FCC SAR TEST REPORT

FCC ID	:	**2AP4W-VWEAR**
Equipment	:	**mPERS**
Brand Name	:	**Belle W**
Model Name	:	**Belle W**
Marketing Name	:	**Belle W**
Applicant	:	**Freeus, LLC 1069 Stewart Dr, Suites 3-6 Ogden, Utah 84404, United States**
Manufacturer	:	**WiBASE Industrial Solutions Inc. Bldg. G, 17F, No. 3-1, Yuan Qu St., Nan Gang Dist., Taipei City, 115, Taiwan.**
Standard	:	**FCC 47 CFR Part 2 (2.1093)**

The product was received on Feb. 14, 2022 and testing was started from Feb. 14, 2022 and completed on Feb. 15, 2022. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample provide by manufacturer and the test data has been evaluated in accordance with the test procedures given in 47 CFR Part 2.1093 and FCC KDB and has been pass the FCC requirement.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. Laboratory, the test report shall not be reproduced except in full.

Cona Huang

Approved by: Cona Huang / Deputy Manager

Sporton International Inc. EMC & Wireless Communications Laboratory
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History of this test report

Report No.	Version	Description	Issued Date
FA1D1704-01	01	Initial issue of report	Apr. 07, 2022

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for Freeus, LLC, mPERS, Belle W, are as follows.

Equipment Class	Frequency Band		Highest SAR Summary			Highest Simultaneous Transmission 1g SAR (W/kg)	Highest Simultaneous Transmission 10g SAR (W/kg)
			Head (Separation 10mm)	Body worn (Separation 0mm)	Extremity (Separation 0mm)		
			1g SAR (W/kg)		10g SAR (W/kg)		
Licensed	LTE	LTE Band 2	0.91	0.59	2.78	1.00	3.41
		LTE Band 4	0.97	0.62	3.37		
		LTE Band 5	0.29	0.19	0.86		
		LTE Band 13	0.23	0.47	2.39		
DTS	WLAN	2.4GHz WLAN	0.03	0.10	0.05		
Date of Testing:			2022/2/14 ~ 2022/2/15				

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation and the FCC designation No. TW1190 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC test. This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg for Partial-Body 1g SAR, 4.0 W/kg for Extremity 10g SAR) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1992, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2013 and FCC KDB publications.

Reviewed by: Jason Wang
Report Producer: Carlie Tsai

2. Guidance Applied

The Specific Absorption Rate (SAR) testing specification, method, and procedure for this device is in accordance with the following standards, the below KDB standard may not including in the TAF code without accreditation.

- FCC 47 CFR Part 2 (2.1093)
- ANSI/IEEE C95.1-1992
- IEEE 1528-2013
- FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04
- FCC KDB 865664 D02 SAR Reporting v01r02
- FCC KDB 447498 D01 General RF Exposure Guidance v06
- FCC KDB 248227 D01 802.11 Wi-Fi SAR v02r02
- FCC KDB 941225 D05 SAR for LTE Devices v02r05

3. Equipment Under Test (EUT) Information

3.1 General Information

Product Feature & Specification	
Equipment Name	mPERS
Brand Name	Belle W
Model Name	Belle W
Marketing Name	Belle W
FCC ID	2AP4W-VWEAR
Wireless Technology and Frequency Range	LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 13: 777 MHz ~ 787 MHz WLAN 2.4 GHz Band: 2400 MHz ~ 2483.5 MHz
Mode	LTE: QPSK, 16QAM WLAN: 802.11b/g/n HT20
HW Version	DVT1
SW Version	V1.01.211129R
EUT Stage	Identical Prototype

3.2 General LTE SAR Test and Reporting Considerations

Summarized necessary items addressed in KDB 941225 D05 v02r05	
FCC ID	2AP4W-VWEAR
Equipment Name	mPERS
Operating Frequency Range of each LTE transmission band	LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 13: 777 MHz ~ 787 MHz
Channel Bandwidth	LTE Band 2:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz LTE Band 4:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz LTE Band 5:1.4MHz, 3MHz, 5MHz, 10MHz LTE Band 13: 5MHz, 10MHz
uplink modulations used	QPSK / 16QAM
LTE Voice / Data requirements	Data only
LTE MPR permanently built-in by design	Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3
LTE A-MPR	In the base station simulator configuration, Network Setting value is set to NS_01 to disable A-MPR during SAR testing and the LTE SAR tests was transmitting on all TTI frames (Maximum TTI)
Spectrum plots for RB configuration	A properly configured base station simulator was used for the SAR and power measurement; therefore, spectrum plots for each RB allocation and offset configuration are not included in the SAR report.

Modulation	Channel bandwidth / Transmission bandwidth (N_{RB})						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2
64 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 2
64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 3
256 QAM	≥ 1						≤ 5

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

LTE Band 2

	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	18607	1850.7	18615	1851.5	18625	1852.5	18650	1855	18675	1857.5	18700	1860
M	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880
H	19193	1909.3	19185	1908.5	19175	1907.5	19150	1905	19125	1902.5	19100	1900

LTE Band 4

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

LTE Band 5

	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	20407	824.7	20415	825.5	20425	826.5	20450	829
M	20525	836.5	20525	836.5	20525	836.5	20525	836.5
H	20643	848.3	20635	847.5	20625	846.5	20600	844

LTE Band 13

	Bandwidth 5 MHz		Bandwidth 10 MHz	
	Channel #	Freq.(MHz)	Channel #	Freq.(MHz)
L	23205	779.5	23230	782
M	23230	782		
H	23255	784.5		

4. RF Exposure Limits

4.1 Uncontrolled Environment

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

4.2 Controlled Environment

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

Limits for Occupational/Controlled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.4	8.0	20.0

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

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.08	1.6	4.0

1. Whole-Body SAR is averaged over the entire body, partial-body SAR is averaged over any 1gram of tissue defined as a tissue volume in the shape of a cube. SAR for hands, wrists, feet and ankles is averaged over any 10 grams of tissue defined as a tissue volume in the shape of a cube.

5. Specific Absorption Rate (SAR)

5.1 Introduction

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

5.2 SAR Definition

The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density (ρ). The equation description is as below:

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

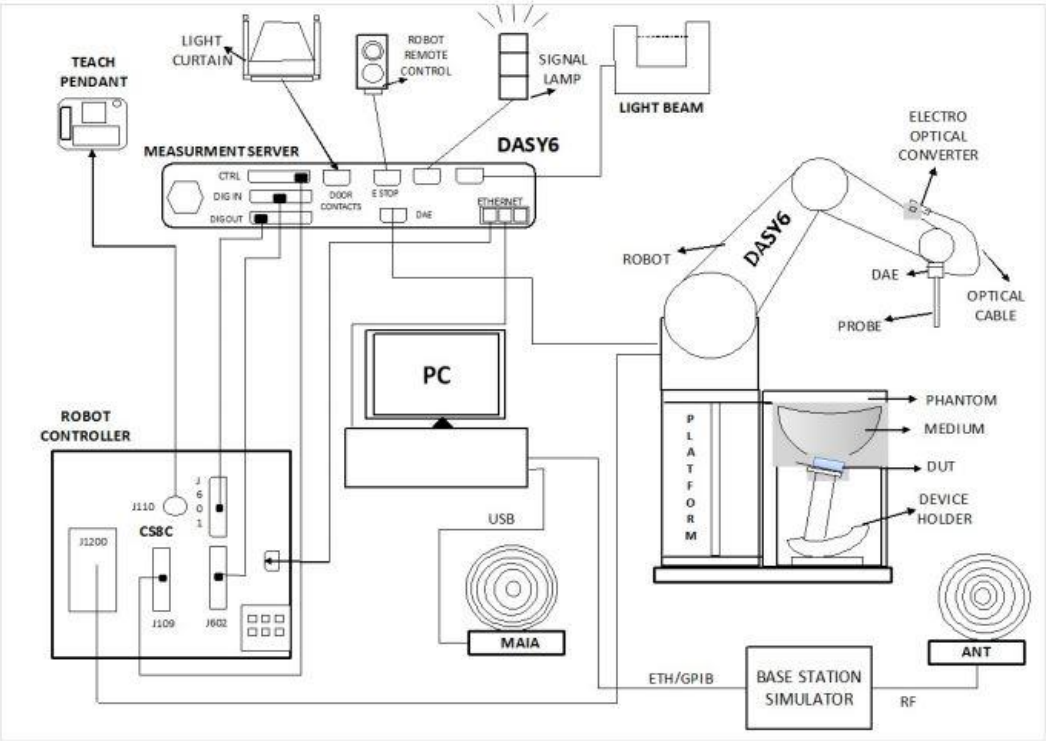
SAR is expressed in units of Watts per kilogram (W/kg)

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

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

6. System Description and Setup

The DASY system used for performing compliance tests consists of the following items:



- The DASY system in DASY6/DASY5 V5.2 SAR Configuration is shown above
- A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic Field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running windows software and the DASY5/DASY6 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

6.1 Test Site Location

The SAR measurement facilities used to collect data are within both Sporton Lab list below test site location are accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 1190 and 3786) and the FCC designation No. TW1190 and TW3786 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC test.

Test Site	EMC & Wireless Communications Laboratory		Wensan Laboratory		
Test Site Location	TW1190 No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan		TW3786 No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan		
Test Site No.	SAR01-HY	SAR03-HY	SAR08-HY	SAR09-HY	SAR15-HY
	SAR04-HY	SAR05-HY	SAR11-HY	SAR12-HY	
	SAR06-HY	SAR10-HY	SAR13-HY	SAR14-HY	

6.2 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.

<ES3DV3 Probe>

Construction	Symmetric design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Frequency	10 MHz – 4 GHz; Linearity: ±0.2 dB (30 MHz – 4 GHz)
Directivity	±0.2 dB in TSL (rotation around probe axis) ±0.3 dB in TSL (rotation normal to probe axis)
Dynamic Range	5 µW/g – >100 mW/g; Linearity: ±0.2 dB
Dimensions	Overall length: 337 mm (tip: 20 mm) Tip diameter: 3.9 mm (body: 12 mm) Distance from probe tip to dipole centers: 3.0 mm

<EX3DV4 Probe>

Construction	Symmetric design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Frequency	10 MHz – >6 GHz Linearity: ±0.2 dB (30 MHz – 6 GHz)
Directivity	±0.3 dB in TSL (rotation around probe axis) ±0.5 dB in TSL (rotation normal to probe axis)
Dynamic Range	10 µW/g – >100 mW/g Linearity: ±0.2 dB (noise: typically <1 µW/g)
Dimensions	Overall length: 337 mm (tip: 20 mm) Tip diameter: 2.5 mm (body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm

6.3 Data Acquisition Electronics (DAE)

The data acquisition electronics (DAE) consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information as well as an optical uplink for commands and the clock.

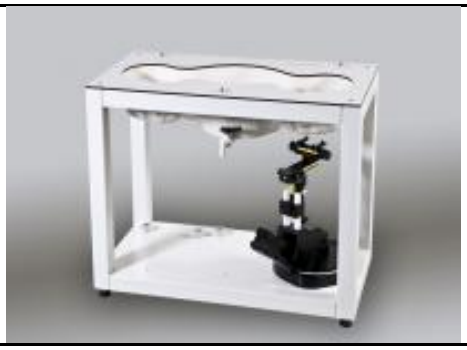
The input impedance of the DAE is 200 MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

Fig 5.1 Photo of DAE

6.4 Phantom

<SAM Twin Phantom>

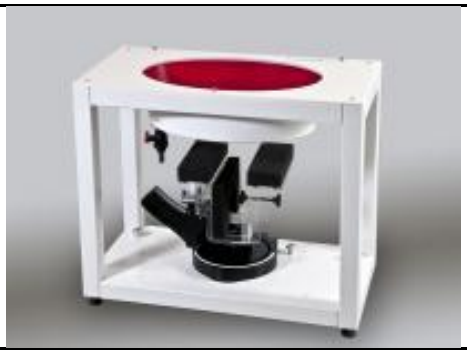
Shell Thickness	2 ± 0.2 mm; Center ear point: 6 ± 0.2 mm
Filling Volume	Approx. 25 liters
Dimensions	Length: 1000 mm; Width: 500 mm; Height: adjustable feet
Measurement Areas	Left Hand, Right Hand, Flat Phantom



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

<ELI Phantom>

Shell Thickness	2 ± 0.2 mm (sagging: <1%)
Filling Volume	Approx. 30 liters
Dimensions	Major ellipse axis: 600 mm Minor axis: 400 mm



The ELI phantom is intended for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI4 is fully compatible with standard and all known tissue simulating liquids.

6.5 Device Holder

<Mounting Device for Hand-Held Transmitter>

In combination with the Twin SAM V5.0/V5.0c or ELI phantoms, the Mounting Device for Hand-Held Transmitters enables rotation of the mounted transmitter device to specified spherical coordinates. At the heads, the rotation axis is at the ear opening. Transmitter devices can be easily and accurately positioned according to IEC 62209-1, IEEE 1528, FCC, or other specifications. The device holder can be locked for positioning at different phantom sections (left head, right head, flat). And upgrade kit to Mounting Device to enable easy mounting of wider devices like big smart-phones, e-books, small tablets, etc. It holds devices with width up to 140 mm.

Mounting Device for Hand-Held Transmitters

Mounting Device Adaptor for Wide-Phones

<Mounting Device for Laptops and other Body-Worn Transmitters>

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.

Mounting Device for Laptops

7. Measurement Procedures

The measurement procedures are as follows:

<Conducted power measurement>

(a) For WWAN power measurement, use base station simulator to configure EUT WWAN transmission in conducted connection with RF cable, at maximum power in each supported wireless interface and frequency band.
(b) Read the WWAN RF power level from the base station simulator.
(c) For WLAN/BT power measurement, use engineering software to configure EUT WLAN/BT continuously transmission, at maximum RF power in each supported wireless interface and frequency band
(d) Connect EUT RF port through RF cable to the power meter, and measure WLAN/BT output power

<SAR measurement>

(a) Use base station simulator to configure EUT WWAN transmission in radiated connection, and engineering software to configure EUT WLAN/BT continuously transmission, at maximum RF power, in the highest power channel.
(b) Place the EUT in the positions as Appendix D demonstrates.
(c) Set scan area, grid size and other setting on the DASY software.
(d) Measure SAR results for the highest power channel on each testing position.
(e) Find out the largest SAR result on these testing positions of each band
(f) Measure SAR results for other channels in worst SAR testing position if the reported SAR of highest power channel is larger than 0.8 W/kg

According to the test standard, the recommended procedure for assessing the peak spatial-average SAR value consists of the following steps:

(a) Power reference measurement
(b) Area scan
(c) Zoom scan
(d) Power drift measurement

7.1 Spatial Peak SAR Evaluation

The procedure for spatial peak SAR evaluation has been implemented according to the test standard. It can be conducted for 1g and 10g, as well as for user-specific masses. The DASY software includes all numerical procedures necessary to evaluate the spatial peak SAR value.

The base for the evaluation is a "cube" measurement. The measured volume must include the 1g and 10g cubes with the highest averaged SAR values. For that purpose, the center of the measured volume is aligned to the interpolated peak SAR value of a previously performed area scan.

The entire evaluation of the spatial peak values is performed within the post-processing engine (SEMCAD). The system always gives the maximum values for the 1g and 10g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

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

7.2 Power Reference Measurement

The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. This distance cannot be smaller than the distance of sensor calibration points to probe tip as defined in the probe properties.

7.3 Area Scan

The area scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASY software can find the maximum found in the scanned area, within a range of the global maximum. The range (in dB0 is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE standard 1528 and IEC 62209 standards, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan), if only one zoom scan follows the area scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of zoom scans has to be increased accordingly.

Area scan parameters extracted from FCC KDB 865664 D01v01r04 SAR measurement 100 MHz to 6 GHz.

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 ± 1 mm	½·δ·ln(2) ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}	≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
	When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	

7.4 Zoom Scan

Zoom scans are used assess the peak spatial SAR values within a cubic averaging volume containing 1 gram and 10 gram of simulated tissue. The zoom scan measures points (refer to table below) within a cube shoes base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the zoom scan evaluates the averaged SAR for 1 gram and 10 gram and displays these values next to the job's label.

Zoom scan parameters extracted from FCC KDB 865664 D01v01r04 SAR measurement 100 MHz to 6 GHz.

			≤ 3 GHz	> 3 GHz
Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	≤ 1.5·$\Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm

Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.

* When zoom scan is required and the *reported* SAR from the *area scan based 1-g SAR estimation* procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.

7.5 Volume Scan Procedures

The volume scan is used for assess overlapping SAR distributions for antennas transmitting in different frequency bands. It is equivalent to an oversized zoom scan used in standalone measurements. The measurement volume will be used to enclose all the simultaneous transmitting antennas. For antennas transmitting simultaneously in different frequency bands, the volume scan is measured separately in each frequency band. In order to sum correctly to compute the 1g aggregate SAR, the EUT remain in the same test position for all measurements and all volume scan use the same spatial resolution and grid spacing. When all volume scan were completed, the software, SEMCAD postprocessor can combine and subsequently superpose these measurement data to calculating the multiband SAR.

7.6 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.

8. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	750MHz System Validation Kit	D750V3	1012	Aug. 18, 2021	Aug. 17, 2022
SPEAG	835MHz System Validation Kit(2)	D835V2	4d167	Nov. 25, 2019	Nov. 22, 2022
SPEAG	1750MHz System Validation Kit(2)	D1750V2	1112	Mar. 07, 2019	Mar. 04, 2022
SPEAG	1900MHz System Validation Kit(2)	D1900V2	5d185	Mar. 07, 2019	Mar. 04, 2022
SPEAG	2450MHz System Validation Kit(2)	D2450V2	929	Nov. 21, 2019	Nov. 18, 2022
SPEAG	Data Acquisition Electronics	DAE4	778	May. 21, 2021	May. 20, 2022
SPEAG	Data Acquisition Electronics	DAE4	853	Jul. 14, 2021	Jul. 13, 2022
SPEAG	Dosimetric E-Field Probe	EX3DV4	7350	Dec. 20, 2021	Dec. 19, 2022
SPEAG	Dosimetric E-Field Probe	EX3DV4	7590	Mar. 25, 2021	Mar. 24, 2022
Testo	Hygro meter	608-H1	45196600	Oct. 22, 2021	Oct. 21, 2022
Testo	Hygro meter	608-H1	45207528	Oct. 22, 2021	Oct. 21, 2022
Anritsu	Radio Communication Analyzer	MT8821C	6201341950	Oct. 21, 2021	Oct. 20, 2022
SPEAG	Device Holder	N/A	N/A	N/A	N/A
Anritsu	Signal Generator	MG3710A	6201502524	Oct. 24, 2021	Oct. 23, 2022
Keysight	ENA Network Analyzer	E5071C	MY46104758	Sep. 07, 2021	Sep. 06, 2022
SPEAG	Dielectric Probe Kit	DAK-3.5	1126	Sep. 24, 2021	Sep. 23, 2022
LINE SEIKI	Digital Thermometer	DTM3000-spezial	2942	Oct. 26, 2021	Oct. 25, 2022
Anritsu	Power Meter	ML2495A	1419002	Aug. 18, 2021	Aug. 17, 2022
Anritsu	Power Sensor	MA2411B	1911176	Aug. 18, 2021	Aug. 17, 2022
Anritsu	Power Meter	ML2495A	1804003	Oct. 09, 2021	Oct. 08, 2022
Anritsu	Power Sensor	MA2411B	1726150	Oct. 09, 2021	Oct. 08, 2022
Anritsu	Spectrum Analyzer	MS2830A	6201396378	Jul. 16, 2021	Jul. 15, 2022
Agilent	Spectrum Analyzer	E4408B	MY44211028	Aug. 19, 2021	Aug. 18, 2022
Mini-Circuits	Power Amplifier	ZVE-8G+	6418	Oct. 12, 2021	Oct. 11, 2022
Mini-Circuits	Power Amplifier	ZVE-8G+	479102029	Sep. 06, 2021	Sep. 05, 2022
ATM	Dual Directional Coupler	C122H-10	P610410z-02	Note 1	
Warison	Directional Coupler	WCOU-10-50S-10	WR889BMC4B1	Note 1	
Woken	Attenuator 1	WK0602-XX	N/A	Note 1	
PE	Attenuator 2	PE7005-10	N/A	Note 1	
PE	Attenuator 3	PE7005- 3	N/A	Note 1	

General Note:

1. Prior to system verification and validation, the path loss from the signal generator to the system check source and the power meter, which includes the amplifier, cable, attenuator and directional coupler, was measured by the network analyzer. The reading of the power meter was offset by the path loss difference between the path to the power meter and the path to the system check source to monitor the actual power level fed to the system check source.
2. The dipole calibration interval can be extended to 3 years with justification according to KDB 865664 D01. The dipoles are also not physically damaged, or repaired during the interval. The justification data in appendix C can be found which the return loss is < -20dB, within 20% of prior calibration, the impedance is within 5 ohm of prior calibration for each dipole.

9. System Verification

9.1 Tissue Verification

The tissue dielectric parameters of tissue-equivalent media used for SAR measurements must be characterized within a temperature range of 18℃ to 25℃, measured with calibrated instruments and apparatuses, such as network analyzers and temperature probes. The temperature of the tissue-equivalent medium during SAR measurement must also be within 18℃ to 25℃ and within ± 2℃ of the temperature when the tissue parameters are characterized. The tissue dielectric measurement system must be calibrated before use. The dielectric parameters must be measured before the tissue-equivalent medium is used in a series of SAR measurements.
The liquid tissue depth was at least 15cm in the phantom for all SAR testing

<Tissue Dielectric Parameter Check Results>

Frequency (MHz)	Liquid Temp. (℃)	Conductivity (σ)	Permittivity (ε_r)	Conductivity Target (σ)	Permittivity Target (ε_r)	Delta (σ) (%)	Delta (ε_r) (%)	Limit (%)	Date
750	22.2	0.892	43.189	0.89	41.90	0.22	3.08	±5	2022/2/14
835	22.2	0.923	42.773	0.90	41.50	2.56	3.07	±5	2022/2/14
1750	22.6	1.382	40.730	1.37	40.10	0.88	1.57	±5	2022/2/15
1750	22.6	1.346	40.860	1.37	40.10	-1.75	1.90	±5	2022/2/15
1900	22.6	1.429	39.314	1.40	40.00	2.07	-1.72	±5	2022/2/15
1900	22.6	1.416	39.574	1.40	40.00	1.14	-1.07	±5	2022/2/15
2450	22.2	1.792	39.367	1.80	39.20	-0.44	0.43	±5	2022/2/14

9.2 System Performance Check Results

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

Test Site	Date	Frequency (MHz)	Input Power (mW)	Dipole S/N	Probe S/N	DAE S/N	Measured 1g SAR (W/kg)	Targeted 1g SAR (W/kg)	Normalized 1g SAR (W/kg)	Deviation (%)	Measured 10g SAR (W/kg)	Targeted 10g SAR (W/kg)	Normalized 10g SAR (W/kg)	Deviation (%)
SAR03	2022/2/14	750	250	D750V3-1012	EX3DV4 - SN7590	DAE4 Sn853	2.04	8.56	8.16	-4.67	1.32	5.56	5.28	-5.04
SAR03	2022/2/14	835	250	D835V2-4d167	EX3DV4 - SN7590	DAE4 Sn853	2.45	9.55	9.8	2.62	1.59	6.21	6.36	2.42
SAR03	2022/2/15	1750	250	D1750V2-1112	EX3DV4 - SN7590	DAE4 Sn853	8.61	36.70	34.44	-6.16	4.50	19.40	18	-7.22
SAR06	2022/2/15	1750	250	D1750V2-1112	EX3DV4 - SN7350	DAE4 Sn778	8.62	36.70	34.48	-6.05	4.54	19.40	18.16	-6.39
SAR03	2022/2/15	1900	250	D1900V2-5d185	EX3DV4 - SN7590	DAE4 Sn853	9.14	39.40	36.56	-7.21	4.69	20.50	18.76	-8.49
SAR06	2022/2/15	1900	250	D1900V2-5d185	EX3DV4 - SN7350	DAE4 Sn778	10.20	39.40	40.8	3.55	5.16	20.50	20.64	0.68
SAR03	2022/2/14	2450	250	D2450V2-929	EX3DV4 - SN7590	DAE4 Sn853	13.20	53.10	52.8	-0.56	6.20	24.70	24.8	0.40

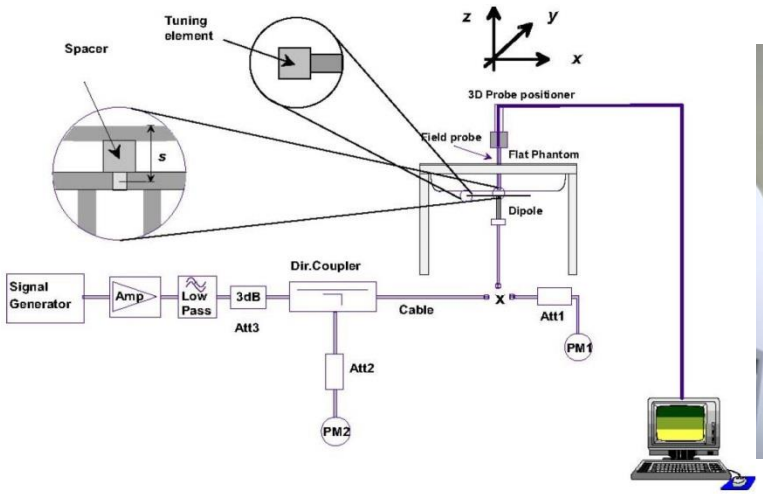


Fig 8.3.1 System Performance Check Setup

Fig 8.3.2 Setup Photo

10. LTE Output Power (Unit: dBm)

<LTE Conducted Power>

General Note:

1. Anritsu MT8820C base station simulator was used to setup the connection with EUT; the frequency band, channel bandwidth, RB allocation configuration, modulation type are set in the base station simulator to configure EUT transmitting at maximum power and at different configurations which are requested to be reported to FCC, for conducted power measurement and SAR testing.
2. Per KDB 941225 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.
3. 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.
4. Per KDB 941225 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
5. 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.
6. Per KDB 941225 D05v02r05, 16QAM output power for each RB allocation configuration is > not ½ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, 16QAM SAR testing is not required.
7. 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 bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
8. For LTE B4/B5 the maximum bandwidth does not support three non-overlapping channels, per KDB 941225 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.

<LTE Band 2>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				18700	18900	19100	
Frequency (MHz)				1860	1880	1900	
20	QPSK	1	0	21.87	21.90	21.74	22
20	QPSK	1	49	21.85	21.89	21.85	
20	QPSK	1	99	21.51	21.49	21.45	
20	QPSK	50	0	20.33	20.43	20.58	21
20	QPSK	50	24	20.49	20.46	20.61	
20	QPSK	50	50	20.18	20.27	20.28	
20	QPSK	100	0	20.48	20.49	20.58	
20	16QAM	1	0	20.30	20.47	20.49	21
20	16QAM	1	49	20.38	20.45	20.59	
20	16QAM	1	99	20.23	20.37	20.35	
20	16QAM	12	0	20.66	20.65	20.33	21
20	16QAM	12	24	20.55	20.34	20.54	
20	16QAM	12	50	20.45	20.39	20.61	
20	16QAM	27	0	20.61	20.54	20.50	21
Channel				18675	18900	19125	Tune-up limit (dBm)
Frequency (MHz)				1857.5	1880	1902.5	
15	QPSK	1	0	21.73	21.76	21.63	22
15	QPSK	1	37	21.75	21.71	21.77	
15	QPSK	1	74	21.41	21.36	21.28	
15	QPSK	36	0	20.30	20.33	20.48	21
15	QPSK	36	20	20.34	20.33	20.47	
15	QPSK	36	39	20.18	20.14	20.21	
15	QPSK	75	0	20.48	20.39	20.44	
15	16QAM	1	0	20.14	20.43	20.44	21
15	16QAM	1	37	20.33	20.37	20.43	
15	16QAM	1	74	20.12	20.34	20.23	
15	16QAM	12	0	20.33	20.34	20.49	21
15	16QAM	12	20	20.31	20.55	20.64	
15	16QAM	12	39	20.49	20.50	20.54	
15	16QAM	27	0	20.51	20.55	20.51	21
Channel				18650	18900	19150	Tune-up limit (dBm)
Frequency (MHz)				1855	1880	1905	
10	QPSK	1	0	21.60	21.47	21.50	22
10	QPSK	1	25	21.36	21.55	21.42	
10	QPSK	1	49	21.19	21.41	21.32	
10	QPSK	25	0	20.06	20.39	20.23	21
10	QPSK	25	12	20.06	20.34	20.20	
10	QPSK	25	25	20.14	20.44	20.35	
10	QPSK	50	0	20.20	20.46	20.40	
10	16QAM	1	0	20.23	20.40	20.26	21
10	16QAM	1	25	20.43	20.52	20.42	
10	16QAM	1	49	20.03	20.32	20.29	
10	16QAM	12	0	19.51	19.67	19.48	21
10	16QAM	12	12	19.35	19.66	19.61	
10	16QAM	12	25	19.18	19.47	19.29	
10	16QAM	27	0	20.67	20.34	20.00	21
Channel				18625	18900	19175	Tune-up limit (dBm)
Frequency (MHz)				1852.5	1880	1907.5	
5	QPSK	1	0	21.53	21.40	21.46	22
5	QPSK	1	12	21.21	21.46	21.42	
5	QPSK	1	24	21.18	21.26	21.31	

5	QPSK	12	0	19.93	20.28	20.15	21
5	QPSK	12	7	19.99	20.29	20.16	
5	QPSK	12	13	20.02	20.31	20.22	
5	QPSK	25	0	20.17	20.29	20.20	
5	16QAM	1	0	20.11	20.27	20.12	21
5	16QAM	1	12	20.43	20.45	20.35	
5	16QAM	1	24	20.02	20.24	20.15	
5	16QAM	12	0	19.34	19.55	19.36	21
5	16QAM	12	7	19.34	19.47	19.41	
5	16QAM	12	13	19.11	19.46	19.21	
5	16QAM	25	0	19.21	19.51	19.48	
Channel				18615	18900	19185	Tune-up limit (dBm)
Frequency (MHz)				1851.5	1880	1908.5	
3	QPSK	1	0	21.50	21.37	21.38	22
3	QPSK	1	8	21.10	21.37	21.33	
3	QPSK	1	14	21.05	21.11	21.20	
3	QPSK	8	0	19.73	20.13	20.10	21
3	QPSK	8	4	19.97	20.10	20.12	
3	QPSK	8	7	19.92	20.22	20.10	
3	QPSK	15	0	20.06	20.09	20.11	
3	16QAM	1	0	20.00	20.09	19.95	21
3	16QAM	1	8	20.34	20.43	20.32	
3	16QAM	1	14	19.96	20.04	20.03	
3	16QAM	8	0	19.23	19.45	19.36	21
3	16QAM	8	4	19.30	19.41	19.32	
3	16QAM	8	7	19.10	19.35	19.01	
3	16QAM	15	0	19.15	19.40	19.16	
Channel				18607	18900	19193	Tune-up limit (dBm)
Frequency (MHz)				1850.7	1880	1909.3	
1.4	QPSK	1	0	21.45	21.32	21.43	22
1.4	QPSK	1	3	21.07	21.33	21.31	
1.4	QPSK	1	5	20.98	21.20	21.16	
1.4	QPSK	3	0	21.52	21.39	21.36	
1.4	QPSK	3	1	21.05	21.30	21.36	
1.4	QPSK	3	3	21.06	21.26	21.31	
1.4	QPSK	6	0	20.15	20.14	20.06	21
1.4	16QAM	1	0	20.05	20.09	19.92	21
1.4	16QAM	1	3	20.37	20.40	20.25	
1.4	16QAM	1	5	19.94	20.15	20.09	
1.4	16QAM	3	0	20.09	20.09	19.94	
1.4	16QAM	3	1	20.29	20.41	20.15	
1.4	16QAM	3	3	19.92	20.22	20.06	
1.4	16QAM	6	0	19.00	19.23	19.16	21

<LTE Band 4>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				20050	20175	20300	
Frequency (MHz)				1720	1732.5	1745	
20	QPSK	1	0	22.58	22.60	22.57	23
20	QPSK	1	49	22.36	22.45	22.38	
20	QPSK	1	99	22.49	22.53	22.55	
20	QPSK	50	0	21.21	21.20	21.07	22
20	QPSK	50	24	20.99	21.11	21.07	
20	QPSK	50	50	21.03	21.09	20.94	
20	QPSK	100	0	20.99	21.17	21.08	
20	16QAM	1	0	21.29	21.34	21.28	22
20	16QAM	1	49	21.05	21.05	21.08	
20	16QAM	1	99	21.04	21.13	20.99	
20	16QAM	12	0	21.02	21.18	21.29	22
20	16QAM	12	24	20.99	20.98	20.95	
20	16QAM	12	50	20.89	20.98	20.97	
20	16QAM	27	0	20.87	20.89	20.88	21
Channel				20025	20175	20325	Tune-up limit (dBm)
Frequency (MHz)				1717.5	1732.5	1747.5	
15	QPSK	1	0	22.54	22.58	22.42	23
15	QPSK	1	37	22.34	22.35	22.32	
15	QPSK	1	74	22.34	22.46	22.46	
15	QPSK	36	0	21.15	21.17	20.94	22
15	QPSK	36	20	20.93	20.99	21.05	
15	QPSK	36	39	20.95	20.91	20.79	
15	QPSK	75	0	20.87	21.06	21.05	
15	16QAM	1	0	21.19	21.19	21.13	22
15	16QAM	1	37	20.95	20.99	20.96	
15	16QAM	1	74	20.94	20.94	20.92	
15	16QAM	12	0	21.10	21.14	21.26	22
15	16QAM	12	20	20.98	20.99	20.95	
15	16QAM	12	39	20.87	20.84	20.84	
15	16QAM	27	0	20.87	20.80	20.88	21
Channel				20000	20175	20350	Tune-up limit (dBm)
Frequency (MHz)				1715	1732.5	1750	
10	QPSK	1	0	22.59	22.53	22.58	23
10	QPSK	1	25	22.24	22.48	22.24	
10	QPSK	1	49	22.20	22.44	22.30	
10	QPSK	25	0	21.18	21.34	21.13	22
10	QPSK	25	12	21.03	21.27	21.13	
10	QPSK	25	25	21.09	21.17	20.97	
10	QPSK	50	0	21.05	21.25	21.09	
10	16QAM	1	0	21.15	21.26	21.21	22
10	16QAM	1	25	21.23	21.37	21.19	
10	16QAM	1	49	20.90	21.15	20.99	
10	16QAM	12	0	20.08	20.23	20.11	21
10	16QAM	12	12	20.41	20.50	20.44	
10	16QAM	12	25	20.18	20.30	20.17	
10	16QAM	27	0	20.15	20.30	20.39	21
Channel				19975	20175	20375	Tune-up limit (dBm)
Frequency (MHz)				1712.5	1732.5	1752.5	
5	QPSK	1	0	22.41	22.40	22.53	23
5	QPSK	1	12	22.18	22.39	22.10	
5	QPSK	1	24	22.16	22.38	22.26	

5	QPSK	12	0	21.17	21.30	21.08	22
5	QPSK	12	7	21.00	21.19	20.99	
5	QPSK	12	13	20.99	20.99	20.81	
5	QPSK	25	0	21.02	21.24	21.06	
5	16QAM	1	0	21.08	21.13	21.07	22
5	16QAM	1	12	21.21	21.20	21.00	
5	16QAM	1	24	20.81	21.13	20.79	
5	16QAM	12	0	19.96	20.16	20.07	21
5	16QAM	12	7	20.31	20.32	20.35	
5	16QAM	12	13	20.02	20.25	20.16	
5	16QAM	25	0	20.20	20.30	20.15	
Channel				19965	20175	20385	Tune-up limit (dBm)
Frequency (MHz)				1711.5	1732.5	1753.5	
3	QPSK	1	0	22.33	22.38	22.41	23
3	QPSK	1	8	21.99	22.25	22.03	
3	QPSK	1	14	22.02	22.33	22.18	
3	QPSK	8	0	21.00	21.12	21.03	22
3	QPSK	8	4	20.85	21.01	20.90	
3	QPSK	8	7	20.95	20.85	20.62	
3	QPSK	15	0	20.82	21.22	20.92	
3	16QAM	1	0	20.99	20.93	21.00	22
3	16QAM	1	8	21.09	21.00	20.81	
3	16QAM	1	14	20.74	21.08	20.77	
3	16QAM	8	0	19.84	19.98	19.94	21
3	16QAM	8	4	20.30	20.13	20.22	
3	16QAM	8	7	19.94	20.16	20.09	
3	16QAM	15	0	20.05	20.13	19.95	
Channel				19957	20175	20393	Tune-up limit (dBm)
Frequency (MHz)				1710.7	1732.5	1754.3	
1.4	QPSK	1	0	22.19	22.19	22.31	23
1.4	QPSK	1	3	21.82	22.09	21.84	
1.4	QPSK	1	5	21.92	22.16	22.10	
1.4	QPSK	3	0	22.24	22.30	22.25	
1.4	QPSK	3	1	21.88	22.10	21.88	
1.4	QPSK	3	3	21.96	22.21	22.01	
1.4	QPSK	6	0	20.78	21.18	20.83	22
1.4	16QAM	1	0	20.97	20.75	20.84	22
1.4	16QAM	1	3	20.96	20.95	20.72	
1.4	16QAM	1	5	20.58	20.96	20.68	
1.4	16QAM	3	0	20.99	20.93	20.82	
1.4	16QAM	3	1	20.91	20.82	20.66	
1.4	16QAM	3	3	20.74	20.96	20.71	
1.4	16QAM	6	0	20.23	20.14	20.15	21

<LTE Band 5>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				20450	20525	20600	
Frequency (MHz)				829	836.5	844	
10	QPSK	1	0	23.51	23.18	23.30	24
10	QPSK	1	25	23.23	23.42	23.17	
10	QPSK	1	49	23.01	23.24	23.25	
10	QPSK	25	0	21.90	22.27	22.01	23
10	QPSK	25	12	21.87	22.33	22.06	
10	QPSK	25	25	21.84	22.23	22.00	
10	QPSK	50	0	21.81	22.30	22.12	
10	16QAM	1	0	21.60	21.98	21.70	23
10	16QAM	1	25	21.98	22.06	22.08	
10	16QAM	1	49	21.63	22.03	21.84	
10	16QAM	12	0	20.91	21.33	21.08	22
10	16QAM	12	12	20.90	21.29	21.17	
10	16QAM	12	25	20.83	21.23	21.10	
10	16QAM	27	0	21.79	21.50	21.66	22
Channel				20425	20525	20625	Tune-up limit (dBm)
Frequency (MHz)				826.5	836.5	846.5	
5	QPSK	1	0	22.97	23.10	23.16	24
5	QPSK	1	12	23.06	23.40	23.21	
5	QPSK	1	24	22.95	23.20	23.13	
5	QPSK	12	0	21.84	22.26	22.16	23
5	QPSK	12	7	22.06	22.15	22.22	
5	QPSK	12	13	21.84	22.06	22.07	
5	QPSK	25	0	21.87	22.20	22.13	
5	16QAM	1	0	21.64	21.92	21.74	23
5	16QAM	1	12	21.73	21.94	21.88	
5	16QAM	1	24	21.63	21.96	21.81	
5	16QAM	12	0	20.88	21.24	21.17	22
5	16QAM	12	7	21.01	21.20	21.14	
5	16QAM	12	13	20.74	21.19	21.09	
5	16QAM	25	0	21.43	21.32	21.26	
Channel				20415	20525	20635	Tune-up limit (dBm)
Frequency (MHz)				825.5	836.5	847.5	
3	QPSK	1	0	23.10	23.06	23.21	24
3	QPSK	1	8	23.17	22.92	23.20	
3	QPSK	1	14	23.12	22.84	22.96	
3	QPSK	8	0	22.25	21.79	22.03	23
3	QPSK	8	4	22.15	21.78	22.09	
3	QPSK	8	7	22.01	21.76	21.99	
3	QPSK	15	0	22.40	21.94	22.13	
3	16QAM	1	0	21.98	21.57	21.99	23
3	16QAM	1	8	22.00	21.59	21.90	
3	16QAM	1	14	21.99	21.51	21.92	
3	16QAM	8	0	21.30	20.82	21.05	22
3	16QAM	8	4	21.27	20.80	21.06	
3	16QAM	8	7	21.27	20.86	20.97	
3	16QAM	15	0	21.05	20.56	20.87	
Channel				20407	20525	20643	Tune-up limit (dBm)
Frequency (MHz)				824.7	836.5	848.3	
1.4	QPSK	1	0	23.08	23.09	22.88	24
1.4	QPSK	1	3	22.90	22.86	22.68	
1.4	QPSK	1	5	22.77	22.69	22.64	

1.4	QPSK	3	0	23.09	23.10	22.87	
1.4	QPSK	3	1	22.90	22.86	22.70	
1.4	QPSK	3	3	22.76	22.84	22.72	
1.4	QPSK	6	0	22.07	22.07	22.03	23
1.4	16QAM	1	0	21.90	21.92	21.86	
1.4	16QAM	1	3	21.60	21.43	21.43	
1.4	16QAM	1	5	21.50	21.44	21.51	23
1.4	16QAM	3	0	21.98	21.95	21.93	
1.4	16QAM	3	1	21.54	21.62	21.50	
1.4	16QAM	3	3	21.60	21.51	21.50	
1.4	16QAM	6	0	20.80	20.80	20.71	22

<LTE Band 13>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel					23230		
Frequency (MHz)					782		
10	QPSK	1	0		23.09		24
10	QPSK	1	25		23.03		
10	QPSK	1	49		22.59		
10	QPSK	25	0		22.11		23
10	QPSK	25	12		22.04		
10	QPSK	25	25		22.03		
10	QPSK	50	0		22.13		
10	16QAM	1	0		22.12		23
10	16QAM	1	25		22.24		
10	16QAM	1	49		21.74		
10	16QAM	12	0		21.92		22
10	16QAM	12	12		21.80		
10	16QAM	12	25		21.74		
10	16QAM	27	0		21.50		22
Channel				23205	23230	23255	Tune-up limit (dBm)
Frequency (MHz)				779.5	782	784.5	
5	QPSK	1	0	22.98	23.08	23.02	24
5	QPSK	1	12	22.75	22.69	22.61	
5	QPSK	1	24	22.97	22.94	22.85	
5	QPSK	12	0	21.77	21.87	21.73	23
5	QPSK	12	7	21.83	21.88	21.87	
5	QPSK	12	13	21.78	21.76	21.71	
5	QPSK	25	0	22.39	22.34	22.32	
5	16QAM	1	0	22.73	22.65	22.70	23
5	16QAM	1	12	22.52	22.60	22.55	
5	16QAM	1	24	22.26	22.30	22.25	
5	16QAM	12	0	20.27	20.31	20.27	22
5	16QAM	12	7	20.21	20.15	20.15	
5	16QAM	12	13	20.49	20.45	20.32	
5	16QAM	25	0	20.85	20.84	20.74	

11. 2.4GHz WiFi Output Power (Unit: dBm)

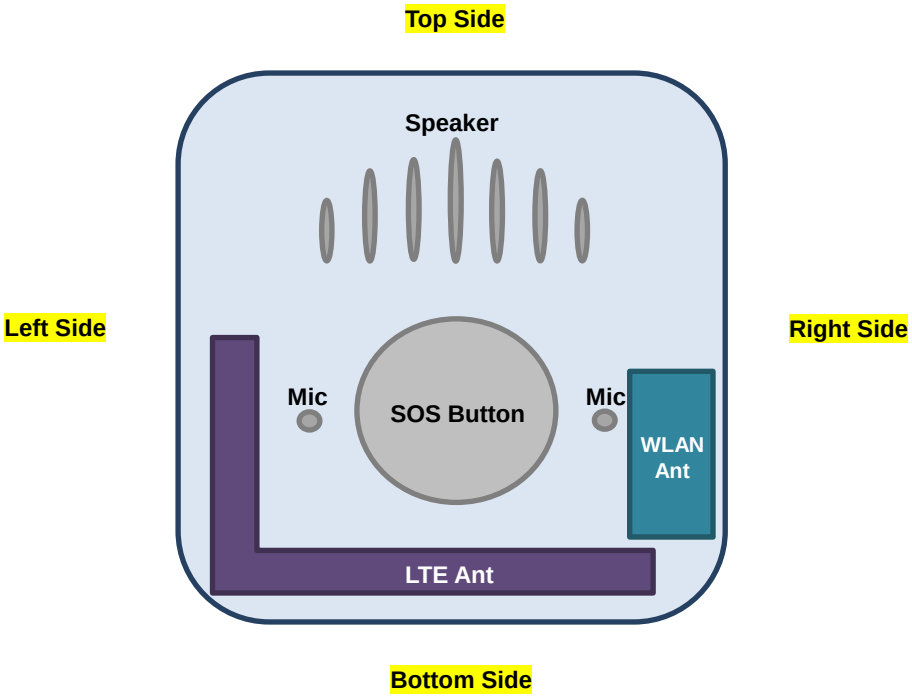
General Note:

1. The maximum output power specified for production units are determined for all applicable 802.11 transmission modes in each standalone and aggregated frequency band. Maximum output power is measured for the highest maximum output power configuration(s) in each frequency band according to the default power measurement procedures. For “Not required”, SAR Test reduction was applied from KDB 248227 guidance, Sec. 2.1, b), 1) when the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11g/n mode is used for SAR measurement, on the highest measured output power channel in the initial test configuration, additional output power measurements were not necessary.
2. Per KDB 248227 D01v02r02, SAR test reduction is determined according to 802.11 transmission mode configurations and certain exposure conditions with multiple test positions. In the 2.4 GHz band, separate SAR procedures are applied to DSSS and OFDM configurations to simplify DSSS test requirements. For OFDM, in both 2.4 GHz bands, an initial test configuration must be determined for each standalone and aggregated frequency band, according to the transmission mode configuration with the highest maximum output power specified for production units to perform SAR measurements. If the same highest maximum output power applies to different combinations of channel bandwidths, modulations and data rates, additional procedures are applied to determine which test configurations require SAR measurement. When applicable, an initial test position may be applied to reduce the number of SAR measurements required for next to the ear, UMPC mini-tablet or hotspot mode configurations with multiple test positions.
3. For 2.4 GHz 802.11b DSSS, either the initial test position procedure for multiple exposure test positions or the DSSS procedure for fixed exposure position is applied; these are mutually exclusive. For 2.4 GHz OFDM configurations, the initial test configuration is applied to measure SAR using either the initial test position procedure for multiple exposure test position configurations or the initial test configuration procedures for fixed exposure test conditions. Based on the reported SAR of the measured configurations and maximum output power of the transmission mode configurations that are not included in the initial test configuration, the subsequent test configuration and initial test position procedures are applied to determine if SAR measurements are required for the remaining OFDM transmission configurations. In general, the number of test channels that require SAR measurement is minimized based on maximum output power measured for the test sample(s).
4. For OFDM transmission configurations in the 2.4 GHz bands, When the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11g/n mode is used for SAR measurement, on the highest measured output power channel for each frequency band.
5. DSSS and OFDM configurations are considered separately according to the required SAR procedures. SAR is measured in the initial test position using the 802.11 transmission mode configuration required by the DSSS procedure or initial test configuration and subsequent test configuration(s) according to the OFDM procedures.18 The initial test position procedure is described in the following:
   a. When the reported SAR of the initial test position is ≤ 0.4 W/kg, further SAR measurement is not required for the other test positions in that exposure configuration and 802.11 transmission mode combinations within the frequency band or aggregated band.
   b. When the reported SAR of the test position is > 0.4 W/kg, SAR is repeated for the 802.11 transmission mode configuration tested in the initial test position to measure the subsequent next closet/smallest test separation distance and maximum coupling test position on the highest maximum output power channel, until the report SAR is ≤ 0.8 W/kg or all required test position are tested.
   c. For all positions/configurations, when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions/configurations on the subsequent next highest measured output power channel(s) until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.

<2.4GHz WLAN>

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
2.4GHz WLAN	802.11b 1Mbps	1	2412	5.80	6.00	99.00
		6	2437	5.80	6.00	
		11	2462	5.90	6.00	
	802.11g 6Mbps	1	2412	not required	0.00	not required
		6	2437		0.00	
		11	2462		0.00	
	802.11n-HT20 MCS0	1	2412		0.00	
		6	2437		0.00	
		11	2462		0.00	

12. Antenna Location



Front View

13. SAR Test Results

General Note:

1. Per KDB 447498 D01v06, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
   a. Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
   b. For SAR testing of WLAN signal with non-100% duty cycle, the measured SAR is scaled-up by the duty cycle scaling factor which is equal to "1/(duty cycle)"
   c. For WWAN Head and Extremity condition: Reported SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor
   d. For WWAN Body-worn condition: Reported SAR(W/kg)= Measured SAR(W/kg) * Tune-up Scaling Factor * Transmission Scaling Factor
   e. For WLAN: Reported SAR(W/kg)= Measured SAR(W/kg)* Duty Cycle scaling factor * Tune-up scaling factor
2. According to the SAR analysis exhibit, LTE B2/B4/B5/B13 maximum tune-up power scaled down with the transmission factor is applied in body-worn reported SAR calculation.

13.1 Head SAR

<FDD LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	LTE Band 2	20M	QPSK	1	0	Front	10mm	18900	1880	21.90	22.00	1.023	-0.1	0.838	0.858
01	LTE Band 2	20M	QPSK	1	0	Front	10mm	18700	1860	21.87	22.00	1.030	0.04	0.881	0.908
	LTE Band 2	20M	QPSK	1	0	Front	10mm	19100	1900	21.74	22.00	1.062	-0.07	0.690	0.733
	LTE Band 2	20M	QPSK	50	24	Front	10mm	19100	1900	20.61	21.00	1.094	-0.11	0.597	0.653
	LTE Band 2	20M	QPSK	100	0	Front	10mm	19100	1900	20.58	21.00	1.102	-0.11	0.547	0.603
	LTE Band 2	20M	QPSK	1	0	Bottom Side	10mm	18900	1880	21.90	22.00	1.023	-0.08	0.047	0.048
	LTE Band 2	20M	QPSK	50	24	Bottom Side	10mm	19100	1900	20.61	21.00	1.094	0.07	0.033	0.036
02	LTE Band 4	20M	QPSK	1	0	Front	10mm	20175	1732.5	22.60	23.00	1.096	0.17	0.888	0.974
	LTE Band 4	20M	QPSK	50	0	Front	10mm	20175	1732.5	21.20	22.00	1.202	0.16	0.643	0.773
	LTE Band 4	20M	QPSK	100	0	Front	10mm	20175	1732.5	21.17	22.00	1.211	-0.02	0.632	0.765
	LTE Band 4	20M	QPSK	1	0	Bottom Side	10mm	20175	1732.5	22.60	23.00	1.096	-0.17	0.104	0.114
	LTE Band 4	20M	QPSK	50	0	Bottom Side	10mm	20175	1732.5	21.20	22.00	1.202	-0.07	0.076	0.091
03	LTE Band 5	10M	QPSK	1	0	Front	10mm	20525	836.5	23.18	24.00	1.208	-0.05	0.238	0.287
	LTE Band 5	10M	QPSK	25	12	Front	10mm	20525	836.5	22.33	23.00	1.167	-0.15	0.166	0.193
	LTE Band 5	10M	QPSK	1	0	Bottom Side	10mm	20525	836.5	23.18	24.00	1.208	0.09	0.001	0.001
	LTE Band 5	10M	QPSK	25	12	Bottom Side	10mm	20525	836.5	22.33	23.00	1.167	-0.06	0.001	0.001
04	LTE Band 13	10M	QPSK	1	0	Front	10mm	23230	782	23.09	24.00	1.233	-0.01	0.183	0.226
	LTE Band 13	10M	QPSK	25	0	Front	10mm	23230	782	22.11	23.00	1.227	0.11	0.147	0.181
	LTE Band 13	10M	QPSK	1	0	Bottom Side	10mm	23230	782	23.09	24.00	1.233	0.07	0.001	0.001
	LTE Band 13	10M	QPSK	25	0	Bottom Side	10mm	23230	782	22.11	23.00	1.227	-0.01	0.001	0.001

<WLAN SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
05	WLAN2.4GHz	802.11b 1Mbps	Front	10mm	11	2462	5.90	6.00	1.023	99	1.010	-0.05	0.026	0.027
	WLAN2.4GHz	802.11b 1Mbps	Front	10mm	1	2412	5.80	6.00	1.047	99	1.010	-0.05	0.020	0.021
	WLAN2.4GHz	802.11b 1Mbps	Front	10mm	6	2437	5.80	6.00	1.047	99	1.010	-0.01	0.023	0.024
	WLAN2.4GHz	802.11b 1Mbps	Bottom Side	10mm	11	2462	5.90	6.00	1.023	99	1.010	-0.19	0.001	0.001

13.2 Body Worn Accessory SAR

<FDD LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Accessory	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Transmission Cycle %	Transmission Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
06	LTE Band 2	20M	QPSK	1	0	Front	0mm	-	18900	1880	21.90	22.00	1.023	8.1	0.081	0.06	7.170	0.594
	LTE Band 2	20M	QPSK	1	0	Front	0mm	Clip	18900	1880	21.90	22.00	1.023	8.1	0.081	-0.1	7.040	0.584
	LTE Band 2	20M	QPSK	1	0	Front	0mm	-	18700	1860	21.87	22.00	1.030	8.1	0.081	0.19	6.470	0.540
	LTE Band 2	20M	QPSK	1	0	Front	0mm	-	19100	1900	21.74	22.00	1.062	8.1	0.081	0.11	5.120	0.440
	LTE Band 2	20M	QPSK	50	24	Front	0mm	-	19100	1900	20.61	21.00	1.094	8.1	0.081	0.17	5.000	0.443
	LTE Band 2	20M	QPSK	1	0	Back	0mm	-	18900	1880	21.90	22.00	1.023	8.1	0.081	-0.04	2.500	0.207
	LTE Band 2	20M	QPSK	50	24	Back	0mm	-	19100	1900	20.61	21.00	1.094	8.1	0.081	0.07	1.740	0.154
	LTE Band 2	20M	QPSK	1	0	Left Side	0mm	-	18900	1880	21.90	22.00	1.023	8.1	0.081	-0.12	2.390	0.198
	LTE Band 2	20M	QPSK	50	24	Left Side	0mm	-	19100	1900	20.61	21.00	1.094	8.1	0.081	0.16	1.690	0.150
	LTE Band 2	20M	QPSK	1	0	Right Side	0mm	-	18900	1880	21.90	22.00	1.023	8.1	0.081	-0.1	0.587	0.049
	LTE Band 2	20M	QPSK	50	24	Right Side	0mm	-	19100	1900	20.61	21.00	1.094	8.1	0.081	0.16	0.426	0.038
	LTE Band 2	20M	QPSK	1	0	Top Side	0mm	-	18900	1880	21.90	22.00	1.023	8.1	0.081	0.03	6.970	0.578
	LTE Band 2	20M	QPSK	50	24	Top Side	0mm	-	19100	1900	20.61	21.00	1.094	8.1	0.081	-0.11	4.800	0.425
	LTE Band 2	20M	QPSK	1	0	Bottom Side	0mm	-	18900	1880	21.90	22.00	1.023	8.1	0.081	0.08	0.322	0.027
	LTE Band 2	20M	QPSK	50	24	Bottom Side	0mm	-	19100	1900	20.61	21.00	1.094	8.1	0.081	0.15	0.230	0.020
07	LTE Band 4	20M	QPSK	1	0	Front	0mm	-	20175	1732.5	22.60	23.00	1.096	8.1	0.081	0.06	6.980	0.620
	LTE Band 4	20M	QPSK	50	0	Front	0mm	-	20175	1732.5	21.20	22.00	1.202	8.1	0.081	-0.04	3.780	0.368
	LTE Band 4	20M	QPSK	1	0	Front	0mm	Clip	20175	1732.5	22.60	23.00	1.096	8.1	0.081	0.1	5.080	0.451
	LTE Band 4	20M	QPSK	1	0	Back	0mm	-	20175	1732.5	22.60	23.00	1.096	8.1	0.081	-0.11	1.960	0.174
	LTE Band 4	20M	QPSK	50	0	Back	0mm	-	20175	1732.5	21.20	22.00	1.202	8.1	0.081	0.15	1.360	0.132
	LTE Band 4	20M	QPSK	1	0	Left Side	0mm	-	20175	1732.5	22.60	23.00	1.096	8.1	0.081	-0.12	0.437	0.039
	LTE Band 4	20M	QPSK	50	0	Left Side	0mm	-	20175	1732.5	21.20	22.00	1.202	8.1	0.081	-0.14	0.318	0.031
	LTE Band 4	20M	QPSK	1	0	Right Side	0mm	-	20175	1732.5	22.60	23.00	1.096	8.1	0.081	0.05	3.130	0.278
	LTE Band 4	20M	QPSK	50	0	Right Side	0mm	-	20175	1732.5	21.20	22.00	1.202	8.1	0.081	0.13	2.280	0.222
	LTE Band 4	20M	QPSK	1	0	Top Side	0mm	-	20175	1732.5	22.60	23.00	1.096	8.1	0.081	0.1	4.270	0.379
	LTE Band 4	20M	QPSK	50	0	Top Side	0mm	-	20175	1732.5	21.20	22.00	1.202	8.1	0.081	0.18	3.100	0.302
	LTE Band 4	20M	QPSK	1	0	Bottom Side	0mm	-	20175	1732.5	22.60	23.00	1.096	8.1	0.081	-0.15	0.316	0.028
	LTE Band 4	20M	QPSK	50	0	Bottom Side	0mm	-	20175	1732.5	21.20	22.00	1.202	8.1	0.081	-0.02	0.210	0.020
08	LTE Band 5	10M	QPSK	1	0	Front	0mm	-	20525	836.5	23.18	24.00	1.208	8.1	0.081	0.02	1.920	0.188
	LTE Band 5	10M	QPSK	25	12	Front	0mm	-	20525	836.5	22.33	23.00	1.167	8.1	0.081	0.14	1.340	0.127
	LTE Band 5	10M	QPSK	1	0	Front	0mm	Clip	20525	836.5	23.18	24.00	1.208	8.1	0.081	-0.01	1.910	0.187
	LTE Band 5	10M	QPSK	1	0	Back	0mm	-	20525	836.5	23.18	24.00	1.208	8.1	0.081	-0.15	0.408	0.040
	LTE Band 5	10M	QPSK	25	12	Back	0mm	-	20525	836.5	22.33	23.00	1.167	8.1	0.081	0.01	0.274	0.026
	LTE Band 5	10M	QPSK	1	0	Left Side	0mm	-	20525	836.5	23.18	24.00	1.208	8.1	0.081	0.06	0.304	0.030
	LTE Band 5	10M	QPSK	25	12	Left Side	0mm	-	20525	836.5	22.33	23.00	1.167	8.1	0.081	0.12	0.206	0.019
	LTE Band 5	10M	QPSK	1	0	Right Side	0mm	-	20525	836.5	23.18	24.00	1.208	8.1	0.081	-0.02	0.967	0.095
	LTE Band 5	10M	QPSK	25	12	Right Side	0mm	-	20525	836.5	22.33	23.00	1.167	8.1	0.081	-0.13	0.798	0.075
	LTE Band 5	10M	QPSK	1	0	Top Side	0mm	-	20525	836.5	23.18	24.00	1.208	8.1	0.081	-0.19	1.280	0.125
	LTE Band 5	10M	QPSK	25	12	Top Side	0mm	-	20525	836.5	22.33	23.00	1.167	8.1	0.081	-0.11	0.842	0.080
	LTE Band 5	10M	QPSK	1	0	Bottom Side	0mm	-	20525	836.5	23.18	24.00	1.208	8.1	0.081	0.08	0.086	0.008
	LTE Band 5	10M	QPSK	25	12	Bottom Side	0mm	-	20525	836.5	22.33	23.00	1.167	8.1	0.081	0.01	0.071	0.007
09	LTE Band 13	10M	QPSK	1	0	Front	0mm	-	23230	782	23.09	24.00	1.233	8.1	0.081	-0.04	4.740	0.473
	LTE Band 13	10M	QPSK	25	0	Front	0mm	-	23230	782	22.11	23.00	1.227	8.1	0.081	0.09	3.840	0.382
	LTE Band 13	10M	QPSK	1	0	Front	0mm	Clip	23230	782	23.09	24.00	1.233	8.1	0.081	-0.12	4.730	0.472
	LTE Band 13	10M	QPSK	1	0	Back	0mm	-	23230	782	23.09	24.00	1.233	8.1	0.081	-0.11	0.470	0.047
	LTE Band 13	10M	QPSK	25	0	Back	0mm	-	23230	782	22.11	23.00	1.227	8.1	0.081	-0.03	0.398	0.040
	LTE Band 13	10M	QPSK	1	0	Left Side	0mm	-	23230	782	23.09	24.00	1.233	8.1	0.081	-0.09	0.190	0.019
	LTE Band 13	10M	QPSK	25	0	Left Side	0mm	-	23230	782	22.11	23.00	1.227	8.1	0.081	-0.11	0.150	0.015
	LTE Band 13	10M	QPSK	1	0	Right Side	0mm	-	23230	782	23.09	24.00	1.233	8.1	0.081	0.06	1.950	0.195
	LTE Band 13	10M	QPSK	25	0	Right Side	0mm	-	23230	782	22.11	23.00	1.227	8.1	0.081	-0.12	1.580	0.157
	LTE Band 13	10M	QPSK	1	0	Top Side	0mm	-	23230	782	23.09	24.00	1.233	8.1	0.081	-0.16	3.200	0.320
	LTE Band 13	10M	QPSK	25	0	Top Side	0mm	-	23230	782	22.11	23.00	1.227	8.1	0.081	0.15	2.410	0.240
	LTE Band 13	10M	QPSK	1	0	Bottom Side	0mm	-	23230	782	23.09	24.00	1.233	8.1	0.081	-0.16	0.068	0.007
	LTE Band 13	10M	QPSK	25	0	Bottom Side	0mm	-	23230	782	22.11	23.00	1.227	8.1	0.081	-0.1	0.054	0.005

<WLAN SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Accessory	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
10	WLAN2.4GHz	802.11b 1Mbps	Front	0mm	-	11	2462	5.90	6.00	1.023	99	1.010	-0.03	0.093	0.096
	WLAN2.4GHz	802.11b 1Mbps	Front	0mm	Clip	11	2462	5.90	6.00	1.023	99	1.010	-0.06	0.091	0.094
	WLAN2.4GHz	802.11b 1Mbps	Front	0mm	-	1	2412	5.80	6.00	1.047	99	1.010	-0.11	0.090	0.095
	WLAN2.4GHz	802.11b 1Mbps	Front	0mm	-	6	2437	5.80	6.00	1.047	99	1.010	-0.11	0.090	0.095
	WLAN2.4GHz	802.11b 1Mbps	Back	0mm	-	11	2462	5.90	6.00	1.023	99	1.010	-0.13	0.035	0.036
	WLAN2.4GHz	802.11b 1Mbps	Left Side	0mm	-	11	2462	5.90	6.00	1.023	99	1.010	0.1	0.092	0.095
	WLAN2.4GHz	802.11b 1Mbps	Right Side	0mm	-	11	2462	5.90	6.00	1.023	99	1.010	0.09	0.001	0.001
	WLAN2.4GHz	802.11b 1Mbps	Top Side	0mm	-	11	2462	5.90	6.00	1.023	99	1.010	-0.13	0.060	0.062
	WLAN2.4GHz	802.11b 1Mbps	Bottom Side	0mm	-	11	2462	5.90	6.00	1.023	99	1.010	-0.17	0.001	0.001

13.3 Extremity SAR

<FDD LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
11	LTE Band 2	20M	QPSK	1	0	Front	0mm	18900	1880	21.90	22.00	1.023	0.06	2.720	2.783
	LTE Band 2	20M	QPSK	1	0	Front	0mm	18700	1860	21.87	22.00	1.030	0.19	2.450	2.524
	LTE Band 2	20M	QPSK	1	0	Front	0mm	19100	1900	21.74	22.00	1.062	0.11	2.000	2.123
	LTE Band 2	20M	QPSK	50	24	Front	0mm	19100	1900	20.61	21.00	1.094	-0.14	1.940	2.122
	LTE Band 2	20M	QPSK	50	24	Front	0mm	18900	1880	20.46	21.00	1.132	0.14	1.939	2.196
	LTE Band 2	20M	QPSK	50	24	Front	0mm	18700	1860	20.49	21.00	1.125	0.09	1.473	1.656
	LTE Band 2	20M	QPSK	100	0	Front	0mm	19100	1900	20.58	21.00	1.102	-0.01	1.378	1.518
	LTE Band 2	20M	QPSK	1	0	Back	0mm	18900	1880	21.90	22.00	1.023	0.04	1.010	1.034
	LTE Band 2	20M	QPSK	50	24	Back	0mm	19100	1900	20.61	21.00	1.094	0.05	0.631	0.691
	LTE Band 2	20M	QPSK	1	0	Left Side	0mm	18900	1880	21.90	22.00	1.023	0.02	0.760	0.778
	LTE Band 2	20M	QPSK	50	24	Left Side	0mm	19100	1900	20.61	21.00	1.094	-0.18	0.542	0.593
	LTE Band 2	20M	QPSK	1	0	Right Side	0mm	18900	1880	21.90	22.00	1.023	0.05	0.222	0.227
	LTE Band 2	20M	QPSK	50	24	Right Side	0mm	19100	1900	20.61	21.00	1.094	-0.05	0.158	0.173
	LTE Band 2	20M	QPSK	1	0	Top Side	0mm	18900	1880	21.90	22.00	1.023	-0.17	2.060	2.108
	LTE Band 2	20M	QPSK	1	0	Top Side	0mm	18700	1860	21.87	22.00	1.030	0.11	2.010	2.071
	LTE Band 2	20M	QPSK	1	0	Top Side	0mm	19100	1900	21.74	22.00	1.062	0.05	1.980	2.102
	LTE Band 2	20M	QPSK	50	24	Top Side	0mm	19100	1900	20.61	21.00	1.094	0.02	1.468	1.606
	LTE Band 2	20M	QPSK	100	0	Top Side	0mm	19100	1900	20.58	21.00	1.102	0.12	1.448	1.595
	LTE Band 2	20M	QPSK	1	0	Bottom Side	0mm	18900	1880	21.90	22.00	1.023	0.05	0.151	0.155
	LTE Band 2	20M	QPSK	50	24	Bottom Side	0mm	19100	1900	20.61	21.00	1.094	-0.02	0.108	0.118
12	LTE Band 4	20M	QPSK	1	0	Front	0mm	20175	1732.5	22.60	23.00	1.096	0.06	3.070	3.366
	LTE Band 4	20M	QPSK	50	0	Front	0mm	20175	1732.5	21.20	22.00	1.202	0.1	1.717	2.064
	LTE Band 4	20M	QPSK	100	0	Front	0mm	20175	1732.5	21.17	22.00	1.211	-0.02	1.690	2.046
	LTE Band 4	20M	QPSK	1	0	Back	0mm	20175	1732.5	22.60	23.00	1.096	-0.06	1.030	1.129
	LTE Band 4	20M	QPSK	50	0	Back	0mm	20175	1732.5	21.20	22.00	1.202	-0.01	0.746	0.897
	LTE Band 4	20M	QPSK	1	0	Left Side	0mm	20175	1732.5	22.60	23.00	1.096	-0.08	0.226	0.248
	LTE Band 4	20M	QPSK	50	0	Left Side	0mm	20175	1732.5	21.20	22.00	1.202	-0.07	0.164	0.197
	LTE Band 4	20M	QPSK	1	0	Right Side	0mm	20175	1732.5	22.60	23.00	1.096	0.02	1.420	1.557
	LTE Band 4	20M	QPSK	50	0	Right Side	0mm	20175	1732.5	21.20	22.00	1.202	0.07	1.020	1.226
	LTE Band 4	20M	QPSK	1	0	Top Side	0mm	20175	1732.5	22.60	23.00	1.096	0.04	1.940	2.127
	LTE Band 4	20M	QPSK	50	0	Top Side	0mm	20175	1732.5	21.20	22.00	1.202	0.01	1.400	1.683
	LTE Band 4	20M	QPSK	100	0	Top Side	0mm	20175	1732.5	21.17	22.00	1.211	0.19	1.397	1.692
	LTE Band 4	20M	QPSK	1	0	Bottom Side	0mm	20175	1732.5	22.60	23.00	1.096	-0.18	0.195	0.214
	LTE Band 4	20M	QPSK	50	0	Bottom Side	0mm	20175	1732.5	21.20	22.00	1.202	-0.09	0.141	0.170

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
13	LTE Band 5	10M	QPSK	1	0	Front	0mm	20525	836.5	23.18	24.00	1.208	0.02	0.710	0.858
	LTE Band 5	10M	QPSK	25	12	Front	0mm	20525	836.5	22.33	23.00	1.167	-0.01	0.518	0.604
	LTE Band 5	10M	QPSK	1	0	Back	0mm	20525	836.5	23.18	24.00	1.208	0.11	0.198	0.239
	LTE Band 5	10M	QPSK	25	12	Back	0mm	20525	836.5	22.33	23.00	1.167	-0.08	0.134	0.156
	LTE Band 5	10M	QPSK	1	0	Left Side	0mm	20525	836.5	23.18	24.00	1.208	-0.05	0.127	0.153
	LTE Band 5	10M	QPSK	25	12	Left Side	0mm	20525	836.5	22.33	23.00	1.167	-0.01	0.086	0.100
	LTE Band 5	10M	QPSK	1	0	Right Side	0mm	20525	836.5	23.18	24.00	1.208	-0.05	0.262	0.316
	LTE Band 5	10M	QPSK	25	12	Right Side	0mm	20525	836.5	22.33	23.00	1.167	-0.19	0.177	0.207
	LTE Band 5	10M	QPSK	1	0	Top Side	0mm	20525	836.5	23.18	24.00	1.208	0.02	0.439	0.530
	LTE Band 5	10M	QPSK	25	12	Top Side	0mm	20525	836.5	22.33	23.00	1.167	-0.02	0.297	0.346
	LTE Band 5	10M	QPSK	1	0	Bottom Side	0mm	20525	836.5	23.18	24.00	1.208	-0.05	0.034	0.041
	LTE Band 5	10M	QPSK	25	12	Bottom Side	0mm	20525	836.5	22.33	23.00	1.167	-0.02	0.023	0.027
14	LTE Band 13	10M	QPSK	1	0	Front	0mm	23230	782	23.09	24.00	1.233	-0.04	1.940	2.392
	LTE Band 13	10M	QPSK	25	0	Front	0mm	23230	782	22.11	23.00	1.227	-0.08	1.560	1.915
	LTE Band 13	10M	QPSK	50	0	Front	0mm	23230	782	22.13	23.00	1.222	-0.19	1.540	1.882
	LTE Band 13	10M	QPSK	1	0	Back	0mm	23230	782	23.09	24.00	1.233	0.09	0.256	0.316
	LTE Band 13	10M	QPSK	25	0	Back	0mm	23230	782	22.11	23.00	1.227	0.17	0.205	0.252
	LTE Band 13	10M	QPSK	1	0	Left Side	0mm	23230	782	23.09	24.00	1.233	0.01	0.095	0.117
	LTE Band 13	10M	QPSK	25	0	Left Side	0mm	23230	782	22.11	23.00	1.227	-0.03	0.076	0.093
	LTE Band 13	10M	QPSK	1	0	Right Side	0mm	23230	782	23.09	24.00	1.233	-0.06	0.509	0.628
	LTE Band 13	10M	QPSK	25	0	Right Side	0mm	23230	782	22.11	23.00	1.227	-0.04	0.408	0.501
	LTE Band 13	10M	QPSK	1	0	Top Side	0mm	23230	782	23.09	24.00	1.233	-0.05	1.100	1.356
	LTE Band 13	10M	QPSK	25	0	Top Side	0mm	23230	782	22.11	23.00	1.227	-0.13	0.881	1.082
	LTE Band 13	10M	QPSK	1	0	Bottom Side	0mm	23230	782	23.09	24.00	1.233	-0.15	0.028	0.035
	LTE Band 13	10M	QPSK	25	0	Bottom Side	0mm	23230	782	22.11	23.00	1.227	-0.09	0.022	0.027

<WLAN SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
15	WLAN2.4GHz	802.11b 1Mbps	Front	0mm	11	2462	5.90	6.00	1.023	99	1.010	-0.03	0.046	0.048
	WLAN2.4GHz	802.11b 1Mbps	Front	0mm	1	2412	5.80	6.00	1.047	99	1.010	-0.01	0.043	0.045
	WLAN2.4GHz	802.11b 1Mbps	Front	0mm	6	2437	5.80	6.00	1.047	99	1.010	-0.13	0.041	0.043
	WLAN2.4GHz	802.11b 1Mbps	Back	0mm	11	2462	5.90	6.00	1.023	99	1.010	0.07	0.021	0.022
	WLAN2.4GHz	802.11b 1Mbps	Left Side	0mm	11	2462	5.90	6.00	1.023	99	1.010	-0.03	0.037	0.038
	WLAN2.4GHz	802.11b 1Mbps	Right Side	0mm	11	2462	5.90	6.00	1.023	99	1.010	-0.11	0.001	0.001
	WLAN2.4GHz	802.11b 1Mbps	Top Side	0mm	11	2462	5.90	6.00	1.023	99	1.010	0.07	0.023	0.024
	WLAN2.4GHz	802.11b 1Mbps	Bottom Side	0mm	11	2462	5.90	6.00	1.023	99	1.010	0.03	0.001	0.001

13.4 Repeated SAR Measurement

No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Ratio	Reported 1g SAR (W/kg)
1st	LTE Band 2	20M	QPSK	1	0	Front	10mm	18700	1860	21.87	22.00	1.030	0.04	0.881	-	0.908
2nd	LTE Band 2	20M	QPSK	1	0	Front	10mm	18700	1860	21.87	22.00	1.030	-0.05	0.868	1.01	0.894
1st	LTE Band 4	20M	QPSK	1	0	Front	10mm	20175	1732.5	22.60	23.00	1.096	0.17	0.888	-	0.974
2nd	LTE Band 4	20M	QPSK	1	0	Front	10mm	20175	1732.5	22.60	23.00	1.096	0.01	0.875	1.01	0.959

No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 10g SAR (W/kg)	Ratio	Reported 10g SAR (W/kg)
1st	LTE Band 2	20M	QPSK	1	0	Front	0mm	18900	1880	21.90	22.00	1.023	0.06	2.720	-	2.783
2nd	LTE Band 2	20M	QPSK	1	0	Front	0mm	18900	1880	21.90	22.00	1.023	0.14	2.700	1.01	2.763
1st	LTE Band 4	20M	QPSK	1	0	Front	0mm	20175	1732.5	22.60	23.00	1.096	0.06	3.070	-	3.366
2nd	LTE Band 4	20M	QPSK	1	0	Front	0mm	20175	1732.5	22.60	23.00	1.096	-0.11	3.010	1.02	3.300

General Note:

1. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg.
2. Per KDB 865664 D01v01r04, if the ratio among the repeated measurement is ≤ 1.2 and the measured SAR <1.45W/kg, only one repeated measurement is required.
3. Per KDB 865664 D01v01r04, if the extremity repeated SAR is necessary, the same procedures should be adapted for measurements according to extremity and occupational exposure limits by applying a factor of 2.5 for extremity exposure and a factor of 5 for occupational exposure to the corresponding SAR thresholds.
4. The ratio is the difference in percentage between original and repeated *measured SAR*.
5. All measurement SAR result is scaled-up to account for tune-up tolerance and is compliant.

14. Simultaneous Transmission Analysis

NO.	Simultaneous Transmission Configurations	Head	Body-worn	Extremity
1.	WWAN + WLAN2.4GHz	Yes	Yes	Yes

General Note:

1. The Scaled SAR summation is calculated based on the same configuration and test position.
2. Per KDB 447498 D01v06, simultaneous transmission SAR is compliant if,
   i) Scalar SAR summation < 1.6W/kg.
   ii) SPLSR = (SAR1 + SAR2)^1.5 / (min. separation distance, mm), and the peak separation distance is determined from the square root of $[(x1-x2)^2 + (y1-y2)^2 + (z1-z2)^2]$, where (x1, y1, z1) and (x2, y2, z2) are the coordinates of the extrapolated peak SAR locations in the zoom scan.
   iii) If SPLSR ≤ 0.04, simultaneously transmission SAR measurement is not necessary.
   iv) Simultaneously transmission SAR measurement, and the reported multi-band SAR < 1.6W/kg.
   v) The SPLSR calculated results please refer to section 14.2.

14.1 Head Exposure Conditions

WWAN Band		Exposure Position	1 WWAN 1g SAR (W/kg)	2 WLAN2.4GHz 1g SAR (W/kg)	1+2 Summed 1g SAR (W/kg)
LTE	LTE Band 2	Front	0.908	0.027	**0.935**
		Bottom Side	0.048	0.001	**0.049**
	LTE Band 4	Front	0.974	0.027	**1.001**
		Bottom Side	0.114	0.001	**0.115**
	LTE Band 5	Front	0.287	0.027	**0.314**
		Bottom Side	0.001	0.001	**0.002**
	LTE Band 13	Front	0.226	0.027	**0.253**
		Bottom Side	0.001	0.001	**0.002**

14.2 Body-Worn Accessory Exposure Conditions

WWAN Band		Exposure Position	1 WWAN 1g SAR (W/kg)	2 WLAN2.4GHz 1g SAR (W/kg)	1+2 Summed 1g SAR (W/kg)
LTE	LTE Band 2	Front	0.594	0.096	**0.690**
		Back	0.207	0.036	**0.243**
		Left side	0.198	0.095	**0.293**
		Right side	0.049	0.001	**0.050**
		Top side	0.578	0.062	**0.640**
		Bottom side	0.027	0.001	**0.028**
	LTE Band 4	Front	0.620	0.096	**0.716**
		Back	0.174	0.036	**0.210**
		Left side	0.039	0.095	**0.134**
		Right side	0.278	0.001	**0.279**
		Top side	0.379	0.062	**0.441**
		Bottom side	0.028	0.001	**0.029**
	LTE Band 5	Front	0.188	0.096	**0.284**
		Back	0.040	0.036	**0.076**
		Left side	0.030	0.095	**0.125**
		Right side	0.095	0.001	**0.096**
		Top side	0.125	0.062	**0.187**
		Bottom side	0.008	0.001	**0.009**
	LTE Band 13	Front	0.473	0.096	**0.569**
		Back	0.047	0.036	**0.083**
		Left side	0.019	0.095	**0.114**
		Right side	0.195	0.001	**0.196**
		Top side	0.320	0.062	**0.382**
		Bottom side	0.007	0.001	**0.008**

WWAN Band		Exposure Position	1 WWAN 1g SAR (W/kg)	2 WLAN2.4GHz 1g SAR (W/kg)	1+2 Summed 1g SAR (W/kg)
LTE	LTE Band 2	Front with Clip	0.584	0.094	**0.678**
	LTE Band 4	Front with Clip	0.451	0.094	**0.545**
	LTE Band 5	Front with Clip	0.187	0.094	**0.281**
	LTE Band 13	Front with Clip	0.472	0.094	**0.566**

14.3 Extremity Exposure Conditions

WWAN Band		Exposure Position	1 WWAN 10g SAR (W/kg)	2 WLAN2.4GHz 10g SAR (W/kg)	1+2 Summed 10g SAR (W/kg)
LTE	LTE Band 2	Front	2.783	0.048	**2.831**
		Back	1.034	0.022	**1.056**
		Left side	0.778	0.038	**0.816**
		Right side	0.227	0.001	**0.228**
		Top side	2.108	0.024	**2.132**
		Bottom side	0.155	0.001	**0.156**
	LTE Band 4	Front	3.366	0.048	**3.414**
		Back	1.129	0.022	**1.151**
		Left side	0.248	0.038	**0.286**
		Right side	1.557	0.001	**1.558**
		Top side	2.127	0.024	**2.151**
		Bottom side	0.214	0.001	**0.215**
	LTE Band 5	Front	0.858	0.048	**0.906**
		Back	0.239	0.022	**0.261**
		Left side	0.153	0.038	**0.191**
		Right side	0.316	0.001	**0.317**
		Top side	0.530	0.024	**0.554**
		Bottom side	0.041	0.001	**0.042**
	LTE Band 13	Front	2.392	0.048	**2.440**
		Back	0.316	0.022	**0.338**
		Left side	0.117	0.038	**0.155**
		Right side	0.628	0.001	**0.629**
		Top side	1.356	0.024	**1.380**
		Bottom side	0.035	0.001	**0.036**

Test Engineer： EN Liu

15. Uncertainty Assessment

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

Declaration of Conformity:
The test results with all measurement uncertainty excluded is presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

16. References

[1] FCC 47 CFR Part 2 “Frequency Allocations and Radio Treaty Matters; General Rules and Regulations”

[2] ANSI/IEEE Std. C95.1-1992, “IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz”, September 1992

[3] IEEE Std. 1528-2013, “IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques”, Sep 2013

[4] SPEAG DASY System Handbook

[5] FCC KDB 248227 D01 v02r02, “SAR Guidance for IEEE 802.11 (WiFi) Transmitters”, Oct 2015.

[6] FCC KDB 447498 D01 v06, “Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies”, Oct 2015

[7] FCC KDB 941225 D05 v02r05, “SAR Evaluation Considerations for LTE Devices”, Dec 2015

[8] FCC KDB 865664 D01 v01r04, "SAR Measurement Requirements for 100 MHz to 6 GHz", Aug 2015.

[9] FCC KDB 865664 D02 v01r02, “RF Exposure Compliance Reporting and Documentation Considerations” Oct 2015.