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

# SAR EVALUATION REPORT

**FOR**

**CDMA/GSM/WCDMA/LTE Phone + BT/BLE, DTS/UNII a/b/g/n/ac, ANT+ and NFC**

**MODEL NUMBER: SM-A8050**

**FCC ID: A3LSMA8050**

**REPORT NUMBER: 4788886237-S1V3**

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ACCREDITED
Testing Laboratory

**TL-637**

## Revision History

| Rev. | Date | Revisions | Revised By |
|---|---|---|---|
| V1 | 4/17/2019 | Initial Issue | JeongYeon Won |
| V2 | 4/22/2019 | -Sec.6.3<br>Added “Note.2” in WLAN target power table. | JeongYeon Won |
| V3 | 4/24/2019 | -Sec.7<br>Revised Note 6’s comment. | JeongYeon Won |
| | | | |


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# 1. Attestation of Test Results

| | | | | |
|---|---|---|---|---|
| Applicant Name | SAMSUNG ELECTRONICS CO.,LTD. | | | |
| FCC ID | A3LSMA8050 | | | |
| Model Number | SM-A8050 | | | |
| Applicable Standards | FCC 47 CFR § 2.1093<br>Published RF exposure KDB procedures<br>IEEE Std 1528-2013 | | | |
| **SAR Limits (W/Kg)** | | | | |
| Exposure Category | Peak spatial-average(1g of tissue) | | Peak spatial-average(10g of tissue) | |
| General population / Uncontrolled exposure | 1.6 | | 4 | |
| **The Highest Reported SAR (W/kg)** | | | | |
| **RF Exposure Conditions** | **Equipment Class** | | | |
| | **Licensed** | **DTS** | **U-NII** | **DSS(BT)** |
| Head | 0.32 | <0.10 | <0.10 | <0.10 |
| Body-worn | 0.62 | <0.10 | 0.17 | <0.10 |
| Hotspot | 1.36 | 0.17 | <0.10 | <0.10 |
| Product Specific 10g | 1.86 | N/A | 1.46 | N/A |
| Simultaneous TX – Head | 0.37 | 0.32 | 0.37 | 0.33 |
| Simultaneous TX – Body-worn | 0.81 | 0.79 | 0.81 | 0.79 |
| Simultaneous TX – Hotspot | 1.51 | 1.46 | 1.51 | 1.45 |
| Simultaneous TX – Product Specific 10g | 3.46 | N/A | 3.46 | N/A |
| Date Tested | 3/5/2019 to 4/13/2019 | | | |
| Test Results | Pass | | | |

UL Korea, Ltd. 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 Korea, Ltd. 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 Korea, Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Korea, Ltd. 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 IAS, any agency of the Federal Government, or any agency of any government.

| | |
|---|---|
| Approved & Released By: | Prepared By: |
| Justin Park<br>Lead Test Engineer<br>UL Korea, Ltd. Suwon Laboratory | JeongYeon Won<br>Laboratory Technician<br>UL Korea, Ltd. Suwon Laboratory |


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# 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:

- 248227 D01 802.11 Wi-Fi SAR v02r02
- 447498 D01 General RF Exposure Guidance v06
- 648474 D04 Handset SAR v01r03
- 690783 D01 SAR Listings on Grants v01r03
- 865664 D01 SAR measurement 100 MHz to 6 GHz v01r04
- 865664 D02 RF Exposure Reporting v01r02
- 941225 D01 3G SAR Procedures v03r01
- 941225 D05 SAR for LTE Devices v02r05
- 941225 D05A LTE Rel.10 KDB Inquiry Sheet v01r02
- 941225 D06 Hotspot Mode v02r01
- 941225 D07 UMPC Mini Tablet v01r02

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, RF Exposure Procedures Update (Other LTE Considerations)
- TCB workshop October, 2016; Page 7, RF Exposure Procedures (Bluetooth Duty Factor)
- TCB workshop October, 2016; Page 18, RF Exposure Procedures (DUT Holder Perturbations)
- TCB workshop May, 2017; Page 6, RF Exposure Procedures (LTE Test Conditions)
- TCB workshop Nov, 2017; Page 3, RF Exposure Procedures (LTE UL/DL Carrier Aggregation SAR)
- TCB workshop April, 2018; Page 3, RF Exposure Procedures (LTE DL CA SAR Test Exclusion Update)

# 3. Facilities and Accreditation

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

| Suwon |
|---|
| SAR 1 Room |
| SAR 2 Room |
| SAR 3 Room |
| SAR 4 Room |

UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-637.
The full scope of accreditation can be viewed at http://www.iasonline.org/PDF/TL/TL-637.pdf.


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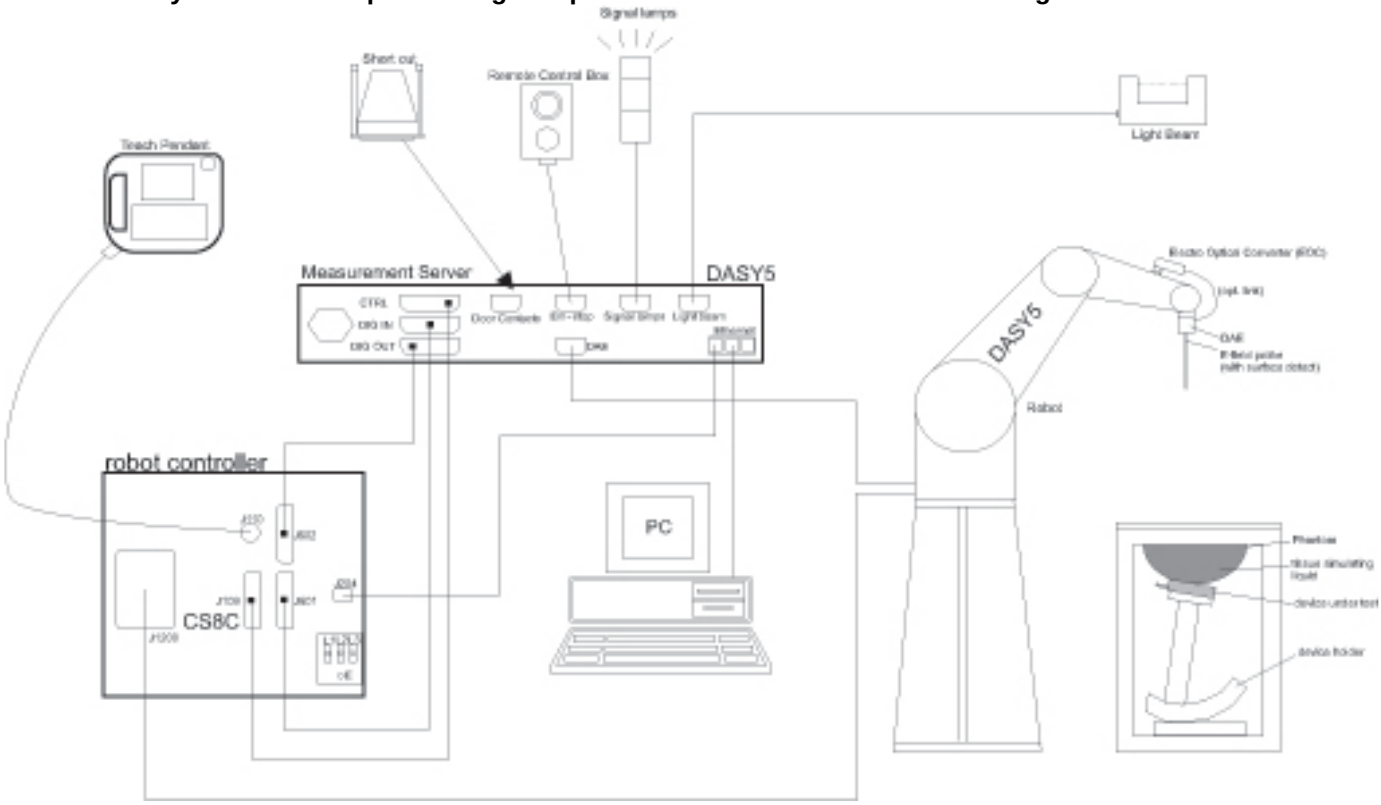
# 4. SAR Measurement System & Test Equipment

## 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.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## 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. | |


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**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 | $\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$ | |
| 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.

**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.


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## 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 |
|---|---|---|---|---|
| Network Analyzer | Agilent | E5071C | MY46522054 | 8-7-2019 |
| Dielectric Assessment Kit | SPEAG | DAK-3.5 | 1196 | 6-26-2019 |
| Shorting block | SPEAG | DAK-3.5 Short | SM DAK 200 BA | N/A |
| Thermometer | LKM | DTM3000 | 3424 | 8-9-2019 |

**System Check**

| Name of Equipment | Manufacturer | Type/Model | Serial No. | Cal. Due Date |
|---|---|---|---|---|
| MXG Analog Signal Generator | Agilent | N5181A | MY50145882 | 8-7-2019 |
| Power Sensor | Agilent | U2000A | MY54260010 | 8-7-2019 |
| Power Sensor | Agilent | U2000A | MY54260007 | 8-7-2019 |
| Power Amplifier | EXODUS | 1410025-AMP2027-10003 | 10003 | 8-8-2019 |
| Directional Coupler | Agilent | 772D | MY52180193 | 8-7-2019 |
| Directional Coupler | Agilent | 778D | MY52180432 | 8-7-2019 |
| Low Pass Filter | MICROLAB | LA-15N | 03943 | 8-7-2019 |
| Low Pass Filter | FILTRON | L14012FL | 1410003S | 8-7-2019 |
| Attenuator | Agilent | 8491B/003 | MY39269292 | 8-7-2019 |
| Attenuator | Agilent | 8491B/010 | MY39269315 | 8-7-2019 |
| Attenuator | Agilent | 8491B/020 | MY39269298 | 8-7-2019 |
| E-Field Probe (SAR1) | SPEAG | EX3DV4 | 7376 | 9-26-2019 |
| E-Field Probe (SAR2) | SPEAG | EX3DV4 | 7330 | 1-31-2020 |
| E-Field Probe (SAR3) | SPEAG | EX3DV4 | 7314 | 8-30-2019 |
| E-Field Probe (SAR4) | SPEAG | EX3DV4 | 3991 | 5-24-2019 |
| Data Acquisition Electronics (SAR1) | SPEAG | DAE4 | 912 | 11-16-2019 |
| Data Acquisition Electronics (SAR1) | SPEAG | DAE4 | 1447 | 3-21-2020 |
| Data Acquisition Electronics (SAR2) | SPEAG | DAE4 | 1494 | 7-23-2019 |
| Data Acquisition Electronics (SAR3) | SPEAG | DAE4 | 1468 | 8-22-2019 |
| Data Acquisition Electronics (SAR4) | SPEAG | DAE4 | 1259 | 7-26-2019 |
| System Validation Dipole | SPEAG | D750V3 | 1122 | 2-19-2020 |
| System Validation Dipole | SPEAG | D835V2 | 4d174 | 1-23-2021 |
| System Validation Dipole | SPEAG | D1750V2 | 1125 | 2-16-2020 |
| System Validation Dipole | SPEAG | D1900V2 | 5d199 | 3-15-2020 |
| System Validation Dipole | SPEAG | D1900V2 | 5d190 | 10-23-2020 |
| System Validation Dipole | SPEAG | D2450V2 | 939 | 10-16-2020 |
| System Validation Dipole | SPEAG | D2600V2 | 1097 | 1-17-2020 |
| System Validation Dipole | SPEAG | D5GHzV2 | 1184 | 8-21-2020 |
| Thermometer (SAR1) | Lutron | MHB-382SD | AH.91463 | 8-8-2019 |
| Thermometer (SAR2) | Lutron | MHB-382SD | AH.50215 | 8-13-2019 |
| Thermometer (SAR3) | Lutron | MHB-382SD | AH.50213 | 8-14-2019 |
| Thermometer (SAR4) | Lutron | MHB-382SD | AH.91478 | 8-8-2019 |

**Others**

| Name of Equipment | Manufacturer | Type/Model | Serial No. | Cal. Due Date |
|---|---|---|---|---|
| Base Station Simulator | R & S | CMW500 | 150313 | 8-9-2019 |
| Base Station Simulator | R & S | CMW500 | 150314 | 8-9-2019 |
| Base Station Simulator | R & S | CMW500 | 162790 | 8-9-2019 |
| Wireless Connectivity Tester | R & S | CMW270 | 100982 | 8-8-2019 |
| Bluetooth Tester | TESCOM | TC-3000C | 3000C000546 | 8-7-2019 |

**Note(s):**

Refer to Appendix F that mentioned about justification for Extended SAR Dipole Calibrations.
(D750V3, SN : 1122, D1750V2, SN : 1125, D1900, SN : 5d199 and D2600, SN : 1097)


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# 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 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.

# 6. Device Under Test (DUT) Information

## 6.1. DUT Description

| | |
|---|---|
| Device Dimension | Overall (Length x Width): 163.0 mm x 76.0 mm<br>Overall Diagonal: 175.0 mm<br>Display Diagonal: 168.0 mm |
| Back Cover | ☒ The Back Cover is not removable. |
| Battery Options | ☒ The rechargeable battery is not user accessible |
| 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 5.8 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 : Ch.36 – Ch.48, Ch.149 – Ch.165)) |
| Test Sample Information | **No.** / **S/N** / **Notes**<br>1 / R38M10QK33K / Main conducted<br>2 / R38M3096LDT / WiFi conducted<br>3 / R38M10QK32M / SAR<br>4 / R38M10QK2WA / SAR<br>5 / R38M10QK2VL / SAR |


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## 6.2. Wireless Technologies

| Wireless technologies | Frequency bands | Operating mode | | Duty Cycle used for SAR testing |
|---|---|---|---|---|
| CDMA (CDMA2000) | BC0 | 1xRTT (Voice & Data)<br>1xEV-DO Rel. 0<br>1xEV-DO Rev. A<br>1xAdvanced | | 100% |
| | Does this device support SV-DO (1xRTT-1xEVDO)? ☐ Yes ☒ No | | | |
| 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 V | UMTS Rel. 99 (Voice & Data)<br>HSDPA (Category 24)<br>HSUPA (Category 6)<br>HSPA+ (DL only) | | 100% |
| LTE | FDD Band 4<br>FDD Band 5<br>FDD Band 12<br>FDD Band 17<br>TDD Band 41 | QPSK<br>16QAM<br>64QAM<br>Rel. 11 Carrier Aggregation (2 Uplinks and 3 Downlinks) | | 100% (FDD)<br>63.3% (TDD)[1] |
| | TDD Band 41 2CC | | | |
| | Does this device support SV-LTE (1xRTT-LTE)? ☐ Yes ☒ No | | | |
| Wi-Fi | 2.4 GHz | 802.11b<br>802.11g<br>802.11n (HT20) | | 98.8% (802.11b)<br>98.7% (802.11g)<br>98.5% (802.11n 20MHz BW) |
| | 5 GHz | 802.11a<br>802.11n (HT20)<br>802.11n (HT40)<br>802.11ac (VHT20)<br>802.11ac (VHT40)<br>802.11ac (VHT80) | | 98.6% (802.11a)<br>98.5% (802.11n,ac 20MHz BW)<br>98.2% (802.11n,ac 40MHz BW)<br>99.1% (802.11ac 80MHz BW) |
| Bluetooth | 2.4 GHz | Version 5.0 LE | | 76.9% (DH5) |

**Notes:**

1. This device supports uplink-downlink configuration 0-6. The configuration with the highest duty cycle was used (Subframe Number 0 at 63.3%).
2. The Bluetooth protocol is considered source-based averaging. Bluetooth GFSK (DH5) was verified to have the highest duty cycle of 76.9% and was considered and used for SAR Testing.
3. Duty cycle for Wi-Fi is referenced from the DTS and UNII report.


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## 6.3. Nominal and Maximum Output Power

KDB 447498 sec.4.1. 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 | Antenna | Mode | Max. RF Output Power (dBm) |
|---|---|---|---|
| | | | Tune-up Limit |
| CDMA BC0 | Main 1 | 1xRTT | **24.8** |
| | | 1xEVDO Rel.0 | **24.8** |
| | | 1xEVDO Rel.A | **24.8** |
| | | 1xAdvabced | **24.8** |

| RF Air interface | Antenna | Mode | Time Slots | Max. RF Output Power (dBm) | |
|---|---|---|---|---|---|
| | | | | Tune-up Limit | Frame Pwr |
| GSM850 | Main 1 | Voice/GPRS | 1 | **34.0** | **25.0** |
| | | GPRS | 2 | **31.0** | **25.0** |
| | | GPRS | 3 | **28.5** | **24.2** |
| | | GPRS | 4 | **27.0** | **24.0** |
| | | EGPRS | 1 | **27.0** | **18.0** |
| | | EGPRS | 2 | **24.5** | **18.5** |
| | | EGPRS | 3 | **23.0** | **18.7** |
| | | EGPRS | 4 | **21.0** | **18.0** |
| GSM1900 | Main 1 | Voice/GPRS | 1 | **30.8** | **21.8** |
| | | GPRS | 2 | **27.8** | **21.8** |
| | | GPRS | 3 | **26.0** | **21.7** |
| | | GPRS | 4 | **24.8** | **21.8** |
| | | EGPRS | 1 | **25.5** | **16.5** |
| | | EGPRS | 2 | **23.5** | **17.5** |
| | | EGPRS | 3 | **23.0** | **18.7** |
| | | EGPRS | 4 | **21.5** | **18.5** |

| RF Air interface | Antenna | Mode | Max. RF Output Power (dBm) | Reduced. RF Output Power (dBm) |
|---|---|---|---|---|
| W-CDMA Band II | Main 1 | R99 | **24.0** | **19.0** |
| | | HSDPA | **23.0** | **18.0** |
| | | HSUPA | **23.5** | **18.5** |
| W-CDMA Band V | Main 1 | R99 | **25.0** | |
| | | HSDPA | **24.0** | |
| | | HSUPA | **24.0** | |

| RF Air interface | Antenna | Mode | Max. RF Output Power (dBm) | Reduced. RF Output Power (dBm) |
|---|---|---|---|---|
| LTE Band 4 | Main 1 | QPSK | **25.0** | **20.0** |
| LTE Band 5 | Main 1 | QPSK | **25.5** | |
| LTE Band 12 | Main 1 | QPSK | **25.0** | |
| LTE Band 17* | Main 1 | QPSK | **25.0** | |
| LTE Band 41 | Main 2 | QPSK | **24.5** | |
| LTE-Uplink 2CA Band 41 | Main 2 | QPSK | **24.5** | |

**Notes:**

1. The device utilizes power reduction under some portable hotspot conditions for SAR compliance. There is power reduction for WWAN bands (WCDMA Band II, LTE Band 4). The reduced powers were confirmed via conducted power measurements the RF port. Detailed description of the hotspot power reduction mechanism is included in the operational description.
2. WWAN bands (WCDMA Band II, LTE Band 4) has support to proximity sensor back-off function. it is operating during extremity (hand-held) use conditions. And This function is apply to phablet 10-g SAR exposure condition. Other Head and Body exposure conditions are performed SAR test at full power. The proximity sensor details explain in SAR report according to Section 6 in KDB 616217.
3. All back-off functions are not operating at the same time.
4. LTE QPSK configuration has the highest maximum average output power per 3GPP standard.
5. LTE Band 17 (Frequency range: 704-716 MHz) is covered by LTE Band 12 (Frequency range: 699-716 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.


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| RF Air interface | Mode | Max. RF Output Power (dBm) | Reduced. RF Output Power (dBm) |
|---|---|---|---|
| WiFi 2.4 GHz (Ch.1 - Ch.11) | 802.11b | **19.0** | **12.0** |
| | 802.11g | **17.5** | **12.0** |
| | 802.11n HT20 | **17.5** | **12.0** |
| WiFi 2.4 GHz (Ch.12 - Ch.13) | 802.11b | **8.0** | **8.0** |
| | 802.11g | **8.0** | **8.0** |
| | 802.11n HT20 | **7.0** | **7.0** |
| WiFi 5 GHz (UNII-1) | 802.11a | **16.5** | **12.0** |
| | 802.11n HT20 | **16.5** | **12.0** |
| | 802.11n HT40 | **16.0** | **12.0** |
| | 802.11ac VHT20 | **16.5** | **12.0** |
| | 802.11ac VHT40 | **16.0** | **12.0** |
| | 802.11ac VHT80 | **14.0** | **12.0** |
| WiFi 5 GHz (UNII-2A) | 802.11a | **16.5** | **12.0** |
| | 802.11n HT20 | **16.5** | **12.0** |
| | 802.11n HT40 | **15.0** | **12.0** |
| | 802.11ac VHT20 | **16.5** | **12.0** |
| | 802.11ac VHT40 | **15.0** | **12.0** |
| | 802.11ac VHT80 | **14.0** | **12.0** |
| WiFi 5 GHz (UNII-2C) | 802.11a | **14.5** | **12.0** |
| | 802.11n HT20 | **14.5** | **12.0** |
| | 802.11n HT40 | **16.0** | **12.0** |
| | 802.11ac VHT20 | **14.5** | **12.0** |
| | 802.11ac VHT40 | **16.0** | **12.0** |
| | 802.11ac VHT80 | **14.0** | **12.0** |
| WiFi 5 GHz (UNII-3) | 802.11a | **16.0** | **12.0** |
| | 802.11n HT20 | **16.0** | **12.0** |
| | 802.11n HT40 | **16.0** | **12.0** |
| | 802.11ac VHT20 | **16.0** | **12.0** |
| | 802.11ac VHT40 | **16.0** | **12.0** |
| | 802.11ac VHT80 | **14.0** | **12.0** |
| Bluetooth | | **15.0** | |
| Bluetooth LE | | **12.0** | |

**Note(s):**

1. This device uses an independent fixed level power reduction mechanism for WLAN operations during voice or VoIP held to ear scenarios. Per FCC Guidance, the held-to-ear exposure conditions were evaluated at reduced power according to the head SAR positions described in IEEE 1528-2013. Detailed descriptions of the power reduction mechanism are included in the operational description.
2. Each Ant.1 & Ant.2 are operating same target power for SISO mode as well as MIMO mod according above table.


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## 6.4. General LTE SAR Test and Reporting Considerations

| Item | Description | | | | | | |
|---|---|---|---|---|---|---|---|
| Frequency range, Channel Bandwidth, Numbers and Frequencies | Band 4 | Frequency range: 1710 - 1755 MHz | | | | | |
| | | Channel Bandwidth | | | | | |
| | | 20 MHz | 15 MHz | 10 MHz | 5 MHz | 3 MHz | 1.4 MHz |
| | Low | 20050/ 1720 | 20025/ 1717.5 | 20000/ 1715 | 19975/ 1712.5 | 19965/ 1711.5 | 19957/ 1710.7 |
| | Mid | 20175/ 1732.5 | 20175/ 1732.5 | 20175/ 1732.5 | 20175/ 1732.5 | 20175/ 1732.5 | 20175/ 1732.5 |
| | High | 20300/ 1745 | 20325/ 1747.5 | 20350/ 1750 | 20375/ 1752.5 | 20385/ 1753.5 | 20393/ 1754.3 |
| | Band 5 | Frequency range: 824 - 849 MHz | | | | | |
| | | Channel Bandwidth | | | | | |
| | | 20 MHz | 15 MHz | 10 MHz | 5 MHz | 3 MHz | 1.4 MHz |
| | Low | | | 20450/ 829 | 20425/ 826.5 | 20415/ 825.5 | 20407/ 824.7 |
| | Mid | | | 20525/ 836.5 | 20525/ 836.5 | 20525/ 836.5 | 20525/ 836.5 |
| | High | | | 20600/ 844 | 20625/ 846.5 | 20635/ 847.5 | 20643/ 848.3 |
| | Band 12 | Frequency range: 699 – 716 MHz | | | | | |
| | | Channel Bandwidth | | | | | |
| | | 20 MHz | 15 MHz | 10 MHz | 5 MHz | 3 MHz | 1.4 MHz |
| | Low | | | 23060/ 704 | 23035/ 701.5 | 23025/ 700.5 | 23017/ 699.7 |
| | Mid | | | 23095/ 707.5 | 23095/ 707.5 | 23095/ 707.5 | 23095/ 707.5 |
| | High | | | 23130/ 711 | 23155/ 713.5 | 23165/ 714.5 | 23173/ 715.3 |
| | Band 17 | Frequency range: 704 - 716 MHz | | | | | |
| | | Channel Bandwidth | | | | | |
| | | 20 MHz | 15 MHz | 10 MHz | 5 MHz | 3 MHz | 1.4 MHz |
| | Low | | | 23780/ 709 | 23755/ 706.5 | | |
| | Mid | | | 23790/ 710 | 23790/ 710 | | |
| | High | | | 23800/ 711 | 23825/ 713.5 | | |
| | Band 41 | Frequency range: 2555 - 2655 MHz | | | | | |
| | | Channel Bandwidth | | | | | |
| | | 20 MHz | 15 MHz | 10 MHz | 5 MHz | 3 MHz | 1.4 MHz |
| | Low | 40340/ 2565 | 40315/ 2562.5 | 40290/ 2560 | 40265/ 2557.5 | | |
| | Mid | 40740/ 2605 | 40740/ 2605 | 40740/ 2605 | 40740/ 2605 | | |
| | High | 41140/ 2645 | 41165/ 2647.5 | 41190/ 2650 | 41215/ 2652.5 | | |
| LTE transmitter and antenna implementation | Refer to Appendix A. | | | | | | |
| Maximum power reduction (MPR) | **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 |

MPR Built-in by design

The manufacturer MPR values are always within the 3GPP maximum MPR allowance but may not follow the default MPR values.

A-MPR (additional MPR) was disabled during SAR testing



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**General LTE SAR Test and Reporting Considerations (Continued)**

| | |
|---|---|
| Power reduction | Yes |
| Spectrum plots for RB configurations | 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. |

**Notes:**

1. SAR Testing for LTE was performed with the same number of RB and RB offsets transmitting on all TTI frames (maximum TTI).


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## 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.

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

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

**Note(s):**
This device supports uplink-downlink configurations 0-6. The configuration with highest duty cycle was used for SAR Testing: configuration 0 at 63.3% duty cycle and Special Subframe 7


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# 6.6. LTE Carrier Aggregation

## DL Inter-Band (Nom-Contiguous)

| E-UTRA CA configuration (BCS) | E-UTRA Band | Allowed Channel BW Per Carrier (MHz) | | | Max Aggregated BW |
|---|---|---|---|---|---|
| | | 1st Carrier | 2nd Carrier | 3nd Carrier | |
| CA_41A-41A (0)(1) | Band 41 | 10, 15, 20 | 10, 15, 20 | | 40 MHz |
| | | 5, 10, 15, 20 | 5, 10, 15, 20 | | 40 MHz |

## DL Inter-Band (Contiguous)

| E-UTRA CA configuration (BCS) | E-UTRA Band | Allowed Channel BW Per Carrier (MHz) | | | Max Aggregated BW |
|---|---|---|---|---|---|
| | | 1st Carrier | 2nd Carrier | 3nd Carrier | |
| CA_41C (0)(1)(2)(3) | Band 41 | 10 | 20 | | 40 MHz |
| | | 15 | 15, 20 | | |
| | | 20 | 10, 15, 20 | | |
| | | 5, 10 | 20 | | 40 MHz |
| | | 15 | 15, 20 | | |
| | | 20 | 5, 10, 15, 20 | | |
| | | 10 | 15, 20 | | 40 MHz |
| | | 15 | 10, 15, 20 | | |
| | | 20 | 10, 15, 20 | | |
| | | 10 | 20 | | 40 MHz |
| | | 20 | 20 | | |
| CA_41D (0) | Band 41 | 10 | 20 | 15 | 60 MHz |
| | | 10 | 15, 20 | 20 | |
| | | 15 | 20 | 10, 15 | |
| | | 15 | 10, 15, 20 | 20 | |
| | | 20 | 15, 20 | 10 | |
| | | 20 | 10, 15, 20 | 15, 20 | |

## UL Intra-Band Contiguous

| E-UTRA CA configuration (BCS) | E-UTRA Band | Allowed Channel BW Per Carrier (MHz) | | | Max Aggregated BW |
|---|---|---|---|---|---|
| | | 1st Carrier | 2nd Carrier | 3nd Carrier | |
| CA_41C (0)(1) | Band 41 | 10 | 20 | | 40 MHz |
| | | 15 | 15, 20 | | |
| | | 20 | 10, 15, 20 | | |
| | | 5, 10 | 20 | | 40 MHz |
| | | 15 | 15, 20 | | |
| | | 20 | 5, 10, 15, 20 | | |

**Note(s):**

1. For supported channels, please refer to §6.4.


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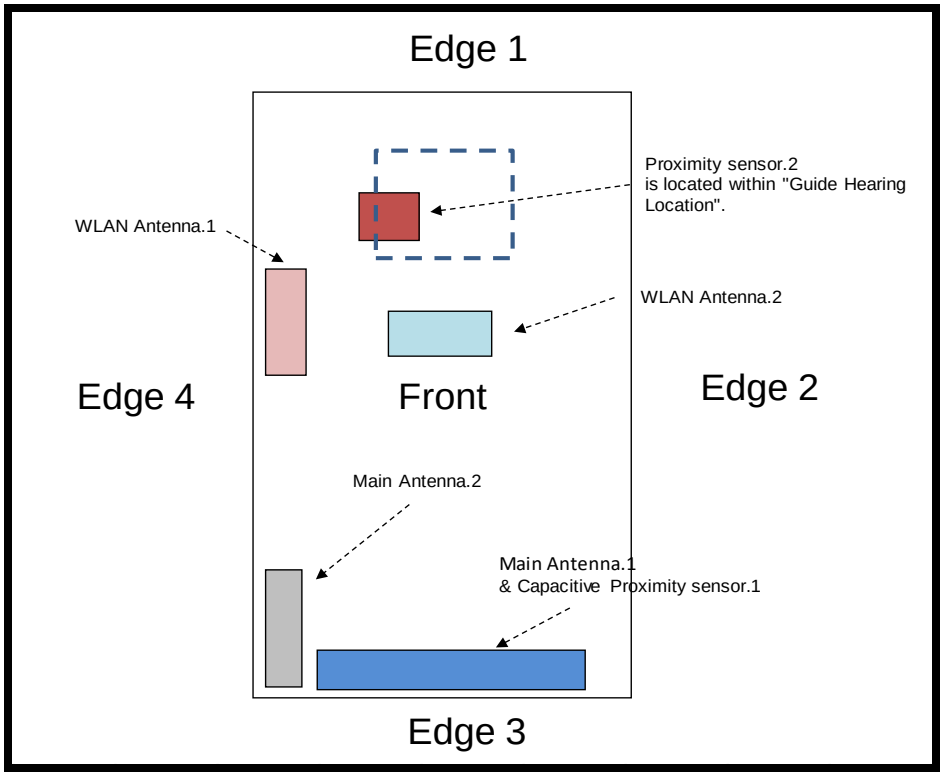
## 6.7. Proximity Sensor feature

The DUT has two proximity sensors to reduce the output power. The position of the sensors and antenna are as shown in the graphic.




**Notes:**

1. Proximity sensor.1 is related to only Main Antenna.1.
2. Proximity sensor.2 is related to both WLAN Antenna.1 and 2.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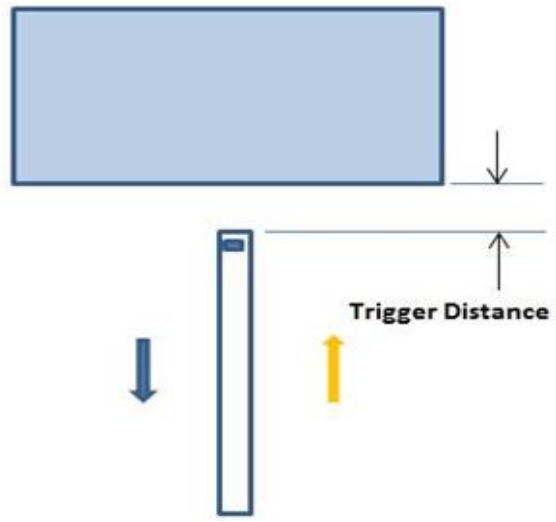
### 6.7.1. Proximity Sensor Triggering Distance (KDB 616217 §6.2)

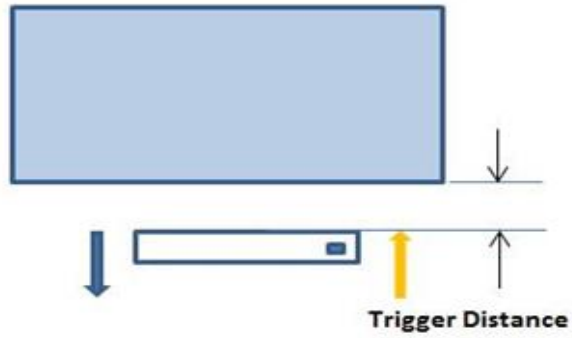
Front, Rear and Edge 3 of the DUT was placed directly below the flat phantom. The DUT was moved toward the phantom in accordance with the steps outlined in KDB 616217 §6.2 to determine the trigger distance for enabling power reduction. The DUT was moved away from the phantom to determine the trigger distance for resuming full power.

The DUT featured a visual indicator on its display that showed the status of the proximity sensor (Triggered or not triggered). This was used to determine the status of the sensor during the proximity sensor assessment as monitoring the output power directly was not practical without affecting the measurement.

It was confirmed separately that the output power was altered according to the proximity sensor status indication. This was achieved by observing the proximity sensor status at the same time as monitoring the conducted power. Section 9 contains both the full and reduced conducted power measurements.




**Proximity Sensor Trigger Distance Assessment**
**KDB 616217 §6.2, Edge 3**




**Proximity Sensor Trigger Distance Assessment**
**KDB 616217 §6.2, Rear, Front**

**LEGEND**

Direction of DUT travel for determination of power reduction triggering point

Direction of DUT travel for determination of full power resumption triggering point

**Summary of Trigger Distances**

| Tissue simulating liquid | Antenna | Trigger distance - Front | | Trigger distance - Rear | | Trigger distance – Edge 3 | |
|---|---|---|---|---|---|---|---|
| | | Moving toward phantom | Moving from phantom | Moving toward phantom | Moving from phantom | Moving toward phantom | Moving from phantom |
| 1750 Body | Main Ant.1 | 9 mm | 9 mm | 7 mm | 7 mm | 10 mm | 10 mm |
| 1900 Body | Main Ant.1 | 9 mm | 9 mm | 7 mm | 7 mm | 10 mm | 10 mm |
| 2450 Head | WLAN Ant.1 | 6 mm | 6 mm | N/A | | N/A | |
| 5G Head | WLAN Ant.1 | 6 mm | 6 mm | N/A | | N/A | |
| 2450 Head | WLAN Ant.2 | 5 mm | 5 mm | N/A | | N/A | |
| 5G Head | WLAN Ant.2 | 5 mm | 5 mm | N/A | | N/A | |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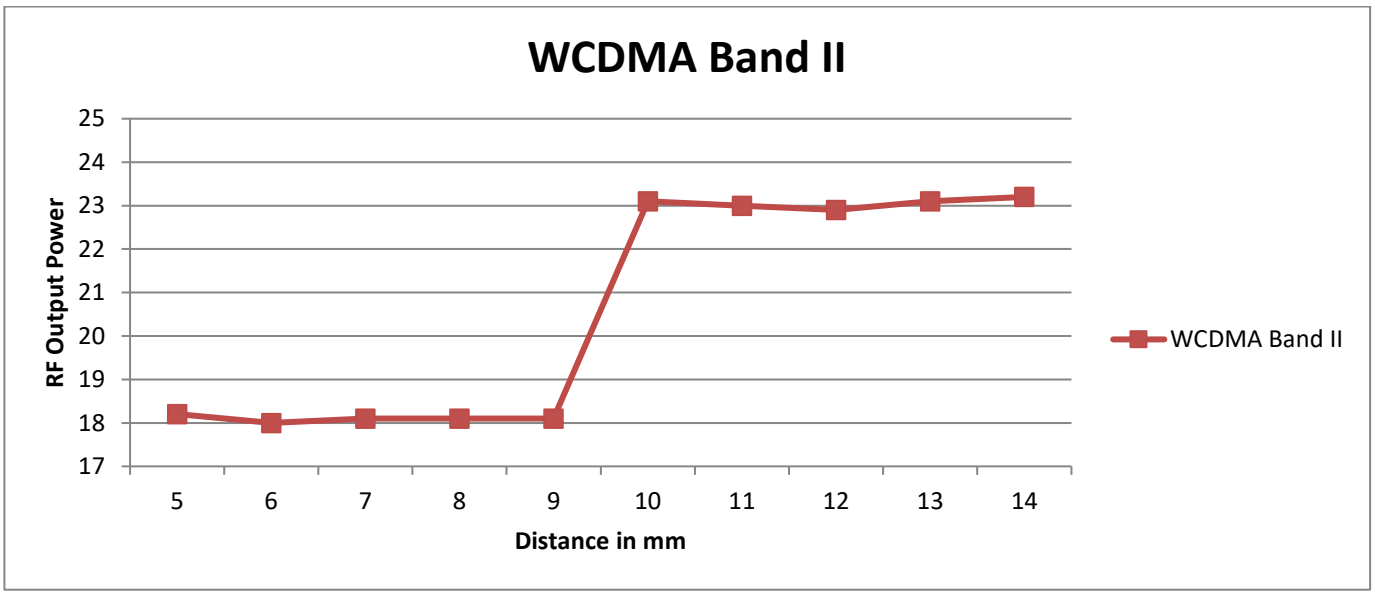
## Proximity Sensor Triggering Distance Measurement Results

### WCDMA Band II

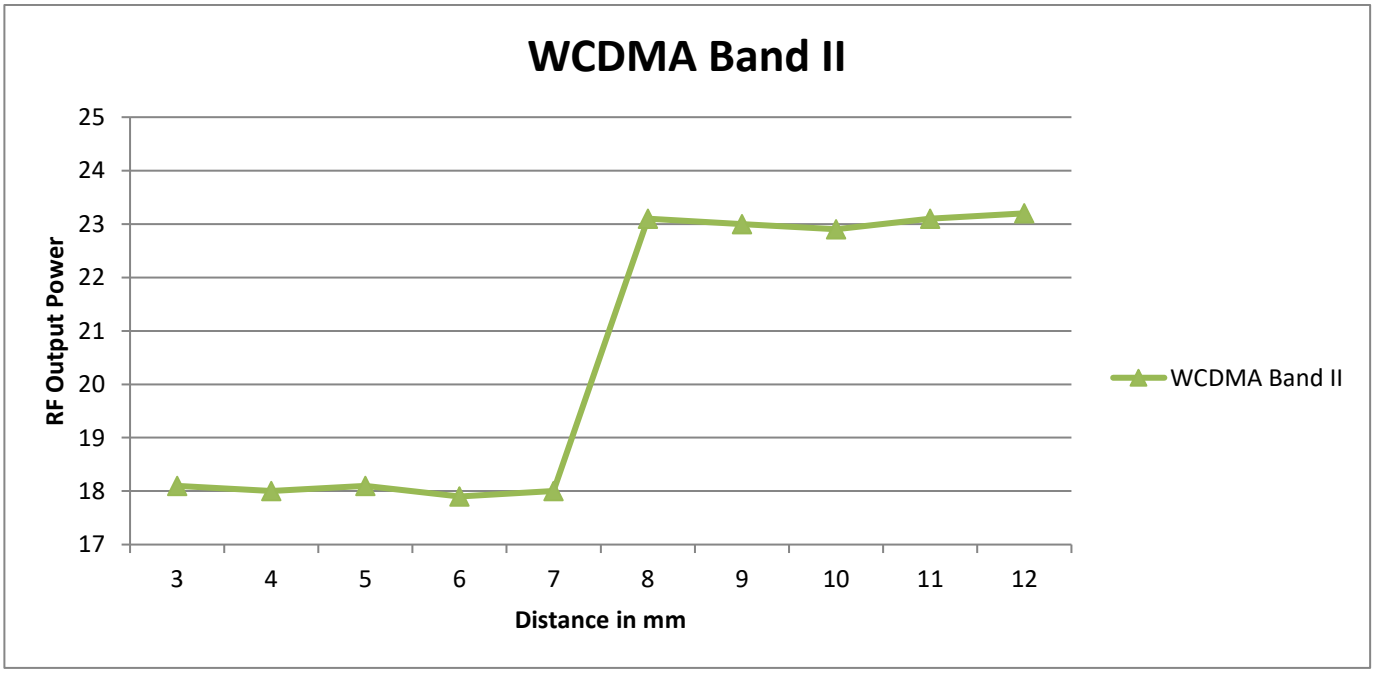
Front, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

| Distance to DUT vs. Output Power in dBm | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Distance (mm) | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| WCDMA Band II | 18.2 | 18.0 | 18.1 | 18.1 | 18.1 | 23.1 | 23.0 | 22.9 | 23.1 | 23.2 |




Rear, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

| Distance to DUT vs. Output Power in dBm | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Distance (mm) | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| WCDMA Band II | 18.1 | 18.0 | 18.1 | 17.9 | 18.0 | 23.1 | 23.0 | 22.9 | 23.1 | 23.2 |





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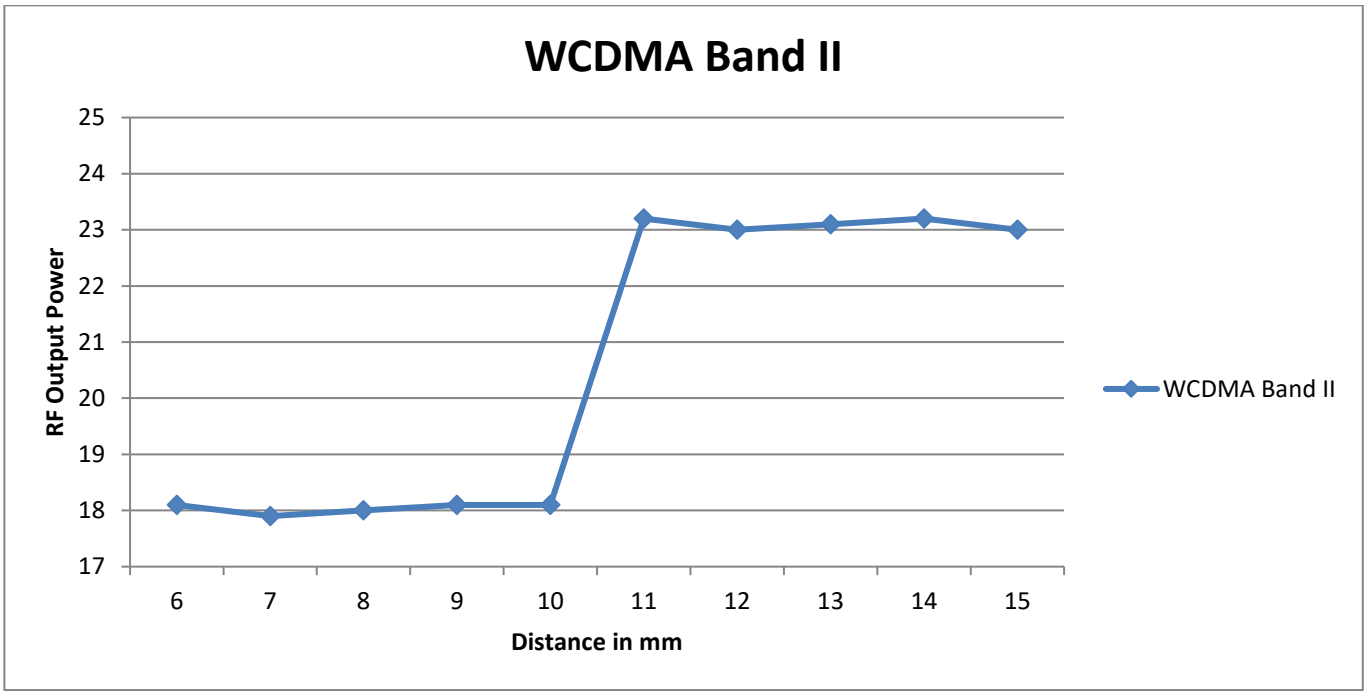
Edge 3, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

| Distance to DUT vs. Output Power in dBm | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Distance (mm) | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| WCDMA Band II | 18.1 | 17.9 | 18.0 | 18.1 | 18.1 | 23.2 | 23.0 | 23.1 | 23.2 | 23.0 |





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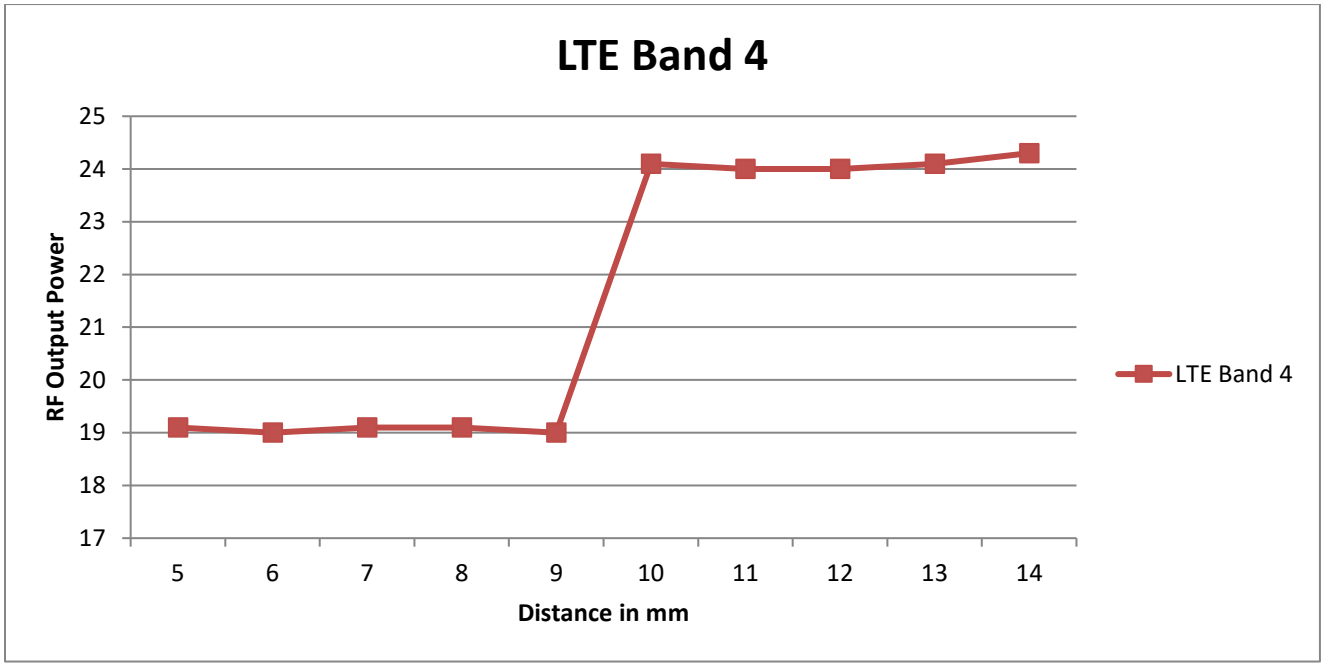
## LTE Band 4

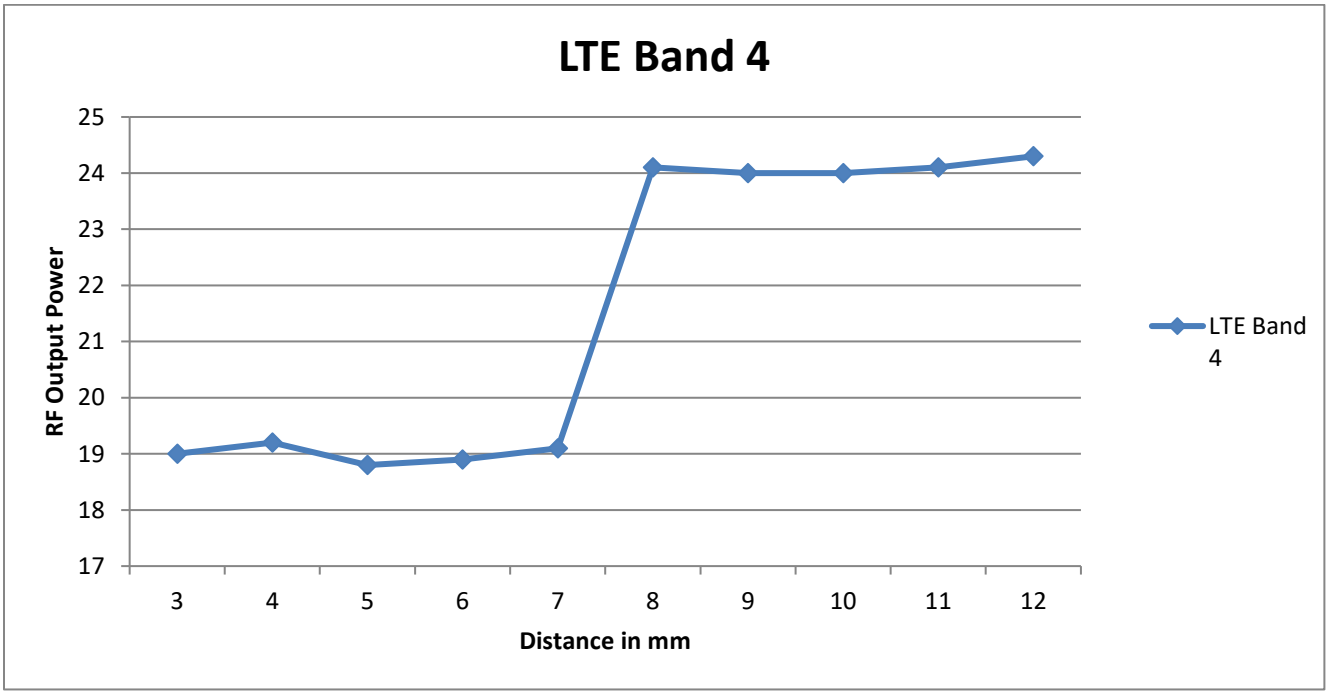
Front, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

| Distance to DUT vs. Output Power in dBm | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Distance (mm) | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| LTE Band 4 | 19.1 | 19.0 | 19.1 | 19.1 | 19.0 | 24.1 | 24.0 | 24.0 | 24.1 | 24.3 |




Rear, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

| Distance to DUT vs. Output Power in dBm | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Distance (mm) | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| LTE Band 4 | 19.0 | 19.2 | 18.8 | 18.9 | 19.1 | 24.1 | 24.0 | 24.0 | 24.1 | 24.3 |





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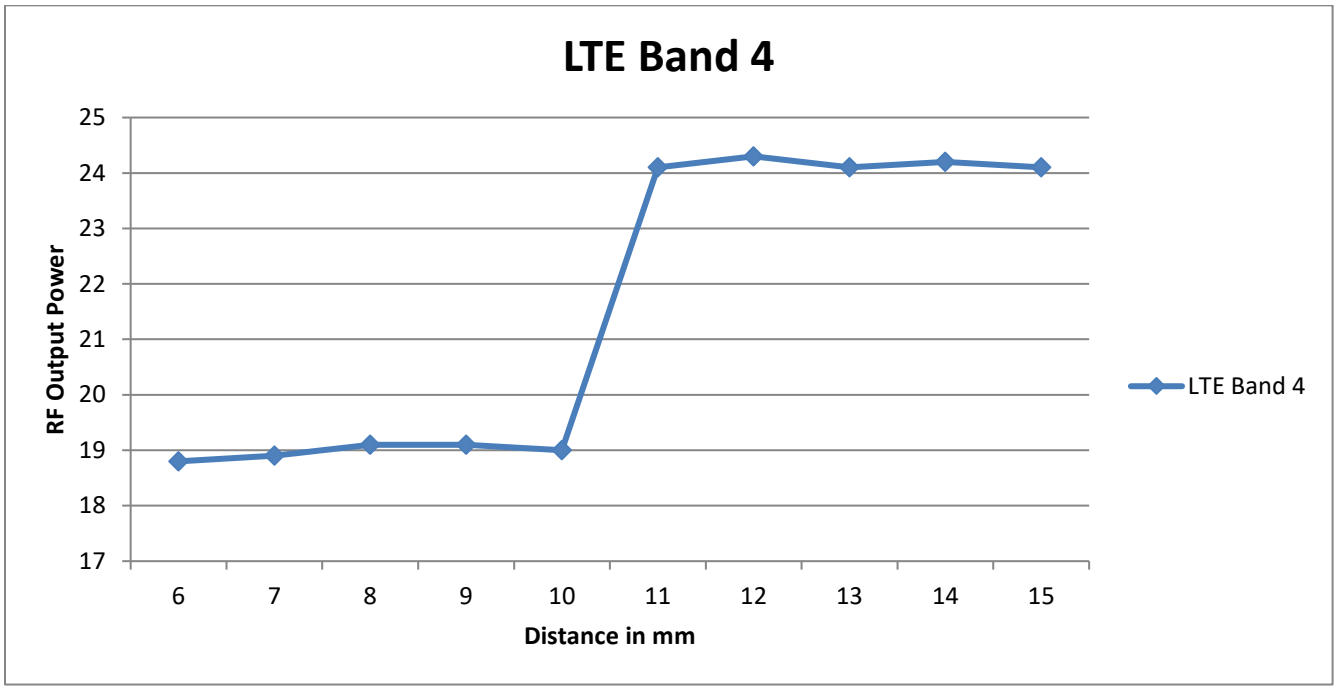
Edge 3, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

| Distance to DUT vs. Output Power in dBm | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Distance (mm) | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| LTE Band 4 | 18.8 | 18.9 | 19.1 | 19.1 | 19.0 | 24.1 | 24.3 | 24.1 | 24.2 | 24.1 |





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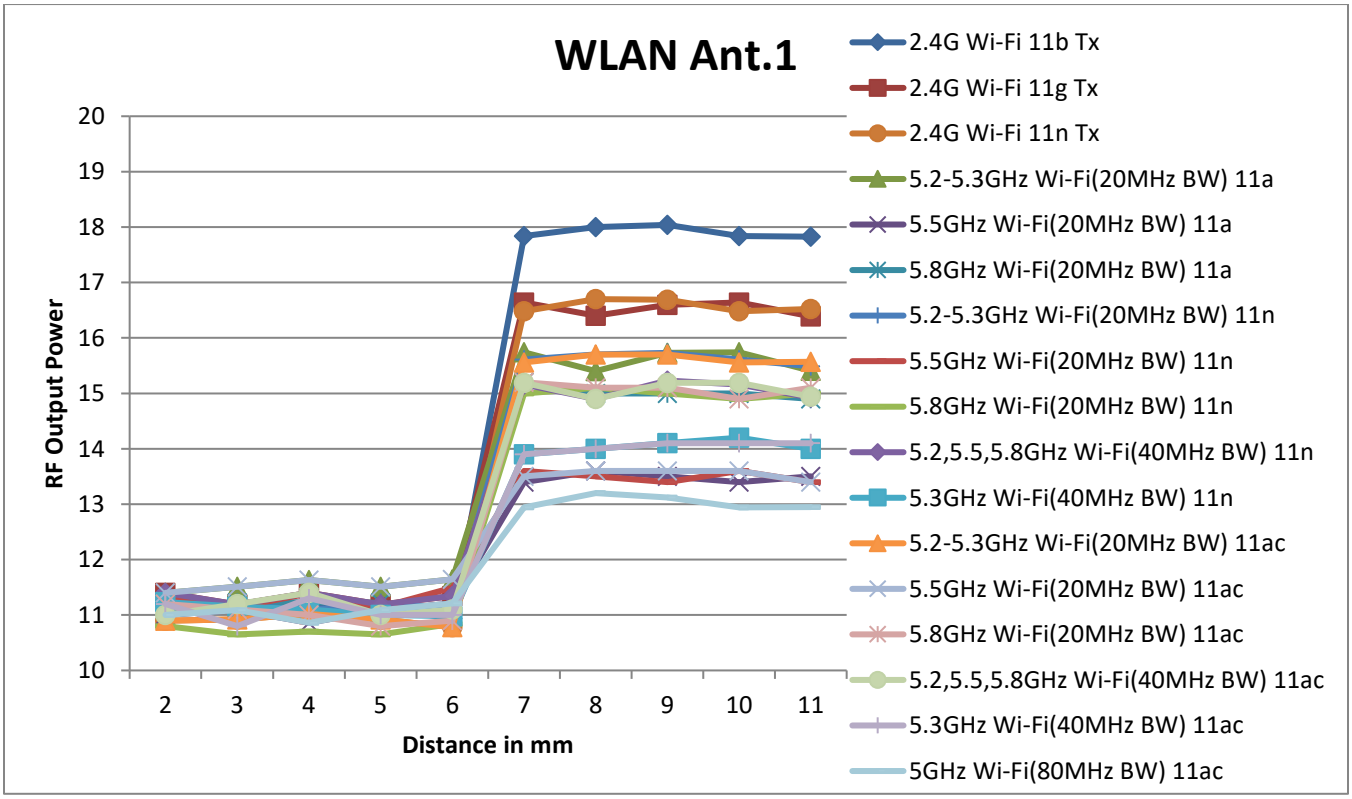
## WLAN Ant.1 : 2.4GHz and 5GHz

Front, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

| Distance to DUT vs. Output Power in dBm | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Distance (mm) | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 2.4G Wi-Fi 11b Tx | 11.0 | 11.1 | 11.2 | 11.1 | 10.9 | 17.8 | 18.0 | 18.0 | 17.8 | 17.8 |
| 2.4G Wi-Fi 11g Tx | 11.4 | 11.2 | 11.4 | 11.2 | 11.3 | 16.6 | 16.4 | 16.6 | 16.6 | 16.4 |
| 2.4G Wi-Fi 11n Tx | 10.9 | 10.9 | 11.0 | 10.9 | 10.8 | 16.5 | 16.7 | 16.7 | 16.5 | 16.5 |
| 5.2-5.3GHz Wi-Fi(20MHz BW) 11a | 11.4 | 11.5 | 11.6 | 11.5 | 11.6 | 15.7 | 15.4 | 15.7 | 15.7 | 15.4 |
| 5.5GHz Wi-Fi(20MHz BW) 11a | 11.0 | 11.1 | 10.9 | 11.1 | 11.2 | 13.4 | 13.6 | 13.5 | 13.4 | 13.5 |
| 5.8GHz Wi-Fi(20MHz BW) 11a | 11.1 | 11.2 | 11.2 | 11.2 | 11.1 | 15.2 | 15.0 | 15.0 | 15.0 | 14.9 |
| 5.2-5.3GHz Wi-Fi(20MHz BW) 11n | 11.1 | 11.2 | 11.1 | 11.2 | 11.2 | 15.6 | 15.7 | 15.7 | 15.6 | 15.5 |
| 5.5GHz Wi-Fi(20MHz BW) 11n | 11.3 | 11.1 | 11.4 | 11.1 | 11.5 | 13.6 | 13.5 | 13.4 | 13.6 | 13.4 |
| 5.8GHz Wi-Fi(20MHz BW) 11n | 10.8 | 10.7 | 10.7 | 10.7 | 10.8 | 15.0 | 15.1 | 15.0 | 14.9 | 15.0 |
| 5.2,5.5,5.8GHz Wi-Fi(40MHz BW) 11n | 11.4 | 11.2 | 11.4 | 11.2 | 11.3 | 15.2 | 14.9 | 15.2 | 15.2 | 14.9 |
| 5.3GHz Wi-Fi(40MHz BW) 11n | 11.2 | 11.2 | 11.1 | 11.0 | 11.0 | 13.9 | 14.0 | 14.1 | 14.2 | 14.0 |
| 5.2-5.3GHz Wi-Fi(20MHz BW) 11ac | 10.9 | 10.9 | 11.0 | 10.9 | 10.8 | 15.6 | 15.7 | 15.7 | 15.6 | 15.6 |
| 5.5GHz Wi-Fi(20MHz BW) 11ac | 11.4 | 11.5 | 11.6 | 11.5 | 11.6 | 13.5 | 13.6 | 13.6 | 13.6 | 13.4 |
| 5.8GHz Wi-Fi(20MHz BW) 11ac | 11.2 | 11.1 | 11.0 | 10.8 | 10.9 | 15.2 | 15.1 | 15.1 | 14.9 | 15.1 |
| 5.2,5.5,5.8GHz Wi-Fi(40MHz BW) 11ac | 11.0 | 11.2 | 11.4 | 11.0 | 11.1 | 15.2 | 14.9 | 15.2 | 15.2 | 14.9 |
| 5.3GHz Wi-Fi(40MHz BW) 11ac | 11.2 | 10.8 | 11.3 | 11.0 | 11.0 | 13.9 | 14.0 | 14.1 | 14.1 | 14.1 |
| 5GHz Wi-Fi(80MHz BW) 11ac | 11.0 | 11.1 | 10.9 | 11.1 | 11.2 | 12.9 | 13.2 | 13.1 | 12.9 | 13.0 |





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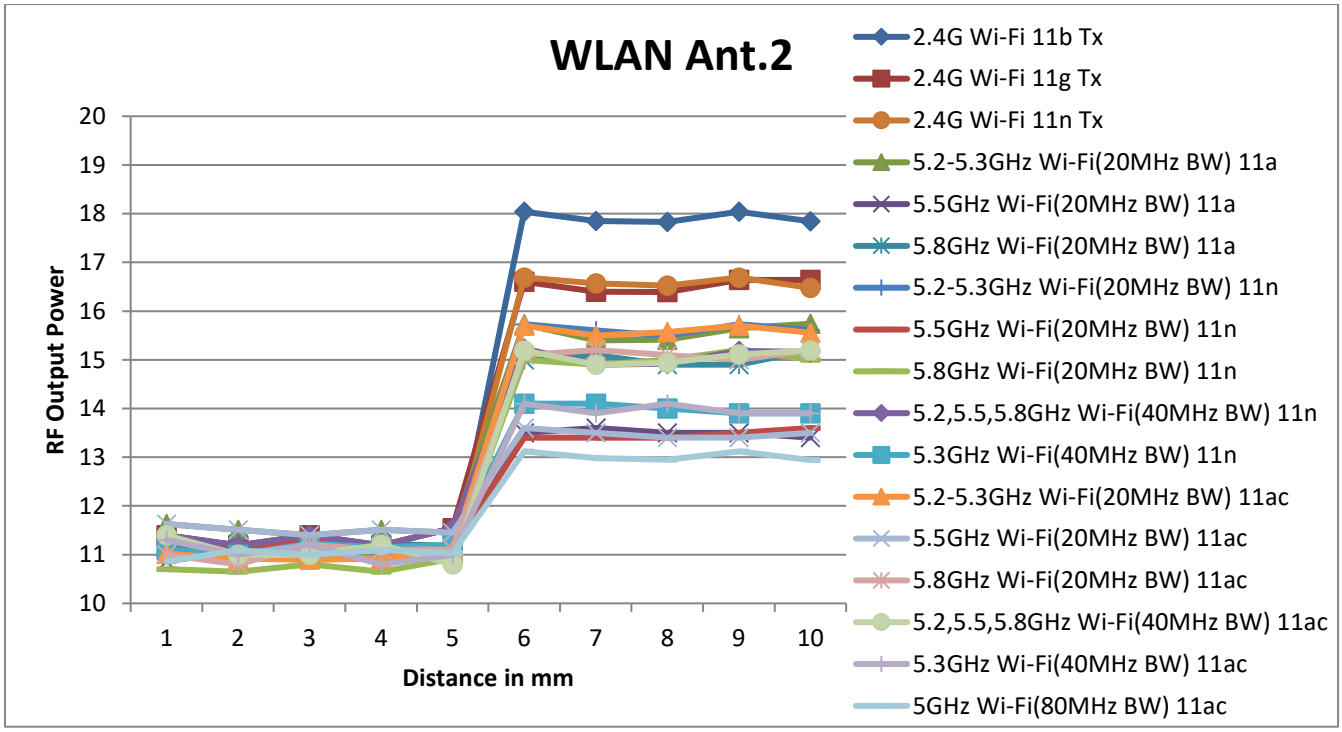
**WLAN Ant.2 : 2.4GHz and 5GHz**

Front, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

| Distance to DUT vs. Output Power in dBm | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Distance (mm) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 2.4G Wi-Fi 11b Tx | 11.2 | 11.1 | 11.0 | 11.1 | 10.8 | 18.0 | 17.9 | 17.8 | 18.0 | 17.8 |
| 2.4G Wi-Fi 11g Tx | 11.4 | 11.2 | 11.4 | 11.2 | 11.5 | 16.6 | 16.4 | 16.4 | 16.6 | 16.6 |
| 2.4G Wi-Fi 11n Tx | 11.0 | 10.9 | 10.9 | 10.9 | 11.1 | 16.7 | 16.6 | 16.5 | 16.7 | 16.5 |
| 5.2-5.3GHz Wi-Fi(20MHz BW) 11a | 11.6 | 11.5 | 11.4 | 11.5 | 11.5 | 15.7 | 15.4 | 15.4 | 15.7 | 15.7 |
| 5.5GHz Wi-Fi(20MHz BW) 11a | 10.9 | 11.1 | 11.0 | 11.1 | 11.0 | 13.5 | 13.6 | 13.5 | 13.5 | 13.4 |
| 5.8GHz Wi-Fi(20MHz BW) 11a | 11.2 | 11.2 | 11.1 | 11.2 | 11.2 | 15.0 | 15.1 | 14.9 | 14.9 | 15.2 |
| 5.2-5.3GHz Wi-Fi(20MHz BW) 11n | 11.1 | 11.2 | 11.1 | 11.2 | 11.1 | 15.7 | 15.6 | 15.5 | 15.7 | 15.6 |
| 5.5GHz Wi-Fi(20MHz BW) 11n | 11.4 | 11.1 | 11.3 | 11.1 | 11.1 | 13.4 | 13.4 | 13.4 | 13.5 | 13.6 |
| 5.8GHz Wi-Fi(20MHz BW) 11n | 10.7 | 10.7 | 10.8 | 10.7 | 10.9 | 15.0 | 14.9 | 15.0 | 15.2 | 15.0 |
| 5.2,5.5,5.8GHz Wi-Fi(40MHz BW) 11n | 11.4 | 11.2 | 11.4 | 11.2 | 11.5 | 15.2 | 14.9 | 14.9 | 15.2 | 15.2 |
| 5.3GHz Wi-Fi(40MHz BW) 11n | 11.1 | 11.0 | 11.2 | 11.2 | 11.2 | 14.1 | 14.1 | 14.0 | 13.9 | 13.9 |
| 5.2-5.3GHz Wi-Fi(20MHz BW) 11ac | 11.0 | 10.9 | 10.9 | 10.9 | 11.1 | 15.7 | 15.5 | 15.6 | 15.7 | 15.6 |
| 5.5GHz Wi-Fi(20MHz BW) 11ac | 11.6 | 11.5 | 11.4 | 11.5 | 11.5 | 13.6 | 13.5 | 13.4 | 13.4 | 13.5 |
| 5.8GHz Wi-Fi(20MHz BW) 11ac | 11.0 | 10.8 | 11.2 | 11.1 | 11.1 | 15.1 | 15.2 | 15.1 | 15.0 | 15.2 |
| 5.2,5.5,5.8GHz Wi-Fi(40MHz BW) 11ac | 11.4 | 11.0 | 11.0 | 11.2 | 10.8 | 15.2 | 14.9 | 14.9 | 15.1 | 15.2 |
| 5.3GHz Wi-Fi(40MHz BW) 11ac | 11.3 | 11.0 | 11.2 | 10.8 | 11.0 | 14.1 | 13.9 | 14.1 | 13.9 | 13.9 |
| 5GHz Wi-Fi(80MHz BW) 11ac | 10.9 | 11.1 | 11.0 | 11.1 | 11.0 | 13.1 | 13.0 | 13.0 | 13.1 | 12.9 |




## 6.7.2. Proximity Sensor Coverage (KDB 616217 §6.3)

Except WLAN, As there is no spatial offset between the antenna and the proximity sensor element, proximity sensor coverage did not need to be assessed.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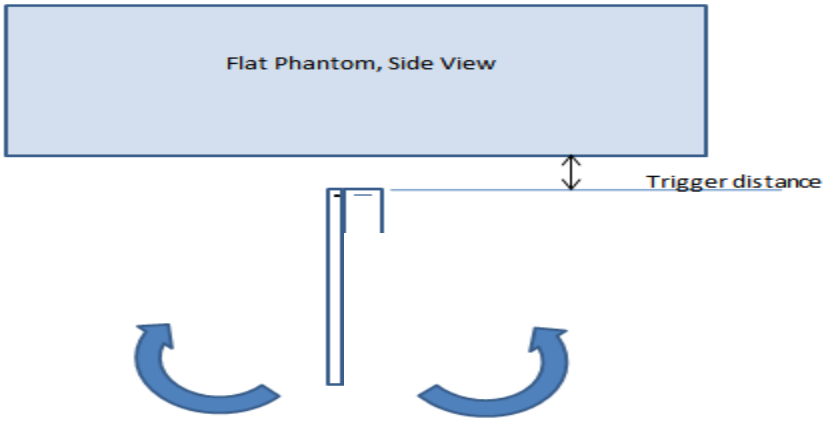
## 6.7.3. Proximity Sensor Tilt Angle Assessment (KDB 616217 §6.4)

The DUT was positioned directly below the flat phantom at the minimum measured trigger distance with Edge 3 parallel to the base of the flat phantom for each band.

The EUT was rotated about Edge 3 for angles up to +/- 45°. If the output power increased during the rotation the DUT was moved 1mm toward the phantom and the rotation repeated. This procedure was repeated until the power remained reduced for all angles up to +/- 45°.




Proximity sensor tilt angle asse ıent (Edge 3) KDB 616217 §6.4

**Summary of Tablet Tilt Angle Influence to Proximity Sensor Triggering (Edge 3)**

| Band (MHz) | Minimum trigger distance measured according to KDB 616217 §6.2 | Minimum distance at which power reduction was maintained over +/-45° | Power reduction status | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | -45° | -40° | -30° | -20° | -10° | 0° | 10° | 20° | 30° | 40° | 45° |
| 1750 | 10 mm | 10 mm | On | On | On | On | On | On | On | On | On | On | On |
| 1900 | 10 mm | 10 mm | On | On | On | On | On | On | On | On | On | On | On |

## 6.7.4. Resulting test positions for SAR measurements

| Wireless technologies | DUT Position | §6.2 Triggering Distance | §6.3 Coverage | §6.4 Tilt Angle | Worst case distance for SAR |
|---|---|---|---|---|---|
| WWAN (Main Ant.1) | Front | 9 mm | N/A | N/A | 8 mm |
| | Rear | 7 mm | N/A | N/A | 6 mm |
| | Edge 3 | 10 mm | N/A | 10 mm | 9 mm |
| WLAN Ant.1 | Front | 6 mm | N/A | 70 mm | 5 mm |
| WLAN Ant.2 | Front | 5 mm | N/A | 70 mm | 4 mm |

**Notes:**

1. Worst case distance for WLAN SAR is not considered for body exposure condition. Because Power reduction is applied only voice or VoIP held to ear scenarios.
2. For WLAN, This proximity sensor is only operating in Head exposure condition. So tilt position of Head exposure was additional verified.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# 7. RF Exposure Conditions (Test Configurations)

Refer to Appendix A for the specific details of the antenna-to-antenna and antenna-to-edge(s) distances.

| Wireless technologies | RF Exposure Conditions | DUT Configuration | DUT-to-User Separation | Test Position | Antenna-to-edge/surface | SAR Required | Note |
|---|---|---|---|---|---|---|---|
| WWAN (Main Ant.1) | Head | Configuration 1 | 0 mm | Left Touch | N/A | Yes | |
| | | | | Left Tilt (7°) | N/A | Yes | |
| | | | | Right Touch | N/A | Yes | |
| | | | | Right Tilt (7°) | N/A | Yes | |
| | Body | Configuration 1 | 15 mm | Rear | N/A | Yes | |
| | | | | Front | N/A | Yes | |
| | Hotspot | Configuration 1 & Configuration 2 | 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 | |
| | Product Specific 10g | Configuration 1 & Configuration 2 | 0 mm | Rear | Refer to notes 2 & 3 | | |
| | | | | Front | | | |
| | | | | Edge 1 (Top) | | | |
| | | | | Edge 2 (Right) | | | |
| | | | | Edge 3 (Bottom) | | | |
| | | | | Edge 4 (Left) | | | |
| WWAN (Main Ant.2) | Head | Configuration 1 | 0 mm | Left Touch | N/A | Yes | |
| | | | | Left Tilt (7°) | N/A | Yes | |
| | | | | Right Touch | N/A | Yes | |
| | | | | Right Tilt (7°) | N/A | Yes | |
| | Body | Configuration 1 | 15 mm | Rear | N/A | Yes | |
| | | | | Front | N/A | Yes | |
| | Hotspot | Configuration 1 & Configuration 2 | 10 mm | Rear | < 25 mm | Yes | |
| | | | | Front | < 25 mm | Yes | |
| | | | | Edge 1 (Top) | > 25 mm | No | 1 |
| | | | | Edge 2 (Right) | > 25 mm | No | 1 |
| | | | | Edge 3 (Bottom) | < 25 mm | Yes | |
| | | | | Edge 4 (Left) | < 25 mm | Yes | |
| | Product Specific 10g | Configuration 1 & Configuration 2 | 0 mm | Rear | Refer to notes 2 & 3 | | |
| | | | | Front | | | |
| | | | | Edge 1 (Top) | | | |
| | | | | Edge 2 (Right) | | | |
| | | | | Edge 3 (Bottom) | | | |
| | | | | Edge 4 (Left) | | | |

**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.
2. For Phablet devices: When hotspot mode applies, Product specific 10-g SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg.
3. For Phablet devices: When hotspot mode applies and power reduction applies to hotspot mode, Product Specific 10-g SAR is required for each test position that has an adjusted SAR to maximum power that is > 1.2 W/kg.
4. This device has not support to traditional earpiece. So we got guidance for the acceptable head SAR test configuration from FCC.
5. Tilt test is evaluated at 7 degree due to any point on the handset is in contact with the phantom.
6. This device has an extendable camera lens on the front side. *Following guidance from FCC via KDB enquiry* head and body-worn exposure conditions were evaluated with the lens in the closed position (configuration 1) consistent with how the lens would be positioned in those conditions. Hot-spot and extremity SAR measurements were made with the lens in the closed position(configuration 1) and in the extended position (configuration 2).


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| Wireless technologies | RF Exposure Conditions | DUT Configuration | DUT-to-User Separation | Test Position | Antenna-to-edge/surface | SAR Required | Note |
|---|---|---|---|---|---|---|---|
| WLAN & BT (Ant.1) | Head | Configuration 1 | 0 mm | Left Touch | N/A | Yes | |
| | | | | Left Tilt (7°) | N/A | Yes | |
| | | | | Right Touch | N/A | Yes | |
| | | | | Right Tilt (7°) | N/A | Yes | |
| | Body | Configuration 1 | 15 mm | Rear | N/A | Yes | |
| | | | | Front | N/A | Yes | |
| | Hotspot | Configuration 1 & Configuration 2 | 10 mm | Rear | < 25 mm | Yes | |
| | | | | Front | < 25 mm | Yes | |
| | | | | Edge 1 (Top) | > 25 mm | No | 1 |
| | | | | Edge 2 (Right) | > 25 mm | No | 1 |
| | | | | Edge 3 (Bottom) | > 25 mm | No | 1 |
| | | | | Edge 4 (Left) | < 25 mm | Yes | |
| | Product Specific 10g | Configuration 1 & Configuration 2 | 0 mm | Rear | Refer to notes 2 & 3 | | |
| | | | | Front | | | |
| | | | | Edge 1 (Top) | | | |
| | | | | Edge 2 (Right) | | | |
| | | | | Edge 3 (Bottom) | | | |
| | | | | Edge 4 (Left) | | | |
| WLAN (Ant.2) | Head | Configuration 1 | 0 mm | Left Touch | N/A | Yes | |
| | | | | Left Tilt (7°) | N/A | Yes | |
| | | | | Right Touch | N/A | Yes | |
| | | | | Right Tilt (7°) | N/A | Yes | |
| | Body | Configuration 1 | 15 mm | Rear | N/A | Yes | |
| | | | | Front | N/A | Yes | |
| | Hotspot | Configuration 1 & Configuration 2 | 10 mm | Rear | < 25 mm | Yes | |
| | | | | Front | < 25 mm | Yes | |
| | | | | Edge 1 (Top) | > 25 mm | No | 1 |
| | | | | Edge 2 (Right) | > 25 mm | No | 1 |
| | | | | Edge 3 (Bottom) | > 25 mm | No | 1 |
| | | | | Edge 4 (Left) | < 25 mm | Yes | |
| | Product Specific 10g | Configuration 1 & Configuration 2 | 0 mm | Rear | Refer to notes 2 & 3 | | |
| | | | | Front | | | |
| | | | | Edge 1 (Top) | | | |
| | | | | Edge 2 (Right) | | | |
| | | | | Edge 3 (Bottom) | | | |
| | | | | Edge 4 (Left) | | | |

**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.
2. For Phablet devices: When hotspot mode applies, Product specific 10-g SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg.
3. For Phablet devices: When hotspot mode is not supported, Product specific 10-g SAR is required for all surfaces and edges with an antenna located at ≤ 25mm from that surface or edge in direct contact with a flat phantom, to address interactive hand use exposure conditions.
4. This device has not support to traditional earpiece. So we got guidance for the acceptable head SAR test configuration from FCC.
5. Tilt test is evaluated at 7 degree due to any point on the handset is in contact with the phantom.
6. This device has an extendable camera lens on the front side. *Following guidance from FCC via KDB enquiry* head and body-worn exposure conditions were evaluated with the lens in the closed position (configuration 1) consistent with how the lens would be positioned in those conditions. Hot-spot and extremity SAR measurements were made with the lens in the closed position(configuration 1) and in the extended position (configuration 2).


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# 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.

### 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



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**Dielectric Property Measurements Results:**

**SAR 1 Room**

| Date | Freq. (MHz) | Liquid Parameters | | | Measured | Target | Delta (%) | Limit ±(%) |
|---|---|---|---|---|---|---|---|---|
| 3-21-2019 | Body 2600 | e' | 53.6800 | Relative Permittivity ($\varepsilon_r$): | 53.68 | 52.51 | 2.23 | 5 |
| | | e'' | 15.3100 | Conductivity (σ): | 2.21 | 2.16 | 2.43 | 5 |
| | Body 2500 | e' | 53.8800 | Relative Permittivity ($\varepsilon_r$): | 53.88 | 52.64 | 2.36 | 5 |
| | | e'' | 15.0800 | Conductivity (σ): | 2.10 | 2.02 | 3.76 | 5 |
| | Body 2700 | e' | 53.4400 | Relative Permittivity ($\varepsilon_r$): | 53.44 | 52.38 | 2.01 | 5 |
| | | e'' | 15.5000 | Conductivity (σ): | 2.33 | 2.30 | 1.11 | 5 |
| 4-4-2019 | Head 2600 | e' | 38.1200 | Relative Permittivity ($\varepsilon_r$): | 38.12 | 39.01 | -2.28 | 5 |
| | | e'' | 14.1100 | Conductivity (σ): | 2.04 | 1.96 | 3.96 | 5 |
| | Head 2500 | e' | 38.4800 | Relative Permittivity ($\varepsilon_r$): | 38.48 | 39.14 | -1.68 | 5 |
| | | e'' | 13.8800 | Conductivity (σ): | 1.93 | 1.85 | 4.07 | 5 |
| | Head 2700 | e' | 37.7400 | Relative Permittivity ($\varepsilon_r$): | 37.74 | 38.88 | -2.94 | 5 |
| | | e'' | 14.3700 | Conductivity (σ): | 2.16 | 2.07 | 4.21 | 5 |
| 4-5-2019 | Head 5250 | e' | 36.1300 | Relative Permittivity ($\varepsilon_r$): | 36.13 | 35.93 | 0.55 | 5 |
| | | e'' | 16.1000 | Conductivity (σ): | 4.70 | 4.70 | -0.05 | 5 |
| | Head 5260 | e' | 36.1100 | Relative Permittivity ($\varepsilon_r$): | 36.11 | 35.92 | 0.52 | 5 |
| | | e'' | 16.1200 | Conductivity (σ): | 4.71 | 4.71 | 0.05 | 5 |
| | Head 5600 | e' | 35.7000 | Relative Permittivity ($\varepsilon_r$): | 35.70 | 35.53 | 0.47 | 5 |
| | | e'' | 16.2700 | Conductivity (σ): | 5.07 | 5.06 | 0.12 | 5 |
| | Head 5750 | e' | 35.4400 | Relative Permittivity ($\varepsilon_r$): | 35.44 | 35.36 | 0.22 | 5 |
| | | e'' | 16.3400 | Conductivity (σ): | 5.22 | 5.21 | 0.20 | 5 |
| | Head 5825 | e' | 35.3300 | Relative Permittivity ($\varepsilon_r$): | 35.33 | 35.30 | 0.08 | 5 |
| | | e'' | 16.4200 | Conductivity (σ): | 5.32 | 5.27 | 0.92 | 5 |
| 4-8-2019 | Body 2250 | e' | 54.0800 | Relative Permittivity ($\varepsilon_r$): | 54.08 | 52.97 | 2.09 | 5 |
| | | e'' | 13.9200 | Conductivity (σ): | 1.74 | 1.76 | -0.84 | 5 |
| | Body 2300 | e' | 53.9300 | Relative Permittivity ($\varepsilon_r$): | 53.93 | 52.90 | 1.94 | 5 |
| | | e'' | 14.1400 | Conductivity (σ): | 1.81 | 1.80 | 0.27 | 5 |
| | Body 2350 | e' | 53.9000 | Relative Permittivity ($\varepsilon_r$): | 53.90 | 52.84 | 2.01 | 5 |
| | | e'' | 14.3300 | Conductivity (σ): | 1.87 | 1.85 | 1.17 | 5 |
| 4-8-2019 | Head 5250 | e' | 36.3500 | Relative Permittivity ($\varepsilon_r$): | 36.35 | 35.93 | 1.16 | 5 |
| | | e'' | 15.9300 | Conductivity (σ): | 4.65 | 4.70 | -1.10 | 5 |
| | Head 5260 | e' | 36.3400 | Relative Permittivity ($\varepsilon_r$): | 36.34 | 35.92 | 1.16 | 5 |
| | | e'' | 15.9400 | Conductivity (σ): | 4.66 | 4.71 | -1.07 | 5 |
| | Head 5600 | e' | 35.8800 | Relative Permittivity ($\varepsilon_r$): | 35.88 | 35.53 | 0.97 | 5 |
| | | e'' | 15.9900 | Conductivity (σ): | 4.98 | 5.06 | -1.61 | 5 |
| | Head 5750 | e' | 35.6200 | Relative Permittivity ($\varepsilon_r$): | 35.62 | 35.36 | 0.73 | 5 |
| | | e'' | 16.0900 | Conductivity (σ): | 5.14 | 5.21 | -1.33 | 5 |
| | Head 5825 | e' | 35.5400 | Relative Permittivity ($\varepsilon_r$): | 35.54 | 35.30 | 0.68 | 5 |
| | | e'' | 16.1600 | Conductivity (σ): | 5.23 | 5.27 | -0.68 | 5 |
| 4-9-2019 | Head 2450 | e' | 39.7500 | Relative Permittivity ($\varepsilon_r$): | 39.75 | 39.20 | 1.40 | 5 |
| | | e'' | 13.4400 | Conductivity (σ): | 1.83 | 1.80 | 1.72 | 5 |
| | Head 2400 | e' | 40.0700 | Relative Permittivity ($\varepsilon_r$): | 40.07 | 39.30 | 1.97 | 5 |
| | | e'' | 13.2200 | Conductivity (σ): | 1.76 | 1.75 | 0.72 | 5 |
| | Head 2480 | e' | 39.6000 | Relative Permittivity ($\varepsilon_r$): | 39.60 | 39.16 | 1.12 | 5 |
| | | e'' | 13.5400 | Conductivity (σ): | 1.87 | 1.83 | 1.89 | 5 |
| 4-10-2019 | Body 2450 | e' | 51.9600 | Relative Permittivity ($\varepsilon_r$): | 51.96 | 52.70 | -1.40 | 5 |
| | | e'' | 14.4000 | Conductivity (σ): | 1.96 | 1.95 | 0.60 | 5 |
| | Body 2400 | e' | 52.2700 | Relative Permittivity ($\varepsilon_r$): | 52.27 | 52.77 | -0.95 | 5 |
| | | e'' | 14.2000 | Conductivity (σ): | 1.89 | 1.90 | -0.16 | 5 |
| | Body 2480 | e' | 51.8400 | Relative Permittivity ($\varepsilon_r$): | 51.84 | 52.66 | -1.56 | 5 |
| | | e'' | 14.5000 | Conductivity (σ): | 2.00 | 1.99 | 0.37 | 5 |


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**SAR 1 Room _(Continued)**

| Date | Freq. (MHz) | Liquid Parameters | | | Measured | Target | Delta (%) | Limit ±(%) |
|---|---|---|---|---|---|---|---|---|
| 4-10-2019 | Body 2600 | e' | 51.3100 | Relative Permittivity ($\varepsilon_r$): | 51.31 | 52.51 | -2.29 | 5 |
| | | e'' | 14.5300 | Conductivity ($\sigma$): | 2.10 | 2.16 | -2.79 | 5 |
| | Body 2500 | e' | 51.7400 | Relative Permittivity ($\varepsilon_r$): | 51.74 | 52.64 | -1.70 | 5 |
| | | e'' | 14.4800 | Conductivity ($\sigma$): | 2.01 | 2.02 | -0.37 | 5 |
| | Body 2700 | e' | 51.0800 | Relative Permittivity ($\varepsilon_r$): | 51.08 | 52.38 | -2.49 | 5 |
| | | e'' | 14.6100 | Conductivity ($\sigma$): | 2.19 | 2.30 | -4.69 | 5 |

**SAR 2 Room**

| Date | Freq. (MHz) | Liquid Parameters | | | Measured | Target | Delta (%) | Limit ±(%) |
|---|---|---|---|---|---|---|---|---|
| 4-8-2019 | Body 835 | e' | 53.0700 | Relative Permittivity ($\varepsilon_r$): | 53.07 | 55.20 | -3.86 | 5 |
| | | e'' | 20.8200 | Conductivity ($\sigma$): | 0.97 | 0.97 | -0.35 | 5 |
| | Body 820 | e' | 53.2200 | Relative Permittivity ($\varepsilon_r$): | 53.22 | 55.28 | -3.72 | 5 |
| | | e'' | 20.8800 | Conductivity ($\sigma$): | 0.95 | 0.97 | -1.70 | 5 |
| | Body 850 | e' | 52.9600 | Relative Permittivity ($\varepsilon_r$): | 52.96 | 55.16 | -3.98 | 5 |
| | | e'' | 20.7700 | Conductivity ($\sigma$): | 0.98 | 0.99 | -0.56 | 5 |


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**SAR 3 Room**

| Date | Freq. (MHz) | Liquid Parameters | | | Measured | Target | Delta (%) | Limit ±(%) |
|---|---|---|---|---|---|---|---|---|
| 4-1-2019 | Head 835 | e' | 41.8800 | Relative Permittivity ($\varepsilon_r$): | 41.88 | 41.50 | 0.92 | 5 |
| | | e'' | 19.8300 | Conductivity ($\sigma$): | 0.92 | 0.90 | 2.30 | 5 |
| | Head 820 | e' | 42.0500 | Relative Permittivity ($\varepsilon_r$): | 42.05 | 41.60 | 1.08 | 5 |
| | | e'' | 19.8800 | Conductivity ($\sigma$): | 0.91 | 0.90 | 0.89 | 5 |
| | Head 850 | e' | 41.7100 | Relative Permittivity ($\varepsilon_r$): | 41.71 | 41.50 | 0.51 | 5 |
| | | e'' | 19.8100 | Conductivity ($\sigma$): | 0.94 | 0.92 | 2.32 | 5 |
| 4-1-2019 | Body 835 | e' | 55.0800 | Relative Permittivity ($\varepsilon_r$): | 55.08 | 55.20 | -0.22 | 5 |
| | | e'' | 20.7400 | Conductivity ($\sigma$): | 0.96 | 0.97 | -0.73 | 5 |
| | Body 820 | e' | 55.2000 | Relative Permittivity ($\varepsilon_r$): | 55.20 | 55.28 | -0.14 | 5 |
| | | e'' | 20.8000 | Conductivity ($\sigma$): | 0.95 | 0.97 | -2.07 | 5 |
| | Body 850 | e' | 54.9500 | Relative Permittivity ($\varepsilon_r$): | 54.95 | 55.16 | -0.38 | 5 |
| | | e'' | 20.6800 | Conductivity ($\sigma$): | 0.98 | 0.99 | -0.99 | 5 |
| 4-5-2019 | Body 5250 | e' | 47.3900 | Relative Permittivity ($\varepsilon_r$): | 47.39 | 48.95 | -3.19 | 5 |
| | | e'' | 18.4800 | Conductivity ($\sigma$): | 5.39 | 5.35 | 0.78 | 5 |
| | Body 5260 | e' | 47.3600 | Relative Permittivity ($\varepsilon_r$): | 47.36 | 48.94 | -3.23 | 5 |
| | | e'' | 18.5000 | Conductivity ($\sigma$): | 5.41 | 5.36 | 0.86 | 5 |
| | Body 5600 | e' | 46.8300 | Relative Permittivity ($\varepsilon_r$): | 46.83 | 48.48 | -3.40 | 5 |
| | | e'' | 18.7600 | Conductivity ($\sigma$): | 5.84 | 5.76 | 1.40 | 5 |
| | Body 5750 | e' | 46.5900 | Relative Permittivity ($\varepsilon_r$): | 46.59 | 48.27 | -3.49 | 5 |
| | | e'' | 18.9000 | Conductivity ($\sigma$): | 6.04 | 5.94 | 1.80 | 5 |
| | Body 5825 | e' | 46.4700 | Relative Permittivity ($\varepsilon_r$): | 46.47 | 48.20 | -3.59 | 5 |
| | | e'' | 18.9700 | Conductivity ($\sigma$): | 6.14 | 6.00 | 2.40 | 5 |
| 4-8-2019 | Body 5250 | e' | 47.7900 | Relative Permittivity ($\varepsilon_r$): | 47.79 | 48.95 | -2.37 | 5 |
| | | e'' | 18.5400 | Conductivity ($\sigma$): | 5.41 | 5.35 | 1.10 | 5 |
| | Body 5260 | e' | 47.7700 | Relative Permittivity ($\varepsilon_r$): | 47.77 | 48.94 | -2.39 | 5 |
| | | e'' | 18.5400 | Conductivity ($\sigma$): | 5.42 | 5.36 | 1.08 | 5 |
| | Body 5600 | e' | 47.1800 | Relative Permittivity ($\varepsilon_r$): | 47.18 | 48.48 | -2.68 | 5 |
| | | e'' | 18.8600 | Conductivity ($\sigma$): | 5.87 | 5.76 | 1.94 | 5 |
| | Body 5750 | e' | 46.9700 | Relative Permittivity ($\varepsilon_r$): | 46.97 | 48.27 | -2.70 | 5 |
| | | e'' | 19.0100 | Conductivity ($\sigma$): | 6.08 | 5.94 | 2.39 | 5 |
| | Body 5825 | e' | 46.8500 | Relative Permittivity ($\varepsilon_r$): | 46.85 | 48.20 | -2.80 | 5 |
| | | e'' | 19.0700 | Conductivity ($\sigma$): | 6.18 | 6.00 | 2.94 | 5 |
| 4-9-2019 | Head 835 | e' | 43.2000 | Relative Permittivity ($\varepsilon_r$): | 43.20 | 41.50 | 4.10 | 5 |
| | | e'' | 19.4800 | Conductivity ($\sigma$): | 0.90 | 0.90 | 0.49 | 5 |
| | Head 820 | e' | 43.4000 | Relative Permittivity ($\varepsilon_r$): | 43.40 | 41.60 | 4.32 | 5 |
| | | e'' | 19.5400 | Conductivity ($\sigma$): | 0.89 | 0.90 | -0.84 | 5 |
| | Head 850 | e' | 43.0000 | Relative Permittivity ($\varepsilon_r$): | 43.00 | 41.50 | 3.61 | 5 |
| | | e'' | 19.4700 | Conductivity ($\sigma$): | 0.92 | 0.92 | 0.57 | 5 |
| 4-12-2019 | Body 1900 | e' | 53.1000 | Relative Permittivity ($\varepsilon_r$): | 53.10 | 53.30 | -0.38 | 5 |
| | | e'' | 14.9600 | Conductivity ($\sigma$): | 1.58 | 1.52 | 3.98 | 5 |
| | Body 1850 | e' | 53.2000 | Relative Permittivity ($\varepsilon_r$): | 53.20 | 53.30 | -0.19 | 5 |
| | | e'' | 15.0600 | Conductivity ($\sigma$): | 1.55 | 1.52 | 1.92 | 5 |
| | Body 1910 | e' | 53.0900 | Relative Permittivity ($\varepsilon_r$): | 53.09 | 53.30 | -0.39 | 5 |
| | | e'' | 15.0000 | Conductivity ($\sigma$): | 1.59 | 1.52 | 4.80 | 5 |


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**SAR 4 Room**

| Date | Freq. (MHz) | Liquid Parameters | | | Measured | Target | Delta (%) | Limit ±(%) |
|---|---|---|---|---|---|---|---|---|
| 4-1-2019 | Body 1900 | e' | 54.8200 | Relative Permittivity ($\varepsilon_r$): | 54.82 | 53.30 | 2.85 | 5 |
| | | e'' | 14.5000 | Conductivity (σ): | 1.53 | 1.52 | 0.78 | 5 |
| | Body 1850 | e' | 54.8700 | Relative Permittivity ($\varepsilon_r$): | 54.87 | 53.30 | 2.95 | 5 |
| | | e'' | 14.4900 | Conductivity (σ): | 1.49 | 1.52 | -1.94 | 5 |
| | Body 1910 | e' | 54.8000 | Relative Permittivity ($\varepsilon_r$): | 54.80 | 53.30 | 2.81 | 5 |
| | | e'' | 14.5100 | Conductivity (σ): | 1.54 | 1.52 | 1.38 | 5 |
| 4-2-2019 | Head 1900 | e' | 38.8700 | Relative Permittivity ($\varepsilon_r$): | 38.87 | 40.00 | -2.83 | 5 |
| | | e'' | 13.6100 | Conductivity (σ): | 1.44 | 1.40 | 2.70 | 5 |
| | Head 1850 | e' | 38.9600 | Relative Permittivity ($\varepsilon_r$): | 38.96 | 40.00 | -2.60 | 5 |
| | | e'' | 13.6600 | Conductivity (σ): | 1.41 | 1.40 | 0.37 | 5 |
| | Head 1910 | e' | 38.8500 | Relative Permittivity ($\varepsilon_r$): | 38.85 | 40.00 | -2.88 | 5 |
| | | e'' | 13.6100 | Conductivity (σ): | 1.45 | 1.40 | 3.24 | 5 |
| 4-4-2019 | Head 750 | e' | 42.3000 | Relative Permittivity ($\varepsilon_r$): | 42.30 | 41.96 | 0.81 | 5 |
| | | e'' | 22.0200 | Conductivity (σ): | 0.92 | 0.89 | 2.82 | 5 |
| | Head 700 | e' | 42.2500 | Relative Permittivity ($\varepsilon_r$): | 42.25 | 42.22 | 0.08 | 5 |
| | | e'' | 22.8900 | Conductivity (σ): | 0.89 | 0.89 | 0.19 | 5 |
| | Head 790 | e' | 42.1600 | Relative Permittivity ($\varepsilon_r$): | 42.16 | 41.76 | 0.97 | 5 |
| | | e'' | 21.2200 | Conductivity (σ): | 0.93 | 0.90 | 4.01 | 5 |
| 4-4-2019 | Body 750 | e' | 56.8300 | Relative Permittivity ($\varepsilon_r$): | 56.83 | 55.55 | 2.31 | 5 |
| | | e'' | 23.9100 | Conductivity (σ): | 1.00 | 0.96 | 3.53 | 5 |
| | Body 700 | e' | 56.9200 | Relative Permittivity ($\varepsilon_r$): | 56.92 | 55.74 | 2.12 | 5 |
| | | e'' | 24.9500 | Conductivity (σ): | 0.97 | 0.96 | 1.24 | 5 |
| | Body 790 | e' | 56.6800 | Relative Permittivity ($\varepsilon_r$): | 56.68 | 55.39 | 2.32 | 5 |
| | | e'' | 22.8600 | Conductivity (σ): | 1.00 | 0.97 | 3.93 | 5 |
| 4-4-2019 | Body 1750 | e' | 52.6300 | Relative Permittivity ($\varepsilon_r$): | 52.63 | 53.44 | -1.52 | 5 |
| | | e'' | 15.3300 | Conductivity (σ): | 1.49 | 1.49 | 0.37 | 5 |
| | Body 1710 | e' | 52.6500 | Relative Permittivity ($\varepsilon_r$): | 52.65 | 53.54 | -1.67 | 5 |
| | | e'' | 15.5100 | Conductivity (σ): | 1.47 | 1.46 | 0.90 | 5 |
| | Body 1755 | e' | 52.6300 | Relative Permittivity ($\varepsilon_r$): | 52.63 | 53.43 | -1.49 | 5 |
| | | e'' | 15.3200 | Conductivity (σ): | 1.49 | 1.49 | 0.39 | 5 |
| 4-5-2019 | Head 1750 | e' | 39.3400 | Relative Permittivity ($\varepsilon_r$): | 39.34 | 40.08 | -1.86 | 5 |
| | | e'' | 14.2100 | Conductivity (σ): | 1.38 | 1.37 | 1.00 | 5 |
| | Head 1710 | e' | 39.3600 | Relative Permittivity ($\varepsilon_r$): | 39.36 | 40.15 | -1.96 | 5 |
| | | e'' | 14.3000 | Conductivity (σ): | 1.36 | 1.35 | 0.98 | 5 |
| | Head 1755 | e' | 39.3400 | Relative Permittivity ($\varepsilon_r$): | 39.34 | 40.08 | -1.84 | 5 |
| | | e'' | 14.2000 | Conductivity (σ): | 1.39 | 1.37 | 1.01 | 5 |
| 4-10-2019 | Body 1900 | e' | 53.1600 | Relative Permittivity ($\varepsilon_r$): | 53.16 | 53.30 | -0.26 | 5 |
| | | e'' | 14.9900 | Conductivity (σ): | 1.58 | 1.52 | 4.19 | 5 |
| | Body 1850 | e' | 53.3300 | Relative Permittivity ($\varepsilon_r$): | 53.33 | 53.30 | 0.06 | 5 |
| | | e'' | 15.1200 | Conductivity (σ): | 1.56 | 1.52 | 2.32 | 5 |
| | Body 1910 | e' | 53.1400 | Relative Permittivity ($\varepsilon_r$): | 53.14 | 53.30 | -0.30 | 5 |
| | | e'' | 14.9700 | Conductivity (σ): | 1.59 | 1.52 | 4.59 | 5 |
| 4-10-2019 | Head 1900 | e' | 38.5100 | Relative Permittivity ($\varepsilon_r$): | 38.51 | 40.00 | -3.73 | 5 |
| | | e'' | 13.6600 | Conductivity (σ): | 1.44 | 1.40 | 3.08 | 5 |
| | Head 1850 | e' | 38.6400 | Relative Permittivity ($\varepsilon_r$): | 38.64 | 40.00 | -3.40 | 5 |
| | | e'' | 13.8100 | Conductivity (σ): | 1.42 | 1.40 | 1.47 | 5 |
| | Head 1910 | e' | 38.4800 | Relative Permittivity ($\varepsilon_r$): | 38.48 | 40.00 | -3.80 | 5 |
| | | e'' | 13.6400 | Conductivity (σ): | 1.45 | 1.40 | 3.47 | 5 |


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## 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 2.5 mm.
  For 5 GHz band - Distance between probe sensors and phantom surface was set to 1.4 mm
- The dipole input power (forward power) was 100 mW.
- The results are normalized to 1 W input power.

**Reference Target SAR Values**

The reference SAR values can be obtained from the calibration certificate of system validation dipoles.

| System Dipole | Serial No. | Cal. Date | Freq. (MHz) | Target SAR Values (W/kg) | | |
|---|---|---|---|---|---|---|
| | | | | 1g/10g | Head | Body |
| D750V3 | 1122 | 2-19-2018 | 750 | 1g | 8.22 | 8.63 |
| | | | | 10g | 5.35 | 5.72 |
| D835V2 | 4d174 | 1-23-2019 | 835 | 1g | 9.28 | 9.47 |
| | | | | 10g | 6.04 | 6.23 |
| D1750V2 | 1125 | 2-16-2018 | 1750 | 1g | 36.50 | 36.80 |
| | | | | 10g | 19.30 | 19.50 |
| D1900V2 | 5d199 | 3-15-2018 | 1900 | 1g | 40.40 | 39.60 |
| | | | | 10g | 21.10 | 20.80 |
| D1900V2 | 5d190 | 10-23-2018 | 1900 | 1g | 39.10 | 39.00 |
| | | | | 10g | 20.40 | 20.50 |
| D2450V2 | 939 | 10-16-2018 | 2450 | 1g | 53.20 | 50.10 |
| | | | | 10g | 24.80 | 23.50 |
| D2600V2 | 1097 | 1-17-2018 | 2600 | 1g | 56.40 | 54.40 |
| | | | | 10g | 25.30 | 24.20 |
| D5GHzV2 | 1184 | 8-21-2018 | 5250 | 1g | 81.10 | 75.00 |
| | | | | 10g | 23.40 | 20.90 |
| | | | 5600 | 1g | 85.00 | 78.60 |
| | | | | 10g | 24.40 | 22.00 |
| | | | 5750 | 1g | 82.60 | 76.20 |
| | | | | 10g | 23.70 | 21.20 |

**Note(s):**

Refer to Appendix F that mentioned about justification for Extended SAR Dipole Calibrations
(D750, SN : 1122, D1750, SN : 1125, D1900, SN : 5d199, D2600, SN : 1097)


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**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 1 Room**

| Date Tested | System Dipole | | T.S. Liquid | | Measured Results | | Target (Ref. Value) | Delta ±10 % | Plot No. |
|---|---|---|---|---|---|---|---|---|---|
| | Type | Serial # | | | Zoom Scan to 100 mW | Normalize to 1 W | | | |
| 3-21-2019 | D2600V2 | 1097 | Body | 1g | 5.24 | 52.40 | 54.40 | -3.68 | 1, 2 |
| | | | | 10g | 2.33 | 23.30 | 24.20 | -3.72 | |
| 4-4-2019 | D2600V2 | 1097 | Head | 1g | 5.75 | 57.50 | 56.40 | 1.95 | |
| | | | | 10g | 2.51 | 25.10 | 25.30 | -0.79 | |
| 4-5-2019 | D5GHzV2 | 1184 | Head | 1g | 7.49 | 74.90 | 81.10 | -7.64 | 3, 4 |
| | | | | 10g | 2.14 | 21.40 | 23.40 | -8.55 | |
| 4-5-2019 | D5GHzV2 | 1184 | Head | 1g | 8.36 | 83.60 | 85.00 | -1.65 | |
| | | | | 10g | 2.36 | 23.60 | 24.40 | -3.28 | |
| 4-5-2019 | D5GHzV2 | 1184 | Head | 1g | 8.14 | 81.40 | 82.60 | -1.45 | |
| | | | | 10g | 2.31 | 23.10 | 23.70 | -2.53 | |
| 4-8-2019 | D2450V2 | 939 | Body | 1g | 5.31 | 53.10 | 50.10 | 5.99 | |
| | | | | 10g | 2.47 | 24.70 | 23.50 | 5.11 | |
| 4-8-2019 | D5GHzV2 | 1184 | Head | 1g | 7.85 | 78.50 | 81.10 | -3.21 | |
| | | | | 10g | 2.22 | 22.20 | 23.40 | -5.13 | |
| 4-8-2019 | D5GHzV2 | 1184 | Head | 1g | 8.82 | 88.20 | 85.00 | 3.76 | |
| | | | | 10g | 2.48 | 24.80 | 24.40 | 1.64 | |
| 4-8-2019 | D5GHzV2 | 1184 | Head | 1g | 8.66 | 86.60 | 82.60 | 4.84 | |
| | | | | 10g | 2.45 | 24.50 | 23.70 | 3.38 | |
| 4-9-2019 | D2450V2 | 939 | Head | 1g | 5.39 | 53.90 | 53.20 | 1.32 | |
| | | | | 10g | 2.45 | 24.50 | 24.80 | -1.21 | |
| 4-10-2019 | D2450V2 | 939 | Body | 1g | 5.44 | 54.40 | 50.10 | 8.58 | 5, 6 |
| | | | | 10g | 2.54 | 25.40 | 23.50 | 8.09 | |
| 4-10-2019 | D2600V2 | 1097 | Body | 1g | 5.55 | 55.50 | 54.40 | 2.02 | |
| | | | | 10g | 2.48 | 24.80 | 24.20 | 2.48 | |

**SAR 2 Room**

| Date Tested | System Dipole | | T.S. Liquid | | Measured Results | | Target (Ref. Value) | Delta ±10 % | Plot No. |
|---|---|---|---|---|---|---|---|---|---|
| | Type | Serial # | | | Zoom Scan to 100 mW | Normalize to 1 W | | | |
| 4-8-2019 | D835V2 | 4d174 | Body | 1g | 0.95 | 9.5 | 9.47 | 0.32 | 7, 8 |
| | | | | 10g | 0.62 | 6.2 | 6.23 | 0.00 | |


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**SAR 3 Room**

| Date Tested | System Dipole | | T.S. Liquid | | Measured Results | | Target (Ref. Value) | Delta ±10 % | Plot No. |
|---|---|---|---|---|---|---|---|---|---|
| | Type | Serial # | | | Zoom Scan to 100 mW | Normalize to 1 W | | | |
| 4-1-2019 | D835V2 | 4d174 | Head | 1g | 0.91 | 9.05 | 9.28 | -2.48 | |
| | | | | 10g | 0.59 | 5.93 | 6.04 | -1.82 | |
| 4-1-2019 | D835V2 | 4d174 | Body | 1g | 0.97 | 9.72 | 9.47 | 2.64 | |
| | | | | 10g | 0.64 | 6.36 | 6.23 | 2.09 | |
| 4-5-2019 | D5GHzV2 | 1184 | Body | 1g | 7.88 | 78.80 | 75.00 | 5.07 | |
| | | | | 10g | 2.20 | 22.00 | 20.90 | 5.26 | |
| 4-5-2019 | D5GHzV2 | 1184 | Body | 1g | 8.45 | 84.50 | 78.60 | 7.51 | |
| | | | | 10g | 2.33 | 23.30 | 22.00 | 5.91 | |
| 4-5-2019 | D5GHzV2 | 1184 | Body | 1g | 7.66 | 76.60 | 76.20 | 0.52 | |
| | | | | 10g | 2.13 | 21.30 | 21.20 | 0.47 | |
| 4-8-2019 | D5GHzV2 | 1184 | Body | 1g | 7.81 | 78.10 | 75.00 | 4.13 | |
| | | | | 10g | 2.17 | 21.70 | 20.90 | 3.83 | |
| 4-8-2019 | D5GHzV2 | 1184 | Body | 1g | 8.26 | 82.60 | 78.60 | 5.09 | |
| | | | | 10g | 2.27 | 22.70 | 22.00 | 3.18 | |
| 4-8-2019 | D5GHzV2 | 1184 | Body | 1g | 7.54 | 75.43 | 76.20 | -1.01 | |
| | | | | 10g | 2.10 | 21.00 | 21.20 | -0.94 | |
| 4-9-2019 | D835V2 | 4d174 | Head | 1g | 0.97 | 9.72 | 9.28 | 4.74 | 9, 10 |
| | | | | 10g | 0.64 | 6.37 | 6.04 | 5.46 | |
| 4-12-2019 | D1900V2 | 5d190 | Body | 1g | 4.01 | 40.10 | 39.00 | 2.82 | 11, 12 |
| | | | | 10g | 2.09 | 20.90 | 20.50 | 1.95 | |

**SAR 4 Room**

| Date Tested | System Dipole | | T.S. Liquid | | Measured Results | | Target (Ref. Value) | Delta ±10 % | Plot No. |
|---|---|---|---|---|---|---|---|---|---|
| | Type | Serial # | | | Zoom Scan to 100 mW | Normalize to 1 W | | | |
| 4-1-2019 | D1900V2 | 5d199 | Body | 1g | 4.02 | 40.20 | 39.60 | 1.52 | |
| | | | | 10g | 2.09 | 20.90 | 20.80 | 0.48 | |
| 4-2-2019 | D1900V2 | 5d199 | Head | 1g | 3.96 | 39.60 | 40.40 | -1.98 | |
| | | | | 10g | 2.05 | 20.50 | 21.10 | -2.84 | |
| 4-4-2019 | D750V3 | 1122 | Head | 1g | 0.82 | 8.19 | 8.22 | -0.36 | |
| | | | | 10g | 0.53 | 5.31 | 5.35 | -0.75 | |
| 4-4-2019 | D750V3 | 1122 | Body | 1g | 0.89 | 8.90 | 8.63 | 3.13 | 13, 14 |
| | | | | 10g | 0.59 | 5.91 | 5.72 | 3.32 | |
| 4-4-2019 | D1750V2 | 1125 | Body | 1g | 3.68 | 36.80 | 36.80 | 0.00 | |
| | | | | 10g | 1.96 | 19.60 | 19.50 | 0.51 | |
| 4-5-2019 | D1750V2 | 1125 | Head | 1g | 3.55 | 35.50 | 36.50 | -2.74 | 15, 16 |
| | | | | 10g | 1.87 | 18.70 | 19.30 | -3.11 | |
| 4-10-2019 | D1900V2 | 5d190 | Body | 1g | 3.84 | 38.40 | 39.00 | -1.54 | |
| | | | | 10g | 2.00 | 20.00 | 20.50 | -2.44 | |
| 4-10-2019 | D1900V2 | 5d199 | Body | 1g | 3.82 | 38.20 | 39.10 | -2.30 | |
| | | | | 10g | 1.97 | 19.70 | 20.40 | -3.43 | |


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# 9. Conducted Output Power Measurements

Conducted output power was measured for WWAN in accordance with ANSI C63.26-2015.

## 9.1 CDMA

**1x Advanced Setup Procedures used to establish the test signals**

Call box setup procedure

- Protocol Rev > 6 (IS-2000-0)
- System ID: 331; NID: 65535, Reg. Ch. #.:
- Radio Config (RC) > Fwd11,Rvs8
- Service Option (SO) Setup > SO75 (Loopback)
- Traffic Data Rate > Full
- Rvs Power Ctrl > All Up bits (Maximum TxPout)
- Reverse Power Control Mode: 00-200 to 400 bps
- Smart blanking was disabled.

**CDMA BC0 Measured Results**

| Mode | | Channel | Freq. (MHz) | Maximum Average Power (dBm) | |
|---|---|---|---|---|---|
| | | | | Measured Pwr | Tune-up Limit |
| 1xRTT | RC1, SO55 (Loopback) | 1013 | 824.70 | 24.0 | 24.8 |
| | | 384 | 836.52 | 24.0 | |
| | | 777 | 848.31 | 23.9 | |
| | RC3, SO55 (Loopback) | 1013 | 824.70 | 24.0 | |
| | | 384 | 836.52 | 23.9 | |
| | | 777 | 848.31 | 24.0 | |
| | RC3, SO32 (+F-SCH) | 1013 | 824.70 | 24.0 | |
| | | 384 | 836.52 | 24.0 | |
| | | 777 | 848.31 | 24.0 | |
| 1xAdvanced | Fwd11/Rvs8 SO75 (Loopback) | 1013 | 824.70 | 24.0 | 24.8 |
| | | 384 | 836.52 | 23.8 | |
| | | 777 | 848.31 | 23.9 | |
| 1xEv-Do Rel. 0 | 307.2 kbps (2 slot, QPSK) | 1013 | 824.70 | 23.8 | 24.8 |
| | | 384 | 836.52 | 23.7 | |
| | | 777 | 848.31 | 23.7 | |
| 1xEv-Do Rev. A | 307.2k, QPSK/ ACK channel is transmitted at all the slots | 1013 | 824.70 | 23.8 | 24.8 |
| | | 384 | 836.52 | 23.7 | |
| | | 777 | 848.31 | 23.7 | |


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## 9.2 GSM

**Per KDB 941225 D01 3G SAR Procedures:**

SAR test reduction for GPRS and EDGE modes is determined by the source-based time-averaged output power specified for production units, including tune-up tolerance. The data mode with highest specified time-averaged output power should be tested for SAR compliance in the applicable exposure conditions. For modes with the same specified maximum output power and tolerance, the higher number time-slot configuration should be tested.

**GSM850 Measured Results**

| Mode | Coding Scheme | Time Slots | Ch No. | Freq. (MHz) | Maximum Average Power (dBm) | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measured | | Tune-up Limit | |
| | | | | | Burst Pwr | Frame Pwr | Burst Pwr | Frame Pwr |
| GSM (Voice) | CS1 | 1 | 128 | 824.2 | 33.2 | 24.2 | 34.0 | 25.0 |
| | | | 190 | 836.6 | 33.4 | 24.4 | | |
| | | | 251 | 848.8 | 33.2 | 24.2 | | |
| GPRS (GMSK) | CS1 | 1 | 128 | 824.2 | 33.2 | 24.2 | 34.0 | 25.0 |
| | | | 190 | 836.6 | 33.5 | 24.5 | | |
| | | | 251 | 848.8 | 33.3 | 24.3 | | |
| | | 2 | 128 | 824.2 | 29.4 | 23.4 | 31.0 | **25.0** |
| | | | 190 | 836.6 | 29.6 | 23.5 | | |
| | | | 251 | 848.8 | 29.3 | 23.3 | | |
| | | 3 | 128 | 824.2 | 27.7 | 23.4 | 28.5 | 24.2 |
| | | | 190 | 836.6 | 27.4 | 23.1 | | |
| | | | 251 | 848.8 | 27.6 | 23.3 | | |
| | | 4 | 128 | 824.2 | 26.3 | 23.3 | 27.0 | 24.0 |
| | | | 190 | 836.6 | 26.5 | 23.5 | | |
| | | | 251 | 848.8 | 26.1 | 23.1 | | |
| EGPRS (8PSK) | MCS5 | 1 | 128 | 824.2 | 26.3 | 17.3 | 27.0 | 18.0 |
| | | | 190 | 836.6 | 26.1 | 17.1 | | |
| | | | 251 | 848.8 | 26.1 | 17.1 | | |
| | | 2 | 128 | 824.2 | 23.2 | 17.2 | 24.5 | 18.5 |
| | | | 190 | 836.6 | 23.1 | 17.1 | | |
| | | | 251 | 848.8 | 23.1 | 17.1 | | |
| | | 3 | 128 | 824.2 | 21.8 | 17.6 | 23.0 | 18.7 |
| | | | 190 | 836.6 | 21.8 | 17.6 | | |
| | | | 251 | 848.8 | 21.7 | 17.5 | | |
| | | 4 | 128 | 824.2 | 20.3 | 17.3 | 21.0 | 18.0 |
| | | | 190 | 836.6 | 20.4 | 17.4 | | |
| | | | 251 | 848.8 | 20.2 | 17.2 | | |

**Notes:**

The worst-case configuration and mode for SAR testing is determined to be as follows:

- GMSK (GPRS) mode with 2 time slots for Max power, based on the Tune-up Procedure. Refer to §6.3.
- SAR is not required for EGPRS (8PSK) mode because the maximum output power and tune-up limit is ≤ 1/4dB higher than GMSK GPRS or the adjusted SAR of the highest reported SAR of GMSK GPRS is ≤ 1.2W/kg.


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**GSM1900 Measured Results**

| Mode | Coding Scheme | Time Slots | Ch No. | Freq. (MHz) | Maximum Average Power (dBm) | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measured | | Tune-up Limit | |
| | | | | | Burst Pwr | Frame Pwr | Burst Pwr | Frame Pwr |
| GSM (Voice) | CS1 | 1 | 512 | 1850.2 | 30.3 | 21.2 | 30.8 | 21.8 |
| | | | 661 | 1880.0 | 30.2 | 21.2 | | |
| | | | 810 | 1909.8 | 30.2 | 21.1 | | |
| GPRS (GMSK) | CS1 | 1 | 512 | 1850.2 | 30.3 | 21.2 | 30.8 | 21.8 |
| | | | 661 | 1880.0 | 30.2 | 21.1 | | |
| | | | 810 | 1909.8 | 30.1 | 21.1 | | |
| | | 2 | 512 | 1850.2 | 27.0 | 21.0 | 27.8 | 21.8 |
| | | | 661 | 1880.0 | 27.0 | 21.0 | | |
| | | | 810 | 1909.8 | 27.2 | 21.2 | | |
| | | 3 | 512 | 1850.2 | 24.9 | 20.6 | 26.0 | 21.7 |
| | | | 661 | 1880.0 | 25.0 | 20.7 | | |
| | | | 810 | 1909.8 | 25.2 | 20.9 | | |
| | | 4 | 512 | 1850.2 | 23.5 | 20.5 | 24.8 | **21.8** |
| | | | 661 | 1880.0 | 23.5 | 20.5 | | |
| | | | 810 | 1909.8 | 23.7 | 20.7 | | |
| EGPRS (8PSK) | MCS5 | 1 | 512 | 1850.2 | 25.1 | 16.1 | 25.5 | 16.5 |
| | | | 661 | 1880.0 | 25.0 | 16.0 | | |
| | | | 810 | 1909.8 | 25.2 | 16.2 | | |
| | | 2 | 512 | 1850.2 | 22.7 | 16.6 | 23.5 | 17.5 |
| | | | 661 | 1880.0 | 22.6 | 16.6 | | |
| | | | 810 | 1909.8 | 22.9 | 16.9 | | |
| | | 3 | 512 | 1850.2 | 21.9 | 17.7 | 23.0 | 18.7 |
| | | | 661 | 1880.0 | 21.9 | 17.7 | | |
| | | | 810 | 1909.8 | 22.3 | 18.0 | | |
| | | 4 | 512 | 1850.2 | 20.5 | 17.4 | 21.5 | 18.5 |
| | | | 661 | 1880.0 | 20.5 | 17.5 | | |
| | | | 810 | 1909.8 | 20.9 | 17.8 | | |

**Notes:**

The worst-case configuration and mode for SAR testing is determined to be as follows:

- GMSK (GPRS) mode with 4 time slots for Max power, based on the Tune-up Procedure. Refer to §6.3.
- SAR is not required for EGPRS (8PSK) mode because the maximum output power and tune-up limit is ≤ 1/4dB higher than GMSK GPRS or the adjusted SAR of the highest reported SAR of GMSK GPRS is ≤ 1.2W/kg.


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## 9.3 W-CDMA

**Release 99 Setup Procedures used to establish the test signals**

The following tests were completed according to the test requirements outlined in section 5.2 of the 3GPP TS34.121-1 specification. The DUT supports power Class 3, which has a nominal maximum output power of 24 dBm (+1.7/-3.7).

| Mode | Subtest | Rel99 |
|---|---|---|
| WCDMA General Settings | Loopback Mode | Test Mode 2 |
| | Rel99 RMC | 12.2kbps RMC |
| | Power Control Algorithm | Algorithm2 |
| | βc/βd | 8/15 |

**HSDPA Setup Procedures used to establish the test signals**

The following 4 Sub-tests were completed according to Release 5 procedures in section 5.2 of 3GPP TS34.121. A summary of these settings are illustrated below:

| | Mode | HSDPA | HSDPA | HSDPA | HSDPA |
|---|---|---|---|---|---|
| | Subtest | 1 | 2 | 3 | 4 |
| W-CDMA General Settings | Loopback Mode | Test Mode 1 | | | |
| | Rel99 RMC | 12.2kbps RMC | | | |
| | HSDPA FRC | H-Set 1 | | | |
| | Power Control Algorithm | Algorithm 2 | | | |
| | βc | 2/15 | 11/15 | 15/15 | 15/15 |
| | βd | 15/15 | 15/15 | 8/15 | 4/15 |
| | Bd (SF) | 64 | | | |
| | βc/βd | 2/15 | 11/15 | 15/8 | 15/4 |
| | βhs | 4/15 | 24/15 | 30/15 | 30/15 |
| | MPR (dB) | 0 | 0 | 0.5 | 0.5 |
| HSDPA Specific Settings | $D_{ACK}$ | 8 | | | |
| | $D_{NAK}$ | 8 | | | |
| | DCQI | 8 | | | |
| | Ack-Nack repetition factor | 3 | | | |
| | CQI Feedback (Table 5.2B.4) | 4ms | | | |
| | CQI Repetition Factor (Table 5.2B.4) | 2 | | | |
| | Ahs=βhs/βc | 30/15 | | | |


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**HSPA (HSDPA & HSUPA) Setup Procedures used to establish the test signals**

The following 5 Sub-tests were completed according to Release 6 procedures in table C,11.1.3 of 3GPP TS 34.121-1 v13.
A summary of these settings are illustrated below:

| | Mode | HSPA | | | | |
|---|---|---|---|---|---|---|
| | Subtest | 1 | 2 | 3 | 4 | 5 |
| WCDMA General Settings | Loopback Mode | Test Mode 1 | | | | |
| | Rel99 RMC | 12.2 kbps RMC | | | | |
| | HSDPA FRC | H-Set 1 | | | | |
| | HSUPA Test | HSPA | | | | |
| | Power Control Algorithm | Algorithm 2 | | | | Algorithm 1 |
| | βc | 11/15 | 6/15 | 15/15 | 2/15 | 15/15 |
| | βd | 15/15 | 15/15 | 9/15 | 15/15 | 0 |
| | βec | 209/225 | 12/15 | 30/15 | 2/15 | 5/15 |
| | βc/βd | 11/15 | 6/15 | 15/9 | 2/15 | - |
| | βhs | 22/15 | 12/15 | 30/15 | 4/15 | 5/15 |
| | βed | 1309/225 | 94/75 | 47/15 | 56/75 | 47/15 |
| | CM (dB) | 1 | 3 | 2 | 3 | 1 |
| | MPR (dB) | 0 | 2 | 1 | 2 | 0 |
| HSDPA Specific Settings | DACK | 8 | | | | 0 |
| | DNAK | 8 | | | | 0 |
| | DCQI | 8 | | | | 0 |
| | Ack-Nack repetition factor | 3 | | | | |
| | CQI Feedback (Table 5.2B.4) | 4ms | | | | |
| | CQI Repetition Factor (Table 5.2B.4) | 2 | | | | |
| | Ahs = βhs/βc | 30/15 | | | | |
| HSUPA Specific Settings | E-DPDCCH | 6 | 8 | 8 | 5 | 0 |
| | DHARQ | 0 | 0 | 0 | 0 | 0 |
| | AG Index | 20 | 12 | 15 | 17 | 12 |
| | ETFCI (from 34.121 Table C.11.1.3) | 75 | 67 | 92 | 71 | 67 |
| | Associated Max UL Data Rate kbps | 242.1 | 174.9 | 482.8 | 205.8 | 308.9 |
| | Reference E-TFCIs | 5 | 5 | 2 | 5 | 1 |
| | Reference E-TFCI | 11 | 11 | 11 | 11 | 67 |
| | Reference E-TFCI PO | 4 | 4 | 4 | 4 | 18 |
| | Reference E-TFCI | 67 | 67 | 92 | 67 | 67 |
| | Reference E-TFCI PO | 18 | 18 | 18 | 18 | 18 |
| | Reference E-TFCI | 71 | 71 | 71 | 71 | 71 |
| | Reference E-TFCI PO | 23 | 23 | 23 | 23 | 23 |
| | Reference E-TFCI | 75 | 75 | 75 | 75 | 75 |
| | Reference E-TFCI PO | 26 | 26 | 26 | 26 | 26 |
| | Reference E-TFCI | 81 | 81 | 81 | 81 | 81 |
| | Reference E-TFCI PO | 27 | 27 | 27 | 27 | 27 |
| | Maximum Channelization Codes | 2xSF2 | | | | SF4 |

**HSPA+**

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## W-CDMA Band II Measured Results

| Mode | | UL Ch No. | Freq. (MHz) | Maximum Average Power (dBm) | | | Reduced Average Power (dBm) - hotspot | | | Reduced Average Power (dBm) - Proximity sensor | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Measured Pwr | MPR | Tune-up Limit | Measured Pwr | MPR | Tune-up Limit | Measured Pwr | MPR | Tune-up Limit |
| Release 99 | Rel 99 (RMC, 12.2 kbps) | 9262 | 1852.4 | 23.3 | N/A | 24.0 | 18.9 | N/A | 19.0 | 19.0 | N/A | 19.0 |
| | | 9400 | 1880.0 | 23.3 | | | 18.9 | | | 18.9 | | |
| | | 9538 | 1907.6 | 23.4 | | | 18.9 | | | 19.0 | | |
| HSDPA | Subtest 1 | 9262 | 1852.4 | 22.3 | 0 | 23.0 | 18.0 | 0 | 18.0 | 18.0 | 0 | 18.0 |
| | | 9400 | 1880.0 | 22.3 | | | 17.9 | | | 17.9 | | |
| | | 9538 | 1907.6 | 22.4 | | | 17.9 | | | 18.0 | | |
| | Subtest 2 | 9262 | 1852.4 | 22.3 | 0 | 23.0 | 18.0 | 0 | 18.0 | 18.0 | 0 | 18.0 |
| | | 9400 | 1880.0 | 22.3 | | | 17.9 | | | 17.9 | | |
| | | 9538 | 1907.6 | 22.4 | | | 17.9 | | | 18.0 | | |
| | Subtest 3 | 9262 | 1852.4 | 21.8 | 0.5 | 22.5 | 17.5 | 0.5 | 17.5 | 17.5 | 0.5 | 17.5 |
| | | 9400 | 1880.0 | 21.8 | | | 17.4 | | | 17.4 | | |
| | | 9538 | 1907.6 | 21.9 | | | 17.4 | | | 17.4 | | |
| | Subtest 4 | 9262 | 1852.4 | 21.8 | 0.5 | 22.5 | 17.5 | 0.5 | 17.5 | 17.5 | 0.5 | 17.5 |
| | | 9400 | 1880.0 | 21.8 | | | 17.4 | | | 17.4 | | |
| | | 9538 | 1907.6 | 21.8 | | | 17.4 | | | 17.5 | | |
| HSUPA | Subtest 1 | 9262 | 1852.4 | 22.3 | 0 | 23.5 | 18.0 | 0 | 18.5 | 18.0 | 0 | 18.5 |
| | | 9400 | 1880.0 | 22.3 | | | 17.9 | | | 17.9 | | |
| | | 9538 | 1907.6 | 22.3 | | | 17.9 | | | 17.9 | | |
| | Subtest 2 | 9262 | 1852.4 | 20.3 | 2 | 21.5 | 16.0 | 2 | 16.5 | 16.0 | 2 | 16.5 |
| | | 9400 | 1880.0 | 20.3 | | | 15.9 | | | 15.9 | | |
| | | 9538 | 1907.6 | 20.4 | | | 16.0 | | | 16.0 | | |
| | Subtest 3 | 9262 | 1852.4 | 21.3 | 1 | 22.5 | 17.0 | 1 | 17.5 | 17.0 | 1 | 17.5 |
| | | 9400 | 1880.0 | 21.3 | | | 16.9 | | | 16.9 | | |
| | | 9538 | 1907.6 | 21.4 | | | 17.0 | | | 17.0 | | |
| | Subtest 4 | 9262 | 1852.4 | 20.3 | 2 | 21.5 | 16.0 | 2 | 16.5 | 16.0 | 2 | 16.5 |
| | | 9400 | 1880.0 | 20.3 | | | 15.9 | | | 15.9 | | |
| | | 9538 | 1907.6 | 20.3 | | | 15.9 | | | 15.9 | | |
| | Subtest 5 | 9262 | 1852.4 | 21.9 | 0 | 23.5 | 17.7 | 0 | 18.5 | 17.7 | 0 | 18.5 |
| | | 9400 | 1880.0 | 22.0 | | | 17.5 | | | 17.5 | | |
| | | 9538 | 1907.6 | 22.0 | | | 17.6 | | | 17.6 | | |

## W-CDMA Band V Measured Results

| Mode | | UL Ch No. | Freq. (MHz) | Maximum Average Power (dBm) | | |
|---|---|---|---|---|---|---|
| | | | | Measured Pwr | MPR | Tune-up Limit |
| Release 99 | Rel 99 (RMC, 12.2 kbps) | 4132 | 826.4 | 23.4 | N/A | 25.0 |
| | | 4183 | 836.6 | 23.3 | | |
| | | 4233 | 846.6 | 23.2 | | |
| HSDPA | Subtest 1 | 4132 | 826.4 | 22.4 | 0 | 24.0 |
| | | 4183 | 836.6 | 22.3 | | |
| | | 4233 | 846.6 | 22.2 | | |
| | Subtest 2 | 4132 | 826.4 | 22.4 | 0 | 24.0 |
| | | 4183 | 836.6 | 22.3 | | |
| | | 4233 | 846.6 | 22.2 | | |
| | Subtest 3 | 4132 | 826.4 | 21.9 | 0.5 | 23.5 |
| | | 4183 | 836.6 | 21.7 | | |
| | | 4233 | 846.6 | 21.7 | | |
| | Subtest 4 | 4132 | 826.4 | 21.9 | 0.5 | 23.5 |
| | | 4183 | 836.6 | 21.8 | | |
| | | 4233 | 846.6 | 21.7 | | |
| HSUPA | Subtest 1 | 4132 | 826.4 | 22.4 | 0 | 24.0 |
| | | 4183 | 836.6 | 22.3 | | |
| | | 4233 | 846.6 | 22.2 | | |
| | Subtest 2 | 4132 | 826.4 | 20.4 | 2 | 22.0 |
| | | 4183 | 836.6 | 20.2 | | |
| | | 4233 | 846.6 | 20.2 | | |
| | Subtest 3 | 4132 | 826.4 | 21.4 | 1 | 23.0 |
| | | 4183 | 836.6 | 21.3 | | |
| | | 4233 | 846.6 | 21.2 | | |
| | Subtest 4 | 4132 | 826.4 | 20.4 | 2 | 22.0 |
| | | 4183 | 836.6 | 20.2 | | |
| | | 4233 | 846.6 | 20.2 | | |
| | Subtest 5 | 4132 | 826.4 | 22.1 | 0 | 24.0 |
| | | 4183 | 836.6 | 22.0 | | |
| | | 4233 | 846.6 | 21.8 | | |


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## 9.4 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 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 |

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 (subclause) | 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 | N/A |
| NS_03 | 6.6.2.2.1 | 2, 4,10, 23, 25, 35, 36, 66, 70 | 3 | >5 | ≤ 1 |
| | | | 5 | >6 | ≤ 1 |
| | | | 10 | >6 | ≤ 1 |
| | | | 15 | >8 | ≤ 1 |
| | | | 20 | >10 | ≤ 1 |
| NS_04 | 6.6.2.2.2, 6.6.3.3.19 | 41 | 5, 10, 15, 20 | Table 6.2.4-4, Table 6.2.4-4a | |
| NS_05 | 6.6.3.3.1 | 1 | 10,15,20 | ≥ 50 (NOTE1) | ≤ 1 (NOTE1) |
| | | | 15, 20 | Table 6.2.4-18 (NOTE2) | |
| | | 65 (NOTE 3) | 10,15,20 | ≥ 50 | ≤ 1 (NOTE 1) |
| | | | 15,20 | Table 6.2.4-18 (NOTE 2) | |
| 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 6.6.3.3.2 | 13 | 10 | 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 | |
| NS_11 | 6.6.2.2.1 6.6.3.3.13 | 23 | 1.4, 3, 5, 10, 15, 20 | Table 6.2.4-5 | |
| NS_12 | 6.6.3.3.5 | 26 | 1.4, 3, 5, 10, 15 | Table 6.2.4-6 | |
| NS_13 | 6.6.3.3.6 | 26 | 5 | Table 6.2.4-7 | |
| NS_14 | 6.6.3.3.7 | 26 | 10, 15 | Table 6.2.4-8 | |
| NS_15 | 6.6.3.3.8 | 26 | 1.4, 3, 5, 10, 15 | Table 6.2.4-9 Table 6.2.4-10 | |
| NS_16 | 6.6.3.3.9 | 27 | 3, 5, 10 | Table 6.2.4-11, Table 6.2.4-12, Table 6.2.4-13 | |
| NS_17 | 6.6.3.3.10 | 28 | 5, 10 | Table 5.6-1 | N/A |
| NS_18 | 6.6.3.3.11 | 28 | 5 | ≥ 2 | ≤ 1 |
| | | | 10, 15, 20 | ≥ 1 | ≤ 4 |
| NS_19 | 6.6.3.3.12 | 44 | 10, 15, 20 | Table 6.2.4-14 | |
| NS_20 | 6.2.2 6.6.2.2.1 6.6.3.3.14 | 23 | 5, 10, 15, 20 | Table 6.2.4-15 | |
| NS_21 | 6.6.2.2.1 6.6.3.3.15 | 30 | 5, 10 | Table 6.2.4-16 | |
| NS_22 | 6.6.3.3.16 | 42, 43 | 5, 10, 15, 20 | Table 6.2.4-17 | |
| NS_23 | 6.6.3.3.17 | 42, 43 | 5, 10, 15, 20 | N/A | |
| NS_24 | 6.6.3.3.20 | 65 (NOTE 4) | 5, 10, 15, 20 | Table 6.2.4-19 | |
| NS_25 | 6.6.3.3.21 | 65 (NOTE 4) | 5, 10, 15, 20 | Table 6.2.4-20 | |
| NS_26 | 6.6.3.3.22 | 68 | 10, 15 | Table 6.2.4-21 | |
| NS_27 | 6.6.2.2.5, 6.6.3.3.23 | 48 | 5, 10, 15, 20 | Table 6.2.4-22 | |
| NS_28 | 6.2.2A, 6.6.3.3.24 | 46 (NOTE 5) | 20 | Table 6.2.4-23 | |
| NS_29 | 6.2.2A, 6.6.2.3.1a, 6.6.3.3.25 | 46 (NOTE 5) | 20 | Table 6.2.4-24 | |
| NS_30 | 6.2.2A, 6.6.3.3.26 | 46 (NOTE 5) | 20 | Table 6.2.4-25 | |
| NS_31 | 6.2.2A, 6.6.3.3.27 | 46 (NOTE 5) | 20 | Table 6.2.4-26 | |
| | | | | | |
| NS_32 | - | - | - | - | - |
| NOTE 1: Applicable when the lower edge of the assigned E-UTRA UL channel bandwidth frequency is larger than or equal to the upper edge of PHS band (1915.7 MHz) + 4 MHz + the channel BW assigned, where channel BW is as defined in subclause 5.6. A-MPR for | | | | | |


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# 1 Max power Results

## LTE Band 4 Measured Results

| BW (MHz) | Mode | RB Allocation | RB offset | Maximum Average Power (dBm) | | | MPR | Tune-up Limit |
|---|---|---|---|---|---|---|---|---|
| | | | | Measured Pwr (dBm) | | | | |
| | | | | [redacted] | 20175 | [redacted] | | |
| | | | | | 1732.5 MHz | | | |
| 20 MHz | QPSK | 1 | 0 | [redacted] | 24.0 | [redacted] | 0.0 | 25 |
| | | 1 | 49 | [redacted] | 23.9 | [redacted] | 0.0 | 25 |
| | | 1 | 99 | [redacted] | 23.9 | [redacted] | 0.0 | 25 |
| | | 50 | 0 | [redacted] | 23.0 | [redacted] | 1.0 | 24 |
| | | 50 | 24 | [redacted] | 23.0 | [redacted] | 1.0 | 24 |
| | | 50 | 50 | [redacted] | 22.9 | [redacted] | 1.0 | 24 |
| | | 100 | 0 | [redacted] | 23.0 | [redacted] | 1.0 | 24 |
| | 16QAM | 1 | 0 | [redacted] | 23.3 | [redacted] | 1.0 | 24 |
| | | 1 | 49 | [redacted] | 23.2 | [redacted] | 1.0 | 24 |
| | | 1 | 99 | [redacted] | 23.2 | [redacted] | 1.0 | 24 |
| | | 50 | 0 | [redacted] | 22.1 | [redacted] | 2.0 | 23 |
| | | 50 | 24 | [redacted] | 22.1 | [redacted] | 2.0 | 23 |
| | | 50 | 50 | [redacted] | 22.0 | [redacted] | 2.0 | 23 |
| | | 100 | 0 | [redacted] | 22.1 | [redacted] | 2.0 | 23 |
| | 64QAM | 1 | 0 | [redacted] | 22.3 | [redacted] | 2.0 | 23 |
| | | 1 | 49 | [redacted] | 22.3 | [redacted] | 2.0 | 23 |
| | | 1 | 99 | [redacted] | 22.3 | [redacted] | 2.0 | 23 |
| | | 50 | 0 | [redacted] | 21.3 | [redacted] | 3.0 | 22 |
| | | 50 | 24 | [redacted] | 21.2 | [redacted] | 3.0 | 22 |
| | | 50 | 50 | [redacted] | 21.2 | [redacted] | 3.0 | 22 |
| | | 100 | 0 | [redacted] | 21.2 | [redacted] | 3.0 | 22 |

| BW (MHz) | Mode | RB Allocation | RB offset | Measured Pwr (dBm) | | | MPR | Tune-up Limit |
|---|---|---|---|---|---|---|---|---|
| | | | | 20025 | 20175 | 20325 | | |
| | | | | 1717.5 MHz | 1732.5 MHz | 1747.5 MHz | | |
| 15 MHz | QPSK | 1 | 0 | 23.9 | 24.0 | 24.0 | 0.0 | 25 |
| | | 1 | 37 | 23.9 | 23.9 | 23.9 | 0.0 | 25 |
| | | 1 | 74 | 23.9 | 23.9 | 23.8 | 0.0 | 25 |
| | | 36 | 0 | 22.9 | 23.0 | 23.0 | 1.0 | 24 |
| | | 36 | 20 | 22.8 | 22.9 | 23.0 | 1.0 | 24 |
| | | 36 | 39 | 22.9 | 22.9 | 22.9 | 1.0 | 24 |
| | | 75 | 0 | 22.9 | 23.0 | 22.9 | 1.0 | 24 |
| | 16QAM | 1 | 0 | 23.2 | 23.2 | 22.9 | 1.0 | 24 |
| | | 1 | 37 | 23.0 | 23.2 | 22.7 | 1.0 | 24 |
| | | 1 | 74 | 23.1 | 23.2 | 22.8 | 1.0 | 24 |
| | | 36 | 0 | 21.9 | 22.1 | 22.1 | 2.0 | 23 |
| | | 36 | 20 | 21.8 | 22.0 | 22.0 | 2.0 | 23 |
| | | 36 | 39 | 21.9 | 22.0 | 22.0 | 2.0 | 23 |
| | | 75 | 0 | 22.0 | 22.1 | 22.0 | 2.0 | 23 |
| | 64QAM | 1 | 0 | 22.1 | 22.4 | 22.7 | 2.0 | 23 |
| | | 1 | 37 | 22.0 | 22.3 | 22.5 | 2.0 | 23 |
| | | 1 | 74 | 22.1 | 22.3 | 22.6 | 2.0 | 23 |
| | | 36 | 0 | 21.1 | 21.2 | 21.2 | 3.0 | 22 |
| | | 36 | 20 | 21.1 | 21.2 | 21.1 | 3.0 | 22 |
| | | 36 | 39 | 21.1 | 21.1 | 21.1 | 3.0 | 22 |
| | | 75 | 0 | 21.1 | 21.2 | 21.2 | 3.0 | 22 |


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## LTE Band 4 Measured Results (continued)

| BW (MHz) | Mode | RB Allocation | RB offset | Measured Pwr (dBm) | | | MPR | Tune-up Limit |
|---|---|---|---|---|---|---|---|---|
| | | | | 20000 | 20175 | 20350 | | |
| | | | | 1715 MHz | 1732.5 MHz | 1750 MHz | | |
| 10 MHz | QPSK | 1 | 0 | 23.7 | 23.9 | 23.9 | 0.0 | 25 |
| | | 1 | 25 | 23.7 | 23.8 | 23.8 | 0.0 | 25 |
| | | 1 | 49 | 23.7 | 23.8 | 23.8 | 0.0 | 25 |
| | | 25 | 0 | 22.8 | 23.0 | 22.9 | 1.0 | 24 |
| | | 25 | 12 | 22.7 | 23.0 | 22.9 | 1.0 | 24 |
| | | 25 | 25 | 22.7 | 22.9 | 22.9 | 1.0 | 24 |
| | | 50 | 0 | 22.7 | 22.9 | 22.9 | 1.0 | 24 |
| | 16QAM | 1 | 0 | 22.7 | 23.0 | 22.9 | 1.0 | 24 |
| | | 1 | 25 | 22.6 | 22.9 | 22.8 | 1.0 | 24 |
| | | 1 | 49 | 22.6 | 22.9 | 22.8 | 1.0 | 24 |
| | | 25 | 0 | 22.8 | 22.9 | 23.0 | 2.0 | 23 |
| | | 25 | 12 | 22.8 | 23.0 | 23.0 | 2.0 | 23 |
| | | 25 | 25 | 22.8 | 23.0 | 22.9 | 2.0 | 23 |
| | | 50 | 0 | 22.8 | 23.0 | 22.9 | 2.0 | 23 |
| | 64QAM | 1 | 0 | 21.9 | 23.0 | 22.2 | 2.0 | 23 |
| | | 1 | 25 | 21.8 | 22.9 | 22.1 | 2.0 | 23 |
| | | 1 | 49 | 21.9 | 22.9 | 22.1 | 2.0 | 23 |
| | | 25 | 0 | 21.1 | 21.2 | 21.2 | 3.0 | 22 |
| | | 25 | 12 | 21.1 | 21.2 | 21.1 | 3.0 | 22 |
| | | 25 | 25 | 21.0 | 21.2 | 21.1 | 3.0 | 22 |
| | | 50 | 0 | 21.0 | 21.1 | 21.0 | 3.0 | 22 |

| BW (MHz) | Mode | RB Allocation | RB offset | Maximum Average Power (dBm) | | | MPR | Tune-up Limit |
|---|---|---|---|---|---|---|---|---|
| | | | | Measured Pwr (dBm) | | | | |
| | | | | 19975 | 20175 | 20375 | | |
| | | | | 1712.5 MHz | 1732.5 MHz | 1752.5 MHz | | |
| 5 MHz | QPSK | 1 | 0 | 23.7 | 24.0 | 23.9 | 0.0 | 25 |
| | | 1 | 12 | 23.6 | 23.9 | 23.9 | 0.0 | 25 |
| | | 1 | 24 | 23.8 | 23.9 | 23.9 | 0.0 | 25 |
| | | 12 | 0 | 22.6 | 22.9 | 22.9 | 1.0 | 24 |
| | | 12 | 7 | 22.6 | 23.0 | 22.9 | 1.0 | 24 |
| | | 12 | 13 | 22.7 | 22.9 | 22.9 | 1.0 | 24 |
| | | 25 | 0 | 22.7 | 22.9 | 22.9 | 1.0 | 24 |
| | 16QAM | 1 | 0 | 22.8 | 23.0 | 23.0 | 1.0 | 24 |
| | | 1 | 12 | 22.7 | 23.0 | 22.9 | 1.0 | 24 |
| | | 1 | 24 | 22.8 | 23.0 | 22.9 | 1.0 | 24 |
| | | 12 | 0 | 21.8 | 22.1 | 22.0 | 2.0 | 23 |
| | | 12 | 7 | 21.8 | 22.1 | 22.0 | 2.0 | 23 |
| | | 12 | 13 | 21.8 | 22.0 | 22.0 | 2.0 | 23 |
| | | 25 | 0 | 21.8 | 21.9 | 21.9 | 2.0 | 23 |
| | 64QAM | 1 | 0 | 22.1 | 22.0 | 22.3 | 2.0 | 23 |
| | | 1 | 12 | 22.0 | 21.9 | 22.2 | 2.0 | 23 |
| | | 1 | 24 | 22.1 | 21.9 | 22.2 | 2.0 | 23 |
| | | 12 | 0 | 20.8 | 21.2 | 21.2 | 3.0 | 22 |
| | | 12 | 7 | 20.7 | 21.1 | 21.1 | 3.0 | 22 |
| | | 12 | 13 | 20.8 | 21.1 | 21.1 | 3.0 | 22 |
| | | 25 | 0 | 20.8 | 21.1 | 21.1 | 3.0 | 22 |


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## LTE Band 4 Measured Results (continued)

| BW (MHz) | Mode | RB Allocation | RB offset | Measured Pwr (dBm) | | | MPR | Tune-up Limit |
|---|---|---|---|---|---|---|---|---|
| | | | | 19965 | 20175 | 20385 | | |
| | | | | 1711.5 MHz | 1732.5 MHz | 1753.5 MHz | | |
| 3 MHz | QPSK | 1 | 0 | 23.6 | 23.9 | 23.8 | 0.0 | 25 |
| | | 1 | 8 | 23.6 | 23.9 | 23.9 | 0.0 | 25 |
| | | 1 | 14 | 23.6 | 23.8 | 23.8 | 0.0 | 25 |
| | | 8 | 0 | 22.6 | 22.9 | 22.9 | 1.0 | 24 |
| | | 8 | 4 | 22.6 | 23.0 | 22.9 | 1.0 | 24 |
| | | 8 | 7 | 22.6 | 22.9 | 22.9 | 1.0 | 24 |
| | | 15 | 0 | 22.6 | 22.9 | 22.9 | 1.0 | 24 |
| | 16QAM | 1 | 0 | 22.7 | 22.9 | 22.8 | 1.0 | 24 |
| | | 1 | 8 | 22.7 | 23.0 | 22.9 | 1.0 | 24 |
| | | 1 | 14 | 22.6 | 22.9 | 22.8 | 1.0 | 24 |
| | | 8 | 0 | 21.7 | 22.0 | 22.0 | 2.0 | 23 |
| | | 8 | 4 | 21.7 | 22.0 | 22.0 | 2.0 | 23 |
| | | 8 | 7 | 21.7 | 22.1 | 22.0 | 2.0 | 23 |
| | | 15 | 0 | 21.6 | 21.9 | 21.9 | 2.0 | 23 |
| | 64QAM | 1 | 0 | 22.1 | 22.2 | 22.0 | 2.0 | 23 |
| | | 1 | 8 | 22.1 | 22.2 | 22.1 | 2.0 | 23 |
| | | 1 | 14 | 22.0 | 22.1 | 22.0 | 2.0 | 23 |
| | | 8 | 0 | 20.8 | 21.0 | 21.0 | 3.0 | 22 |
| | | 8 | 4 | 20.9 | 21.0 | 21.0 | 3.0 | 22 |
| | | 8 | 7 | 20.8 | 21.0 | 21.0 | 3.0 | 22 |
| | | 15 | 0 | 20.7 | 21.1 | 21.0 | 3.0 | 22 |

| BW (MHz) | Mode | RB Allocation | RB offset | Measured Pwr (dBm) | | | MPR | Tune-up Limit |
|---|---|---|---|---|---|---|---|---|
| | | | | 19957 | 20175 | 20393 | | |
| | | | | 1710.7 MHz | 1732.5 MHz | 1754.3 MHz | | |
| 1.4 MHz | QPSK | 1 | 0 | 23.6 | 23.8 | 23.7 | 0.0 | 25 |
| | | 1 | 3 | 23.6 | 23.8 | 23.7 | 0.0 | 25 |
| | | 1 | 5 | 23.5 | 23.7 | 23.7 | 0.0 | 25 |
| | | 3 | 0 | 23.5 | 23.7 | 23.6 | 0.0 | 25 |
| | | 3 | 1 | 23.6 | 23.8 | 23.7 | 0.0 | 25 |
| | | 3 | 3 | 23.6 | 23.8 | 23.7 | 0.0 | 25 |
| | | 6 | 0 | 22.5 | 22.8 | 22.7 | 1.0 | 24 |
| | 16QAM | 1 | 0 | 22.9 | 22.8 | 22.7 | 1.0 | 24 |
| | | 1 | 3 | 23.0 | 22.9 | 22.7 | 1.0 | 24 |
| | | 1 | 5 | 22.9 | 22.9 | 22.7 | 1.0 | 24 |
| | | 3 | 0 | 22.7 | 23.0 | 22.8 | 1.0 | 24 |
| | | 3 | 1 | 22.8 | 23.1 | 22.9 | 1.0 | 24 |
| | | 3 | 3 | 22.8 | 23.0 | 22.9 | 1.0 | 24 |
| | | 6 | 0 | 21.5 | 22.1 | 22.0 | 2.0 | 23 |
| | 64QAM | 1 | 0 | 21.8 | 22.0 | 22.2 | 2.0 | 23 |
| | | 1 | 3 | 21.9 | 22.1 | 22.3 | 2.0 | 23 |
| | | 1 | 5 | 21.8 | 22.0 | 22.2 | 2.0 | 23 |
| | | 3 | 0 | 21.6 | 22.0 | 22.2 | 2.0 | 23 |
| | | 3 | 1 | 21.7 | 22.1 | 22.2 | 2.0 | 23 |
| | | 3 | 3 | 21.7 | 22.1 | 22.2 | 2.0 | 23 |
| | | 6 | 0 | 20.7 | 21.2 | 20.9 | 3.0 | 22 |

**Note(s):**

20 MHz Bandwidths does not support at least three non-overlapping channels in certain channel bandwidths. 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 per KDB 941225 D05 SAR for LTE Devices


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## LTE Band 5 Measured Results

| BW (MHz) | Mode | RB Allocation | RB offset | Maximum Average Power (dBm) | | | MPR | Tune-up Limit |
|---|---|---|---|---|---|---|---|---|
| | | | | Measured Pwr (dBm) | | | | |
| | | | | [redacted] | 20525 | [redacted] | | |
| | | | | [redacted] | 836.5 MHz | [redacted] | | |
| 10 MHz | QPSK | 1 | 0 | [redacted] | 24.0 | [redacted] | 0.0 | 25.5 |
| | | 1 | 25 | [redacted] | 23.9 | [redacted] | 0.0 | 25.5 |
| | | 1 | 49 | [redacted] | 23.8 | [redacted] | 0.0 | 25.5 |
| | | 25 | 0 | [redacted] | 23.0 | [redacted] | 1.0 | 24.5 |
| | | 25 | 12 | [redacted] | 22.9 | [redacted] | 1.0 | 24.5 |
| | | 25 | 25 | [redacted] | 22.9 | [redacted] | 1.0 | 24.5 |
| | | 50 | 0 | [redacted] | 23.0 | [redacted] | 1.0 | 24.5 |
| | 16QAM | 1 | 0 | [redacted] | 22.9 | [redacted] | 1.0 | 24.5 |
| | | 1 | 25 | [redacted] | 22.8 | [redacted] | 1.0 | 24.5 |
| | | 1 | 49 | [redacted] | 22.7 | [redacted] | 1.0 | 24.5 |
| | | 25 | 0 | [redacted] | 21.6 | [redacted] | 2.0 | 23.5 |
| | | 25 | 12 | [redacted] | 21.6 | [redacted] | 2.0 | 23.5 |
| | | 25 | 25 | [redacted] | 21.5 | [redacted] | 2.0 | 23.5 |
| | | 50 | 0 | [redacted] | 21.5 | [redacted] | 2.0 | 23.5 |
| | 64QAM | 1 | 0 | [redacted] | 22.3 | [redacted] | 2.0 | 23.5 |
| | | 1 | 25 | [redacted] | 22.2 | [redacted] | 2.0 | 23.5 |
| | | 1 | 49 | [redacted] | 22.2 | [redacted] | 2.0 | 23.5 |
| | | 25 | 0 | [redacted] | 21.6 | [redacted] | 3.0 | 22.5 |
| | | 25 | 12 | [redacted] | 21.6 | [redacted] | 3.0 | 22.5 |
| | | 25 | 25 | [redacted] | 21.5 | [redacted] | 3.0 | 22.5 |
| | | 50 | 0 | [redacted] | 21.5 | [redacted] | 3.0 | 22.5 |

| BW (MHz) | Mode | RB Allocation | RB offset | Measured Pwr (dBm) | | | MPR | Tune-up Limit |
|---|---|---|---|---|---|---|---|---|
| | | | | 20425 | 20525 | 20625 | | |
| | | | | 826.5 MHz | 836.5 MHz | 846.5 MHz | | |
| 5 MHz | QPSK | 1 | 0 | 24.1 | 24.0 | 23.8 | 0.0 | 25.5 |
| | | 1 | 12 | 24.0 | 23.9 | 23.8 | 0.0 | 25.5 |
| | | 1 | 24 | 24.0 | 23.9 | 23.8 | 0.0 | 25.5 |
| | | 12 | 0 | 23.1 | 22.9 | 22.7 | 1.0 | 24.5 |
| | | 12 | 7 | 23.1 | 22.9 | 22.7 | 1.0 | 24.5 |
| | | 12 | 13 | 23.1 | 22.9 | 22.7 | 1.0 | 24.5 |
| | | 25 | 0 | 23.1 | 22.9 | 22.8 | 1.0 | 24.5 |
| | 16QAM | 1 | 0 | 23.6 | 23.1 | 22.9 | 1.0 | 24.5 |
| | | 1 | 12 | 23.5 | 23.0 | 22.8 | 1.0 | 24.5 |
| | | 1 | 24 | 23.5 | 23.0 | 22.8 | 1.0 | 24.5 |
| | | 12 | 0 | 22.3 | 22.0 | 21.9 | 2.0 | 23.5 |
| | | 12 | 7 | 22.3 | 22.0 | 21.9 | 2.0 | 23.5 |
| | | 12 | 13 | 22.2 | 22.0 | 21.8 | 2.0 | 23.5 |
| | | 25 | 0 | 22.2 | 21.9 | 21.8 | 2.0 | 23.5 |
| | 64QAM | 1 | 0 | 22.4 | 21.9 | 22.0 | 2.0 | 23.5 |
| | | 1 | 12 | 22.3 | 21.8 | 22.0 | 2.0 | 23.5 |
| | | 1 | 24 | 22.3 | 21.9 | 21.9 | 2.0 | 23.5 |
| | | 12 | 0 | 21.1 | 21.1 | 20.9 | 3.0 | 22.5 |
| | | 12 | 7 | 21.1 | 21.0 | 20.8 | 3.0 | 22.5 |
| | | 12 | 13 | 21.1 | 21.0 | 20.7 | 3.0 | 22.5 |
| | | 25 | 0 | 21.1 | 21.0 | 20.8 | 3.0 | 22.5 |


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## LTE Band 5 Measured Results (continued)

| BW (MHz) | Mode | RB Allocation | RB offset | Measured Pwr (dBm) | | | MPR | Tune-up Limit |
|---|---|---|---|---|---|---|---|---|
| | | | | 20415 | 20525 | 20635 | | |
| | | | | 825.5 MHz | 836.5 MHz | 847.5 MHz | | |
| 3 MHz | QPSK | 1 | 0 | 24.0 | 23.9 | 23.7 | 0.0 | 25.5 |
| | | 1 | 8 | 24.0 | 23.9 | 23.8 | 0.0 | 25.5 |
| | | 1 | 14 | 24.0 | 23.9 | 23.8 | 0.0 | 25.5 |
| | | 8 | 0 | 23.0 | 22.9 | 22.7 | 1.0 | 24.5 |
| | | 8 | 4 | 23.0 | 22.9 | 22.7 | 1.0 | 24.5 |
| | | 8 | 7 | 23.0 | 22.9 | 22.7 | 1.0 | 24.5 |
| | | 15 | 0 | 23.0 | 22.9 | 22.7 | 1.0 | 24.5 |
| | 16QAM | 1 | 0 | 23.1 | 22.9 | 23.1 | 1.0 | 24.5 |
| | | 1 | 8 | 23.1 | 22.9 | 23.1 | 1.0 | 24.5 |
| | | 1 | 14 | 23.0 | 22.8 | 23.0 | 1.0 | 24.5 |
| | | 8 | 0 | 22.1 | 22.1 | 21.8 | 2.0 | 23.5 |
| | | 8 | 4 | 22.2 | 22.1 | 21.8 | 2.0 | 23.5 |
| | | 8 | 7 | 22.1 | 22.1 | 21.8 | 2.0 | 23.5 |
| | | 15 | 0 | 22.0 | 22.0 | 21.8 | 2.0 | 23.5 |
| | 64QAM | 1 | 0 | 22.2 | 22.2 | 22.1 | 2.0 | 23.5 |
| | | 1 | 8 | 22.2 | 22.1 | 22.0 | 2.0 | 23.5 |
| | | 1 | 14 | 22.1 | 22.1 | 22.0 | 2.0 | 23.5 |
| | | 8 | 0 | 21.1 | 20.9 | 20.7 | 3.0 | 22.5 |
| | | 8 | 4 | 21.2 | 20.9 | 20.8 | 3.0 | 22.5 |
| | | 8 | 7 | 21.2 | 20.9 | 20.7 | 3.0 | 22.5 |
| | | 15 | 0 | 21.1 | 21.0 | 20.8 | 3.0 | 22.5 |

| BW (MHz) | Mode | RB Allocation | RB offset | Maximum Average Power (dBm) | | | MPR | Tune-up Limit |
|---|---|---|---|---|---|---|---|---|
| | | | | Measured Pwr (dBm) | | | | |
| | | | | 20407 | 20525 | 20643 | | |
| | | | | 824.7 MHz | 836.5 MHz | 848.3 MHz | | |
| 1.4 MHz | QPSK | 1 | 0 | 23.9 | 23.9 | 23.6 | 0.0 | 25.5 |
| | | 1 | 3 | 23.9 | 23.9 | 23.7 | 0.0 | 25.5 |
| | | 1 | 5 | 23.9 | 23.8 | 23.6 | 0.0 | 25.5 |
| | | 3 | 0 | 23.9 | 23.8 | 23.5 | 0.0 | 25.5 |
| | | 3 | 1 | 23.9 | 23.8 | 23.6 | 0.0 | 25.5 |
| | | 3 | 3 | 24.0 | 23.8 | 23.6 | 0.0 | 25.5 |
| | | 6 | 0 | 22.9 | 22.8 | 22.6 | 1.0 | 24.5 |
| | 16QAM | 1 | 0 | 23.0 | 22.9 | 22.9 | 1.0 | 24.5 |
| | | 1 | 3 | 23.0 | 23.0 | 23.0 | 1.0 | 24.5 |
| | | 1 | 5 | 23.0 | 22.9 | 22.9 | 1.0 | 24.5 |
| | | 3 | 0 | 23.1 | 22.9 | 22.8 | 1.0 | 24.5 |
| | | 3 | 1 | 23.2 | 23.0 | 22.8 | 1.0 | 24.5 |
| | | 3 | 3 | 23.2 | 23.0 | 22.8 | 1.0 | 24.5 |
| | | 6 | 0 | 22.1 | 22.0 | 21.5 | 2.0 | 23.5 |
| | 64QAM | 1 | 0 | 22.1 | 22.0 | 22.0 | 2.0 | 23.5 |
| | | 1 | 3 | 22.1 | 22.1 | 22.1 | 2.0 | 23.5 |
| | | 1 | 5 | 22.0 | 22.0 | 21.9 | 2.0 | 23.5 |
| | | 3 | 0 | 22.2 | 21.9 | 21.9 | 2.0 | 23.5 |
| | | 3 | 1 | 22.0 | 21.9 | 22.0 | 2.0 | 23.5 |
| | | 3 | 3 | 22.1 | 22.9 | 21.9 | 2.0 | 23.5 |
| | | 6 | 0 | 21.1 | 21.2 | 20.6 | 3.0 | 22.5 |

**Note(s):**

10 MHz Bandwidths does not support at least three non-overlapping channels in certain channel bandwidths. 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 per KDB 941225 D05 SAR for LTE Devices


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## LTE Band 12 Measured Results

| BW (MHz) | Mode | RB Allocation | RB offset | Maximum Average Power (dBm) | | | MPR | Tune-up Limit |
|---|---|---|---|---|---|---|---|---|
| | | | | Measured Pwr (dBm) | | | | |
| | | | | [redacted] | 23095 | [redacted] | | |
| | | | | [redacted] | 707.5 MHz | [redacted] | | |
| 10 MHz | QPSK | 1 | 0 | [redacted] | 23.7 | [redacted] | 0.0 | 25 |
| | | 1 | 25 | [redacted] | 23.5 | [redacted] | 0.0 | 25 |
| | | 1 | 49 | [redacted] | 23.5 | [redacted] | 0.0 | 25 |
| | | 25 | 0 | [redacted] | 22.6 | [redacted] | 1.0 | 24 |
| | | 25 | 12 | [redacted] | 22.6 | [redacted] | 1.0 | 24 |
| | | 25 | 25 | [redacted] | 22.5 | [redacted] | 1.0 | 24 |
| | | 50 | 0 | [redacted] | 22.5 | [redacted] | 1.0 | 24 |
| | 16QAM | 1 | 0 | [redacted] | 22.6 | [redacted] | 1.0 | 24 |
| | | 1 | 25 | [redacted] | 22.4 | [redacted] | 1.0 | 24 |
| | | 1 | 49 | [redacted] | 22.3 | [redacted] | 1.0 | 24 |
| | | 25 | 0 | [redacted] | 21.7 | [redacted] | 2.0 | 23 |
| | | 25 | 12 | [redacted] | 21.6 | [redacted] | 2.0 | 23 |
| | | 25 | 25 | [redacted] | 21.6 | [redacted] | 2.0 | 23 |
| | | 50 | 0 | [redacted] | 21.6 | [redacted] | 2.0 | 23 |
| | 64QAM | 1 | 0 | [redacted] | 21.9 | [redacted] | 2.0 | 23 |
| | | 1 | 25 | [redacted] | 21.7 | [redacted] | 2.0 | 23 |
| | | 1 | 49 | [redacted] | 21.6 | [redacted] | 2.0 | 23 |
| | | 25 | 0 | [redacted] | 20.8 | [redacted] | 3.0 | 22 |
| | | 25 | 12 | [redacted] | 20.8 | [redacted] | 3.0 | 22 |
| | | 25 | 25 | [redacted] | 20.7 | [redacted] | 3.0 | 22 |
| | | 50 | 0 | [redacted] | 20.7 | [redacted] | 3.0 | 22 |

| BW (MHz) | Mode | RB Allocation | RB offset | Measured Pwr (dBm) | | | MPR | Tune-up Limit |
|---|---|---|---|---|---|---|---|---|
| | | | | 23035 | 23095 | 23155 | | |
| | | | | 701.5 MHz | 707.5 MHz | 713.5 MHz | | |
| 5 MHz | QPSK | 1 | 0 | 23.9 | 23.6 | 23.5 | 0.0 | 25 |
| | | 1 | 12 | 23.8 | 23.6 | 23.5 | 0.0 | 25 |
| | | 1 | 24 | 23.6 | 23.6 | 23.5 | 0.0 | 25 |
| | | 12 | 0 | 22.7 | 22.6 | 22.4 | 1.0 | 24 |
| | | 12 | 7 | 22.7 | 22.6 | 22.5 | 1.0 | 24 |
| | | 12 | 13 | 22.7 | 22.5 | 22.5 | 1.0 | 24 |
| | | 25 | 0 | 22.6 | 22.6 | 22.4 | 1.0 | 24 |
| | 16QAM | 1 | 0 | 22.7 | 22.6 | 22.5 | 1.0 | 24 |
| | | 1 | 12 | 22.7 | 22.5 | 22.5 | 1.0 | 24 |
| | | 1 | 24 | 22.6 | 22.6 | 22.5 | 1.0 | 24 |
| | | 12 | 0 | 21.8 | 21.7 | 21.6 | 2.0 | 23 |
| | | 12 | 7 | 21.8 | 21.7 | 21.6 | 2.0 | 23 |
| | | 12 | 13 | 21.8 | 21.7 | 21.6 | 2.0 | 23 |
| | | 25 | 0 | 21.6 | 21.6 | 21.4 | 2.0 | 23 |
| | 64QAM | 1 | 0 | 22.0 | 21.5 | 21.5 | 2.0 | 23 |
| | | 1 | 12 | 21.9 | 21.5 | 21.5 | 2.0 | 23 |
| | | 1 | 24 | 21.9 | 21.5 | 21.5 | 2.0 | 23 |
| | | 12 | 0 | 20.7 | 20.7 | 20.5 | 3.0 | 22 |
| | | 12 | 7 | 20.7 | 20.7 | 20.5 | 3.0 | 22 |
| | | 12 | 13 | 20.7 | 20.7 | 20.5 | 3.0 | 22 |
| | | 25 | 0 | 20.7 | 20.6 | 20.5 | 3.0 | 22 |


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## LTE Band 12 Measured Results (continued)

| BW (MHz) | Mode | RB Allocation | RB offset | Measured Pwr (dBm) | | | MPR | Tune-up Limit |
|---|---|---|---|---|---|---|---|---|
| | | | | 23025 | 23095 | 23165 | | |
| | | | | 700.5 MHz | 707.5 MHz | 714.5 MHz | | |
| 3 MHz | QPSK | 1 | 0 | 23.9 | 23.6 | 23.5 | 0.0 | 25 |
| | | 1 | 8 | 23.9 | 23.6 | 23.5 | 0.0 | 25 |
| | | 1 | 14 | 23.8 | 23.5 | 23.5 | 0.0 | 25 |
| | | 8 | 0 | 22.8 | 22.6 | 22.5 | 1.0 | 24 |
| | | 8 | 4 | 22.8 | 22.6 | 22.5 | 1.0 | 24 |
| | | 8 | 7 | 22.8 | 22.6 | 22.5 | 1.0 | 24 |
| | | 15 | 0 | 22.7 | 22.5 | 22.5 | 1.0 | 24 |
| | 16QAM | 1 | 0 | 22.6 | 22.5 | 22.5 | 1.0 | 24 |
| | | 1 | 8 | 22.6 | 22.6 | 22.5 | 1.0 | 24 |
| | | 1 | 14 | 22.6 | 22.5 | 22.4 | 1.0 | 24 |
| | | 8 | 0 | 21.9 | 21.6 | 21.6 | 2.0 | 23 |
| | | 8 | 4 | 21.9 | 21.7 | 21.6 | 2.0 | 23 |
| | | 8 | 7 | 21.9 | 21.6 | 21.6 | 2.0 | 23 |
| | | 15 | 0 | 21.8 | 21.5 | 21.5 | 2.0 | 23 |
| | 64QAM | 1 | 0 | 21.7 | 21.6 | 21.6 | 2.0 | 23 |
| | | 1 | 8 | 21.7 | 21.6 | 21.6 | 2.0 | 23 |
| | | 1 | 14 | 21.7 | 21.5 | 21.5 | 2.0 | 23 |
| | | 8 | 0 | 20.9 | 20.6 | 20.6 | 3.0 | 22 |
| | | 8 | 4 | 20.8 | 20.7 | 20.6 | 3.0 | 22 |
| | | 8 | 7 | 20.8 | 20.7 | 20.6 | 3.0 | 22 |
| | | 15 | 0 | 20.7 | 20.5 | 20.6 | 3.0 | 22 |

| BW (MHz) | Mode | RB Allocation | RB offset | Maximum Average Power (dBm) | | | MPR | Tune-up Limit |
|---|---|---|---|---|---|---|---|---|
| | | | | Measured Pwr (dBm) | | | | |
| | | | | 23017 | 23095 | 23173 | | |
| | | | | 699.7 MHz | 707.5 MHz | 715.3 MHz | | |
| 1.4 MHz | QPSK | 1 | 0 | 23.7 | 23.5 | 23.4 | 0.0 | 25 |
| | | 1 | 3 | 23.7 | 23.5 | 23.5 | 0.0 | 25 |
| | | 1 | 5 | 23.7 | 23.5 | 23.4 | 0.0 | 25 |
| | | 3 | 0 | 23.5 | 23.4 | 23.4 | 0.0 | 25 |
| | | 3 | 1 | 23.6 | 23.5 | 23.4 | 0.0 | 25 |
| | | 3 | 3 | 23.5 | 23.5 | 23.5 | 0.0 | 25 |
| | | 6 | 0 | 22.7 | 22.5 | 22.4 | 1.0 | 24 |
| | 16QAM | 1 | 0 | 22.5 | 22.8 | 22.8 | 1.0 | 24 |
| | | 1 | 3 | 22.6 | 22.8 | 22.8 | 1.0 | 24 |
| | | 1 | 5 | 22.6 | 22.8 | 22.7 | 1.0 | 24 |
| | | 3 | 0 | 22.7 | 22.6 | 22.6 | 1.0 | 24 |
| | | 3 | 1 | 22.7 | 22.7 | 22.7 | 1.0 | 24 |
| | | 3 | 3 | 22.7 | 22.7 | 22.7 | 1.0 | 24 |
| | | 6 | 0 | 21.8 | 21.4 | 21.4 | 2.0 | 23 |
| | 64QAM | 1 | 0 | 21.7 | 22.4 | 22.4 | 2.0 | 23 |
| | | 1 | 3 | 21.8 | 22.5 | 22.5 | 2.0 | 23 |
| | | 1 | 5 | 21.7 | 22.4 | 22.4 | 2.0 | 23 |
| | | 3 | 0 | 21.8 | 22.6 | 22.5 | 2.0 | 23 |
| | | 3 | 1 | 21.8 | 22.7 | 22.6 | 2.0 | 23 |
| | | 3 | 3 | 21.8 | 22.7 | 22.5 | 2.0 | 23 |
| | | 6 | 0 | 21.0 | 21.5 | 21.4 | 3.0 | 22 |

**Note(s):**

10 MHz Bandwidths does not support at least three non-overlapping channels in certain channel bandwidths. 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 per KDB 941225 D05 SAR for LTE Devices


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# 2. Reduced power Results

## LTE Band 4 Measured Results

| BW (MHz) | Mode | RB Allocation | RB offset | Hotspot-Reduced Average Power (dBm) | | | | | Proximity sensor-Reduced Average Power (dBm) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Measured Pwr (dBm) | | | MPR | Tune-up Limit | Measured Pwr (dBm) | | | MPR | Tune-up Limit |
| | | | | [redacted] | 20175 | [redacted] | | | [redacted] | 20175 | [redacted] | | |
| | | | | [redacted] | 1732.5 MHz | [redacted] | | | [redacted] | 1732.5 MHz | [redacted] | | |
| 20 MHz | QPSK | 1 | 0 | [redacted] | 18.7 | [redacted] | 0.0 | 20 | [redacted] | 18.7 | [redacted] | 0.0 | 20 |
| | | 1 | 49 | [redacted] | 18.6 | [redacted] | 0.0 | 20 | [redacted] | 18.6 | [redacted] | 0.0 | 20 |
| | | 1 | 99 | [redacted] | 18.5 | [redacted] | 0.0 | 20 | [redacted] | 18.6 | [redacted] | 0.0 | 20 |
| | | 50 | 0 | [redacted] | 18.8 | [redacted] | 0.0 | 20 | [redacted] | 18.8 | [redacted] | 0.0 | 20 |
| | | 50 | 24 | [redacted] | 18.7 | [redacted] | 0.0 | 20 | [redacted] | 18.7 | [redacted] | 0.0 | 20 |
| | | 50 | 50 | [redacted] | 18.7 | [redacted] | 0.0 | 20 | [redacted] | 18.6 | [redacted] | 0.0 | 20 |
| | | 100 | 0 | [redacted] | 18.7 | [redacted] | 0.0 | 20 | [redacted] | 18.7 | [redacted] | 0.0 | 20 |
| | 16QAM | 1 | 0 | [redacted] | 19.2 | [redacted] | 0.0 | 20 | [redacted] | 19.2 | [redacted] | 0.0 | 20 |
| | | 1 | 49 | [redacted] | 19.1 | [redacted] | 0.0 | 20 | [redacted] | 19.1 | [redacted] | 0.0 | 20 |
| | | 1 | 99 | [redacted] | 19.1 | [redacted] | 0.0 | 20 | [redacted] | 19.1 | [redacted] | 0.0 | 20 |
| | | 50 | 0 | [redacted] | 18.8 | [redacted] | 0.0 | 20 | [redacted] | 18.8 | [redacted] | 0.0 | 20 |
| | | 50 | 24 | [redacted] | 18.8 | [redacted] | 0.0 | 20 | [redacted] | 18.8 | [redacted] | 0.0 | 20 |
| | | 50 | 50 | [redacted] | 18.7 | [redacted] | 0.0 | 20 | [redacted] | 18.7 | [redacted] | 0.0 | 20 |
| | | 100 | 0 | [redacted] | 18.8 | [redacted] | 0.0 | 20 | [redacted] | 18.8 | [redacted] | 0.0 | 20 |
| | 64QAM | 1 | 0 | [redacted] | 19.1 | [redacted] | 0.0 | 20 | [redacted] | 19.2 | [redacted] | 0.0 | 20 |
| | | 1 | 49 | [redacted] | 19.0 | [redacted] | 0.0 | 20 | [redacted] | 19.2 | [redacted] | 0.0 | 20 |
| | | 1 | 99 | [redacted] | 19.0 | [redacted] | 0.0 | 20 | [redacted] | 19.2 | [redacted] | 0.0 | 20 |
| | | 50 | 0 | [redacted] | 18.9 | [redacted] | 0.0 | 20 | [redacted] | 18.9 | [redacted] | 0.0 | 20 |
| | | 50 | 24 | [redacted] | 18.8 | [redacted] | 0.0 | 20 | [redacted] | 18.8 | [redacted] | 0.0 | 20 |
| | | 50 | 50 | [redacted] | 18.8 | [redacted] | 0.0 | 20 | [redacted] | 18.7 | [redacted] | 0.0 | 20 |
| | | 100 | 0 | [redacted] | 18.8 | [redacted] | 0.0 | 20 | [redacted] | 18.8 | [redacted] | 0.0 | 20 |

| BW (MHz) | Mode | RB Allocation | RB offset | Measured Pwr (dBm) | | | MPR | Tune-up Limit | Measured Pwr (dBm) | | | MPR | Tune-up Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 20025 | 20175 | 20325 | | | 20025 | 20175 | 20325 | | |
| | | | | 1717.5 MHz | 1732.5 MHz | 1747.5 MHz | | | 1717.5 MHz | 1732.5 MHz | 1747.5 MHz | | |
| 15 MHz | QPSK | 1 | 0 | 18.6 | 18.7 | 18.8 | 0.0 | 20 | 18.5 | 18.8 | 18.7 | 0.0 | 20 |
| | | 1 | 37 | 18.5 | 18.6 | 18.7 | 0.0 | 20 | 18.5 | 18.6 | 18.6 | 0.0 | 20 |
| | | 1 | 74 | 18.6 | 18.6 | 18.6 | 0.0 | 20 | 18.5 | 18.7 | 18.6 | 0.0 | 20 |
| | | 36 | 0 | 18.6 | 18.7 | 18.7 | 0.0 | 20 | 18.6 | 18.7 | 18.7 | 0.0 | 20 |
| | | 36 | 20 | 18.5 | 18.7 | 18.6 | 0.0 | 20 | 18.5 | 18.7 | 18.6 | 0.0 | 20 |
| | | 36 | 39 | 18.6 | 18.6 | 18.7 | 0.0 | 20 | 18.6 | 18.6 | 18.6 | 0.0 | 20 |
| | | 75 | 0 | 18.6 | 18.7 | 18.6 | 0.0 | 20 | 18.6 | 18.6 | 18.6 | 0.0 | 20 |
| | 16QAM | 1 | 0 | 19.1 | 18.7 | 18.9 | 0.0 | 20 | 18.6 | 19.2 | 19.2 | 0.0 | 20 |
| | | 1 | 37 | 19.0 | 18.6 | 19.1 | 0.0 | 20 | 18.5 | 19.1 | 19.0 | 0.0 | 20 |
| | | 1 | 74 | 19.1 | 18.6 | 19.1 | 0.0 | 20 | 18.6 | 19.1 | 19.0 | 0.0 | 20 |
| | | 36 | 0 | 18.8 | 18.8 | 18.8 | 0.0 | 20 | 18.7 | 18.8 | 18.8 | 0.0 | 20 |
| | | 36 | 20 | 18.7 | 18.8 | 18.7 | 0.0 | 20 | 18.6 | 18.8 | 18.8 | 0.0 | 20 |
| | | 36 | 39 | 18.7 | 18.7 | 18.7 | 0.0 | 20 | 18.7 | 18.7 | 18.7 | 0.0 | 20 |
| | | 75 | 0 | 18.8 | 18.8 | 18.7 | 0.0 | 20 | 18.7 | 18.8 | 18.7 | 0.0 | 20 |
| | 64QAM | 1 | 0 | 18.8 | 18.9 | 19.2 | 0.0 | 20 | 19.2 | 19.2 | 18.9 | 0.0 | 20 |
| | | 1 | 37 | 18.8 | 19.2 | 19.1 | 0.0 | 20 | 19.1 | 19.1 | 18.8 | 0.0 | 20 |
| | | 1 | 74 | 18.8 | 19.3 | 19.1 | 0.0 | 20 | 19.2 | 19.1 | 18.8 | 0.0 | 20 |
| | | 36 | 0 | 18.7 | 18.8 | 18.8 | 0.0 | 20 | 18.7 | 18.8 | 18.8 | 0.0 | 20 |
| | | 36 | 20 | 18.7 | 18.8 | 18.7 | 0.0 | 20 | 18.6 | 18.8 | 18.7 | 0.0 | 20 |
| | | 36 | 39 | 18.8 | 18.7 | 18.6 | 0.0 | 20 | 18.7 | 18.7 | 18.7 | 0.0 | 20 |
| | | 75 | 0 | 18.7 | 18.8 | 18.7 | 0.0 | 20 | 18.7 | 18.8 | 18.7 | 0.0 | 20 |


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## LTE Band 4 Measured Results (continued)

| BW (MHz) | Mode | RB Allocation | RB offset | Measured Pwr (dBm) | | | MPR | Tune-up Limit | Measured Pwr (dBm) | | | MPR | Tune-up Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 20000 | 20175 | 20350 | | | 20000 | 20175 | 20350 | | |
| | | | | 1715 MHz | 1732.5 MHz | 1750 MHz | | | 1715 MHz | 1732.5 MHz | 1750 MHz | | |
| 10 MHz | QPSK | 1 | 0 | 18.4 | 18.7 | 18.7 | 0.0 | 20 | 18.4 | 18.7 | 18.7 | 0.0 | 20 |
| | | 1 | 25 | 18.3 | 18.6 | 18.6 | 0.0 | 20 | 18.4 | 18.6 | 18.5 | 0.0 | 20 |
| | | 1 | 49 | 18.3 | 18.6 | 18.6 | 0.0 | 20 | 18.4 | 18.5 | 18.5 | 0.0 | 20 |
| | | 25 | 0 | 18.5 | 18.7 | 18.7 | 0.0 | 20 | 18.5 | 18.7 | 18.7 | 0.0 | 20 |
| | | 25 | 12 | 18.5 | 18.7 | 18.7 | 0.0 | 20 | 18.5 | 18.7 | 18.6 | 0.0 | 20 |
| | | 25 | 25 | 18.4 | 18.6 | 18.7 | 0.0 | 20 | 18.4 | 18.7 | 18.6 | 0.0 | 20 |
| | | 50 | 0 | 18.5 | 18.6 | 18.7 | 0.0 | 20 | 18.5 | 18.7 | 18.6 | 0.0 | 20 |
| | 16QAM | 1 | 0 | 18.6 | 19.2 | 18.7 | 0.0 | 20 | 18.4 | 18.8 | 19.1 | 0.0 | 20 |
| | | 1 | 25 | 18.5 | 19.0 | 18.6 | 0.0 | 20 | 18.4 | 18.7 | 19.0 | 0.0 | 20 |
| | | 1 | 49 | 18.5 | 19.0 | 18.6 | 0.0 | 20 | 18.4 | 18.7 | 19.0 | 0.0 | 20 |
| | | 25 | 0 | 18.7 | 18.9 | 18.8 | 0.0 | 20 | 18.6 | 18.9 | 18.8 | 0.0 | 20 |
| | | 25 | 12 | 18.7 | 18.8 | 18.8 | 0.0 | 20 | 18.6 | 18.8 | 18.7 | 0.0 | 20 |
| | | 25 | 25 | 18.6 | 18.8 | 18.7 | 0.0 | 20 | 18.5 | 18.8 | 18.7 | 0.0 | 20 |
| | | 50 | 0 | 18.6 | 18.8 | 18.8 | 0.0 | 20 | 18.5 | 18.8 | 18.7 | 0.0 | 20 |
| | 64QAM | 1 | 0 | 19.1 | 18.8 | 18.8 | 0.0 | 20 | 19.1 | 18.8 | 18.8 | 0.0 | 20 |
| | | 1 | 25 | 19.0 | 18.7 | 18.8 | 0.0 | 20 | 19.0 | 18.7 | 18.7 | 0.0 | 20 |
| | | 1 | 49 | 19.0 | 18.7 | 18.7 | 0.0 | 20 | 19.0 | 18.7 | 18.7 | 0.0 | 20 |
| | | 25 | 0 | 18.6 | 18.9 | 18.8 | 0.0 | 20 | 18.6 | 18.9 | 18.8 | 0.0 | 20 |
| | | 25 | 12 | 18.6 | 18.8 | 18.7 | 0.0 | 20 | 18.6 | 18.8 | 18.7 | 0.0 | 20 |
| | | 25 | 25 | 18.6 | 18.8 | 18.7 | 0.0 | 20 | 18.6 | 18.8 | 18.7 | 0.0 | 20 |
| | | 50 | 0 | 18.6 | 18.8 | 18.7 | 0.0 | 20 | 18.6 | 18.8 | 18.7 | 0.0 | 20 |

| BW (MHz) | Mode | RB Allocation | RB offset | Measured Pwr (dBm) | | | MPR | Tune-up Limit | Measured Pwr (dBm) | | | MPR | Tune-up Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 19975 | 20175 | 20375 | | | 19975 | 20175 | 20375 | | |
| | | | | 1712.5 MHz | 1732.5 MHz | 1752.5 MHz | | | 1712.5 MHz | 1732.5 MHz | 1752.5 MHz | | |
| 5 MHz | QPSK | 1 | 0 | 18.4 | 18.8 | 18.7 | 0.0 | 20 | 18.5 | 18.7 | 18.6 | 0.0 | 20 |
| | | 1 | 12 | 18.3 | 18.7 | 18.6 | 0.0 | 20 | 18.4 | 18.6 | 18.5 | 0.0 | 20 |
| | | 1 | 24 | 18.4 | 18.7 | 18.6 | 0.0 | 20 | 18.5 | 18.7 | 18.6 | 0.0 | 20 |
| | | 12 | 0 | 18.4 | 18.7 | 18.6 | 0.0 | 20 | 18.4 | 18.7 | 18.6 | 0.0 | 20 |
| | | 12 | 7 | 18.4 | 18.7 | 18.6 | 0.0 | 20 | 18.4 | 18.7 | 18.6 | 0.0 | 20 |
| | | 12 | 13 | 18.5 | 18.6 | 18.6 | 0.0 | 20 | 18.4 | 18.6 | 18.6 | 0.0 | 20 |
| | | 25 | 0 | 18.5 | 18.7 | 18.6 | 0.0 | 20 | 18.4 | 18.6 | 18.6 | 0.0 | 20 |
| | 16QAM | 1 | 0 | 19.0 | 18.9 | 18.9 | 0.0 | 20 | 18.7 | 18.9 | 19.2 | 0.0 | 20 |
| | | 1 | 12 | 18.9 | 18.8 | 18.8 | 0.0 | 20 | 18.6 | 18.8 | 19.1 | 0.0 | 20 |
| | | 1 | 24 | 19.0 | 18.9 | 18.8 | 0.0 | 20 | 18.7 | 18.8 | 19.2 | 0.0 | 20 |
| | | 12 | 0 | 18.6 | 18.8 | 18.8 | 0.0 | 20 | 18.5 | 18.8 | 18.8 | 0.0 | 20 |
| | | 12 | 7 | 18.6 | 18.8 | 18.7 | 0.0 | 20 | 18.5 | 18.8 | 18.8 | 0.0 | 20 |
| | | 12 | 13 | 18.7 | 18.8 | 18.7 | 0.0 | 20 | 18.6 | 18.8 | 18.8 | 0.0 | 20 |
| | | 25 | 0 | 18.6 | 18.8 | 18.6 | 0.0 | 20 | 18.6 | 18.7 | 18.7 | 0.0 | 20 |
| | 64QAM | 1 | 0 | 18.4 | 18.8 | 19.0 | 0.0 | 20 | 18.4 | 18.8 | 19.0 | 0.0 | 20 |
| | | 1 | 12 | 18.3 | 18.8 | 18.9 | 0.0 | 20 | 18.3 | 18.7 | 18.9 | 0.0 | 20 |
| | | 1 | 24 | 18.4 | 18.8 | 19.0 | 0.0 | 20 | 18.4 | 18.8 | 18.9 | 0.0 | 20 |
| | | 12 | 0 | 18.5 | 18.7 | 18.7 | 0.0 | 20 | 18.4 | 18.7 | 18.7 | 0.0 | 20 |
| | | 12 | 7 | 18.4 | 18.7 | 18.7 | 0.0 | 20 | 18.4 | 18.7 | 18.7 | 0.0 | 20 |
| | | 12 | 13 | 18.5 | 18.7 | 18.7 | 0.0 | 20 | 18.5 | 18.7 | 18.7 | 0.0 | 20 |
| | | 25 | 0 | 18.6 | 18.8 | 18.6 | 0.0 | 20 | 18.6 | 18.8 | 18.7 | 0.0 | 20 |


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## LTE Band 4 Measured Results (continued)

| BW (MHz) | Mode | RB Allocation | RB offset | Measured Pwr (dBm) | | | MPR | Tune-up Limit | Measured Pwr (dBm) | | | MPR | Tune-up Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 19965 | 20175 | 20385 | | | 19965 | 20175 | 20385 | | |
| | | | | 1711.5 MHz | 1732.5 MHz | 1753.5 MHz | | | 1711.5 MHz | 1732.5 MHz | 1753.5 MHz | | |
| 3 MHz | QPSK | 1 | 0 | 18.4 | 18.6 | 18.7 | 0.0 | 20 | 18.4 | 18.6 | 18.6 | 0.0 | 20 |
| | | 1 | 8 | 18.4 | 18.7 | 18.7 | 0.0 | 20 | 18.4 | 18.6 | 18.7 | 0.0 | 20 |
| | | 1 | 14 | 18.3 | 18.6 | 18.6 | 0.0 | 20 | 18.3 | 18.5 | 18.5 | 0.0 | 20 |
| | | 8 | 0 | 18.4 | 18.6 | 18.6 | 0.0 | 20 | 18.3 | 18.6 | 18.6 | 0.0 | 20 |
| | | 8 | 4 | 18.4 | 18.7 | 18.6 | 0.0 | 20 | 18.4 | 18.6 | 18.6 | 0.0 | 20 |
| | | 8 | 7 | 18.4 | 18.7 | 18.6 | 0.0 | 20 | 18.4 | 18.6 | 18.5 | 0.0 | 20 |
| | | 15 | 0 | 18.4 | 18.7 | 18.6 | 0.0 | 20 | 18.4 | 18.6 | 18.5 | 0.0 | 20 |
| | 16QAM | 1 | 0 | 18.4 | 18.8 | 19.1 | 0.0 | 20 | 18.4 | 18.8 | 19.0 | 0.0 | 20 |
| | | 1 | 8 | 18.4 | 18.8 | 19.1 | 0.0 | 20 | 18.4 | 18.8 | 19.1 | 0.0 | 20 |
| | | 1 | 14 | 18.3 | 18.7 | 19.0 | 0.0 | 20 | 18.3 | 18.7 | 19.0 | 0.0 | 20 |
| | | 8 | 0 | 18.6 | 18.7 | 18.7 | 0.0 | 20 | 18.6 | 18.7 | 18.7 | 0.0 | 20 |
| | | 8 | 4 | 18.6 | 18.8 | 18.8 | 0.0 | 20 | 18.5 | 18.7 | 18.7 | 0.0 | 20 |
| | | 8 | 7 | 18.6 | 18.8 | 18.8 | 0.0 | 20 | 18.5 | 18.8 | 18.7 | 0.0 | 20 |
| | | 15 | 0 | 18.5 | 18.7 | 18.7 | 0.0 | 20 | 18.5 | 18.7 | 18.7 | 0.0 | 20 |
| | 64QAM | 1 | 0 | 19.0 | 18.7 | 18.8 | 0.0 | 20 | 18.6 | 19.2 | 18.7 | 0.0 | 20 |
| | | 1 | 8 | 19.0 | 18.8 | 18.8 | 0.0 | 20 | 18.6 | 18.9 | 18.7 | 0.0 | 20 |
| | | 1 | 14 | 18.9 | 18.7 | 18.7 | 0.0 | 20 | 18.5 | 19.2 | 18.6 | 0.0 | 20 |
| | | 8 | 0 | 18.6 | 18.8 | 18.6 | 0.0 | 20 | 18.4 | 18.9 | 18.7 | 0.0 | 20 |
| | | 8 | 4 | 18.6 | 18.8 | 18.7 | 0.0 | 20 | 18.5 | 18.9 | 18.7 | 0.0 | 20 |
| | | 8 | 7 | 18.6 | 18.7 | 18.7 | 0.0 | 20 | 18.4 | 18.9 | 18.7 | 0.0 | 20 |
| | | 15 | 0 | 18.4 | 18.7 | 18.7 | 0.0 | 20 | 18.5 | 18.7 | 18.7 | 0.0 | 20 |

| BW (MHz) | Mode | RB Allocation | RB offset | Measured Pwr (dBm) | | | MPR | Tune-up Limit | Measured Pwr (dBm) | | | MPR | Tune-up Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 19957 | 20175 | 20393 | | | 19957 | 20175 | 20393 | | |
| | | | | 1710.7 MHz | 1732.5 MHz | 1754.3 MHz | | | 1710.7 MHz | 1732.5 MHz | 1754.3 MHz | | |
| 1.4 MHz | QPSK | 1 | 0 | 18.3 | 18.6 | 18.5 | 0.0 | 20 | 18.3 | 18.6 | 18.4 | 0.0 | 20 |
| | | 1 | 3 | 18.4 | 18.7 | 18.6 | 0.0 | 20 | 18.3 | 18.6 | 18.5 | 0.0 | 20 |
| | | 1 | 5 | 18.3 | 18.6 | 18.5 | 0.0 | 20 | 18.3 | 18.6 | 18.4 | 0.0 | 20 |
| | | 3 | 0 | 18.4 | 18.6 | 18.5 | 0.0 | 20 | 18.3 | 18.5 | 18.4 | 0.0 | 20 |
| | | 3 | 1 | 18.4 | 18.7 | 18.6 | 0.0 | 20 | 18.4 | 18.6 | 18.5 | 0.0 | 20 |
| | | 3 | 3 | 18.4 | 18.6 | 18.6 | 0.0 | 20 | 18.3 | 18.5 | 18.5 | 0.0 | 20 |
| | | 6 | 0 | 18.3 | 18.6 | 18.6 | 0.0 | 20 | 18.2 | 18.5 | 18.5 | 0.0 | 20 |
| | 16QAM | 1 | 0 | 18.8 | 18.8 | 18.7 | 0.0 | 20 | 18.8 | 18.8 | 18.6 | 0.0 | 20 |
| | | 1 | 3 | 18.8 | 18.8 | 18.7 | 0.0 | 20 | 18.8 | 18.8 | 18.6 | 0.0 | 20 |
| | | 1 | 5 | 18.8 | 18.9 | 18.7 | 0.0 | 20 | 18.7 | 18.8 | 18.6 | 0.0 | 20 |
| | | 3 | 0 | 18.6 | 18.8 | 18.8 | 0.0 | 20 | 18.6 | 18.7 | 18.7 | 0.0 | 20 |
| | | 3 | 1 | 18.7 | 18.8 | 18.8 | 0.0 | 20 | 18.6 | 18.7 | 18.8 | 0.0 | 20 |
| | | 3 | 3 | 18.6 | 18.8 | 18.8 | 0.0 | 20 | 18.6 | 18.7 | 18.7 | 0.0 | 20 |
| | | 6 | 0 | 18.3 | 18.8 | 18.8 | 0.0 | 20 | 18.3 | 18.7 | 18.7 | 0.0 | 20 |
| | 64QAM | 1 | 0 | 18.4 | 18.7 | 18.7 | 0.0 | 20 | 18.5 | 18.6 | 18.6 | 0.0 | 20 |
| | | 1 | 3 | 18.4 | 18.7 | 18.7 | 0.0 | 20 | 18.6 | 18.6 | 18.6 | 0.0 | 20 |
| | | 1 | 5 | 18.3 | 18.7 | 18.7 | 0.0 | 20 | 18.5 | 18.7 | 18.6 | 0.0 | 20 |
| | | 3 | 0 | 18.6 | 18.7 | 18.6 | 0.0 | 20 | 18.4 | 18.8 | 18.6 | 0.0 | 20 |
| | | 3 | 1 | 18.6 | 18.8 | 18.6 | 0.0 | 20 | 18.4 | 18.9 | 18.7 | 0.0 | 20 |
| | | 3 | 3 | 18.6 | 18.8 | 18.6 | 0.0 | 20 | 18.4 | 18.8 | 18.7 | 0.0 | 20 |
| | | 6 | 0 | 18.4 | 18.6 | 18.6 | 0.0 | 20 | 18.4 | 18.6 | 18.5 | 0.0 | 20 |

**Note(s):**

20 MHz Bandwidths does not support at least three non-overlapping channels in certain channel bandwidths. 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 per KDB 941225 D05 SAR for LTE Devices


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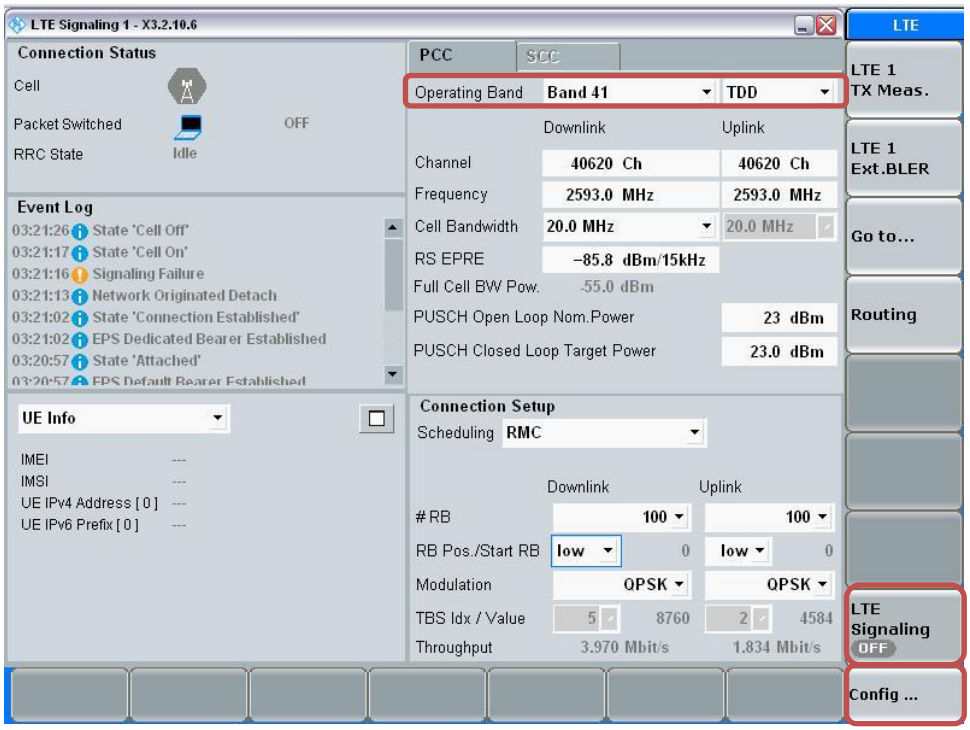
## LTE Band TDD Measured Results

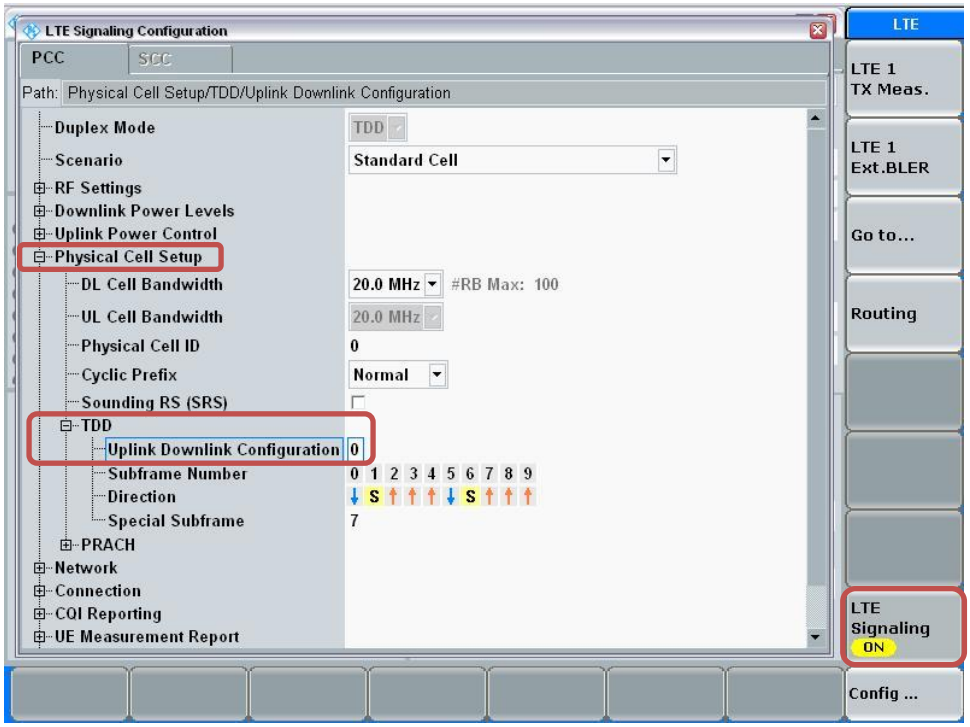
### Procedure used to establish SAR test signal for LTE TDD Band

Set to CMW-500 with following parameters:

- Turn the LTE Signaling off using “ON | OFF” key
- Operating Band: Select Band 41 and TDD
- Go to “Config….”




- Go to “Physical Cell Setup”
- Select “TDD” and Set “Uplink Downlink Configuration” to “0”
- Turn the cell on using “ON | OFF” key





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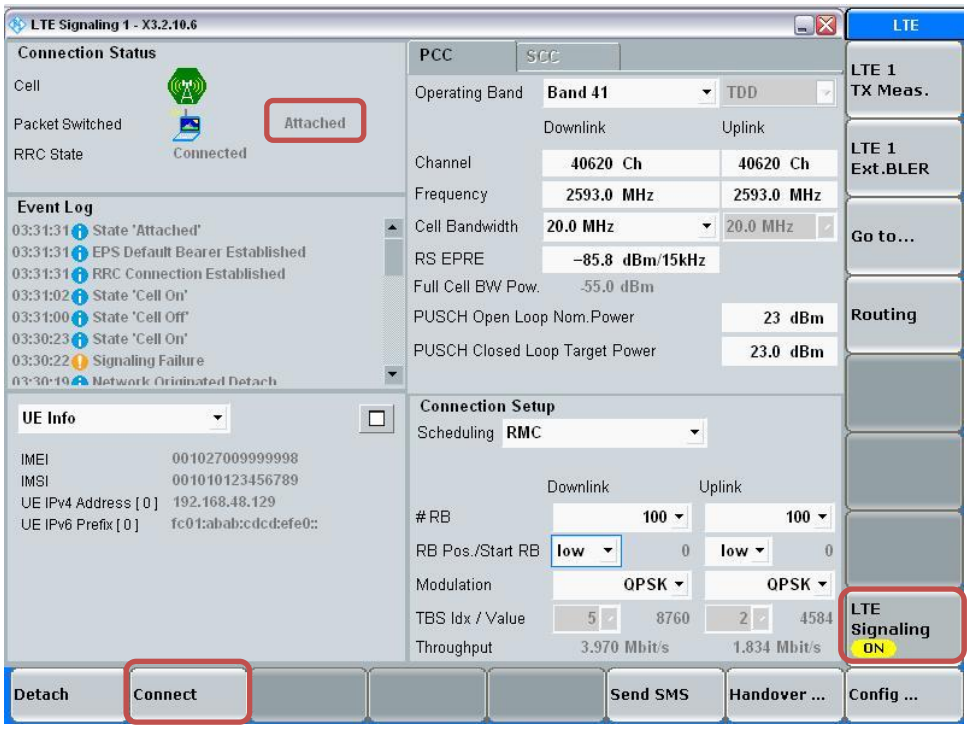
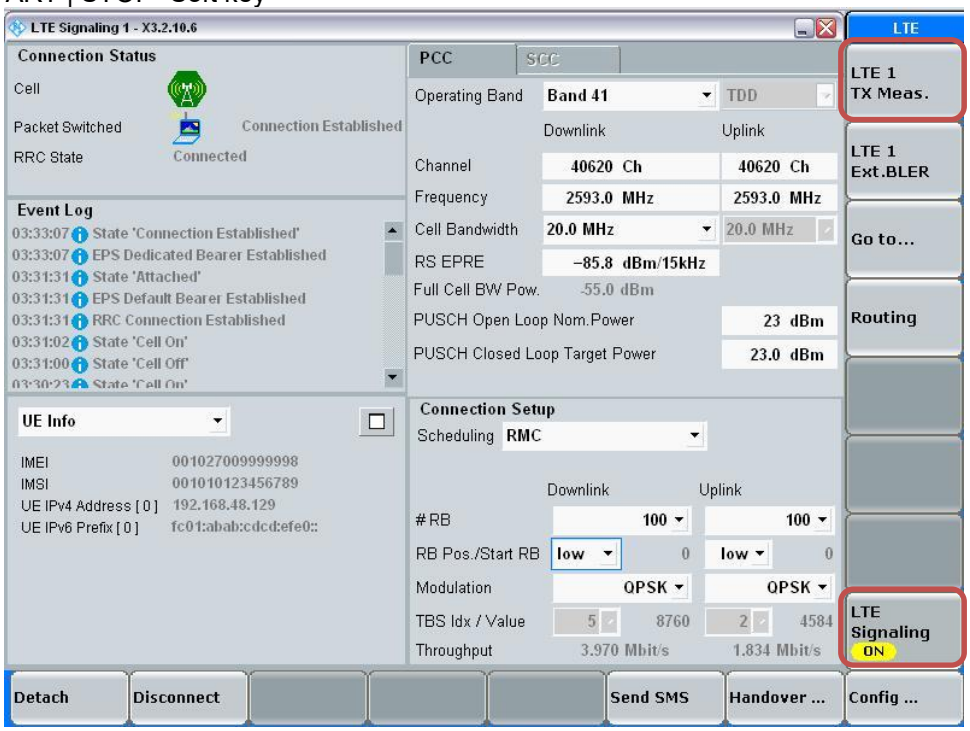
**Connect to EUT**

- Turn the cell on using “ON | OFF” key
- After EUT is Attached
- Select “Connect”




**Max Power Setting**

- Select “LTE 1 TX Meas.”
- Press “RESTART | STOP” Soft key





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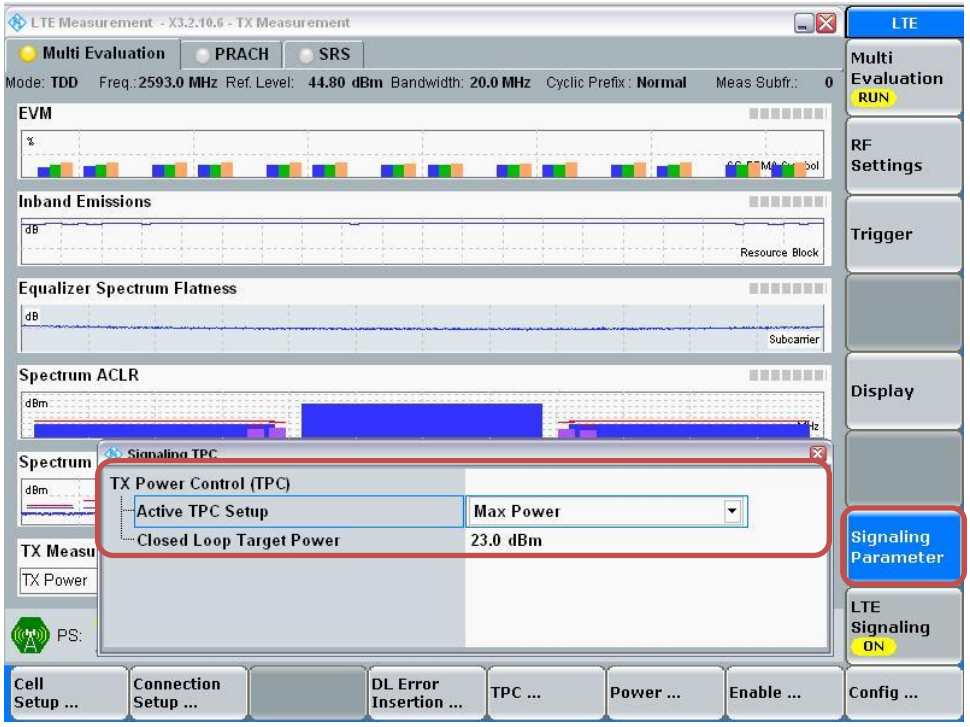
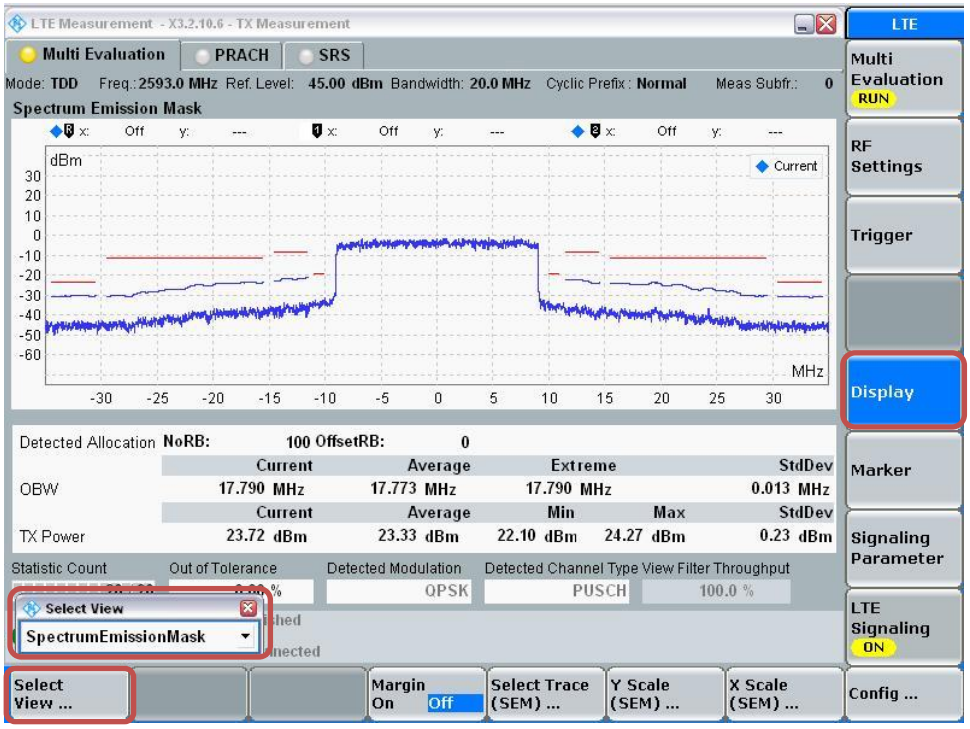
- Select “Signaling Parameter”
- Select “TX Power Control (TPC)” > Select “Active TPC Setup” to “Max Power” > Set “Closed Loop Target Power” to “23 dBm”




## View TX Power

- Go to “Display”
- Select “Select View…”
- Select “Spectrum Emission Mask”





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## LTE Band 41 Measured Results

| BW (MHz) | Mode | RB Allocation | RB offset | Maximum Average Power (dBm) | | | MPR | Tune-up Limit |
|---|---|---|---|---|---|---|---|---|
| | | | | Measured Pwr (dBm) | | | | |
| | | | | 40340 | 40740 | 41140 | | |
| | | | | 2565 MHz | 2605 MHz | 2645 MHz | | |
| 20 MHz | QPSK | 1 | 0 | 23.9 | 23.5 | 23.3 | 0.0 | 24.5 |
| | | 1 | 49 | 23.7 | 23.3 | 23.1 | 0.0 | 24.5 |
| | | 1 | 99 | 24.0 | 23.3 | 23.0 | 0.0 | 24.5 |
| | | 50 | 0 | 22.6 | 22.4 | 22.4 | 1.0 | 23.5 |
| | | 50 | 24 | 22.6 | 22.5 | 22.3 | 1.0 | 23.5 |
| | | 50 | 50 | 22.7 | 22.4 | 22.3 | 1.0 | 23.5 |
| | | 100 | 0 | 22.6 | 22.4 | 22.3 | 1.0 | 23.5 |
| | 16QAM | 1 | 0 | 22.9 | 22.5 | 22.3 | 1.0 | 23.5 |
| | | 1 | 49 | 22.6 | 22.3 | 22.1 | 1.0 | 23.5 |
| | | 1 | 99 | 22.5 | 22.3 | 22.0 | 1.0 | 23.5 |
| | | 50 | 0 | 21.7 | 21.5 | 21.6 | 2.0 | 22.5 |
| | | 50 | 24 | 21.6 | 21.5 | 21.5 | 2.0 | 22.5 |
| | | 50 | 50 | 21.5 | 21.4 | 21.5 | 2.0 | 22.5 |
| | | 100 | 0 | 21.6 | 21.5 | 21.4 | 2.0 | 22.5 |
| | 64QAM | 1 | 0 | 21.9 | 21.9 | 21.4 | 2.0 | 22.5 |
| | | 1 | 49 | 21.6 | 21.7 | 21.2 | 2.0 | 22.5 |
| | | 1 | 99 | 21.5 | 21.7 | 21.1 | 2.0 | 22.5 |
| | | 50 | 0 | 20.7 | 20.5 | 20.6 | 3.0 | 21.5 |
| | | 50 | 24 | 20.7 | 20.5 | 20.5 | 3.0 | 21.5 |
| | | 50 | 50 | 20.6 | 20.4 | 20.4 | 3.0 | 21.5 |
| | | 100 | 0 | 20.7 | 20.5 | 20.4 | 3.0 | 21.5 |
| BW (MHz) | Mode | RB Allocation | RB offset | Measured Pwr (dBm) | | | MPR | Tune-up Limit |
| | | | | 40315 | 40740 | 41165 | | |
| | | | | 2562.5 MHz | 2605 MHz | 2647.5 MHz | | |
| 15 MHz | QPSK | 1 | 0 | 23.9 | 23.3 | 23.2 | 0.0 | 24.5 |
| | | 1 | 37 | 23.7 | 23.2 | 23.0 | 0.0 | 24.5 |
| | | 1 | 74 | 23.5 | 23.2 | 22.9 | 0.0 | 24.5 |
| | | 36 | 0 | 22.7 | 22.4 | 22.2 | 1.0 | 23.5 |
| | | 36 | 20 | 22.7 | 22.5 | 22.2 | 1.0 | 23.5 |
| | | 36 | 39 | 22.6 | 22.3 | 22.1 | 1.0 | 23.5 |
| | | 75 | 0 | 22.6 | 22.4 | 22.2 | 1.0 | 23.5 |
| | 16QAM | 1 | 0 | 22.8 | 22.3 | 22.3 | 1.0 | 23.5 |
| | | 1 | 37 | 22.5 | 22.3 | 22.2 | 1.0 | 23.5 |
| | | 1 | 74 | 22.5 | 22.2 | 22.2 | 1.0 | 23.5 |
| | | 36 | 0 | 21.7 | 21.4 | 21.3 | 2.0 | 22.5 |
| | | 36 | 20 | 21.7 | 21.5 | 21.3 | 2.0 | 22.5 |
| | | 36 | 39 | 21.6 | 21.4 | 21.2 | 2.0 | 22.5 |
| | | 75 | 0 | 21.7 | 21.5 | 21.3 | 2.0 | 22.5 |
| | 64QAM | 1 | 0 | 22.1 | 21.3 | 20.9 | 2.0 | 22.5 |
| | | 1 | 37 | 21.8 | 21.2 | 20.8 | 2.0 | 22.5 |
| | | 1 | 74 | 21.7 | 21.1 | 20.7 | 2.0 | 22.5 |
| | | 36 | 0 | 20.9 | 20.4 | 20.4 | 3.0 | 21.5 |
| | | 36 | 20 | 20.8 | 20.5 | 20.4 | 3.0 | 21.5 |
| | | 36 | 39 | 20.7 | 20.4 | 20.3 | 3.0 | 21.5 |
| | | 75 | 0 | 20.7 | 20.5 | 20.3 | 3.0 | 21.5 |


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## LTE Band 41 Measured Results (continued)

| BW (MHz) | Mode | RB Allocation | RB offset | Measured Pwr (dBm) | | | MPR | Tune-up Limit |
|---|---|---|---|---|---|---|---|---|
| | | | | 40290 | 40740 | 41190 | | |
| | | | | 2560 MHz | 2605 MHz | 2650 MHz | | |
| 10 MHz | QPSK | 1 | 0 | 23.9 | 23.3 | 23.1 | 0.0 | 24.5 |
| | | 1 | 25 | 23.7 | 23.3 | 23.0 | 0.0 | 24.5 |
| | | 1 | 49 | 23.7 | 23.3 | 22.9 | 0.0 | 24.5 |
| | | 25 | 0 | 22.2 | 21.9 | 21.8 | 1.0 | 23.5 |
| | | 25 | 12 | 22.2 | 21.9 | 21.7 | 1.0 | 23.5 |
| | | 25 | 25 | 22.1 | 21.8 | 21.6 | 1.0 | 23.5 |
| | | 50 | 0 | 22.1 | 21.9 | 21.6 | 1.0 | 23.5 |
| | 16QAM | 1 | 0 | 22.9 | 22.4 | 22.4 | 1.0 | 23.5 |
| | | 1 | 25 | 22.7 | 22.3 | 22.2 | 1.0 | 23.5 |
| | | 1 | 49 | 22.6 | 22.3 | 22.1 | 1.0 | 23.5 |
| | | 25 | 0 | 21.7 | 21.5 | 21.4 | 2.0 | 22.5 |
| | | 25 | 12 | 21.7 | 21.5 | 21.4 | 2.0 | 22.5 |
| | | 25 | 25 | 21.6 | 21.4 | 21.3 | 2.0 | 22.5 |
| | | 50 | 0 | 21.7 | 21.5 | 21.4 | 2.0 | 22.5 |
| | 64QAM | 1 | 0 | 22.1 | 21.4 | 20.9 | 2.0 | 22.5 |
| | | 1 | 25 | 21.8 | 21.3 | 20.8 | 2.0 | 22.5 |
| | | 1 | 49 | 21.7 | 21.4 | 20.7 | 2.0 | 22.5 |
| | | 25 | 0 | 20.7 | 20.4 | 20.4 | 3.0 | 21.5 |
| | | 25 | 12 | 20.7 | 20.4 | 20.4 | 3.0 | 21.5 |
| | | 25 | 25 | 20.6 | 20.3 | 20.3 | 3.0 | 21.5 |
| | | 50 | 0 | 20.6 | 20.4 | 20.3 | 3.0 | 21.5 |

| BW (MHz) | Mode | RB Allocation | RB offset | Maximum Average Power (dBm) | | | MPR | Tune-up Limit |
|---|---|---|---|---|---|---|---|---|
| | | | | Measured Pwr (dBm) | | | | |
| | | | | 40265 | 40740 | 41215 | | |
| | | | | 2557.5 MHz | 2605 MHz | 2652.5 MHz | | |
| 5 MHz | QPSK | 1 | 0 | 23.8 | 23.4 | 23.0 | 0.0 | 24.5 |
| | | 1 | 12 | 23.7 | 23.3 | 23.1 | 0.0 | 24.5 |
| | | 1 | 24 | 23.6 | 23.4 | 23.0 | 0.0 | 24.5 |
| | | 12 | 0 | 22.8 | 22.4 | 22.2 | 1.0 | 23.5 |
| | | 12 | 7 | 22.8 | 22.4 | 22.2 | 1.0 | 23.5 |
| | | 12 | 13 | 22.7 | 22.4 | 22.2 | 1.0 | 23.5 |
| | | 25 | 0 | 22.6 | 22.4 | 22.2 | 1.0 | 23.5 |
| | 16QAM | 1 | 0 | 22.7 | 22.4 | 22.3 | 1.0 | 23.5 |
| | | 1 | 12 | 22.6 | 22.3 | 22.4 | 1.0 | 23.5 |
| | | 1 | 24 | 22.5 | 22.3 | 22.3 | 1.0 | 23.5 |
| | | 12 | 0 | 21.8 | 21.4 | 21.4 | 2.0 | 22.5 |
| | | 12 | 7 | 21.8 | 21.3 | 21.4 | 2.0 | 22.5 |
| | | 12 | 13 | 21.7 | 21.4 | 21.4 | 2.0 | 22.5 |
| | | 25 | 0 | 21.6 | 21.5 | 21.4 | 2.0 | 22.5 |
| | 64QAM | 1 | 0 | 21.9 | 21.1 | 21.7 | 2.0 | 22.5 |
| | | 1 | 12 | 21.8 | 21.0 | 21.7 | 2.0 | 22.5 |
| | | 1 | 24 | 21.7 | 21.0 | 21.6 | 2.0 | 22.5 |
| | | 12 | 0 | 20.7 | 20.4 | 20.4 | 3.0 | 21.5 |
| | | 12 | 7 | 20.7 | 20.4 | 20.4 | 3.0 | 21.5 |
| | | 12 | 13 | 20.6 | 20.4 | 20.4 | 3.0 | 21.5 |
| | | 25 | 0 | 20.6 | 20.5 | 20.3 | 3.0 | 21.5 |


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### 9.4.1 LTE Rel.11 Carrier Aggregation

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

For inter-band carrier aggregation with uplink assigned to one E-UTRA band (Table 5.6A-1), the requirement in subclause 6.2.3 apply.

For inter-band carrier aggregation with one component carrier per operating band and the uplink active in two E-UTRA bands, the requirements in subclause 6.2.3 apply for each uplink component carrier.

For inter-band contiguous carrier aggregation the allowed Maximum Power Reduction (MPR) for the maximum output power applicable to the DUT in the table below. In case the modulation format is different on different component carriers the MPR is determined by the rules applied to higher order of those modulations.

| Modulation | CA bandwidth Class B and C / Smallest Component Carrier Transmission Bandwidth Configuration | | | | MPR (dB) |
|---|---|---|---|---|---|
| | 25 RB | 50 RB | 75 RB | 100 RB | |
| QPSK | > 8 and ≤ 25 | > 12 and ≤ 50 | > 16 and ≤ 75 | > 18 and ≤ 100 | ≤ 1 |
| QPSK | > 25 | > 50 | > 75 | > 100 | ≤ 2 |
| 16 QAM | ≤ 8 | ≤ 12 | ≤ 16 | ≤ 18 | ≤ 1 |
| 16 QAM | > 8 and ≤ 25 | > 12 and ≤ 50 | > 16 and ≤ 75 | > 18 and ≤ 100 | ≤ 2 |
| 16 QAM | > 25 | > 50 | > 75 | > 100 | ≤ 3 |
| 64 QAM | ≤ 8 and allocation wholly contained within a single CC | ≤ 12 and allocation wholly contained within a single CC | ≤ 16 and allocation wholly contained within a single CC | ≤ 18 and allocation wholly contained within a single CC | ≤ 2 |
| 64 QAM | > 8 or allocation extends across two CC's | > 12 or allocation extends across two CC's | > 16 or allocation extends across two CC's | > 18 or allocation extends across two CC's | ≤ 3 |

For PUCCH and SRS transmissions, the allowed MPR is according to that specified for PUSCH QPSK modulation for the corresponding transmission bandwidth.


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For intra-band contiguous carrier aggregation bandwidth class C with non-contiguous resource allocation, the allowed Maximum Power Reduction (MPR) for the maximum output power in Table 6.2.2A-1 is specified as follows

$$MPR = CEIL\ \{\min(M_A, M_{IM5}), 0.5\}$$

Where $M_A$ is defined as follows

| | | |
|---|---|---|
| $M_A =$ | 8.2 | ;$0 \le A < 0.025$ |
| | 9.2 – 40A | ;$0.025 \le A < 0.05$ |
| | 8 – 16A | ;$0.05 \le A < 0.25$ |
| | 4.83 – 3.33A | ;$0.25 \le A \le 0.4$ |
| | 3.83 – 0.83A | ;$0.4 \le A \le 1$ |

and $M_{IM5}$ is defined as follows

| | | |
|---|---|---|
| $M_{IM5} =$ | 4.5 | ; $\Delta_{IM5} < 1.5 * BW_{Channel_CA}$ |
| | 6.0 | ; $1.5 * BW_{Channel_CA} \le \Delta_{IM5} < BW_{Channel_CA}/2 + \Delta f_{ooB}$ |
| | $M_A$ | ; $\Delta_{IM5} \ge BW_{Channel_CA}/2 + \Delta f_{ooB}$ |

Where

$A = N_{RB_alloc} / N_{RB_agg}$

$\Delta_{IM5} = \max(\left| F_{C_agg} - (3*F_{agg_alloc_low} - 2*F_{agg_alloc_high}) \right|, \left| F_{C_agg} - (3*F_{agg_alloc_high} - 2*F_{agg_alloc_low}) \right|)$

CEIL{$M_A$, 0.5} means rounding upwards to closest 0.5dB, i.e. MPR ∈ [3.0, 3.5, 4.0, 4.5, 5.0, 5.5, 6.0, 6.5, 7.0, 7.5, 8.0, 8.5]

For intra-band carrier aggregation, the MPR is evaluated per slot and given by the maximum value taken over the transmission(s) on all component carriers within the slot; the maximum MPR over the two slots is then applied for the entire subframe.

For intra-band non-contiguous carrier aggregation with one uplink carrier on the PCC, the requirements in the subclause 6.2.3 apply. For intra-band non-contiguous aggregation with two uplink carriers the MPR is defined tfor those E-UTRA bands where maximum possible $W_{GAP} \le 42.2$ MHz as follows

$$MPR = CEIL\{M_A, 0.5\}$$

Where $M_N$ is defined as follows

| | | |
|---|---|---|
| $M_N =$ | -0.125N + 18.25 | ; $2 \le N \le 50$ |
| | -0.0333 N + 13.67 | ; $50 < N \le 200$ |

Where $N = N_{RB_alloc}$ is the number of allocated resource blocks.

For the UE maximum output power modified by MPR, the power limits specified in subclause 6.2.5A apply.


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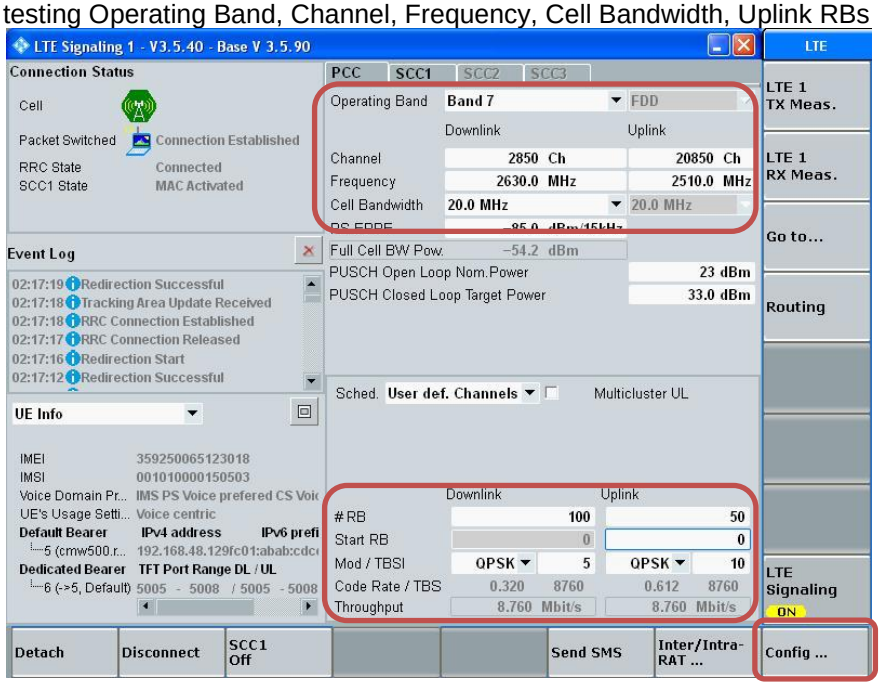
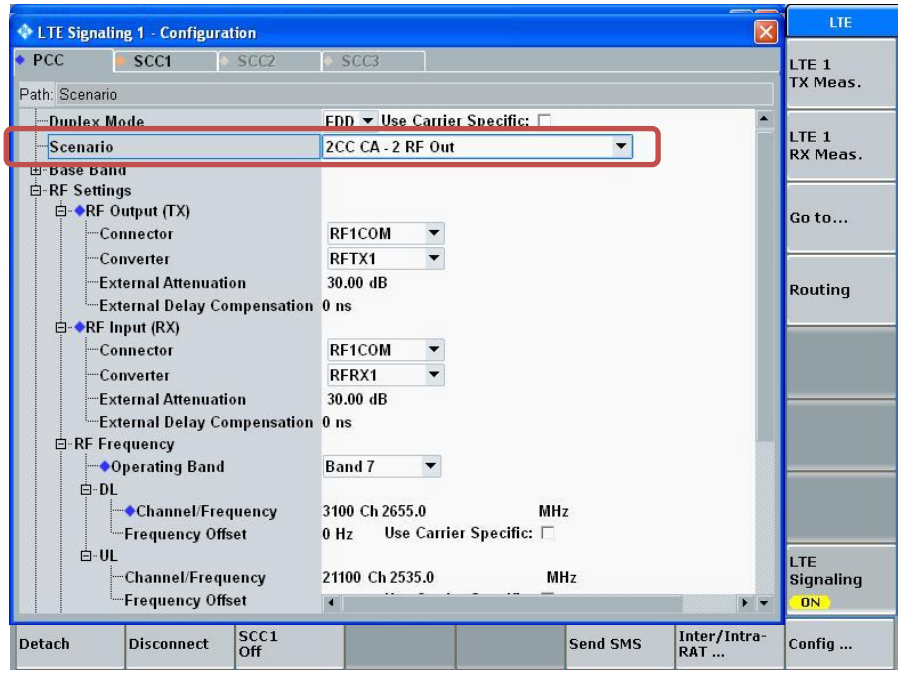
**LTE Carrier Aggregation Test Signal Set-up Procedure**

**(Use normal LTE set-up procedure in addition with the following steps)**

Set to CMW-500 with following parameters:

- PCC tab:
  - Select the testing Operating Band, Channel, Frequency, Cell Bandwidth, Uplink RBs
- 

- Go to “Config….”
- Go to “Scenario”
- Set to “2CC CA – 2 RF Out”





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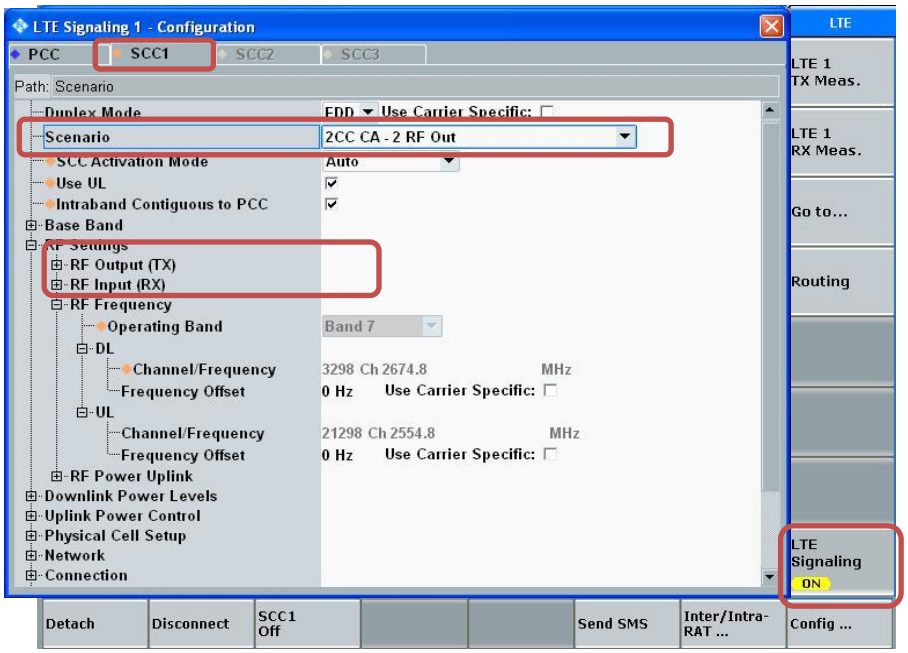
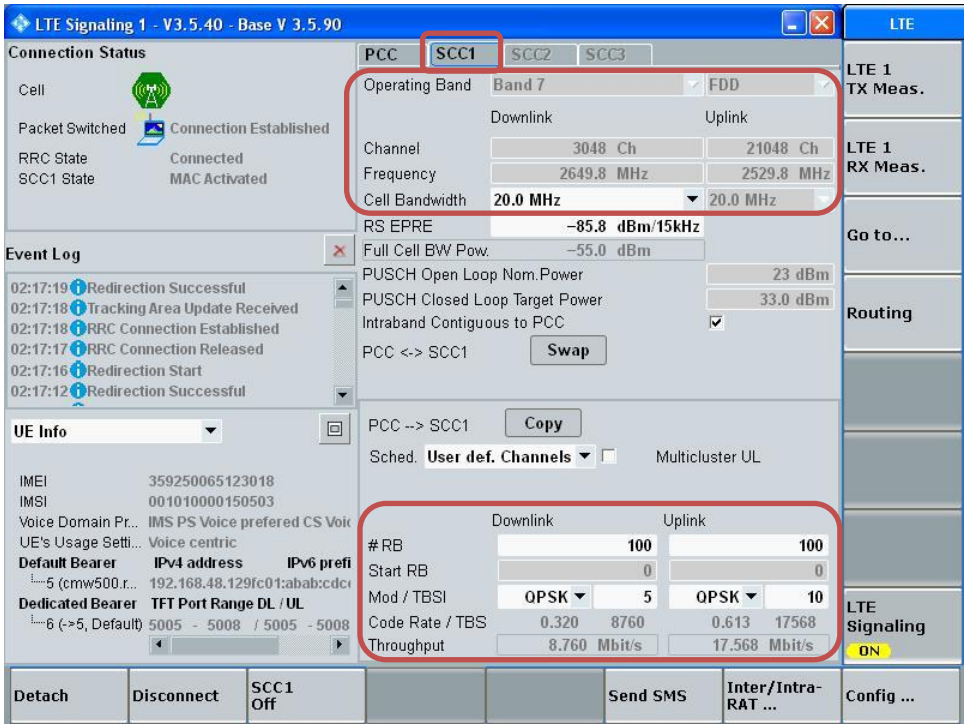
- Select “SCC1” tab
- Go to “Scenario”
- Set to “2CC CA – 2 RF Out”
- Enable “Use UL”
- Enable “Intraband Contiguous to PCC”
- Select “LTE Signaling” button




- Select “SCC1” tab
  - Select the testing Cell Bandwidth, Uplink RBs





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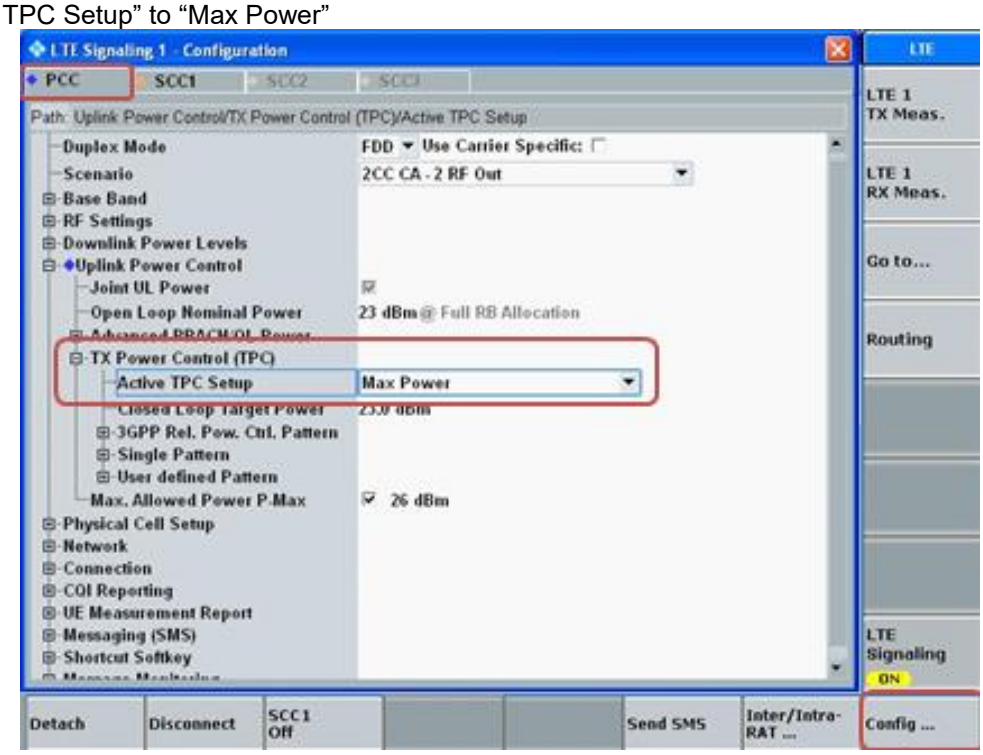
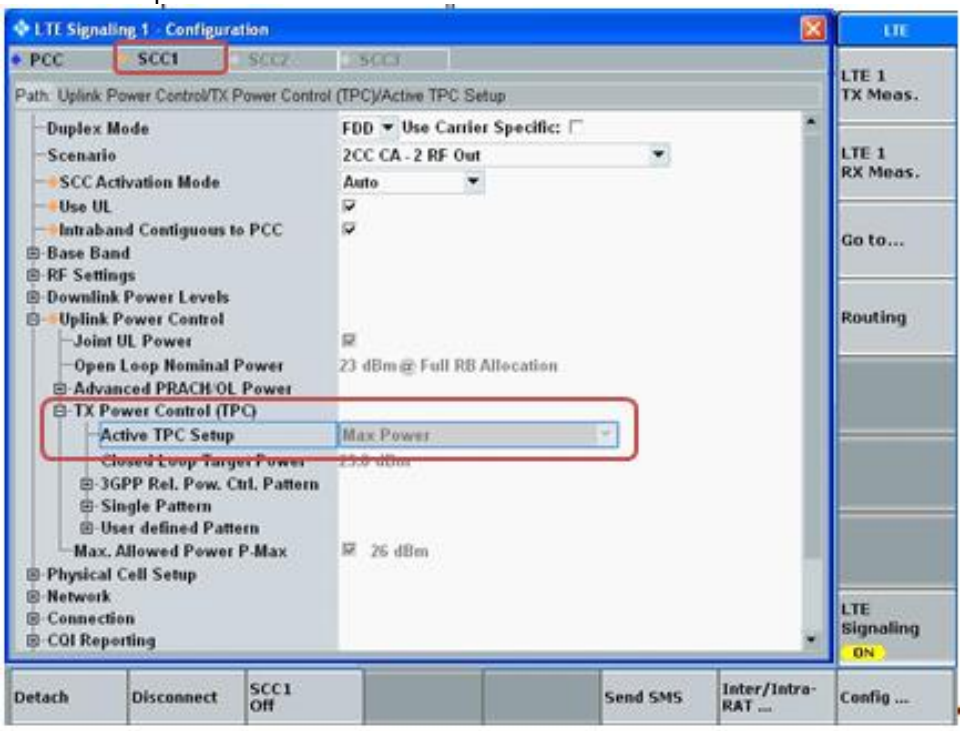
**Max Power Setting**

- Select “Config …” button
- Select PCC tab
- Set “Active TPC Setup” to “Max Power”




- Select SCC1 tab
- Verify that “Active TPC Setup” is set to “Max Power”





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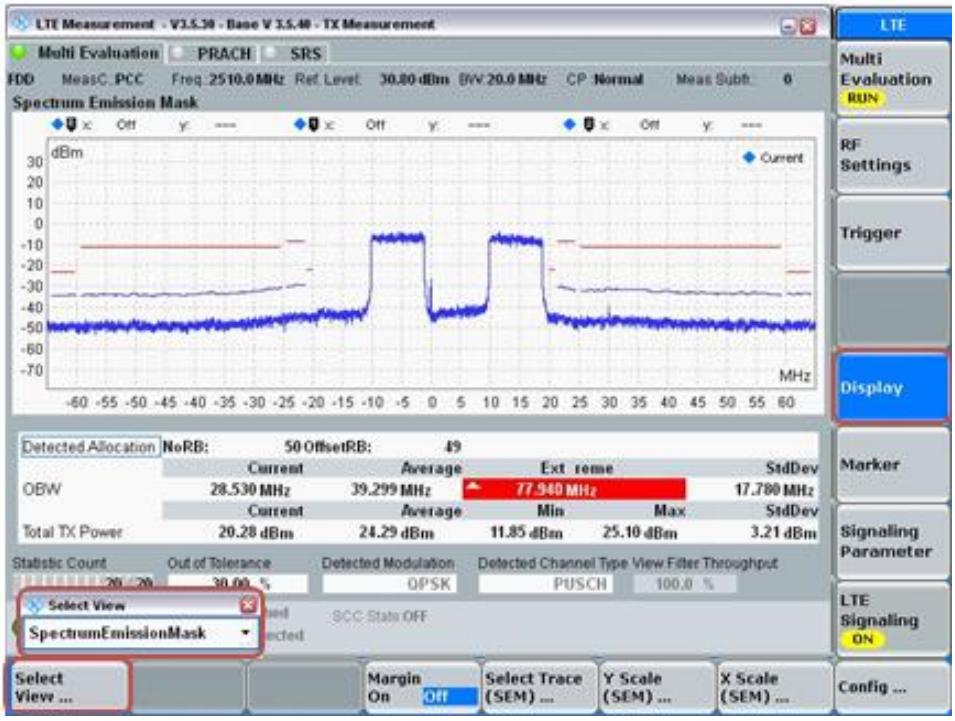
**View TX Power**

- Go to “Display”
- Select “Select View…”
- Select “Spectrum Emission Mask”





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## LTE Carrier Aggregation Up Link Combinations;

According to the TCB workshop (Nov. 2017), Maximum output power measurement is required for each UL CA configuration for the required test channels described in KDB 941225 D05. The required test channel should be associated with the UL PCC. And the SCC and subsequent CC must use configurations similar to the PCC to establish conservative or worst case equivalent SAR test conditions.

The detail of the UL CA configurations corresponding to the maximum output power conditions specified are mentioned in the power table for the CC combinations, including aggregated BW, RB allocation and offset per CC, modulation, MPR conditions with respect to RB allocation and offsets across the CCs

LTE-uplink 2CA Band 41 for SAR testing

| E-UTRA CA configurations | PWR Back-off | Bands | | DL | | | | | | UL | | | | | | | | | | | | | | | | | LTE Rel.8 Power (dBm) | Delta |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | PCC | SCC | PCC | | | SCC | | | PCC | | | | | | SCC | | | | | | MPR | PCC+SCC | | | | | |
| | | 1st | 2nd | BW | Freq | Ch | BW | Freq | Ch | Mod | RB | Offset | BW | Freq | Ch | Mod | RB | Offset | BW | Freq | Ch | | Aggregated BW | Tune-Up Limit | CA power (total PCC+SCC) | 3GPP Rel.# | | |
| CA_41C (0) | Off | 41C | 41C | 20 | 2565.0 | 40340 | 20 | 2584.8 | 40538 | QPSK | 1 | 99 | 20 | 2565.0 | 40340 | QPSK | 1 | 0 | 20 | 2584.8 | 40538 | 0 | 40 | 24.5 | 23.5 | 12 | 24.0 | -0.5 |
| | | 41C | 41C | 20 | 2605.0 | 40740 | 20 | 2585.2 | 40542 | QPSK | 1 | 0 | 20 | 2605.0 | 40740 | QPSK | 1 | 99 | 20 | 2585.2 | 40542 | 0 | 40 | 24.5 | 23.2 | 12 | 23.5 | -0.3 |
| | | 41C | 41C | 20 | 2645.0 | 41140 | 20 | 2625.2 | 40942 | QPSK | 1 | 0 | 20 | 2645.0 | 41140 | QPSK | 1 | 99 | 20 | 2625.2 | 40942 | 0 | 40 | 24.5 | 23.0 | 12 | 23.3 | -0.3 |

**Note(s):**

Both UL CA SAR is measured at yellow highlight configurations according to standalone SAR configurations.
Standalone SAR configurations and output power results are reference to section. 10.9.

## LTE Carrier Aggregation Down Link Combinations;

The DL CA power measurement conditions for various CC's combinations were determined according LTE DL CA SAR Test Exclusion guidance in TCB workshop note (April 2018). Only yellow highlighted cells need power measurement. The following power measurements were performed with a single carrier uplink; CA for this particular project only supports one (1) uplink and up to three (3) downlinks.

### LTE Release 10 Carrier Aggregation

| Index | 2CC | Restriction | Completely Covered by Measurement Supersrt | Reverse |
|---|---|---|---|---|
| 2CC #1 | 41A-41A | | | - |
| 2CC #2 | 41C | | | - |

| Index | 3CC | Restriction | Completely Covered by Measurement Supersrt | Reverse |
|---|---|---|---|---|
| 3CC #1 | 41D | | | - |

### DL CA Measured Results

| E-UTRA CA configutation (BCS) | | Bands | | | UL | | | | | DL | | | | | | | | | LTE Rel 8 Tx. Power [dBm] | LTE Rel 10 Tx. Power [dBm] | Delta |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | PCC | SCC1 | SCC2 | PCC | | | | | PCC | | | SCC1 | | | SCC2 | | | | | |
| | | 1st | 2nd | 3rd | Mode | BW (MHz) | Channel | Freq. (MHz) | RB/Offset | BW (MHz) | Channel | Freq. (MHz) | BW (MHz) | Channel | Freq. (MHz) | BW (MHz) | Channel | Freq. (MHz) | | | |
| Intra Non-contiguous | 41A-41A | 41A | 41A | | QPSK | 20 | 40340 | 2565 | 1/99 | 20 | 40340 | 2565 | 20 | 41140 | 2645.0 | | | | 24.0 | 23.8 | -0.2 |
| | | | | | | | | | | | | | | | | | | | | | |
| Intra Contiguous | 41C | 41C | 41C | | QPSK | 20 | 40340 | 2565 | 1/99 | 20 | 40340 | 2565 | 20 | 40538 | 2584.8 | | | | 24.0 | 23.8 | -0.2 |
| | 41D | 41D | 41D | 41D | QPSK | 20 | 40340 | 2565 | 1/99 | 20 | 40340 | 2565 | 20 | 40538 | 2584.8 | 20 | 40736 | 2604.6 | 24.0 | 23.8 | -0.2 |

**Note:**

1_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 dB.

2_When the same frequency band is used for both contiguous and non-contiguous in DL CA Intra band, power was measured using the configuration with the largest aggregated bandwidth and maximum output power among the contiguous and non-contiguous in DL CA Intra band configurations


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# 9.5 Wi-Fi 2.4 GHz (DTS Band)

## Measured Results

| Antenna | Band (GHz) | Mode | Data Rate | Ch # | Freq. (MHz) | Maximum Average Power (dBm) | | | Reduced Average Power (dBm) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Meas Pwr | Tune-up Limit | SAR Test (Yes/No) | Meas Pwr | Tune-up Limit | SAR Test (Yes/No) |
| WLAN Ant.1 | 2.4 | 802.11b | 1 Mbps | 1 | 2412.0 | 18.1 | 19.0 | Yes | 11.9 | 12.0 | Yes |
| | | | | 6 | 2437.0 | 17.7 | | | 11.5 | | |
| | | | | 11 | 2462.0 | 17.8 | | | 11.4 | | |
| | | | | 12 | 2467.0 | 7.0 | 8.0 | No | 7.0 | 8.0 | No |
| | | | | 13 | 2472.0 | 7.0 | | | 7.0 | | |
| | | 802.11g | 6 Mbps | 1 | 2412.0 | Not Required | 17.5 | No | Not Required | 12.0 | No |
| | | | | 6 | 2437.0 | | | | | | |
| | | | | 11 | 2462.0 | | | | | | |
| | | | | 12 | 2467.0 | | 8.0 | | | 8.0 | |
| | | | | 13 | 2472.0 | | | | | | |
| | | 802.11n (HT20) | 6.5 Mbps | 1 | 2412.0 | Not Required | 17.5 | No | Not Required | 12.0 | No |
| | | | | 6 | 2437.0 | | | | | | |
| | | | | 11 | 2462.0 | | | | | | |
| | | | | 12 | 2467.0 | | 7.0 | | | 7.0 | |
| | | | | 13 | 2472.0 | | | | | | |

| Antenna | Band (GHz) | Mode | Data Rate | Ch # | Freq. (MHz) | Maximum Average Power (dBm) | | | Reduced Average Power (dBm) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Meas Pwr | Tune-up Limit | SAR Test (Yes/No) | Meas Pwr | Tune-up Limit | SAR Test (Yes/No) |
| WLAN Ant.2 | 2.4 | 802.11b | 1 Mbps | 1 | 2412.0 | 18.9 | 19.0 | Yes | 11.8 | 12.0 | Yes |
| | | | | 6 | 2437.0 | 17.9 | | | 10.9 | | |
| | | | | 11 | 2462.0 | 17.9 | | | 10.9 | | |
| | | | | 12 | 2467.0 | 6.9 | 8.0 | No | 6.9 | 8.0 | No |
| | | | | 13 | 2472.0 | 6.9 | | | 6.9 | | |
| | | 802.11g | 6 Mbps | 1 | 2412.0 | Not Required | 17.5 | No | Not Required | 12.0 | No |
| | | | | 6 | 2437.0 | | | | | | |
| | | | | 11 | 2462.0 | | | | | | |
| | | | | 12 | 2467.0 | | 8.0 | | | 8.0 | |
| | | | | 13 | 2472.0 | | | | | | |
| | | 802.11n (HT20) | 6.5 Mbps | 1 | 2412.0 | Not Required | 17.5 | No | Not Required | 12.0 | No |
| | | | | 6 | 2437.0 | | | | | | |
| | | | | 11 | 2462.0 | | | | | | |
| | | | | 12 | 2467.0 | | 7.0 | | | 7.0 | |
| | | | | 13 | 2472.0 | | | | | | |

**Note(s):**

1. SAR is not required for 802.11g/n modes when the adjusted SAR for 802.11b is < 1.2 W/kg.
2. For "Not required", SAR Test reduction was applied from KDB 248227 guidance, Sec. 2.1, b), 1) when the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11a/g/n/ac mode is used for SAR measurement, on the highest measured output power channel in the initial test configuration, for each frequency band. Additional output power measurements were not deemed necessary.
3. Additionally, SAR is not required for Channels 12 and 13 because the tune-up limit and the measured output power for these two channels are no greater than those for the default test channels. Refer to §6.3.


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## 9.6 Wi-Fi 5GHz (U-NII Bands)

**Measured Results**

| Antenna | Band (GHz) | Mode | Data Rate | Ch # | Freq. (MHz) | Maximum Average Power (dBm) | | | Reduced Average Power (dBm) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Meas Pwr | Tune-up Limit | SAR Test (Yes/No) | Meas Pwr | Tune-up Limit | SAR Test (Yes/No) |
| WLAN Ant.1 | 5.3 (U-NII 2A) | 802.11a | 6 Mbps | 52 | 5260.0 | 16.2 | 16.5 | Yes | Not Required | 12.0 | No |
| | | | | 56 | 5280.0 | 16.1 | | | | | |
| | | | | 60 | 5300.0 | 15.9 | | | | | |
| | | | | 64 | 5320.0 | 15.9 | | | | | |
| | | 802.11n (HT20) | 6.5 Mbps | 52 | 5260.0 | 16.0 | 16.5 | No | Not Required | 12.0 | No |
| | | | | 56 | 5280.0 | 15.8 | | | | | |
| | | | | 60 | 5300.0 | 15.7 | | | | | |
| | | | | 64 | 5320.0 | 15.7 | | | | | |
| | | 802.11n (HT40) | 13.5 Mbps | 54 | 5270.0 | Not Required | 15.0 | No | Not Required | 12.0 | No |
| | | | | 62 | 5310.0 | | | | | | |
| | | 802.11ac (VHT20) | 6.5 Mbps | 52 | 5260.0 | 15.8 | 16.5 | No | Not Required | 12.0 | No |
| | | | | 56 | 5280.0 | 15.6 | | | | | |
| | | | | 60 | 5300.0 | 15.6 | | | | | |
| | | | | 64 | 5320.0 | 15.5 | | | | | |
| | | 802.11ac (VHT40) | 13.5 Mbps | 54 | 5270.0 | Not Required | 15.0 | No | Not Required | 12.0 | No |
| | | | | 62 | 5310.0 | | | | | | |
| | | 802.11ac (VHT80) | 29.3 Mbps | 58 | 5290.0 | Not Required | 14.0 | No | 11.7 | 12.0 | Yes |
| | 5.5 (U-NII 2C) | 802.11a | 6 Mbps | 100 | 5500.0 | Not Required | 14.5 | No | Not Required | 12.0 | No |
| | | | | 120 | 5600.0 | | | | | | |
| | | | | 124 | 5620.0 | | | | | | |
| | | | | 144 | 5720.0 | | | | | | |
| | | 802.11n (HT20) | 6.5 Mbps | 100 | 5500.0 | Not Required | 14.5 | No | Not Required | 12.0 | No |
| | | | | 120 | 5600.0 | | | | | | |
| | | | | 124 | 5620.0 | | | | | | |
| | | | | 144 | 5720.0 | | | | | | |
| | | 802.11n (HT40) | 13.5 Mbps | 102 | 5510.0 | 15.6 | 16.0 | Yes | Not Required | 12.0 | No |
| | | | | 118 | 5590.0 | 15.4 | | | | | |
| | | | | 126 | 5630.0 | 15.3 | | | | | |
| | | | | 142 | 5710.0 | 15.5 | | | | | |
| | | 802.11ac (VHT20) | 6.5 Mbps | 100 | 5500.0 | Not Required | 14.5 | No | Not Required | 12.0 | No |
| | | | | 120 | 5600.0 | | | | | | |
| | | | | 124 | 5620.0 | | | | | | |
| | | | | 144 | 5720.0 | | | | | | |
| | | 802.11ac (VHT40) | 13.5 Mbps | 102 | 5510.0 | 15.5 | 16.0 | No | Not Required | 12.0 | No |
| | | | | 118 | 5590.0 | 15.2 | | | | | |
| | | | | 126 | 5630.0 | 15.2 | | | | | |
| | | | | 142 | 5710.0 | 15.3 | | | | | |
| | | 802.11ac (VHT80) | 29.3 Mbps | 106 | 5530.0 | Not Required | 14.0 | No | 11.6 | 12.0 | Yes |
| | | | | 122 | 5610.0 | | | | 11.1 | | |
| | | | | 138 | 5690.0 | | | | 11.5 | | |
| | 5.8 (U-NII 3) | 802.11a | 6 Mbps | 149 | 5745.0 | Not Required | 16.0 | No | Not Required | 12.0 | No |
| | | | | 157 | 5785.0 | | | | | | |
| | | | | 165 | 5825.0 | | | | | | |
| | | 802.11n (HT20) | 6.5 Mbps | 149 | 5745.0 | Not Required | 16.0 | No | Not Required | 12.0 | No |
| | | | | 157 | 5785.0 | | | | | | |
| | | | | 165 | 5825.0 | | | | | | |
| | | 802.11n (HT40) | 13.5 Mbps | 151 | 5755.0 | 15.5 | 16.0 | Yes | Not Required | 12.0 | No |
| | | | | 159 | 5795.0 | 15.7 | | | | | |
| | | 802.11ac (VHT20) | 6.5 Mbps | 149 | 5745.0 | Not Required | 16.0 | No | Not Required | 12.0 | No |
| | | | | 157 | 5785.0 | | | | | | |
| | | | | 165 | 5825.0 | | | | | | |
| | | 802.11ac (VHT40) | 13.5 Mbps | 151 | 5755.0 | 15.3 | 16.0 | No | Not Required | 12.0 | No |
| | | | | 159 | 5795.0 | 15.6 | | | | | |
| | | 802.11ac (VHT80) | 29.3 Mbps | 155 | 5775.0 | Not Required | 14.0 | No | 11.9 | 12.0 | Yes |

**Note(s):**

1. For "Not required", SAR Test reduction was applied from KDB 248227 guidance, Sec. 2.1, b), 1) when the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11a/g/n/ac mode is used for SAR measurement, on the highest measured output power channel in the initial test configuration, for each frequency band.
2. When the same transmission mode configurations have the same maximum output power on the same channel for the 802.11 a/g/n/ac/ax modes, the channel in the lower order/sequence 802.11 mode (i.e. a, g, n ac) is selected.
3. When UNII band 2A's specified maximum output power is higher or same than UNII band 1, begin SAR measurement in UNII band 2A; and if the highest reported SAR for UNII band 2A is
   - ≤ 1.2 W/kg, SAR is not required for UNII band 1
   - > 1.2 W/kg, both bands should be tested independently for SAR.


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## Measured Results

| Antenna | Band (GHz) | Mode | Data Rate | Ch # | Freq. (MHz) | Maximum Average Power (dBm) | | | Reduced Average Power (dBm) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Meas Pwr | Tune-up Limit | SAR Test (Yes/No) | Meas Pwr | Tune-up Limit | SAR Test (Yes/No) |
| WLAN Ant.2 | 5.3 (U-NII 2A) | 802.11a | 6 Mbps | 52 | 5260.0 | 15.8 | 16.5 | Yes | Not Required | 12.0 | No |
| | | | | 56 | 5280.0 | 15.7 | | | | | |
| | | | | 60 | 5300.0 | 15.5 | | | | | |
| | | | | 64 | 5320.0 | 15.6 | | | | | |
| | | 802.11n (HT20) | 6.5 Mbps | 52 | 5260.0 | 15.5 | 16.5 | No | Not Required | 12.0 | No |
| | | | | 56 | 5280.0 | 15.5 | | | | | |
| | | | | 60 | 5300.0 | 15.3 | | | | | |
| | | | | 64 | 5320.0 | 15.3 | | | | | |
| | | 802.11n (HT40) | 13.5 Mbps | 54 | 5270.0 | Not Required | 15.0 | No | Not Required | 12.0 | No |
| | | | | 62 | 5310.0 | | | | | | |
| | | 802.11ac (VHT20) | 6.5 Mbps | 52 | 5260.0 | 15.3 | 16.5 | No | Not Required | 12.0 | No |
| | | | | 56 | 5280.0 | 15.3 | | | | | |
| | | | | 60 | 5300.0 | 15.1 | | | | | |
| | | | | 64 | 5320.0 | 15.2 | | | | | |
| | | 802.11ac (VHT40) | 13.5 Mbps | 54 | 5270.0 | Not Required | 15.0 | No | Not Required | 12.0 | No |
| | | | | 62 | 5310.0 | | | | | | |
| | | 802.11ac (VHT80) | 29.3 Mbps | 58 | 5290.0 | Not Required | 14.0 | No | 11.4 | 12.0 | Yes |
| | 5.5 (U-NII 2C) | 802.11a | 6 Mbps | 100 | 5500.0 | Not Required | 14.5 | No | Not Required | 12.0 | No |
| | | | | 120 | 5600.0 | | | | | | |
| | | | | 124 | 5620.0 | | | | | | |
| | | | | 144 | 5720.0 | | | | | | |
| | | 802.11n (HT20) | 6.5 Mbps | 100 | 5500.0 | Not Required | 14.5 | No | Not Required | 12.0 | No |
| | | | | 120 | 5600.0 | | | | | | |
| | | | | 124 | 5620.0 | | | | | | |
| | | | | 144 | 5720.0 | | | | | | |
| | | 802.11n (HT40) | 13.5 Mbps | 102 | 5510.0 | 15.5 | 16.0 | Yes | Not Required | 12.0 | No |
| | | | | 118 | 5590.0 | 15.5 | | | | | |
| | | | | 126 | 5630.0 | 15.2 | | | | | |
| | | | | 142 | 5710.0 | 15.3 | | | | | |
| | | 802.11ac (VHT20) | 6.5 Mbps | 100 | 5500.0 | Not Required | 14.5 | No | Not Required | 12.0 | No |
| | | | | 120 | 5600.0 | | | | | | |
| | | | | 124 | 5620.0 | | | | | | |
| | | | | 144 | 5720.0 | | | | | | |
| | | 802.11ac (VHT40) | 13.5 Mbps | 102 | 5510.0 | 15.4 | 16.0 | No | Not Required | 12.0 | No |
| | | | | 118 | 5590.0 | 15.3 | | | | | |
| | | | | 126 | 5630.0 | 15.0 | | | | | |
| | | | | 142 | 5710.0 | 15.1 | | | | | |
| | | 802.11ac (VHT80) | 29.3 Mbps | 106 | 5530.0 | Not Required | 14.0 | No | 12.0 | 12.0 | Yes |
| | | | | 122 | 5610.0 | | | | 11.7 | | |
| | | | | 138 | 5690.0 | | | | 11.3 | | |
| | 5.8 (U-NII 3) | 802.11a | 6 Mbps | 149 | 5745.0 | Not Required | 16.0 | No | Not Required | 12.0 | No |
| | | | | 157 | 5785.0 | | | | | | |
| | | | | 165 | 5825.0 | | | | | | |
| | | 802.11n (HT20) | 6.5 Mbps | 149 | 5745.0 | Not Required | 16.0 | No | Not Required | 12.0 | No |
| | | | | 157 | 5785.0 | | | | | | |
| | | | | 165 | 5825.0 | | | | | | |
| | | 802.11n (HT40) | 13.5 Mbps | 151 | 5755.0 | 15.1 | 16.0 | Yes | Not Required | 12.0 | No |
| | | | | 159 | 5795.0 | 14.8 | | | | | |
| | | 802.11ac (VHT20) | 6.5 Mbps | 149 | 5745.0 | Not Required | 16.0 | No | Not Required | 12.0 | No |
| | | | | 157 | 5785.0 | | | | | | |
| | | | | 165 | 5825.0 | | | | | | |
| | | 802.11ac (VHT40) | 13.5 Mbps | 151 | 5755.0 | 15.0 | 16.0 | No | Not Required | 12.0 | No |
| | | | | 159 | 5795.0 | 14.6 | | | | | |
| | | 802.11ac (VHT80) | 29.3 Mbps | 155 | 5775.0 | Not Required | 14.0 | No | 11.3 | 12.0 | Yes |

## Note(s):

1. For "Not required", SAR Test reduction was applied from KDB 248227 guidance, Sec. 2.1, b), 1) when the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11a/g/n/ac mode is used for SAR measurement, on the highest measured output power channel in the initial test configuration, for each frequency band.
2. When the same transmission mode configurations have the same maximum output power on the same channel for the 802.11 a/g/n/ac/ax modes, the channel in the lower order/sequence 802.11 mode (i.e. a, g, n ac) is selected.
3. When UNII band 2A's specified maximum output power is higher or same than UNII band 1, begin SAR measurement in UNII band 2A; and if the highest reported SAR for UNII band 2A is
   - ≤ 1.2 W/kg, SAR is not required for UNII band 1
   - > 1.2 W/kg, both bands should be tested independently for SAR.


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## 9.7 Bluetooth

**Measured Results**

| Band (GHz) | Mode | Ch # | Freq. (MHz) | Maximum Average Power (dBm) | |
|---|---|---|---|---|---|
| | | | | Meas Pwr | Tune-up Limit |
| 2.4 | GFSK | 0 | 2402 | 14.2 | 15.0 |
| | | 39 | 2441 | 13.5 | |
| | | 78 | 2480 | 14.0 | |
| | EDR, 8-DPSK | 0 | 2402 | 11.9 | |
| | | 39 | 2441 | 11.6 | |
| | | 78 | 2480 | 12.6 | |
| | LE, GFSK-1M | 0 | 2402 | 11.1 | 12.0 |
| | | 19 | 2440 | 10.8 | |
| | | 39 | 2480 | 11.7 | |
| | LE, GFSK-2M | 0 | 2402 | 11.0 | |
| | | 19 | 2440 | 10.6 | |
| | | 39 | 2480 | 11.5 | |

**Note(s):**

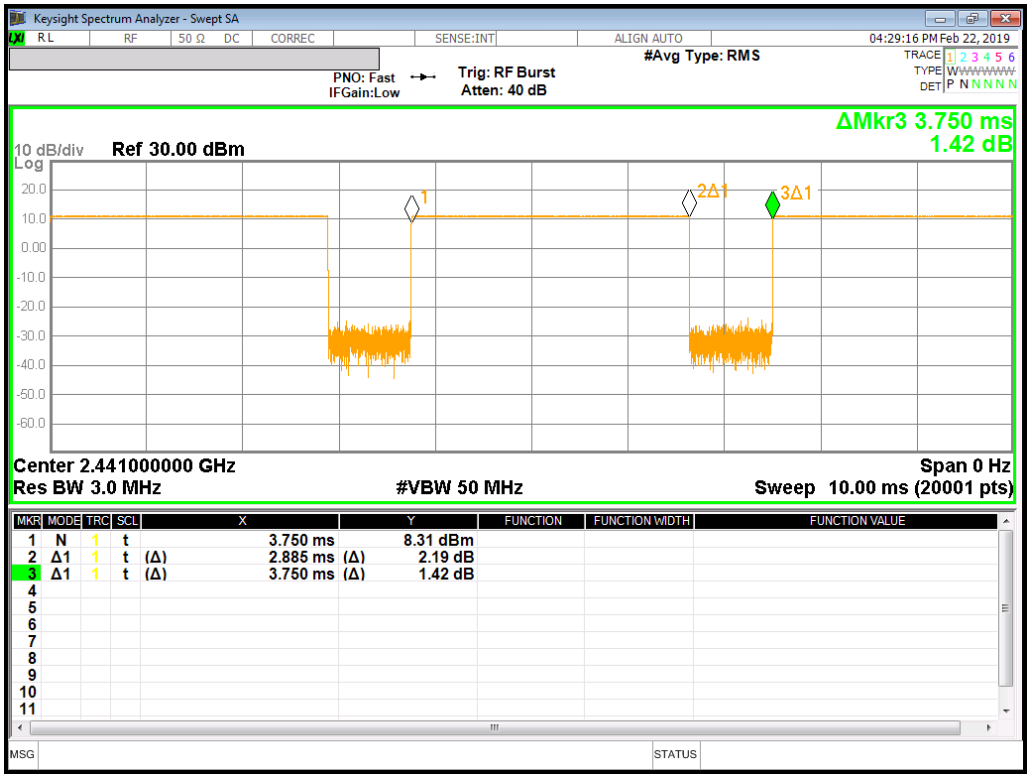
SAR test is evaluated at GFSK mode in Bluetooth

**Duty Factor Measured Results**

| Mode | Type | T on (ms) | Period (ms) | Duty Cycle | Crest Factor (1/duty cycle) |
|---|---|---|---|---|---|
| GFSK | DH5 | 2.885 | 3.750 | 76.9% | 1.30 |

## Duty Cycle plots

GFSK





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# 10. Measured and Reported (Scaled) SAR Results

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

Reported SAR(W/kg) for WWAN= Measured SAR *Tune-up Scaling Factor

Reported SAR(W/kg) for Wi-Fi and Bluetooth= Measured SAR * Tune-up scaling factor * Duty Cycle scaling factor

**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 does not apply, 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. 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 .

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 D01 SAR test for 3G devices:**

When the maximum output power and tune-up tolerance specified for production units in a secondary mode is ≤ ¼ dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode.

**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.



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**KDB 248227 D01 SAR meas for 802.11:**

SAR test reduction for 802.11 Wi-Fi transmission mode configurations are considered separately for DSSS and OFDM. An initial test position is determined to reduce the number of tests required for certain exposure configurations with multiple test positions. An initial test configuration is determined for each frequency band and aggregated band according to maximum output power, channel bandwidth, wireless mode configurations and other operating parameters to streamline the measurement requirements. For 2.4 GHz DSSS, either the initial test position or DSSS procedure is applied to reduce the number of SAR tests; these are mutually exclusive. For OFDM, an initial test position is only applicable to next to the ear, UMPC mini-tablet and hotspot mode configurations, which is tested using the initial test configuration to facilitate test reduction. For other exposure conditions with a fixed test position, SAR test reduction is determined using only the initial test configuration.

The multiple test positions require SAR measurements in head, hotspot mode or UMPC mini-tablet configurations may be reduced according to the highest reported SAR determined using the *initial test position(s)* by applying the DSSS or OFDM SAR measurement procedures in the required wireless mode test configuration(s). The *initial test position(s)* is measured using the highest measured maximum output power channel in the required wireless mode test configuration(s). When the *reported* SAR for 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 wireless mode combination within the frequency band or aggregated band. DSSS and OFDM configurations are considered separately according to the required SAR procedures.
- > 0.4 W/kg, SAR is repeated using the same wireless mode test 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 *reported* SAR is ≤ 0.8 W/kg or all required test positions are tested.
  - For subsequent test positions with equivalent test separation distance or when exposure is dominated by coupling conditions, the position for maximum coupling condition should be tested.
  - When it is unclear, all equivalent conditions must be tested.
- For all positions/configurations tested using the *initial test position* and subsequent test positions, when the *reported* SAR is > 0.8 W/kg, measure the SAR for these positions/configurations on the subsequent next highest measured output power channel(s) until the *reported* SAR is ≤ 1.2 W/kg or all required test channels are considered.
  - The additional power measurements required for this step should be limited to those necessary for identifying subsequent highest output power channels to apply the test reduction.
- When the specified maximum output power is the same for both UNII 1 and UNII 2A, begin SAR measurements in UNII 2A with the channel with the highest measured output power. If the reported SAR for UNII 2A is ≤ 1.2 W/kg, SAR is not required for UNII 1; otherwise treat the remaining bands separately and test them independently for SAR.
- When the specified maximum output power is different between UNII 1 and UNII 2A, begin SAR with the band that has the higher specified maximum output. If the highest reported SAR for the band with the highest specified power is ≤ 1.2 W/kg, testing for the band with the lower specified output power is not required; otherwise test the remaining bands independently for SAR.

To determine the *initial test position*, Area Scans were performed to determine the position with the *Maximum Value of SAR (measured)*. The position that produced the highest *Maximum Value of SAR* is considered the worst case position; thus used as the *initial test position*.


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## 10.1 CDMA BC0

| Antenna | RF Exposure Conditions | Mode | PWR Back-off | Dist. (mm) | Test Position | Ch #. | Freq. (MHz) | Power (dBm) | | 1-g SAR (W/kg) | | Note | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Tune-up limit | Meas. | Meas. | Scaled | | |
| Main 1 | Head | 1xRTT (RC3 SO55) | N/A | 0 | Left Touch | 384 | 836.5 | 24.8 | 24.0 | 0.103 | 0.124 | 1 | |
| | | | | | Left Tilt | 384 | 836.5 | 24.8 | 24.0 | 0.104 | 0.126 | | |
| | | | | | Right Touch | 384 | 836.5 | 24.8 | 24.0 | 0.130 | 0.157 | | 1 |
| | | | | | Right Tilt | 384 | 836.5 | 24.8 | 24.0 | 0.094 | 0.113 | | |
| | Body-worn | 1xRTT (RC3 SO32) | N/A | 15 | Rear | 384 | 836.5 | 24.8 | 24.0 | 0.171 | 0.207 | | 2 |
| | | | | | Front | 384 | 836.5 | 24.8 | 24.0 | 0.136 | 0.164 | | |
| | Hotspot | 1xEVDO (Rev. 0) | N/A | 10 | Rear | 384 | 836.5 | 24.8 | 23.7 | 0.356 | 0.458 | | 3 |
| | | | | | Front | 384 | 836.5 | 24.8 | 23.7 | 0.293 | 0.377 | | |
| | | | | | Edge 2 | 384 | 836.5 | 24.8 | 23.7 | 0.196 | 0.252 | | |
| | | | | | Edge 3 | 384 | 836.5 | 24.8 | 23.7 | 0.216 | 0.278 | | |
| | | | | | Edge 4 | 384 | 836.5 | 24.8 | 23.7 | 0.033 | 0.043 | | |
| Main.1 | Hotspot | 1xEVDO (Rev. 0) | N/A | 10 | Rear | 384 | 836.5 | 24.8 | 23.7 | 0.337 | 0.433 | 2 | |

## 10.2 GSM 850

| Antenna | RF Exposure Conditions | Mode | PWR Back-off | Dist. (mm) | Test Position | Ch #. | Freq. (MHz) | Power (dBm) | | 1-g SAR (W/kg) | | Note | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Tune-up limit | Meas. | Meas. | Scaled | | |
| Main 1 | Head | GPRS 2 Slot | N/A | 0 | Left Touch | 190 | 836.6 | 31.0 | 29.6 | 0.110 | 0.153 | 1 | |
| | | | | | Left Tilt | 190 | 836.6 | 31.0 | 29.6 | 0.101 | 0.140 | | |
| | | | | | Right Touch | 190 | 836.6 | 31.0 | 29.6 | 0.125 | 0.174 | | 4 |
| | | | | | Right Tilt | 190 | 836.6 | 31.0 | 29.6 | 0.093 | 0.129 | | |
| | Body-worn | GPRS 2 Slot | N/A | 15 | Rear | 190 | 836.6 | 31.0 | 29.6 | 0.190 | 0.264 | | 5 |
| | | | | | Front | 190 | 836.6 | 31.0 | 29.6 | 0.153 | 0.213 | | |
| | Hotspot | GPRS 2 Slot | N/A | 10 | Rear | 190 | 836.6 | 31.0 | 29.6 | 0.363 | 0.505 | | 6 |
| | | | | | Front | 190 | 836.6 | 31.0 | 29.6 | 0.264 | 0.367 | | |
| | | | | | Edge 2 | 190 | 836.6 | 31.0 | 29.6 | 0.074 | 0.103 | | |
| | | | | | Edge 3 | 190 | 836.6 | 31.0 | 29.6 | 0.196 | 0.272 | | |
| | | | | | Edge 4 | 190 | 836.6 | 31.0 | 29.6 | 0.037 | 0.051 | | |
| Main.1 | Hotspot | GPRS 2 Slot | N/A | 10 | Rear | 190 | 836.6 | 31.0 | 29.6 | 0.339 | 0.471 | 2 | |

**Note(s) for Sec.10:**

1. DUT was tested for Configuration.1. Please refer to Test Configuration in Sec.7.
2. DUT was tested for Configuration.2. Please refer to Test Configuration in Sec.7.


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## 10.3 GSM1900

| Antenna | RF Exposure Conditions | Mode | PWR Back-off | Dist. (mm) | Test Position | Ch #. | Freq. (MHz) | Power (dBm) | | 1-g SAR (W/kg) | | Note | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Tune-up limit | Meas. | Meas. | Scaled | | |
| Main 1 | Head | GPRS 4 Slot | N/A | 0 | Left Touch | 661 | 1880.0 | 24.8 | 23.5 | 0.047 | 0.064 | 1 | |
| | | | | | Left Tilt | 661 | 1880.0 | 24.8 | 23.5 | 0.024 | 0.032 | | |
| | | | | | Right Touch | 661 | 1880.0 | 24.8 | 23.5 | 0.071 | 0.096 | | 7 |
| | | | | | Right Tilt | 661 | 1880.0 | 24.8 | 23.5 | 0.029 | 0.039 | | |
| | Body-worn | GPRS 4 Slot | N/A | 15 | Rear | 661 | 1880.0 | 24.8 | 23.5 | 0.202 | 0.274 | | 8 |
| | | | | | Front | 661 | 1880.0 | 24.8 | 23.5 | 0.187 | 0.254 | | |
| | Hotspot | GPRS 4 Slot | N/A | 10 | Rear | 661 | 1880.0 | 24.8 | 23.5 | 0.435 | 0.590 | | |
| | | | | | Front | 661 | 1880.0 | 24.8 | 23.5 | 0.410 | 0.556 | | |
| | | | | | Edge 2 | 661 | 1880.0 | 24.8 | 23.5 | 0.091 | 0.123 | | |
| | | | | | Edge 3 | 512 | 1850.2 | 24.8 | 23.5 | 1.010 | 1.362 | | 9 |
| | | | | | | 661 | 1880.0 | 24.8 | 23.5 | 0.859 | 1.166 | | |
| | | | | | | 810 | 1909.8 | 24.8 | 23.7 | 0.710 | 0.908 | | |
| | | | | | Edge 4 | 661 | 1880.0 | 24.8 | 23.5 | 0.033 | 0.044 | | |
| Main.1 | Hotspot | GPRS 4 Slot | N/A | 10 | Edge 3 | 512 | 1850.2 | 24.8 | 23.5 | 0.985 | 1.329 | 2 | |

| Antenna | RF Exposure Conditions | Mode | PWR Back-off | Dist. (mm) | Test Position | Ch #. | Freq. (MHz) | Power (dBm) | | 10-g SAR (W/kg) | | Note | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Tune-up limit | Meas. | Meas. | Scaled | | |
| Main 1 | Product Specific-10g | GPRS 4 Slot | N/A | 0 | Edge 3 | 512 | 1850.2 | 24.8 | 23.5 | 1.380 | 1.862 | 1 | 10 |
| Main 1 | Product Specific-10g | GPRS 4 Slot | N/A | 0 | Edge 3 | 512 | 1850.2 | 24.8 | 23.5 | 1.330 | 1.794 | 2 | |

## 10.4 W-CDMA Band II

| Antenna | RF Exposure Conditions | Mode | PWR Back-off | Dist. (mm) | Test Position | Ch #. | Freq. (MHz) | Power (dBm) | | 1-g SAR (W/kg) | | Note | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Tune-up limit | Meas. | Meas. | Scaled | | |
| Main.1 | Head | Rel.99 RMC | Off | 0 | Left Touch | 9400 | 1880.0 | 24.0 | 23.3 | 0.060 | 0.070 | 1 | |
| | | | | | Left Tilt | 9400 | 1880.0 | 24.0 | 23.3 | 0.010 | 0.012 | | |
| | | | | | Right Touch | 9400 | 1880.0 | 24.0 | 23.3 | 0.074 | 0.087 | | 11 |
| | | | | | Right Tilt | 9400 | 1880.0 | 24.0 | 23.3 | 0.032 | 0.038 | | |
| | Body-worn | Rel.99 RMC | Off | 15 | Rear | 9400 | 1880.0 | 24.0 | 23.3 | 0.320 | 0.376 | | |
| | | | | | Front | 9400 | 1880.0 | 24.0 | 23.3 | 0.325 | 0.382 | | 12 |
| | Hotspot | Rel.99 RMC | On | 10 | Rear | 9400 | 1880.0 | 19.0 | 18.9 | 0.276 | 0.283 | | |
| | | | | | Front | 9400 | 1880.0 | 19.0 | 18.9 | 0.273 | 0.280 | | |
| | | | | | Edge 2 | 9400 | 1880.0 | 19.0 | 18.9 | 0.054 | 0.056 | | |
| | | | | | Edge 3 | 9400 | 1880.0 | 19.0 | 18.9 | 0.551 | 0.566 | | 13 |
| | | | | | Edge 4 | 9400 | 1880.0 | 19.0 | 18.9 | 0.017 | 0.017 | | |
| Main.1 | Hotspot | Rel.99 RMC | On | 10 | Edge 3 | 9400 | 1880.0 | 19.0 | 18.9 | 0.509 | 0.522 | 2 | |

| Antenna | RF Exposure Conditions | Mode | PWR Back-off | Dist. (mm) | Test Position | Ch #. | Freq. (MHz) | Power (dBm) | | 10-g SAR (W/kg) | | Note | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Tune-up limit | Meas. | Meas. | Scaled | | |
| Main.1 | Product Specific-10g | Rel.99 RMC | Off | 9 | Edge 3 | 9400 | 1880.0 | 24.0 | 23.3 | 1.220 | 1.434 | 1 | 14 |
| | | | On | 0 | | 9400 | 1880.0 | 19.0 | 18.9 | 0.877 | 0.894 | | |
| Main.1 | Product Specific-10g | Rel.99 RMC | Off | 9 | Edge 3 | 9400 | 1880.0 | 24.0 | 23.3 | 1.020 | 1.199 | 2 | |

**Note(s) for Sec.10:**

1. DUT was tested for Configuration.1. Please refer to Test Configuration in Sec.7.
2. DUT was tested for Configuration.2. Please refer to Test Configuration in Sec.7.

## 10.5 W-CDMA Band V


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| Antenna | RF Exposure Conditions | Mode | PWR Back-off | Dist. (mm) | Test Position | Ch #. | Freq. (MHz) | Power (dBm) | | 1-g SAR (W/kg) | | Note | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Tune-up limit | Meas. | Meas. | Scaled | | |
| Main 1 | Head | Rel.99 RMC | N/A | 0 | Left Touch | 4183 | 836.6 | 25.0 | 23.3 | 0.143 | 0.211 | 1 | |
| | | | | | Left Tilt | 4183 | 836.6 | 25.0 | 23.3 | 0.123 | 0.182 | | |
| | | | | | Right Touch | 4183 | 836.6 | 25.0 | 23.3 | 0.167 | 0.247 | | 15 |
| | | | | | Right Tilt | 4183 | 836.6 | 25.0 | 23.3 | 0.113 | 0.167 | | |
| | Body-worn | Rel.99 RMC | N/A | 15 | Rear | 4183 | 836.6 | 25.0 | 23.3 | 0.262 | 0.387 | | 16 |
| | | | | | Front | 4183 | 836.6 | 25.0 | 23.3 | 0.208 | 0.307 | | |
| | Hotspot | Rel.99 RMC | N/A | 10 | Rear | 4183 | 836.6 | 25.0 | 23.3 | 0.521 | 0.770 | | 17 |
| | | | | | Front | 4183 | 836.6 | 25.0 | 23.3 | 0.402 | 0.594 | | |
| | | | | | Edge 2 | 4183 | 836.6 | 25.0 | 23.3 | 0.089 | 0.132 | | |
| | | | | | Edge 3 | 4183 | 836.6 | 25.0 | 23.3 | 0.283 | 0.418 | | |
| | | | | | Edge 4 | 4183 | 836.6 | 25.0 | 23.3 | 0.045 | 0.066 | | |
| Main.1 | Hotspot | Rel.99 RMC | N/A | 10 | Rear | 4183 | 836.6 | 25.0 | 23.3 | 0.515 | 0.761 | 2 | |

## 10.6 LTE Band 4 (20MHz Bandwidth)

| Antenna | RF Exposure Conditions | Mode | PWR Back-off | Dist. (mm) | Test Position | Ch #. | Freq. (MHz) | RB Allocation | RB offest | Power (dBm) | | 1-g SAR (W/kg) | | Note | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Tune-up limit | Meas. | Meas. | Scaled | | |
| Main 1 | Head | QPSK | Off | 0 | Left Touch | 20175 | 1732.5 | 1 | 0 | 25.0 | 24.0 | 0.252 | 0.315 | 1 | 18 |
| | | | | | | | | 50 | 0 | 24.0 | 23.0 | 0.198 | 0.248 | | |
| | | | | | Left Tilt | 20175 | 1732.5 | 1 | 0 | 25.0 | 24.0 | 0.084 | 0.105 | | |
| | | | | | | | | 50 | 0 | 24.0 | 23.0 | 0.066 | 0.083 | | |
| | | | | | Right Touch | 20175 | 1732.5 | 1 | 0 | 25.0 | 24.0 | 0.197 | 0.247 | | |
| | | | | | | | | 50 | 0 | 24.0 | 23.0 | 0.154 | 0.193 | | |
| | | | | | Right Tilt | 20175 | 1732.5 | 1 | 0 | 25.0 | 24.0 | 0.078 | 0.098 | | |
| | | | | | | | | 50 | 0 | 24.0 | 23.0 | 0.063 | 0.079 | | |
| | Body-worn | QPSK | Off | 15 | Rear | 20175 | 1732.5 | 1 | 0 | 25.0 | 24.0 | 0.478 | 0.598 | | |
| | | | | | | | | 50 | 0 | 24.0 | 23.0 | 0.391 | 0.489 | | |
| | | | | | Front | 20175 | 1732.5 | 1 | 0 | 25.0 | 24.0 | 0.498 | 0.623 | | 19 |
| | | | | | | | | 50 | 0 | 24.0 | 23.0 | 0.408 | 0.510 | | |
| | Hotspot | QPSK | On | 10 | Rear | 20175 | 1732.5 | 1 | 99 | 20.0 | 18.7 | 0.262 | 0.355 | | |
| | | | | | | | | 50 | 50 | 20.0 | 18.8 | 0.262 | 0.346 | | |
| | | | | | Front | 20175 | 1732.5 | 1 | 99 | 20.0 | 18.7 | 0.289 | 0.391 | | |
| | | | | | | | | 50 | 50 | 20.0 | 18.8 | 0.294 | 0.388 | | |
| | | | | | Edge 2 | 20175 | 1732.5 | 1 | 99 | 20.0 | 18.7 | 0.042 | 0.056 | | |
| | | | | | | | | 50 | 50 | 20.0 | 18.8 | 0.039 | 0.052 | | |
| | | | | | Edge 3 | 20175 | 1732.5 | 1 | 99 | 20.0 | 18.7 | 0.465 | 0.630 | | 20 |
| | | | | | | | | 50 | 50 | 20.0 | 18.8 | 0.464 | 0.612 | | |
| | | | | | Edge 4 | 20175 | 1732.5 | 1 | 99 | 20.0 | 18.7 | 0.044 | 0.060 | | |
| | | | | | | | | 50 | 50 | 20.0 | 18.8 | 0.046 | 0.060 | | |
| Main.1 | Hotspot | QPSK | On | 10 | Edge 3 | 20175 | 1732.5 | 1 | 99 | 20.0 | 18.7 | 0.459 | 0.622 | 2 | |

| Antenna | RF Exposure Conditions | Mode | PWR Back-off | Dist. (mm) | Test Position | Ch #. | Freq. (MHz) | RB Allocation | RB offest | Power (dBm) | | 10-g SAR (W/kg) | | Note | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Tune-up limit | Meas. | Meas. | Scaled | | |
| Main.1 | Product Specific-10g | QPSK | Off | 8 | Front | 20175 | 1732.5 | 1 | 0 | 25.0 | 24.0 | 0.787 | 0.985 | 1 | |
| | | | On | 0 | | | | 1 | 99 | 20.0 | 18.7 | 0.895 | 1.209 | | |
| Main.1 | Product Specific-10g | QPSK | Off | 9 | Edge 3 | 20175 | 1732.5 | 1 | 0 | 25.0 | 24.0 | 1.080 | 1.352 | | |
| | | | On | 0 | | | | 1 | 99 | 20.0 | 18.7 | 1.340 | 1.809 | | 21 |
| Main.1 | Product Specific-10g | QPSK | On | 0 | Edge 3 | 20175 | 1732.5 | 1 | 99 | 20.0 | 18.7 | 1.170 | 1.580 | 2 | |

**Note(s) for Sec.10:**

1. DUT was tested for Configuration.1. Please refer to Test Configuration in Sec.7.
2. DUT was tested for Configuration.2. Please refer to Test Configuration in Sec.7.


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## 10.7 LTE Band 5 (10MHz Bandwidth)

| Antenna | RF Exposure Conditions | Mode | PWR Back-off | Dist. (mm) | Test Position | Ch #. | Freq. (MHz) | RB Allocation | RB offest | Power (dBm) | | 1-g SAR (W/kg) | | Note | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Tune-up limit | Meas. | Meas. | Scaled | | |
| Main 1 | Head | QPSK | N/A | 0 | Left Touch | 20525 | 836.5 | 1 | 0 | 25.5 | 24.0 | 0.118 | 0.168 | 1 | |
| | | | | | | | | 25 | 0 | 24.5 | 23.0 | 0.096 | 0.136 | | |
| | | | | | Left Tilt | 20525 | 836.5 | 1 | 0 | 25.5 | 24.0 | 0.089 | 0.127 | | |
| | | | | | | | | 25 | 0 | 24.5 | 23.0 | 0.071 | 0.101 | | |
| | | | | | Right Touch | 20525 | 836.5 | 1 | 0 | 25.5 | 24.0 | 0.134 | 0.191 | | 22 |
| | | | | | | | | 25 | 0 | 24.5 | 23.0 | 0.113 | 0.161 | | |
| | | | | | Right Tilt | 20525 | 836.5 | 1 | 0 | 25.5 | 24.0 | 0.089 | 0.126 | | |
| | | | | | | | | 25 | 0 | 24.5 | 23.0 | 0.072 | 0.103 | | |
| | Body-worn | QPSK | N/A | 15 | Rear | 20525 | 836.5 | 1 | 0 | 25.5 | 24.0 | 0.196 | 0.279 | | 23 |
| | | | | | | | | 25 | 0 | 24.5 | 23.0 | 0.163 | 0.233 | | |
| | | | | | Front | 20525 | 836.5 | 1 | 0 | 25.5 | 24.0 | 0.170 | 0.242 | | |
| | | | | | | | | 25 | 0 | 24.5 | 23.0 | 0.140 | 0.200 | | |
| | Hotspot | QPSK | N/A | 10 | Rear | 20525 | 836.5 | 1 | 0 | 25.5 | 24.0 | 0.383 | 0.546 | | 24 |
| | | | | | | | | 25 | 0 | 24.5 | 23.0 | 0.317 | 0.453 | | |
| | | | | | Front | 20525 | 836.5 | 1 | 0 | 25.5 | 24.0 | 0.316 | 0.450 | | |
| | | | | | | | | 25 | 0 | 24.5 | 23.0 | 0.259 | 0.370 | | |
| | | | | | Edge 2 | 20525 | 836.5 | 1 | 0 | 25.5 | 24.0 | 0.203 | 0.289 | | |
| | | | | | | | | 25 | 0 | 24.5 | 23.0 | 0.175 | 0.250 | | |
| | | | | | Edge 3 | 20525 | 836.5 | 1 | 0 | 25.5 | 24.0 | 0.238 | 0.339 | | |
| | | | | | | | | 25 | 0 | 24.5 | 23.0 | 0.193 | 0.276 | | |
| | | | | | Edge 4 | 20525 | 836.5 | 1 | 0 | 25.5 | 24.0 | 0.047 | 0.067 | | |
| | | | | | | | | 25 | 0 | 24.5 | 23.0 | 0.032 | 0.046 | | |
| Main.1 | Hotspot | QPSK | N/A | 10 | Rear | 20525 | 836.5 | 1 | 0 | 25.5 | 24.0 | 0.380 | 0.542 | 2 | |

## 10.8 LTE Band 12 (10MHz Bandwidth)

| Antenna | RF Exposure Conditions | Mode | PWR Back-off | Dist. (mm) | Test Position | Ch #. | Freq. (MHz) | RB Allocation | RB offest | Power (dBm) | | 1-g SAR (W/kg) | | Note | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Tune-up limit | Meas. | Meas. | Scaled | | |
| Main 1 | Head | QPSK | N/A | 0 | Left Touch | 23095 | 707.5 | 1 | 0 | 25.0 | 23.7 | 0.112 | 0.151 | 1 | |
| | | | | | | | | 25 | 0 | 24.0 | 22.6 | 0.089 | 0.123 | | |
| | | | | | Left Tilt | 23095 | 707.5 | 1 | 0 | 25.0 | 23.7 | 0.120 | 0.161 | | |
| | | | | | | | | 25 | 0 | 24.0 | 22.6 | 0.094 | 0.129 | | |
| | | | | | Right Touch | 23095 | 707.5 | 1 | 0 | 25.0 | 23.7 | 0.128 | 0.172 | | 25 |
| | | | | | | | | 25 | 0 | 24.0 | 22.6 | 0.101 | 0.139 | | |
| | | | | | Right Tilt | 23095 | 707.5 | 1 | 0 | 25.0 | 23.7 | 0.108 | 0.145 | | |
| | | | | | | | | 25 | 0 | 24.0 | 22.6 | 0.087 | 0.119 | | |
| | Body-worn | QPSK | N/A | 15 | Rear | 23095 | 707.5 | 1 | 0 | 25.0 | 23.7 | 0.199 | 0.268 | | 26 |
| | | | | | | | | 25 | 0 | 24.0 | 22.6 | 0.155 | 0.214 | | |
| | | | | | Front | 23095 | 707.5 | 1 | 0 | 25.0 | 23.7 | 0.172 | 0.231 | | |
| | | | | | | | | 25 | 0 | 24.0 | 22.6 | 0.135 | 0.186 | | |
| | Hotspot | QPSK | N/A | 10 | Rear | 23095 | 707.5 | 1 | 0 | 25.0 | 23.7 | 0.328 | 0.441 | | 27 |
| | | | | | | | | 25 | 0 | 24.0 | 22.6 | 0.258 | 0.356 | | |
| | | | | | Front | 23095 | 707.5 | 1 | 0 | 25.0 | 23.7 | 0.221 | 0.297 | | |
| | | | | | | | | 25 | 0 | 24.0 | 22.6 | 0.175 | 0.242 | | |
| | | | | | Edge 2 | 23095 | 707.5 | 1 | 0 | 25.0 | 23.7 | 0.156 | 0.210 | | |
| | | | | | | | | 25 | 0 | 24.0 | 22.6 | 0.122 | 0.168 | | |
| | | | | | Edge 3 | 23095 | 707.5 | 1 | 0 | 25.0 | 23.7 | 0.130 | 0.175 | | |
| | | | | | | | | 25 | 0 | 24.0 | 22.6 | 0.103 | 0.142 | | |
| | | | | | Edge 4 | 23095 | 707.5 | 1 | 0 | 25.0 | 23.7 | 0.123 | 0.165 | | |
| | | | | | | | | 25 | 0 | 24.0 | 22.6 | 0.094 | 0.129 | | |
| Main.1 | Hotspot | QPSK | N/A | 10 | Rear | 23095 | 707.5 | 1 | 0 | 25.0 | 23.7 | 0.310 | 0.417 | 2 | |

**Note(s) for Sec.10:**

1. DUT was tested for Configuration.1. Please refer to Test Configuration in Sec.7.
2. DUT was tested for Configuration.2. Please refer to Test Configuration in Sec.7.


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## 10.9 LTE Band 41 (20MHz Bandwidth)

| Antenna | RF Exposure Conditions | Mode | PWR Back-off | Dist. (mm) | Test Position | Ch #. | Freq. (MHz) | RB Allocation | RB offest | Power (dBm) | | 1-g SAR (W/kg) | | Note | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Tune-up limit | Meas. | Meas. | Scaled | | |
| Main 2 | Head | QPSK | N/A | 0 | Left Touch | 40340 | 2565.0 | 1 | 99 | 24.5 | 24.0 | 0.095 | 0.108 | 1 | 28 |
| | | | | | | | | 50 | 50 | 23.5 | 22.7 | 0.073 | 0.089 | | |
| | | | | | Left Tilt | 40340 | 2565.0 | 1 | 99 | 24.5 | 24.0 | 0.047 | 0.053 | | |
| | | | | | | | | 50 | 50 | 23.5 | 22.7 | 0.031 | 0.038 | | |
| | | | | | Right Touch | 40340 | 2565.0 | 1 | 99 | 24.5 | 24.0 | 0.050 | 0.056 | | |
| | | | | | | | | 50 | 50 | 23.5 | 22.7 | 0.035 | 0.042 | | |
| | | | | | Right Tilt | 40340 | 2565.0 | 1 | 99 | 24.5 | 24.0 | 0.024 | 0.027 | | |
| | | | | | | | | 50 | 50 | 23.5 | 22.7 | 0.010 | 0.013 | | |
| | Body-worn | QPSK | N/A | 15 | Rear | 40340 | 2565.0 | 1 | 99 | 24.5 | 24.0 | 0.136 | 0.154 | | 29 |
| | | | | | | | | 50 | 50 | 23.5 | 22.7 | 0.102 | 0.124 | | |
| | | | | | Front | 40340 | 2565.0 | 1 | 99 | 24.5 | 24.0 | 0.118 | 0.134 | | |
| | | | | | | | | 50 | 50 | 23.5 | 22.7 | 0.085 | 0.104 | | |
| | Hotspot | QPSK | N/A | 10 | Rear | 40340 | 2565.0 | 1 | 99 | 24.5 | 24.0 | 0.276 | 0.313 | | |
| | | | | | | | | 50 | 50 | 23.5 | 22.7 | 0.203 | 0.246 | | |
| | | | | | Front | 40340 | 2565.0 | 1 | 99 | 24.5 | 24.0 | 0.226 | 0.257 | | |
| | | | | | | | | 50 | 50 | 23.5 | 22.7 | 0.163 | 0.198 | | |
| | | | | | Edge 2 | 40340 | 2565.0 | 1 | 99 | 24.5 | 24.0 | 0.043 | 0.049 | | |
| | | | | | | | | 50 | 50 | 23.5 | 22.7 | 0.033 | 0.040 | | |
| | | | | | Edge 3 | 40340 | 2565.0 | 1 | 99 | 24.5 | 24.0 | 0.326 | 0.370 | | 30 |
| | | | | | | | | 50 | 50 | 23.5 | 22.7 | 0.265 | 0.322 | | |
| | | | | | Edge 4 | 40340 | 2565.0 | 1 | 99 | 24.5 | 24.0 | 0.222 | 0.252 | | |
| | | | | | | | | 50 | 50 | 23.5 | 22.7 | 0.173 | 0.210 | | |
| Main. 2 | Hotspot | QPSK | N/A | 10 | Edge 3 | 40340 | 2565 | 1 | 99 | 24.5 | 24.0 | 0.279 | 0.317 | 2 | |

**Note(s) for Sec.10:**

1. DUT was tested for Configuration.1. Please refer to Test Configuration in Sec.7.
2. DUT was tested for Configuration.2. Please refer to Test Configuration in Sec.7.


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## 10.10 Wi-Fi (DTS Band)

| Antenna | Frequency Band | Mode | RF Exposure Conditions | PWR Back-off | Dist. (mm) | Test Position | Ch #. | Freq. (MHz) | Area Scan Max. SAR (W/kg) | Duty Cycle (%) | Power (dBm) | | 1-g SAR (W/kg) | | A Note | B Note | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Tune-up limit | Meas. | Meas. | Scaled | | | |
| SISO (WiFi Ant.1) | 2.4GHz | 802.11b 1 Mbps | Head | On | 0 | Left Touch | 1 | 2412.0 | 0.001 | 98.8 | 12.0 | 11.9 | | | 1 | | |
| | | | | | | Left Tilt | 1 | 2412.0 | 0.001 | 98.8 | 12.0 | 11.9 | | | | | |
| | | | | | | Right Touch | 1 | 2412.0 | 0.013 | 98.8 | 12.0 | 11.9 | 0.004 | 0.004 | | 1 | 31 |
| | | | | | | Rightt Tilt | 1 | 2412.0 | 0.001 | 98.8 | 12.0 | 11.9 | | | | | |
| | | | Body-worn | Off | 15 | Rear | 1 | 2412.0 | 0.001 | 98.8 | 19.0 | 18.1 | <0.001 | <0.001 | | 1 | |
| | | | | | | Front | 1 | 2412.0 | 0.002 | 98.8 | 19.0 | 18.1 | | | | | |
| | | | Hotspot | Off | 10 | Rear | 1 | 2412.0 | 0.003 | 98.8 | 19.0 | 18.1 | | | | | |
| | | | | | | Front | 1 | 2412.0 | 0.004 | 98.8 | 19.0 | 18.1 | | | | | |
| | | | | | | Edge 4 | 1 | 2412.0 | 0.009 | 98.8 | 19.0 | 18.1 | 0.004 | 0.005 | | 1 | |
| Ant.1 | 2.4GHz | 802.11b 1 Mbps | Hotspot | Off | 10 | Edge 4 | 1 | 2412.0 | 0.006 | 98.8 | 19.0 | 18.1 | <0.001 | <0.001 | 2 | | |
| SISO (WiFi Ant.2) | 2.4GHz | 802.11b 1 Mbps | Head | On | 0 | Left Touch | 1 | 2412.0 | 0.001 | 98.8 | 12.0 | 11.8 | | | 1 | | |
| | | | | | | Left Tilt | 1 | 2412.0 | 0.006 | 98.8 | 12.0 | 11.8 | <0.001 | <0.001 | | | |
| | | | | | | Right Touch | 1 | 2412.0 | 0.002 | 98.8 | 12.0 | 11.8 | | | | 1 | |
| | | | | | | Rightt Tilt | 1 | 2412.0 | 0.002 | 98.8 | 12.0 | 11.8 | | | | | |
| | | | Body-worn | Off | 15 | Rear | 1 | 2412.0 | 0.076 | 98.8 | 19.0 | 18.9 | 0.060 | 0.062 | | 1 | 32 |
| | | | | | | Front | 1 | 2412.0 | 0.002 | 98.8 | 19.0 | 18.9 | | | | | |
| | | | Hotspot | Off | 10 | Rear | 1 | 2412.0 | 0.191 | 98.8 | 19.0 | 18.9 | 0.165 | 0.172 | | 1 | 33 |
| | | | | | | Front | 1 | 2412.0 | 0.003 | 98.8 | 19.0 | 18.9 | | | | | |
| | | | | | | Edge 4 | 1 | 2412.0 | 0.021 | 98.8 | 19.0 | 18.9 | | | | | |
| Ant.2 | 2.4GHz | 802.11b 1 Mbps | Hotspot | Off | 10 | Rear | 1 | 2412.0 | 0.151 | 98.8 | 19.0 | 18.9 | 0.131 | 0.136 | 2 | | |

### A-Note(s) for Sec.10:

1. DUT was tested for Configuration.1. Please refer to Test Configuration in Sec.7.
2. DUT was tested for Configuration.2. Please refer to Test Configuration in Sec.7.

### B-Note(s):

1. When the Highest reported SAR is ≤ 0.4 or 1.0 W/kg (1-g or 10-g respectively). Therefore, further SAR measurements within this exposure condition are not required.
2. Highest reported SAR is > 0.4 or 1.0 W/kg (1-g or 10-g respectively). Due to the highest reported SAR for this test position, other test positions in this exposure condition were evaluated until a SAR ≤ 0.8 or 2.0 W/kg (1-g or 10-g respectively) was reported.
3. Testing for a second channel was required because the reported SAR for this test position was > 0.8 or 2.0 W/kg (1-g or 10-g respectively).
4. Additional testing required in order satisfying FCC simultaneous transmission limit criteria.
5. SAR testing is not required for OFDM mode(s) 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.


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## 10.11 Wi-Fi (U-NII Bands)

| Antenna | Frequency Band | Mode | RF Exposure Conditions | PWR Back-off | Dist. (mm) | Test Position | Ch #. | Freq. (MHz) | Area Scan Max. SAR (W/kg) | Duty Cycle (%) | Power (dBm) | | 1-g SAR (W/kg) | | 10-g SAR (W/kg) | | A Note | B Note | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Tune-up limit | Meas. | Meas. | Scaled | Meas. | Scaled | | | |
| SISO (WiFi Ant.1) | 5.3 GHz U-NII 2A | 802.11ac VHT80 29.3 Mbps | Head | On | 0 | Left Touch | 58 | 5290.0 | 0.026 | 99.1 | 12.0 | 11.7 | | | | | 1 | | |
| | | | | | | Left Tilt | 58 | 5290.0 | 0.016 | 99.1 | 12.0 | 11.7 | | | | | | | |
| | | | | | | Right Touch | 58 | 5290.0 | 0.080 | 99.1 | 12.0 | 11.7 | 0.026 | 0.028 | | | | 1 | 34 |
| | | | | | | Rightt Tilt | 58 | 5290.0 | 0.065 | 99.1 | 12.0 | 11.7 | | | | | | | |
| | | 802.11a 6 Mbps | Body-worn | Off | 15 | Rear | 52 | 5260.0 | 0.014 | 98.6 | 16.5 | 16.2 | | | | | | | |
| | | | | | | Front | 52 | 5260.0 | 0.016 | 98.6 | 16.5 | 16.2 | 0.005 | 0.006 | | | | 1 | |
| | | | Product Specific 10-g | Off | 0 | Rear | 52 | 5260.0 | 0.170 | 98.6 | 16.5 | 16.2 | | | | | | | |
| | | | | | | Front | 52 | 5260.0 | 1.189 | 98.6 | 16.5 | 16.2 | | | 0.074 | 0.080 | | 1 | |
| | | | | | | Edge 4 | 52 | 5260.0 | 0.303 | 98.6 | 16.5 | 16.2 | | | | | | | |
| Ant.1 | 5.3 GHz U-NII 2A | 802.11a 6 Mbps | Product Specific 10-g | Off | 0 | Front | 52 | 5260.0 | 0.969 | 98.6 | 16.5 | 16.2 | | | 0.074 | 0.080 | 2 | | |
| SISO (WiFi Ant.2) | 5.3 GHz U-NII 2A | 802.11ac VHT80 29.3 Mbps | Head | On | 0 | Left Touch | 58 | 5290.0 | 0.014 | 99.1 | 12.0 | 11.4 | | | | | 1 | | |
| | | | | | | Left Tilt | 58 | 5290.0 | 0.012 | 99.1 | 12.0 | 11.4 | | | | | | | |
| | | | | | | Right Touch | 58 | 5290.0 | 0.022 | 99.1 | 12.0 | 11.4 | <0.001 | <0.001 | | | | 1 | |
| | | | | | | Rightt Tilt | 58 | 5290.0 | 0.014 | 99.1 | 12.0 | 11.4 | | | | | | | |
| | | 802.11a 6 Mbps | Body-worn | Off | 15 | Rear | 52 | 5260.0 | 0.318 | 98.6 | 16.5 | 15.8 | 0.140 | 0.169 | | | | 1 | 35 |
| | | | | | | Front | 52 | 5260.0 | 0.007 | 98.6 | 16.5 | 15.8 | | | | | | | |
| | | | Product Specific 10-g | Off | 0 | Rear | 52 | 5260.0 | 13.648 | 98.6 | 16.5 | 15.8 | | | 1.180 | 1.422 | | | |
| | | | | | | Front | 52 | 5260.0 | 0.024 | 98.6 | 16.5 | 15.8 | | | | | | | |
| | | | | | | Edge 4 | 52 | 5260.0 | 0.175 | 98.6 | 16.5 | 15.8 | | | 0.025 | 0.031 | | 2 | |
| Ant.2 | 5.3 GHz U-NII 2A | 802.11a 6 Mbps | Product Specific 10-g | Off | 0 | Rear | 52 | 5260.0 | 23.132 | 98.6 | 16.5 | 15.8 | | | 1.210 | 1.458 | 2 | | 36 |
| | | | | | | Front | 52 | 5260.0 | 0.019 | 98.6 | 16.5 | 15.8 | | | | | | | |
| | | | | | | Edge 4 | 52 | 5260.0 | 0.197 | 98.6 | 16.5 | 15.8 | | | 0.029 | 0.034 | | 2 | |

### A-Note(s) for Sec.10:

1. DUT was tested for Configuration.1. Please refer to Test Configuration in Sec.7.
2. DUT was tested for Configuration.2. Please refer to Test Configuration in Sec.7.

### B-Note(s):

1. When the Highest reported SAR is ≤ 0.4 or 1.0 W/kg (1-g or 10-g respectively). Therefore, further SAR measurements within this exposure condition are not required.
2. Highest reported SAR is > 0.4 or 1.0 W/kg (1-g or 10-g respectively). Due to the highest reported SAR for this test position, other test positions in this exposure condition were evaluated until a SAR ≤ 0.8 or 2.0 W/kg (1-g or 10-g respectively) was reported.
3. Testing for a second channel was required because the reported SAR for this test position was > 0.8 or 2.0 W/kg (1-g or 10-g respectively).
4. Additional testing required in order satisfying FCC simultaneous transmission limit criteria.


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| Antenna | Frequency Band | Mode | RF Exposure Conditions | PWR Back-off | Dist. (mm) | Test Position | Ch #. | Freq. (MHz) | Area Scan Max. SAR (W/kg) | Duty Cycle (%) | Power (dBm) | | 1-g SAR (W/kg) | | 10-g SAR (W/kg) | | A Note | B Note | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Tune-up limit | Meas. | Meas. | Scaled | Meas. | Scaled | | | |
| SISO (WiFi Ant.1) | 5.5 GHz U-NII 2C | 802.11ac VHT80 29.3 Mbps | Head | On | 0 | Left Touch | 106 | 5530.0 | 0.016 | 99.1 | 12.0 | 11.6 | | | | | 1 | | |
| | | | | | | Left Tilt | 106 | 5530.0 | 0.024 | 99.1 | 12.0 | 11.6 | | | | | | | |
| | | | | | | Right Touch | 106 | 5530.0 | 0.102 | 99.1 | 12.0 | 11.6 | 0.046 | 0.050 | | | | 1 | 37 |
| | | | | | | Rightt Tilt | 106 | 5530.0 | 0.046 | 99.1 | 12.0 | 11.6 | | | | | | | |
| | | 802.11n HT40 13.5 Mbps | Body-worn | Off | 15 | Rear | 102 | 5510.0 | 0.024 | 98.2 | 16.0 | 15.6 | | | | | | | |
| | | | | | | Front | 102 | 5510.0 | 0.026 | 98.2 | 16.0 | 15.6 | 0.008 | 0.009 | | | | 1 | |
| | | | Product Specific 10-g | Off | 0 | Rear | 102 | 5510.0 | 0.220 | 98.2 | 16.0 | 15.6 | | | | | | | |
| | | | | | | Front | 102 | 5510.0 | 1.956 | 98.2 | 16.0 | 15.6 | | | 0.121 | 0.135 | | 1 | |
| | | | | | | Edge 4 | 102 | 5510.0 | 1.077 | 98.2 | 16.0 | 15.6 | | | | | | | |
| Ant.1 | 5.5 GHz U-NII 2C | 802.11n HT40 | Product Specific 10-g | Off | 0 | Front | 102 | 5510.0 | 1.853 | 98.2 | 16.0 | 15.6 | | | 0.115 | 0.129 | 2 | | |
| SISO (WiFi Ant.2) | 5.5 GHz U-NII 2C | 802.11ac VHT80 29.3 Mbps | Head | On | 0 | Left Touch | 138 | 5690.0 | 0.009 | 99.1 | 12.0 | 12.0 | | | | | 1 | | |
| | | | | | | Left Tilt | 138 | 5690.0 | 0.007 | 99.1 | 12.0 | 12.0 | | | | | | | |
| | | | | | | Right Touch | 138 | 5690.0 | 0.006 | 99.1 | 12.0 | 12.0 | | | | | | | |
| | | | | | | Rightt Tilt | 138 | 5690.0 | 0.011 | 99.1 | 12.0 | 12.0 | <0.001 | <0.001 | | | | 1 | |
| | | 802.11n HT40 13.5 Mbps | Body-worn | Off | 15 | Rear | 102 | 5510.0 | 0.114 | 98.2 | 16.0 | 15.5 | 0.045 | 0.052 | | | | 1 | 38 |
| | | | | | | Front | 102 | 5510.0 | 0.008 | 98.2 | 16.0 | 15.5 | | | | | | | |
| | | | Product Specific 10-g | Off | 0 | Rear | 102 | 5510.0 | 4.206 | 98.2 | 16.0 | 15.5 | | | 0.396 | 0.450 | | 1 | |
| | | | | | | Front | 102 | 5510.0 | 0.015 | 98.2 | 16.0 | 15.5 | | | | | | | |
| | | | | | | Edge 4 | 102 | 5510.0 | 0.064 | 98.2 | 16.0 | 15.5 | | | | | | | |
| Ant.2 | 5.5 GHz U-NII 2C | 802.11n HT40 | Product Specific 10-g | Off | 0 | Rear | 102 | 5510.0 | 4.710 | 98.2 | 16.0 | 15.5 | | | 0.440 | 0.500 | 2 | 1 | 39 |
| | | | | | | Front | 102 | 5510.0 | 0.010 | 98.2 | 16.0 | 15.5 | | | | | | | |
| | | | | | | Edge 4 | 102 | 5510.0 | 0.028 | 98.2 | 16.0 | 15.5 | | | | | | | |

## A-Note(s) for Sec.10:

1. DUT was tested for Configuration.1. Please refer to Test Configuration in Sec.7.
2. DUT was tested for Configuration.2. Please refer to Test Configuration in Sec.7.

## B-Note(s):

1. When the Highest reported SAR is ≤ 0.4 or 1.0 W/kg (1-g or 10-g respectively). Therefore, further SAR measurements within this exposure condition are not required.
2. Highest reported SAR is > 0.4 or 1.0 W/kg (1-g or 10-g respectively). Due to the highest reported SAR for this test position, other test positions in this exposure condition were evaluated until a SAR ≤ 0.8 or 2.0 W/kg (1-g or 10-g respectively) was reported.
3. Testing for a second channel was required because the reported SAR for this test position was > 0.8 or 2.0 W/kg (1-g or 10-g respectively).
4. Additional testing required in order satisfying FCC simultaneous transmission limit criteria.


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| Antenna | Frequency Band | Mode | RF Exposure Conditions | PWR Back-off | Dist. (mm) | Test Position | Ch #. | Freq. (MHz) | Area Scan Max. SAR (W/kg) | Duty Cycle (%) | Power (dBm) | | 1-g SAR (W/kg) | | A Note | B Note | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Tune-up limit | Meas. | Meas. | Scaled | | | |
| SISO (WiFi Ant.1) | 5.8 GHz U-NII 3 | 802.11ac VHT80 29.3 Mbps | Head | On | 0 | Left Touch | 155 | 5775.0 | 0.024 | 99.1 | 12.0 | 11.9 | | | 1 | | |
| | | | | | | Left Tilt | 155 | 5775.0 | 0.010 | 99.1 | 12.0 | 11.9 | | | | | |
| | | | | | | Right Touch | 155 | 5775.0 | 0.155 | 99.1 | 12.0 | 11.9 | 0.059 | 0.060 | | 1 | 40 |
| | | | | | | Rightt Tilt | 155 | 5775.0 | 0.062 | 99.1 | 12.0 | 11.9 | | | | | |
| | | 802.11n HT40 13.5 Mbps | Body-worn | Off | 15 | Rear | 159 | 5795.0 | 0.046 | 98.2 | 16.0 | 15.7 | | | | | |
| | | | | | | Front | 159 | 5795.0 | 0.046 | 98.2 | 16.0 | 15.7 | 0.019 | 0.021 | | 1 | |
| | | | Hotspot | Off | 10 | Rear | 151 | 5755.0 | 0.063 | 98.2 | 16.0 | 15.5 | | | | | |
| | | | | | | Front | 151 | 5755.0 | 0.095 | 98.2 | 16.0 | 15.5 | | | | | |
| | | | | | | Edge 4 | 151 | 5755.0 | 0.105 | 98.2 | 16.0 | 15.5 | 0.053 | 0.060 | | 1 | |
| Ant.1 | 5.8 GHz U-NII 3 | 802.11n HT40 | Hotspot | Off | 10 | Edge 4 | 151 | 5755.0 | 0.098 | 98.2 | 16.0 | 15.5 | 0.041 | 0.047 | 2 | | |
| SISO (WiFi Ant.2) | 5.8 GHz U-NII 3 | 802.11ac VHT80 29.3 Mbps | Head | On | 0 | Left Touch | 155 | 5775.0 | 0.006 | 99.1 | 12.0 | 11.3 | | | 1 | | |
| | | | | | | Left Tilt | 155 | 5775.0 | 0.011 | 99.1 | 12.0 | 11.3 | | | | | |
| | | | | | | Right Touch | 155 | 5775.0 | 0.011 | 99.1 | 12.0 | 11.3 | <0.001 | <0.001 | | 1 | |
| | | | | | | Rightt Tilt | 155 | 5775.0 | 0.008 | 99.1 | 12.0 | 11.3 | | | | | |
| | | 802.11n HT40 13.5 Mbps | Body-worn | Off | 15 | Rear | 151 | 5755.0 | 0.117 | 98.2 | 16.0 | 15.1 | 0.046 | 0.057 | | 1 | 41 |
| | | | | | | Front | 151 | 5755.0 | 0.005 | 98.2 | 16.0 | 15.1 | | | | | |
| | | | Hotspot | Off | 10 | Rear | 151 | 5755.0 | 0.179 | 98.2 | 16.0 | 15.1 | 0.073 | 0.091 | | 1 | 42 |
| | | | | | | Front | 151 | 5755.0 | 0.005 | 98.2 | 16.0 | 15.1 | | | | | |
| | | | | | | Edge 4 | 151 | 5755.0 | 0.038 | 98.2 | 16.0 | 15.1 | | | | | |
| Ant.2 | 5.8 GHz U-NII 3 | 802.11n HT40 | Hotspot | Off | 10 | Rear | 151 | 5755.0 | 0.144 | 98.2 | 16.0 | 15.1 | 0.060 | 0.075 | 2 | | |

## A-Note(s) for Sec.10:

1. DUT was tested for Configuration.1. Please refer to Test Configuration in Sec.7.
2. DUT was tested for Configuration.2. Please refer to Test Configuration in Sec.7.

## B-Note(s):

1. When the Highest reported SAR is ≤ 0.4 or 1.0 W/kg (1-g or 10-g respectively). Therefore, further SAR measurements within this exposure condition are not required.
2. Highest reported SAR is > 0.4 or 1.0 W/kg (1-g or 10-g respectively). Due to the highest reported SAR for this test position, other test positions in this exposure condition were evaluated until a SAR ≤ 0.8 or 2.0 W/kg (1-g or 10-g respectively) was reported.
3. Testing for a second channel was required because the reported SAR for this test position was > 0.8 or 2.0 W/kg (1-g or 10-g respectively).
4. Additional testing required in order satisfying FCC simultaneous transmission limit criteria.


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## 10.12 Bluetooth

| Antenna | Frequency Band | Mode | RF Exposure Conditions | Dist. (mm) | Test Position | Ch #. | Freq. (MHz) | Duty Cycle (%) | Power (dBm) | | 1-g SAR (W/kg) | | Note | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Tune-up limit | Meas. | Meas. | Scaled | | |
| WiFi Ant.1 | 2.4GHz | GFSK | Head | 0 | Left Touch | 0 | 2402.0 | 76.9 | 15.0 | 14.2 | <0.001 | <0.001 | 1 | |
| | | | | | Left Tilt | 0 | 2402.0 | 76.9 | 15.0 | 14.2 | <0.001 | <0.001 | | |
| | | | | | Right Touch | 0 | 2402.0 | 76.9 | 15.0 | 14.2 | 0.007 | 0.011 | | 43 |
| | | | | | Right Tilt | 0 | 2402.0 | 76.9 | 15.0 | 14.2 | 0.002 | 0.003 | | |
| | | GFSK | Body-worn | 15 | Rear | 0 | 2402.0 | 76.9 | 15.0 | 14.2 | <0.001 | <0.001 | | |
| | | | | | Front | 0 | 2402.0 | 76.9 | 15.0 | 14.2 | <0.001 | <0.001 | | |
| | | GFSK | Hotspot | 10 | Rear | 0 | 2402.0 | 76.9 | 15.0 | 14.2 | <0.001 | <0.001 | | |
| | | | | | Front | 0 | 2402.0 | 76.9 | 15.0 | 14.2 | <0.001 | <0.001 | | |
| | | | | | Edge 4 | 0 | 2402.0 | 76.9 | 15.0 | 14.2 | <0.001 | <0.001 | | |

**Note(s) for Sec.10:**

1. DUT was tested for Configuration.1. Please refer to Test Configuration in Sec.7.
2. Configuration.2 was considered at DTS Ant.1.

## 10.13 LTE-uplink 2CA Band 41 (20MHz + 20MHz BW)

| Antenna | RF Exposure Conditions | Mode | PWR Back-off | Dist. (mm) | Test Position | PCC UL | | | | SCC UL | | | | Power (dBm) | | 1-g SAR (W/kg) | | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Ch #. | Freq. (MHz) | RB Allocation | RB offest | Ch #. | Freq. (MHz) | RB Allocation | RB offest | Tune-up limit | Meas. | Meas. | Scaled | |
| Main 2 | Head | QPSK | Off | 0 | Left touch | 40340 | 2565.0 | 1 | 99 | 40538 | 2584.8 | 1 | 0 | 24.5 | 23.5 | 0.075 | 0.093 | 44 |
| | Body-worn | QPSK | Off | 15 | Rear | 40340 | 2565.0 | 1 | 99 | 40538 | 2584.8 | 1 | 0 | 24.5 | 23.5 | 0.102 | 0.128 | 45 |
| | Hotspot | QPSK | Off | 10 | Edge 3 | 40340 | 2565.0 | 1 | 99 | 40538 | 2584.8 | 1 | 0 | 24.5 | 23.5 | 0.288 | 0.360 | 46 |


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# 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 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.

**Peak spatial-average (1g of tissue)**

| Frequency Band (MHz) | Air Interface | RF Exposure Conditions | Test Position | Repeated SAR (Yes/No) | Highest Measured SAR (W/kg) | Repeated Measured SAR (W/kg) | Largest to Smallest SAR Ratio |
|---|---|---|---|---|---|---|---|
| 700 | LTE Band 12 | Hotspot | Rear | No | 0.328 | N/A | N/A |
| 835 | GSM 850 | Hotspot | Rear | No | 0.363 | N/A | N/A |
| | CDMA BC 0 | Hotspot | Rear | No | 0.356 | N/A | N/A |
| | WCDMA Band V | Hotspot | Rear | No | 0.521 | N/A | N/A |
| | LTE Band 5 | Hotspot | Rear | No | 0.383 | N/A | N/A |
| 1750 | LTE Band 4 | Hotspot | Edge 3 | No | 0.465 | N/A | N/A |
| 1900 | GSM 1900 | Hotspot | Edge 3 | Yes | 1.010 | 1 | 1.01 |
| | WCDMA Band II | Hotspot | Edge 3 | No | 0.551 | N/A | N/A |
| 2400 | Wi-Fi 802.11b/g/n | Hotspot | Rear | No | 0.165 | N/A | N/A |
| | Bluetooth | Head | Right Touch | No | 0.007 | N/A | N/A |
| 2600 | LTE Band 41 | Hotspot | Edge 3 | No | 0.510 | N/A | N/A |
| 5300 | Wi-Fi 802.11a/n | Body | Rear | No | 0.140 | N/A | N/A |
| 5500 | Wi-Fi 802.11a/n | Head | Right Touch | No | 0.046 | N/A | N/A |
| 5800 | Wi-Fi 802.11a/n | Hotspot | Rear | No | 0.073 | N/A | N/A |

**Peak spatial-average (10g of tissue)**

| Frequency Band (MHz) | Air Interface | RF Exposure Conditions | Test Position | Repeated SAR (Yes/No) | Highest Measured SAR (W/kg) | Repeated Measured SAR (W/kg) | Largest to Smallest SAR Ratio |
|---|---|---|---|---|---|---|---|
| 1750 | LTE Band 4 | Product specific 10g | Edge 3 | No | 1.340 | N/A | N/A |
| 1900 | GSM 1900 | Product specific 10g | Edge 3 | No | 1.380 | N/A | N/A |
| | WCDMA Band II | Product specific 10g | Edge 3 | No | 1.220 | N/A | N/A |
| 5300 | Wi-Fi 802.11a/n | Product specific 10g | Rear | No | 1.210 | N/A | N/A |
| 5500 | Wi-Fi 802.11a/n | Product specific 10g | Rear | No | 0.440 | N/A | N/A |

**Note(s):**

Second Repeated Measurement is not required since the ratio of the largest to smallest SAR for the original and first repeated measurement is not > 1.20.


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# 12 DUT Holder Perturbations

In accordance with published DUT Holder Perturbations in Oct.2016 TCB workshop,

When Highest reported SAR is over 1.2 or 3.0 W/kg (1-g or 10-g respectively), Holder perturbation verification is required for each antenna, using the highest configuration among all applicable frequency bands. Both Head test and Body test (Edge 1-4 sides) are evaluated with DUT holder. Both Front and Rear sides are evaluated without DUT holder. (Details of test setup are refer to Appendix A.)

So we are only consider about Head test and Body test (Edge 1-4 sides).

**Main Antenna**

| Frequency Band (MHz) | Air Interface | RF Exposure Conditions | Test Position | DUT Holder Perturbation (Yes/No) | Highest Reported SAR (W/kg) | SAR test without holder Scaled SAR (W/kg) | Deviation (%) |
|---|---|---|---|---|---|---|---|
| 1900 | GSM 1900 | Hotspot | Edge 3 | Yes | 1.362 | 1.362 | 1.00 |

**Note(s):**

Both deviation should be within measurement uncertainty (22%).

# 13 Simultaneous Transmission SAR Analysis

## Simultaneous Transmission Condition

| RF Exposure Condition | Item | Capable Transmit Configurations | | | | |
|---|---|---|---|---|---|---|
| Head & Body-worn & Hotspot & Product Specific 10-g | 1 | GSM (Voice/GPRS) | + | DTS Ant.1 (and/or) DTS Ant.2 | | |
| | 2 | GSM (Voice/GPRS) | + | UNII Ant.1 (and/or) UNII Ant.2 | | |
| | 3 | GSM (Voice/GPRS) | + | BT | | |
| | 4 | GSM (Voice/GPRS) | + | BT | + | UNII Ant.2 |
| | 5 | GSM (Voice/GPRS) | + | ***RSDB scenario*** | | |
| | 6 | W-CDMA | + | DTS Ant.1 (and/or) DTS Ant.2 | | |
| | 7 | W-CDMA | + | UNII Ant.1 (and/or) UNII Ant.2 | | |
| | 8 | W-CDMA | + | BT | | |
| | 9 | W-CDMA | + | BT | + | UNII Ant.2 |
| | 10 | W-CDMA | + | ***RSDB scenario*** | | |
| | 11 | LTE | + | DTS Ant.1 (and/or) DTS Ant.2 | | |
| | 12 | LTE | + | UNII Ant.1 (and/or) UNII Ant.2 | | |
| | 13 | LTE | + | BT | | |
| | 14 | LTE | + | BT | + | UNII Ant.2 |
| | 15 | LTE | + | ***RSDB scenario*** | | |

Notes:
1. DTS supports Wi-Fi Direct, Hotspot and VoIP.
2. U-NII supports Wi-Fi Direct, Hotspot and VoIP.
3. GPRS, W-CDMA, LTE supports Hotspot and VoIP.
4. Only U-NII Ant.2 Radio can transmit simultaneously with Bluetooth Radio.
5. DTS Radio cannot transmit simultaneously with Bluetooth Radio.
6. DTS Radio can transmit simultaneously with UNII Radio in RSDB scenarios.
7. BT tethering is consider about each RF exposure conditions
8. GSM (Voice) is only consider in both Head & Body-worn exposure conditions.

**RSDB scenarios**

| Mode | Scenario | # of TX | 5GHz (UNII) | | 2.4GHz (DTS) | |
|---|---|---|---|---|---|---|
| | | | Ant1 | Ant2 | Ant1 | Ant2 |
| 2.4GHz+5GHz RSDB Only | 1 | 2 | - | On | On | - |


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# Simultaneous transmission SAR test exclusion considerations

KDB 447498 D01 General RF Exposure Guidance provides two procedures for determining simultaneous transmission SAR test exclusion: Sum of SAR and SAR to Peak Location Ratio (SPLSR)

## Sum of SAR

To qualify for simultaneous transmission SAR test exclusion based upon Sum of SAR the sum of the reported standalone SARs for all simultaneously transmitting antennas shall be below the applicable standalone SAR limit. If the sum of the SARs is above the applicable limit then simultaneous transmission SAR test exclusion may still apply if the requirements of the SAR to Peak Location Ratio (SPLSR) evaluation are met.

## SAR to Peak Location Ratio (SPLSR)

KDB 447498 D01 General RF Exposure Guidance explains how to calculate the SAR to Peak Location Ratio (SPLSR) between pairs of simultaneously transmitting antennas:

$$SPLSR = (SAR_1 + SAR_2)^{1.5} / Ri$$

Where:

$SAR_1$ is the highest reported or estimated SAR for the first of a pair of simultaneous transmitting antennas, in a specific test operating mode and exposure condition

$SAR_2$ is the highest reported or estimated SAR for the second of a pair of simultaneous transmitting antennas, in the same test operating mode and exposure condition as the first

***Ri*** is the separation distance between the pair of simultaneous transmitting antennas. When the SAR is measured, for both antennas in the pair, it is determined by the actual x, y and z coordinates in the 1-g SAR for each SAR peak location, based on the extrapolated and interpolated result in the zoom scan measurement, using the formula of

$$[(x_1-x_2)^2 + (y_1-y_2)^2 + (z_1-z_2)^2]$$

In order for a pair of simultaneous transmitting antennas with the sum of 1-g SAR > 1.6 W/kg to qualify for exemption from Simultaneous Transmission SAR measurements, it has to satisfy the condition of:

$$(SAR_1 + SAR_2)^{1.5} / Ri \leq 0.04$$

When an individual antenna transmits at on two bands simultaneously, the sum of the highest *reported* SAR for the frequency bands should be used to determine $SAR_1$.or $SAR_2$. When SPLSR is necessary, the smallest distance between the peak SAR locations for the antenna pair with respect to the peaks from each antenna should be used.

The antennas in all antenna pairs that do not qualify for simultaneous transmission SAR test exclusion must be tested for SAR compliance, according to the enlarged zoom scan and volume scan post-processing procedures in KDB Publication 865664 D01

The antennas for the unlicensed transmitters are closely situated. As a result, the associated SAR hotspots are also closely situated. Some of the sum of SAR calculations yielded results over 1.6 W/kg. The SPSLR calculations for these situations were performed by treating the unlicensed SAR values as a single transmitter. The most conservative distance between all the unlicensed hotspots to the licensed hotspot was used for the value of *d* in the SPSLR calculation.


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## Simultaneous transmission SAR measurement

When simultaneous transmission SAR measurements are required in different frequency bands not covered by a single probe calibration point then separate tests for each frequency band are performed. The tests are performed using enlarged zoom scans which are processed, by means of superposition, using the DASY5 volume scan postprocessing procedures to determine the 1-g SAR for the aggregate SAR distribution.

The spatial resolution used for all enlarged zoom scans is the same as used for the most stringent zoom scans. I.E. the scan parameters required for the highest frequency assessed are used for all enlarged zoom scans. The scans cover the complete area of the device to ensure all transmitting antennas and radiating structures are assessed.

DASY5 provides the ability to perform Multiband Evaluations according to the latest standards using the Volume Scan job as well as appropriate routines for the Post-processing.

In order to extract and process measurements within different frequency bands, the SEMCAD X Post-processor performs the combination and subsequent superposition of these measurement data via DASY5= Combined MultiBand Averaged SAR.

Combined Multi Band Averaged SAR allows - in addition to the data extraction - an evaluation of the 1 g, 10 g and/or arbitrary averaged mass SAR.
Power Scaling Factor is used to allow the volume scans to be scaled by a value other than "1", this is important when the results need to be scaled to different maximum power levels. The Power Scaling Factor is applied to each individual point of the scan. When power scaling is used in multi-band combinations the scaling factor is applied to each individual point of the first scan, the second factor is then applied to each individual point of the second scan and so on. The scans are then combined.

## 13.1 Sum of the SAR for WWAN & Wi-Fi & BT

| RF Exposure | Test Position | Standalone SAR (W/kg) | | | | | | ∑ SAR (W/kg) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | WWAN | DTS Ant.1 | DTS Ant.2 | UNII Ant.1 | UNII Ant.2 | BT | WWAN + DTS Ant.1 | WWAN + DTS Ant.2 | WWAN + DTS Ant.1 + DTS Ant.2 | WWAN + UNII Ant.1 | WWAN + UNII Ant.2 | WWAN + UNII Ant.1+ UNII Ant.2 | WWAN + BT | WWAN + DTS Ant.1 + UNII Ant.2 | WWAN + BT + UNII Ant.2 |
| | | 1 | 2 | 3 | 4 | 5 | 6 | 1+2 | 1+3 | 1+2+3 | 1+4 | 1+5 | 1+4+5 | 1+6 | 1+2+5 | 1+5+6 |
| Head (1g-SAR) | All positions | 0.315 | 0.004 | 0.001 | 0.050 | 0.001 | 0.011 | 0.319 | 0.316 | 0.320 | 0.365 | 0.316 | 0.366 | 0.326 | 0.320 | 0.327 |
| Body-Worn (1g-SAR) | All positions | 0.623 | 0.001 | 0.062 | 0.021 | 0.169 | 0.001 | 0.624 | 0.685 | 0.686 | 0.644 | 0.792 | 0.813 | 0.624 | 0.793 | 0.793 |
| Hotspot (1-g SAR) | All positions | 1.362 | 0.005 | 0.172 | 0.060 | 0.091 | 0.001 | 1.367 | 1.534 | 1.539 | 1.422 | 1.453 | 1.513 | 1.363 | 1.458 | 1.454 |
| Product Specific (10-g SAR) | All positions | 1.862 | | | 0.135 | 1.458 | | | | | 1.997 | 3.320 | 3.455 | | | |

**Conclusion:**

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


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# Appendixes

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

**4788886237-S1V3 FCC Report SAR_App A_Photos & Ant. Locations**

**4788886237-S1V3 FCC Report SAR_App B_Highest SAR Test Plots**

**4788886237-S1V3 FCC Report SAR_App C_System Check Plots**

**4788886237-S1V3 FCC Report SAR_App D_SAR Tissue Ingredients**

**4788886237-S1V3 FCC Report SAR_App E_Probe Cal. Certificates**

**4788886237-S1V3 FCC Report SAR_App F_Dipole Cal. Certificates**

**END OF REPORT**


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