FCC SAR Test Report

APPLICANT	**:**	**TCL Communication Ltd.**
EQUIPMENT	**:**	**Vodafone USB Connect LPWA v2**
BRAND NAME	**:**	**Vodafone**
MODEL NAME	**:**	**IKM1GL**
FCC ID	**:**	**2ACCJSCD007**
STANDARD	**:**	**FCC 47 CFR Part 2 (2.1093)**

We, Sporton International Inc. (Shenzhen), would like to declare that the tested sample has been evaluated in accordance with the test procedures given in 47 CFR Part 2.1093 and FCC KDB and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. (Shenzhen), the test report shall not be reproduced except in full.

Hank Huang

Approved by: Hank Huang

ACCREDITED
Cert #5145.01

Sporton International Inc. (Shenzhen)
1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055
People's Republic of China

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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA561313	Rev. 01	Initial issue of report	Aug. 11, 2025

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **TCL Communication Ltd., Vodafone USB Connect LPWA v2, IKM1GL,** are as follows.

Highest 1g SAR Summary			
Equipment Class	Frequency Band		Body (Separation 0mm)
			1g SAR (W/kg)
Licensed	LTE	LTE Band 2	**0.92**
		LTE Band 4	0.85
		LTE Band 5	0.58
		LTE Band 12	0.59
		LTE Band 13	0.51
Date of Testing:		2025/7/1 ~ 2025/7/12	

Declaration of Conformity:
The test results with all measurement uncertainty excluded are 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.

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) 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.

2. Administration Data

Sporton International Inc. (Shenzhen) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.01.

Testing Laboratory			
Test Firm	Sporton International Inc. (Shenzhen)		
Test Site Location	1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055 People's Republic of China TEL: +86-755-86379589 FAX: +86-755-86379595		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	SAR02-SZ	CN1256	421272

Applicant	
Company Name	TCL Communication Ltd.
Address	5/F, Building 22E, 22 Science Park East Avenue, Hong Kong Science Park, Shatin, NT, Hong Kong

Manufacturer	
Company Name	Vodafone Procurement Company S.à.r.l.
Address	15 rue Edward Steichen, L-2540 Luxembourg, Grand-Duché de Luxembourg

3. Guidance Applied

The Specific Absorption Rate (SAR) testing specification, method, and procedure for this device is in accordance with the following standards:

- FCC 47 CFR Part 2 (2.1093)
- ANSI/IEEE C95.1-1992
- IEEE 1528-2013
- 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 447498 D02 SAR Procedures for Dongle Xmtr v02r01
- FCC KDB 941225 D05 SAR for LTE Devices v02r05
- FCC KDB 616217 D04 SAR for laptop and tablets v01r02

4. Equipment Under Test (EUT) Information

4.1 General Information

Product Feature & Specification	
Equipment Name	Vodafone USB Connect LPWA v2
Brand Name	Vodafone
Model Name	IKM1GL
FCC ID	2ACCJSCD007
IMEI Code	359345650000173, 359345650000116
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 12 : 699 MHz ~ 716 MHz LTE Band 13 : 777 MHz ~ 787 MHz NB-IOT Band 2 : 1850 MHz ~ 1910 MHz NB-IOT Band 4 : 1710 MHz ~ 1755 MHz NB-IOT Band 5 : 824 MHz ~ 849 MHz NB-IOT Band 12: 699 MHz ~ 716 MHz NB-IOT Band 13: 777 MHz ~ 787 MHz
Mode	LTE: QPSK, 16QAM NB-IOT: BPSK, QPSK
HW Version	V3.0
SW Version	IKM1GL_ZZ_01.00_01
EUT Stage	Production Unit

Remark:

1. The device implements Proximity sensors detect mechanism trigger reduced power for the power management for SAR compliance at different exposure conditions (body). The device will invoke corresponding work scenarios power level, which are provided in the operational description.

4.2 General LTE SAR Test and Reporting Considerations

<table>
<tr><th colspan="2">Summarized necessary items addressed in KDB 941225 D05 v02r05</th></tr>
<tr><td>FCC ID</td><td>2ACCJSCD007</td></tr>
<tr><td>Equipment Name</td><td>Vodafone USB Connect LPWA v2</td></tr>
<tr><td>Operating Frequency Range of each LTE transmission band</td><td>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
NB-IOT Band 2 : 1850 MHz ~ 1910 MHz
NB-IOT Band 4 : 1710 MHz ~ 1755 MHz
NB-IOT Band 5 : 824 MHz ~ 849 MHz
NB-IOT Band 12: 699 MHz ~ 716 MHz
NB-IOT Band 13: 777 MHz ~ 787 MHz</td></tr>
<tr><td>Channel Bandwidth</td><td>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 12:1.4MHz, 3MHz, 5MHz, 10MHz
LTE Band 13: 5MHz, 10MHz</td></tr>
<tr><td>Uplink Modulations used</td><td>BPSK / QPSK / 16QAM</td></tr>
<tr><td>LTE Voice / Data requirements</td><td>Data only</td></tr>
<tr><td>LTE Release Version</td><td>R13</td></tr>
<tr><td>CA Support</td><td>Not Supported</td></tr>
<tr><td>LTE MPR permanently built-in by design</td><td>Table 6.2.3E-1: Maximum Power Reduction (MPR) for Power Class 3
<table>
<tr><th rowspan="2">Modulation</th><th colspan="6">Channel bandwidth / Transmission bandwidth (N_{RB})</th><th rowspan="2">MPR (dB)</th></tr>
<tr><th>1.4 MHz</th><th>3.0 MHz</th><th>5 MHz</th><th>10 MHz</th><th>15 MHz</th><th>20 MHz</th></tr>
<tr><td>QPSK</td><td>>2</td><td>>2</td><td>>1</td><td>>4</td><td>-</td><td>-</td><td>≤ 1</td></tr>
<tr><td>QPSK</td><td>>5</td><td>>5</td><td>-</td><td>-</td><td>-</td><td>-</td><td>≤ 2</td></tr>
<tr><td>16 QAM</td><td>≤ 2</td><td>≤ 2</td><td>>1</td><td>>3</td><td>-</td><td>-</td><td>≤ 1</td></tr>
<tr><td>16QAM</td><td>>2</td><td>>2</td><td>>3</td><td>>5</td><td>-</td><td>-</td><td>≤ 2</td></tr>
</table></td></tr>
<tr><td>LTE A-MPR</td><td>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)</td></tr>
<tr><td>Spectrum plots for RB configuration</td><td>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.</td></tr>
<tr><td>Power reduction applied to satisfy SAR compliance</td><td>Yes, when operating in Proximity sensors detect mechanism; body will trigger reduced power for some bands applied to satisfy SAR compliance, the detail please referred to section 13.</td></tr>
</table>

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 12								
	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	23017	699.7	23025	700.5	23035	701.5	23060	704
M	23095	707.5	23095	707.5	23095	707.5	23095	707.5
H	23173	715.3	23165	714.5	23155	713.5	23130	711

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		

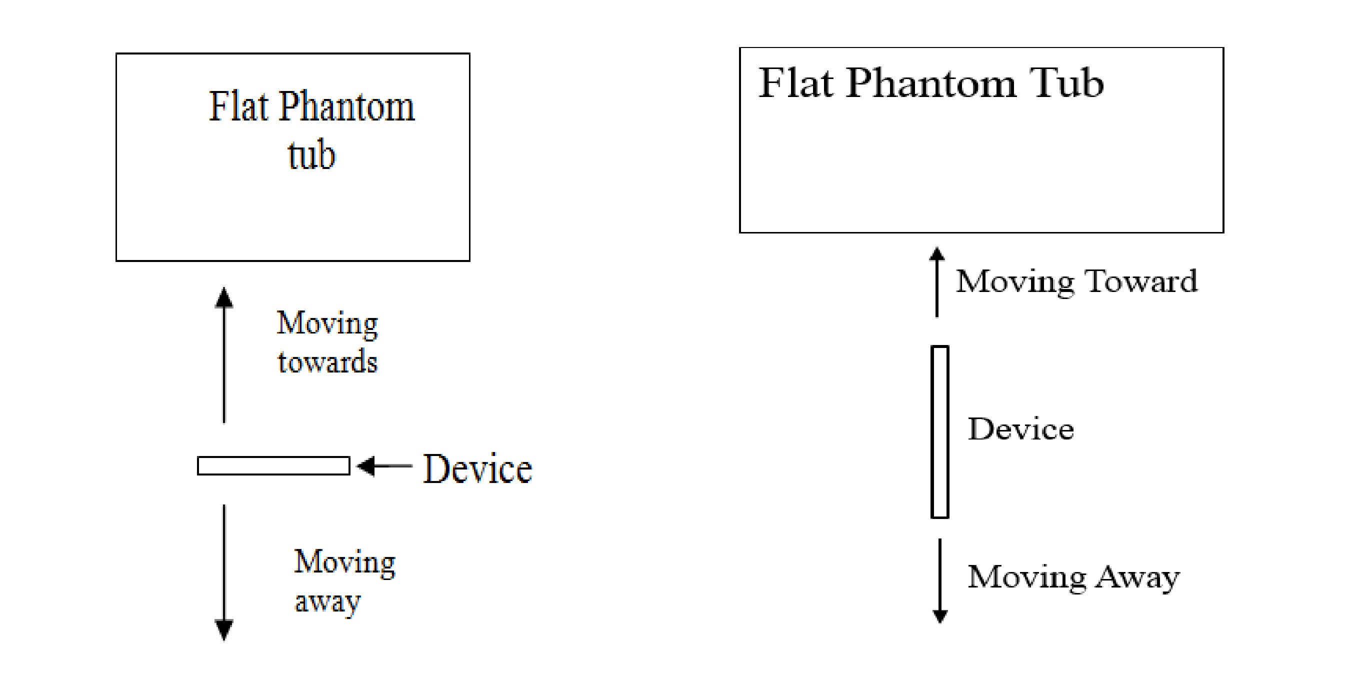
NB-IOT

Transmission (H, M, L) channel numbers and frequencies in each LTE band										
	LTE Band 2		LTE Band 4		LTE Band 5		LTE Band 12		LTE Band 13	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	18601	1850.1	19951	1710.1	20401	824.1	23011	699.1	23181	777.1
M	18900	1880	20175	1732.5	20525	836.5	23095	707.5	23230	782
H	19199	1909.9	20399	1754.9	20649	848.9	23179	715.9	23279	786.9

5. Proximity Sensor Triggering Test

<Proximity Sensor Triggering Distance>:

1. Proximity sensor triggering distance testing was performed according to the procedures outlined in KDB 616217 D04 section 6.2, and EUT moving further away from the flat phantom and EUT moving toward the flat phantom were both assessed and the tissue-equivalent medium for highest frequency (1900MHz) and lowest frequency (750MHz) was used for proximity sensor triggering testing.
2. Capacitive proximity sensors placed coincident with antenna elements at the device are utilized to determine when the device comes in proximity of the user's body or finger or hand at the front or back or right or left or top side of the device. There is no need to do sensor coverage testing for the proximity sensor is designed to support sufficient detection range and sensitivity to cover regions of the sensors in all applicable directions since the proximity sensor entirely covers the antenna.
3. The sensors can use to detect the proximity of the user's body or handheld states at the front or back or right or left or top side of the device use a detection threshold distance. When front/back/right/left/top sides of body or handheld condition is detected reduced power will be active. The trigger distance shown in the sections below.
4. For verification of compliance of power reduction scheme, additional SAR testing with EUT transmitting at full RF power at a conservative trigger distance -1mm was performed.



Sensor/Handheld detection test set-up, Front and Back sides	Handheld detection test set-up, Left Side, Right Side and Top Side

<P-sensor>

Proximity Sensor Triggering Distance (mm)										
Position	Front		Back		Left Side		Right Side		Top Side	
	Moving towards	Moving away	Moving towards	Moving away	Moving towards	Moving away	Moving towards	Moving away	Moving towards	Moving away
Minimum	16	16	16	16	16	16	16	16	16	16

6. RF Exposure Limits

6.1 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.

6.2 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

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.

7. Specific Absorption Rate (SAR)

7.1 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.

7.2 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:

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

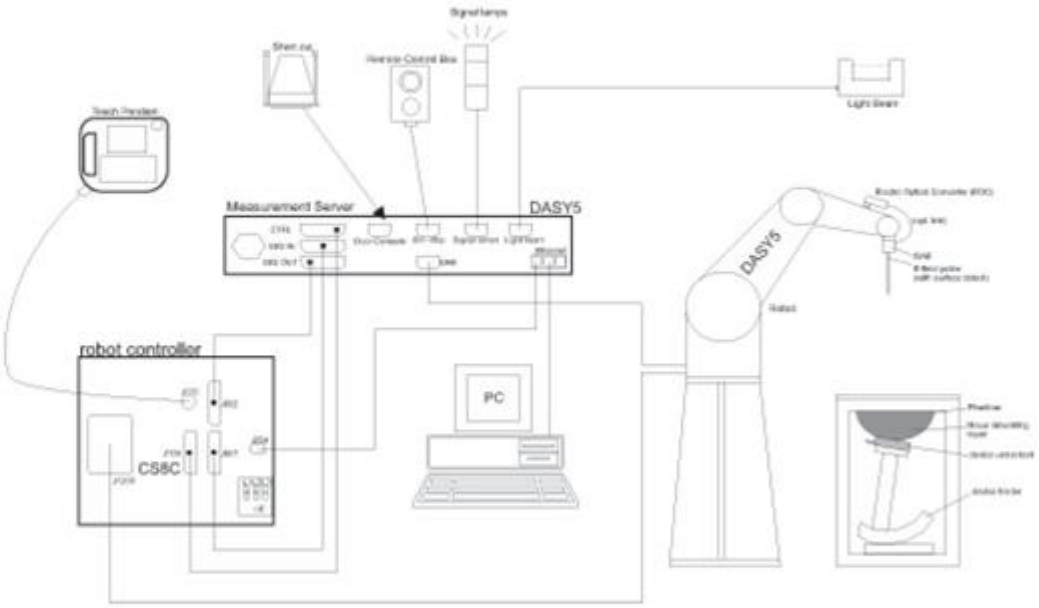
SAR is expressed in units of Watts per kilogram (W/kg)

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

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

8. System Description and Setup

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



- A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic Field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running WinXP or Win7 and the DASY5 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

8.1 E-Field Probe

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

<EX3DV4 Probe>

Construction	Symmetric design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Frequency	4 MHz – 10 GHz Linearity: ±0.2 dB (30 MHz – 10 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	

8.2 Data Acquisition Electronics (DAE)

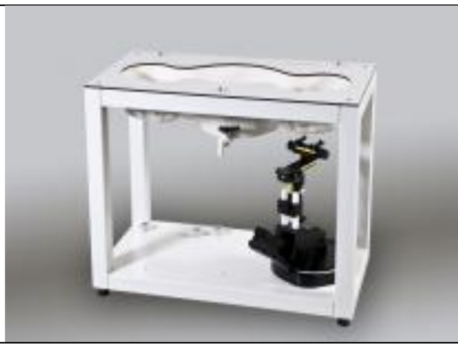
The data acquisition electronics (DAE) consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the measurement server is accomplished through an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

Photo of DAE

8.3 Phantom

<SAM Twin Phantom>

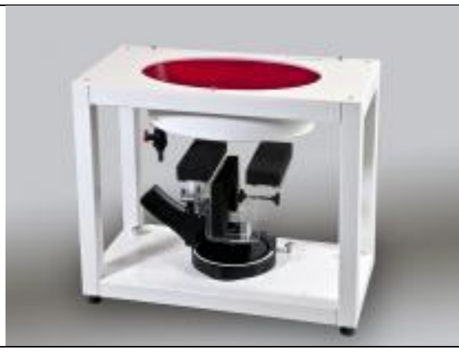
Shell Thickness	2 ± 0.2 mm; Center ear point: 6 ± 0.2 mm
Filling Volume	Approx. 25 liters
Dimensions	Length: 1000 mm; Width: 500 mm; Height: adjustable feet
Measurement Areas	Left Hand, Right Hand, Flat Phantom



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 or for evaluating transmitters operating at low frequencies. ELI is fully compatible with standard and all known tissue simulating liquids.

8.4 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

9. Measurement Procedures

The measurement procedures are as follows:

<Conducted power measurement>

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

<SAR measurement>

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

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

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

9.1 Spatial Peak SAR Evaluation

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

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

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

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

9.2 Power Reference Measurement

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

9.3 Area 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.

<table>
<tr><th></th><th>$\leq$ 3 GHz</th><th>> 3 GHz</th></tr>
<tr><td>Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface</td><td>5 ± 1 mm</td><td>$\frac{1}{2}\cdot\delta\cdot\ln(2) \pm 0.5$ mm</td></tr>
<tr><td>Maximum probe angle from probe axis to phantom surface normal at the measurement location</td><td>30° ± 1°</td><td>20° ± 1°</td></tr>
<tr><td rowspan="2">Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}</td><td>$\leq$ 2 GHz: $\leq$ 15 mm
2 – 3 GHz: $\leq$ 12 mm</td><td>3 – 4 GHz: $\leq$ 12 mm
4 – 6 GHz: $\leq$ 10 mm</td></tr>
<tr><td colspan="2">When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be $\leq$ the corresponding x or y dimension of the test device with at least one measurement point on the test device.</td></tr>
</table>

9.4 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.

<table>
<tr><td colspan="3"></td><td>$\leq$ 3 GHz</td><td>> 3 GHz</td></tr>
<tr><td colspan="3">Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}</td><td>$\leq$ 2 GHz: $\leq$ 8 mm
2 – 3 GHz: $\leq$ 5 mm*</td><td>3 – 4 GHz: $\leq$ 5 mm*
4 – 6 GHz: $\leq$ 4 mm*</td></tr>
<tr><td rowspan="3">Maximum zoom scan spatial resolution, normal to phantom surface</td><td colspan="2">uniform grid: $\Delta z_{Zoom}(n)$</td><td>$\leq$ 5 mm</td><td>3 – 4 GHz: $\leq$ 4 mm
4 – 5 GHz: $\leq$ 3 mm
5 – 6 GHz: $\leq$ 2 mm</td></tr>
<tr><td rowspan="2">graded grid</td><td>$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface</td><td>$\leq$ 4 mm</td><td>3 – 4 GHz: $\leq$ 3 mm
4 – 5 GHz: $\leq$ 2.5 mm
5 – 6 GHz: $\leq$ 2 mm</td></tr>
<tr><td>$\Delta z_{Zoom}(n>1)$: between subsequent points</td><td colspan="2">$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$</td></tr>
<tr><td>Minimum zoom scan volume</td><td colspan="2">x, y, z</td><td>$\geq$ 30 mm</td><td>3 – 4 GHz: $\geq$ 28 mm
4 – 5 GHz: $\geq$ 25 mm
5 – 6 GHz: $\geq$ 22 mm</td></tr>
<tr><td colspan="5">Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.
* When zoom scan is required and the <u>reported</u> SAR from the area scan based 1-g SAR estimation procedures of KDB 447498 is $\leq$ 1.4 W/kg, $\leq$ 8 mm, $\leq$ 7 mm and $\leq$ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.</td></tr>
</table>

9.5 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.

9.6 Power Drift Monitoring

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

10. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	750MHz System Validation Kit	D750V3	1099	Dec. 13, 2024	Dec. 12, 2025
SPEAG	835MHz System Validation Kit	D835V2	4d162	Dec. 13, 2024	Dec. 12, 2025
SPEAG	1750MHz System Validation Kit	D1750V2	1137	Oct. 15, 2024	Oct. 14, 2025
SPEAG	1900MHz System Validation Kit	D1900V2	5d182	Dec. 16, 2024	Dec. 15, 2025
SPEAG	Data Acquisition Electronics	DAE4	1386	Aug. 30, 2024	Aug. 29, 2025
SPEAG	Dosimetric E-Field Probe	EX3DV4	3819	Aug. 22, 2024	Aug. 21, 2025
SPEAG	SAM Twin Phantom	QD 000 P40 CD	1670	NCR	NCR
SPEAG	Phone Positioner	N/A	N/A	NCR	NCR
Anritsu	Radio communication analyzer	MT8821C	6201588577	Apr. 01, 2025	Mar. 31, 2026
R&S	Wideband Radio Communication Tester	CMW500	169085	Dec. 26, 2024	Dec. 25, 2025
Keysight	Network Analyzer	E5071C	MY46523671	Oct. 15, 2024	Oct. 14, 2025
Speag	Dielectric Assessment KIT	DAK-3.5	1144	Aug. 20, 2024	Aug. 19, 2025
Agilent	Signal Generator	N5181A	MY50145381	Dec. 26, 2024	Dec. 25, 2025
Anritsu	Power Senor	MA2411B	1306099	Oct. 15, 2024	Oct. 14, 2025
Anritsu	Power Meter	ML2495A	1349001	Oct. 15, 2024	Oct. 14, 2025
Anritsu	Power Sensor	MA2411B	1218010	Oct. 14, 2024	Oct. 13, 2025
Anritsu	Power Meter	ML2495A	1339473	Dec. 26, 2024	Dec. 25, 2025
TES	Hygrometer	1310	220305411	Jan. 02, 2025	Jan. 01, 2026
Anymetre	Thermo-Hygrometer	JR593	2015030903	Dec. 28, 2024	Dec. 27, 2025
SPEAG	Device Holder	N/A	N/A	N/A	N/A
ARRA	Power Divider	A3200-2	N/A	Note 1	
ET Industries	Dual Directional Coupler	C-058-10	N/A	Note 1	
Jinkexinhua	Attenuator	10db-8G	N/A	Note 1	
AR	Amplifier	5S1G4	0333096	Note 1	
Mini-Circuits	Amplifier	ZVE-3W-83+	599201528	Note 1	

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.

11. System Verification

11.1 Tissue Simulating Liquids

For the measurement of the field distribution inside the SAM phantom with DASY, the phantom must be filled with around 25 liters of homogeneous body tissue simulating liquid. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm, which is shown in Fig. 10.1.

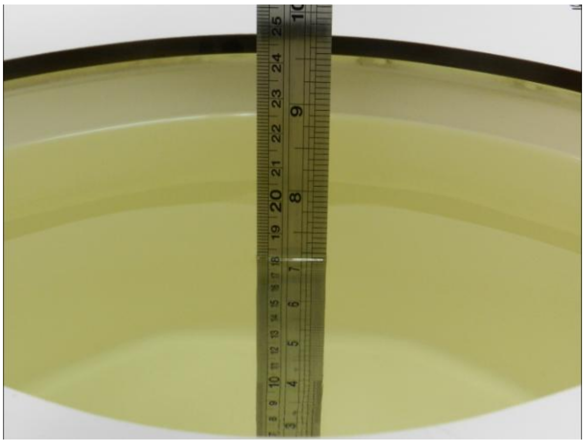


Fig 10.1 Photo of Liquid Height for Body SAR

11.2 Tissue Verification

The following tissue formulations are provided for reference only as some of the parameters have not been thoroughly verified. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation.

Frequency (MHz)	Water (%)	Sugar (%)	Cellulose (%)	Salt (%)	Preventol (%)	DGBE (%)	Conductivity (σ)	Permittivity (εr)
For Head								
750	41.1	57.0	0.2	1.4	0.2	0	0.89	41.9
835	40.3	57.9	0.2	1.4	0.2	0	0.90	41.5
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

<Tissue Dielectric Parameter Check Results>

Frequency (MHz)	Tissue Type	Liquid Temp. (℃)	Conductivity (σ)	Permittivity (ε_r)	Conductivity Target (σ)	Permittivity Target (ε_r)	Delta (σ) (%)	Delta (ε_r) (%)	Limit (%)	Date
750	Head	22.3	0.900	43.165	0.89	41.90	1.12	3.02	±5	2025/7/1
835	Head	22.3	0.942	41.846	0.90	41.50	4.67	0.83	±5	2025/7/5
1750	Head	22.2	1.354	40.865	1.37	40.10	-1.17	1.91	±5	2025/7/6
1900	Head	22.2	1.433	40.023	1.40	40.00	2.36	0.06	±5	2025/7/12

11.3 System Performance Check Results

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

Date	Frequency (MHz)	Tissue Type	Input Power (mW)	Dipole S/N	Probe S/N	DAE S/N	Measured 1g SAR (W/kg)	Targeted 1g SAR (W/kg)	Normalized 1g SAR (W/kg)	Deviation (%)
2025/7/1	750	Head	250	1099	3819	1386	2.010	8.280	8.04	-2.90
2025/7/5	835	Head	250	4d162	3819	1386	2.410	9.080	9.64	6.17
2025/7/6	1750	Head	250	1137	3819	1386	8.570	36.800	34.28	-6.85
2025/7/12	1900	Head	250	5d182	3819	1386	9.710	39.800	38.84	-2.41

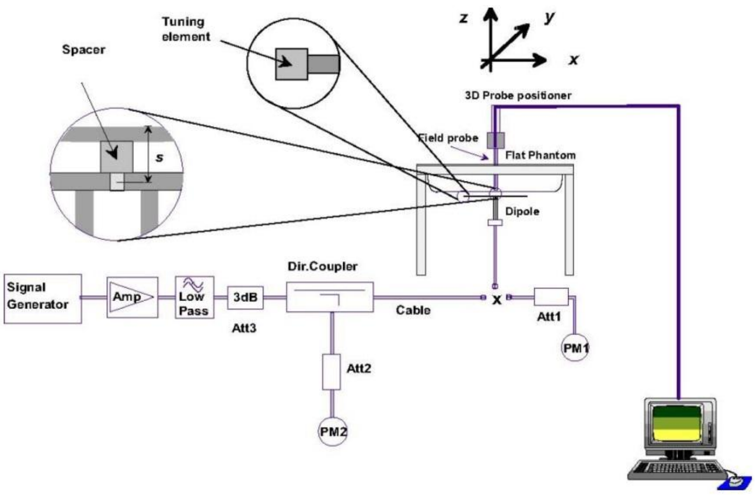


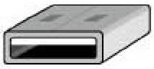
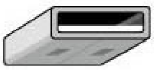
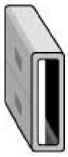
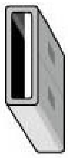
Fig 10.3.1 System Performance Check Setup

Fig 10.3.2 Setup Photo

12. RF Exposure Positions

12.1 SAR Testing for USB Dongle

Test all USB orientations [see figure below: (A) Horizontal-Up, (B) Horizontal-Down, (C) Vertical-Front, and (D) Vertical-Back] with a device-to-phantom separation distance of 5 mm or less, according to KDB Publication 447498 D02 requirements. These test orientations are intended for the exposure conditions found in typical laptop/notebook/netbook or tablet computers with either horizontal or vertical USB connector configurations at various locations in the keyboard section of the computer. Current generation portable host computers should be used to establish the required SAR measurement separation distance. The same test separation distance must be used to test all frequency bands and modes in each USB orientation. The typical Horizontal-Up USB connection (A), found in the majority of host computers, must be tested using an appropriate host computer. A host computer with either Vertical-Front (C) or Vertical Back (D) USB connection should be used to test one of the vertical USB orientations. If a suitable host computer is not available for testing the Horizontal-Down (B) or the remaining Vertical USB orientation, a high quality USB cable, 12 inches or less, may be used for testing these other orientations. It must be documented that the USB cable does not influence the radiating characteristics and output power of the transmitter.

			
Configuration 1 (Horizontal Up)	Configuration 2 (Horizontal Down)	Configuration 3 (Vertical Front)	Configuration 4 (Vertical Back)

Please refer to Appendix D for the test setup photos.

13. Conducted RF Output Power (Unit: dBm)

The detailed conducted power table can refer to Appendix E.

<LTE Conducted Power>

General Note:

1. Anritsu MT8821C 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/64QAM 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 / B12 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.

14. Antenna Location

The detailed antenna location information can refer to SAR Test Setup Photos.

15. 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 WWAN: Reported SAR(W/kg)= Measured SAR(W/kg)*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:
   · ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
   · ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
   · ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz
3. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg.
4. The following table “n/a” in the result means the SAR cube is too small to be detected.

LTE Note:

1. 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.
2. Per KDB 941225 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
3. 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.
4. 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/64QAM SAR testing is not required.
5. 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.
6. For LTE B4 / B12 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.

15.1 Body SAR

Plot No.	Band	BW (MHz)	Sub-carrier Speacing (KHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Power Reduction	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)
NB-IOT																	
01	LTE Band 2	-	3.75KHz	QPSK	1	0	Front	0mm	Sensor on	18900	1880	17.41	19.00	1.442	-0.09	0.639	**0.922**
	LTE Band 2	-	3.75KHz	QPSK	1	0	Back	0mm	Sensor on	18900	1880	17.41	19.00	1.442	0.14	0.468	0.675
	LTE Band 2	-	3.75KHz	QPSK	1	0	Left Side	0mm	Sensor on	18900	1880	17.41	19.00	1.442	0.18	0.286	0.412
	LTE Band 2	-	3.75KHz	QPSK	1	0	Right Side	0mm	Sensor on	18900	1880	17.41	19.00	1.442	-0.11	0.419	0.604
	LTE Band 2	-	3.75KHz	QPSK	1	0	Top Side	0mm	Sensor on	18900	1880	17.41	19.00	1.442	-0.19	0.107	0.154
	LTE Band 2	-	3.75KHz	QPSK	1	0	Front	0mm	Sensor on	18601	1850.1	17.36	19.00	1.459	0.11	0.630	0.919
	LTE Band 2	-	3.75KHz	QPSK	1	0	Front	0mm	Sensor on	19199	1909.9	17.38	19.00	1.452	0.01	0.632	0.918
	LTE Band 2	-	3.75KHz	QPSK	1	0	Front	15mm	Sensor off	18900	1880	22.34	24.00	1.466	0.09	0.228	0.334
	LTE Band 2	-	3.75KHz	QPSK	1	0	Back	15mm	Sensor off	18900	1880	22.34	24.00	1.466	-0.07	0.363	0.532
	LTE Band 2	-	3.75KHz	QPSK	1	0	Left Side	15mm	Sensor off	18900	1880	22.34	24.00	1.466	0.12	0.115	0.169
	LTE Band 2	-	3.75KHz	QPSK	1	0	Right Side	15mm	Sensor off	18900	1880	22.34	24.00	1.466	-0.12	0.148	0.217
	LTE Band 2	-	3.75KHz	QPSK	1	0	Top Side	15mm	Sensor off	18900	1880	22.34	24.00	1.466	-	n/a	n/a
02	LTE Band 4	-	3.75KHz	QPSK	1	0	Front	0mm	Sensor on	20175	1732.5	17.36	19.00	1.459	0.07	0.579	**0.845**
	LTE Band 4	-	3.75KHz	QPSK	1	0	Back	0mm	Sensor on	20175	1732.5	17.36	19.00	1.459	0.1	0.265	0.387
	LTE Band 4	-	3.75KHz	QPSK	1	0	Left Side	0mm	Sensor on	20175	1732.5	17.36	19.00	1.459	-0.02	0.276	0.403
	LTE Band 4	-	3.75KHz	QPSK	1	0	Right Side	0mm	Sensor on	20175	1732.5	17.36	19.00	1.459	-0.08	0.443	0.646
	LTE Band 4	-	3.75KHz	QPSK	1	0	Top Side	0mm	Sensor on	20175	1732.5	17.36	19.00	1.459	-0.14	0.052	0.076
	LTE Band 4	-	3.75KHz	QPSK	1	0	Front	0mm	Sensor on	19951	1710.1	17.29	19.00	1.483	0.13	0.506	0.750
	LTE Band 4	-	3.75KHz	QPSK	1	0	Front	0mm	Sensor on	20399	1754.9	17.29	19.00	1.483	0.11	0.561	0.832
	LTE Band 4	-	3.75KHz	QPSK	1	0	Front	15mm	Sensor off	20175	1732.5	22.30	24.00	1.479	0.03	0.311	0.460
	LTE Band 4	-	3.75KHz	QPSK	1	0	Back	15mm	Sensor off	20175	1732.5	22.30	24.00	1.479	0.1	0.310	0.459
	LTE Band 4	-	3.75KHz	QPSK	1	0	Left Side	15mm	Sensor off	20175	1732.5	22.30	24.00	1.479	0.08	0.164	0.243
	LTE Band 4	-	3.75KHz	QPSK	1	0	Right Side	15mm	Sensor off	20175	1732.5	22.30	24.00	1.479	0	0.173	0.256
	LTE Band 4	-	3.75KHz	QPSK	1	0	Top Side	15mm	Sensor off	20175	1732.5	22.30	24.00	1.479	-	n/a	n/a
	LTE Band 5	-	3.75KHz	QPSK	1	0	Front	0mm	Sensor on	20525	836.5	20.66	22.00	1.361	0.04	0.382	0.520
	LTE Band 5	-	3.75KHz	QPSK	1	0	Back	0mm	Sensor on	20525	836.5	20.66	22.00	1.361	0.07	0.378	0.515
	LTE Band 5	-	3.75KHz	QPSK	1	0	Left Side	0mm	Sensor on	20525	836.5	20.66	22.00	1.361	0.12	0.349	0.475
	LTE Band 5	-	3.75KHz	QPSK	1	0	Right Side	0mm	Sensor on	20525	836.5	20.66	22.00	1.361	-0.13	0.153	0.208
	LTE Band 5	-	3.75KHz	QPSK	1	0	Top Side	0mm	Sensor on	20525	836.5	20.66	22.00	1.361	-	n/a	n/a
03	LTE Band 5	-	3.75KHz	QPSK	1	0	Front	0mm	Sensor on	20401	824.1	20.59	22.00	1.384	-0.12	0.383	**0.530**
	LTE Band 5	-	3.75KHz	QPSK	1	0	Front	0mm	Sensor on	20649	848.9	20.63	22.00	1.371	-0.18	0.281	0.385
	LTE Band 5	-	3.75KHz	QPSK	1	0	Front	15mm	Sensor off	20525	836.5	22.30	24.00	1.479	0.03	0.082	0.121
	LTE Band 5	-	3.75KHz	QPSK	1	0	Back	15mm	Sensor off	20525	836.5	22.30	24.00	1.479	-0.06	0.065	0.096
	LTE Band 5	-	3.75KHz	QPSK	1	0	Left Side	15mm	Sensor off	20525	836.5	22.30	24.00	1.479	0.09	0.059	0.087
	LTE Band 5	-	3.75KHz	QPSK	1	0	Right Side	15mm	Sensor off	20525	836.5	22.30	24.00	1.479	-	n/a	n/a
	LTE Band 5	-	3.75KHz	QPSK	1	0	Top Side	15mm	Sensor off	20525	836.5	22.30	24.00	1.479	-	n/a	n/a
04	LTE Band 12	-	3.75KHz	QPSK	1	0	Front	0mm	Sensor on	23095	707.5	20.17	22.00	1.524	0.09	0.388	**0.591**
	LTE Band 12	-	3.75KHz	QPSK	1	0	Back	0mm	Sensor on	23095	707.5	20.17	22.00	1.524	-0.03	0.339	0.517
	LTE Band 12	-	3.75KHz	QPSK	1	0	Left Side	0mm	Sensor on	23095	707.5	20.17	22.00	1.524	0.12	0.301	0.459
	LTE Band 12	-	3.75KHz	QPSK	1	0	Right Side	0mm	Sensor on	23095	707.5	20.17	22.00	1.524	0.11	0.196	0.299
	LTE Band 12	-	3.75KHz	QPSK	1	0	Top Side	0mm	Sensor on	23095	707.5	20.17	22.00	1.524	0.19	0.047	0.072
	LTE Band 12	-	3.75KHz	QPSK	1	0	Front	0mm	Sensor on	23011	699.1	20.16	22.00	1.528	-0.05	0.375	0.573
	LTE Band 12	-	3.75KHz	QPSK	1	0	Front	0mm	Sensor on	23179	715.9	20.13	22.00	1.538	-0.11	0.347	0.534
	LTE Band 12	-	3.75KHz	QPSK	1	0	Front	15mm	Sensor off	23095	707.5	22.29	24.00	1.483	-0.03	0.041	0.061
	LTE Band 12	-	3.75KHz	QPSK	1	0	Back	15mm	Sensor off	23095	707.5	22.29	24.00	1.483	-	n/a	n/a
	LTE Band 12	-	3.75KHz	QPSK	1	0	Left Side	15mm	Sensor off	23095	707.5	22.29	24.00	1.483	-	n/a	n/a
	LTE Band 12	-	3.75KHz	QPSK	1	0	Right Side	15mm	Sensor off	23095	707.5	22.29	24.00	1.483	-0.16	0.040	0.059
	LTE Band 12	-	3.75KHz	QPSK	1	0	Top Side	15mm	Sensor off	23095	707.5	22.29	24.00	1.483	-	n/a	n/a
	LTE Band 13	-	3.75KHz	QPSK	1	0	Front	0mm	Sensor on	23230	782	21.04	22.00	1.247	-0.18	0.383	0.478
	LTE Band 13	-	3.75KHz	QPSK	1	0	Back	0mm	Sensor on	23230	782	21.04	22.00	1.247	-0.19	0.273	0.341
	LTE Band 13	-	3.75KHz	QPSK	1	0	Left Side	0mm	Sensor on	23230	782	21.04	22.00	1.247	0.11	0.255	0.318

	LTE Band 13	-	3.75KHz	QPSK	1	0	Right Side	0mm	Sensor on	23230	782	21.04	22.00	1.247	0.11	0.247	0.308
	LTE Band 13	-	3.75KHz	QPSK	1	0	Top Side	0mm	Sensor on	23230	782	21.04	22.00	1.247	-0.09	0.081	0.101
05	LTE Band 13	-	3.75KHz	QPSK	1	0	Front	0mm	Sensor on	23181	777.1	21.00	22.00	1.259	-0.11	0.408	**0.514**
	LTE Band 13	-	3.75KHz	QPSK	1	0	Front	0mm	Sensor on	23279	786.9	20.96	22.00	1.271	-0.01	0.365	0.464
	LTE Band 13	-	3.75KHz	QPSK	1	0	Front	15mm	Sensor off	23230	782	22.34	24.00	1.466	-0.15	0.092	0.135
	LTE Band 13	-	3.75KHz	QPSK	1	0	Back	15mm	Sensor off	23230	782	22.34	24.00	1.466	0.1	0.107	0.157
	LTE Band 13	-	3.75KHz	QPSK	1	0	Left Side	15mm	Sensor off	23230	782	22.34	24.00	1.466	-0.04	0.066	0.097
	LTE Band 13	-	3.75KHz	QPSK	1	0	Right Side	15mm	Sensor off	23230	782	22.34	24.00	1.466	-0.15	0.048	0.070
	LTE Band 13	-	3.75KHz	QPSK	1	0	Top Side	15mm	Sensor off	23230	782	22.34	24.00	1.466	-	n/a	n/a
CAT M1																	
06	LTE Band 2	20M	-	QPSK	1	0	Front	0mm	Sensor on	18900	1880	17.80	19.00	1.318	0.08	0.603	**0.795**
	LTE Band 2	20M	-	QPSK	1	0	Back	0mm	Sensor on	18900	1880	17.80	19.00	1.318	0.17	0.427	0.563
	LTE Band 2	20M	-	QPSK	1	0	Left Side	0mm	Sensor on	18900	1880	17.80	19.00	1.318	-0.1	0.244	0.322
	LTE Band 2	20M	-	QPSK	1	0	Right Side	0mm	Sensor on	18900	1880	17.80	19.00	1.318	-0.19	0.384	0.506
	LTE Band 2	20M	-	QPSK	1	0	Top Side	0mm	Sensor on	18900	1880	17.80	19.00	1.318	0.16	0.115	0.152
	LTE Band 2	20M	-	QPSK	1	0	Front	0mm	Sensor on	18700	1860	17.73	19.00	1.340	-0.18	0.463	0.620
	LTE Band 2	20M	-	QPSK	1	0	Front	0mm	Sensor on	19100	1900	17.72	19.00	1.343	0.15	0.454	0.610
	LTE Band 2	20M	-	QPSK	1	0	Front	15mm	Sensor off	18900	1880	22.96	24.00	1.271	0	0.234	0.297
	LTE Band 2	20M	-	QPSK	1	0	Back	15mm	Sensor off	18900	1880	22.96	24.00	1.271	-	n/a	n/a
	LTE Band 2	20M	-	QPSK	1	0	Left Side	15mm	Sensor off	18900	1880	22.96	24.00	1.271	0	0.049	0.062
	LTE Band 2	20M	-	QPSK	1	0	Right Side	15mm	Sensor off	18900	1880	22.96	24.00	1.271	0.13	0.063	0.080
	LTE Band 2	20M	-	QPSK	1	0	Top Side	15mm	Sensor off	18900	1880	22.96	24.00	1.271	-	n/a	n/a
	LTE Band 2	20M	-	QPSK	3	0	Front	0mm	Sensor on	18900	1880	17.73	19.00	1.340	-0.11	0.480	0.643
	LTE Band 2	20M	-	QPSK	3	0	Back	0mm	Sensor on	18900	1880	17.73	19.00	1.340	-0.03	0.387	0.518
	LTE Band 2	20M	-	QPSK	3	0	Left Side	0mm	Sensor on	18900	1880	17.73	19.00	1.340	0.17	0.303	0.406
	LTE Band 2	20M	-	QPSK	3	0	Right Side	0mm	Sensor on	18900	1880	17.73	19.00	1.340	-0.16	0.406	0.544
	LTE Band 2	20M	-	QPSK	3	0	Top Side	0mm	Sensor on	18900	1880	17.73	19.00	1.340	-0.03	0.107	0.143
	LTE Band 4	20M	-	QPSK	1	0	Front	0mm	Sensor on	20175	1732.5	17.66	19.00	1.361	0.17	0.481	0.655
	LTE Band 4	20M	-	QPSK	1	0	Back	0mm	Sensor on	20175	1732.5	17.66	19.00	1.361	0.06	0.460	0.626
	LTE Band 4	20M	-	QPSK	1	0	Left Side	0mm	Sensor on	20175	1732.5	17.66	19.00	1.361	0.13	0.232	0.316
	LTE Band 4	20M	-	QPSK	1	0	Right Side	0mm	Sensor on	20175	1732.5	17.66	19.00	1.361	-0.17	0.360	0.490
	LTE Band 4	20M	-	QPSK	1	0	Top Side	0mm	Sensor on	20175	1732.5	17.66	19.00	1.361	-0.08	0.066	0.090
	LTE Band 4	20M	-	QPSK	1	0	Front	0mm	Sensor on	20050	1720	17.64	19.00	1.368	-0.13	0.480	0.657
07	LTE Band 4	20M	-	QPSK	1	0	Front	0mm	Sensor on	20300	1745	17.62	19.00	1.374	-0.04	0.573	**0.787**
	LTE Band 4	20M	-	QPSK	1	0	Front	15mm	Sensor off	20175	1732.5	22.94	24.00	1.276	0.07	0.184	0.235
	LTE Band 4	20M	-	QPSK	1	0	Back	15mm	Sensor off	20175	1732.5	22.94	24.00	1.276	-	n/a	n/a
	LTE Band 4	20M	-	QPSK	1	0	Left Side	15mm	Sensor off	20175	1732.5	22.94	24.00	1.276	-	n/a	n/a
	LTE Band 4	20M	-	QPSK	1	0	Right Side	15mm	Sensor off	20175	1732.5	22.94	24.00	1.276	0.14	0.055	0.070
	LTE Band 4	20M	-	QPSK	1	0	Top Side	15mm	Sensor off	20175	1732.5	22.94	24.00	1.276	-	n/a	n/a
	LTE Band 4	20M	-	QPSK	3	0	Front	0mm	Sensor on	20175	1732.5	17.63	19.00	1.371	-0.11	0.470	0.644
	LTE Band 4	20M	-	QPSK	3	0	Back	0mm	Sensor on	20175	1732.5	17.63	19.00	1.371	-0.13	0.335	0.459
	LTE Band 4	20M	-	QPSK	3	0	Left Side	0mm	Sensor on	20175	1732.5	17.63	19.00	1.371	-0.04	0.217	0.297
	LTE Band 4	20M	-	QPSK	3	0	Right Side	0mm	Sensor on	20175	1732.5	17.63	19.00	1.371	0.09	0.376	0.515
	LTE Band 4	20M	-	QPSK	3	0	Top Side	0mm	Sensor on	20175	1732.5	17.63	19.00	1.371	0.04	0.055	0.075
	LTE Band 5	10M	-	QPSK	1	0	Front	0mm	Sensor on	20525	836.5	20.85	22.00	1.303	0.01	0.430	0.560
	LTE Band 5	10M	-	QPSK	1	0	Back	0mm	Sensor on	20525	836.5	20.85	22.00	1.303	-0.11	0.289	0.377
	LTE Band 5	10M	-	QPSK	1	0	Left Side	0mm	Sensor on	20525	836.5	20.85	22.00	1.303	0.11	0.413	0.538
	LTE Band 5	10M	-	QPSK	1	0	Right Side	0mm	Sensor on	20525	836.5	20.85	22.00	1.303	0.15	0.264	0.344
	LTE Band 5	10M	-	QPSK	1	0	Top Side	0mm	Sensor on	20525	836.5	20.85	22.00	1.303	0.14	0.044	0.057
08	LTE Band 5	10M	-	QPSK	1	0	Front	0mm	Sensor on	20450	829	20.83	22.00	1.309	-0.08	0.439	**0.575**
	LTE Band 5	10M	-	QPSK	1	0	Front	0mm	Sensor on	20600	844	20.80	22.00	1.318	-0.01	0.415	0.547
	LTE Band 5	10M	-	QPSK	1	0	Front	15mm	Sensor off	20525	836.5	22.88	24.00	1.294	0.09	0.072	0.093
	LTE Band 5	10M	-	QPSK	1	0	Back	15mm	Sensor off	20525	836.5	22.88	24.00	1.294	0.14	0.022	0.028
	LTE Band 5	10M	-	QPSK	1	0	Left Side	15mm	Sensor off	20525	836.5	22.88	24.00	1.294	-	n/a	n/a
	LTE Band 5	10M	-	QPSK	1	0	Right Side	15mm	Sensor off	20525	836.5	22.88	24.00	1.294	-	n/a	n/a
	LTE Band 5	10M	-	QPSK	1	0	Top Side	15mm	Sensor off	20525	836.5	22.88	24.00	1.294	-	n/a	n/a

	LTE Band 5	10M	-	QPSK	3	0	Front	0mm	Sensor on	20525	836.5	20.83	22.00	1.309	-0.14	0.421	0.551
	LTE Band 5	10M	-	QPSK	3	0	Back	0mm	Sensor on	20525	836.5	20.83	22.00	1.309	-0.14	0.348	0.456
	LTE Band 5	10M	-	QPSK	3	0	Left Side	0mm	Sensor on	20525	836.5	20.83	22.00	1.309	-0.06	0.358	0.469
	LTE Band 5	10M	-	QPSK	3	0	Right Side	0mm	Sensor on	20525	836.5	20.83	22.00	1.309	0.13	0.240	0.314
	LTE Band 5	10M	-	QPSK	3	0	Top Side	0mm	Sensor on	20525	836.5	20.83	22.00	1.309	-0.02	0.112	0.147
09	LTE Band 12	10M	-	QPSK	1	0	Front	0mm	Sensor on	23095	707.5	20.78	22.00	1.324	0.08	0.392	**0.519**
	LTE Band 12	10M	-	QPSK	1	0	Back	0mm	Sensor on	23095	707.5	20.78	22.00	1.324	0.03	0.386	0.511
	LTE Band 12	10M	-	QPSK	1	0	Left Side	0mm	Sensor on	23095	707.5	20.78	22.00	1.324	-0.17	0.335	0.444
	LTE Band 12	10M	-	QPSK	1	0	Right Side	0mm	Sensor on	23095	707.5	20.78	22.00	1.324	-0.02	0.192	0.254
	LTE Band 12	10M	-	QPSK	1	0	Top Side	0mm	Sensor on	23095	707.5	20.78	22.00	1.324	-0.03	0.077	0.102
	LTE Band 12	10M	-	QPSK	1	0	Front	0mm	Sensor on	23060	704	20.75	22.00	1.334	0.17	0.385	0.513
	LTE Band 12	10M	-	QPSK	1	0	Front	0mm	Sensor on	23130	711	20.73	22.00	1.340	0.01	0.379	0.508
	LTE Band 12	10M	-	QPSK	1	0	Front	15mm	Sensor off	23095	707.5	23.28	24.00	1.180	-	n/a	n/a
	LTE Band 12	10M	-	QPSK	1	0	Back	15mm	Sensor off	23095	707.5	23.28	24.00	1.180	0.05	0.045	0.053
	LTE Band 12	10M	-	QPSK	1	0	Left Side	15mm	Sensor off	23095	707.5	23.28	24.00	1.180	-	n/a	n/a
	LTE Band 12	10M	-	QPSK	1	0	Right Side	15mm	Sensor off	23095	707.5	23.28	24.00	1.180	-	n/a	n/a
	LTE Band 12	10M	-	QPSK	1	0	Top Side	15mm	Sensor off	23095	707.5	23.28	24.00	1.180	-	n/a	n/a
	LTE Band 12	10M	-	QPSK	3	0	Front	0mm	Sensor on	23095	707.5	20.75	22.00	1.334	0.17	0.388	0.517
	LTE Band 12	10M	-	QPSK	3	0	Back	0mm	Sensor on	23095	707.5	20.75	22.00	1.334	0	0.384	0.512
	LTE Band 12	10M	-	QPSK	3	0	Left Side	0mm	Sensor on	23095	707.5	20.75	22.00	1.334	-0.19	0.321	0.428
	LTE Band 12	10M	-	QPSK	3	0	Right Side	0mm	Sensor on	23095	707.5	20.75	22.00	1.334	-0.07	0.195	0.260
	LTE Band 12	10M	-	QPSK	3	0	Top Side	0mm	Sensor on	23095	707.5	20.75	22.00	1.334	-0.06	0.081	0.108
10	LTE Band 13	10M	-	QPSK	1	0	Front	0mm	Sensor on	23230	782	21.08	22.00	1.236	0.01	0.374	**0.462**
	LTE Band 13	10M	-	QPSK	1	0	Back	0mm	Sensor on	23230	782	21.08	22.00	1.236	-0.03	0.329	0.407
	LTE Band 13	10M	-	QPSK	1	0	Left Side	0mm	Sensor on	23230	782	21.08	22.00	1.236	0.04	0.367	0.454
	LTE Band 13	10M	-	QPSK	1	0	Right Side	0mm	Sensor on	23230	782	21.08	22.00	1.236	-0.16	0.209	0.258
	LTE Band 13	10M	-	QPSK	1	0	Top Side	0mm	Sensor on	23230	782	21.08	22.00	1.236	-0.13	0.057	0.070
	LTE Band 13	10M	-	QPSK	1	0	Front	15mm	Sensor off	23230	782	23.11	24.00	1.227	-	n/a	n/a
	LTE Band 13	10M	-	QPSK	1	0	Back	15mm	Sensor off	23230	782	23.11	24.00	1.227	0.02	0.053	0.065
	LTE Band 13	10M	-	QPSK	1	0	Left Side	15mm	Sensor off	23230	782	23.11	24.00	1.227	-	n/a	n/a
	LTE Band 13	10M	-	QPSK	1	0	Right Side	15mm	Sensor off	23230	782	23.11	24.00	1.227	-	n/a	n/a
	LTE Band 13	10M	-	QPSK	1	0	Top Side	15mm	Sensor off	23230	782	23.11	24.00	1.227	-	n/a	n/a
	LTE Band 13	10M	-	QPSK	3	0	Front	0mm	Sensor on	23230	782	21.07	22.00	1.239	0.19	0.372	0.461
	LTE Band 13	10M	-	QPSK	3	0	Back	0mm	Sensor on	23230	782	21.07	22.00	1.239	-0.12	0.337	0.417
	LTE Band 13	10M	-	QPSK	3	0	Left Side	0mm	Sensor on	23230	782	21.07	22.00	1.239	0.08	0.362	0.448
	LTE Band 13	10M	-	QPSK	3	0	Right Side	0mm	Sensor on	23230	782	21.07	22.00	1.239	0.1	0.205	0.254
	LTE Band 13	10M	-	QPSK	3	0	Top Side	0mm	Sensor on	23230	782	21.07	22.00	1.239	-0.03	0.054	0.067

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16. 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.

17. References

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

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

[3] IEEE Std. 1528-2013, “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 447498 D01 v06, “Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies”, Oct 2015

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

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

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

[9] FCC KDB 616217 D04 v01r02, “SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers”, Oct 2015

[10] FCC KDB 447498 D02 v02r01, “SAR Measurement Procedures for USB Dongle Transmitters”, Oct 2015.

Appendixes

Please refer to separated files for the following appendixes

Appendix A. Plots of System Performance Check

Appendix B. Plots of High SAR Measurement

Appendix C. DASY Calibration Certificate

Appendix D. Test Setup Photos

Appendix E. Conducted RF Output Power Table

------THE END------