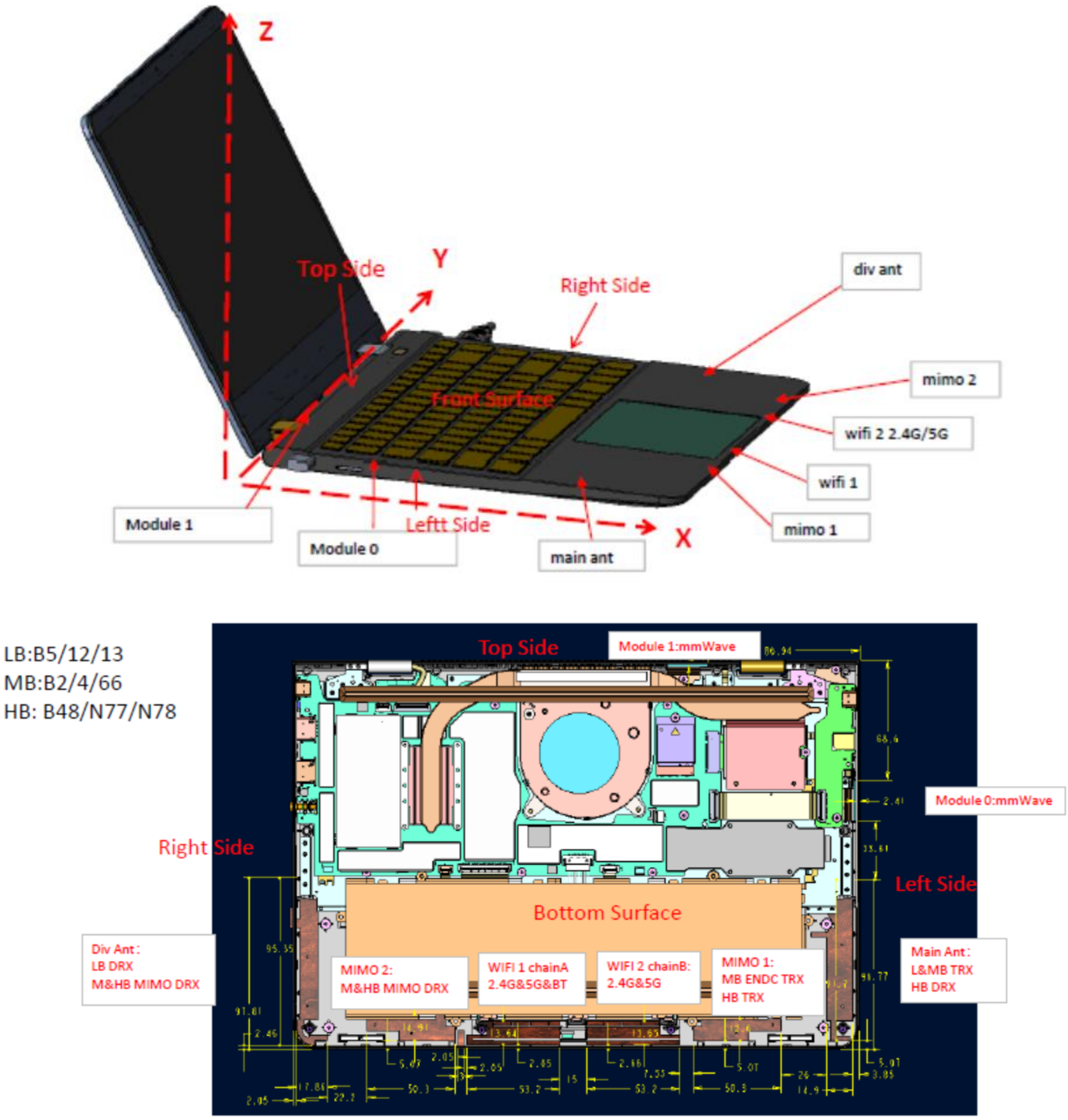

Fig.15.1 EUT Antenna Locations

Antenna	Frequency Bands	TX/RX	Remark
Main Ant	WCDMA B2/4/5 LTE B2/4/5/12/13/66 5G NR n2/5/66	TRX	Only RX (LTE B48, 5G NR n77/78)
Div Ant	LTE 2/4/5/12/13/66/48 5G NR n2/5/66/77/78	RX	N/A
MIMO 1	LTE B48 5G n77/78	TRX	Only RX (LTE B2/4/66, 5G n2/66)
MIMO 2	LTE B2/4/66/48 5G NR n2/66/77/78	RX	N/A
WIFI 1	2.4G/5G/BT	TRX	N/A
WIFI 2	2.4G/5G	TRX	N/A
Module 0	5G mmWave n260/261	TRX	N/A
Module 1	5G mmWave n260/261	TRX	N/A

15.2 Test Positions Consideration

Antenna	Measurement Plane at 0mm					
	Front Surface	Bottom Surface	Left Side	Right Side	Top Side	Bottom Side
Main Ant	Yes	Yes	Yes	No	No	No
MIMO 1	Yes	Yes	Yes	No	No	No
WIFI 1	Yes	Yes	No	No	No	No
WIFI 2	Yes	Yes	No	No	No	No

Note:

1. Per KDB 616217 D04v01r02, when the overall diagonal dimension of display is > 20 cm, the test distance is 0mm; the SAR Test Exclusion Threshold in KDB 447498 section 4.3.1 can be applied to determine SAR test exclusion for adjacent edge configurations.
2. Per KDB 616217 D04v01r02, extremity SAR evaluation for the front surface of keyboard and left side is required.

16 SAR Test Results Summary

16.1 Test Guidance

1. 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 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. There is the protrusion on the bottom surface less than 5mm, we will select it for the most conservative measurement reference level.
4. According to KDB 616217 D04, when antennas are incorporated in the keyboard section of a laptop computer, SAR is required for the bottom surface of the keyboard with the display screen opened at an angle of 90° to the keyboard compartment at the minimum separation distance of 0mm.
5. Considering the user directly contact the keyboard under normal condition, the extremity SAR also would be measurement at the front surface of keyboard with the display screen opened at an angle of 360° will be tested.
6. The extremity SAR should be applied for left side of the keyboard the antenna is closer to the edges of the keyboard than to the bottom surface.
7. Extremity SAR measurement for top side of the keyboard is not required for the WWAN & WLAN antennas are located away from the edge.
8. For WIFI 1 & WIFI 2 antennas, extremity SAR of bottom side is not required for it will not be contacted under normal condition.
9. When the human is closed to the device, the proximity sensor will be active automatically and the power reduced one level for all of the WWAN bands and the reduced power applied to CA, EN-DC and simultaneous transmission at the same time.
10. 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 cycle 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.

16.2 Body SAR Data

Band/Mode	Test Position	Gap (mm)	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	Bottom Face	0mm	9262	11.70	12.50	1.202	0.094	0.113
Band IV/RMC 12.2Kbps	Bottom Face	0mm	1513	12.86	13.50	1.159	0.149	0.173
Band V/RMC 12.2Kbps	Bottom Face	0mm	4132	14.38	15.00	1.153	0.178	0.205
LTE Band 2/1RB#0 20M	Bottom Face	0mm	18900	10.43	11.00	1.140	0.091	0.103
LTE Band 2/50RB#0 20M	Bottom Face	0mm	18900	9.68	10.00	1.076	0.088	0.095
LTE Band 4/1RB#0 20M	Bottom Face	0mm	20175	11.35	12.00	1.161	0.153	0.178
LTE Band 4/50RB#0 20M	Bottom Face	0mm	20175	10.34	11.00	1.164	0.145	0.169
LTE Band 5/1RB#0 10M	Bottom Face	0mm	20525	12.57	13.00	1.104	0.168	0.185
LTE Band 5/25RB#0 10M	Bottom Face	0mm	20525	11.60	12.00	1.096	0.164	0.180
LTE Band 12/1RB#0 10M	Bottom Face	0mm	23095	12.63	13.00	1.089	0.128	0.139

LTE Band 12/25RB#0 10M	Bottom Face	0mm	23095	11.66	12.00	1.081	0.086	0.093
LTE Band 13/1RB#0 10M	Bottom Face	0mm	23230	13.55	14.00	1.109	0.149	0.165
LTE Band 13/25RB#0 10M	Bottom Face	0mm	23230	12.77	13.00	1.054	0.142	0.150
LTE Band 48/1RB#0 20M	Bottom Face	0mm	56640	11.61	12.00	1.094	0.110	0.121
LTE Band 48/50RB#0 20M	Bottom Face	0mm	56640	10.71	11.00	1.069	0.080	0.085
LTE Band 66/1RB#0 20M	Bottom Face	0mm	132322	11.45	12.00	1.135	0.147	0.167
LTE Band 66B/1RB#0 10M	Bottom Face	0mm	132373	10.35	11.00	1.161	0.047	0.055
LTE Band 66C/1RB#0 20M	Bottom Face	0mm	132323	10.26	11.00	1.186	0.042	0.050
LTE Band 66/50RB#0 20M	Bottom Face	0mm	132322	10.69	11.00	1.074	0.145	0.156
5G NR n2/1RB#1 20M	Bottom Face	0mm	376000	11.19	12.00	1.205	0.137	0.165
5G NR n2/50RB#25 20M	Bottom Face	0mm	376000	10.61	11.00	1.094	0.100	0.109
5G NR n5/1RB#1 20M	Bottom Face	0mm	167300	13.20	14.00	1.202	0.192	0.231
5G NR n5/50RB#25 20M	Bottom Face	0mm	167300	12.61	13.00	1.094	0.126	0.138
5G NR n66/1RB#1 20M	Bottom Face	0mm	349000	12.35	13.00	1.161	0.140	0.163
5G NR n66/50RB#25 20M	Bottom Face	0mm	349000	11.64	12.00	1.086	0.110	0.120
5G NR n77/1RB#1 100M	Bottom Face	0mm	656000	23.64	24.00	1.086	0.117	0.127
5G NR n77/135RB#1 100M	Bottom Face	0mm	656000	22.67	23.00	1.079	0.100	0.108
5G NR n78/1RB#1 100M	Bottom Face	0mm	650000	21.55	22.00	1.109	0.111	0.123
5G NR n78/135RB#1 100M	Bottom Face	0mm	650000	20.65	21.00	1.084	0.098	0.106
Chain A								
WLAN 2.4GHz/802.11b	Bottom Face	0mm	13	13.39	14.00	1.151	0.328	0.379
Chain B								
WLAN 2.4GHz/802.11b	Bottom Face	0mm	13	13.04	13.50	1.112	0.327	0.365
Chain A								
WLAN 5.2GHz/802.11ac-80	Bottom Face	0mm	42	7.76	8.50	1.186	0.272	0.379
Chain B								
WLAN 5.2GHz/802.11ac-80	Bottom Face	0mm	42	7.80	8.50	1.175	0.119	0.164
Chain A								
WLAN 5.3GHz/802.11ac-80	Bottom Face	0mm	58	7.61	8.00	1.094	0.289	0.371
Chain B								

WLAN 5.3GHz/802.11ac-80	Bottom Face	0mm	58	7.90	8.50	1.148	0.289	0.390
Chain A								
WLAN 5.5GHz/802.11ac-80	Bottom Face	0mm	106	7.12	8.00	1.225	0.308	0.443
Chain B								
WLAN 5.5GHz/802.11ac-80	Bottom Face	0mm	138	8.01	8.50	1.119	0.471	0.619
Chain A								
WLAN 5.8GHz/802.11ac-80	Bottom Face	0mm	155	8.42	9.00	1.143	0.282	0.378
Chain B								
WLAN 5.8GHz/802.11ac-80	Bottom Face	0mm	155	7.64	8.00	1.086	0.432	0.551
Chain A								
Bluetooth/DH5	Bottom Face	0mm	78	8.80	9.50	1.175	0.381	0.482

Note:

1. Per KDB 447498 D01v06, for each exposure position, if the highest output channel Reported SAR ≤0.8W/kg, other channels SAR testing is not necessary.
2. Additional WLAN SAR testing was performed for simultaneous transmission analysis.
3. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required when the measured SAR is ≥0.8W/kg.
4. Per KDB248227 D01v02r02, OFDM SAR is not required when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.
5. According to KDB 865664 D02v01r02, SAR plot is required for the highest measured SAR in each exposure configuration, wireless mode and frequency band combination.
6. The WLAN Reported 1g SAR (W/kg) has been calculated together with the duty cycle scaling factor 1.005 for 2.4G, 1.174 for 5G.
7. According to Oct.2016 TCB workshop for Bluetooth SAR consideration and the theoretical duty cycle is 83.3%, therefore the actual duty cycle will be scaled up to the theoretical value of Bluetooth reported SAR calculation. The duty cycle of Bluetooth is 77.33%, Therefore the duty cycle scaling factor 1.077 should be used to calculating the reported SAR.

16.3 Extremity SAR Data

Band/Mode	Test Position	Gap (mm)	CH.	Ave. Power (dBm)	Tune-up Limit (dBm)	Tune-up Scaling Factor	Meas. SAR_{10g} (W/kg)	Reported SAR_{10g} (W/kg)
Band II/RMC 12.2Kbps	Front Face	0mm	9262	11.70	12.50	1.202	0.122	0.147
Band II/RMC 12.2Kbps	Left Side	0mm	9262	11.70	12.50	1.202	0.113	0.136
Band IV/RMC 12.2Kbps	Front Face	0mm	1513	12.86	13.50	1.159	0.137	0.159
Band IV/RMC 12.2Kbps	Left Side	0mm	1513	12.86	13.50	1.159	0.148	0.171
Band V/RMC 12.2Kbps	Front Face	0mm	4132	14.38	15.00	1.153	0.213	0.246
Band V/RMC 12.2Kbps	Left Side	0mm	4132	14.38	15.00	1.153	0.082	0.095
LTE Band 2/1RB#0 20M	Front Face	0mm	18900	10.43	11.00	1.140	0.126	0.144
LTE Band 2/1RB#0 20M	Left Side	0mm	18900	10.43	11.00	1.140	0.107	0.122
LTE Band 2/50RB#0 20M	Front Face	0mm	18900	9.68	10.00	1.076	0.112	0.121
LTE Band 2/50RB#0 20M	Left Side	0mm	18900	9.68	10.00	1.076	0.085	0.091
LTE Band 4/1RB#0 20M	Front Face	0mm	20175	11.35	12.00	1.161	0.213	0.247
LTE Band 4/1RB#0 20M	Left Side	0mm	20175	11.35	12.00	1.161	0.145	0.168
LTE Band 4/50RB#0 20M	Front Face	0mm	20175	10.34	11.00	1.164	0.132	0.154
LTE Band 4/50RB#0 20M	Left Side	0mm	20175	10.34	11.00	1.164	0.100	0.116
LTE Band 5/1RB#0 10M	Front Face	0mm	20525	12.57	13.00	1.104	0.210	0.232
LTE Band 5/1RB#0 10M	Left Side	0mm	20525	12.57	13.00	1.104	0.076	0.084
LTE Band 5/25RB#0 10M	Front Face	0mm	20525	11.60	12.00	1.096	0.205	0.225
LTE Band 5/25RB#0 10M	Left Side	0mm	20525	11.60	12.00	1.096	0.054	0.059
LTE Band 12/1RB#0 10M	Front Face	0mm	23095	12.63	13.00	1.089	0.160	0.174
LTE Band 12/1RB#0 10M	Left Side	0mm	23095	12.63	13.00	1.089	0.049	0.053
LTE Band 12/25RB#0 10M	Front Face	0mm	23095	11.66	12.00	1.081	0.110	0.119
LTE Band 12/25RB#0 10M	Left Side	0mm	23095	11.66	12.00	1.081	0.034	0.037
LTE Band 13/1RB#0 10M	Front Face	0mm	23230	13.55	14.00	1.109	0.196	0.217
LTE Band 13/1RB#0 10M	Left Side	0mm	23230	13.55	14.00	1.109	0.074	0.082
LTE Band 13/25RB#0 10M	Front Face	0mm	23230	12.77	13.00	1.054	0.185	0.195
LTE Band 13/25RB#0 10M	Left Side	0mm	23230	12.77	13.00	1.054	0.061	0.064

LTE Band 48/1RB#0 20M	Front Face	0mm	56640	11.61	12.00	1.094	0.042	0.046
LTE Band 48/1RB#0 20M	Left Side	0mm	56640	11.61	12.00	1.094	0.031	0.034
LTE Band 48/50RB#0 20M	Front Face	0mm	56640	10.71	11.00	1.069	0.038	0.041
LTE Band 48/50RB#0 20M	Left Side	0mm	56640	10.71	11.00	1.069	0.022	0.024
LTE Band 66/1RB#0 20M	Front Face	0mm	132322	11.45	12.00	1.135	0.134	0.152
LTE Band 66/1RB#0 20M	Left Side	0mm	132322	11.45	12.00	1.135	0.148	0.168
LTE Band 66B/1RB#0 10M	Front Face	0mm	132373	10.35	11.00	1.161	0.064	0.074
LTE Band 66B/1RB#0 10M	Left Side	0mm	132373	10.35	11.00	1.161	0.038	0.044
LTE Band 66C/1RB#0 20M	Front Face	0mm	132323	10.26	11.00	1.186	0.075	0.089
LTE Band 66C/1RB#0 20M	Left Side	0mm	132323	10.26	11.00	1.186	0.042	0.050
LTE Band 66/50RB#0 20M	Front Face	0mm	132322	10.69	11.00	1.074	0.132	0.142
LTE Band 66/50RB#0 20M	Left Side	0mm	132322	10.69	11.00	1.074	0.115	0.124
5G NR n2/1RB#1 20M	Front Face	0mm	376000	11.19	12.00	1.205	0.171	0.206
5G NR n2/1RB#1 20M	Left Side	0mm	376000	11.19	12.00	1.205	0.108	0.130
5G NR n2/50RB#25 20M	Front Face	0mm	376000	10.61	11.00	1.094	0.142	0.155
5G NR n2/50RB#25 20M	Left Side	0mm	376000	10.61	11.00	1.094	0.085	0.093
5G NR n5/1RB#1 20M	Front Face	0mm	167300	13.20	14.00	1.202	0.227	0.273
5G NR n5/1RB#1 20M	Left Side	0mm	167300	13.20	14.00	1.202	0.076	0.092
5G NR n5/50RB#25 20M	Front Face	0mm	167300	12.61	13.00	1.094	0.136	0.149
5G NR n5/50RB#25 20M	Left Side	0mm	167300	12.61	13.00	1.094	0.065	0.071
5G NR n66/1RB#1 20M	Front Face	0mm	349000	12.35	13.00	1.161	0.148	0.172
5G NR n66/1RB#1 20M	Left Side	0mm	349000	12.35	13.00	1.161	0.147	0.171
5G NR n66/50RB#25 20M	Front Face	0mm	349000	11.64	12.00	1.086	0.116	0.126
5G NR n66/50RB#25 20M	Left Side	0mm	349000	11.64	12.00	1.086	0.117	0.127
5G NR n77/1RB#1 100M	Front Face	0mm	656000	23.64	24.00	1.086	0.065	0.071
5G NR n77/1RB#1 100M	Left Side	0mm	656000	23.64	24.00	1.086	0.039	0.042
5G NR n77/135RB#1 100M	Front Face	0mm	656000	22.67	23.00	1.079	0.051	0.055
5G NR n77/135RB#1 100M	Left Side	0mm	656000	22.67	23.00	1.079	0.033	0.036
5G NR n78/1RB#1 100M	Front Face	0mm	650000	21.55	22.00	1.109	0.071	0.078
5G NR n78/1RB#1 100M	Left Side	0mm	650000	21.55	22.00	1.109	0.042	0.047
5G NR n78/135RB#1 100M	Front Face	0mm	650000	20.65	21.00	1.084	0.065	0.070

5G NR n78/135RB#1 100M	Left Side	0mm	650000	20.65	21.00	1.084	0.033	0.036
Chain A								
WLAN 2.4GHz/802.11b	Front Face	0mm	13	13.39	14.00	1.151	0.072	0.083
Chain B								
WLAN 2.4GHz/802.11b	Front Face	0mm	13	13.04	13.50	1.112	0.084	0.094
Chain A								
WLAN 5.2GHz/802.11ac-80	Front Face	0mm	42	7.76	8.50	1.186	0.066	0.092
Chain B								
WLAN 5.2GHz/802.11ac-80	Front Face	0mm	42	7.80	8.50	1.175	0.025	0.034
Chain A								
WLAN 5.3GHz/802.11ac-80	Front Face	0mm	58	7.61	8.00	1.094	0.030	0.038
ChainB								
WLAN 5.3GHz/802.11ac-80	Front Face	0mm	58	7.90	8.50	1.148	0.026	0.035
Chain A								
WLAN 5.5GHz/802.11ac-80	Front Face	0mm	106	7.12	8.00	1.225	0.043	0.062
Chain B								
WLAN 5.5GHz/802.11ac-80	Front Face	0mm	138	8.01	8.50	1.119	0.020	0.026
Chain A								
WLAN 5.8GHz/802.11ac-80	Front Face	0mm	155	8.42	9.00	1.143	0.040	0.053
Chain B								
WLAN 5.8GHz/802.11ac-80	Front Face	0mm	155	7.64	8.00	1.086	0.015	0.019
Chain A								
Bluetooth/DH5	Front Face	0mm	78	8.80	9.50	1.175	0.060	0.091

17 Simultaneous Transmission Analysis

17.1 Simultaneous Transmission Consideration

No.	Simultaneous Transmission Consideration	Exposure Position	
		Body	Extremity
1	WWAN (WCDMA/LTE)+WLAN 2.4GHz/5GHz (SISO/MIMO)	Yes	Yes
2	WWAN (WCDMA/LTE)+Bluetooth	Yes	Yes
3	WWAN (5G FR1 SA/NSA)+WLAN 2.4GHz/5GHz (SISO/MIMO)	Yes	Yes
4	WWAN (5G FR1 SA/NSA)+Bluetooth	Yes	Yes
5	WWAN (LTE+5G FR2)+WLAN 2.4GHz/5GHz (SISO/MIMO)	Yes	Yes
6	WWAN (LTE+5G FR2)+Bluetooth	Yes	Yes

Note:

1. Simultaneous Transmission SAR evaluation is not required for BT and Wi-Fi, because the software mechanism have been incorporated to guarantee that the WLAN and Bluetooth transmitters would not simultaneously operate.
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: $(SAR_1 + SAR_2)$ ^ 1.5/Ri ≤0.04,

   R_i is the separation distance between the peak SAR locations for the antenna pair in mm.
3. WWAN+WLAN SISO would not be recorded in this report for it is less than WWAN+WLAN MIMO.

17.2 Simultaneous Transmission Analysis

➢ **Body SAR for Inter CA**

CA Combination	Exposure Position	1 PCC 1g SAR (W/kg)	2 SCC 1g SAR (W/kg)	1+2 Summed 1g SAR (W/kg)
CA_2A-4A	Bottom Surface	0.103	0.178	0.281
CA_2A-5A	Bottom Surface	0.103	0.185	0.288
CA_2A-12A	Bottom Surface	0.103	0.139	0.242
CA_2A-13A	Bottom Surface	0.103	0.165	0.268
CA_2A-66A	Bottom Surface	0.103	0.167	0.27
CA_4A-5A	Bottom Surface	0.178	0.185	0.363
CA_4A-12A	Bottom Surface	0.178	0.139	0.317
CA_4A-13A	Bottom Surface	0.178	0.165	0.343
CA_5A-66A	Bottom Surface	0.185	0.167	0.352
CA_12A-66A	Bottom Surface	0.139	0.167	0.306
CA_13A-66A	Bottom Surface	0.165	0.167	0.332

➢ **Extremity SAR for Inter CA**

CA Combination	Exposure Position	1 PCC 10g SAR (W/kg)	2 SCC 10g SAR (W/kg)	1+2 Summed 1g SAR (W/kg)
CA_2A-4A	Front Surface	0.144	0.247	0.391
	Left Side	0.122	0.168	0.29
CA_2A-5A	Front Surface	0.144	0.232	0.376
	Left Side	0.122	0.084	0.206
CA_2A-12A	Front Surface	0.144	0.174	0.318
	Left Side	0.122	0.053	0.175
CA_2A-13A	Front Surface	0.144	0.217	0.361
	Left Side	0.122	0.082	0.204
CA_2A-66A	Front Surface	0.144	0.152	0.296
	Left Side	0.122	0.168	0.29
CA_4A-5A	Front Surface	0.247	0.232	0.479
	Left Side	0.168	0.084	0.252
CA_4A-12A	Front Surface	0.247	0.174	0.421

	Left Side	0.168	0.053	0.221
CA_4A-13A	Front Surface	0.247	0.217	0.464
	Left Side	0.168	0.082	0.25
CA_5A-66A	Front Surface	0.232	0.152	0.384
	Left Side	0.084	0.168	0.252
CA_12A-66A	Front Surface	0.174	0.152	0.326
	Left Side	0.053	0.168	0.221
CA_13A-66A	Front Surface	0.217	0.152	0.369
	Left Side	0.082	0.168	0.25

- **Body SAR for 5G EN-DC**

EN-DC Combination	Exposure Position	1	2	1+2
		LTE	5G NR	Summed
		1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)
EN-DC_13A-n2	Bottom Surface	0.165	0.165	0.33
EN-DC_48A-n2	Bottom Surface	0.121	0.165	0.286
EN-DC_66A-n2	Bottom Surface	0.167	0.165	0.332
EN-DC_2A-n5	Bottom Surface	0.103	0.231	0.334
EN-DC_48A-n5	Bottom Surface	0.121	0.231	0.352
EN-DC_66A-n5	Bottom Surface	0.167	0.231	0.398
EN-DC_2A-n66	Bottom Surface	0.103	0.163	0.266
EN-DC_13A-n66	Bottom Surface	0.165	0.163	0.328
EN-DC_48A-n66	Bottom Surface	0.121	0.163	0.284
EN-DC_2A-n77	Bottom Surface	0.103	0.127	0.23
EN-DC_5A-n77	Bottom Surface	0.185	0.127	0.312
EN-DC_13A-n77	Bottom Surface	0.165	0.127	0.292
EN-DC_66A-n77	Bottom Surface	0.167	0.127	0.294

- **Extremity SAR for 5G EN-DC**

CA Combination	Exposure Position	1 LTE 10g SAR (W/kg)	2 5G NR 10g SAR (W/kg)	1+2 Summed 1g SAR (W/kg)
EN-DC_13A-n2	Front Surface	0.217	0.206	0.423
	Left Side	0.082	0.130	0.212
EN-DC_48A-n2	Front Surface	0.046	0.206	0.252
	Left Side	0.034	0.130	0.164
EN-DC_66A-n2	Front Surface	0.152	0.206	0.358
	Left Side	0.168	0.130	0.298
EN-DC_2A-n5	Front Surface	0.144	0.273	0.417
	Left Side	0.122	0.092	0.214
EN-DC_48A-n5	Front Surface	0.046	0.273	0.319
	Left Side	0.034	0.092	0.126
EN-DC_66A-n5	Front Surface	0.152	0.273	0.425
	Left Side	0.168	0.092	0.26
EN-DC_2A-n66	Front Surface	0.144	0.172	0.316
	Left Side	0.122	0.171	0.293
EN-DC_13A-n66	Front Surface	0.217	0.172	0.389
	Left Side	0.082	0.171	0.253
EN-DC_48A-n66	Front Surface	0.046	0.172	0.218
	Left Side	0.034	0.171	0.205
EN-DC_2A-n77	Front Surface	0.144	0.071	0.215
	Left Side	0.122	0.042	0.164
EN-DC_5A-n77	Front Surface	0.232	0.071	0.303
	Left Side	0.084	0.042	0.126
EN-DC_13A-n77	Front Surface	0.217	0.071	0.288
	Left Side	0.082	0.042	0.124
EN-DC_66A-n77	Front Surface	0.152	0.071	0.223
	Left Side	0.168	0.042	0.21

➤ **Body SAR for WLAN MIMO**

WLAN Bands	Exposure Position	1 Chain A 1g SAR (W/kg)	2 Chain B 1g SAR (W/kg)	1+2 Summed 1g SAR (W/kg)
WLAN 2.4GHz	Bottom Surface	0.379	0.365	0.744
WLAN 5GHz	Bottom Surface	0.443	0.619	1.062

➤ **Extremity SAR for WLAN MIMO**

WLAN Bands	Exposure Position	1 Chain A 10g SAR (W/kg)	2 Chain B 10g SAR (W/kg)	1+2 Summed 1g SAR (W/kg)
WLAN 2.4GHz	Front Surface	0.083	0.094	0.177
WLAN 5GHz	Front Surface	0.092	0.035	0.127

➤ **Body Simultaneous Transmission for WWAN(3G/4G/5G SA)+WLAN MIMO**

WWAN Band	Exposure Position	1 WWAN 1g SAR (W/kg)	2 2.4GHz WLAN 1g SAR (W/kg)	3 5GHz WLAN 1g SAR (W/kg)	1+2 Summed 1g SAR (W/kg)	1+3 Summed 1g SAR (W/kg)
WCDMA Band II	Bottom Surface	0.113	0.744	1.062	0.857	1.175
WCDMA Band IV	Bottom Surface	0.173	0.744	1.062	0.917	1.235
WCDMA Band V	Bottom Surface	0.205	0.744	1.062	0.949	1.267
LTE Band 2	Bottom Surface	0.103	0.744	1.062	0.847	1.165
LTE Band 4	Bottom Surface	0.178	0.744	1.062	0.922	1.24
LTE Band 5	Bottom Surface	0.185	0.744	1.062	0.929	1.247
LTE Band 12	Bottom Surface	0.139	0.744	1.062	0.883	1.201
LTE Band 13	Bottom Surface	0.165	0.744	1.062	0.909	1.227
LTE Band 48	Bottom Surface	0.121	0.744	1.062	0.865	1.183
LTE Band 66	Bottom Surface	0.167	0.744	1.062	0.911	1.229
5G NR n2	Bottom Surface	0.165	0.744	1.062	0.909	1.227
5G NR n5	Bottom Surface	0.231	0.744	1.062	0.975	1.293
5G NR n66	Bottom Surface	0.163	0.744	1.062	0.907	1.225
5G NR n77	Bottom Surface	0.127	0.744	1.062	0.871	1.189
5G NR n78	Bottom Surface	0.123	0.744	1.062	0.867	1.185

➢ **Body Simultaneous Transmission for WWAN(LTE CA)+WLAN MIMO**

CA Combination	Exposure Position	1	2	3	1+2 Summed 1g SAR (W/kg)	1+3 Summed 1g SAR (W/kg)
		WWAN	2.4GHz WLAN	5GHz WLAN		
		1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)		
CA_2A-4A	Bottom Surface	0.281	0.744	1.062	1.025	1.343
CA_2A-5A	Bottom Surface	0.288	0.744	1.062	1.032	1.35
CA_2A-12A	Bottom Surface	0.242	0.744	1.062	0.986	1.304
CA_2A-13A	Bottom Surface	0.268	0.744	1.062	1.012	1.33
CA_2A-66A	Bottom Surface	0.27	0.744	1.062	1.014	1.332
CA_4A-5A	Bottom Surface	0.363	0.744	1.062	1.107	1.425
CA_4A-12A	Bottom Surface	0.317	0.744	1.062	1.061	1.379
CA_4A-13A	Bottom Surface	0.343	0.744	1.062	1.087	1.405
CA_5A-66A	Bottom Surface	0.352	0.744	1.062	1.096	1.414
CA_12A-66A	Bottom Surface	0.306	0.744	1.062	1.05	1.368
CA_13A-66A	Bottom Surface	0.332	0.744	1.062	1.076	1.394

➢ **Body Simultaneous Transmission for WWAN(5G EN-DC)+WLAN MIMO**

EN-DC Combination	Exposure Position	1	2	3	1+2 Summed 1g SAR (W/kg)	1+3 Summed 1g SAR (W/kg)
		WWAN	2.4GHz WLAN	5GHz WLAN		
		1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)		
EN-DC_13A-n2	Bottom Surface	0.33	0.744	1.062	1.074	1.392
EN-DC_48A-n2	Bottom Surface	0.286	0.744	1.062	1.03	1.348
EN-DC_66A-n2	Bottom Surface	0.332	0.744	1.062	1.076	1.394
EN-DC_2A-n5	Bottom Surface	0.334	0.744	1.062	1.078	1.396
EN-DC_48A-n5	Bottom Surface	0.352	0.744	1.062	1.096	1.414
EN-DC_66A-n5	Bottom Surface	0.398	0.744	1.062	1.142	1.46
EN-DC_2A-n66	Bottom Surface	0.266	0.744	1.062	1.01	1.328
EN-DC_13A-n66	Bottom Surface	0.328	0.744	1.062	1.072	1.39
EN-DC_48A-n66	Bottom Surface	0.284	0.744	1.062	1.028	1.346
EN-DC_2A-n77	Bottom Surface	0.23	0.744	1.062	0.974	1.292
EN-DC_5A-n77	Bottom Surface	0.312	0.744	1.062	1.056	1.374
EN-DC_13A-n77	Bottom Surface	0.292	0.744	1.062	1.036	1.354
EN-DC_66A-n77	Bottom Surface	0.294	0.744	1.062	1.038	1.356

➢ **Body Simultaneous Transmission for WWAN(3G/4G/5G SA)+Bluetooth**

WWAN Band	Exposure Position	1	2	1+2
		WWAN	Bluetooth	Summed
		1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)
WCDMA Band II	Bottom Surface	0.113	0.482	0.595
WCDMA Band IV	Bottom Surface	0.173	0.482	0.655
WCDMA Band V	Bottom Surface	0.205	0.482	0.687
LTE Band 2	Bottom Surface	0.103	0.482	0.585
LTE Band 4	Bottom Surface	0.178	0.482	0.66
LTE Band 5	Bottom Surface	0.185	0.482	0.667
LTE Band 12	Bottom Surface	0.139	0.482	0.621
LTE Band 13	Bottom Surface	0.165	0.482	0.647
LTE Band 48	Bottom Surface	0.121	0.482	0.603
LTE Band 66	Bottom Surface	0.167	0.482	0.649
5G NR n2	Bottom Surface	0.165	0.482	0.647
5G NR n66	Bottom Surface	0.163	0.482	0.645
5G NR n78	Bottom Surface	0.123	0.482	0.605

➢ **Body Simultaneous Transmission for WWAN(LTE CA)+Bluetooth**

CA Combination	Exposure Position	1	2	1+2
		WWAN	Bluetooth	Summed
		1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)
CA_2A-4A	Bottom Surface	0.281	0.482	0.763
CA_2A-5A	Bottom Surface	0.288	0.482	0.77
CA_2A-12A	Bottom Surface	0.242	0.482	0.724
CA_2A-13A	Bottom Surface	0.268	0.482	0.75
CA_2A-66A	Bottom Surface	0.27	0.482	0.752
CA_4A-5A	Bottom Surface	0.363	0.482	0.845
CA_4A-12A	Bottom Surface	0.317	0.482	0.799
CA_4A-13A	Bottom Surface	0.343	0.482	0.825
CA_5A-66A	Bottom Surface	0.352	0.482	0.834
CA_12A-66A	Bottom Surface	0.306	0.482	0.788
CA_13A-66A	Bottom Surface	0.332	0.482	0.814

- **Body Simultaneous Transmission for WWAN(5G EN-DC)+Bluetooth**

EN-DC Combination	Exposure Position	1	2	1+2 Summed 1g SAR (W/kg)
		WWAN	Bluetooth	
		1g SAR (W/kg)	1g SAR (W/kg)	
EN-DC_13A-n2	Bottom Surface	0.33	0.482	0.812
EN-DC_48A-n2	Bottom Surface	0.286	0.482	0.768
EN-DC_66A-n2	Bottom Surface	0.332	0.482	0.814
EN-DC_2A-n5	Bottom Surface	0.334	0.482	0.816
EN-DC_48A-n5	Bottom Surface	0.352	0.482	0.834
EN-DC_66A-n5	Bottom Surface	0.398	0.482	0.88
EN-DC_2A-n66	Bottom Surface	0.266	0.482	0.748
EN-DC_13A-n66	Bottom Surface	0.328	0.482	0.81
EN-DC_48A-n66	Bottom Surface	0.284	0.482	0.766
EN-DC_2A-n77	Bottom Surface	0.23	0.482	0.712
EN-DC_5A-n77	Bottom Surface	0.312	0.482	0.794
EN-DC_13A-n77	Bottom Surface	0.292	0.482	0.774
EN-DC_66A-n77	Bottom Surface	0.294	0.482	0.776

- **Extremity Simultaneous Transmission for WWAN(3G/4G/5G SA)+WLAN MIMO**

WWAN Band	Exposure Position	1	2	3	1+2 Summed 10g SAR (W/kg)	1+3 Summed 10g SAR (W/kg)
		WWAN	2.4GHz WLAN	5GHz WLAN		
		10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)		
WCDMA Band II	Front Surface	0.147	0.177	0.127	0.324	0.274
	Left Side	0.136			0.136	0.136
WCDMA Band IV	Front Surface	0.159	0.177	0.127	0.336	0.286
	Left Side	0.171			0.171	0.171
WCDMA Band V	Front Surface	0.246	0.177	0.127	0.423	0.373
	Left Side	0.095			0.095	0.095
LTE Band 2	Front Surface	0.144	0.177	0.127	0.321	0.271
	Left Side	0.122			0.122	0.122
LTE Band 4	Front Surface	0.247	0.177	0.127	0.424	0.374
	Left Side	0.168			0.168	0.168
LTE Band 5	Front Surface	0.232	0.177	0.127	0.409	0.359
	Left Side	0.084			0.084	0.084
LTE Band 12	Front Surface	0.174	0.177	0.127	0.351	0.301

	Left Side	0.053			0.053	0.053
LTE Band 13	Front Surface	0.217	0.177	0.127	0.394	0.344
	Left Side	0.082			0.082	0.082
LTE Band 48	Front Surface	0.046	0.177	0.127	0.223	0.173
	Left Side	0.034			0.034	0.034
LTE Band 66	Front Surface	0.152	0.177	0.127	0.329	0.279
	Left Side	0.168			0.168	0.168
5G NR n2	Front Surface	0.206	0.177	0.127	0.383	0.333
	Left Side	0.130			0.13	0.13
5G NR n66	Front Surface	0.172	0.177	0.127	0.349	0.299
	Left Side	0.171			0.171	0.171
5G NR n78	Front Surface	0.078	0.177	0.127	0.255	0.205
	Left Side	0.047			0.047	0.047

➢ **Extremity Simultaneous Transmission for WWAN(LTE CA)+WLAN MIMO**

CA Combination	Exposure Position	1	2	3	1+2 Summed 10g SAR (W/kg)	1+3 Summed 10g SAR (W/kg)
		WWAN	2.4GHz WLAN	5GHz WLAN		
		10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)		
CA_2A-4A	Front Surface	0.391	0.177	0.127	0.568	0.518
	Left Side	0.29			0.29	0.29
CA_2A-5A	Front Surface	0.376	0.177	0.127	0.553	0.503
	Left Side	0.206			0.206	0.206
CA_2A-12A	Front Surface	0.318	0.177	0.127	0.495	0.445
	Left Side	0.175			0.175	0.175
CA_2A-13A	Front Surface	0.361	0.177	0.127	0.538	0.488
	Left Side	0.204			0.204	0.204
CA_2A-66A	Front Surface	0.296	0.177	0.127	0.473	0.423
	Left Side	0.29			0.29	0.29
CA_4A-5A	Front Surface	0.479	0.177	0.127	0.656	0.606
	Left Side	0.252			0.252	0.252
CA_4A-12A	Front Surface	0.421	0.177	0.127	0.598	0.548
	Left Side	0.221			0.221	0.221
CA_4A-13A	Front Surface	0.464	0.177	0.127	0.641	0.591
	Left Side	0.25			0.25	0.25
CA_5A-66A	Front Surface	0.384	0.177	0.127	0.561	0.511
	Left Side	0.252			0.252	0.252

CA_12A-66A	Front Surface	0.326	0.177	0.127	0.503	0.453
	Left Side	0.221			0.221	0.221
CA_13A-66A	Front Surface	0.369	0.177	0.127	0.546	0.496
	Left Side	0.25			0.25	0.25

➢ **Extremity Simultaneous Transmission for WWAN(5G EN-DC)+WLAN MIMO**

EN-DC Combination	Exposure Position	1	2	3	1+2 Summed 10g SAR (W/kg)	1+3 Summed 10g SAR (W/kg)
		WWAN	2.4GHz WLAN	5GHz WLAN		
		10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)		
EN-DC_13A-n2	Front Surface	0.423	0.177	0.127	0.6	0.55
	Left Side	0.212			0.212	0.212
EN-DC_48A-n2	Front Surface	0.252	0.177	0.127	0.429	0.379
	Left Side	0.164			0.164	0.164
EN-DC_66A-n2	Front Surface	0.358	0.177	0.127	0.535	0.485
	Left Side	0.298			0.298	0.298
EN-DC_2A-n5	Front Surface	0.417	0.177	0.127	0.594	0.544
	Left Side	0.214			0.214	0.214
EN-DC_48A-n5	Front Surface	0.319	0.177	0.127	0.496	0.446
	Left Side	0.126			0.126	0.126
EN-DC_66A-n5	Front Surface	0.425	0.177	0.127	0.602	0.552
	Left Side	0.26			0.26	0.26
EN-DC_2A-n66	Front Surface	0.316	0.177	0.127	0.493	0.443
	Left Side	0.293			0.293	0.293
EN-DC_13A-n66	Front Surface	0.389	0.177	0.127	0.566	0.516
	Left Side	0.253			0.253	0.253
EN-DC_48A-n66	Front Surface	0.218	0.177	0.127	0.395	0.345
	Left Side	0.205			0.205	0.205
EN-DC_2A-n77	Front Surface	0.215	0.177	0.127	0.392	0.342
	Left Side	0.164			0.164	0.164
EN-DC_5A-n77	Front Surface	0.303	0.177	0.127	0.48	0.43
	Left Side	0.126			0.126	0.126
EN-DC_13A-n77	Front Surface	0.288	0.177	0.127	0.465	0.415
	Left Side	0.124			0.124	0.124
EN-DC_66A-n77	Front Surface	0.223	0.177	0.127	0.4	0.35
	Left Side	0.21			0.21	0.21

➢ **Extremity Simultaneous Transmission for WWAN(3G/4G/5G SA)+Bluetooth**

WWAN Band	Exposure Position	1	2	1+2
		WWAN	Bluetooth	Summed
		1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)
WCDMA Band II	Front Surface	0.147	0.091	0.238
	Left Side	0.136		0.136
WCDMA Band IV	Front Surface	0.159	0.091	0.25
	Left Side	0.171		0.171
WCDMA Band V	Front Surface	0.246	0.091	0.337
	Left Side	0.095		0.095
LTE Band 2	Front Surface	0.144	0.091	0.235
	Left Side	0.122		0.122
LTE Band 4	Front Surface	0.247	0.091	0.338
	Left Side	0.168		0.168
LTE Band 5	Front Surface	0.232	0.091	0.323
	Left Side	0.084		0.084
LTE Band 12	Front Surface	0.174	0.091	0.265
	Left Side	0.053		0.053
LTE Band 13	Front Surface	0.217	0.091	0.308
	Left Side	0.082		0.082
LTE Band 48	Front Surface	0.046	0.091	0.137
	Left Side	0.034		0.034
LTE Band 66	Front Surface	0.152	0.091	0.243
	Left Side	0.168		0.168
5G NR n2	Front Surface	0.206	0.091	0.297
	Left Side	0.130		0.13
5G NR n66	Front Surface	0.172	0.091	0.263
	Left Side	0.171		0.171
5G NR n78	Front Surface	0.078	0.091	0.169
	Left Side	0.047		0.047

➢ **Extremity Simultaneous Transmission for WWAN(LTE CA)+Bluetooth**

CA Combination	Exposure Position	1 WWAN 1g SAR (W/kg)	2 Bluetooth 1g SAR (W/kg)	1+2 Summed 1g SAR (W/kg)
CA_2A-4A	Front Surface	0.391	0.091	0.482
	Left Side	0.29		0.29
CA_2A-5A	Front Surface	0.376	0.091	0.467
	Left Side	0.206		0.206
CA_2A-12A	Front Surface	0.318	0.091	0.409
	Left Side	0.175		0.175
CA_2A-13A	Front Surface	0.361	0.091	0.452
	Left Side	0.204		0.204
CA_2A-66A	Front Surface	0.296	0.091	0.387
	Left Side	0.29		0.29
CA_4A-5A	Front Surface	0.479	0.091	0.57
	Left Side	0.252		0.252
CA_4A-12A	Front Surface	0.421	0.091	0.512
	Left Side	0.221		0.221
CA_4A-13A	Front Surface	0.464	0.091	0.555
	Left Side	0.25		0.25
CA_5A-66A	Front Surface	0.384	0.091	0.475
	Left Side	0.252		0.252
CA_12A-66A	Front Surface	0.326	0.091	0.417
	Left Side	0.221		0.221
CA_13A-66A	Front Surface	0.369	0.091	0.46
	Left Side	0.25		0.25

- **Extremity Simultaneous Transmission for WWAN(5G EN-DC)+Bluetooth**

EN-DC Combination	Exposure Position	1	2	1+2
		WWAN	Bluetooth	Summed
		1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)
EN-DC_13A-n2	Front Surface	0.423	0.091	0.514
	Left Side	0.212		0.212
EN-DC_13A-n2	Front Surface	0.252	0.091	0.343
	Left Side	0.164		0.164
EN-DC_66A-n2	Front Surface	0.358	0.091	0.449
	Left Side	0.298		0.298
EN-DC_2A-n5	Front Surface	0.417	0.091	0.508
	Left Side	0.214		0.214
EN-DC_2A-n5	Front Surface	0.319	0.091	0.41
	Left Side	0.126		0.126
EN-DC_66A-n5	Front Surface	0.425	0.091	0.516
	Left Side	0.26		0.26
EN-DC_2A-n66	Front Surface	0.316	0.091	0.407
	Left Side	0.293		0.293
EN-DC_13A-n66	Front Surface	0.389	0.091	0.48
	Left Side	0.253		0.253
EN-DC_48A-n66	Front Surface	0.218	0.091	0.309
	Left Side	0.205		0.205
EN-DC_2A-n77	Front Surface	0.215	0.091	0.306
	Left Side	0.164		0.164
EN-DC_5A-n77	Front Surface	0.303	0.091	0.394
	Left Side	0.126		0.126
EN-DC_13A-n77	Front Surface	0.288	0.091	0.379
	Left Side	0.124		0.124
EN-DC_13A-n77	Front Surface	0.223	0.091	0.314
	Left Side	0.21		0.21

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18 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.

19 Measurement Conclusion

The SAR evaluation indicates that the EUT complies with the RF radiation exposure limits of FCC, with respect to all parameters subject to this test. These measurements were taken to simulate the RF effects of RF exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests. The results and statements relate only to the item(s) tested. Please note that the absorption and distribution of electromagnetic energy in the body are very complex phenomena that depend on the mass, shape, and size of the body, the orientation of the body with respect to the field vectors, and the electrical properties of both the body and the environment. Other variables that may play a substantial role in possible biological effects are those that characterize the environment (e.g. ambient temperature, air velocity, relative humidity, and body insulation) and those that characterize the individual (e.g. age, gender, activity level, debilitation, or disease). Because various factors may interact with one another to vary the specific biological outcome of an exposure to electromagnetic fields, any protection guide should consider maximal amplification of biological effects as a result of field-body interactions, environmental conditions, and physiological variables.

Annex A General Information

1. Identification of the Responsible Testing Laboratory

Laboratory Name:	Shenzhen Morlab Communications Technology Co., Ltd.
Laboratory Address:	FL.1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China
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2. Identification of the Responsible Testing Location

Name:	Shenzhen Morlab Communications Technology Co., Ltd.
Address:	FL.1-3, 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 ******