# FCC SAR TEST REPORT

| | | |
|---|---|---|
| **FCC ID** | : | **ACJFZT1A** |
| **Equipment** | : | **Tablet Computer** |
| **Brand Name** | : | **Panasonic** |
| **Model Name** | : | **FZ-T1BB, FZ-T1BC** |
| **Applicant** | : | **Panasonic Corporation of North America<br>Two Riverfront Plaza, 9th Floor, Newark, NJ 07102-5490** |
| **Manufacturer** | : | **Panasonic Mobile Communications Co., Ltd.<br>600 Saedo-cho, Tsuzuki-ku, Yokohama City 224-8539, Japan** |
| **Standard** | : | **FCC 47 CFR Part 2 (2.1093)<br>ANSI/IEEE C95.1-1992<br>IEEE 1528-2013** |

**The product was received on Jul. 16, 2018 and testing was started from Jul. 16, 2018 and completed on Aug. 24, 2018. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.**

**The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.**

**The test results in this variant report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERTIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.**

Jones Tsai

**Approved by: Jones Tsai / Manager**

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# History of this test report

| Report No. | Version | Description | Issued Date |
|---|---|---|---|
| FA870417 | 01 | Initial issue of report | Aug. 22, 2018 |
| FA870417 | 02 | Update section1, 8, 9, 13.2, 14.2, 14.5 | Aug. 27, 2018 |
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# 1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for Panasonic Corporation of North America, Tablet Computer, FZ-T1BB, FZ-T1BC, are as follows.

| Equipment Class | Frequency Band | Highest SAR Summary | | | | Highest Simultaneous Transmission 1g SAR (W/kg) |
|---|---|---|---|---|---|---|
| | | Head (Separation 0mm) | Body-worn (Separation 10mm) | Hotspot (Separation 10mm) | Product Specific (Separation 0mm) | |
| | | 1g SAR (W/kg) | | | 10g SAR (W/kg) | |
| Licensed | WCDMA II | 0.68 | 1.44 | 1.44 | 2.61 | 1.46 |
| | WCDMA V | 0.44 | 0.71 | 0.71 | | |
| | LTE Band 2 | 0.77 | 1.44 | 1.44 | 2.82 | |
| | LTE Band 4 | 0.84 | 1.08 | 1.08 | | |
| | LTE Band 5 | 0.44 | 0.62 | 0.62 | | |
| | LTE Band 12 | 0.31 | 0.53 | 0.53 | | |
| | LTE Band 13 | 0.37 | 0.68 | 0.68 | | |
| DTS | 2.4GHz WLAN | 0.42 | 0.18 | 0.19 | | 1.44 |
| NII | 5GHz WLAN | 0.28 | 0.75 | 0.29 | 0.66 | 1.45 |
| DSS | Bluetooth | 0.03 | 0.02 | 0.02 | | 1.46 |
| Date of Testing: | | 2018/7/16 ~ 2018/8/24 | | | | |

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 1190) 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 Product Specific 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: Eric Huang**
**Report Producer: Wan Liu**

# 2. 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 648474 D04 SAR Evaluation Considerations for Wireless Handsets v01r03
- FCC KDB 248227 D01 802.11 Wi-Fi SAR v02r02
- FCC KDB 941225 D01 3G SAR Procedures v03r01
- FCC KDB 941225 D05 SAR for LTE Devices v02r05
- FCC KDB 941225 D06 Hotspot Mode SAR v02r01

# 3. Equipment Under Test (EUT) Information

## 3.1 General Information

| Product Feature & Specification | |
|---|---|
| **Equipment Name** | Tablet Computer |
| **Brand Name** | Panasonic |
| **Model Name** | FZ-T1BB, FZ-T1BC |
| **FCC ID** | ACJFZT1A |
| **IMEI Code** | 358384090005170 |
| **Wireless Technology and Frequency Range** | WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz<br>WCDMA Band V: 826.4 MHz ~ 846.6 MHz<br>LTE Band 2: 1850.7 MHz ~ 1909.3 MHz<br>LTE Band 4: 1710.7 MHz ~ 1754.3 MHz<br>LTE Band 5: 824.7 MHz ~ 848.3 MHz<br>LTE Band 12: 699.7 MHz ~ 715.3 MHz<br>LTE Band 13: 779.5 MHz ~ 784.5 MHz<br>WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz<br>WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz<br>WLAN 5.3GHz Band: 5260 MHz ~ 5320 MHz<br>WLAN 5.5GHz Band: 5500 MHz ~ 5700 MHz<br>WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz<br>Bluetooth: 2402 MHz ~ 2480 MHz |
| **Mode** | AMR / RMC 12.2Kbps<br>HSDPA<br>HSUPA<br>LTE: QPSK, 16QAM<br>802.11a/b/g/n HT20/HT40<br>Bluetooth BR/EDR/LE |
| **EUT Stage** | Identical Prototype |

**Remark:**

1. This device WLAN 2.4GHz supports Hotspot operation, Bluetooth support tethering applications, WLAN 5GHz B1/B4 support WiFi Direct group owner.
2. This product can be combined with a gun handle and the gun handle does not supports any RF transmitters, the hand SAR does not necessary, due to the device overall diagonal dimension > 16.0 cm has been considered basic hand SAR requirement according to KDB 648474 D04v01r03.
3. The device supports specific holster at body-worn condition, the test condition for body-worn with holster is not necessary, due to the distance is 20mm away human body when the device attach the holster is higher than the current body-worn test distance, please kindly refer appendix D.
4. WWAN function of Model: FZ-T1BC is disabled by the embedded software; cannot and will not be enabled via the end user or the grantee.
5. All the test results were performed with sample 1.

| Sample List | |
|---|---|
| Sample 1 | FZ-T1BB |
| Sample 2 | FZ-T1BC |

## 3.2 General LTE SAR Test and Reporting Considerations

| Summarized necessary items addressed in KDB 941225 D05 v02r05 | |
|---|---|
| FCC ID | ACJFZT1A |
| Equipment Name | Tablet Computer |
| Operating Frequency Range of each LTE transmission band | LTE Band 2: 1850.7 MHz ~ 1909.3 MHz<br>LTE Band 4: 1710.7 MHz ~ 1754.3 MHz<br>LTE Band 5: 824.7 MHz ~ 848.3 MHz<br>LTE Band 12: 699.7 MHz ~ 715.3 MHz<br>LTE Band 13: 779.5 MHz ~ 784.5 MHz |
| Channel Bandwidth | LTE Band 02:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz<br>LTE Band 04:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz<br>LTE Band 05:1.4MHz, 3MHz, 5MHz, 10MHz<br>LTE Band 12:1.4MHz, 3MHz, 5MHz, 10MHz<br>LTE Band 13: 5MHz, 10MHz |
| uplink modulations used | QPSK / 16QAM |
| LTE Voice / Data requirements | Voice and Data |
| LTE MPR permanently built-in by design | **Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3** |

| 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 |

| | |
|---|---|
| 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. |

| 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 | | |

# 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:

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

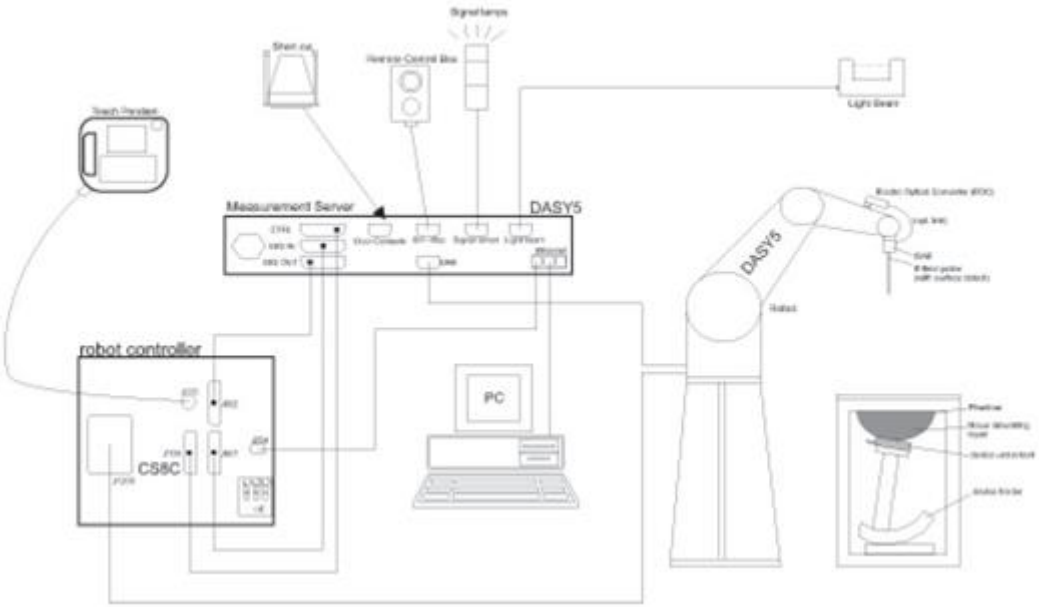
SAR is expressed in units of Watts per kilogram (W/kg)

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

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:**




- 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.

## 6.1 E-Field Probe

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

**<ES3DV3 Probe>**

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

**<EX3DV4 Probe>**

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

## 6.2 Data Acquisition Electronics (DAE)

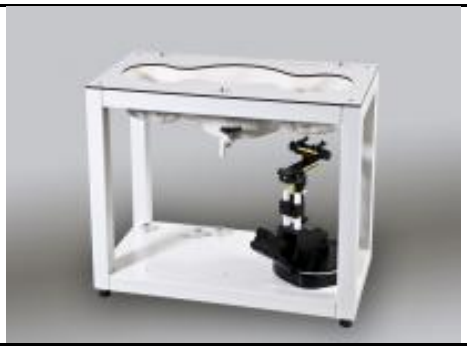
The data acquisition electronics (DAE) consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the measurement server is accomplished through an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

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

**Fig 5.1 Photo of DAE**

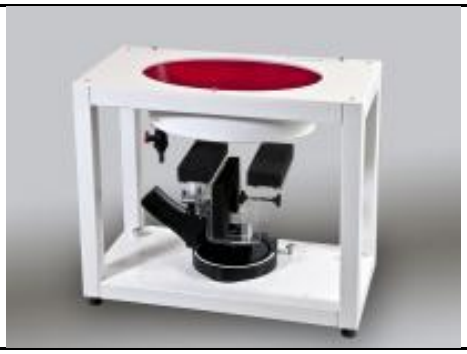
## 6.3 Phantom

**<SAM Twin Phantom>**

| | | |
|---|---|---|
| **Shell Thickness** | 2 ± 0.2 mm;<br>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<br>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.

## 6.4 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

# 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: $\Delta x_{Area}$, $\Delta y_{Area}$ | ≤ 2 GHz: ≤ 15 mm<br>2 – 3 GHz: ≤ 12 mm | 3 – 4 GHz: ≤ 12 mm<br>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: $\Delta x_{Zoom}$, $\Delta y_{Zoom}$ | | | ≤ 2 GHz: ≤ 8 mm<br>2 – 3 GHz: ≤ 5 mm* | 3 – 4 GHz: ≤ 5 mm*<br>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<br>4 – 5 GHz: ≤ 3 mm<br>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<br>4 – 5 GHz: ≤ 2.5 mm<br>5 – 6 GHz: ≤ 2 mm |
| | | $\Delta z_{Zoom}(n>1)$: between subsequent points | $\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$ | |
| Minimum zoom scan volume | x, y, z | | ≥ 30 mm | 3 – 4 GHz: ≥ 28 mm<br>4 – 5 GHz: ≥ 25 mm<br>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 | 1107 | Feb. 27, 2018 | Feb. 26, 2019 |
| SPEAG | 835MHz System Validation Kit | D835V2 | 4d167 | Feb. 27, 2018 | Feb. 26, 2019 |
| SPEAG | 1750MHz System Validation Kit | D1750V2 | 1068 | Nov. 15, 2017 | Nov. 14, 2018 |
| SPEAG | 1900MHz System Validation Kit | D1900V2 | 5d041 | Sep. 28, 2017 | Sep. 27, 2018 |
| SPEAG | 2450MHz System Validation Kit | D2450V2 | 736 | Sep. 18, 2017 | Sep. 17, 2018 |
| SPEAG | 5GHz System Validation Kit | D5GHzV2 | 1006 | Sep. 26, 2017 | Sep. 25, 2018 |
| SPEAG | Data Acquisition Electronics | DAE4 | 1424 | Jan. 18, 2018 | Jan. 17, 2019 |
| SPEAG | Data Acquisition Electronics | DAE4 | 1399 | Nov. 16, 2017 | Nov. 15, 2018 |
| SPEAG | Data Acquisition Electronics | DAE4 | 778 | May. 25, 2018 | May. 24, 2019 |
| SPEAG | Data Acquisition Electronics | DAE3 | 577 | Sep. 25, 2017 | Sep. 24, 2018 |
| SPEAG | Data Acquisition Electronics | DAE4 | 853 | Jul. 19, 2017 | Jul. 18, 2018 |
| SPEAG | Data Acquisition Electronics | DAE4 | 917 | Dec. 14, 2017 | Dec. 13, 2018 |
| SPEAG | Data Acquisition Electronics | DAE3 | 495 | May. 24, 2018 | May. 23, 2019 |
| SPEAG | Dosimetric E-Field Probe | EX3DV4 | 3976 | Jan. 23, 2018 | Jan. 22, 2019 |
| SPEAG | Dosimetric E-Field Probe | ES3DV3 | 3270 | Sep. 25, 2017 | Sep. 24, 2018 |
| SPEAG | Dosimetric E-Field Probe | EX3DV4 | 3931 | Sep. 29, 2017 | Sep. 28, 2018 |
| SPEAG | Dosimetric E-Field Probe | ES3DV3 | 3169 | May. 28, 2018 | May. 27, 2019 |
| SPEAG | Dosimetric E-Field Probe | ES3DV3 | 3170 | Oct. 26, 2017 | Oct. 25, 2018 |
| SPEAG | Dosimetric E-Field Probe | EX3DV4 | 3925 | May. 31, 2018 | May. 30, 2019 |
| RCPTWN | Thermometer | HTC-1 | TM560-1 | Mar. 16, 2018 | Mar. 15, 2019 |
| Gencom | Thermometer | TE1 | TM225-1 | Mar. 16, 2018 | Mar. 15, 2019 |
| WonDer | Thermometer | WD-5016 | TM642-1 | Mar. 16, 2018 | Mar. 15, 2019 |
| WonDer | Thermometer | WD-5016 | TM131-1 | Mar. 16, 2018 | Mar. 15, 2019 |
| WonDer | Thermometer | WD-5016 | TM132-1 | Mar. 16, 2018 | Mar. 15, 2019 |
| Anritsu | Radio Communication Analyzer | MT8821C | 6201341950 | Apr. 17, 2018 | Apr. 16, 2019 |
| Agilent | Wireless Communication Test Set | E5515C | MY50266977 | May. 21, 2018 | May. 20, 2019 |
| R&S | BT Base Station | CBT | 100815 | Feb. 05, 2018 | Feb. 04, 2019 |
| SPEAG | Device Holder | N/A | N/A | N/A | N/A |
| Anritsu | Signal Generator | MG3710A | 6201502524 | Dec. 07, 2017 | Dec. 06, 2018 |
| Agilent | ENA Network Analyzer | E5071C | MY46316648 | Jan. 17, 2018 | Jan. 16, 2019 |
| SPEAG | Dielectric Probe Kit | DAK-3.5 | 1126 | Sep. 26, 2017 | Sep. 25, 2018 |
| LINE SEIKI | Digital Thermometer | DTM3000-spezial | 3169 | Sep. 06, 2017 | Sep. 05, 2018 |
| Anritsu | Power Meter | ML2495A | 1419002 | May. 18, 2018 | May. 17, 2019 |
| Anritsu | Power Sensor | MA2411B | 1339124 | May. 18, 2018 | May. 17, 2019 |
| Anritsu | Power Meter | ML2495A | 1218006 | Oct. 06, 2017 | Oct. 05, 2018 |
| Anritsu | Power Sensor | MA2411B | 1207363 | Oct. 06, 2017 | Oct. 05, 2018 |
| Anritsu | Spectrum Analyzer | MS2830A | 6201396378 | Jun. 23, 2018 | Jun. 22, 2019 |
| Mini-Circuits | Power Amplifier | ZVE-8G+ | D120604 | Mar. 12, 2018 | Mar. 11, 2019 |
| Mini-Circuits | Power Amplifier | ZHL-42W+ | QA1344002 | Mar. 12, 2018 | Mar. 11, 2019 |
| ATM | Dual Directional Coupler | C122H-10 | P610410z-02 | 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.

# 9. System Verification

## 9.1 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 head SAR testing, the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15 cm, which is shown in Fig. 10.1. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm, which is shown in Fig. 10.2.

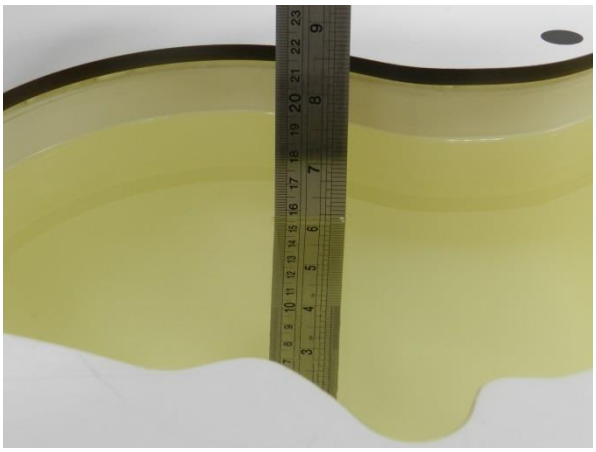


**Fig 10.1Photo of Liquid Height for Head SAR**

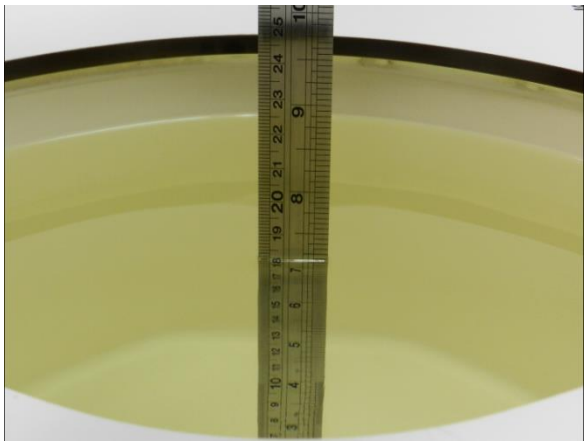


**Fig 10.2 Photo of Liquid Height for Body SAR**

## 9.2 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 |
| 900 | 40.3 | 57.9 | 0.2 | 1.4 | 0.2 | 0 | 0.97 | 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 |
| For Body | | | | | | | | |
| 750 | 51.7 | 47.2 | 0 | 0.9 | 0.1 | 0 | 0.96 | 55.5 |
| 835 | 50.8 | 48.2 | 0 | 0.9 | 0.1 | 0 | 0.97 | 55.2 |
| 900 | 50.8 | 48.2 | 0 | 0.9 | 0.1 | 0 | 1.05 | 55.0 |
| 1800, 1900, 2000 | 70.2 | 0 | 0 | 0.4 | 0 | 29.4 | 1.52 | 53.3 |
| 2450 | 68.6 | 0 | 0 | 0 | 0 | 31.4 | 1.95 | 52.7 |
| 2600 | 68.1 | 0 | 0 | 0.1 | 0 | 31.8 | 2.16 | 52.5 |

Simulating Liquid for 5GHz, Manufactured by SPEAG

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

### <Tissue Dielectric Parameter Check Results>

| Frequency (MHz) | Tissue Type | Liquid Temp. (℃) | Conductivity (σ) | Permittivity ($\varepsilon_r$) | Conductivity Target (σ) | Permittivity Target ($\varepsilon_r$) | Delta (σ) (%) | Delta ($\varepsilon_r$) (%) | Limit (%) | Date |
|---|---|---|---|---|---|---|---|---|---|---|
| 750 | HSL | 22.2 | 0.893 | 40.485 | 0.89 | 41.90 | 0.34 | -3.38 | ±5 | 2018/7/18 |
| 750 | MSL | 22.6 | 0.972 | 54.534 | 0.96 | 55.50 | 1.25 | -1.74 | ±5 | 2018/7/20 |
| 835 | HSL | 22.5 | 0.880 | 40.542 | 0.90 | 41.50 | -2.22 | -2.31 | ±5 | 2018/7/16 |
| 835 | MSL | 22.7 | 0.966 | 56.947 | 0.97 | 55.20 | -0.41 | 3.16 | ±5 | 2018/7/19 |
| 1750 | HSL | 22.3 | 1.364 | 40.866 | 1.37 | 40.10 | -0.44 | 1.91 | ±5 | 2018/7/18 |
| 1750 | MSL | 22.7 | 1.492 | 53.456 | 1.49 | 53.40 | 0.13 | 0.10 | ±5 | 2018/7/19 |
| 1900 | HSL | 22.3 | 1.447 | 39.730 | 1.40 | 40.00 | 3.36 | -0.68 | ±5 | 2018/7/18 |
| 1900 | HSL | 22.4 | 1.420 | 40.800 | 1.40 | 40.00 | 1.43 | 2.00 | ±5 | 2018/7/25 |
| 1900 | MSL | 22.5 | 1.560 | 53.388 | 1.52 | 53.30 | 2.63 | 0.17 | ±5 | 2018/7/25 |
| 2450 | HSL | 22.6 | 1.846 | 38.765 | 1.80 | 39.20 | 2.56 | -1.11 | ±5 | 2018/7/20 |
| 2450 | HSL | 22.5 | 1.780 | 40.500 | 1.80 | 39.20 | -1.11 | 3.32 | ±5 | 2018/7/25 |
| 2450 | MSL | 22.5 | 1.975 | 51.195 | 1.95 | 52.70 | 1.28 | -2.86 | ±5 | 2018/7/23 |
| 2450 | MSL | 22.4 | 1.996 | 53.444 | 1.95 | 52.70 | 2.36 | 1.41 | ±5 | 2018/7/26 |
| 5250 | HSL | 22.5 | 4.648 | 36.980 | 4.71 | 35.95 | -1.32 | 2.87 | ±5 | 2018/7/24 |
| 5250 | MSL | 22.5 | 5.550 | 47.797 | 5.36 | 48.95 | 3.54 | -2.36 | ±5 | 2018/7/23 |
| 5250 | MSL | 22.6 | 5.468 | 48.253 | 5.36 | 48.95 | 2.01 | -1.42 | ±5 | 2018/8/24 |
| 5600 | HSL | 22.5 | 4.995 | 36.475 | 5.07 | 35.50 | -1.48 | 2.75 | ±5 | 2018/7/24 |
| 5600 | MSL | 22.5 | 5.994 | 47.122 | 5.77 | 48.50 | 3.88 | -2.84 | ±5 | 2018/7/23 |
| 5750 | HSL | 22.5 | 5.171 | 36.316 | 5.22 | 35.35 | -0.94 | 2.73 | ±5 | 2018/7/24 |
| 5750 | MSL | 22.5 | 6.194 | 46.842 | 5.94 | 48.28 | 4.28 | -2.98 | ±5 | 2018/7/23 |
| 5750 | MSL | 22.6 | 6.166 | 47.404 | 5.94 | 48.28 | 3.80 | -1.81 | ±5 | 2018/8/24 |

## 9.3 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 (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| 2018/7/18 | 750 | HSL | 250 | D750V3-1107 | ES3DV3 - SN3169 | DAE3 Sn577 | 1.90 | 8.18 | 7.6 | -7.09 |
| 2018/7/20 | 750 | MSL | 250 | D750V3-1107 | ES3DV3 - SN3169 | DAE3 Sn577 | 2.16 | 8.52 | 8.64 | 1.41 |
| 2018/7/16 | 835 | HSL | 250 | D835V2-4d167 | ES3DV3 - SN3170 | DAE4 Sn853 | 2.44 | 9.26 | 9.76 | 5.40 |
| 2018/7/19 | 835 | MSL | 250 | D835V2-4d167 | ES3DV3 - SN3169 | DAE3 Sn577 | 2.39 | 9.62 | 9.56 | -0.62 |
| 2018/7/18 | 1750 | HSL | 250 | D1750V2-1068 | ES3DV3 - SN3169 | DAE3 Sn577 | 8.99 | 36.70 | 35.96 | -2.02 |
| 2018/7/19 | 1750 | MSL | 250 | D1750V2-1068 | ES3DV3 - SN3169 | DAE3 Sn577 | 9.39 | 37.20 | 37.56 | 0.97 |
| 2018/7/18 | 1900 | HSL | 250 | D1900V2-5d041 | ES3DV3 - SN3169 | DAE3 Sn577 | 10.00 | 40.50 | 40 | -1.23 |
| 2018/7/25 | 1900 | HSL | 250 | D1900V2-5d041 | ES3DV3 - SN3169 | DAE4 Sn917 | 9.91 | 40.50 | 39.64 | -2.12 |
| 2018/7/25 | 1900 | MSL | 250 | D1900V2-5d041 | ES3DV3 - SN3270 | DAE4 Sn778 | 10.10 | 40.70 | 40.4 | -0.74 |
| 2018/7/20 | 2450 | HSL | 250 | D2450V2-736 | ES3DV3 - SN3169 | DAE3 Sn577 | 13.60 | 52.40 | 54.4 | 3.82 |
| 2018/7/25 | 2450 | HSL | 250 | D2450V2-736 | ES3DV3 - SN3169 | DAE4 Sn917 | 13.00 | 52.40 | 52 | -0.76 |
| 2018/7/23 | 2450 | MSL | 250 | D2450V2-736 | ES3DV3 - SN3169 | DAE3 Sn577 | 12.70 | 50.80 | 50.8 | 0.00 |
| 2018/7/26 | 2450 | MSL | 250 | D2450V2-736 | ES3DV3 - SN3270 | DAE4 Sn778 | 12.90 | 50.80 | 51.6 | 1.57 |
| 2018/7/24 | 5250 | HSL | 100 | D5GHzV2-1006 | EX3DV4 - SN3976 | DAE4 Sn1424 | 8.26 | 78.30 | 82.6 | 5.49 |
| 2018/7/23 | 5250 | MSL | 100 | D5GHzV2-1006 | EX3DV4 - SN3931 | DAE4 Sn1399 | 7.23 | 77.00 | 72.3 | -6.10 |
| 2018/8/24 | 5250 | MSL | 100 | D5GHzV2-1006 | EX3DV4 - SN3925 | DAE3 Sn495 | 7.96 | 77.00 | 79.6 | 3.38 |
| 2018/7/24 | 5600 | HSL | 100 | D5GHzV2-1006 | EX3DV4 - SN3976 | DAE4 Sn1424 | 8.85 | 85.00 | 88.5 | 4.12 |
| 2018/7/23 | 5600 | MSL | 100 | D5GHzV2-1006 | EX3DV4 - SN3931 | DAE4 Sn1399 | 8.10 | 80.10 | 81 | 1.12 |
| 2018/7/24 | 5750 | HSL | 100 | D5GHzV2-1006 | EX3DV4 - SN3976 | DAE4 Sn1424 | 7.35 | 78.50 | 73.5 | -6.37 |
| 2018/7/23 | 5750 | MSL | 100 | D5GHzV2-1006 | EX3DV4 - SN3931 | DAE4 Sn1399 | 7.30 | 75.10 | 73 | -2.80 |
| 2018/8/24 | 5750 | MSL | 100 | D5GHzV2-1006 | EX3DV4 - SN3925 | DAE3 Sn495 | 7.10 | 75.10 | 71 | -5.46 |

| Date | Frequency (MHz) | Tissue Type | Input Power (mW) | Dipole S/N | Probe S/N | DAE S/N | Measured 10g SAR (W/kg) | Targeted 10g SAR (W/kg) | Normalized 10g SAR (W/kg) | Deviation (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| 2018/7/25 | 1900 | MSL | 250 | D1900V2-5d041 | ES3DV3 - SN3270 | DAE4 Sn778 | 5.25 | 21.40 | 21 | -1.87 |
| 2018/7/23 | 5250 | MSL | 100 | D5GHzV2-1006 | EX3DV4 - SN3931 | DAE4 Sn1399 | 2.06 | 21.30 | 20.6 | -3.29 |
| 2018/7/23 | 5600 | MSL | 100 | D5GHzV2-1006 | EX3DV4 - SN3931 | DAE4 Sn1399 | 2.29 | 22.40 | 22.9 | 2.23 |

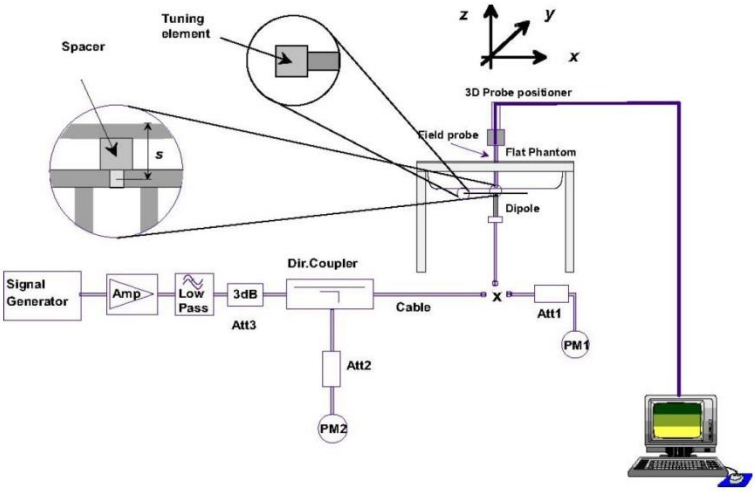



Fig 8.3.1 System Performance Check Setup

Fig 8.3.2 Setup Photo

# 10. RF Exposure Positions

## 10.1 Ear and handset reference point

Figure 9.1.1 shows the front, back, and side views of the SAM phantom. The center-of-mouth reference point is labeled “M,” the left ear reference point (ERP) is marked “LE,” and the right ERP is marked “RE.” Each ERP is 15 mm along the B-M (back-mouth) line behind the entrance-to-ear-canal (EEC) point, as shown in Figure 9.1.2 The Reference Plane is defined as passing through the two ear reference points and point M. The line N-F (neck-front), also called the reference pivoting line, is normal to the Reference Plane and perpendicular to both a line passing through RE and LE and the B-M line (see Figure 9.1.3). Both N-F and B-M lines should be marked on the exterior of the phantom shell to facilitate handset positioning. Posterior to the N-F line the ear shape is a flat surface with 6 mm thickness at each ERP, and forward of the N-F line the ear is truncated, as illustrated in Figure 9.1.2. The ear truncation is introduced to preclude the ear lobe from interfering with handset tilt, which could lead to unstable positioning at the cheek.

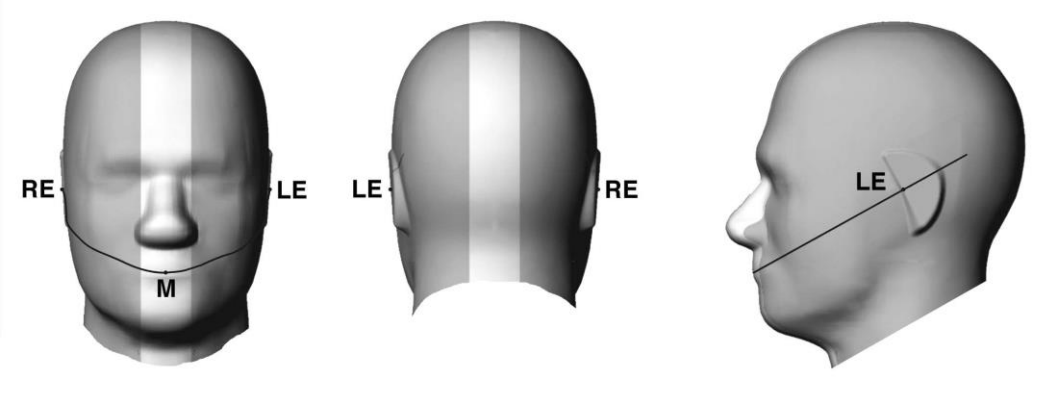



**Fig 9.1.1 Front, back, and side views of SAM twin phantom**

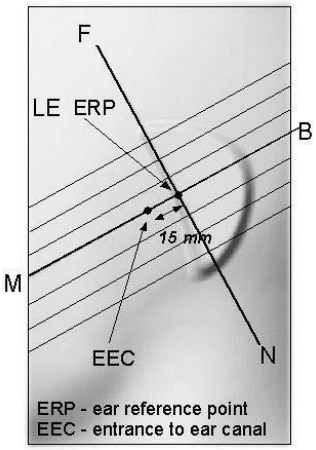



**Fig 9.1.2 Close-up side view of phantom showing the ear region.**

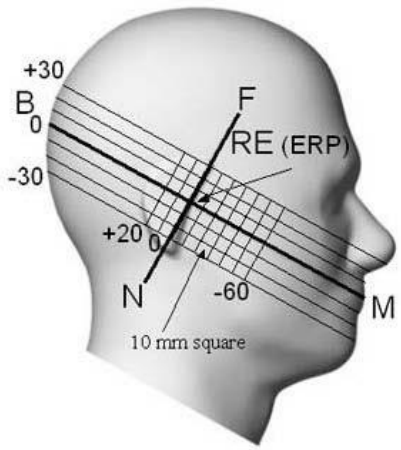



**Fig 9.1.3 Side view of the phantom showing relevant markings and seven cross-sectional plane locations**

## 10.2 Definition of the cheek position

1. Ready the handset for talk operation, if necessary. For example, for handsets with a cover piece (flip cover), open the cover. If the handset can transmit with the cover closed, both configurations must be tested.
2. Define two imaginary lines on the handset—the vertical centerline and the horizontal line. The vertical centerline passes through two points on the front side of the handset—the midpoint of the width wt of the handset at the level of the acoustic output (point A in Figure 9.2.1 and Figure 9.2.2), and the midpoint of the width wb of the bottom of the handset (point B). The horizontal line is perpendicular to the vertical centerline and passes through the center of the acoustic output (see Figure 9.2.1). The two lines intersect at point A. Note that for many handsets, point A coincides with the center of the acoustic output; however, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical centerline is not necessarily parallel to the front face of the handset (see Figure 9.2.2), especially for clamshell handsets, handsets with flip covers, and other irregularly-shaped handsets.
3. Position the handset close to the surface of the phantom such that point A is on the (virtual) extension of the line passing through points RE and LE on the phantom (see Figure 9.2.3), such that the plane defined by the vertical centerline and the horizontal line of the handset is approximately parallel to the sagittal plane of the phantom.
4. Translate the handset towards the phantom along the line passing through RE and LE until handset point A touches the pinna at the ERP.
5. While maintaining the handset in this plane, rotate it around the LE-RE line until the vertical centerline is in the plane normal to the plane containing B-M and N-F lines, i.e., the Reference Plane.
6. Rotate the handset around the vertical centerline until the handset (horizontal line) is parallel to the N-F line.
7. While maintaining the vertical centerline in the Reference Plane, keeping point A on the line passing through RE and LE, and maintaining the handset contact with the pinna, rotate the handset about the N-F line until any point on the handset is in contact with a phantom point below the pinna on the cheek. See Figure 9.2.3. The actual rotation angles should be documented in the test report.

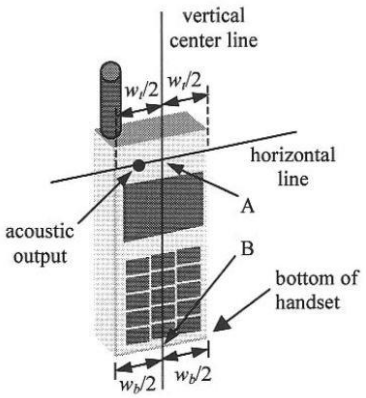



**Fig 9.2.1 Handset vertical and horizontal reference lines—"fixed case**

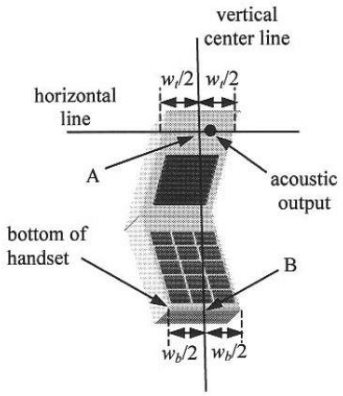



**Fig 9.2.2 Handset vertical and horizontal reference lines—"clam-shell case"**

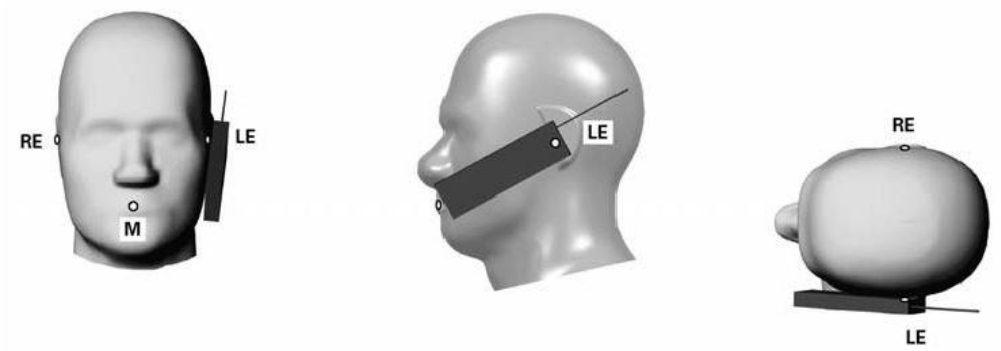



**Fig 9.2.3 cheek or touch position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which establish the Reference Plane for handset positioning, are indicated.**

## 10.3 Definition of the tilt position

1. Ready the handset for talk operation, if necessary. For example, for handsets with a cover piece (flip cover), open the cover. If the handset can transmit with the cover closed, both configurations must be tested.
2. While maintaining the orientation of the handset, move the handset away from the pinna along the line passing through RE and LE far enough to allow a rotation of the handset away from the cheek by 15°.
3. Rotate the handset around the horizontal line by 15°.
4. While maintaining the orientation of the handset, move the handset towards the phantom on the line passing through RE and LE until any part of the handset touches the ear. The tilt position is obtained when the contact point is on the pinna. See Figure 9.3.1. If contact occurs at any location other than the pinna, e.g., the antenna at the back of the phantom head, the angle of the handset should be reduced. In this case, the tilt position is obtained if any point on the handset is in contact with the pinna and a second point

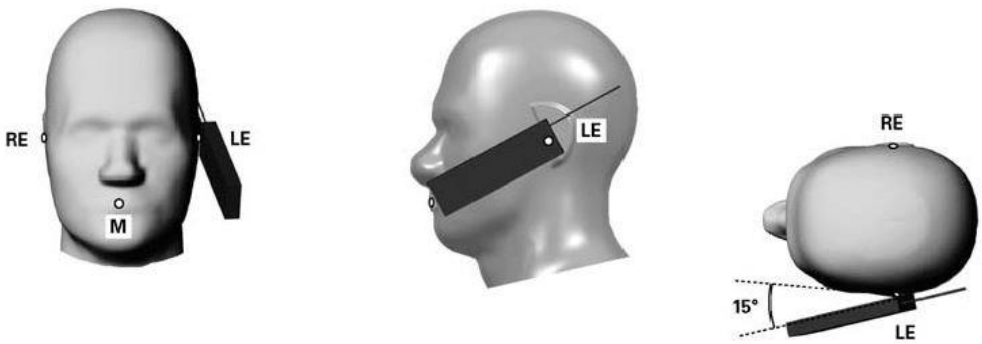



**Fig 9.3.1 Tilt position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which define the Reference Plane for handset positioning, are indicated.**

## 10.4 Body Worn Accessory

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration (see Figure 9.4). Per KDB648474 D04v01r03, body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in FCC KDB 447498 D01v06 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode, when applicable. When the reported SAR for body-worn accessory, measured without a headset connected to the handset is > 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a handset attached to the handset.

Accessories for body-worn operation configurations are divided into two categories: those that do not contain metallic components and those that do contain metallic components and those that do contain metallic components. When multiple accessories that do not contain metallic components are supplied with the device, the device is tested with only the accessory that dictates the closest spacing to the body. Then multiple accessories that contain metallic components are test with the device with each accessory. If multiple accessories share an identical metallic component (i.e. the same metallic belt-chip used with different holsters with no other metallic components) only the accessory that dictates the closest spacing to the body is tested.

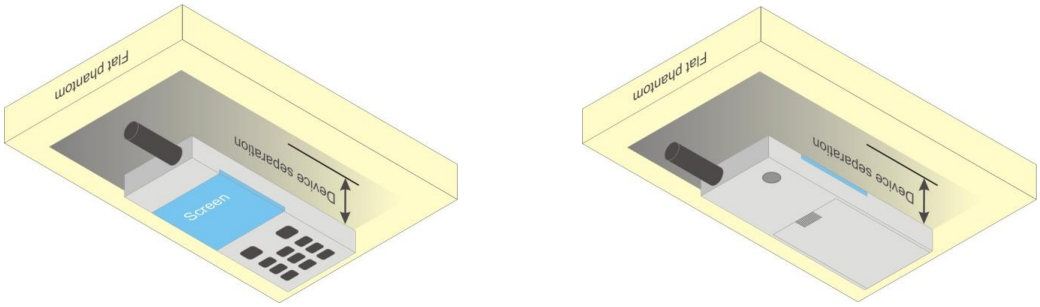



**Fig 9.4 Body Worn Position**

## 10.5 Product Specific Exposure

For smart phones with a display diagonal dimension > 15.0 cm or an overall diagonal dimension > 16.0 cm that provide similar mobile web access and multimedia support found in mini-tablets or UMPC mini-tablets that support voice calls next to the ear, According to KDB648474 D04v01r03, the following phablet procedures should be applied to evaluate SAR compliance for each applicable wireless modes and frequency band. Devices marketed as phablets, regardless of form factors and operating characteristics must be tested as a phablet to determine SAR compliance

1. The normally required head and body-worn accessory SAR test procedures for handsets, including hotspot mode, must be applied.

2. The UMPC mini-tablet procedures must also be applied to test the SAR of all surfaces and edges with an antenna located at ≤ 25 mm from that surface or edge, in direct contact with a flat phantom, for 10-g extremity SAR according to the body-equivalent tissue dielectric parameters in KDB 865664 to address interactive hand use exposure conditions.6 The UMPC mini-tablet 1-g SAR at 5 mm is not required. When hotspot mode applies, 10-g extremity SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg.

## 10.6 Wireless Router

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

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

# 11. Conducted RF Output Power (Unit: dBm)

**<WCDMA Conducted Power>**

1. The following tests were conducted according to the test requirements outlines in 3GPP TS 34.121 specification.
2. The procedures in KDB 941225 D01v03r01 are applied for 3GPP Rel. 6 HSPA to configure the device in the required sub-test mode(s) to determine SAR test exclusion.

A summary of these settings are illustrated below:

**HSDPA Setup Configuration:**

a. The EUT was connected to Base Station Agilent E5515C referred to the Setup Configuration.
b. The RF path losses were compensated into the measurements.
c. A call was established between EUT and Base Station with following setting:
   i. Set Gain Factors ($\beta_c$ and $\beta_d$) and parameters were set according to each
   ii. Specific sub-test in the following table, C10.1.4, quoted from the TS 34.121
   iii. Set RMC 12.2Kbps + HSDPA mode.
   iv. Set Cell Power = -86 dBm
   v. Set HS-DSCH Configuration Type to FRC (H-set 1, QPSK)
   vi. Select HSDPA Uplink Parameters
   vii. Set Delta ACK, Delta NACK and Delta CQI = 8
   viii. Set Ack-Nack Repetition Factor to 3
   ix. Set CQI Feedback Cycle (k) to 4 ms
   x. Set CQI Repetition Factor to 2
   xi. Power Ctrl Mode = All Up bits
d. The transmitted maximum output power was recorded.

**Table C.10.1.4: β values for transmitter characteristics tests with HS-DPCCH**

| Sub-test | $\beta_c$ | $\beta_d$ | $\beta_d$ (SF) | $\beta_c/\beta_d$ | $\beta_{HS}$ (Note1, Note 2) | CM (dB) (Note 3) | MPR (dB) (Note 3) |
|---|---|---|---|---|---|---|---|
| 1 | 2/15 | 15/15 | 64 | 2/15 | 4/15 | 0.0 | 0.0 |
| 2 | 12/15 (Note 4) | 15/15 (Note 4) | 64 | 12/15 (Note 4) | 24/15 | 1.0 | 0.0 |
| 3 | 15/15 | 8/15 | 64 | 15/8 | 30/15 | 1.5 | 0.5 |
| 4 | 15/15 | 4/15 | 64 | 15/4 | 30/15 | 1.5 | 0.5 |

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

Note 2: For the HS-DPCCH power mask requirement test in clause 5.2C, 5.7A, and the Error Vector Magnitude (EVM) with HS-DPCCH test in clause 5.13.1A, and HSDPA EVM with phase discontinuity in clause 5.13.1AA, $\Delta_{ACK}$ and $\Delta_{NACK}$ = 30/15 with $\beta_{hs}$ = 30/15 * $\beta_c$, and $\Delta_{CQI}$ = 24/15 with $\beta_{hs}$ = 24/15 * $\beta_c$.

Note 3: CM = 1 for $\beta_c/\beta_d$ =12/15, $\beta_{hs}/\beta_c$=24/15. For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.

Note 4: For subtest 2 the $\beta_c/\beta_d$ ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $\beta_c$ = 11/15 and $\beta_d$ = 15/15.

**Setup Configuration**

**HSUPA Setup Configuration:**

a. The EUT was connected to Base Station Agilent E5515C referred to the Setup Configuration.
b. The RF path losses were compensated into the measurements.
c. A call was established between EUT and Base Station with following setting * :
   i. Call Configs = 5.2B, 5.9B, 5.10B, and 5.13.2B with QPSK
   ii. Set the Gain Factors ($\beta_c$ and $\beta_d$) and parameters (AG Index) were set according to each specific sub-test in the following table, C11.1.3, quoted from the TS 34.121
   iii. Set Cell Power = -86 dBm
   iv. Set Channel Type = 12.2k + HSPA
   v. Set UE Target Power
   vi. Power Ctrl Mode= Alternating bits
   vii. Set and observe the E-TFCI
   viii. Confirm that E-TFCI is equal to the target E-TFCI of 75 for sub-test 1, and other subtest's E-TFCI
d. The transmitted maximum output power was recorded.

**Table C.11.1.3: β values for transmitter characteristics tests with HS-DPCCH and E-DCH**

| Sub-test | $\beta_c$ | $\beta_d$ | $\beta_d$ (SF) | $\beta_c/\beta_d$ | $\beta_{HS}$ (Note1) | $\beta_{ec}$ | $\beta_{ed}$ (Note 4) (Note 5) | $\beta_{ed}$ (SF) | $\beta_{ed}$ (Codes) | CM (dB) (Note 2) | MPR (dB) (Note 2) (Note 6) | AG Index (Note 5) | E-TFCI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 11/15 (Note 3) | 15/15 (Note 3) | 64 | 11/15 (Note 3) | 22/15 | 209/225 | 1309/225 | 4 | 1 | 1.0 | 0.0 | 20 | 75 |
| 2 | 6/15 | 15/15 | 64 | 6/15 | 12/15 | 12/15 | 94/75 | 4 | 1 | 3.0 | 2.0 | 12 | 67 |
| 3 | 15/15 | 9/15 | 64 | 15/9 | 30/15 | 30/15 | $\beta_{ed}1$: 47/15<br>$\beta_{ed}2$: 47/15 | 4<br>4 | 2 | 2.0 | 1.0 | 15 | 92 |
| 4 | 2/15 | 15/15 | 64 | 2/15 | 4/15 | 2/15 | 56/75 | 4 | 1 | 3.0 | 2.0 | 17 | 71 |
| 5 | 15/15 | 0 | - | - | 5/15 | 5/15 | 47/15 | 4 | 1 | 1.0 | 0.0 | 12 | 67 |

Note 1: For sub-test 1 to 4, $\Delta_{ACK}$, $\Delta_{NACK}$ and $\Delta_{CQI}$ = 30/15 with $\beta_{hs}$ = 30/15 * $\beta_c$ . For sub-test 5, $\Delta_{ACK}$, $\Delta_{NACK}$ and $\Delta_{CQI}$ = 5/15 with $\beta_{hs}$ = 5/15 * $\beta_c$ .

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

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

Note 4: In case of testing by UE using E-DPDCH Physical Layer category 1, Sub-test 3 is omitted according to TS25.306 Table 5.1g.

Note 5: $\beta_{ed}$ can not be set directly; it is set by Absolute Grant Value.

Note 6: For subtests 2, 3 and 4, UE may perform E-DPDCH power scaling at max power which could results in slightly smaller MPR values.

**Setup Configuration**

**<WCDMA Conducted Power>**

**General Note:**

1. Per KDB 941225 D01v03r01, for SAR testing is measured using a 12.2 kbps RMC with TPC bits configured to all "1's".
2. Per KDB 941225 D01v03r01, RMC 12.2kbps setting is used to evaluate SAR. The maximum output power and tune-up tolerance specified for production units in HSDPA / HSUPA is ≤ ¼ dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio of specified maximum output power and tune-up tolerance of HSDPA / HSUPA to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA, and according to the following RF output power, the output power results of the secondary modes HSDPA / HSUPA are less than ¼ dB higher than the primary modes; therefore, SAR measurement is not required for HSDPA / HSUPA.

| Band | | WCDMA II | | | Tune-up Limit (dBm) | WCDMA V | | | Tune-up Limit (dBm) |
|---|---|---|---|---|---|---|---|---|---|
| TX Channel | | 9262 | 9400 | 9538 | | 4132 | 4182 | 4233 | |
| Rx Channel | | 9662 | 9800 | 9938 | | 4357 | 4407 | 4458 | |
| Frequency (MHz) | | 1852.4 | 1880 | 1907.6 | | 826.4 | 836.4 | 846.6 | |
| 3GPP Rel 99 | AMR 12.2Kbps | 22.93 | 22.99 | 23.12 | 23.20 | 23.13 | 23.11 | 23.07 | 24.50 |
| 3GPP Rel 99 | RMC 12.2Kbps | 22.94 | 23.00 | 23.13 | 23.20 | 23.15 | 23.06 | 22.97 | 24.50 |
| 3GPP Rel 6 | HSDPA Subtest-1 | 21.79 | 21.83 | 22.02 | 23.20 | 22.15 | 22.13 | 22.12 | 24.50 |
| 3GPP Rel 6 | HSDPA Subtest-2 | 21.99 | 21.86 | 22.13 | 23.00 | 22.18 | 22.09 | 22.04 | 24.50 |
| 3GPP Rel 6 | HSDPA Subtest-3 | 21.22 | 21.20 | 21.60 | 22.70 | 21.62 | 21.57 | 21.55 | 24.00 |
| 3GPP Rel 6 | HSDPA Subtest-4 | 21.21 | 21.32 | 21.50 | 22.70 | 21.65 | 21.63 | 21.50 | 24.00 |
| 3GPP Rel 6 | HSUPA Subtest-1 | 21.63 | 21.40 | 21.80 | 23.20 | 21.43 | 21.49 | 22.07 | 24.50 |
| 3GPP Rel 6 | HSUPA Subtest-2 | 20.67 | 20.67 | 20.58 | 21.20 | 20.81 | 21.05 | 20.90 | 22.50 |
| 3GPP Rel 6 | HSUPA Subtest-3 | 20.20 | 20.40 | 20.97 | 22.20 | 20.99 | 21.20 | 20.97 | 23.50 |
| 3GPP Rel 6 | HSUPA Subtest-4 | 20.95 | 20.98 | 20.95 | 21.20 | 21.15 | 21.27 | 21.04 | 22.50 |
| 3GPP Rel 6 | HSUPA Subtest-5 | 21.71 | 21.86 | 22.12 | 23.20 | 22.15 | 22.13 | 22.08 | 24.50 |

## <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 / 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.

**<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) | MPR (dB) |
|---|---|---|---|---|---|---|---|---|
| Channel | | | | 18700 | 18900 | 19100 | | |
| Frequency (MHz) | | | | 1860 | 1880 | 1900 | | |
| 20 | QPSK | 1 | 0 | 23.38 | 23.47 | 23.27 | 24 | 0 |
| 20 | QPSK | 1 | 49 | 23.80 | 23.62 | 23.76 | | |
| 20 | QPSK | 1 | 99 | 23.53 | 23.27 | 23.16 | | |
| 20 | QPSK | 50 | 0 | 22.44 | 22.36 | 22.42 | 23 | 1 |
| 20 | QPSK | 50 | 24 | 22.25 | 22.21 | 22.41 | | |
| 20 | QPSK | 50 | 50 | 22.37 | 22.14 | 22.32 | | |
| 20 | QPSK | 100 | 0 | 22.33 | 22.24 | 22.32 | | |
| 20 | 16QAM | 1 | 0 | 22.34 | 22.49 | 22.50 | 23 | 1 |
| 20 | 16QAM | 1 | 49 | 22.04 | 22.05 | 22.78 | | |
| 20 | 16QAM | 1 | 99 | 22.11 | 21.96 | 22.53 | | |
| 20 | 16QAM | 50 | 0 | 21.43 | 21.45 | 21.27 | 22 | 2 |
| 20 | 16QAM | 50 | 24 | 21.27 | 21.13 | 21.36 | | |
| 20 | 16QAM | 50 | 50 | 21.11 | 21.30 | 21.36 | | |
| 20 | 16QAM | 100 | 0 | 21.33 | 21.26 | 21.34 | | |
| Channel | | | | 18675 | 18900 | 19125 | Tune-up limit (dBm) | MPR (dB) |
| Frequency (MHz) | | | | 1857.5 | 1880 | 1902.5 | | |
| 15 | QPSK | 1 | 0 | 23.38 | 23.33 | 23.36 | 24 | 0 |
| 15 | QPSK | 1 | 37 | 23.47 | 23.22 | 23.45 | | |
| 15 | QPSK | 1 | 74 | 23.23 | 23.29 | 23.45 | | |
| 15 | QPSK | 36 | 0 | 22.19 | 22.28 | 22.55 | 23 | 1 |
| 15 | QPSK | 36 | 20 | 22.34 | 22.22 | 22.51 | | |
| 15 | QPSK | 36 | 39 | 22.42 | 22.23 | 22.37 | | |
| 15 | QPSK | 75 | 0 | 22.31 | 22.24 | 22.34 | | |
| 15 | 16QAM | 1 | 0 | 22.63 | 22.09 | 22.46 | 23 | 1 |
| 15 | 16QAM | 1 | 37 | 22.65 | 21.94 | 22.40 | | |
| 15 | 16QAM | 1 | 74 | 22.51 | 22.08 | 22.41 | | |
| 15 | 16QAM | 36 | 0 | 21.17 | 21.17 | 21.36 | 22 | 2 |
| 15 | 16QAM | 36 | 20 | 21.27 | 21.33 | 21.42 | | |
| 15 | 16QAM | 36 | 39 | 21.34 | 21.24 | 21.31 | | |
| 15 | 16QAM | 75 | 0 | 21.26 | 21.18 | 21.32 | | |
| Channel | | | | 18650 | 18900 | 19150 | Tune-up limit (dBm) | MPR (dB) |
| Frequency (MHz) | | | | 1855 | 1880 | 1905 | | |
| 10 | QPSK | 1 | 0 | 23.30 | 23.32 | 23.47 | 24 | 0 |
| 10 | QPSK | 1 | 25 | 23.42 | 23.48 | 23.52 | | |
| 10 | QPSK | 1 | 49 | 23.37 | 23.14 | 23.40 | | |
| 10 | QPSK | 25 | 0 | 22.39 | 22.26 | 22.50 | 23 | 1 |
| 10 | QPSK | 25 | 12 | 22.19 | 22.27 | 22.46 | | |
| 10 | QPSK | 25 | 25 | 22.27 | 22.15 | 22.31 | | |
| 10 | QPSK | 50 | 0 | 22.28 | 22.23 | 22.45 | | |
| 10 | 16QAM | 1 | 0 | 22.60 | 22.60 | 22.50 | 23 | 1 |
| 10 | 16QAM | 1 | 25 | 22.95 | 22.71 | 22.59 | | |
| 10 | 16QAM | 1 | 49 | 22.91 | 22.28 | 22.44 | | |
| 10 | 16QAM | 25 | 0 | 21.14 | 21.18 | 21.62 | 22 | 2 |
| 10 | 16QAM | 25 | 12 | 21.14 | 21.28 | 21.61 | | |
| 10 | 16QAM | 25 | 25 | 21.11 | 21.18 | 21.52 | | |
| 10 | 16QAM | 50 | 0 | 21.25 | 21.15 | 21.46 | | |

| Channel | | | | 18625 | 18900 | 19175 | Tune-up limit (dBm) | MPR (dB) |
|---|---|---|---|---|---|---|---|---|
| Frequency (MHz) | | | | 1852.5 | 1880 | 1907.5 | | |
| 5 | QPSK | 1 | 0 | 23.07 | 23.36 | 23.14 | 24 | 0 |
| 5 | QPSK | 1 | 12 | 23.00 | 23.49 | 23.19 | | |
| 5 | QPSK | 1 | 24 | 22.98 | 23.30 | 23.26 | | |
| 5 | QPSK | 12 | 0 | 22.14 | 22.12 | 22.25 | 23 | 1 |
| 5 | QPSK | 12 | 7 | 22.19 | 22.09 | 22.22 | | |
| 5 | QPSK | 12 | 13 | 22.18 | 22.13 | 22.31 | | |
| 5 | QPSK | 25 | 0 | 22.15 | 22.14 | 22.26 | | |
| 5 | 16QAM | 1 | 0 | 22.24 | 22.74 | 22.58 | 23 | 1 |
| 5 | 16QAM | 1 | 12 | 22.37 | 22.15 | 22.56 | | |
| 5 | 16QAM | 1 | 24 | 22.67 | 22.31 | 22.79 | | |
| 5 | 16QAM | 12 | 0 | 20.98 | 21.09 | 21.15 | 22 | 2 |
| 5 | 16QAM | 12 | 7 | 21.01 | 21.09 | 21.01 | | |
| 5 | 16QAM | 12 | 13 | 21.03 | 21.13 | 21.20 | | |
| 5 | 16QAM | 25 | 0 | 21.10 | 21.14 | 21.25 | | |
| Channel | | | | 18615 | 18900 | 19185 | Tune-up limit (dBm) | MPR (dB) |
| Frequency (MHz) | | | | 1851.5 | 1880 | 1908.5 | | |
| 3 | QPSK | 1 | 0 | 23.28 | 23.26 | 23.24 | 24 | 0 |
| 3 | QPSK | 1 | 8 | 23.08 | 23.19 | 23.14 | | |
| 3 | QPSK | 1 | 14 | 23.16 | 23.14 | 23.26 | | |
| 3 | QPSK | 8 | 0 | 22.29 | 22.16 | 22.47 | 23 | 1 |
| 3 | QPSK | 8 | 4 | 22.23 | 22.20 | 22.52 | | |
| 3 | QPSK | 8 | 7 | 22.29 | 22.23 | 22.39 | | |
| 3 | QPSK | 15 | 0 | 22.25 | 22.21 | 22.40 | | |
| 3 | 16QAM | 1 | 0 | 22.54 | 22.43 | 22.69 | 23 | 1 |
| 3 | 16QAM | 1 | 8 | 22.30 | 22.36 | 22.62 | | |
| 3 | 16QAM | 1 | 14 | 22.43 | 22.33 | 22.62 | | |
| 3 | 16QAM | 8 | 0 | 21.01 | 21.02 | 21.35 | 22 | 2 |
| 3 | 16QAM | 8 | 4 | 20.96 | 20.96 | 21.26 | | |
| 3 | 16QAM | 8 | 7 | 21.11 | 20.99 | 21.46 | | |
| 3 | 16QAM | 15 | 0 | 21.04 | 20.81 | 21.54 | | |
| Channel | | | | 18607 | 18900 | 19193 | Tune-up limit (dBm) | MPR (dB) |
| Frequency (MHz) | | | | 1850.7 | 1880 | 1909.3 | | |
| 1.4 | QPSK | 1 | 0 | 23.29 | 23.06 | 23.38 | 24 | 0 |
| 1.4 | QPSK | 1 | 3 | 23.21 | 23.13 | 23.40 | | |
| 1.4 | QPSK | 1 | 5 | 23.21 | 22.97 | 23.32 | | |
| 1.4 | QPSK | 3 | 0 | 23.27 | 23.19 | 23.50 | | |
| 1.4 | QPSK | 3 | 1 | 23.40 | 23.24 | 23.61 | | |
| 1.4 | QPSK | 3 | 3 | 23.34 | 23.24 | 23.48 | | |
| 1.4 | QPSK | 6 | 0 | 22.37 | 22.23 | 22.41 | 23 | 1 |
| 1.4 | 16QAM | 1 | 0 | 21.97 | 22.08 | 22.18 | 23 | 1 |
| 1.4 | 16QAM | 1 | 3 | 22.13 | 22.42 | 22.46 | | |
| 1.4 | 16QAM | 1 | 5 | 21.96 | 21.99 | 22.44 | | |
| 1.4 | 16QAM | 3 | 0 | 22.10 | 21.96 | 22.53 | | |
| 1.4 | 16QAM | 3 | 1 | 22.44 | 22.24 | 22.44 | | |
| 1.4 | 16QAM | 3 | 3 | 22.44 | 22.00 | 22.33 | | |
| 1.4 | 16QAM | 6 | 0 | 21.14 | 20.92 | 21.41 | 22 | 2 |

**<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) | MPR (dB) |
|---|---|---|---|---|---|---|---|---|
| Channel | | | | 20050 | 20175 | 20300 | | |
| Frequency (MHz) | | | | 1720 | 1732.5 | 1745 | | |
| 20 | QPSK | 1 | 0 | 24.11 | 23.63 | 23.67 | 24.5 | 0 |
| 20 | QPSK | 1 | 49 | 24.00 | 23.77 | 23.84 | | |
| 20 | QPSK | 1 | 99 | 23.84 | 23.56 | 23.60 | | |
| 20 | QPSK | 50 | 0 | 22.93 | 22.87 | 22.82 | 23.5 | 1 |
| 20 | QPSK | 50 | 24 | 22.83 | 22.73 | 22.79 | | |
| 20 | QPSK | 50 | 50 | 22.73 | 22.69 | 22.77 | | |
| 20 | QPSK | 100 | 0 | 22.79 | 22.78 | 22.84 | | |
| 20 | 16QAM | 1 | 0 | 22.77 | 22.90 | 22.87 | 23.5 | 1 |
| 20 | 16QAM | 1 | 49 | 22.72 | 23.00 | 23.02 | | |
| 20 | 16QAM | 1 | 99 | 22.73 | 22.80 | 22.62 | | |
| 20 | 16QAM | 50 | 0 | 21.78 | 21.80 | 21.92 | 22.5 | 2 |
| 20 | 16QAM | 50 | 24 | 21.74 | 21.70 | 21.79 | | |
| 20 | 16QAM | 50 | 50 | 21.90 | 21.64 | 21.64 | | |
| 20 | 16QAM | 100 | 0 | 21.83 | 21.70 | 21.83 | | |
| Channel | | | | 20025 | 20175 | 20325 | Tune-up limit (dBm) | MPR (dB) |
| Frequency (MHz) | | | | 1717.5 | 1732.5 | 1747.5 | | |
| 15 | QPSK | 1 | 0 | 24.02 | 23.87 | 23.89 | 24.5 | 0 |
| 15 | QPSK | 1 | 37 | 24.01 | 23.74 | 24.05 | | |
| 15 | QPSK | 1 | 74 | 23.76 | 23.71 | 23.76 | | |
| 15 | QPSK | 36 | 0 | 22.95 | 22.87 | 22.78 | 23.5 | 1 |
| 15 | QPSK | 36 | 20 | 22.86 | 22.75 | 22.79 | | |
| 15 | QPSK | 36 | 39 | 22.90 | 22.76 | 22.79 | | |
| 15 | QPSK | 75 | 0 | 22.97 | 22.81 | 22.73 | | |
| 15 | 16QAM | 1 | 0 | 23.37 | 23.22 | 23.13 | 23.5 | 1 |
| 15 | 16QAM | 1 | 37 | 23.00 | 22.89 | 23.19 | | |
| 15 | 16QAM | 1 | 74 | 23.09 | 22.46 | 23.12 | | |
| 15 | 16QAM | 36 | 0 | 21.88 | 21.90 | 21.82 | 22.5 | 2 |
| 15 | 16QAM | 36 | 20 | 21.74 | 21.80 | 21.75 | | |
| 15 | 16QAM | 36 | 39 | 21.82 | 21.68 | 21.71 | | |
| 15 | 16QAM | 75 | 0 | 22.01 | 21.86 | 21.81 | | |
| Channel | | | | 20000 | 20175 | 20350 | Tune-up limit (dBm) | MPR (dB) |
| Frequency (MHz) | | | | 1715 | 1732.5 | 1750 | | |
| 10 | QPSK | 1 | 0 | 23.97 | 23.91 | 23.65 | 24.5 | 0 |
| 10 | QPSK | 1 | 25 | 24.10 | 24.00 | 23.90 | | |
| 10 | QPSK | 1 | 49 | 23.89 | 23.71 | 23.57 | | |
| 10 | QPSK | 25 | 0 | 22.94 | 22.85 | 22.89 | 23.5 | 1 |
| 10 | QPSK | 25 | 12 | 22.90 | 22.88 | 22.77 | | |
| 10 | QPSK | 25 | 25 | 22.93 | 22.77 | 22.75 | | |
| 10 | QPSK | 50 | 0 | 22.89 | 22.83 | 22.77 | | |
| 10 | 16QAM | 1 | 0 | 23.29 | 22.85 | 23.04 | 23.5 | 1 |
| 10 | 16QAM | 1 | 25 | 23.36 | 23.23 | 23.30 | | |
| 10 | 16QAM | 1 | 49 | 23.29 | 22.59 | 22.78 | | |
| 10 | 16QAM | 25 | 0 | 21.97 | 21.99 | 21.74 | 22.5 | 2 |
| 10 | 16QAM | 25 | 12 | 21.94 | 21.76 | 21.74 | | |
| 10 | 16QAM | 25 | 25 | 21.97 | 21.84 | 21.71 | | |
| 10 | 16QAM | 50 | 0 | 21.94 | 21.88 | 21.83 | | |

| Channel | | | | 19975 | 20175 | 20375 | Tune-up limit (dBm) | MPR (dB) |
|---|---|---|---|---|---|---|---|---|
| Frequency (MHz) | | | | 1712.5 | 1732.5 | 1752.5 | | |
| 5 | QPSK | 1 | 0 | 23.60 | 23.85 | 23.63 | 24.5 | 0 |
| 5 | QPSK | 1 | 12 | 23.96 | 24.02 | 23.98 | | |
| 5 | QPSK | 1 | 24 | 23.79 | 23.84 | 23.60 | | |
| 5 | QPSK | 12 | 0 | 22.78 | 22.75 | 22.69 | 23.5 | 1 |
| 5 | QPSK | 12 | 7 | 22.79 | 22.75 | 22.74 | | |
| 5 | QPSK | 12 | 13 | 22.79 | 22.74 | 22.67 | | |
| 5 | QPSK | 25 | 0 | 22.84 | 22.69 | 22.72 | | |
| 5 | 16QAM | 1 | 0 | 23.12 | 22.88 | 23.28 | 23.5 | 1 |
| 5 | 16QAM | 1 | 12 | 23.31 | 22.53 | 22.97 | | |
| 5 | 16QAM | 1 | 24 | 23.07 | 22.86 | 23.24 | | |
| 5 | 16QAM | 12 | 0 | 21.78 | 21.71 | 21.63 | 22.5 | 2 |
| 5 | 16QAM | 12 | 7 | 21.73 | 21.78 | 21.60 | | |
| 5 | 16QAM | 12 | 13 | 21.72 | 21.88 | 21.63 | | |
| 5 | 16QAM | 25 | 0 | 21.83 | 21.74 | 21.57 | | |
| Channel | | | | 19965 | 20175 | 20385 | Tune-up limit (dBm) | MPR (dB) |
| Frequency (MHz) | | | | 1711.5 | 1732.5 | 1753.5 | | |
| 3 | QPSK | 1 | 0 | 24.00 | 23.75 | 23.84 | 24.5 | 0 |
| 3 | QPSK | 1 | 8 | 23.92 | 23.69 | 23.75 | | |
| 3 | QPSK | 1 | 14 | 24.05 | 23.69 | 23.74 | | |
| 3 | QPSK | 8 | 0 | 22.86 | 22.68 | 22.76 | 23.5 | 1 |
| 3 | QPSK | 8 | 4 | 22.89 | 22.73 | 22.72 | | |
| 3 | QPSK | 8 | 7 | 22.84 | 22.74 | 22.69 | | |
| 3 | QPSK | 15 | 0 | 22.80 | 22.70 | 22.64 | | |
| 3 | 16QAM | 1 | 0 | 22.67 | 22.94 | 22.46 | 23.5 | 1 |
| 3 | 16QAM | 1 | 8 | 22.49 | 22.91 | 22.57 | | |
| 3 | 16QAM | 1 | 14 | 22.46 | 22.89 | 22.62 | | |
| 3 | 16QAM | 8 | 0 | 21.75 | 21.88 | 21.63 | 22.5 | 2 |
| 3 | 16QAM | 8 | 4 | 21.90 | 21.89 | 21.74 | | |
| 3 | 16QAM | 8 | 7 | 21.82 | 21.74 | 21.61 | | |
| 3 | 16QAM | 15 | 0 | 21.85 | 21.51 | 21.61 | | |
| Channel | | | | 19957 | 20175 | 20393 | Tune-up limit (dBm) | MPR (dB) |
| Frequency (MHz) | | | | 1710.7 | 1732.5 | 1754.3 | | |
| 1.4 | QPSK | 1 | 0 | 23.86 | 23.69 | 23.71 | 24.5 | 0 |
| 1.4 | QPSK | 1 | 3 | 23.93 | 23.75 | 23.69 | | |
| 1.4 | QPSK | 1 | 5 | 23.80 | 23.71 | 23.63 | | |
| 1.4 | QPSK | 3 | 0 | 23.96 | 23.70 | 23.77 | | |
| 1.4 | QPSK | 3 | 1 | 24.02 | 23.75 | 23.82 | | |
| 1.4 | QPSK | 3 | 3 | 23.99 | 23.75 | 23.74 | | |
| 1.4 | QPSK | 6 | 0 | 22.95 | 22.77 | 22.72 | 23.5 | 1 |
| 1.4 | 16QAM | 1 | 0 | 22.83 | 22.88 | 22.57 | 23.5 | 1 |
| 1.4 | 16QAM | 1 | 3 | 23.06 | 22.76 | 22.52 | | |
| 1.4 | 16QAM | 1 | 5 | 22.48 | 22.73 | 22.30 | | |
| 1.4 | 16QAM | 3 | 0 | 22.57 | 22.89 | 22.69 | | |
| 1.4 | 16QAM | 3 | 1 | 23.07 | 23.14 | 22.96 | | |
| 1.4 | 16QAM | 3 | 3 | 23.09 | 23.05 | 22.99 | | |
| 1.4 | 16QAM | 6 | 0 | 21.96 | 21.79 | 21.44 | 22.5 | 2 |

**<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) | MPR (dB) |
|---|---|---|---|---|---|---|---|---|
| Channel | | | | 20450 | 20525 | 20600 | | |
| Frequency (MHz) | | | | 829 | 836.5 | 844 | | |
| 10 | QPSK | 1 | 0 | 23.77 | 23.67 | 23.78 | 24.5 | 0 |
| 10 | QPSK | 1 | 25 | 23.90 | 23.85 | 23.96 | | |
| 10 | QPSK | 1 | 49 | 23.60 | 23.39 | 23.54 | | |
| 10 | QPSK | 25 | 0 | 22.85 | 22.71 | 22.72 | 23.5 | 1 |
| 10 | QPSK | 25 | 12 | 22.81 | 22.75 | 22.66 | | |
| 10 | QPSK | 25 | 25 | 22.72 | 22.76 | 22.71 | | |
| 10 | QPSK | 50 | 0 | 22.72 | 22.71 | 22.79 | | |
| 10 | 16QAM | 1 | 0 | 22.90 | 22.96 | 22.70 | 23.5 | 1 |
| 10 | 16QAM | 1 | 25 | 22.51 | 22.73 | 22.88 | | |
| 10 | 16QAM | 1 | 49 | 22.87 | 22.76 | 22.50 | | |
| 10 | 16QAM | 25 | 0 | 21.69 | 21.66 | 21.91 | 22.5 | 2 |
| 10 | 16QAM | 25 | 12 | 21.67 | 21.60 | 21.93 | | |
| 10 | 16QAM | 25 | 25 | 21.60 | 21.50 | 21.85 | | |
| 10 | 16QAM | 50 | 0 | 21.84 | 21.73 | 21.86 | | |
| Channel | | | | 20425 | 20525 | 20625 | Tune-up limit (dBm) | MPR (dB) |
| Frequency (MHz) | | | | 826.5 | 836.5 | 846.5 | | |
| 5 | QPSK | 1 | 0 | 23.91 | 23.49 | 23.66 | 24.5 | 0 |
| 5 | QPSK | 1 | 12 | 23.92 | 23.62 | 23.85 | | |
| 5 | QPSK | 1 | 24 | 23.87 | 23.49 | 23.61 | | |
| 5 | QPSK | 12 | 0 | 22.74 | 22.67 | 22.73 | 23.5 | 1 |
| 5 | QPSK | 12 | 7 | 22.73 | 22.75 | 22.59 | | |
| 5 | QPSK | 12 | 13 | 22.78 | 22.62 | 22.65 | | |
| 5 | QPSK | 25 | 0 | 22.74 | 22.68 | 22.62 | | |
| 5 | 16QAM | 1 | 0 | 22.90 | 22.88 | 22.70 | 23.5 | 1 |
| 5 | 16QAM | 1 | 12 | 22.72 | 22.88 | 22.62 | | |
| 5 | 16QAM | 1 | 24 | 22.60 | 22.72 | 22.51 | | |
| 5 | 16QAM | 12 | 0 | 21.77 | 21.63 | 21.54 | 22.5 | 2 |
| 5 | 16QAM | 12 | 7 | 21.69 | 21.61 | 21.49 | | |
| 5 | 16QAM | 12 | 13 | 21.73 | 21.62 | 21.58 | | |
| 5 | 16QAM | 25 | 0 | 21.97 | 21.67 | 21.82 | | |
| Channel | | | | 20415 | 20525 | 20635 | Tune-up limit (dBm) | MPR (dB) |
| Frequency (MHz) | | | | 825.5 | 836.5 | 847.5 | | |
| 3 | QPSK | 1 | 0 | 23.71 | 23.82 | 23.75 | 24.5 | 0 |
| 3 | QPSK | 1 | 8 | 23.59 | 23.69 | 23.72 | | |
| 3 | QPSK | 1 | 14 | 23.71 | 23.60 | 23.56 | | |
| 3 | QPSK | 8 | 0 | 22.82 | 22.71 | 22.81 | 23.5 | 1 |
| 3 | QPSK | 8 | 4 | 22.60 | 22.73 | 22.63 | | |
| 3 | QPSK | 8 | 7 | 22.75 | 22.78 | 22.63 | | |
| 3 | QPSK | 15 | 0 | 22.77 | 22.68 | 22.62 | | |
| 3 | 16QAM | 1 | 0 | 22.91 | 22.83 | 22.69 | 23.5 | 1 |
| 3 | 16QAM | 1 | 8 | 22.86 | 22.86 | 22.56 | | |
| 3 | 16QAM | 1 | 14 | 22.81 | 22.76 | 22.50 | | |
| 3 | 16QAM | 8 | 0 | 21.91 | 21.52 | 21.57 | 22.5 | 2 |
| 3 | 16QAM | 8 | 4 | 21.82 | 21.47 | 21.46 | | |
| 3 | 16QAM | 8 | 7 | 21.89 | 21.50 | 21.53 | | |
| 3 | 16QAM | 15 | 0 | 21.91 | 21.72 | 21.57 | | |

| Channel | | | | 20407 | 20525 | 20643 | Tune-up limit (dBm) | MPR (dB) |
|---|---|---|---|---|---|---|---|---|
| Frequency (MHz) | | | | 824.7 | 836.5 | 848.3 | | |
| 1.4 | QPSK | 1 | 0 | 23.68 | 23.75 | 23.51 | 24.5 | 0 |
| 1.4 | QPSK | 1 | 3 | 23.65 | 23.72 | 23.55 | | |
| 1.4 | QPSK | 1 | 5 | 23.50 | 23.65 | 23.50 | | |
| 1.4 | QPSK | 3 | 0 | 23.72 | 23.69 | 23.76 | | |
| 1.4 | QPSK | 3 | 1 | 23.65 | 23.79 | 23.61 | | |
| 1.4 | QPSK | 3 | 3 | 23.78 | 23.76 | 23.54 | | |
| 1.4 | QPSK | 6 | 0 | 22.81 | 22.82 | 22.53 | 23.5 | 1 |
| 1.4 | 16QAM | 1 | 0 | 22.84 | 22.88 | 22.85 | 23.5 | 1 |
| 1.4 | 16QAM | 1 | 3 | 22.69 | 22.77 | 22.74 | | |
| 1.4 | 16QAM | 1 | 5 | 22.98 | 22.87 | 22.51 | | |
| 1.4 | 16QAM | 3 | 0 | 22.77 | 22.83 | 22.52 | | |
| 1.4 | 16QAM | 3 | 1 | 22.75 | 22.72 | 22.78 | | |
| 1.4 | 16QAM | 3 | 3 | 22.64 | 22.95 | 22.66 | | |
| 1.4 | 16QAM | 6 | 0 | 21.83 | 21.75 | 21.64 | 22.5 | 2 |

**<LTE Band 12>**

| BW [MHz] | Modulation | RB Size | RB Offset | Power Low Ch. / Freq. | Power Middle Ch. / Freq. | Power High Ch. / Freq. | Tune-up limit (dBm) | MPR (dB) |
|---|---|---|---|---|---|---|---|---|
| Channel | | | | 23060 | 23095 | 23130 | | |
| Frequency (MHz) | | | | 704 | 707.5 | 711 | | |
| 10 | QPSK | 1 | 0 | 23.51 | 23.48 | 23.77 | 24.5 | 0 |
| 10 | QPSK | 1 | 25 | 24.00 | 23.68 | 23.91 | | |
| 10 | QPSK | 1 | 49 | 23.49 | 23.23 | 23.57 | | |
| 10 | QPSK | 25 | 0 | 22.69 | 22.61 | 22.66 | 23.5 | 1 |
| 10 | QPSK | 25 | 12 | 22.64 | 22.62 | 22.69 | | |
| 10 | QPSK | 25 | 25 | 22.63 | 22.52 | 22.68 | | |
| 10 | QPSK | 50 | 0 | 22.68 | 22.63 | 22.72 | | |
| 10 | 16QAM | 1 | 0 | 22.24 | 22.90 | 22.84 | 23.5 | 1 |
| 10 | 16QAM | 1 | 25 | 22.69 | 22.95 | 23.23 | | |
| 10 | 16QAM | 1 | 49 | 22.37 | 22.35 | 22.71 | | |
| 10 | 16QAM | 25 | 0 | 21.71 | 21.86 | 21.58 | 22.5 | 2 |
| 10 | 16QAM | 25 | 12 | 21.70 | 21.84 | 21.58 | | |
| 10 | 16QAM | 25 | 25 | 21.89 | 21.68 | 21.58 | | |
| 10 | 16QAM | 50 | 0 | 21.61 | 21.53 | 21.52 | | |
| Channel | | | | 23035 | 23095 | 23155 | Tune-up limit (dBm) | MPR (dB) |
| Frequency (MHz) | | | | 701.5 | 707.5 | 713.5 | | |
| 5 | QPSK | 1 | 0 | 23.75 | 23.73 | 23.76 | 24.5 | 0 |
| 5 | QPSK | 1 | 12 | 23.83 | 23.63 | 23.84 | | |
| 5 | QPSK | 1 | 24 | 23.84 | 23.46 | 23.84 | | |
| 5 | QPSK | 12 | 0 | 22.60 | 22.64 | 22.61 | 23.5 | 1 |
| 5 | QPSK | 12 | 7 | 22.59 | 22.64 | 22.77 | | |
| 5 | QPSK | 12 | 13 | 22.53 | 22.62 | 22.69 | | |
| 5 | QPSK | 25 | 0 | 22.64 | 22.62 | 22.66 | | |
| 5 | 16QAM | 1 | 0 | 22.56 | 23.09 | 23.13 | 23.5 | 1 |
| 5 | 16QAM | 1 | 12 | 22.63 | 22.92 | 22.77 | | |
| 5 | 16QAM | 1 | 24 | 22.90 | 23.19 | 23.27 | | |
| 5 | 16QAM | 12 | 0 | 21.57 | 21.56 | 21.34 | 22.5 | 2 |
| 5 | 16QAM | 12 | 7 | 21.59 | 21.41 | 21.41 | | |
| 5 | 16QAM | 12 | 13 | 21.54 | 21.57 | 21.42 | | |
| 5 | 16QAM | 25 | 0 | 21.43 | 21.67 | 21.66 | | |
| Channel | | | | 23025 | 23095 | 23165 | Tune-up limit (dBm) | MPR (dB) |
| Frequency (MHz) | | | | 700.5 | 707.5 | 714.5 | | |
| 3 | QPSK | 1 | 0 | 23.82 | 23.74 | 23.71 | 24.5 | 0 |
| 3 | QPSK | 1 | 8 | 23.77 | 23.51 | 23.80 | | |
| 3 | QPSK | 1 | 14 | 23.74 | 23.49 | 23.71 | | |
| 3 | QPSK | 8 | 0 | 22.55 | 22.53 | 22.58 | 23.5 | 1 |
| 3 | QPSK | 8 | 4 | 22.57 | 22.45 | 22.64 | | |
| 3 | QPSK | 8 | 7 | 22.52 | 22.49 | 22.61 | | |
| 3 | QPSK | 15 | 0 | 22.62 | 22.64 | 22.52 | | |
| 3 | 16QAM | 1 | 0 | 22.45 | 23.11 | 23.04 | 23.5 | 1 |
| 3 | 16QAM | 1 | 8 | 22.62 | 22.94 | 22.76 | | |
| 3 | 16QAM | 1 | 14 | 22.93 | 23.13 | 23.23 | | |
| 3 | 16QAM | 8 | 0 | 21.50 | 21.57 | 21.29 | 22.5 | 2 |
| 3 | 16QAM | 8 | 4 | 21.58 | 21.46 | 21.47 | | |
| 3 | 16QAM | 8 | 7 | 21.43 | 21.46 | 21.30 | | |
| 3 | 16QAM | 15 | 0 | 21.38 | 21.63 | 21.49 | | |

| Channel | | | | 23017 | 23095 | 23173 | Tune-up limit (dBm) | MPR (dB) |
|---|---|---|---|---|---|---|---|---|
| Frequency (MHz) | | | | 699.7 | 707.5 | 715.3 | | |
| 1.4 | QPSK | 1 | 0 | 23.59 | 23.67 | 23.57 | 24.5 | 0 |
| 1.4 | QPSK | 1 | 3 | 23.59 | 23.61 | 23.60 | | |
| 1.4 | QPSK | 1 | 5 | 23.29 | 23.62 | 23.65 | | |
| 1.4 | QPSK | 3 | 0 | 23.66 | 23.64 | 23.71 | | |
| 1.4 | QPSK | 3 | 1 | 23.73 | 23.73 | 23.67 | | |
| 1.4 | QPSK | 3 | 3 | 23.67 | 23.67 | 23.81 | | |
| 1.4 | QPSK | 6 | 0 | 22.60 | 22.55 | 22.77 | 23.5 | 1 |
| 1.4 | 16QAM | 1 | 0 | 22.63 | 22.89 | 23.13 | 23.5 | 1 |
| 1.4 | 16QAM | 1 | 3 | 23.19 | 23.33 | 23.14 | | |
| 1.4 | 16QAM | 1 | 5 | 22.79 | 22.78 | 23.02 | | |
| 1.4 | 16QAM | 3 | 0 | 22.75 | 22.73 | 22.80 | | |
| 1.4 | 16QAM | 3 | 1 | 22.68 | 22.67 | 22.91 | | |
| 1.4 | 16QAM | 3 | 3 | 22.58 | 22.67 | 22.70 | | |
| 1.4 | 16QAM | 6 | 0 | 20.96 | 21.64 | 21.48 | 22.5 | 2 |

**<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) | MPR (dB) |
|---|---|---|---|---|---|---|---|---|
| Channel | | | | 23230 | | | | |
| Frequency (MHz) | | | | 782 | | | | |
| 10 | QPSK | 1 | 0 | 23.80 | | | 24.5 | 0 |
| 10 | QPSK | 1 | 25 | 23.89 | | | | |
| 10 | QPSK | 1 | 49 | 23.52 | | | | |
| 10 | QPSK | 25 | 0 | 22.76 | | | 23.5 | 1 |
| 10 | QPSK | 25 | 12 | 22.69 | | | | |
| 10 | QPSK | 25 | 25 | 22.61 | | | | |
| 10 | QPSK | 50 | 0 | 22.66 | | | | |
| 10 | 16QAM | 1 | 0 | 23.06 | | | 23.5 | 1 |
| 10 | 16QAM | 1 | 25 | 23.42 | | | | |
| 10 | 16QAM | 1 | 49 | 22.83 | | | | |
| 10 | 16QAM | 25 | 0 | 21.58 | | | 22.5 | 2 |
| 10 | 16QAM | 25 | 12 | 21.69 | | | | |
| 10 | 16QAM | 25 | 25 | 21.50 | | | | |
| 10 | 16QAM | 50 | 0 | 21.56 | | | | |
| Channel | | | | 23205 | 23230 | 23255 | Tune-up limit (dBm) | MPR (dB) |
| Frequency (MHz) | | | | 779.5 | 782 | 784.5 | | |
| 5 | QPSK | 1 | 0 | 23.68 | 23.67 | 23.61 | 24.5 | 0 |
| 5 | QPSK | 1 | 12 | 23.72 | 23.88 | 23.61 | | |
| 5 | QPSK | 1 | 24 | 23.49 | 23.75 | 23.46 | | |
| 5 | QPSK | 12 | 0 | 22.77 | 22.71 | 22.71 | 23.5 | 1 |
| 5 | QPSK | 12 | 7 | 22.79 | 22.75 | 22.63 | | |
| 5 | QPSK | 12 | 13 | 22.66 | 22.71 | 22.61 | | |
| 5 | QPSK | 25 | 0 | 22.65 | 22.68 | 22.67 | | |
| 5 | 16QAM | 1 | 0 | 23.28 | 22.54 | 22.55 | 23.5 | 1 |
| 5 | 16QAM | 1 | 12 | 22.97 | 22.50 | 22.89 | | |
| 5 | 16QAM | 1 | 24 | 22.82 | 22.38 | 22.72 | | |
| 5 | 16QAM | 12 | 0 | 21.46 | 21.57 | 21.65 | 22.5 | 2 |
| 5 | 16QAM | 12 | 7 | 21.52 | 21.65 | 21.43 | | |
| 5 | 16QAM | 12 | 13 | 21.46 | 21.63 | 21.49 | | |
| 5 | 16QAM | 25 | 0 | 21.58 | 21.68 | 21.58 | | |

**<WLAN Conducted Power>**

**General Note:**

1. 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 and 5 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.
2. 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 and 5 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).
3. For OFDM transmission configurations in the 2.4 GHz and 5 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 802.11a/g/n/ac mode is used for SAR measurement, on the highest measured output power channel for each frequency band.
4. 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 | 19.25 | 19.50 | 100.00 |
| | | 6 | 2437 | 19.32 | 19.50 | |
| | | 11 | 2462 | 19.30 | 19.50 | |
| | 802.11g 6Mbps | 1 | 2412 | 14.12 | 14.50 | 87.02 |
| | | 6 | 2437 | 17.15 | 17.50 | |
| | | 11 | 2462 | 14.08 | 14.50 | |
| | 802.11n-HT20 MCS0 | 1 | 2412 | 14.21 | 14.50 | 85.83 |
| | | 6 | 2437 | 17.21 | 17.50 | |
| | | 11 | 2462 | 14.36 | 14.50 | |

**<5GHz WLAN >**

| | Mode | Channel | Frequency (MHz) | Average power (dBm) | Tune-Up Limit | Duty Cycle % |
|---|---|---|---|---|---|---|
| 5.2GHz WLAN | 802.11a 6Mbps | 36 | 5180 | 14.42 | 14.50 | 86.69 |
| | | 40 | 5200 | 14.45 | 14.50 | |
| | | 44 | 5220 | 14.47 | 14.50 | |
| | | 48 | 5240 | 14.14 | 14.50 | |
| | 802.11n-HT20 MCS0 | 36 | 5180 | 14.48 | 14.50 | 86.49 |
| | | 40 | 5200 | 14.47 | 14.50 | |
| | | 44 | 5220 | 14.49 | 14.50 | |
| | | 48 | 5240 | 14.08 | 14.50 | |
| | 802.11n-HT40 MCS0 | 38 | 5190 | 14.19 | 14.50 | 85.37 |
| | | 46 | 5230 | 14.09 | 14.50 | |

| | Mode | Channel | Frequency (MHz) | Average power (dBm) | Tune-Up Limit | Duty Cycle % |
|---|---|---|---|---|---|---|
| 5.3GHz WLAN | 802.11a 6Mbps | 52 | 5260 | 17.22 | 17.50 | 86.69 |
| | | 56 | 5280 | 17.23 | 17.50 | |
| | | 60 | 5300 | 17.24 | 17.50 | |
| | | 64 | 5320 | 14.33 | 14.50 | |
| | 802.11n-HT20 MCS0 | 52 | 5260 | 16.20 | 16.50 | 86.49 |
| | | 56 | 5280 | 16.30 | 16.50 | |
| | | 60 | 5300 | 16.48 | 16.50 | |
| | | 64 | 5320 | 14.10 | 14.50 | |
| | 802.11n-HT40 MCS0 | 54 | 5270 | 14.33 | 14.50 | 85.37 |
| | | 62 | 5310 | 14.46 | 14.50 | |

| | Mode | Channel | Frequency (MHz) | Average power (dBm) | Tune-Up Limit | Duty Cycle % |
|---|---|---|---|---|---|---|
| 5.5GHz WLAN | 802.11a 6Mbps | 100 | 5500 | 14.09 | 14.50 | 86.69 |
| | | 116 | 5580 | 17.37 | 17.50 | |
| | | 124 | 5620 | 17.35 | 17.50 | |
| | | 132 | 5660 | 17.33 | 17.50 | |
| | | 140 | 5700 | 14.17 | 14.50 | |
| | 802.11n-HT20 MCS0 | 100 | 5500 | 14.33 | 14.50 | 86.49 |
| | | 116 | 5580 | 16.23 | 16.50 | |
| | | 124 | 5620 | 16.20 | 16.50 | |
| | | 132 | 5660 | 16.18 | 16.50 | |
| | | 140 | 5700 | 14.43 | 14.50 | |
| | 802.11n-HT40 MCS0 | 102 | 5510 | 14.14 | 14.50 | 85.37 |
| | | 110 | 5550 | 14.34 | 14.50 | |
| | | 126 | 5630 | 14.30 | 14.50 | |
| | | 134 | 5670 | 14.22 | 14.50 | |

| | Mode | Channel | Frequency (MHz) | Average power (dBm) | Tune-Up Limit | Duty Cycle % |
|---|---|---|---|---|---|---|
| 5.8GHz WLAN | 802.11a 6Mbps | 149 | 5745 | 17.18 | 17.50 | 86.69 |
| | | 157 | 5785 | 17.42 | 17.50 | |
| | | 165 | 5825 | 17.17 | 17.50 | |
| | 802.11n-HT20 MCS0 | 149 | 5745 | 16.33 | 16.50 | 86.49 |
| | | 157 | 5785 | 16.36 | 16.50 | |
| | | 165 | 5825 | 16.10 | 16.50 | |
| | 802.11n-HT40 MCS0 | 151 | 5755 | 14.14 | 14.50 | 85.37 |
| | | 159 | 5795 | 14.10 | 14.50 | |

**<2.4GHz Bluetooth>**

| Mode | Channel | Frequency (MHz) | Average power (dBm) | | | Tune-up Limit | | |
|---|---|---|---|---|---|---|---|---|
| | | | 1Mbps | 2Mbps | 3Mbps | 1Mbps | 2Mbps | 3Mbps |
| BR / EDR | CH 00 | 2402 | 10.38 | 8.44 | 8.45 | 11.70 | 9.50 | 9.50 |
| | CH 39 | 2441 | 10.21 | 8.40 | 8.41 | 11.70 | 9.50 | 9.50 |
| | CH 78 | 2480 | 9.14 | 7.30 | 7.34 | 9.90 | 7.80 | 7.80 |

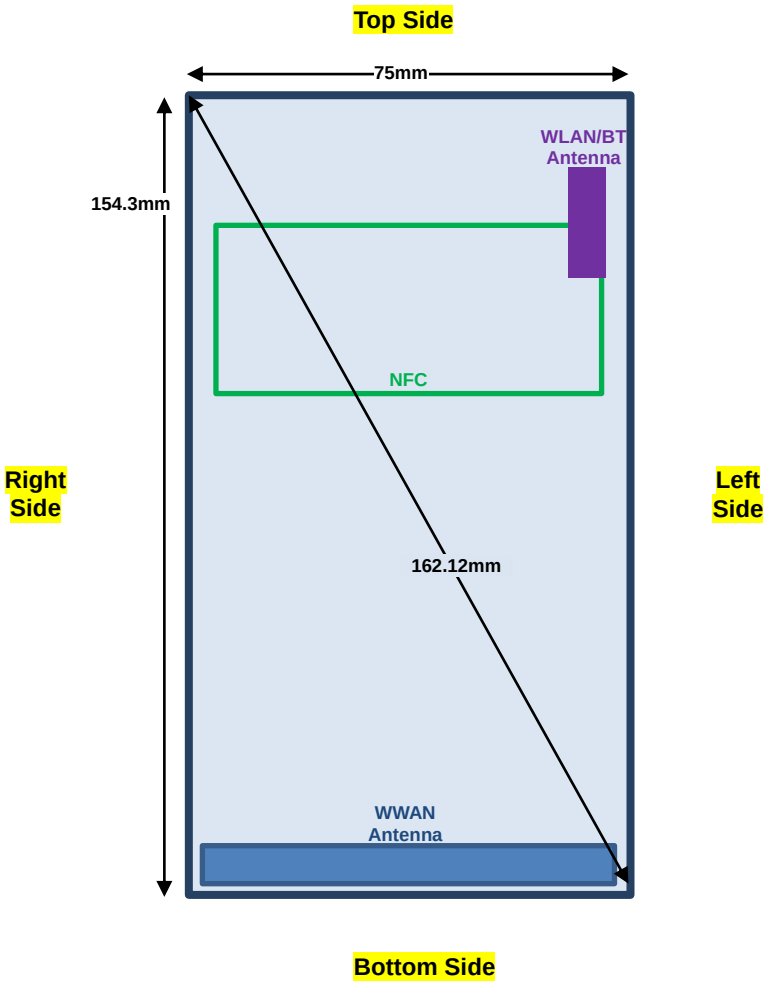
| Mode | Channel | Frequency (MHz) | Average power (dBm) | Tune-up Limit |
|---|---|---|---|---|
| | | | GFSK | GFSK |
| LE | CH 00 | 2402 | 1.55 | 2.80 |
| | CH 19 | 2440 | 0.90 | 2.80 |
| | CH 39 | 2480 | -0.43 | 0.80 |

**General Note:**

1. For 2.4GHz Bluetooth SAR testing was selected 1Mbps due to its highest average power and duty cycle is 76.72% considered in SAR testing, and the duty cycle would be scaled to theoretical 83.3% in reported SAR calculation.

# 12. Antenna Location

**<Mobile Phone>**




| Distance of the Antenna to the EUT surface/edge | | | | | | |
|---|---|---|---|---|---|---|
| Antennas | Back | Front | Top Side | Bottom Side | Right Side | Left Side |
| WWAN | ≤ 25mm | ≤ 25mm | >25mm | ≤ 25mm | ≤ 25mm | ≤ 25mm |
| BT&WLAN | ≤ 25mm | ≤ 25mm | ≤ 25mm | >25mm | >25mm | ≤ 25mm |

| Positions for SAR tests; Hotspot mode | | | | | | |
|---|---|---|---|---|---|---|
| Antennas | Back | Front | Top Side | Bottom Side | Right Side | Left Side |
| WWAN | Yes | Yes | No | Yes | Yes | Yes |
| BT&WLAN | Yes | Yes | Yes | No | No | Yes |

**General Note:**

1. Referring to KDB 941225 D06 v02r01, when the overall device length and width are ≥ 9cm*5cm, the test distance is 10 mm. SAR must be measured for all sides and surfaces with a transmitting antenna located within 25mm from that surface or edge

# 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: Reported SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor
   d. For WLAN/Bluetooth: Reported SAR(W/kg)= Measured SAR(W/kg)* Duty Cycle scaling factor * Tune-up scaling factor
2. Per KDB 447498 D01v06, for each exposure position, testing of other required channels within the operating mode of a frequency band is not required when the *reported* 1-g or 10-g SAR for the mid-band or highest output power channel is:
   - ≤ 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. Pre KDB648474 D04v01r03, when the reported SAR for a body-worn accessory, measured without a headset connected to the handset, is > 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a headset attached to the handset.
5. Per KDB648474 D04v01r03, for smart phones with a display diagonal dimension > 15.0 cm or an overall diagonal dimension > 16.0 cm, when hotspot mode applies, 10-g product specific SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg, however, when power reduction applies to hotspot mode the measured SAR must be scaled to the maximum output power, including tolerance, allowed for phablet modes to compare with the 1.2 W/kg SAR test reduction threshold, for this device only bottom side SAR for WWAN transmitter scaled to maximum output power is higher than 1.2W/kg of WCDMA B2 and LTE B2, therefore product specific SAR is necessary.
6. For 5GHz WLAN product specific SAR is necessary too, due to an overall diagonal dimension is > 16cm.

**UMTS Note:**

1. Per KDB 941225 D01v03r01, for SAR testing is measured using a 12.2 kbps RMC with TPC bits configured to all “1’s”.
2. Per KDB 941225 D01v03r01, RMC 12.2kbps setting is used to evaluate SAR. The maximum output power and tune-up tolerance specified for production units in HSDPA / HSUPA is ≤ ¼ dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio of specified maximum output power and tune-up tolerance of HSDPA / HSUPA to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA, and according to the following RF output power, the output power results of the secondary modes (HSUPA, HSDPA, DC-HSDPA) are less than ¼ dB higher than the primary modes; therefore, SAR measurement is not required for HSDPA / HSUPA.

**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 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 B12 / B5 / B4 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.

**WLAN Note:**

1. Per KDB 248227 D01v02r02, for 2.4GHz 802.11g/n SAR testing is not required when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.
2. Per KDB 248227 D01v02r02, U-NII-1 SAR testing is not required when the U-NII-2A band highest reported SAR for a test configuration is ≤ 1.2 W/kg, SAR is not required for U-NII-1 band.
3. 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.
4. 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.
5. During SAR testing the WLAN transmission was verified using a spectrum analyzer.

## 13.1 Head SAR

### <WCDMA SAR>

| Plot No. | Band | Mode | 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | WCDMA II | RMC 12.2Kbps | Right Cheek | 0mm | 9538 | 1907.6 | 23.13 | 23.20 | 1.016 | 0.071 | 0.633 | 0.643 |
| 01 | WCDMA II | RMC 12.2Kbps | Right Cheek | 0mm | 9262 | 1852.4 | 22.94 | 23.20 | 1.062 | 0.056 | 0.644 | 0.684 |
| | WCDMA II | RMC 12.2Kbps | Right Cheek | 0mm | 9400 | 1880 | 23.00 | 23.20 | 1.047 | 0.014 | 0.617 | 0.646 |
| | WCDMA II | RMC 12.2Kbps | Right Tilted | 0mm | 9538 | 1907.6 | 23.13 | 23.20 | 1.016 | -0.049 | 0.231 | 0.235 |
| | WCDMA II | RMC 12.2Kbps | Left Cheek | 0mm | 9538 | 1907.6 | 23.13 | 23.20 | 1.016 | -0.039 | 0.401 | 0.408 |
| | WCDMA II | RMC 12.2Kbps | Left Tilted | 0mm | 9538 | 1907.6 | 23.13 | 23.20 | 1.016 | 0.14 | 0.266 | 0.270 |
| | WCDMA V | RMC 12.2Kbps | Right Cheek | 0mm | 4132 | 826.4 | 23.15 | 24.50 | 1.365 | -0.07 | 0.291 | 0.397 |
| | WCDMA V | RMC 12.2Kbps | Right Tilted | 0mm | 4132 | 826.4 | 23.15 | 24.50 | 1.365 | -0.04 | 0.173 | 0.236 |
| 02 | WCDMA V | RMC 12.2Kbps | Left Cheek | 0mm | 4132 | 826.4 | 23.15 | 24.50 | 1.365 | -0.02 | 0.323 | 0.441 |
| | WCDMA V | RMC 12.2Kbps | Left Cheek | 0mm | 4182 | 836.4 | 23.06 | 24.50 | 1.393 | 0 | 0.316 | 0.440 |
| | WCDMA V | RMC 12.2Kbps | Left Cheek | 0mm | 4233 | 846.6 | 22.97 | 24.50 | 1.422 | 0.06 | 0.303 | 0.431 |
| | WCDMA V | RMC 12.2Kbps | Left Tilted | 0mm | 4132 | 826.4 | 23.15 | 24.50 | 1.365 | 0.1 | 0.163 | 0.222 |

### <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 | 49 | Right Cheek | 0mm | 18700 | 1860 | 23.80 | 24.00 | 1.047 | -0.1 | 0.726 | 0.760 |
| | LTE Band 2 | 20M | QPSK | 1 | 49 | Right Cheek | 0mm | 18900 | 1880 | 23.62 | 24.00 | 1.091 | 0.15 | 0.702 | 0.766 |
| 03 | LTE Band 2 | 20M | QPSK | 1 | 49 | Right Cheek | 0mm | 19100 | 1900 | 23.76 | 24.00 | 1.057 | 0.02 | 0.727 | 0.768 |
| | LTE Band 2 | 20M | QPSK | 50 | 0 | Right Cheek | 0mm | 18700 | 1860 | 22.44 | 23.00 | 1.138 | 0.06 | 0.595 | 0.677 |
| | LTE Band 2 | 20M | QPSK | 100 | 0 | Right Cheek | 0mm | 18700 | 1860 | 22.33 | 23.00 | 1.167 | 0.12 | 0.588 | 0.686 |
| | LTE Band 2 | 20M | QPSK | 1 | 49 | Right Tilted | 0mm | 18700 | 1860 | 23.80 | 24.00 | 1.047 | 0.02 | 0.339 | 0.355 |
| | LTE Band 2 | 20M | QPSK | 50 | 0 | Right Tilted | 0mm | 18700 | 1860 | 22.44 | 23.00 | 1.138 | 0 | 0.261 | 0.297 |
| | LTE Band 2 | 20M | QPSK | 1 | 49 | Left Cheek | 0mm | 18700 | 1860 | 23.80 | 24.00 | 1.047 | 0.04 | 0.459 | 0.481 |
| | LTE Band 2 | 20M | QPSK | 50 | 0 | Left Cheek | 0mm | 18700 | 1860 | 22.44 | 23.00 | 1.138 | 0.04 | 0.348 | 0.396 |
| | LTE Band 2 | 20M | QPSK | 1 | 49 | Left Tilted | 0mm | 18700 | 1860 | 23.80 | 24.00 | 1.047 | -0.07 | 0.365 | 0.382 |
| | LTE Band 2 | 20M | QPSK | 50 | 0 | Left Tilted | 0mm | 18700 | 1860 | 22.44 | 23.00 | 1.138 | 0.13 | 0.281 | 0.320 |
| 04 | LTE Band 4 | 20M | QPSK | 1 | 49 | Right Cheek | 0mm | 20175 | 1732.5 | 23.77 | 24.50 | 1.183 | -0.06 | 0.708 | 0.838 |
| | LTE Band 4 | 20M | QPSK | 50 | 0 | Right Cheek | 0mm | 20175 | 1732.5 | 22.87 | 23.50 | 1.156 | 0.05 | 0.567 | 0.656 |
| | LTE Band 4 | 20M | QPSK | 100 | 0 | Right Cheek | 0mm | 20175 | 1732.5 | 22.78 | 23.50 | 1.180 | 0 | 0.565 | 0.667 |
| | LTE Band 4 | 20M | QPSK | 1 | 49 | Right Tilted | 0mm | 20175 | 1732.5 | 23.77 | 24.50 | 1.183 | 0.14 | 0.297 | 0.351 |
| | LTE Band 4 | 20M | QPSK | 50 | 0 | Right Tilted | 0mm | 20175 | 1732.5 | 22.87 | 23.50 | 1.156 | -0.09 | 0.231 | 0.267 |
| | LTE Band 4 | 20M | QPSK | 1 | 49 | Left Cheek | 0mm | 20175 | 1732.5 | 23.77 | 24.50 | 1.183 | 0.05 | 0.390 | 0.461 |
| | LTE Band 4 | 20M | QPSK | 50 | 0 | Left Cheek | 0mm | 20175 | 1732.5 | 22.87 | 23.50 | 1.156 | 0.11 | 0.308 | 0.356 |
| | LTE Band 4 | 20M | QPSK | 1 | 49 | Left Tilted | 0mm | 20175 | 1732.5 | 23.77 | 24.50 | 1.183 | -0.15 | 0.345 | 0.408 |
| | LTE Band 4 | 20M | QPSK | 50 | 0 | Left Tilted | 0mm | 20175 | 1732.5 | 22.87 | 23.50 | 1.156 | 0.1 | 0.257 | 0.297 |
| | LTE Band 5 | 10M | QPSK | 1 | 25 | Right Cheek | 0mm | 20525 | 836.5 | 23.85 | 24.50 | 1.161 | 0.15 | 0.306 | 0.355 |
| | LTE Band 5 | 10M | QPSK | 25 | 25 | Right Cheek | 0mm | 20525 | 836.5 | 22.76 | 23.50 | 1.186 | 0.13 | 0.241 | 0.286 |
| | LTE Band 5 | 10M | QPSK | 1 | 25 | Right Tilted | 0mm | 20525 | 836.5 | 23.85 | 24.50 | 1.161 | 0.04 | 0.227 | 0.264 |
| | LTE Band 5 | 10M | QPSK | 25 | 25 | Right Tilted | 0mm | 20525 | 836.5 | 22.76 | 23.50 | 1.186 | 0.02 | 0.181 | 0.215 |
| 05 | LTE Band 5 | 10M | QPSK | 1 | 25 | Left Cheek | 0mm | 20525 | 836.5 | 23.85 | 24.50 | 1.161 | 0.02 | 0.377 | 0.438 |
| | LTE Band 5 | 10M | QPSK | 25 | 25 | Left Cheek | 0mm | 20525 | 836.5 | 22.76 | 23.50 | 1.186 | -0.07 | 0.297 | 0.352 |
| | LTE Band 5 | 10M | QPSK | 1 | 25 | Left Tilted | 0mm | 20525 | 836.5 | 23.85 | 24.50 | 1.161 | 0.11 | 0.199 | 0.231 |
| | LTE Band 5 | 10M | QPSK | 25 | 25 | Left Tilted | 0mm | 20525 | 836.5 | 22.76 | 23.50 | 1.186 | -0.07 | 0.155 | 0.184 |

| 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 06 | LTE Band 12 | 10M | QPSK | 1 | 25 | Right Cheek | 0mm | 23095 | 707.5 | 23.68 | 24.50 | 1.208 | -0.08 | 0.255 | 0.308 |
| | LTE Band 12 | 10M | QPSK | 25 | 12 | Right Cheek | 0mm | 23095 | 707.5 | 22.62 | 23.50 | 1.225 | -0.1 | 0.198 | 0.242 |
| | LTE Band 12 | 10M | QPSK | 1 | 25 | Right Tilted | 0mm | 23095 | 707.5 | 23.68 | 24.50 | 1.208 | 0.02 | 0.152 | 0.184 |
| | LTE Band 12 | 10M | QPSK | 25 | 12 | Right Tilted | 0mm | 23095 | 707.5 | 22.62 | 23.50 | 1.225 | 0.03 | 0.115 | 0.141 |
| | LTE Band 12 | 10M | QPSK | 1 | 25 | Left Cheek | 0mm | 23095 | 707.5 | 23.68 | 24.50 | 1.208 | 0.04 | 0.227 | 0.274 |
| | LTE Band 12 | 10M | QPSK | 25 | 12 | Left Cheek | 0mm | 23095 | 707.5 | 22.62 | 23.50 | 1.225 | 0.02 | 0.179 | 0.219 |
| | LTE Band 12 | 10M | QPSK | 1 | 25 | Left Tilted | 0mm | 23095 | 707.5 | 23.68 | 24.50 | 1.208 | -0.17 | 0.131 | 0.158 |
| | LTE Band 12 | 10M | QPSK | 25 | 12 | Left Tilted | 0mm | 23095 | 707.5 | 22.62 | 23.50 | 1.225 | 0.08 | 0.103 | 0.126 |
| | LTE Band 13 | 10M | QPSK | 1 | 25 | Right Cheek | 0mm | 23230 | 782 | 23.89 | 24.50 | 1.151 | 0.04 | 0.267 | 0.307 |
| | LTE Band 13 | 10M | QPSK | 25 | 0 | Right Cheek | 0mm | 23230 | 782 | 22.76 | 23.50 | 1.186 | 0.01 | 0.219 | 0.260 |
| | LTE Band 13 | 10M | QPSK | 1 | 25 | Right Tilted | 0mm | 23230 | 782 | 23.89 | 24.50 | 1.151 | -0.01 | 0.161 | 0.185 |
| | LTE Band 13 | 10M | QPSK | 25 | 0 | Right Tilted | 0mm | 23230 | 782 | 22.76 | 23.50 | 1.186 | -0.14 | 0.129 | 0.153 |
| 07 | LTE Band 13 | 10M | QPSK | 1 | 25 | Left Cheek | 0mm | 23230 | 782 | 23.89 | 24.50 | 1.151 | 0.03 | 0.319 | 0.367 |
| | LTE Band 13 | 10M | QPSK | 25 | 0 | Left Cheek | 0mm | 23230 | 782 | 22.76 | 23.50 | 1.186 | 0.02 | 0.249 | 0.295 |
| | LTE Band 13 | 10M | QPSK | 1 | 25 | Left Tilted | 0mm | 23230 | 782 | 23.89 | 24.50 | 1.151 | 0.03 | 0.149 | 0.171 |
| | LTE Band 13 | 10M | QPSK | 25 | 0 | Left Tilted | 0mm | 23230 | 782 | 22.76 | 23.50 | 1.186 | 0 | 0.121 | 0.143 |

## <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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 08 | WLAN2.4GHz | 802.11b 1Mbps | Right Cheek | 0mm | 6 | 2437 | 19.32 | 19.50 | 1.042 | 100 | 1.000 | -0.02 | 0.406 | 0.423 |
| | WLAN2.4GHz | 802.11b 1Mbps | Right Cheek | 0mm | 1 | 2412 | 19.25 | 19.50 | 1.059 | 100 | 1.000 | 0 | 0.347 | 0.368 |
| | WLAN2.4GHz | 802.11b 1Mbps | Right Cheek | 0mm | 11 | 2462 | 19.30 | 19.50 | 1.047 | 100 | 1.000 | 0.07 | 0.373 | 0.391 |
| | WLAN2.4GHz | 802.11b 1Mbps | Right Tilted | 0mm | 6 | 2437 | 19.32 | 19.50 | 1.042 | 100 | 1.000 | 0.07 | 0.224 | 0.233 |
| | WLAN2.4GHz | 802.11b 1Mbps | Left Cheek | 0mm | 6 | 2437 | 19.32 | 19.50 | 1.042 | 100 | 1.000 | 0.1 | 0.189 | 0.197 |
| | WLAN2.4GHz | 802.11b 1Mbps | Left Tilted | 0mm | 6 | 2437 | 19.32 | 19.50 | 1.042 | 100 | 1.000 | 0.04 | 0.176 | 0.183 |
| | WLAN5GHz | 802.11a 6Mbps | Right Cheek | 0mm | 60 | 5300 | 17.24 | 17.50 | 1.062 | 86.69 | 1.154 | -0.16 | 0.209 | 0.256 |
| | WLAN5GHz | 802.11a 6Mbps | Right Cheek | 0mm | 52 | 5260 | 17.22 | 17.50 | 1.067 | 86.69 | 1.154 | 0.1 | 0.222 | 0.273 |
| 09 | WLAN5GHz | 802.11a 6Mbps | Right Cheek | 0mm | 56 | 5280 | 17.23 | 17.50 | 1.064 | 86.69 | 1.154 | 0.13 | 0.231 | 0.284 |
| | WLAN5GHz | 802.11a 6Mbps | Right Cheek | 0mm | 64 | 5320 | 14.33 | 14.50 | 1.040 | 86.69 | 1.154 | 0.12 | 0.121 | 0.145 |
| | WLAN5GHz | 802.11a 6Mbps | Right Tilted | 0mm | 60 | 5300 | 17.24 | 17.50 | 1.062 | 86.69 | 1.154 | -0.17 | 0.146 | 0.179 |
| | WLAN5GHz | 802.11a 6Mbps | Left Cheek | 0mm | 60 | 5300 | 17.24 | 17.50 | 1.062 | 86.69 | 1.154 | 0.03 | 0.151 | 0.185 |
| | WLAN5GHz | 802.11a 6Mbps | Left Tilted | 0mm | 60 | 5300 | 17.24 | 17.50 | 1.062 | 86.69 | 1.154 | 0.14 | 0.129 | 0.158 |
| 10 | WLAN5GHz | 802.11a 6Mbps | Right Cheek | 0mm | 116 | 5580 | 17.37 | 17.50 | 1.030 | 86.69 | 1.154 | 0.12 | 0.174 | 0.207 |
| | WLAN5GHz | 802.11a 6Mbps | Right Cheek | 0mm | 100 | 5500 | 14.09 | 14.50 | 1.099 | 86.69 | 1.154 | 0.15 | 0.109 | 0.138 |
| | WLAN5GHz | 802.11a 6Mbps | Right Cheek | 0mm | 132 | 5660 | 17.33 | 17.50 | 1.040 | 86.69 | 1.154 | 0.1 | 0.092 | 0.110 |
| | WLAN5GHz | 802.11a 6Mbps | Right Cheek | 0mm | 140 | 5700 | 14.17 | 14.50 | 1.079 | 86.69 | 1.154 | -0.11 | 0.023 | 0.029 |
| | WLAN5GHz | 802.11a 6Mbps | Right Tilted | 0mm | 116 | 5580 | 17.37 | 17.50 | 1.030 | 86.69 | 1.154 | 0.15 | 0.117 | 0.139 |
| | WLAN5GHz | 802.11a 6Mbps | Left Cheek | 0mm | 116 | 5580 | 17.37 | 17.50 | 1.030 | 86.69 | 1.154 | -0.18 | 0.099 | 0.118 |
| | WLAN5GHz | 802.11a 6Mbps | Left Tilted | 0mm | 116 | 5580 | 17.37 | 17.50 | 1.030 | 86.69 | 1.154 | -0.19 | 0.081 | 0.096 |
| | WLAN5GHz | 802.11a 6Mbps | Right Cheek | 0mm | 157 | 5785 | 17.42 | 17.50 | 1.019 | 86.69 | 1.154 | 0.16 | 0.038 | 0.045 |
| 11 | WLAN5GHz | 802.11a 6Mbps | Right Cheek | 0mm | 149 | 5745 | 17.18 | 17.50 | 1.076 | 86.69 | 1.154 | 0.08 | 0.042 | 0.052 |
| | WLAN5GHz | 802.11a 6Mbps | Right Cheek | 0mm | 165 | 5825 | 17.17 | 17.50 | 1.079 | 86.69 | 1.154 | -0.02 | 0.033 | 0.041 |
| | WLAN5GHz | 802.11a 6Mbps | Right Tilted | 0mm | 157 | 5785 | 17.42 | 17.50 | 1.019 | 86.69 | 1.154 | 0.08 | 0.034 | 0.040 |
| | WLAN5GHz | 802.11a 6Mbps | Left Cheek | 0mm | 157 | 5785 | 17.42 | 17.50 | 1.019 | 86.69 | 1.154 | 0.17 | 0.031 | 0.036 |
| | WLAN5GHz | 802.11a 6Mbps | Left Tilted | 0mm | 157 | 5785 | 17.42 | 17.50 | 1.019 | 86.69 | 1.154 | -0.13 | 0.032 | 0.038 |

**<Bluetooth 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bluetooth | 1Mbps | Right Cheek | 0mm | 0 | 2402 | 10.38 | 11.70 | 1.355 | 76.72 | 1.086 | 0.128 | 0.013 | 0.019 |
| 12 | Bluetooth | 1Mbps | Right Cheek | 0mm | 39 | 2441 | 10.21 | 11.70 | 1.409 | 76.72 | 1.086 | 0.138 | 0.022 | 0.034 |
| | Bluetooth | 1Mbps | Right Cheek | 0mm | 78 | 2480 | 9.14 | 9.90 | 1.191 | 76.72 | 1.086 | -0.1 | 0.015 | 0.019 |
| | Bluetooth | 1Mbps | Right Tilted | 0mm | 0 | 2402 | 10.38 | 11.70 | 1.355 | 76.72 | 1.086 | 0.12 | 0.011 | 0.016 |
| | Bluetooth | 1Mbps | Left Cheek | 0mm | 0 | 2402 | 10.38 | 11.70 | 1.355 | 76.72 | 1.086 | 0.133 | 0.011 | 0.016 |
| | Bluetooth | 1Mbps | Left Tilted | 0mm | 0 | 2402 | 10.38 | 11.70 | 1.355 | 76.72 | 1.086 | -0.185 | 0.011 | 0.016 |

## *13.2 Hotspot SAR*

**<WCDMA SAR>**

| Plot No. | Band | Mode | 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | WCDMA II | RMC 12.2Kbps | Front | 10mm | 9538 | 1907.6 | 23.13 | 23.20 | 1.016 | -0.07 | 0.601 | 0.611 |
| 13 | WCDMA II | RMC 12.2Kbps | Back | 10mm | 9538 | 1907.6 | 23.13 | 23.20 | 1.016 | -0.17 | 1.420 | 1.443 |
| | WCDMA II | RMC 12.2Kbps | Back | 10mm | 9262 | 1852.4 | 22.94 | 23.20 | 1.062 | -0.11 | 1.260 | 1.338 |
| | WCDMA II | RMC 12.2Kbps | Back | 10mm | 9400 | 1880 | 23.00 | 23.20 | 1.047 | -0.14 | 1.310 | 1.372 |
| | WCDMA II | RMC 12.2Kbps | Left Side | 10mm | 9538 | 1907.6 | 23.13 | 23.20 | 1.016 | -0.01 | 0.071 | 0.072 |
| | WCDMA II | RMC 12.2Kbps | Right Side | 10mm | 9538 | 1907.6 | 23.13 | 23.20 | 1.016 | -0.03 | 0.634 | 0.644 |
| | WCDMA II | RMC 12.2Kbps | Bottom Side | 10mm | 9538 | 1907.6 | 23.13 | 23.20 | 1.016 | 0 | 0.959 | 0.975 |
| | WCDMA II | RMC 12.2Kbps | Bottom Side | 10mm | 9262 | 1852.4 | 22.94 | 23.20 | 1.062 | 0.07 | 0.817 | 0.867 |
| | WCDMA II | RMC 12.2Kbps | Bottom Side | 10mm | 9400 | 1880 | 23.00 | 23.20 | 1.047 | -0.16 | 0.843 | 0.883 |
| | WCDMA V | RMC 12.2Kbps | Front | 10mm | 4132 | 826.4 | 23.15 | 24.50 | 1.365 | -0.08 | 0.292 | 0.398 |
| | WCDMA V | RMC 12.2Kbps | Back | 10mm | 4132 | 826.4 | 23.15 | 24.50 | 1.365 | 0.1 | 0.472 | 0.644 |
| 14 | WCDMA V | RMC 12.2Kbps | Back | 10mm | 4182 | 836.4 | 23.06 | 24.50 | 1.393 | 0.02 | 0.506 | 0.705 |
| | WCDMA V | RMC 12.2Kbps | Back | 10mm | 4233 | 846.6 | 22.97 | 24.50 | 1.422 | 0 | 0.485 | 0.690 |
| | WCDMA V | RMC 12.2Kbps | Left Side | 10mm | 4132 | 826.4 | 23.15 | 24.50 | 1.365 | 0.04 | 0.359 | 0.490 |
| | WCDMA V | RMC 12.2Kbps | Right Side | 10mm | 4132 | 826.4 | 23.15 | 24.50 | 1.365 | -0.01 | 0.267 | 0.364 |
| | WCDMA V | RMC 12.2Kbps | Bottom Side | 10mm | 4132 | 826.4 | 23.15 | 24.50 | 1.365 | -0.01 | 0.021 | 0.029 |

**<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 | 49 | Front | 10mm | 18700 | 1860 | 23.80 | 24.00 | 1.047 | -0.07 | 0.588 | 0.616 |
| | LTE Band 2 | 20M | QPSK | 50 | 0 | Front | 10mm | 18700 | 1860 | 22.44 | 23.00 | 1.138 | -0.07 | 0.455 | 0.518 |
| | LTE Band 2 | 20M | QPSK | 1 | 49 | Back | 10mm | 18700 | 1860 | 23.80 | 24.00 | 1.047 | -0.14 | 1.260 | 1.319 |
| | LTE Band 2 | 20M | QPSK | 1 | 49 | Back | 10mm | 18900 | 1880 | 23.62 | 24.00 | 1.091 | -0.11 | 1.260 | 1.375 |
| 15 | LTE Band 2 | 20M | QPSK | 1 | 49 | Back | 10mm | 19100 | 1900 | 23.76 | 24.00 | 1.057 | -0.1 | 1.360 | 1.437 |
| | LTE Band 2 | 20M | QPSK | 50 | 0 | Back | 10mm | 18700 | 1860 | 22.44 | 23.00 | 1.138 | -0.12 | 1.010 | 1.149 |
| | LTE Band 2 | 20M | QPSK | 50 | 0 | Back | 10mm | 18900 | 1880 | 22.36 | 23.00 | 1.159 | -0.13 | 1.060 | 1.228 |
| | LTE Band 2 | 20M | QPSK | 50 | 0 | Back | 10mm | 19100 | 1900 | 22.42 | 23.00 | 1.143 | -0.01 | 1.090 | 1.246 |
| | LTE Band 2 | 20M | QPSK | 100 | 0 | Back | 10mm | 18700 | 1860 | 22.33 | 23.00 | 1.167 | -0.18 | 1.020 | 1.190 |
| | LTE Band 2 | 20M | QPSK | 1 | 49 | Left Side | 10mm | 18700 | 1860 | 23.80 | 24.00 | 1.047 | -0.18 | 0.062 | 0.065 |
| | LTE Band 2 | 20M | QPSK | 50 | 0 | Left Side | 10mm | 18700 | 1860 | 22.44 | 23.00 | 1.138 | 0.03 | 0.049 | 0.056 |
| | LTE Band 2 | 20M | QPSK | 1 | 49 | Right Side | 10mm | 18700 | 1860 | 23.80 | 24.00 | 1.047 | 0 | 0.551 | 0.577 |
| | LTE Band 2 | 20M | QPSK | 50 | 0 | Right Side | 10mm | 18700 | 1860 | 22.44 | 23.00 | 1.138 | -0.04 | 0.438 | 0.498 |
| | LTE Band 2 | 20M | QPSK | 1 | 49 | Bottom Side | 10mm | 18700 | 1860 | 23.80 | 24.00 | 1.047 | 0.12 | 0.860 | 0.901 |
| | LTE Band 2 | 20M | QPSK | 1 | 49 | Bottom Side | 10mm | 18900 | 1880 | 23.62 | 24.00 | 1.091 | 0.17 | 0.884 | 0.965 |
| | LTE Band 2 | 20M | QPSK | 1 | 49 | Bottom Side | 10mm | 19100 | 1900 | 23.76 | 24.00 | 1.057 | 0.02 | 0.972 | 1.027 |
| | LTE Band 2 | 20M | QPSK | 50 | 0 | Bottom Side | 10mm | 18700 | 1860 | 22.44 | 23.00 | 1.138 | 0.12 | 0.678 | 0.771 |
| | LTE Band 2 | 20M | QPSK | 100 | 0 | Bottom Side | 10mm | 18700 | 1860 | 22.33 | 23.00 | 1.167 | 0.04 | 0.680 | 0.793 |

| 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 4 | 20M | QPSK | 1 | 49 | Front | 10mm | 20175 | 1732.5 | 23.77 | 24.50 | 1.183 | -0.01 | 0.461 | 0.545 |
| | LTE Band 4 | 20M | QPSK | 50 | 0 | Front | 10mm | 20175 | 1732.5 | 22.87 | 23.50 | 1.156 | 0.02 | 0.336 | 0.388 |
| 16 | LTE Band 4 | 20M | QPSK | 1 | 49 | Back | 10mm | 20175 | 1732.5 | 23.77 | 24.50 | 1.183 | 0.13 | 0.915 | 1.082 |
| | LTE Band 4 | 20M | QPSK | 50 | 0 | Back | 10mm | 20175 | 1732.5 | 22.87 | 23.50 | 1.156 | 0.1 | 0.660 | 0.763 |
| | LTE Band 4 | 20M | QPSK | 100 | 0 | Back | 10mm | 20175 | 1732.5 | 22.78 | 23.50 | 1.180 | 0.02 | 0.679 | 0.801 |
| | LTE Band 4 | 20M | QPSK | 1 | 49 | Left Side | 10mm | 20175 | 1732.5 | 23.77 | 24.50 | 1.183 | -0.08 | 0.042 | 0.050 |
| | LTE Band 4 | 20M | QPSK | 50 | 0 | Left Side | 10mm | 20175 | 1732.5 | 22.87 | 23.50 | 1.156 | -0.03 | 0.030 | 0.035 |
| | LTE Band 4 | 20M | QPSK | 1 | 49 | Right Side | 10mm | 20175 | 1732.5 | 23.77 | 24.50 | 1.183 | 0.04 | 0.339 | 0.401 |
| | LTE Band 4 | 20M | QPSK | 50 | 0 | Right Side | 10mm | 20175 | 1732.5 | 22.87 | 23.50 | 1.156 | 0.09 | 0.263 | 0.304 |
| | LTE Band 4 | 20M | QPSK | 1 | 49 | Bottom Side | 10mm | 20175 | 1732.5 | 23.77 | 24.50 | 1.183 | 0.02 | 0.576 | 0.681 |
| | LTE Band 4 | 20M | QPSK | 50 | 0 | Bottom Side | 10mm | 20175 | 1732.5 | 22.87 | 23.50 | 1.156 | -0.01 | 0.449 | 0.519 |
| | LTE Band 5 | 10M | QPSK | 1 | 25 | Front | 10mm | 20525 | 836.5 | 23.85 | 24.50 | 1.161 | 0.18 | 0.325 | 0.377 |
| | LTE Band 5 | 10M | QPSK | 25 | 25 | Front | 10mm | 20525 | 836.5 | 22.76 | 23.50 | 1.186 | 0.01 | 0.268 | 0.318 |
| 17 | LTE Band 5 | 10M | QPSK | 1 | 25 | Back | 10mm | 20525 | 836.5 | 23.85 | 24.50 | 1.161 | -0.12 | 0.531 | 0.617 |
| | LTE Band 5 | 10M | QPSK | 25 | 25 | Back | 10mm | 20525 | 836.5 | 22.76 | 23.50 | 1.186 | -0.06 | 0.446 | 0.529 |
| | LTE Band 5 | 10M | QPSK | 1 | 25 | Left Side | 10mm | 20525 | 836.5 | 23.85 | 24.50 | 1.161 | -0.07 | 0.496 | 0.576 |
| | LTE Band 5 | 10M | QPSK | 25 | 25 | Left Side | 10mm | 20525 | 836.5 | 22.76 | 23.50 | 1.186 | 0.11 | 0.425 | 0.504 |
| | LTE Band 5 | 10M | QPSK | 1 | 25 | Right Side | 10mm | 20525 | 836.5 | 23.85 | 24.50 | 1.161 | 0.18 | 0.326 | 0.379 |
| | LTE Band 5 | 10M | QPSK | 25 | 25 | Right Side | 10mm | 20525 | 836.5 | 22.76 | 23.50 | 1.186 | -0.06 | 0.277 | 0.328 |
| | LTE Band 5 | 10M | QPSK | 1 | 25 | Bottom Side | 10mm | 20525 | 836.5 | 23.85 | 24.50 | 1.161 | 0.05 | 0.110 | 0.128 |
| | LTE Band 5 | 10M | QPSK | 25 | 25 | Bottom Side | 10mm | 20525 | 836.5 | 22.76 | 23.50 | 1.186 | 0.1 | 0.088 | 0.104 |
| | LTE Band 12 | 10M | QPSK | 1 | 25 | Front | 10mm | 23095 | 707.5 | 23.68 | 24.50 | 1.208 | -0.08 | 0.293 | 0.354 |
| | LTE Band 12 | 10M | QPSK | 25 | 12 | Front | 10mm | 23095 | 707.5 | 22.62 | 23.50 | 1.225 | 0.02 | 0.237 | 0.290 |
| 18 | LTE Band 12 | 10M | QPSK | 1 | 25 | Back | 10mm | 23095 | 707.5 | 23.68 | 24.50 | 1.208 | 0.05 | 0.435 | 0.525 |
| | LTE Band 12 | 10M | QPSK | 25 | 12 | Back | 10mm | 23095 | 707.5 | 22.62 | 23.50 | 1.225 | -0.03 | 0.331 | 0.405 |
| | LTE Band 12 | 10M | QPSK | 1 | 25 | Left Side | 10mm | 23095 | 707.5 | 23.68 | 24.50 | 1.208 | -0.01 | 0.324 | 0.391 |
| | LTE Band 12 | 10M | QPSK | 25 | 12 | Left Side | 10mm | 23095 | 707.5 | 22.62 | 23.50 | 1.225 | 0.03 | 0.254 | 0.311 |
| | LTE Band 12 | 10M | QPSK | 1 | 25 | Right Side | 10mm | 23095 | 707.5 | 23.68 | 24.50 | 1.208 | -0.04 | 0.269 | 0.325 |
| | LTE Band 12 | 10M | QPSK | 25 | 12 | Right Side | 10mm | 23095 | 707.5 | 22.62 | 23.50 | 1.225 | 0.03 | 0.214 | 0.262 |
| | LTE Band 12 | 10M | QPSK | 1 | 25 | Bottom Side | 10mm | 23095 | 707.5 | 23.68 | 24.50 | 1.208 | 0.11 | 0.013 | 0.016 |
| | LTE Band 12 | 10M | QPSK | 25 | 12 | Bottom Side | 10mm | 23095 | 707.5 | 22.62 | 23.50 | 1.225 | -0.14 | 0.009 | 0.012 |
| | LTE Band 13 | 10M | QPSK | 1 | 25 | Front | 10mm | 23230 | 782 | 23.89 | 24.50 | 1.151 | -0.08 | 0.362 | 0.417 |
| | LTE Band 13 | 10M | QPSK | 25 | 0 | Front | 10mm | 23230 | 782 | 22.76 | 23.50 | 1.186 | -0.06 | 0.278 | 0.330 |
| 19 | LTE Band 13 | 10M | QPSK | 1 | 25 | Back | 10mm | 23230 | 782 | 23.89 | 24.50 | 1.151 | -0.05 | 0.593 | 0.682 |
| | LTE Band 13 | 10M | QPSK | 25 | 0 | Back | 10mm | 23230 | 782 | 22.76 | 23.50 | 1.186 | 0.03 | 0.442 | 0.524 |
| | LTE Band 13 | 10M | QPSK | 1 | 25 | Left Side | 10mm | 23230 | 782 | 23.89 | 24.50 | 1.151 | 0.13 | 0.391 | 0.450 |
| | LTE Band 13 | 10M | QPSK | 25 | 0 | Left Side | 10mm | 23230 | 782 | 22.76 | 23.50 | 1.186 | -0.06 | 0.291 | 0.345 |
| | LTE Band 13 | 10M | QPSK | 1 | 25 | Right Side | 10mm | 23230 | 782 | 23.89 | 24.50 | 1.151 | 0.07 | 0.348 | 0.400 |
| | LTE Band 13 | 10M | QPSK | 25 | 0 | Right Side | 10mm | 23230 | 782 | 22.76 | 23.50 | 1.186 | -0.08 | 0.252 | 0.299 |
| | LTE Band 13 | 10M | QPSK | 1 | 25 | Bottom Side | 10mm | 23230 | 782 | 23.89 | 24.50 | 1.151 | -0.07 | 0.062 | 0.071 |
| | LTE Band 13 | 10M | QPSK | 25 | 0 | Bottom Side | 10mm | 23230 | 782 | 22.76 | 23.50 | 1.186 | -0.13 | 0.047 | 0.056 |

## <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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | WLAN2.4GHz | 802.11b 1Mbps | Front | 10mm | 6 | 2437 | 19.32 | 19.50 | 1.042 | 100 | 1.000 | -0.01 | 0.095 | 0.099 |
| | WLAN2.4GHz | 802.11b 1Mbps | Back | 10mm | 6 | 2437 | 19.32 | 19.50 | 1.042 | 100 | 1.000 | -0.02 | 0.170 | 0.177 |
| | WLAN2.4GHz | 802.11b 1Mbps | Left Side | 10mm | 6 | 2437 | 19.32 | 19.50 | 1.042 | 100 | 1.000 | 0.07 | 0.174 | 0.181 |
| | WLAN2.4GHz | 802.11b 1Mbps | Left Side | 10mm | 1 | 2412 | 19.25 | 19.50 | 1.059 | 100 | 1.000 | 0.14 | 0.169 | 0.179 |
| 20 | WLAN2.4GHz | 802.11b 1Mbps | Left Side | 10mm | 11 | 2462 | 19.30 | 19.50 | 1.047 | 100 | 1.000 | 0.02 | 0.184 | 0.193 |
| | WLAN2.4GHz | 802.11b 1Mbps | Top Side | 10mm | 6 | 2437 | 19.32 | 19.50 | 1.042 | 100 | 1.000 | 0.04 | 0.095 | 0.099 |
| | WLAN5GHz | 802.11n-HT40 MCS0 | Front | 10mm | 38 | 5190 | 14.19 | 14.50 | 1.074 | 85.37 | 1.171 | 0.02 | 0.009 | 0.012 |
| | WLAN5GHz | 802.11n-HT40 MCS0 | Back | 10mm | 38 | 5190 | 14.19 | 14.50 | 1.074 | 85.37 | 1.171 | -0.01 | 0.216 | 0.272 |
| 21 | WLAN5GHz | 802.11n-HT40 MCS0 | Back | 10mm | 46 | 5230 | 14.09 | 14.50 | 1.099 | 85.37 | 1.171 | -0.14 | 0.223 | 0.287 |
| | WLAN5GHz | 802.11n-HT40 MCS0 | Left Side | 10mm | 38 | 5190 | 14.19 | 14.50 | 1.074 | 85.37 | 1.171 | -0.06 | 0.060 | 0.075 |
| | WLAN5GHz | 802.11n-HT40 MCS0 | Top Side | 10mm | 38 | 5190 | 14.19 | 14.50 | 1.074 | 85.37 | 1.171 | 0.02 | 0.031 | 0.039 |
| | WLAN5GHz | 802.11a 6Mbps | Front | 10mm | 157 | 5785 | 17.42 | 17.50 | 1.019 | 86.69 | 1.154 | 0.18 | 0.011 | 0.013 |
| | WLAN5GHz | 802.11a 6Mbps | Back | 10mm | 157 | 5785 | 17.42 | 17.50 | 1.019 | 86.69 | 1.154 | -0.06 | 0.116 | 0.136 |
| 22 | WLAN5GHz | 802.11a 6Mbps | Back | 10mm | 149 | 5745 | 17.18 | 17.50 | 1.076 | 86.69 | 1.154 | -0.04 | 0.133 | 0.165 |
| | WLAN5GHz | 802.11a 6Mbps | Back | 10mm | 165 | 5825 | 17.17 | 17.50 | 1.079 | 86.69 | 1.154 | -0.04 | 0.087 | 0.108 |
| | WLAN5GHz | 802.11a 6Mbps | Left Side | 10mm | 157 | 5785 | 17.42 | 17.50 | 1.019 | 86.69 | 1.154 | 0.1 | 0.029 | 0.034 |
| | WLAN5GHz | 802.11a 6Mbps | Top Side | 10mm | 157 | 5785 | 17.42 | 17.50 | 1.019 | 86.69 | 1.154 | -0.09 | 0.014 | 0.016 |

## <Bluetooth 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bluetooth | 1Mbps | Front | 10mm | 0 | 2402 | 10.38 | 11.70 | 1.355 | 76.72 | 1.086 | -0.05 | 0.007 | 0.010 |
| | Bluetooth | 1Mbps | Back | 10mm | 0 | 2402 | 10.38 | 11.70 | 1.355 | 76.72 | 1.086 | 0.16 | 0.012 | 0.018 |
| | Bluetooth | 1Mbps | Left Side | 10mm | 0 | 2402 | 10.38 | 11.70 | 1.355 | 76.72 | 1.086 | 0.07 | 0.014 | 0.021 |
| 23 | Bluetooth | 1Mbps | Left Side | 10mm | 39 | 2441 | 10.21 | 11.70 | 1.409 | 76.72 | 1.086 | 0.07 | 0.016 | 0.024 |
| | Bluetooth | 1Mbps | Left Side | 10mm | 78 | 2480 | 9.14 | 9.90 | 1.191 | 76.72 | 1.086 | -0.18 | 0.013 | 0.017 |
| | Bluetooth | 1Mbps | Top Side | 10mm | 0 | 2402 | 10.38 | 11.70 | 1.355 | 76.72 | 1.086 | 0.08 | 0.007 | 0.011 |

## 13.3 Product Specific SAR

### <WCDMA SAR>

| Plot No. | Band | Mode | 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | WCDMA II | RMC 12.2Kbps | Back | 0mm | 9538 | 1907.6 | 23.13 | 23.20 | 1.016 | 0.02 | 2.500 | 2.541 |
| 24 | WCDMA II | RMC 12.2Kbps | Back | 0mm | 9262 | 1852.4 | 22.94 | 23.20 | 1.062 | 0.11 | 2.460 | 2.612 |
| | WCDMA II | RMC 12.2Kbps | Back | 0mm | 9400 | 1880 | 23.00 | 23.20 | 1.047 | 0.17 | 2.480 | 2.597 |

### <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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 25 | LTE Band 2 | 20M | QPSK | 1 | 49 | Back | 0mm | 19100 | 1900 | 23.76 | 24.00 | 1.057 | 0.05 | 2.670 | 2.822 |
| | LTE Band 2 | 20M | QPSK | 1 | 49 | Back | 0mm | 18700 | 1860 | 23.80 | 24.00 | 1.047 | 0.02 | 2.600 | 2.723 |
| | LTE Band 2 | 20M | QPSK | 1 | 49 | Back | 0mm | 18900 | 1880 | 23.62 | 24.00 | 1.091 | 0.05 | 2.450 | 2.674 |

### <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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | WLAN5GHz | 802.11a 6Mbps | Front | 0mm | 60 | 5300 | 17.24 | 17.50 | 1.062 | 86.69 | 1.154 | -0.15 | 0.068 | 0.083 |
| 26 | WLAN5GHz | 802.11a 6Mbps | Back | 0mm | 60 | 5300 | 17.24 | 17.50 | 1.062 | 86.69 | 1.154 | -0.19 | 0.542 | 0.664 |
| | WLAN5GHz | 802.11a 6Mbps | Back | 0mm | 56 | 5280 | 17.23 | 17.50 | 1.064 | 86.69 | 1.154 | 0.19 | 0.517 | 0.635 |
| | WLAN5GHz | 802.11a 6Mbps | Back | 0mm | 52 | 5260 | 17.22 | 17.50 | 1.067 | 86.69 | 1.154 | -0.12 | 0.480 | 0.591 |
| | WLAN5GHz | 802.11a 6Mbps | Back | 0mm | 64 | 5320 | 14.33 | 14.50 | 1.040 | 86.69 | 1.154 | 0.04 | 0.259 | 0.311 |
| | WLAN5GHz | 802.11a 6Mbps | Left Side | 0mm | 60 | 5300 | 17.24 | 17.50 | 1.062 | 86.69 | 1.154 | -0.1 | 0.458 | 0.561 |
| | WLAN5GHz | 802.11a 6Mbps | Top Side | 0mm | 60 | 5300 | 17.24 | 17.50 | 1.062 | 86.69 | 1.154 | -0.14 | 0.107 | 0.131 |
| | WLAN5GHz | 802.11a 6Mbps | Front | 0mm | 116 | 5580 | 17.37 | 17.50 | 1.030 | 86.69 | 1.154 | 0 | 0.020 | 0.024 |
| | WLAN5GHz | 802.11a 6Mbps | Back | 0mm | 116 | 5580 | 17.37 | 17.50 | 1.030 | 86.69 | 1.154 | 0 | 0.141 | 0.168 |
| 27 | WLAN5GHz | 802.11a 6Mbps | Back | 0mm | 100 | 5500 | 14.09 | 14.50 | 1.099 | 86.69 | 1.154 | -0.05 | 0.218 | 0.276 |
| | WLAN5GHz | 802.11a 6Mbps | Back | 0mm | 132 | 5660 | 17.33 | 17.50 | 1.040 | 86.69 | 1.154 | -0.07 | 0.168 | 0.202 |
| | WLAN5GHz | 802.11a 6Mbps | Back | 0mm | 140 | 5700 | 14.17 | 14.50 | 1.079 | 86.69 | 1.154 | 0.16 | 0.047 | 0.059 |
| | WLAN5GHz | 802.11a 6Mbps | Left Side | 0mm | 116 | 5580 | 17.37 | 17.50 | 1.030 | 86.69 | 1.154 | 0 | 0.107 | 0.127 |
| | WLAN5GHz | 802.11a 6Mbps | Top Side | 0mm | 116 | 5580 | 17.37 | 17.50 | 1.030 | 86.69 | 1.154 | 0.03 | 0.024 | 0.029 |

## 13.4 Body Worn Accessory SAR

### <WCDMA SAR>

| Plot No. | Band | Mode | Test Position | Gap (mm) | Headset | 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | WCDMA II | RMC 12.2Kbps | Front | 10mm | - | 9538 | 1907.6 | 23.13 | 23.20 | 1.016 | -0.07 | 0.601 | 0.611 |
| 28 | WCDMA II | RMC 12.2Kbps | Back | 10mm | - | 9538 | 1907.6 | 23.13 | 23.20 | 1.016 | -0.17 | 1.420 | 1.443 |
| | WCDMA II | RMC 12.2Kbps | Back | 10mm | - | 9262 | 1852.4 | 22.94 | 23.20 | 1.062 | -0.11 | 1.260 | 1.338 |
| | WCDMA II | RMC 12.2Kbps | Back | 10mm | - | 9400 | 1880 | 23.00 | 23.20 | 1.047 | -0.14 | 1.310 | 1.372 |
| | WCDMA II | RMC 12.2Kbps | Back | 10mm | Headset | 9538 | 1907.6 | 23.13 | 23.20 | 1.016 | -0.09 | 1.410 | 1.433 |
| | WCDMA V | RMC 12.2Kbps | Front | 10mm | - | 4132 | 826.4 | 23.15 | 24.50 | 1.365 | -0.08 | 0.292 | 0.398 |
| | WCDMA V | RMC 12.2Kbps | Back | 10mm | - | 4132 | 826.4 | 23.15 | 24.50 | 1.365 | 0.1 | 0.472 | 0.644 |
| 29 | WCDMA V | RMC 12.2Kbps | Back | 10mm | - | 4182 | 836.4 | 23.06 | 24.50 | 1.393 | 0.02 | 0.506 | 0.705 |
| | WCDMA V | RMC 12.2Kbps | Back | 10mm | - | 4233 | 846.6 | 22.97 | 24.50 | 1.422 | 0 | 0.485 | 0.690 |

### <LTE SAR>

| Plot No. | Band | BW (MHz) | Modulation | RB Size | RB offset | Test Position | Gap (mm) | Headset | 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 | 49 | Front | 10mm | - | 18700 | 1860 | 23.80 | 24.00 | 1.047 | -0.07 | 0.588 | 0.616 |
| | LTE Band 2 | 20M | QPSK | 50 | 0 | Front | 10mm | - | 18700 | 1860 | 22.44 | 23.00 | 1.138 | -0.07 | 0.455 | 0.518 |
| | LTE Band 2 | 20M | QPSK | 1 | 49 | Back | 10mm | - | 18700 | 1860 | 23.80 | 24.00 | 1.047 | -0.14 | 1.260 | 1.319 |
| | LTE Band 2 | 20M | QPSK | 1 | 49 | Back | 10mm | - | 18900 | 1880 | 23.62 | 24.00 | 1.091 | -0.11 | 1.260 | 1.375 |
| 30 | LTE Band 2 | 20M | QPSK | 1 | 49 | Back | 10mm | - | 19100 | 1900 | 23.76 | 24.00 | 1.057 | -0.1 | 1.360 | 1.437 |
| | LTE Band 2 | 20M | QPSK | 50 | 0 | Back | 10mm | - | 18700 | 1860 | 22.44 | 23.00 | 1.138 | -0.12 | 1.010 | 1.149 |
| | LTE Band 2 | 20M | QPSK | 50 | 0 | Back | 10mm | - | 18900 | 1880 | 22.36 | 23.00 | 1.159 | -0.13 | 1.060 | 1.228 |
| | LTE Band 2 | 20M | QPSK | 50 | 0 | Back | 10mm | - | 19100 | 1900 | 22.42 | 23.00 | 1.143 | -0.01 | 1.090 | 1.246 |
| | LTE Band 2 | 20M | QPSK | 100 | 0 | Back | 10mm | - | 18700 | 1860 | 22.33 | 23.00 | 1.167 | -0.18 | 1.020 | 1.190 |
| | LTE Band 2 | 20M | QPSK | 1 | 49 | Back | 10mm | Headset | 19100 | 1900 | 23.76 | 24.00 | 1.057 | -0.07 | 1.350 | 1.427 |
| | LTE Band 4 | 20M | QPSK | 1 | 49 | Front | 10mm | - | 20175 | 1732.5 | 23.77 | 24.50 | 1.183 | -0.01 | 0.461 | 0.545 |
| | LTE Band 4 | 20M | QPSK | 50 | 0 | Front | 10mm | - | 20175 | 1732.5 | 22.87 | 23.50 | 1.156 | 0.02 | 0.336 | 0.388 |
| 31 | LTE Band 4 | 20M | QPSK | 1 | 49 | Back | 10mm | - | 20175 | 1732.5 | 23.77 | 24.50 | 1.183 | 0.13 | 0.915 | 1.082 |
| | LTE Band 4 | 20M | QPSK | 50 | 0 | Back | 10mm | - | 20175 | 1732.5 | 22.87 | 23.50 | 1.156 | 0.1 | 0.660 | 0.763 |
| | LTE Band 4 | 20M | QPSK | 100 | 0 | Back | 10mm | - | 20175 | 1732.5 | 22.78 | 23.50 | 1.180 | 0.02 | 0.679 | 0.801 |
| | LTE Band 5 | 10M | QPSK | 1 | 25 | Front | 10mm | - | 20525 | 836.5 | 23.85 | 24.50 | 1.161 | 0.18 | 0.325 | 0.377 |
| | LTE Band 5 | 10M | QPSK | 25 | 25 | Front | 10mm | - | 20525 | 836.5 | 22.76 | 23.50 | 1.186 | 0.01 | 0.268 | 0.318 |
| 32 | LTE Band 5 | 10M | QPSK | 1 | 25 | Back | 10mm | - | 20525 | 836.5 | 23.85 | 24.50 | 1.161 | -0.12 | 0.531 | 0.617 |
| | LTE Band 5 | 10M | QPSK | 25 | 25 | Back | 10mm | - | 20525 | 836.5 | 22.76 | 23.50 | 1.186 | -0.06 | 0.446 | 0.529 |
| | LTE Band 12 | 10M | QPSK | 1 | 25 | Front | 10mm | - | 23095 | 707.5 | 23.68 | 24.50 | 1.208 | -0.08 | 0.293 | 0.354 |
| | LTE Band 12 | 10M | QPSK | 25 | 12 | Front | 10mm | - | 23095 | 707.5 | 22.62 | 23.50 | 1.225 | 0.02 | 0.237 | 0.290 |
| 33 | LTE Band 12 | 10M | QPSK | 1 | 25 | Back | 10mm | - | 23095 | 707.5 | 23.68 | 24.50 | 1.208 | 0.05 | 0.435 | 0.525 |
| | LTE Band 12 | 10M | QPSK | 25 | 12 | Back | 10mm | - | 23095 | 707.5 | 22.62 | 23.50 | 1.225 | -0.03 | 0.331 | 0.405 |
| | LTE Band 13 | 10M | QPSK | 1 | 25 | Front | 10mm | - | 23230 | 782 | 23.89 | 24.50 | 1.151 | -0.08 | 0.362 | 0.417 |
| | LTE Band 13 | 10M | QPSK | 25 | 0 | Front | 10mm | - | 23230 | 782 | 22.76 | 23.50 | 1.186 | -0.06 | 0.278 | 0.330 |
| 34 | LTE Band 13 | 10M | QPSK | 1 | 25 | Back | 10mm | - | 23230 | 782 | 23.89 | 24.50 | 1.151 | -0.05 | 0.593 | 0.682 |
| | LTE Band 13 | 10M | QPSK | 25 | 0 | Back | 10mm | - | 23230 | 782 | 22.76 | 23.50 | 1.186 | 0.03 | 0.442 | 0.524 |

## <WLAN SAR>

| Plot No. | Band | Mode | Test Position | Gap (mm) | Headset | 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | WLAN2.4GHz | 802.11b 1Mbps | Front | 10mm | - | 6 | 2437 | 19.32 | 19.50 | 1.042 | 100 | 1.000 | -0.01 | 0.095 | 0.099 |
| 35 | WLAN2.4GHz | 802.11b 1Mbps | Back | 10mm | - | 6 | 2437 | 19.32 | 19.50 | 1.042 | 100 | 1.000 | -0.02 | 0.170 | 0.177 |
| | WLAN2.4GHz | 802.11b 1Mbps | Back | 10mm | - | 1 | 2412 | 19.25 | 19.50 | 1.059 | 100 | 1.000 | -0.12 | 0.162 | 0.172 |
| | WLAN2.4GHz | 802.11b 1Mbps | Back | 10mm | - | 11 | 2462 | 19.30 | 19.50 | 1.047 | 100 | 1.000 | -0.12 | 0.160 | 0.168 |
| | WLAN5GHz | 802.11a 6Mbps | Front | 10mm | - | 60 | 5300 | 17.24 | 17.50 | 1.062 | 86.69 | 1.154 | -0.12 | 0.051 | 0.062 |
| | WLAN5GHz | 802.11a 6Mbps | Back | 10mm | - | 60 | 5300 | 17.24 | 17.50 | 1.062 | 86.69 | 1.154 | -0.07 | 0.597 | 0.731 |
| 36 | WLAN5GHz | 802.11a 6Mbps | Back | 10mm | - | 56 | 5280 | 17.23 | 17.50 | 1.064 | 86.69 | 1.154 | -0.01 | 0.609 | 0.748 |
| | WLAN5GHz | 802.11a 6Mbps | Back | 10mm | - | 52 | 5260 | 17.22 | 17.50 | 1.067 | 86.69 | 1.154 | -0.04 | 0.575 | 0.708 |
| | WLAN5GHz | 802.11a 6Mbps | Back | 10mm | - | 64 | 5320 | 14.33 | 14.50 | 1.040 | 86.69 | 1.154 | 0.04 | 0.284 | 0.341 |
| | WLAN5GHz | 802.11a 6Mbps | Front | 10mm | - | 116 | 5580 | 17.37 | 17.50 | 1.030 | 86.69 | 1.154 | 0.11 | 0.015 | 0.018 |
| | WLAN5GHz | 802.11a 6Mbps | Back | 10mm | - | 116 | 5580 | 17.37 | 17.50 | 1.030 | 86.69 | 1.154 | 0.01 | 0.200 | 0.238 |
| | WLAN5GHz | 802.11a 6Mbps | Back | 10mm | - | 100 | 5500 | 14.09 | 14.50 | 1.099 | 86.69 | 1.154 | 0 | 0.242 | 0.307 |
| 37 | WLAN5GHz | 802.11a 6Mbps | Back | 10mm | - | 132 | 5660 | 17.33 | 17.50 | 1.040 | 86.69 | 1.154 | 0.1 | 0.265 | 0.318 |
| | WLAN5GHz | 802.11a 6Mbps | Back | 10mm | - | 140 | 5700 | 14.17 | 14.50 | 1.079 | 86.69 | 1.154 | -0.03 | 0.074 | 0.092 |
| | WLAN5GHz | 802.11a 6Mbps | Front | 10mm | - | 157 | 5785 | 17.42 | 17.50 | 1.019 | 86.69 | 1.154 | 0.18 | 0.011 | 0.013 |
| | WLAN5GHz | 802.11a 6Mbps | Back | 10mm | - | 157 | 5785 | 17.42 | 17.50 | 1.019 | 86.69 | 1.154 | -0.06 | 0.116 | 0.136 |
| 38 | WLAN5GHz | 802.11a 6Mbps | Back | 10mm | - | 149 | 5745 | 17.18 | 17.50 | 1.076 | 86.69 | 1.154 | -0.04 | 0.133 | 0.165 |
| | WLAN5GHz | 802.11a 6Mbps | Back | 10mm | - | 165 | 5825 | 17.17 | 17.50 | 1.079 | 86.69 | 1.154 | -0.04 | 0.087 | 0.108 |

## <Bluetooth SAR>

| Plot No. | Band | Mode | Test Position | Gap (mm) | Headset | 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bluetooth | 1Mbps | Front | 10mm | - | 0 | 2402 | 10.38 | 11.70 | 1.355 | 76.72 | 1.086 | -0.05 | 0.007 | 0.010 |
| | Bluetooth | 1Mbps | Back | 10mm | - | 0 | 2402 | 10.38 | 11.70 | 1.355 | 76.72 | 1.086 | 0.16 | 0.012 | 0.018 |
| 39 | Bluetooth | 1Mbps | Back | 10mm | - | 39 | 2441 | 10.21 | 11.70 | 1.409 | 76.72 | 1.086 | 0.09 | 0.013 | 0.020 |
| | Bluetooth | 1Mbps | Back | 10mm | - | 78 | 2480 | 9.14 | 9.90 | 1.191 | 76.72 | 1.086 | -0.05 | 0.010 | 0.013 |

## 13.5 Repeated SAR Measurement

| No. | Band | Mode | 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 | WCDMA II | RMC 12.2Kbps | Back | 10mm | 9538 | 1907.6 | 23.13 | 23.20 | 1.016 | -0.17 | 1.420 | | 1.443 |
| 2nd | WCDMA II | RMC 12.2Kbps | Back | 10mm | 9538 | 1907.6 | 23.13 | 23.20 | 1.016 | 0.13 | 1.400 | 1.01 | 1.423 |
| 1st | LTE Band 4 | 20M_QPSK_1_49 | Back | 10mm | 20175 | 1732.5 | 23.77 | 24.50 | 1.183 | 0.13 | 0.915 | | 1.082 |
| 2nd | LTE Band 4 | 20M_QPSK_1_49 | Back | 10mm | 20175 | 1732.5 | 23.77 | 24.50 | 1.183 | 0.05 | 0.858 | 1.07 | 1.015 |

| 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 | 49 | Back | 0mm | 19100 | 1900 | 23.76 | 24.00 | 1.057 | 0.05 | 2.670 | | 2.822 |
| 2nd | LTE Band 2 | 20M | QPSK | 1 | 49 | Back | 0mm | 19100 | 1900 | 23.76 | 24.00 | 1.057 | -0.07 | 2.640 | 1.01 | 2.790 |

**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 | Portable Handset | | | |
|---|---|---|---|---|---|
| | | Head | Body-worn | Hotspot | Product Specific |
| 1. | WCDMA + WLAN2.4GHz | Yes | Yes | Yes | Yes |
| 2. | LTE + WLAN2.4GHz | Yes | Yes | Yes | Yes |
| 3. | WCDMA+ Bluetooth | Yes | Yes | Yes | Yes |
| 4. | LTE + Bluetooth | Yes | Yes | Yes | Yes |
| 5. | WCDMA + WLAN5GHz | Yes | Yes | Yes | Yes |
| 6. | LTE + WLAN5GHz | Yes | Yes | Yes | Yes |

**General Note:**

1. This device WLAN 2.4GHz supports Hotspot operation and Bluetooth support tethering applications.
2. WLAN and Bluetooth share the same antenna, and cannot transmit simultaneously.
3. All licensed modes share the same antenna part and cannot transmit simultaneously.
4. EUT will choose either WLAN 2.4GHz or WLAN 5GHz according to the network signal condition; therefore, 2.4GHz WLAN and 5GHz WLAN will not operate simultaneously at any moment.
5. The Scaled SAR summation is calculated based on the same configuration and test position.
6. 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 14.5.

## 14.1 Head Exposure Conditions

| WWAN Band | | Exposure Position | 1 WWAN 1g SAR (W/kg) | 2 2.4GHz WLAN 1g SAR (W/kg) | 3 5GHz WLAN 1g SAR (W/kg) | 4 Bluetooth 1g SAR (W/kg) | 1+2 Summed 1g SAR (W/kg) | 1+3 Summed 1g SAR (W/kg) | 1+4 Summed 1g SAR (W/kg) |
|---|---|---|---|---|---|---|---|---|---|
| WCDMA | WCDMA II | Right Cheek | 0.684 | 0.423 | 0.284 | 0.034 | **1.107** | **0.968** | **0.718** |
| | | Right Tilted | 0.235 | 0.233 | 0.179 | 0.016 | **0.468** | **0.414** | **0.251** |
| | | Left Cheek | 0.408 | 0.197 | 0.185 | 0.016 | **0.605** | **0.593** | **0.424** |
| | | Left Tilted | 0.270 | 0.183 | 0.158 | 0.016 | **0.453** | **0.428** | **0.286** |
| | WCDMA V | Right Cheek | 0.397 | 0.423 | 0.284 | 0.034 | **0.820** | **0.681** | **0.431** |
| | | Right Tilted | 0.236 | 0.233 | 0.179 | 0.016 | **0.469** | **0.415** | **0.252** |
| | | Left Cheek | 0.441 | 0.197 | 0.185 | 0.016 | **0.638** | **0.626** | **0.457** |
| | | Left Tilted | 0.222 | 0.183 | 0.158 | 0.016 | **0.405** | **0.380** | **0.238** |
| LTE | LTE Band 2 | Right Cheek | 0.768 | 0.423 | 0.284 | 0.034 | **1.191** | **1.052** | **0.802** |
| | | Right Tilted | 0.355 | 0.233 | 0.179 | 0.016 | **0.588** | **0.534** | **0.371** |
| | | Left Cheek | 0.481 | 0.197 | 0.185 | 0.016 | **0.678** | **0.666** | **0.497** |
| | | Left Tilted | 0.382 | 0.183 | 0.158 | 0.016 | **0.565** | **0.540** | **0.398** |
| | LTE Band 4 | Right Cheek | 0.838 | 0.423 | 0.284 | 0.034 | **1.261** | **1.122** | **0.872** |
| | | Right Tilted | 0.351 | 0.233 | 0.179 | 0.016 | **0.584** | **0.530** | **0.367** |
| | | Left Cheek | 0.461 | 0.197 | 0.185 | 0.016 | **0.658** | **0.646** | **0.477** |
| | | Left Tilted | 0.408 | 0.183 | 0.158 | 0.016 | **0.591** | **0.566** | **0.424** |
| | LTE Band 5 | Right Cheek | 0.355 | 0.423 | 0.284 | 0.034 | **0.778** | **0.639** | **0.389** |
| | | Right Tilted | 0.264 | 0.233 | 0.179 | 0.016 | **0.497** | **0.443** | **0.280** |
| | | Left Cheek | 0.438 | 0.197 | 0.185 | 0.016 | **0.635** | **0.623** | **0.454** |
| | | Left Tilted | 0.231 | 0.183 | 0.158 | 0.016 | **0.414** | **0.389** | **0.247** |
| | LTE Band 12 | Right Cheek | 0.308 | 0.423 | 0.284 | 0.034 | **0.731** | **0.592** | **0.342** |
| | | Right Tilted | 0.184 | 0.233 | 0.179 | 0.016 | **0.417** | **0.363** | **0.200** |
| | | Left Cheek | 0.274 | 0.197 | 0.185 | 0.016 | **0.471** | **0.459** | **0.290** |
| | | Left Tilted | 0.158 | 0.183 | 0.158 | 0.016 | **0.341** | **0.316** | **0.174** |
| | LTE Band 13 | Right Cheek | 0.307 | 0.423 | 0.284 | 0.034 | **0.730** | **0.591** | **0.341** |
| | | Right Tilted | 0.185 | 0.233 | 0.179 | 0.016 | **0.418** | **0.364** | **0.201** |
| | | Left Cheek | 0.367 | 0.197 | 0.185 | 0.016 | **0.564** | **0.552** | **0.383** |
| | | Left Tilted | 0.171 | 0.183 | 0.158 | 0.016 | **0.354** | **0.329** | **0.187** |

## 14.2 Hotspot Exposure Conditions

| WWAN Band | | Exposure Position | 1 WWAN 1g SAR (W/kg) | 2 2.4GHz WLAN 1g SAR (W/kg) | 3 5GHz WLAN 1g SAR (W/kg) | 4 Bluetooth 1g SAR (W/kg) | 1+2 Summed 1g SAR (W/kg) | 1+3 Summed 1g SAR (W/kg) | 1+4 Summed 1g SAR (W/kg) | 1+2 SPLSR | 1+2 Case No | 1+3 SPLSR | 1+3 Case No |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WCDMA | WCDMA II | Front | 0.611 | 0.099 | 0.013 | 0.010 | **0.710** | **0.624** | **0.621** | | | | |
| | | Back | 1.443 | 0.177 | 0.287 | 0.018 | **1.620** | **1.730** | **1.461** | 0.02 | Case 1 | 0.02 | Case 10 |
| | | Left side | 0.072 | 0.193 | 0.075 | 0.024 | **0.265** | **0.147** | **0.096** | | | | |
| | | Right side | 0.644 | | | | **0.644** | **0.644** | **0.644** | | | | |
| | | Top side | | 0.099 | 0.039 | 0.011 | **0.099** | **0.039** | **0.011** | | | | |
| | | Bottom side | 0.975 | | | | **0.975** | **0.975** | **0.975** | | | | |
| | WCDMA V | Front | 0.398 | 0.099 | 0.013 | 0.010 | **0.497** | **0.411** | **0.408** | | | | |
| | | Back | 0.705 | 0.177 | 0.287 | 0.018 | **0.882** | **0.992** | **0.723** | | | | |
| | | Left side | 0.490 | 0.193 | 0.075 | 0.024 | **0.683** | **0.565** | **0.514** | | | | |
| | | Right side | 0.364 | | | | **0.364** | **0.364** | **0.364** | | | | |
| | | Top side | | 0.099 | 0.039 | 0.011 | **0.099** | **0.039** | **0.011** | | | | |
| | | Bottom side | 0.029 | | | | **0.029** | **0.029** | **0.029** | | | | |
| LTE | LTE Band 2 | Front | 0.616 | 0.099 | 0.013 | 0.010 | **0.715** | **0.629** | **0.626** | | | | |
| | | Back | 1.437 | 0.177 | 0.287 | 0.018 | **1.614** | **1.724** | **1.455** | 0.02 | Case 2 | 0.02 | Case 11 |
| | | Left side | 0.065 | 0.193 | 0.075 | 0.024 | **0.258** | **0.140** | **0.089** | | | | |
| | | Right side | 0.577 | | | | **0.577** | **0.577** | **0.577** | | | | |
| | | Top side | | 0.099 | 0.039 | 0.011 | **0.099** | **0.039** | **0.011** | | | | |
| | | Bottom side | 1.027 | | | | **1.027** | **1.027** | **1.027** | | | | |
| | LTE Band 4 | Front | 0.545 | 0.099 | 0.013 | 0.010 | **0.644** | **0.558** | **0.555** | | | | |
| | | Back | 1.082 | 0.177 | 0.287 | 0.018 | **1.259** | **1.369** | **1.100** | | | | |
| | | Left side | 0.050 | 0.193 | 0.075 | 0.024 | **0.243** | **0.125** | **0.074** | | | | |
| | | Right side | 0.401 | | | | **0.401** | **0.401** | **0.401** | | | | |
| | | Top side | | 0.099 | 0.039 | 0.011 | **0.099** | **0.039** | **0.011** | | | | |
| | | Bottom side | 0.681 | | | | **0.681** | **0.681** | **0.681** | | | | |
| | LTE Band 5 | Front | 0.377 | 0.099 | 0.013 | 0.010 | **0.476** | **0.390** | **0.387** | | | | |
| | | Back | 0.617 | 0.177 | 0.287 | 0.018 | **0.794** | **0.904** | **0.635** | | | | |
| | | Left side | 0.576 | 0.193 | 0.075 | 0.024 | **0.769** | **0.651** | **0.600** | | | | |
| | | Right side | 0.379 | | | | **0.379** | **0.379** | **0.379** | | | | |
| | | Top side | | 0.099 | 0.039 | 0.011 | **0.099** | **0.039** | **0.011** | | | | |
| | | Bottom side | 0.128 | | | | **0.128** | **0.128** | **0.128** | | | | |
| | LTE Band 12 | Front | 0.354 | 0.099 | 0.013 | 0.010 | **0.453** | **0.367** | **0.364** | | | | |
| | | Back | 0.525 | 0.177 | 0.287 | 0.018 | **0.702** | **0.812** | **0.543** | | | | |
| | | Left side | 0.391 | 0.193 | 0.075 | 0.024 | **0.584** | **0.466** | **0.415** | | | | |
| | | Right side | 0.325 | | | | **0.325** | **0.325** | **0.325** | | | | |
| | | Top side | | 0.099 | 0.039 | 0.011 | **0.099** | **0.039** | **0.011** | | | | |
| | | Bottom side | 0.016 | | | | **0.016** | **0.016** | **0.016** | | | | |
| | LTE Band 13 | Front | 0.417 | 0.099 | 0.013 | 0.010 | **0.516** | **0.430** | **0.427** | | | | |
| | | Back | 0.682 | 0.177 | 0.287 | 0.018 | **0.859** | **0.969** | **0.700** | | | | |
| | | Left side | 0.450 | 0.193 | 0.075 | 0.024 | **0.643** | **0.525** | **0.474** | | | | |
| | | Right side | 0.400 | | | | **0.400** | **0.400** | **0.400** | | | | |
| | | Top side | | 0.099 | 0.039 | 0.011 | **0.099** | **0.039** | **0.011** | | | | |
| | | Bottom side | 0.071 | | | | **0.071** | **0.071** | **0.071** | | | | |

## 14.3 Product Specific Conditions

| WWAN Band | | Exposure Position | 1 WWAN 10g SAR (W/kg) | 2 2.4GHz WLAN 10g SAR (W/kg) | 3 5GHz WLAN 10g SAR (W/kg) | 4 Bluetooth 10g SAR (W/kg) | 1+2 Summed 10g SAR (W/kg) | 1+3 Summed 10g SAR (W/kg) | 1+4 Summed 10g SAR (W/kg) |
|---|---|---|---|---|---|---|---|---|---|
| WCDMA | WCDMA II | Front | - | - | 0.083 | - | **0.000** | **0.083** | **0.000** |
| | | Back | 2.612 | - | 0.664 | - | **2.612** | **3.276** | **2.612** |
| | | Left side | - | - | 0.561 | - | **0.000** | **0.561** | **0.000** |
| | | Right side | - | - | - | - | **0.000** | **0.000** | **0.000** |
| | | Top side | - | - | 0.131 | - | **0.000** | **0.131** | **0.000** |
| | | Bottom side | - | - | - | - | **0.000** | **0.000** | **0.000** |
| LTE | LTE Band 2 | Front | - | - | 0.083 | - | **0.000** | **0.083** | **0.000** |
| | | Back | 2.822 | - | 0.664 | - | **2.822** | **3.486** | **2.822** |
| | | Left side | - | - | 0.561 | - | **0.000** | **0.561** | **0.000** |
| | | Right side | - | - | - | - | **0.000** | **0.000** | **0.000** |
| | | Top side | - | - | 0.131 | - | **0.000** | **0.131** | **0.000** |
| | | Bottom side | - | - | - | - | **0.000** | **0.000** | **0.000** |

**Note:**

1. According to KDB 941225 D06 v02r01 and KDB 648474 D04v01r03, for WWAN / 2.4GHz WLAN / Bluetooth and 5GHz WLAN SAR ("-") was excluded, due to transmitting antenna located larger 25mm from that surface or edge and Hotspot SAR was < 1.2W/Kg.

## 14.4 Body-Worn Accessory Exposure Conditions

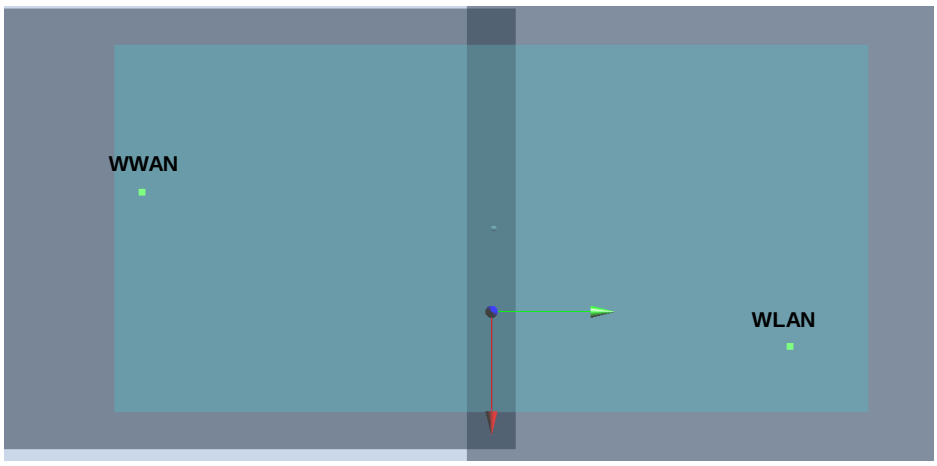
| WWAN Band | | Exposure Position | 1 WWAN 1g SAR (W/kg) | 2 2.4GHz WLAN 1g SAR (W/kg) | 3 5GHz WLAN 1g SAR (W/kg) | 4 Bluetooth 1g SAR (W/kg) | 1+2 Summed 1g SAR (W/kg) | 1+3 Summed 1g SAR (W/kg) | 1+4 Summed 1g SAR (W/kg) | SPLSR | Case No | SPLSR | Case No |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WCDMA | WCDMA II | Front | 0.611 | 0.099 | 0.062 | 0.010 | **0.710** | **0.673** | **0.621** | | | | |
| | | Back | 1.443 | 0.177 | 0.748 | 0.020 | **1.620** | **2.191** | **1.463** | 0.02 | Case 1 | 0.03 | Case 5 |
| | | Back with Headset | 1.433 | 0.177 | 0.748 | 0.020 | **1.610** | **2.181** | **1.453** | 0.02 | Case 3 | 0.02 | Case 6 |
| | WCDMA V | Front | 0.398 | 0.099 | 0.062 | 0.010 | **0.497** | **0.460** | **0.408** | | | | |
| | | Back | 0.705 | 0.177 | 0.748 | 0.020 | **0.882** | **1.453** | **0.725** | | | | |
| LTE | LTE Band 2 | Front | 0.616 | 0.099 | 0.062 | 0.010 | **0.715** | **0.678** | **0.626** | | | | |
| | | Back | 1.437 | 0.177 | 0.748 | 0.020 | **1.614** | **2.185** | **1.457** | 0.02 | Case 2 | 0.02 | Case 7 |
| | | Back with Headset | 1.427 | 0.177 | 0.748 | 0.020 | **1.604** | **2.175** | **1.447** | 0.01 | Case 4 | 0.02 | Case 8 |
| | LTE Band 4 | Front | 0.545 | 0.099 | 0.062 | 0.010 | **0.644** | **0.607** | **0.555** | | | | |
| | | Back | 1.082 | 0.177 | 0.748 | 0.020 | **1.259** | **1.830** | **1.102** | | | 0.02 | Case 9 |
| | LTE Band 5 | Front | 0.377 | 0.099 | 0.062 | 0.010 | **0.476** | **0.439** | **0.387** | | | | |
| | | Back | 0.617 | 0.177 | 0.748 | 0.020 | **0.794** | **1.365** | **0.637** | | | | |
| | LTE Band 12 | Front | 0.354 | 0.099 | 0.062 | 0.010 | **0.453** | **0.416** | **0.364** | | | | |
| | | Back | 0.525 | 0.177 | 0.748 | 0.020 | **0.702** | **1.273** | **0.545** | | | | |
| | LTE Band 13 | Front | 0.417 | 0.099 | 0.062 | 0.010 | **0.516** | **0.479** | **0.427** | | | | |
| | | Back | 0.682 | 0.177 | 0.748 | 0.020 | **0.859** | **1.430** | **0.702** | | | | |

## 14.5 SPLSR Evaluation and Analysis

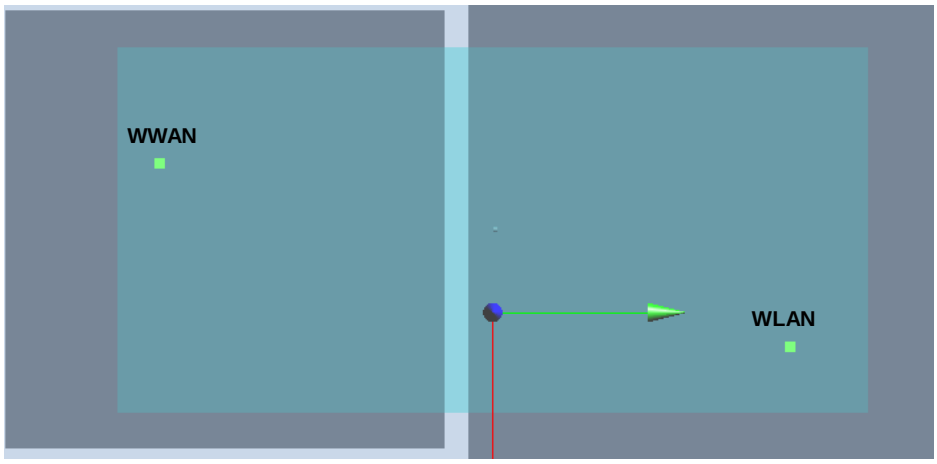
**General Note:**

1. SPLSR = $(SAR_1 + SAR_2)^{1.5}$ / (*min. separation distance, mm*). If SPLSR ≤ 0.04, simultaneously transmission SAR measurement is not necessary

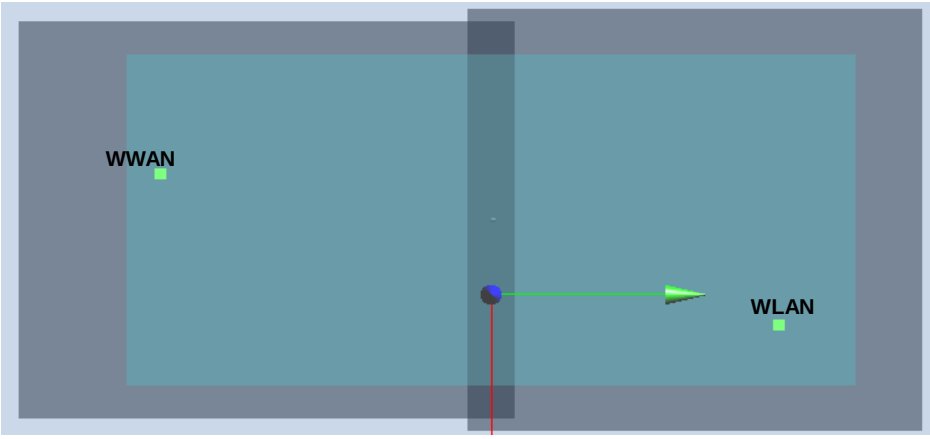
| Case 1 | Band | Position | SAR (W/kg) | Gap (cm) | SAR peak location (m) X | Y | Z | 3D distance (mm) | Summed SAR (W/kg) | SPLSR Results | Simultaneous SAR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | WCDMA II | Back | 1.443 | 10mm | -9.1 | -69.9 | -1.15 | 135.0 | 1.62 | 0.02 | Not required |
| | WLAN2.4GHz | | 0.177 | 10mm | 24 | 61 | -1.16 | | | | |



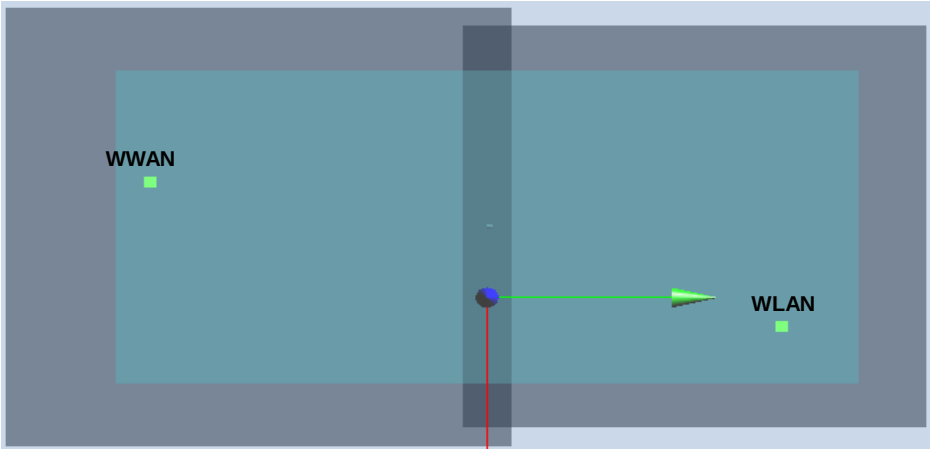

| Case 2 | Band | Position | SAR (W/kg) | Gap (cm) | SAR peak location (m) X | Y | Z | 3D distance (mm) | Summed SAR (W/kg) | SPLSR Results | Simultaneous SAR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | LTE Band 2 | Back | 1.437 | 10mm | -11.3 | -69.1 | -1.13 | 134.8 | 1.61 | 0.02 | Not required |
| | WLAN2.4GHz | | 0.177 | 10mm | 24 | 61 | -1.16 | | | | |



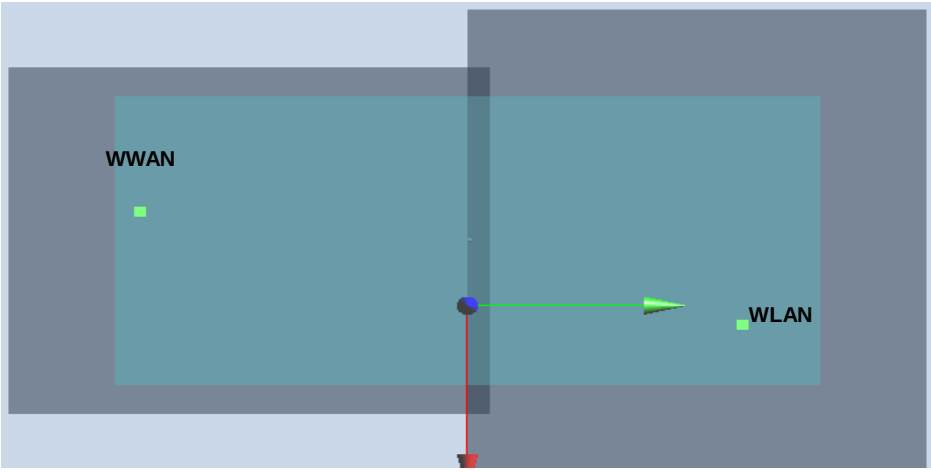
| Case 3 | Band | Position | SAR (W/kg) | Gap (cm) | SAR peak location (m) X | Y | Z | 3D distance (mm) | Summed SAR (W/kg) | SPLSR Results | Simultaneous SAR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | WCDMA II | Back + Headset | 1.433 | 10mm | -10.5 | -70 | -1.14 | 135.5 | 1.61 | 0.02 | Not required |
| | WLAN2.4GHz | | 0.177 | 10mm | 24 | 61 | -1.16 | | | | |



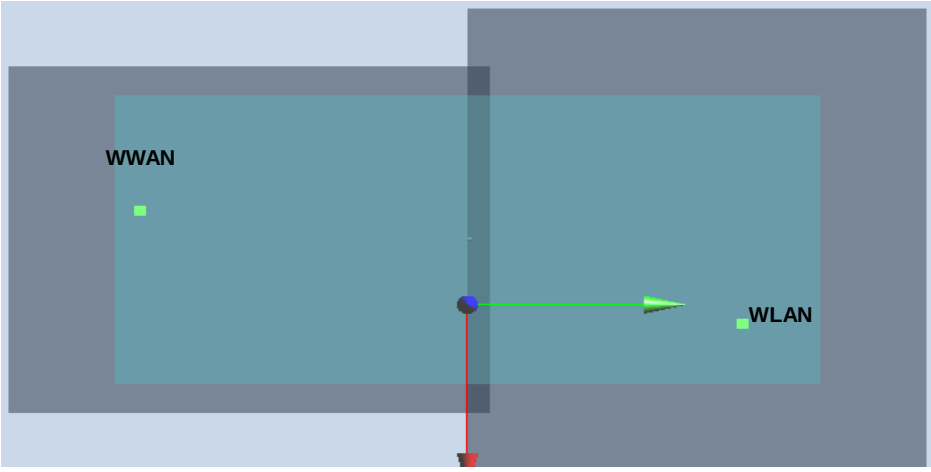

| Case 4 | Band | Position | SAR (W/kg) | Gap (cm) | SAR peak location (m) X | Y | Z | 3D distance (mm) | Summed SAR (W/kg) | SPLSR Results | Simultaneous SAR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | LTE Band 2 | Back+Headset | 1.427 | 10mm | -13.7 | -70 | -1.16 | 136.3 | 1.60 | 0.01 | Not required |
| | WLAN2.4GHz | | 0.177 | 10mm | 24 | 61 | -1.16 | | | | |



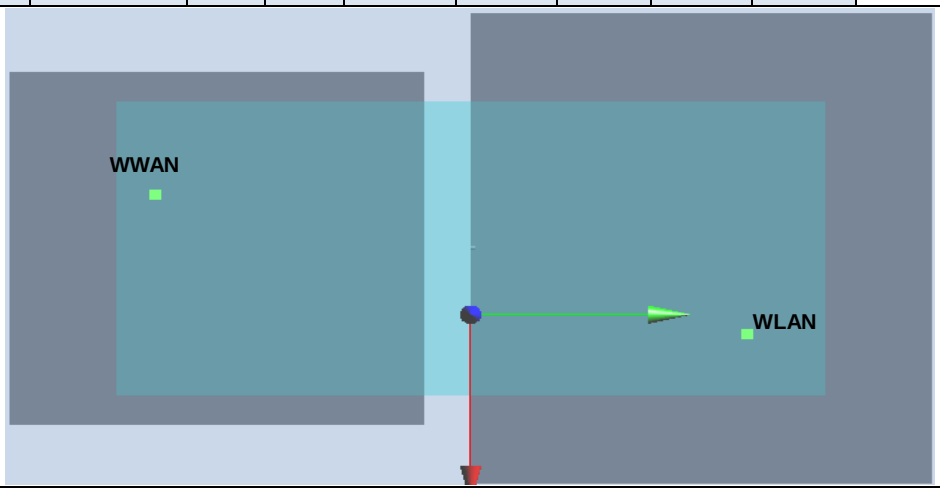
| Case 5 | Band | Position | SAR (W/kg) | Gap (cm) | SAR peak location (m) X | Y | Z | 3D distance (mm) | Summed SAR (W/kg) | SPLSR Results | Simultaneous SAR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | WCDMA II | Back | 1.443 | 10mm | -9.1 | -69.9 | -1.15 | 129.7 | 2.19 | 0.03 | Not required |
| | WLAN5GHz | | 0.748 | 10mm | 22 | 56 | -0.39 | | | | |



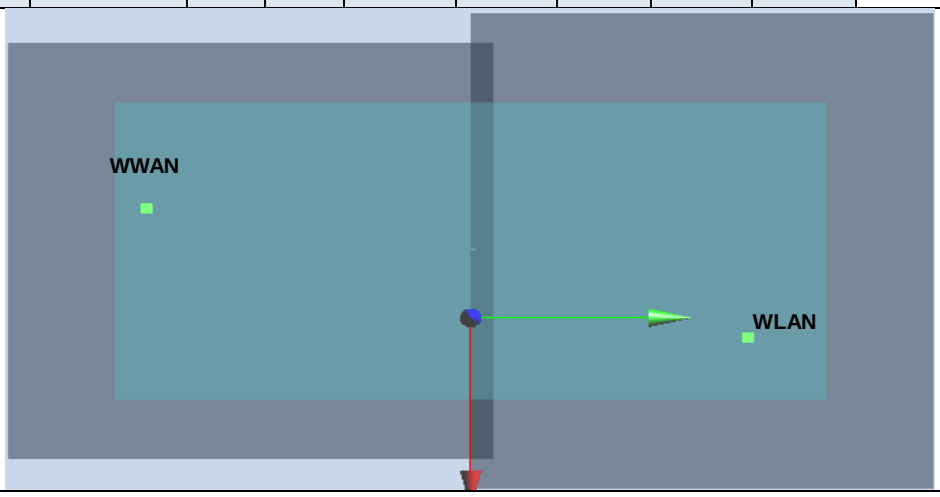

| Case 6 | Band | Position | SAR (W/kg) | Gap (cm) | SAR peak location (m) X | Y | Z | 3D distance (mm) | Summed SAR (W/kg) | SPLSR Results | Simultaneous SAR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | WCDMA II | Back + Headset | 1.433 | 10mm | -10.5 | -70 | -1.14 | 130.1 | 2.18 | 0.02 | Not required |
| | WLAN5GHz | | 0.748 | 10mm | 22 | 56 | -0.39 | | | | |



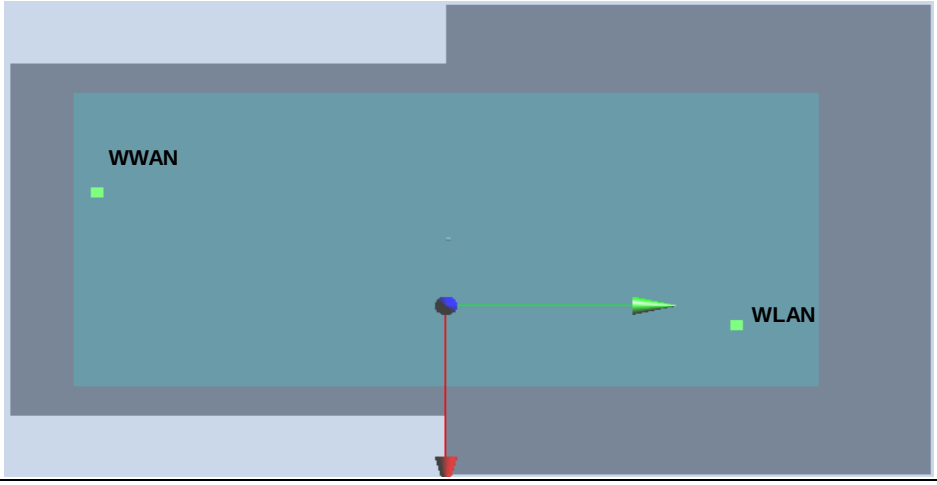
| Case 7 | Band | Position | SAR (W/kg) | Gap (cm) | SAR peak location (m) X | Y | Z | 3D distance (mm) | Summed SAR (W/kg) | SPLSR Results | Simultaneous SAR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | LTE Band 2 | Back | 1.437 | 10mm | -11.3 | -69.1 | -1.13 | 129.5 | 2.19 | 0.02 | Not required |
| | WLAN5GHz | | 0.748 | 10mm | 22 | 56 | -0.39 | | | | |



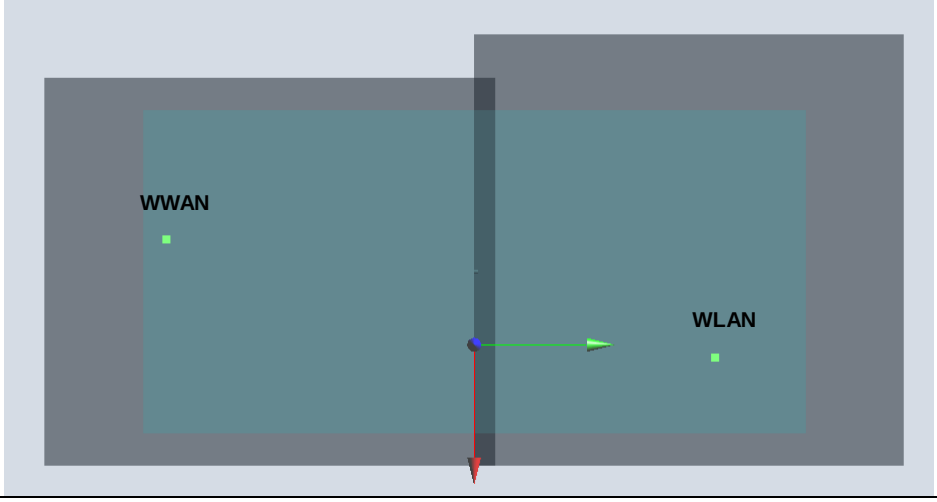

| Case 8 | Band | Position | SAR (W/kg) | Gap (cm) | SAR peak location (m) X | Y | Z | 3D distance (mm) | Summed SAR (W/kg) | SPLSR Results | Simultaneous SAR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | LTE Band 2 | Back + Headset | 1.427 | 10mm | -13.7 | -70 | -1.16 | 131.0 | 2.18 | 0.02 | Not required |
| | WLAN5GHz | | 0.748 | 10mm | 22 | 56 | -0.39 | | | | |



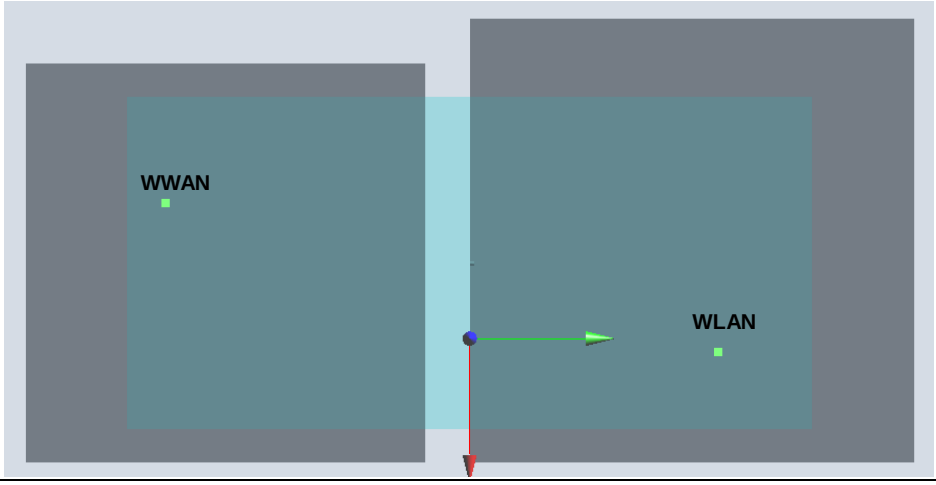
| Case 9 | Band | Position | SAR (W/kg) | Gap (cm) | SAR peak location (m) X | Y | Z | 3D distance (mm) | Summed SAR (W/kg) | SPLSR Results | Simultaneous SAR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | LTE Band 4 | Back | 1.082 | 10mm | -9.8 | -69.4 | -0.51 | 129.4 | 1.83 | 0.02 | Not required |
| | WLAN5GHz | | 0.748 | 10mm | 22 | 56 | -0.39 | | | | |




| Case 10 | Band | Position | SAR (W/kg) | Gap (cm) | SAR peak location (m) X | Y | Z | 3D distance (mm) | Summed SAR (W/kg) | SPLSR Results | Simultaneous SAR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | WCDMA II | Back | 1.443 | 10mm | -9.1 | -69.9 | -1.15 | 127.1 | 1.73 | 0.02 | Not required |
| | WLAN5GHz | | 0.287 | 10mm | 24 | 52.8 | -2.03 | | | | |



| Case 11 | Band | Position | SAR (W/kg) | Gap (cm) | SAR peak location (m) X | Y | Z | 3D distance (mm) | Summed SAR (W/kg) | SPLSR Results | Simultaneous SAR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | LTE Band 2 | Back | 1.437 | 10mm | -11.3 | -69.1 | -1.13 | 126.9 | 1.72 | 0.02 | Not required |
| | WLAN5GHz | | 0.287 | 10mm | 24 | 52.8 | -2.03 | | | | |




**Test Engineer：** Bevis Chang Tom Jiang Kurt Liu Wilson Lin Jay Jian Willy Yu Andy Jiang Randy Lin Neil Hsiang and White Huang

## 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.

## 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 648474 D03 v01r04, “Evaluation and Approval Considerations for Handsets with Specific Wireless Charging Battery Covers” Dec 2015.

[7] FCC KDB 648474 D04 v01r03, “SAR Evaluation Considerations for Wireless Handsets”, Oct 2015.

[8] FCC KDB 941225 D01 v03r01, “3G SAR MEAUREMENT PROCEDURES”, Oct 2015

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

[10] FCC KDB 941225 D06 v02r01, "SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities", Oct 2015.

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

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