# SAR EVALUATION REPORT

## CLASS II PERMISSIVE CHANGE

**FCC 47 CFR § 2.1093**
**IEEE Std 1528-2013**

*For*
**GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac & NFC**

**FCC ID: PY7-96946K**

**Report Number: 16J23633D-S1V2**
**Issue Date: 8/22/2016**

*Prepared for*
**SONY MOBILE COMMUNICATIONS INC.**
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NVLAP LAB CODE 200065-0

**Revision History**

| Rev. | Date | Revisions | Revised By |
|---|---|---|---|
| V1 | 8/17/2016 | Initial Issue | -- |
| V2 | 8/22/2016 | Section 10.2: Updated Table | Coltyce Sanders |
| | | | |
| | | | |

**Table of Contents**

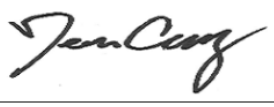
# 1. Attestation of Test Results

| | | | | |
|---|---|---|---|---|
| Applicant Name | SONY MOBILE COMMUNICATIONS INC. | | | |
| FCC ID | PY7-96946K | | | |
| Applicable Standards | FCC 47 CFR § 2.1093<br>Published RF exposure KDB procedures<br>IEEE Std 1528-2013 | | | |
| Exposure Category | SAR Limits (W/Kg) | | | |
| | Peak spatial-average(1g of tissue) | | Extremities (hands, wrists, ankles, etc.) (10g of tissue) | |
| General population / Uncontrolled exposure | 1.6 | | 4 | |
| RF Exposure Conditions | Equipment Class - Highest Reported SAR (W/kg) | | | |
| | PCE | DTS | NII | DSS |
| Head | 0.520 | 0.529 | 0.810 | N/A |
| Body-worn | 0.300 | 0.055 | 0.039 | |
| Hotspot/Wi-Fi Direct | 0.661 | 0.125 | N/A | |
| Extremity | N/A | N/A | 0.251 | |
| Simultaneous Tx | 1.403 | | | 0.675 |
| Date Tested | 7/29/2016 to 8/5/2016 | | | |
| Test Results | Pass | | | |

Note: The proposed CIIPC requires SAR testing for LTE Bands 7 and 41 due to antenna pattern matching differences from the original model. The SAR measurement results from the original filing can be found in FCC SAR report PY7-29752M. This report only contains the SAR values for the added LTE Bands. Please refer to the original filling for the highest SAR values. The Wi-Fi and BT results from the original filling have been used in this report for simultaneous transmission analysis. The Wi-Fi and BT results from the original filling are listed above.

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

**Note:** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government (NIST Handbook 150, Annex A). This report is written to support regulatory compliance of the applicable standards stated above.

| Approved & Released By: | Prepared By: |
|---|---|
|  |  |
| Devin Chang<br>Senior Engineer<br>UL Verification Services Inc. | AJ Newcomer<br>Laboratory Engineer<br>UL Verification Services Inc. |

# 2. Test Specification, Methods and Procedures

The tests documented in this report were performed in accordance with FCC 47 CFR § 2.1093, IEEE STD 1528-2013, the following FCC Published RF exposure KDB procedures:

- 447498 D01 General RF Exposure Guidance v06
- 447498 D03 Supplement C Cross-Reference v01
- 648474 D04 Handset SAR v01r03
- 865664 D01 SAR measurement 100 MHz to 6 GHz v01r04
- 865664 D02 RF Exposure Reporting v01r02
- 941225 D05 SAR for LTE Devices v02r05
- 941225 D05A LTE Rel.10 KDB Inquiry Sheet v01r02
- 941225 D06 Hotspot Mode v02r01

In addition to the above, the following information was used:

- TCB workshop October, 2014; Page 36, RF Exposure Procedures Update (Overlapping LTE Bands)
- TCB workshop October, 2014; Page 37, LTE Considerations (LTE Band 41 Test Channels)

# 3. Facilities and Accreditation

The test sites and measurement facilities used to collect data are located at

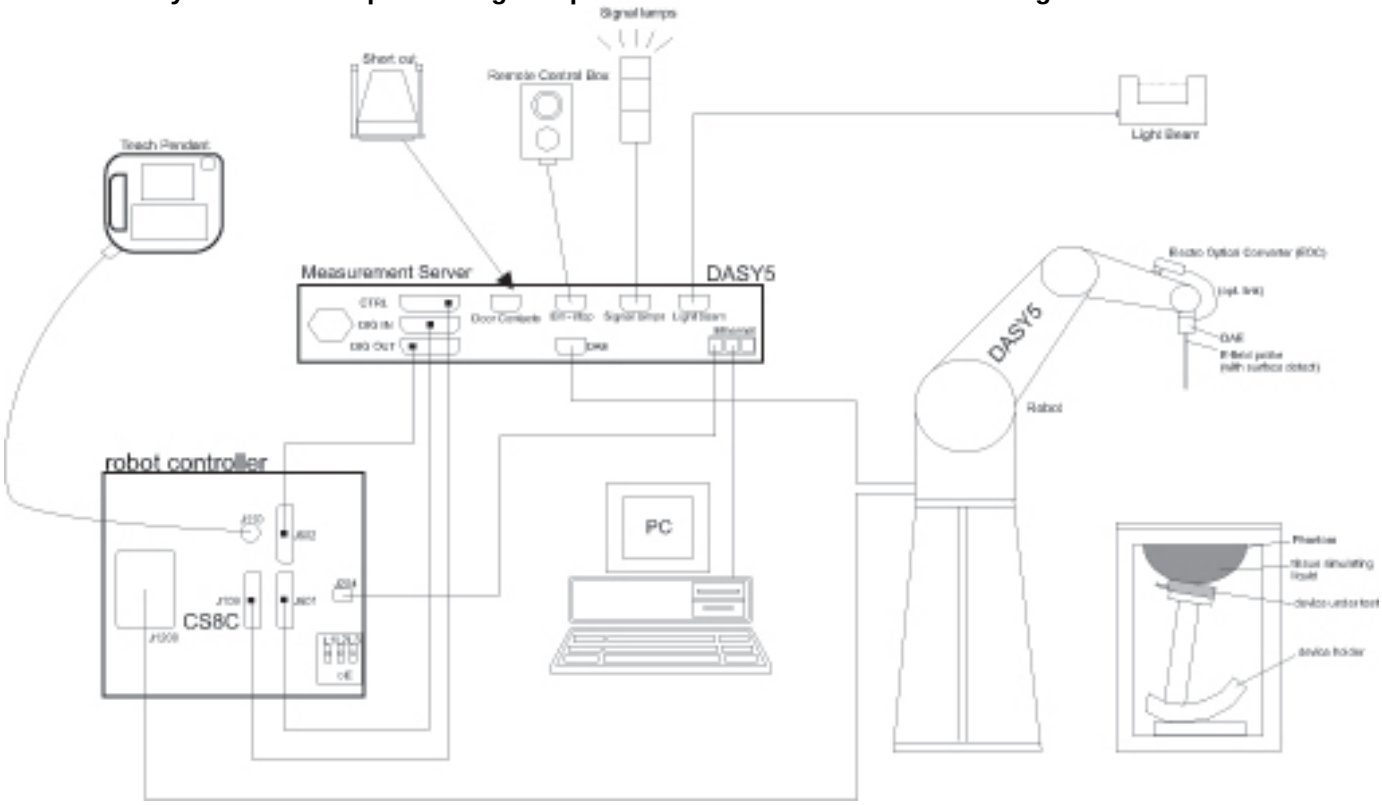
| 47173 Benicia Street | 47266 Benicia Street |
|---|---|
| SAR Lab A | SAR Lab 1 |
| SAR Lab B | SAR Lab 2 |
| SAR Lab C | SAR Lab 3 |
| SAR Lab D | SAR Lab 4 |
| SAR Lab E | SAR Lab 5 |
| SAR Lab F | |
| SAR Lab G | |
| SAR Lab H | |

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0.

# 4. SAR Measurement System & Test Equipment

## 4.1. SAR Measurement System

**The DASY5 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.

## 4.2. SAR Scan Procedures

**Step 1: 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. The minimum distance of probe sensors to surface is 2.1 mm. This distance cannot be smaller than the distance of sensor calibration points to probe tip as defined in the probe properties.

**Step 2: 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 locations even in relatively coarse grids. When an Area Scan has measured all reachable points, it computes the field maximal found in the scanned area, within a range of the global maximum. The range (in dB) is specified in the standards for compliance testing. For example, a 2 dB range is required in 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 KDB 865664 D01 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. | |

**Step 3: Zoom Scan**

Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The Zoom Scan measures points (refer to table below) within a cube whose 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 g and 10 g and displays these values next to the job's label.

Zoom Scan Parameters extracted from KDB 865664 D01 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 | ≤ $1.5 \cdot \Delta z_{Zoom}(n-1)$ | |
| 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.

**Step 4: Power drift measurement**

The Power Drift Measurement measures the field at the same location as the most recent power reference measurement within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the last Power Reference Measurement. This allows a user to monitor the power drift of the device under test within a batch process. The measurement procedure is the same as Step 1.

**Step 5: Z-Scan (FCC only)**

The Z Scan measures points along a vertical straight line. The line runs along the Z-axis of a one-dimensional grid. In order to get a reasonable extrapolation the extrapolated distance should not be larger than the step size in Z-direction.

## 4.3. Test Equipment

The measuring equipment used to perform the tests documented in this report has been calibrated in accordance with the manufacturers' recommendations, and is traceable to recognized national standards.

**Dielectric Property Measurements**

| Name of Equipment | Manufacturer | Type/Model | Serial No. | Cal. Due Date |
|---|---|---|---|---|
| PNA Network Analyzer | Keysight | N5227A | US51270480 | 7/22/2017 |
| Dielectric Probe kit | SPEAG | DAK-3.5 | 1087 | 11/10/2016 |
| Shorting block | SPEAG | DAK-3.5 Short | SM DAK 200 BA | 11/10/2016 |
| *Thermometer | Fisher Scientific | Traceable | 140493798 | 8/4/2016 |
| Network Analyzer | Agilent | 8753ES | MY40000980 | 4/27/2017 |
| Dielectric Probe kit | SPEAG | DAK-3.5 | 1082 | 9/15/2016 |
| Shorting block | SPEAG | DAK-3.5 Short | SM DAK 200 BA | N/A |
| Thermometer | Traceable Calibration Control Co. | 4242 | 140562250 | 8/24/2016 |

**Notes:**

*Thermometer S/N: 140493798 only used for test dates 7/29/2016 to 8/03/2016.

**System Check**

| Name of Equipment | Manufacturer | Type/Model | Serial No. | Cal. Due Date |
|---|---|---|---|---|
| Synthesized Signal Generator | Agilent | N5181A | MY50140610 | 5/9/2017 |
| Power Meter | Agilent | N1912A | MY50001018 | 10/19/2016 |
| Power Sensor | Agilent | E9323A | MY53070007 | 2/27/2017 |
| Power Sensor | Agilent | E9323A | MY53070002 | 3/22/2017 |
| Amplifier | MITEQ | AMF-4D-00400600-50-30P | 1795093 | N/A |
| Directional coupler | Werlatone | C8060-102 | 2149 | N/A |
| DC Power Supply | AMETEK | XT 15-4 | 1319A02778 | N/A |
| Synthesized Signal Generator | Agilent | 8665B | CCS-167 | 9/4/2016 |
| Power Meter | HP | 437B | 3125U11347 | 8/28/2016 |
| Power Meter | HP | 437B | 3125U11364 | 8/10/2016 |
| Power Sensor | HP | 8481A | 2702A76223 | 9/3/2016 |
| Power Sensor | HP | 8481A | 3318A95392 | 9/16/2016 |
| Amplifier | MITEQ | AMF-4D-00400600-50-30P | 1795092 | N/A |
| Directional coupler | Werlatone | C8000-102 | 2710 | N/A |
| DC Power Supply | BK PRECISION | 1611 | 215-02292 | N/A |

**Lab Equipment**

| Name of Equipment | Manufacturer | Type/Model | Serial No. | Cal. Due Date |
|---|---|---|---|---|
| E-Field Probe (SAR Lab 1) | SPEAG | EX3DV4 | 3929 | 3/22/2017 |
| E-Field Probe (SAR Lab 2) | SPEAG | EX3DV4 | 3772 | 2/23/2017 |
| Data Acquisition Electronics (SAR Lab 1) | SPEAG | DAE4 | 1434 | 4/15/2017 |
| Data Acquisition Electronics (SAR Lab 2) | SPEAG | DAE4 | 1257 | 9/16/2016 |
| System Validation Dipole | SPEAG | D2600V2 | 1036 | 3/18/2017 |
| Thermometer (SAR Lab 1) | EXTECH | 445703 | CCS-205 | 3/24/2017 |
| Thermometer (SAR Lab 2) | EXTECH | 445703 | CCS-203 | 3/24/2017 |

**Other**

| Name of Equipment | Manufacturer | Type/Model | Serial No. | Cal. Due Date |
|---|---|---|---|---|
| Base Station Simulator | R & S | CMW500 | 135384 | 6/21/2017 |
| Base Station Simulator | R & S | CMW500 | 134853 | 7/12/2017 |

# 5. Measurement Uncertainty

Per KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz, 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 extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval.

# 6. Device Under Test (DUT) Information

## 6.1. DUT Description

| | |
|---|---|
| Device Dimension | Overall (Length x Width): 146.4 mm x 71.9 mm<br>Overall Diagonal: 162.4 mm<br>Display Diagonal: 131 mm |
| Back Cover | ☒ The rechargeable battery is not user accessible. |
| Battery Options | ☒ The rechargeable battery is not user accessible. |
| Accessory | Headset |
| Wireless Router (Hotspot) | Wi-Fi Hotspot mode permits the device to share its cellular data connection with other Wi-Fi-enabled devices.<br>☒ Mobile Hotspot (Wi-Fi 2.4 GHz)<br>☐ Mobile Hotspot (Wi-Fi 5 GHz) |
| Wi-Fi Direct | Wi-Fi Direct enabled devices transfer data directly between each other<br>☒ Wi-Fi Direct (Wi-Fi 2.4 GHz)<br>☐ Wi-Fi Direct (Wi-Fi 5 GHz) |
| Test sample information | **S/N** / **IMEI** / **Notes**<br>CB512AP7VM / 004402456402894 / SAR_LTE MH Band #1<br>CB512AP7WQ / 004402456402837 / SAR_LTE MH Band #2<br>CB512AP84K / 004402456402662 / SAR_LTE POWER (COND.)_#1<br>CB512AP7UE / 004402456402969 / SAR_LTE POWER (COND.)_#2 |
| Hardware Version | A |
| Software Version | 0.428 |

## 6.2. Wireless Technologies

| Wireless technologies | Frequency bands | Operating mode | | Duty Cycle used for SAR testing |
|---|---|---|---|---|
| GSM | 850<br>1900 | Voice (GMSK)<br>GPRS (GMSK)<br>EGPRS (8PSK) | GPRS Multi-Slot Class:<br>☐ Class 8 - 1 Up, 4 Down<br>☐ Class 10 - 2 Up, 4 Down<br>☐ Class 12 - 4 Up, 4 Down<br>☒ Class 33 - 4 Up, 5 Down | GSM Voice: 12.5%<br>(E)GPRS: 1 Slot: 12.5%<br>2 Slots: 25%<br>3 Slots: 37.5%<br>4 Slots: 50% |
| | Does this device support DTM (Dual Transfer Mode)? ☒ Yes ☐ No | | | |
| W-CDMA (UMTS) | Band II<br>Band IV<br>Band V | UMTS Rel. 99 (Voice & Data)<br>HSDPA (Rel. 5)<br>HSUPA (Rel. 6)<br>HSPA+ (Rel. 7)<br>DC-HSDPA (Rel. 8) | | 100% |
| LTE | FDD Band 2<br>FDD Band 4<br>FDD Band 5<br>FDD Band 7<br>FDD Band 12<br>FDD Band 13<br>FDD Band 17<br>FDD Band 26<br>FDD Band 29 (Rx Only)<br>TDD Band 41 | QPSK<br>16QAM<br>☒ Rel. 11 Carrier Aggregation (1 Uplink and 3 Downlinks) (Carrier Aggregation is only supported for downlink and not for uplink.) | | 100% (FDD)<br>63.3% (TDD) |
| | Does this device support SV-LTE (1xRTT-LTE)? ☐ Yes ☒ No | | | |
| Wi-Fi | 2.4 GHz | 802.11b<br>802.11g<br>802.11n (HT20) | | 100% |
| | 5 GHz | 802.11a<br>802.11n (HT20)<br>802.11n (HT40)<br>802.11ac (VHT20)<br>802.11ac (VHT40)<br>802.11ac (VHT80) | | 100% |
| | Does this device support bands 5.60 ~ 5.65 GHz? ☒ Yes ☐ No | | | |
| | Does this device support Band gap channel(s)? ☒ Yes ☐ No | | | |
| Bluetooth | 2.4 GHz | Version 4.2 LE | | 77.5% (DH5) |

## 6.3. Maximum Output Power from Tune-up Procedure

KDB 447498 sec.4.1.(3) at the maximum rated output power and within the tune-up tolerance range specified for the product, but not more than 2 dB lower than the maximum tune-up tolerance limit

| RF Air Interface | LTE | | | Data | | | |
|---|---|---|---|---|---|---|---|
| | | | | QPSK | | 16QAM | |
| Band | BW | CH | RB Config | Target [dBm] | Tolerance +-[dB] | Target [dBm] | Tolerance +-[dB] |
| LTE B7 | 5MHz, 10MHz 15MHz, 20MHz | Low | 1RB | 19.0 | -1.5~+1.0 | 18.0 | -1.5~+1.0 |
| | | Mid | 50% RB | 18.0 | -1.5~+1.0 | 17.0 | -1.5~+1.0 |
| | | High | 100% RB | 18.0 | -1.5~+1.0 | 17.0 | -1.5~+1.0 |
| LTE B41 | 5MHz, 10MHz, 15MHz, 20MHz | Low | 1RB | 22.0 | -1.5~+1.0 | 21.0 | -1.5~+1.0 |
| | | Mid | 50% RB | 21.0 | -1.5~+1.0 | 20.0 | -1.5~+1.0 |
| | | High | 100% RB | 21.0 | -1.5~+1.0 | 20.0 | -1.5~+1.0 |

## 6.4. General LTE SAR Test and Reporting Considerations

<table>
<tr><th>Item</th><th colspan="7">Description</th></tr>
<tr><td rowspan="13">Frequency range, Channel Bandwidth, Numbers and Frequencies</td><td rowspan="3">Band 7</td><td colspan="6">Frequency range: 2500 - 2570 MHz</td></tr>
<tr><td colspan="6">Channel Bandwidth</td></tr>
<tr><td>20 MHz</td><td>15 MHz</td><td>10 MHz</td><td>5 MHz</td><td>3 MHz</td><td>1.4 MHz</td></tr>
<tr><td>Low</td><td>20850<br>2510</td><td>20825<br>2507.5</td><td>20800<br>2505</td><td>20775<br>2502.5</td><td></td><td></td></tr>
<tr><td>Mid</td><td>21100<br>2535</td><td>21100<br>2535</td><td>21100<br>2535</td><td>21100<br>2535</td><td></td><td></td></tr>
<tr><td>High</td><td>21350<br>2560</td><td>21375<br>2562.5</td><td>21400<br>2565</td><td>21425<br>2567.5</td><td></td><td></td></tr>
<tr><td rowspan="3">Band 41</td><td colspan="6">Frequency range: 2496 - 2690 MHz</td></tr>
<tr><td colspan="6">Channel Bandwidth</td></tr>
<tr><td>20 MHz</td><td>15 MHz</td><td>10 MHz</td><td>5 MHz</td><td>3 MHz</td><td>1.4 MHz</td></tr>
<tr><td>Low</td><td colspan="4">39750 / 2506.0</td><td></td><td></td></tr>
<tr><td>Low-Mid</td><td colspan="4">40185 / 2549.5</td><td></td><td></td></tr>
<tr><td>Mid</td><td colspan="4">40620 / 2593.0</td><td></td><td></td></tr>
<tr><td>Mid-High</td><td colspan="4">41055 / 2636.5</td><td></td><td></td></tr>
<tr><td>High</td><td colspan="4">41490 / 2680.0</td><td></td><td></td></tr>
<tr><td>LTE transmitter and antenna implementation</td><td colspan="7">Refer to Appendix A.</td></tr>
<tr><td>Maximum power reduction (MPR)</td><td colspan="7">
Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3
<table>
<tr><th rowspan="2">Modulation</th><th colspan="6">Channel bandwidth / Transmission bandwidth (RB)</th><th rowspan="2">MPR (dB)</th></tr>
<tr><th>1.4 MHz</th><th>3.0 MHz</th><th>5 MHz</th><th>10 MHz</th><th>15 MHz</th><th>20 MHz</th></tr>
<tr><td>QPSK</td><td>> 5</td><td>> 4</td><td>> 8</td><td>> 12</td><td>> 16</td><td>> 18</td><td>≤ 1</td></tr>
<tr><td>16 QAM</td><td>≤ 5</td><td>≤ 4</td><td>≤ 8</td><td>≤ 12</td><td>≤ 16</td><td>≤ 18</td><td>≤ 1</td></tr>
<tr><td>16 QAM</td><td>> 5</td><td>> 4</td><td>> 8</td><td>> 12</td><td>> 16</td><td>> 18</td><td>≤ 2</td></tr>
</table>
MPR Built-in by design<br>A-MPR (additional MPR) was disabled during SAR testing
</td></tr>
<tr><td>Power reduction</td><td colspan="7">No</td></tr>
<tr><td>Spectrum plots for RB configurations</td><td colspan="7">A properly configured base station simulator was used for the SAR and power measurements; therefore, spectrum plots for each RB allocation and offset configuration are not included in the SAR report.</td></tr>
</table>

**Release 11 Carrier Aggregation (CA) Combinations:**

| Combination | CA configuration | Bandwidth (MHz) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Carrier 1 | | | | | | Carrier 2 | | | | | |
| | | 20 | 15 | 10 | 5 | 3 | 1.4 | 20 | 15 | 10 | 5 | 3 | 1.4 |
| Inter-Band | 2A-4A | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | | |
| | 2A-5A | | | √ | √ | √ | √ | | | √ | √ | | |
| | 2A-12A | √ | √ | √ | √ | | | | | √ | √ | | |
| | 2A-13A | √ | √ | √ | √ | | | | | √ | | | |
| | 2A-17A | | | √ | √ | | | | | √ | √ | | |
| | 2A-29A | | | √ | √ | | | | | √ | √ | √ | |
| | 4A-5A | | | √ | √ | | | | | √ | √ | | |
| | 4A-7A | | | √ | √ | | | √ | √ | √ | √ | | |
| | 4A-12A | | | √ | √ | √ | √ | | | √ | √ | | |
| | 4A-13A | √ | √ | √ | √ | | | | | √ | | | |
| | 4A-17A | | | √ | √ | | | | | √ | √ | | |
| | 4A-29A | | | √ | √ | | | | | √ | √ | √ | |
| | 5A-7A | | | √ | √ | √ | √ | √ | √ | √ | | | |
| Intra-Band contiguous | 7C | | √ | | | | | | √ | | | | |
| | | √ | | | | | | √ | | | | | |
| | 41C | | | √ | | | | √ | | | | | |
| | | | √ | | | | | √ | √ | | | | |
| | | √ | | | | | | √ | √ | √ | | | |
| Intra-Band non-contiguous | 2A-2A | √ | √ | √ | √ | | | √ | √ | √ | √ | | |
| | 4A-4A | √ | √ | √ | √ | | | √ | √ | √ | √ | | |
| | 7A-7A | √ | √ | | | | | √ | √ | | | | |

**Notes:**

For supported channels, please refer to the channels above.

**Release 11 Carrier Aggregation (CA) Combinations (continued):**

| Combination | CA configuration | Bandwidth (MHz) | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Carrier 1 | | | | | | Carrier 2 | | | | | | Carrier 3 | | | | | |
| | | 20 | 15 | 10 | 5 | 3 | 1.4 | 20 | 15 | 10 | 5 | 3 | 1.4 | 20 | 15 | 10 | 5 | 3 | 1.4 |
| Inter-Band | 2A-2A-13A | √ | √ | √ | √ | | | √ | √ | √ | √ | | | | | √ | | | |
| | 4A-4A-5A | √ | √ | √ | √ | | | √ | √ | √ | √ | | | | | √ | √ | | |
| | 4A-4A-12A | √ | √ | √ | √ | | | √ | √ | √ | √ | | | | | √ | √ | | |
| | 4A-4A-13A | √ | √ | √ | √ | | | √ | √ | √ | √ | | | | | √ | | | |
| | 2A-4A-5A | √ | √ | √ | √ | | | √ | √ | √ | √ | | | | | √ | √ | | |
| | 2A-4A-12A | √ | √ | √ | √ | | | √ | √ | √ | √ | | | | | √ | √ | | |
| | 2A-4A-13A | √ | √ | √ | √ | | | √ | √ | √ | √ | | | | | √ | | | |
| | 2A-4A-29A | √ | √ | √ | √ | | | √ | √ | √ | √ | | | | | √ | √ | | |

**Notes:**

For supported channels, please refer to the channels above.

## 6.5. LTE (TDD) Considerations

According to KDB 941225 D05 SAR for LTE Devices, for Time-Division Duplex (TDD) systems, SAR must be tested using a fixed periodic duty factor according to the highest transmission duty factor implemented for the device and supported by the defined 3GPP LTE TDD configurations.

SAR was tested with the highest transmission duty factor (63.33%) using Uplink-downlink configuration 0 and Special subframe configuration 7.

LTE TDD Bands support 3GPP TS 36.211 section 4.2 for Type 2 Frame Structure and Table 4.2-2 for uplink-downlink configurations and Table 4.2-1 for Special subframe configurations.

Table 4.2-1: Configuration of special subframe (lengths of DwPTS/GP/UpPTS).

| Special subframe configuration | Normal cyclic prefix in downlink | | | Extended cyclic prefix in downlink | | |
|---|---|---|---|---|---|---|
| | DwPTS | UpPTS | | DwPTS | UpPTS | |
| | | Normal cyclic prefix in uplink | Extended cyclic prefix in uplink | | Normal cyclic prefix in uplink | Extended cyclic prefix in uplink |
| 0 | $6592 \cdot T_s$ | $2192 \cdot T_s$ | $2560 \cdot T_s$ | $7680 \cdot T_s$ | $2192 \cdot T_s$ | $2560 \cdot T_s$ |
| 1 | $19760 \cdot T_s$ | | | $20480 \cdot T_s$ | | |
| 2 | $21952 \cdot T_s$ | | | $23040 \cdot T_s$ | | |
| 3 | $24144 \cdot T_s$ | | | $25600 \cdot T_s$ | | |
| 4 | $26336 \cdot T_s$ | | | $7680 \cdot T_s$ | $4384 \cdot T_s$ | $5120 \cdot T_s$ |
| 5 | $6592 \cdot T_s$ | $4384 \cdot T_s$ | $5120 \cdot T_s$ | $20480 \cdot T_s$ | | |
| 6 | $19760 \cdot T_s$ | | | $23040 \cdot T_s$ | | |
| 7 | $21952 \cdot T_s$ | | | $12800 \cdot T_s$ | | |
| 8 | $24144 \cdot T_s$ | | | - | - | - |
| 9 | $13168 \cdot T_s$ | | | - | - | - |

**Calculated Duty Cycle**

| Uplink-Downlink Configuration | Downlink-to-Uplink Switch-point Periodicity | Subframe Number | | | | | | | | | | Calculated Duty Cycle (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
| 0 | 5 ms | D | S | U | U | U | D | S | U | U | U | 63.33 |
| 1 | 5 ms | D | S | U | U | D | D | S | U | U | D | 43.33 |
| 2 | 5 ms | D | S | U | D | D | D | S | U | D | D | 23.33 |
| 3 | 10 ms | D | S | U | U | U | D | D | D | D | D | 31.67 |
| 4 | 10 ms | D | S | U | U | D | D | D | D | D | D | 21.67 |
| 5 | 10 ms | D | S | U | D | D | D | D | D | D | D | 11.67 |
| 6 | 5 ms | D | S | U | U | U | D | S | U | U | D | 53.33 |

Calculated Duty Cycle = Extended cyclic prefix in uplink x ($T_s$) x # of S + # of U

Example for Calculated Duty Cycle for Uplink-Downlink Configuration 0:
Calculated Duty Cycle = 5120 x [1/(15000 x 2048)] x 2 + 6 ms = 63.33%
where
$T_s$ = 1/(15000 x 2048) seconds

# 7. RF Exposure Conditions (Test Configurations)

Refer to “SAR Photos and Ant locations” Appendix for the specific details of the antenna-to-antenna and antenna-to-edge(s) distances.

| Wireless technologies | RF Exposure Conditions | DUT-to-User Separation | Test Position | Antenna-to-edge/surface | SAR Required | Note |
|---|---|---|---|---|---|---|
| WWAN | Head | 0 mm | Left Touch | N/A | Yes | |
| | | | Left Tilt (15°) | N/A | Yes | |
| | | | Right Touch | N/A | Yes | |
| | | | Right Tilt (15°) | N/A | Yes | |
| | Body | 15 mm | Rear | N/A | Yes | |
| | | | Front | N/A | Yes | |
| | Hotspot | 10 mm | Rear | < 25 mm | Yes | |
| | | | Front | < 25 mm | Yes | |
| | | | Edge 1 (Top) | > 25 mm | No | 1 |
| | | | Edge 2 (Right) | < 25 mm | Yes | |
| | | | Edge 3 (Bottom) | < 25 mm | Yes | |
| | | | Edge 4 (Left) | < 25 mm | Yes | |

**Notes:**

1. SAR is not required because the distance from the antenna to the edge is > 25 mm as per KDB 941225 D06 Hot Spot SAR.

# 8. Dielectric Property Measurements & System Check

## 8.1. Dielectric Property Measurements

The temperature of the tissue-equivalent medium used during measurement must also be within 18°C to 25°C and within ± 2°C of the temperature when the tissue parameters are characterized.

The dielectric parameters must be measured before the tissue-equivalent medium is used in a series of SAR measurements. The parameters should be re-measured after each 3 – 4 days of use; or earlier if the dielectric parameters can become out of tolerance; for example, when the parameters are marginal at the beginning of the measurement series.

Tissue dielectric parameters were measured at the low, middle and high frequency of each operating frequency range of the test device.

For SAR measurement systems that have implemented the SAR error compensation algorithms documented in IEEE Std 1528-2013, to automatically compensate the measured SAR results for deviations between the measured and required tissue dielectric parameters, the tolerance for εr and σ may be relaxed to ± 10%. This is limited to frequencies ≤ 3 GHz.

### Tissue Dielectric Parameters

FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz

| Target Frequency (MHz) | Head | | Body | |
|---|---|---|---|---|
| | $\varepsilon_r$ | σ (S/m) | $\varepsilon_r$ | σ (S/m) |
| 150 | 52.3 | 0.76 | 61.9 | 0.80 |
| 300 | 45.3 | 0.87 | 58.2 | 0.92 |
| 450 | 43.5 | 0.87 | 56.7 | 0.94 |
| 835 | 41.5 | 0.90 | 55.2 | 0.97 |
| 900 | 41.5 | 0.97 | 55.0 | 1.05 |
| 915 | 41.5 | 0.98 | 55.0 | 1.06 |
| 1450 | 40.5 | 1.20 | 54.0 | 1.30 |
| 1610 | 40.3 | 1.29 | 53.8 | 1.40 |
| 1800 – 2000 | 40.0 | 1.40 | 53.3 | 1.52 |
| 2450 | 39.2 | 1.80 | 52.7 | 1.95 |
| 3000 | 38.5 | 2.40 | 52.0 | 2.73 |
| 5000 | 36.2 | 4.45 | 49.3 | 5.07 |
| 5100 | 36.1 | 4.55 | 49.1 | 5.18 |
| 5200 | 36.0 | 4.66 | 49.0 | 5.30 |
| 5300 | 35.9 | 4.76 | 48.9 | 5.42 |
| 5400 | 35.8 | 4.86 | 48.7 | 5.53 |
| 5500 | 35.6 | 4.96 | 48.6 | 5.65 |
| 5600 | 35.5 | 5.07 | 48.5 | 5.77 |
| 5700 | 35.4 | 5.17 | 48.3 | 5.88 |
| 5800 | 35.3 | 5.27 | 48.2 | 6.00 |

**IEEE Std 1528-2013**

Refer to Table 3 within the IEEE Std 1528-2013

**Dielectric Property Measurements Results:**

| SAR Room | Date | Tissue Type | Band (MHz) | Frequency (MHz) | Relative Permittivity (εr) | | | Conductivity (σ) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Measured | Target | Delta ±5 % | Measured | Target | Delta ±5 % |
| 1 | 7/29/2016 | 2600 | Head | 2600 | 39.31 | 39.01 | 0.77 | 1.97 | 1.96 | 0.25 |
| | | | | 2495 | 39.64 | 39.14 | 1.27 | 1.85 | 1.85 | 0.02 |
| | | | | 2690 | 38.99 | 38.90 | 0.24 | 2.07 | 2.06 | 0.41 |
| 1 | 7/29/2016 | 2600 | Body | 2600 | 50.79 | 52.51 | -3.28 | 2.16 | 2.16 | -0.22 |
| | | | | 2495 | 51.15 | 52.64 | -2.84 | 2.01 | 2.01 | -0.31 |
| | | | | 2690 | 50.44 | 52.40 | -3.74 | 2.28 | 2.29 | -0.14 |
| 2 | 8/3/2016 | 2600 | Head | 2600 | 37.94 | 39.01 | -2.74 | 2.05 | 1.96 | 4.58 |
| | | | | 2495 | 38.38 | 39.14 | -1.95 | 1.93 | 1.85 | 4.51 |
| | | | | 2690 | 37.54 | 38.90 | -3.49 | 2.16 | 2.06 | 4.64 |
| 2 | 8/3/2016 | 2600 | Body | 2600 | 54.02 | 52.51 | 2.87 | 2.22 | 2.16 | 2.79 |
| | | | | 2495 | 54.34 | 52.64 | 3.22 | 2.11 | 2.01 | 4.86 |
| | | | | 2690 | 53.76 | 52.40 | 2.60 | 2.33 | 2.29 | 1.78 |

## 8.2. System Check

SAR system verification is required to confirm measurement accuracy, according to the tissue dielectric media, probe calibration points and other system operating parameters required for measuring the SAR of a test device. The system verification must be performed for each frequency band and within the valid range of each probe calibration point required for testing the device. The same SAR probe(s) and tissue-equivalent media combinations used with each specific SAR system for system verification must be used for device testing. When multiple probe calibration points are required to cover substantially large transmission bands, independent system verifications are required for each probe calibration point. A system verification must be performed before each series of SAR measurements using the same probe calibration point and tissue-equivalent medium. Additional system verification should be considered according to the conditions of the tissue-equivalent medium and measured tissue dielectric parameters, typically every three to four days when the liquid parameters are re-measured or sooner when marginal liquid parameters are used at the beginning of a series of measurements.

**System Performance Check Measurement Conditions:**

- The measurements were performed in the flat section of the TWIN SAM or ELI phantom, shell thickness: 2.0 ±0.2 mm (bottom plate) filled with Body or Head simulating liquid of the following parameters.
- The depth of tissue-equivalent liquid in a phantom must be ≥ 15.0 cm for SAR measurements ≤ 3 GHz and ≥ 10.0 cm for measurements > 3 GHz.
- The DASY system with an E-Field Probe was used for the measurements.
- The dipole was mounted on the small tripod so that the dipole feed point was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10 mm (above 1 GHz) and 15 mm (below 1 GHz) from dipole center to the simulating liquid surface.
- The coarse grid with a grid spacing of 15 mm was aligned with the dipole.
  For 5 GHz band - The coarse grid with a grid spacing of 10 mm was aligned with the dipole.
- Special 7x7x7 (below 3 GHz) and/or 8x8x7 (above 3 GHz) fine cube was chosen for the cube.
- Distance between probe sensors and phantom surface was set to 3 mm.
  For 5 GHz band - Distance between probe sensors and phantom surface was set to 2.5 mm
- The dipole input power (forward power) was 100 mW.
- The results are normalized to 1 W input power.

**System Check Results**

The 1-g and 10-g SAR measured with a reference dipole, using the required tissue-equivalent medium at the test frequency, must be within 10% of the manufacturer calibrated dipole SAR target.

| SAR Room | Date | Tissue Type | Dipole Type _Serial # | Dipole Cal. Due Data | Measured Results for 1g SAR | | | | Measured Results for 10g SAR | | | | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Zoom Scan to 100 mW | Normalize to 1 W | Target (Ref. Value) | Delta ±10 % | Zoom Scan to 100 mW | Normalize to 1 W | Target (Ref. Value) | Delta ±10 % | |
| 1 | 7/29/2016 | Head | D2600V2 SN:1036 | 3/18/2017 | 5.830 | 58.30 | 55.40 | **5.23** | 2.540 | 25.40 | 24.60 | 3.25 | 1,2 |
| 1 | 7/29/2016 | Body | D2600V2 SN:1036 | 3/18/2017 | 5.440 | 54.40 | 53.40 | 1.87 | 2.370 | 23.70 | 23.80 | -0.42 | |
| 2 | 8/3/2016 | Head | D2600V2 SN:1036 | 3/18/2017 | 5.810 | 58.10 | 55.40 | 4.87 | 2.510 | 25.10 | 24.60 | 2.03 | |
| 2 | 8/4/2016 | Body | D2600V2 SN:1036 | 3/18/2017 | 5.680 | 56.80 | 53.40 | **6.37** | 2.490 | 24.90 | 23.80 | 4.62 | 3,4 |

# 9. Conducted Output Power Measurements

## 9.1. LTE

The following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP TS36.101 specification.

UE Power Class: 3 (23 +/- 2dBm). The allowed Maximum Power Reduction (MPR) for the maximum output power due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1 of the 3GPP TS36.101.

**Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3**

| Modulation | Channel bandwidth / Transmission bandwidth (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 |

The allowed A-MPR values specified below in Table 6.2.4.-1 of 3GPP TS36.101 are in addition to the allowed MPR requirements. All the measurements below were performed with A-MPR disabled, by using Network Signaling Value of “NS_01”.

**Table 6.2.4-1: Additional Maximum Power Reduction (A-MPR)**

| Network Signalling value | Requirements (sub-clause) | E-UTRA Band | Channel bandwidth (MHz) | Resources Blocks ($N_{RB}$) | A-MPR (dB) |
|---|---|---|---|---|---|
| NS_01 | 6.6.2.1.1 | Table 5.5-1 | 1.4, 3, 5, 10, 15, 20 | Table 5.6-1 | NA |
| NS_03 | 6.6.2.2.1 | 2, 4,10, 23, 25, 35, 36 | 3 | >5 | ≤ 1 |
| | | | 5 | >6 | ≤ 1 |
| | | | 10 | >6 | ≤ 1 |
| | | | 15 | >8 | ≤ 1 |
| | | | 20 | >10 | ≤ 1 |
| NS_04 | 6.6.2.2.2 | 41 | 5 | >6 | ≤ 1 |
| | | | 10, 15, 20 | See Table 6.2.4-4 | |
| NS_05 | 6.6.3.3.1 | 1 | 10,15,20 | ≥ 50 | ≤ 1 |
| NS_06 | 6.6.2.2.3 | 12, 13, 14, 17 | 1.4, 3, 5, 10 | Table 5.6-1 | n/a |
| NS_07 | 6.6.2.2.3<br>6.6.3.3.2 | 13 | 10 | Table 6.2.4-2 | Table 6.2.4-2 |
| NS_08 | 6.6.3.3.3 | 19 | 10, 15 | > 44 | ≤ 3 |
| NS_09 | 6.6.3.3.4 | 21 | 10, 15 | > 40 | ≤ 1 |
| | | | | > 55 | ≤ 2 |
| NS_10 | | 20 | 15, 20 | Table 6.2.4-3 | Table 6.2.4-3 |
| NS_11 | 6.6.2.2.1 | 23[1] | 1.4, 3, 5, 10 | Table 6.2.4-5 | Table 6.2.4-5 |
| .. | | | | | |
| NS_32 | - | - | - | - | - |
| Note 1: Applies to the lower block of Band 23, i.e. a carrier placed in the 2000-2010 MHz region. | | | | | |

**LTE Band 7 Measured Results**

| Band | BW (MHz) | Mode | RB Allocation | RB offset | MPR | Max. Avg Pwr (dBm) | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 2510 MHz | 2535 MHz | 2560 MHz |
| LTE Band 7 | 20 | QPSK | 1 | 0 | 0 | 19.9 | 19.8 | 19.8 |
| | | | 1 | 49 | 0 | 19.3 | 19.4 | 19.0 |
| | | | 1 | 99 | 0 | 19.6 | 19.5 | 19.3 |
| | | | 50 | 0 | 1 | 18.5 | 18.6 | 18.4 |
| | | | 50 | 24 | 1 | 18.4 | 18.5 | 18.2 |
| | | | 50 | 50 | 1 | 18.4 | 18.5 | 18.1 |
| | | | 100 | 0 | 1 | 18.5 | 18.6 | 18.3 |
| | | 16QAM | 1 | 0 | 1 | 19.0 | 19.0 | 19.0 |
| | | | 1 | 49 | 1 | 18.8 | 18.8 | 18.6 |
| | | | 1 | 99 | 1 | 19.0 | 18.9 | 18.8 |
| | | | 50 | 0 | 2 | 17.5 | 17.5 | 17.4 |
| | | | 50 | 24 | 2 | 17.4 | 17.5 | 17.2 |
| | | | 50 | 50 | 2 | 17.4 | 17.4 | 17.1 |
| | | | 100 | 0 | 2 | 17.5 | 17.6 | 17.3 |
| Band | BW (MHz) | Mode | RB Allocation | RB offset | MPR | Max. Avg Pwr (dBm) | | |
| | | | | | | 2507.5 MHz | 2535 MHz | 2562.5 MHz |
| LTE Band 7 | 15 | QPSK | 1 | 0 | 0 | 19.6 | 19.6 | 19.4 |
| | | | 1 | 37 | 0 | 19.3 | 19.5 | 19.2 |
| | | | 1 | 74 | 0 | 19.4 | 19.4 | 19.1 |
| | | | 36 | 0 | 1 | 18.5 | 18.7 | 18.4 |
| | | | 36 | 20 | 1 | 18.4 | 18.6 | 18.3 |
| | | | 36 | 39 | 1 | 18.5 | 18.6 | 18.2 |
| | | | 75 | 0 | 1 | 18.5 | 18.6 | 18.4 |
| | | 16QAM | 1 | 0 | 1 | 18.9 | 18.6 | 18.8 |
| | | | 1 | 37 | 1 | 18.8 | 18.5 | 18.5 |
| | | | 1 | 74 | 1 | 18.9 | 18.4 | 18.5 |
| | | | 36 | 0 | 2 | 17.4 | 17.7 | 17.4 |
| | | | 36 | 20 | 2 | 17.4 | 17.6 | 17.3 |
| | | | 36 | 39 | 2 | 17.5 | 17.6 | 17.2 |
| | | | 75 | 0 | 2 | 17.6 | 17.6 | 17.3 |
| Band | BW (MHz) | Mode | RB Allocation | RB offset | MPR | Max. Avg Pwr (dBm) | | |
| | | | | | | 2505 MHz | 2535 MHz | 2565 MHz |
| LTE Band 7 | 10 | QPSK | 1 | 0 | 0 | 19.6 | 19.7 | 19.2 |
| | | | 1 | 25 | 0 | 19.5 | 19.6 | 19.0 |
| | | | 1 | 49 | 0 | 19.6 | 19.6 | 19.0 |
| | | | 25 | 0 | 1 | 18.6 | 18.6 | 18.2 |
| | | | 25 | 12 | 1 | 18.7 | 18.7 | 18.2 |
| | | | 25 | 25 | 1 | 18.6 | 18.5 | 18.1 |
| | | | 50 | 0 | 1 | 18.6 | 18.7 | 18.1 |
| | | 16QAM | 1 | 0 | 1 | 18.5 | 18.7 | 18.6 |
| | | | 1 | 25 | 1 | 18.5 | 18.7 | 18.5 |
| | | | 1 | 49 | 1 | 18.5 | 18.5 | 18.5 |
| | | | 25 | 0 | 2 | 17.7 | 17.6 | 17.2 |
| | | | 25 | 12 | 2 | 17.8 | 17.7 | 17.1 |
| | | | 25 | 25 | 2 | 17.7 | 17.5 | 17.1 |
| | | | 50 | 0 | 2 | 17.6 | 17.7 | 17.1 |

**LTE Band 7 Measured Results (continued)**

| Band | BW (MHz) | Mode | RB Allocation | RB offset | MPR | Max. Avg Pwr (dBm) | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 2502.5 MHz | 2535 MHz | 2567.5 MHz |
| LTE Band 7 | 5 | QPSK | 1 | 0 | 0 | 19.4 | 19.7 | 19.1 |
| | | | 1 | 12 | 0 | 19.5 | 19.9 | 19.1 |
| | | | 1 | 24 | 0 | 19.6 | 19.7 | 19.1 |
| | | | 12 | 0 | 1 | 18.6 | 18.6 | 18.0 |
| | | | 12 | 7 | 1 | 18.5 | 18.7 | 18.1 |
| | | | 12 | 13 | 1 | 18.5 | 18.6 | 18.1 |
| | | | 25 | 0 | 1 | 18.5 | 18.7 | 18.1 |
| | | 16QAM | 1 | 0 | 1 | 18.7 | 18.2 | 18.3 |
| | | | 1 | 12 | 1 | 18.8 | 18.3 | 18.2 |
| | | | 1 | 24 | 1 | 18.9 | 18.3 | 18.3 |
| | | | 12 | 0 | 2 | 17.6 | 17.8 | 17.2 |
| | | | 12 | 7 | 2 | 17.6 | 17.9 | 17.2 |
| | | | 12 | 13 | 2 | 17.6 | 17.8 | 17.2 |
| | | | 25 | 0 | 2 | 17.5 | 17.8 | 17.1 |

**LTE Band 41 Measured Results**

| Band | BW (MHz) | Mode | RB Allocation | RB offset | MPR | Max. Avg Pwr (dBm) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 2506 MHz | 2549.5 MHz | 2593 MHz | 2636.5 MHz | 2680 MHz |
| LTE Band 41 | 20 | QPSK | 1 | 0 | 0 | 22.1 | 22.5 | 21.7 | 22.5 | 21.8 |
| | | | 1 | 50 | 0 | 21.9 | 22.0 | 21.6 | 22.2 | 21.5 |
| | | | 1 | 99 | 0 | 22.3 | 22.1 | 22.0 | 22.4 | 21.8 |
| | | | 50 | 0 | 1 | 21.0 | 21.3 | 20.7 | 21.4 | 20.7 |
| | | | 50 | 25 | 1 | 21.0 | 21.1 | 20.7 | 21.3 | 20.7 |
| | | | 50 | 50 | 1 | 21.1 | 21.1 | 20.8 | 21.4 | 20.7 |
| | | | 100 | 0 | 1 | 21.1 | 21.2 | 20.7 | 21.3 | 20.8 |
| | | 16QAM | 1 | 0 | 1 | 21.2 | 21.4 | 20.7 | 21.5 | 20.8 |
| | | | 1 | 50 | 1 | 21.1 | 20.9 | 20.5 | 21.1 | 20.4 |
| | | | 1 | 99 | 1 | 21.4 | 21.1 | 20.9 | 21.3 | 20.7 |
| | | | 50 | 0 | 2 | 20.0 | 20.3 | 19.7 | 20.4 | 19.7 |
| | | | 50 | 25 | 2 | 20.0 | 20.1 | 19.7 | 20.2 | 19.7 |
| | | | 50 | 50 | 2 | 20.2 | 20.0 | 19.7 | 20.3 | 19.6 |
| | | | 100 | 0 | 2 | 20.0 | 20.1 | 19.7 | 20.3 | 19.7 |

| Band | BW (MHz) | Mode | RB Allocation | RB offset | MPR | Max. Avg Pwr (dBm) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 2506 MHz | 2549.5 MHz | 2593 MHz | 2636.5 MHz | 2680 MHz |
| LTE Band 41 | 15 | QPSK | 1 | 0 | 0 | 21.8 | 22.1 | 21.5 | 22.1 | 21.6 |
| | | | 1 | 36 | 0 | 21.7 | 21.6 | 21.4 | 21.9 | 21.3 |
| | | | 1 | 74 | 0 | 21.8 | 21.6 | 21.4 | 21.9 | 21.3 |
| | | | 36 | 0 | 1 | 20.9 | 21.1 | 20.6 | 21.2 | 20.6 |
| | | | 36 | 18 | 1 | 20.9 | 20.9 | 20.5 | 21.0 | 20.5 |
| | | | 36 | 37 | 1 | 20.9 | 20.8 | 20.6 | 21.0 | 20.5 |
| | | | 75 | 0 | 1 | 20.9 | 20.9 | 20.5 | 21.1 | 20.6 |
| | | 16QAM | 1 | 0 | 1 | 20.8 | 21.2 | 20.6 | 21.3 | 20.6 |
| | | | 1 | 36 | 1 | 20.7 | 20.9 | 20.5 | 21.0 | 20.3 |
| | | | 1 | 74 | 1 | 20.9 | 20.7 | 20.5 | 21.0 | 20.3 |
| | | | 36 | 0 | 2 | 19.8 | 20.0 | 19.5 | 20.2 | 19.5 |
| | | | 36 | 18 | 2 | 19.8 | 19.9 | 19.5 | 20.0 | 19.4 |
| | | | 36 | 37 | 2 | 19.9 | 19.8 | 19.5 | 20.0 | 19.4 |
| | | | 75 | 0 | 2 | 19.8 | 19.9 | 19.5 | 20.0 | 19.5 |

| Band | BW (MHz) | Mode | RB Allocation | RB offset | MPR | Max. Avg Pwr (dBm) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 2506 MHz | 2549.5 MHz | 2593 MHz | 2636.5 MHz | 2680 MHz |
| LTE Band 41 | 10 | QPSK | 1 | 0 | 0 | 22.0 | 22.0 | 21.4 | 21.9 | 21.7 |
| | | | 1 | 25 | 0 | 22.0 | 21.8 | 21.4 | 21.8 | 21.6 |
| | | | 1 | 49 | 0 | 22.1 | 21.8 | 21.4 | 21.8 | 21.6 |
| | | | 25 | 0 | 1 | 21.1 | 21.0 | 20.5 | 21.0 | 20.7 |
| | | | 25 | 12 | 1 | 21.1 | 20.9 | 20.4 | 20.9 | 20.6 |
| | | | 25 | 25 | 1 | 21.1 | 20.9 | 20.5 | 20.8 | 20.7 |
| | | | 50 | 0 | 1 | 21.1 | 20.9 | 20.5 | 20.8 | 20.8 |
| | | 16QAM | 1 | 0 | 1 | 21.0 | 21.0 | 20.4 | 20.7 | 20.7 |
| | | | 1 | 25 | 1 | 20.9 | 20.9 | 20.3 | 20.6 | 20.6 |
| | | | 1 | 49 | 1 | 21.0 | 20.8 | 20.4 | 20.6 | 20.7 |
| | | | 25 | 0 | 2 | 20.0 | 19.9 | 19.5 | 19.9 | 19.6 |
| | | | 25 | 12 | 2 | 20.1 | 19.8 | 19.4 | 19.8 | 19.6 |
| | | | 25 | 25 | 2 | 20.2 | 19.8 | 19.5 | 19.8 | 19.6 |
| | | | 50 | 0 | 2 | 20.1 | 19.9 | 19.5 | 19.8 | 19.7 |

**LTE Band 41 Measured Results (continued)**

| Band | BW (MHz) | Mode | RB Allocation | RB offset | MPR | Max. Avg Pwr (dBm) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 2506 MHz | 2549.5 MHz | 2593 MHz | 2636.5 MHz | 2680 MHz |
| LTE Band 41 | 5 | QPSK | 1 | 0 | 0 | 22.2 | 21.9 | 21.6 | 22.0 | 21.6 |
| | | | 1 | 12 | 0 | 22.2 | 21.8 | 21.6 | 22.0 | 21.6 |
| | | | 1 | 24 | 0 | 22.1 | 21.7 | 21.5 | 21.9 | 21.5 |
| | | | 12 | 0 | 1 | 21.1 | 20.9 | 20.5 | 20.8 | 20.7 |
| | | | 12 | 7 | 1 | 21.1 | 20.8 | 20.4 | 20.8 | 20.6 |
| | | | 12 | 13 | 1 | 21.1 | 20.9 | 20.4 | 20.8 | 20.6 |
| | | | 25 | 0 | 1 | 21.1 | 20.8 | 20.4 | 20.8 | 20.6 |
| | | 16QAM | 1 | 0 | 1 | 21.2 | 20.3 | 20.4 | 21.0 | 20.6 |
| | | | 1 | 12 | 1 | 21.3 | 20.4 | 20.4 | 20.9 | 20.5 |
| | | | 1 | 24 | 1 | 21.4 | 20.4 | 20.4 | 21.0 | 20.5 |
| | | | 12 | 0 | 2 | 20.1 | 19.9 | 19.5 | 19.7 | 19.7 |
| | | | 12 | 7 | 2 | 20.1 | 19.8 | 19.4 | 19.8 | 19.6 |
| | | | 12 | 13 | 2 | 20.0 | 19.9 | 19.4 | 19.8 | 19.6 |
| | | | 25 | 0 | 2 | 20.1 | 19.9 | 19.4 | 19.8 | 19.6 |

## 9.2. LTE Carrier Aggregation

| PCC Band | PCC Bandwidth [MHz] | PCC (UL) Channel | PCC (UL) Frequency [MHz] | PCC UL# RB/Offset | SCC Band | SCC Bandwidth [MHz] | SCC (DL) Channel | SCC (DL) Frequency [MHz] | LTE Rel 8 Tx. Power [dBm] | LTE Rel 11 Tx. Power [dBm] |
|---|---|---|---|---|---|---|---|---|---|---|
| Band 4 | 10 | 20000 | 1715 | RB 1/0 | Band 7 | 20 | 3100 | 2655 | 20.85 | 20.80 |
| Band 5 | 10 | 20450 | 829 | RB 1/0 | Band 7 | 20 | 3100 | 2655 | 23.76 | 23.80 |
| Band 7 | 20 | 20850 | 2510 | RB 1/0 | Band 7 | 20 | 3100 | 2655 | 19.01 | 19.00 |
| Band 7 | 20 | 21350 | 2560 | RB 1/0 | Band 7 | 20 | 3100 | 2655 | 18.92 | 18.90 |
| Band 41 | 20 | 41055 | 2636.5 | RB 1/0 | Band 41 | 20 | 40620 | 2593 | 22.54 | 22.53 |

**Note:**

Per KDB 941225 D05A LTE Rel. 10 KDB Inquiry Sheet: SAR is excluded for Carrier Aggregation when measured power does not exceed LTE Release 8 by more than a $^{1}/_{4}$ dBm

# 10. Measured and Reported (Scaled) SAR Results

**SAR Test Reduction criteria are as follows:**

**KDB 447498 D01 General RF Exposure Guidance:**

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

**KDB 648474 D04 Handset SAR:**

With headset attached, 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 headset attached to the handset.

**KDB 648474 D04 Handset SAR (Phablet Only):**

When Hotspot Mode is not supported, 10-g Extremity SAR is required for all surfaces and edges with an antenna located at ≤ 25 mm from that surface or edge in direct contact with a flat phantom, to address interactive hand use exposure conditions.

Additional 1-g SAR testing at 5 mm is not required when hotspot mode 10-g extremity SAR is not required for the surfaces and edges since all 1-g reported SAR < 1.2 W/kg.

**KDB 941225 D05 SAR for LTE Devices:**

SAR test reduction is applied using the following criteria:

- Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB, and 50% RB allocation, using the RB offset and required test channel combination with the highest maximum output power among RB offsets at the upper edge, middle and lower edge of each required test channel.
- When the reported SAR is > 0.8 W/kg, testing for other Channels is performed at the highest output power level for 1RB, and 50% RB configuration for that channel.
- Testing for 100% RB configuration is performed at the highest output power level for 100% RB configuration across the Low, Mid and High Channel when the highest reported SAR for 1 RB and 50% RB are > 0.8 W/kg. Testing for the remaining required channels is not needed because the reported SAR for 100% RB Allocation < 1.45 W/kg.
- Testing for 16-QAM modulation is not required because the reported SAR for QPSK is < 1.45 W/Kg and its output power is not more than 0.5 dB higher than that of QPSK.
- Testing for the other channel bandwidths is not required because the reported SAR for the highest channel bandwidth is < 1.45 W/Kg and its output power is not more than 0.5 dB higher than that of the highest channel bandwidth.
- For LTE bands that do not support at least three non-overlapping channels in certain channel bandwidths, test the available non-overlapping channels instead. 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; therefore, the requirement for H, M and L channels may not fully apply.

## 10.1. LTE Band 7 (20MHz Bandwidth)

| RF Exposure Conditions | Mode | Dist. (mm) | Test Position | Ch #. | Freq. (MHz) | RB Allocation | RB offset | Power (dBm) | | 1-g SAR (W/kg) | | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Tune-up limit | Meas. | Meas. | Scaled | |
| Head | QPSK | 0 | Left Touch | 21100 | 2535.0 | 1 | 0 | 20.0 | 18.9 | 0.154 | 0.198 | |
| | | | | | | 50 | 0 | 19.0 | 17.7 | 0.134 | 0.182 | |
| | | | Left Tilt | 21100 | 2535.0 | 1 | 0 | 20.0 | 18.9 | 0.092 | 0.118 | |
| | | | | | | 50 | 0 | 19.0 | 17.7 | 0.069 | 0.094 | |
| | | | Right Touch | 21100 | 2535.0 | 1 | 0 | 20.0 | 18.9 | 0.404 | **0.520** | 1 |
| | | | | | | 50 | 0 | 19.0 | 17.7 | 0.327 | 0.444 | |
| | | | Right Tilt | 21100 | 2535.0 | 1 | 0 | 20.0 | 18.9 | 0.083 | 0.107 | |
| | | | | | | 50 | 0 | 19.0 | 17.7 | 0.069 | 0.094 | |
| Body-worn | QPSK | 15 | Rear | 21100 | 2535.0 | 1 | 0 | 20.0 | 18.9 | 0.134 | 0.173 | |
| | | | | | | 50 | 0 | 19.0 | 17.7 | 0.107 | 0.145 | |
| | | | Front | 21100 | 2535.0 | 1 | 0 | 20.0 | 18.9 | 0.135 | **0.174** | 2 |
| | | | | | | 50 | 0 | 19.0 | 17.7 | 0.106 | 0.144 | |
| Hotspot | QPSK | 10 | Rear | 21100 | 2535.0 | 1 | 0 | 20.0 | 18.9 | 0.261 | 0.336 | |
| | | | | | | 50 | 0 | 19.0 | 17.7 | 0.204 | 0.277 | |
| | | | Front | 21100 | 2535.0 | 1 | 0 | 20.0 | 18.9 | 0.312 | **0.402** | 3 |
| | | | | | | 50 | 0 | 19.0 | 17.7 | 0.246 | 0.334 | |
| | | | Edge 2 | 21100 | 2535.0 | 1 | 0 | 20.0 | 18.9 | 0.143 | 0.184 | |
| | | | | | | 50 | 0 | 19.0 | 17.7 | 0.114 | 0.155 | |
| | | | Edge 3 | 21100 | 2535.0 | 1 | 0 | 20.0 | 18.9 | 0.093 | 0.120 | |
| | | | | | | 50 | 0 | 19.0 | 17.7 | 0.073 | 0.099 | |
| | | | Edge 4 | 21100 | 2535.0 | 1 | 0 | 20.0 | 18.9 | 0.030 | 0.039 | |
| | | | | | | 50 | 0 | 19.0 | 17.7 | 0.024 | 0.033 | |

## 10.2. LTE Band 41 (20MHz Bandwidth)

| RF Exposure Conditions | Mode | Dist. (mm) | Test Position | Ch #. | Freq. (MHz) | RB Allocation | RB offset | Power (dBm) | | 1-g SAR (W/kg) | | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Tune-up limit | Meas. | Meas. | Scaled | |
| Head | QPSK | 0 | Left Touch | 40620 | 2593.0 | 1 | 99 | 23.0 | 22.0 | 0.173 | 0.216 | |
| | | | | | | 50 | 50 | 22.0 | 20.8 | 0.137 | 0.182 | |
| | | | Left Tilt | 40620 | 2593.0 | 1 | 99 | 23.0 | 22.0 | 0.095 | 0.119 | |
| | | | | | | 50 | 50 | 22.0 | 20.8 | 0.072 | 0.096 | |
| | | | Right Touch | 40620 | 2593.0 | 1 | 99 | 23.0 | 22.0 | 0.412 | **0.515** | 4 |
| | | | | | | 50 | 50 | 22.0 | 20.8 | 0.318 | 0.423 | |
| | | | Right Tilt | 40620 | 2593.0 | 1 | 99 | 23.0 | 22.0 | 0.062 | 0.077 | |
| | | | | | | 50 | 50 | 22.0 | 20.8 | 0.048 | 0.064 | |
| Body-worn | QPSK | 15 | Rear | 40620 | 2593.0 | 1 | 99 | 23.0 | 22.0 | 0.212 | 0.265 | |
| | | | | | | 50 | 50 | 22.0 | 20.8 | 0.175 | 0.233 | |
| | | | Front | 40620 | 2593.0 | 1 | 99 | 23.0 | 22.0 | 0.240 | **0.300** | 5 |
| | | | | | | 50 | 50 | 22.0 | 20.8 | 0.198 | 0.263 | |
| Hotspot | QPSK | 10 | Rear | 40620 | 2593.0 | 1 | 99 | 23.0 | 22.0 | 0.391 | 0.489 | |
| | | | | | | 50 | 50 | 22.0 | 20.8 | 0.322 | 0.428 | |
| | | | Front | 40620 | 2593.0 | 1 | 99 | 23.0 | 22.0 | 0.529 | **0.661** | 6 |
| | | | | | | 36 | 50 | 22.0 | 20.8 | 0.425 | 0.565 | |
| | | | Edge 2 | 40620 | 2593.0 | 1 | 99 | 23.0 | 22.0 | 0.309 | 0.386 | |
| | | | | | | 50 | 50 | 22.0 | 20.8 | 0.249 | 0.331 | |
| | | | Edge 3 | 40620 | 2593.0 | 1 | 99 | 23.0 | 22.0 | 0.151 | 0.189 | |
| | | | | | | 50 | 50 | 22.0 | 20.8 | 0.120 | 0.160 | |
| | | | Edge 4 | 40620 | 2593.0 | 1 | 99 | 23.0 | 22.0 | 0.038 | 0.047 | |
| | | | | | | 50 | 50 | 22.0 | 20.8 | 0.030 | 0.040 | |

# 11. SAR Measurement Variability

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

1) Repeated measurement is not required when the original highest measured SAR is <0.8 or 2 W/kg (1-g or 10-g respectively); steps 2) through 4) do not apply.
2) When the original highest measured SAR is ≥ 0.8 or 2 W/kg (1-g or 10-g respectively), repeat that measurement once.
3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or 3 (1-g or 10-g respectively) or when the original or repeated measurement is ≥ 1.45 or 3.6 W/kg (~ 10% from the 1-g or 10-g respective SAR limit).
4) Perform a third repeated measurement only if the original, first, or second repeated measurement is ≥ 1.5 or 3.75 W/kg (1-g or 10-g respectively) and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20 or 3 (1-g or 10-g respectively).

| Frequency Band (MHz) | Air Interface | RF Exposure Conditions | Test Position | Repeated SAR (Yes/No) | Highest Measured SAR (W/kg) |
|---|---|---|---|---|---|
| 2600 | LTE Band 7 | Head | Right Touch | No | 0.404 |
| | LTE Band 41 | Hotspot | Front | No | 0.529 |

**Note(s):**

Repeated measurement is not required when the original highest measured SAR is <0.8 (1-g).

# 12. Simultaneous Transmission SAR Analysis

**Simultaneous Transmission Condition**

| Case | Cellular | WLAN/BT Main | WLAN/BT Sub | Note |
|---|---|---|---|---|
| 1 | GSM/GPRS/EDGE | BT/BLE | (None) | |
| 2 | | WLAN 2.4G | WLAN 2.4G | |
| 3 | | WLAN 5G | WLAN 5G | |
| 4 | UMTS/HSPA | BT/BLE | (None) | |
| 5 | | WLAN 2.4G | WLAN 2.4G | |
| 6 | | WLAN 5G | WLAN 5G | |
| 7 | LTE | BT/BLE | (None) | |
| 8 | | WLAN 2.4G | WLAN 2.4G | |
| 9 | | WLAN 5G | WLAN 5G | |
| 10 | (None) | BT/BLE<br>WLAN 5G | <br>WLAN 5G | |
| 11 | GSM/GPRS/EDGE | BT/BLE<br>WLAN 5G | <br>WLAN 5G | |
| 12 | UMTS/HSPA | BT/BLE<br>WLAN 5G | <br>WLAN 5G | |
| 13 | LTE | BT/BLE<br>WLAN 5G | <br>WLAN 5G | |
| 14 | GSM/GPRS/EDGE | WLAN 2.4G | WLAN 5G | |
| 15 | | WLAN 5G | WLAN 2.4G | |
| 16 | UMTS/HSPA | WLAN 2.4G | WLAN 5G | |
| 17 | | WLAN 5G | WLAN 2.4G | |
| 18 | LTE | WLAN 2.4G | WLAN 5G | |
| 19 | | WLAN 5G | WLAN 2.4G | |

## 12.1. Sum of the SAR for LTE Band 7 & Wi-Fi & BT

| RF Exposure conditions | Test Position | Standalone SAR (W/kg) | | | | | | ∑ 1-g SAR (W/kg) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | WWAN | DTS | | U-NII | | BT | WWAN + DTS | WWAN + U-NII | WWAN+DTS+U-NII | WWAN+DTS+U-NII | WWAN+U-NII+BT | WWAN+DTS+U-NII+BT |
| | | ① | Chain 0 ② | Chain 1 ③ | Chain 0 ④ | Chain 1 ⑤ | ⑥ | ① + ② + ③ | ① + ④ + ⑤ | ① + ② + ⑤ | ① + ③ + ④ | ① + ④ + ⑤ + ⑥ | ① + ③ + ④ + ⑥ |
| Head | Left Touch | 0.198 | 0.629 | 0.377 | 0.810 | 0.322 | | 1.204 | 1.330 | 1.149 | 1.385 | | |
| | Left Tilt | 0.118 | 0.629 | 0.377 | 0.810 | 0.322 | | 1.124 | 1.250 | 1.069 | 1.305 | | |
| | Right Touch | 0.520 | 0.196 | 0.377 | 0.166 | 0.322 | | 1.093 | 1.008 | 1.038 | 1.063 | | |
| | Right Tilt | 0.107 | 0.196 | 0.377 | 0.166 | 0.322 | | 0.680 | 0.595 | 0.625 | 0.650 | | |
| Body-worn | Rear | 0.173 | 0.055 | 0.126 | 0.039 | 0.107 | 0.210 | 0.354 | 0.319 | 0.335 | 0.338 | 0.529 | 0.548 |
| | Front | 0.174 | 0.055 | 0.126 | 0.039 | 0.107 | 0.210 | 0.355 | 0.320 | 0.336 | 0.339 | 0.530 | 0.549 |
| Hotspot | Rear | 0.336 | 0.125 | 0.189 | | | | 0.650 | 0.336 | 0.461 | 0.525 | | |
| | Front | 0.402 | 0.125 | 0.189 | | | | 0.716 | 0.402 | 0.527 | 0.591 | | |
| | Edge 1 | | 0.125 | 0.189 | | | | 0.314 | | 0.125 | 0.189 | | |
| | Edge 2 | 0.184 | 0.125 | 0.189 | | | | 0.498 | 0.184 | 0.309 | 0.373 | | |
| | Edge 3 | 0.120 | | | | | | 0.120 | 0.120 | 0.120 | 0.120 | | |
| | Edge 4 | 0.039 | | | | | | 0.039 | 0.039 | 0.039 | 0.039 | | |

## 12.2. Sum of the SAR for LTE Band 41 & Wi-Fi & BT

| RF Exposure conditions | Test Position | Standalone SAR (W/kg) | | | | | | ∑ 1-g SAR (W/kg) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | WWAN | DTS | | U-NII | | BT | WWAN + DTS | WWAN + U-NII | WWAN+DTS+U-NII | WWAN+DTS+U-NII | WWAN+U-NII+BT | WWAN+DTS+U-NII+BT |
| | | ① | Chain 0 ② | Chain 1 ③ | Chain 0 ④ | Chain 1 ⑤ | ⑥ | ① + ② + ③ | ① + ④ + ⑤ | ① + ② + ⑤ | ① + ③ + ④ | ① + ④ + ⑤ + ⑥ | ① + ③ + ④ + ⑥ |
| Head | Left Touch | 0.216 | 0.629 | 0.377 | 0.810 | 0.322 | | 1.222 | 1.348 | 1.167 | **1.403** | | |
| | Left Tilt | 0.119 | 0.629 | 0.377 | 0.810 | 0.322 | | 1.125 | 1.251 | 1.070 | 1.306 | | |
| | Right Touch | 0.515 | 0.196 | 0.377 | 0.166 | 0.322 | | 1.088 | 1.003 | 1.033 | 1.058 | | |
| | Right Tilt | 0.077 | 0.196 | 0.377 | 0.166 | 0.322 | | 0.650 | 0.565 | 0.595 | 0.620 | | |
| Body-worn | Rear | 0.265 | 0.055 | 0.126 | 0.039 | 0.107 | 0.210 | 0.446 | 0.411 | 0.427 | 0.430 | 0.621 | 0.640 |
| | Front | 0.300 | 0.055 | 0.126 | 0.039 | 0.107 | 0.210 | 0.481 | 0.446 | 0.462 | 0.465 | 0.656 | **0.675** |
| Hotspot | Rear | 0.489 | 0.125 | 0.189 | | | | 0.803 | 0.489 | 0.614 | 0.678 | | |
| | Front | 0.661 | 0.125 | 0.189 | | | | 0.975 | 0.661 | 0.786 | 0.850 | | |
| | Edge 1 | | 0.125 | 0.189 | | | | 0.314 | | 0.125 | 0.189 | | |
| | Edge 2 | 0.386 | 0.125 | 0.189 | | | | 0.700 | 0.386 | 0.511 | 0.575 | | |
| | Edge 3 | 0.189 | | | | | | 0.189 | 0.189 | 0.189 | 0.189 | | |
| | Edge 4 | 0.047 | | | | | | 0.047 | 0.047 | 0.047 | 0.047 | | |

**Conclusion:**

Simultaneous transmission SAR measurement (Volume Scan) is not required because either the sum of the 1-g SAR is < 1.6 W/kg or the SPLSR is ≤ 0.04 for all circumstances that require SPLSR calculation.

# Appendixes

**Refer to separated files for the following appendixes.**

**16J23633D-S1V1 SAR_App A Setup Photos & Ant. Locations**

**16J23633D-S1V1 SAR_App B System Check Plots**

**16J23633D-S1V1 SAR_App C Highest Test Plots**

**16J23633D-S1V1 SAR_App D Tissue Ingredients**

**16J23633D-S1V1 SAR_App E Probe Cal. Certificates**

**16J23633D-S1V1 SAR_App F Dipole Cal. Certificates**

**END OF REPORT**