# SAR TEST REPORT

| | |
|---|---|
| **Applicant** | Huawei Technologies Co., Ltd |
| **FCC ID** | QISATU-L11 |
| **Product** | Smart Phone |
| **Model** | ATU-L11 |
| **Report No.** | R1802H0028-S1 |
| **Issue Date** | March 13, 2018 |

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **IEEE 1528- 2013, ANSI/ IEEE C95.1-1992.** The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Jiangpeng Lan  Kai Xu

*Performed by: Jiangpeng Lan*  *Approved by: Kai Xu*


## TA Technology (Shanghai) Co., Ltd.

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# 1 Test Laboratory

## 1.1 Notes of the Test Report

This report shall not be reproduced in full or partial, without the written approval of **TA technology (shanghai) co., Ltd.**The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein .Measurement Uncertainties were not taken into account and are published for informational purposes only. This report is written to support regulatory compliance of the applicable standards stated above.

## 1.2 Test facility

**CNAS (accreditation number:L2264)**

TA Technology (Shanghai) Co., Ltd. has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS).

**FCC (Designation number: CN1179, Test Firm Registration Number: 446626)**

TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

**IC (recognition number is 8510A)**

TA Technology (Shanghai) Co., Ltd. has been listed by industry Canada to perform electromagnetic emission measurement.

**VCCI (recognition number is C-4595, T-2154, R-4113, G-10766)**

TA Technology (Shanghai) Co., Ltd. has been listed by industry Japan to perform electromagnetic emission measurement.

**A2LA (Certificate Number: 3857.01)**

TA Technology (Shanghai) Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

## 1.3 Testing Location

| | |
|---|---|
| Company: | TA Technology (Shanghai) Co., Ltd. |
| Address: | No.145, Jintang Rd, Tangzhen Industry Park, Pudong Shanghai, China |
| City: | Shanghai |
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## 1.4 Laboratory Environment

| | |
|---|---|
| Temperature | Min. = 18°C, Max. = 25 °C |
| Relative humidity | Min. = 30%, Max. = 70% |
| Ground system resistance | < 0.5 Ω |
| Ambient noise is checked and found very low and in compliance with requirement of standards. Reflection of surrounding objects is minimized and in compliance with requirement of standards. | |

# 2 Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for the EUT are as follows:
Table 2.1: Highest Reported SAR

| Mode | Highest Reported SAR (W/kg) | | | |
|---|---|---|---|---|
| | 1g SAR Head | 1g SAR Body-worn (Separation 15mm) | 1g SAR Hotspot (Separation 10mm) | Product Specific 10-g SAR (Separation 0mm) |
| GSM 850 | 0.29 | 0.36 | 0.35 | / |
| GSM 1900 | 0.19 | 0.21 | 0.62 | / |
| WCDMA Band II | 0.43 | 0.35 | 0.75 | / |
| WCDMA Band V | 0.38 | 0.47 | 0.51 | / |
| LTE FDD 5 | 0.30 | 0.30 | 0.36 | / |
| LTE FDD 7 | 0.14 | 0.34 | 0.74 | / |
| Wi-Fi (2.4G) | 1.07 | 0.13 | 0.24 | / |
| Bluetooth | 0.18 | / | / | / |
| Date of Testing: | February 26, 2018~ March 7, 2018 | | | |

Note: 1) The highest Reported SAR for head, body-worn, hotspot and simultaneous transmission exposure conditions are 1.07 W/kg, 0.47 W/kg, 0.75 W/kg and 1.131 W/kg.
2) For body worn operation, this device has been tested and meets FCC RF exposure guidelines when used with any accessory thatcontains no metal and that positions the handset a minimum of 15mm from the body. Use of other accessories may not ensure compliance with FCC RF exposure guidelines.
The device is in compliance with Specific Absorption Rate (SAR) for general population/uncontraolled exposure limits according to the FCC rule §2.1093, the ANSI C95.1: 1992/IEEE C95.1: 1991, and had been tested in accordance with the measurement methods and procedures specified in IEEE Std 1528-2013.

# 3 Description of Equipment under Test

**Client Information**

| | |
|---|---|
| **Applicant** | Huawei Technologies Co., Ltd. |
| **Applicant address** | Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.China. |
| **Manufacturer** | Huawei Technologies Co., Ltd. |
| **Manufacturer address** | Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.China. |

**General Technologies**

| | |
|---|---|
| Application Purpose: | Original Grant |
| EUT Stage | Identical Prototype |
| Model: | ATU-L11 |
| IMEI: | 867269030025954 |
| Hardware Version: | HL1ATUM |
| Software Version: | ATU-L11 8.0.1.44(SP1C900) |
| Antenna Type: | Internal Antenna |
| Device Class: | B |
| Wi-Fi Hotspot | Wi-Fi 2.4G |
| Power Class: | GSM 850:4<br>GSM 1900:1<br>UMTS Band II/V:3<br>LTE FDD 5/7:3 |
| Power Level | GSM 850:level 5<br>GSM 1900:level 0<br>UMTS Band II/V:all up bits<br>LTE FDD 5/7:max power |
| EUT Accessory | |
| Adapter 1- EU | Manufacturer: SHENZHEN HUNTKEY ELECTRIC CO., LTD<br>Model: HW-050100E01 |
| Adapter 2- EU | Manufacturer: HUIZHOU BYD ELECTRONIC CO., LTD.<br>Model: HW-050100E01 |
| Adapter 3- EU | Manufacturer: DONG GUAN PHITEK ELECTRONICS CO., LTD.<br>Model: HW-050100E01 |
| Adapter 4- UK | Manufacturer: SHENZHEN HUNTKEY ELECTRIC CO., LTD |

| | |
|---|---|
| | Model: HW-050100B01 |
| Adapter 5- UK | Manufacturer: HUIZHOU BYD ELECTRONIC CO., LTD.<br>Model: HW-050100B01 |
| Adapter 6- UK | Manufacturer: DONG GUAN PHITEK ELECTRONICS CO., LTD.<br>Model: HW-050100B01 |
| Adapter 7- US | Manufacturer: SHENZHEN HUNTKEY ELECTRIC CO., LTD<br>Model: HW-050100U01 |
| Adapter 8- US | Manufacturer: HUIZHOU BYD ELECTRONIC CO., LTD.<br>Model: HW-050100U01 |
| Adapter 9- US | Manufacturer: DONG GUAN PHITEK ELECTRONICS CO., LTD.<br>Model: HW-050100U01 |
| Adapter 10- AU | Manufacturer: SHENZHEN HUNTKEY ELECTRIC CO., LTD<br>Model: HW-050100A01 |
| Adapter 11- AU | Manufacturer: HUIZHOU BYD ELECTRONIC CO., LTD.<br>Model: HW-050100A01 |
| Adapter 12- AU | Manufacturer: DONG GUAN PHITEK ELECTRONICS CO., LTD.<br>Model: HW-050100A01 |
| Battery 1 | Manufacturer: SCUD(FUJIAN) Electronics Co.,Ltd<br>Model: HB366481ECW-11 |
| Battery 2 | Manufacturer: Sunwoda Electronics Co.,Ltd<br>Model: HB366481ECW-11 |
| Battery 3 | Manufacturer: Desay battery Co.,LTD<br>Model: HB366481ECW-11 |
| Earphone 1 | Manufacturer: BOLUO COUNTY QUANCHENG ELECTRONIC CO.,LTD<br>Model: 1293-3283-3.5MM-300 |
| Earphone 2 | Manufacturer: GoerTek Inc<br>Model: HA1-3W |
| Earphone 3 | Manufacturer: Jiangxi Lianchuang Hongsheng Electronic Co.,LTD<br>Model: MEMD1532B528A00 |
| Earphone 4 | Manufacturer: BOLUO COUNTY QUANCHENG ELECTRONIC CO.,LTD<br>Model: 1293#+3283# 3.5MM-150 |
| Earphone 5 | Manufacturer: GoerTek Inc<br>Model: HA1-3 |
| Earphone 6 | Manufacturer: Jiangxi Lianchuang Hongsheng Electronic Co.,LTD<br>Model: MEMD1532B528000 |
| Earphone 7 | Manufacturer: FOXCONN<br>Model: EPAB542-2WH03-DH |
| USB Extend Cable | 100cm Cable, Shielded |

**Wireless Technology and Frequency Range**

| Wireless Technology | | Modulation | Operating mode | Tx (MHz) |
|---|---|---|---|---|
| GSM | 850 | Voice(GMSK)<br>GPRS(GMSK)<br>EGPRS(GMSK,8PSK) | ☐Multi-slot Class:8-1UP<br>☐Multi-slot Class:10-2UP<br>☒Multi-slot Class:12-4UP<br>☐Multi-slot Class:33-4UP | 824 ~ 849 |
| | 1900 | | | 1850 ~ 1910 |
| | Does this device support DTM (Dual Transfer Mode)? ☐Yes ☒No | | | |
| UMTS | Band II | QPSK | HSDPA UE Category:14<br>HSUPA UE Category:6<br>DC-HSDPA UE Category:24 | 1850 ~ 1910 |
| | Band V | | | 824 ~ 849 |
| LTE | FDD 5 | QPSK, 16QAM | Rel. 9 | 824 ~ 849 |
| | FDD 7 | | | 2500 ~ 2570 |
| | Does this device support Carrier Aggregation (CA) ☐Yes ☒No | | | |
| | Does this device support SV-LTE (1xRTT-LTE)? ☐Yes ☒No | | | |
| BT | 2.4G | Version 4.2 LE | | 2402 ~2480 |
| Wi-Fi | 2.4G | DSSS,OFDM | 802.11b/g/n HT20 | 2412 ~ 2462 |
| | | OFDM | 802.11n HT40 | 2422 ~ 2452 |
| | Does this device support MIMO ☐Yes ☒No | | | |
| NFC | 13.56MHz | | | |

# 4 Test Specification, Methods and Procedures

The tests documented in this report were performed in accordance with FCC 47 CFR § 2.1093, IEEE 1528- 2013, ANSI C95.1: 1992/IEEE C95.1: 1991, 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
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 D06 Hotspot Mode v02r01

# 5 Operational Conditions during Test

## 5.1 Test Positions

### 5.1.1 Against Phantom Head

Measurements were made in “cheek” and “tilt” positions on both the left hand and right hand sides of the phantom.

The positions used in the measurements were according to IEEE 1528 - 2013 "IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques".

### 5.1.2 Body Worn Configuration

Body-worn operating configurations should be tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in normal use configurations.

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration. Per FCC KDB Publication 648474 D04, Body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in FCC KDB Publication 447498 D01 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode, when applicable. When the reported SAR for a body-worn accessory, measured without a headset connected to the handset, is > 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a headset attached to the handset.

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

Body-worn accessories may not always be supplied or available as options for some devices intended to be authorized for body-worn use. In this case, a test configuration with a separation distance between the back of the device and the flat phantom is used. Test position spacing was documented. Transmitters that are designed to operate in front of a person’s face, as in push-to-talk configurations, are tested for SAR compliance with the front of the device positioned to face the flat phantom in head fluid. For devices that are carried next to the body such as a shoulder, waist or chest-worn transmitters, SAR compliance is tested with the accessories, including headsets and microphones, attached to the device and positioned against a flat phantom in a normal use configuration.

### 5.1.3 Phablet SAR test considerations

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

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

b) The UMPC mini-tablet procedures must also be applied to test the SAR of all surfaces and edges with an antenna located at ≤ 25 mm from that surface or edge, in direct contact with a flat phantom, for product specific 10-g SAR according to the body-equivalent tissue dielectric parameters in KDB Publication 865664 D01 to address interactive hand use exposure conditions. The 1-g SAR at 5 mm for UMPC mini-tablets is not required. When hotspot mode applies, 10-g extremity SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg; however, when power reduction applies to hotspot mode the measured SAR must be scaled to the maximum output power, including tolerance, allowed for phablet modes to compare with the 1.2 W/kg SAR test reduction threshold. The normal tablet procedures in KDB Publication 616217 are required when the overall diagonal dimension of the device is > 20.0 cm. Hotspot mode SAR is not required when normal tablet procedures are applied. Extremity 10-g SAR is also not required for the front (top) surface of larger form factor full size tablets. The more conservative normal tablet SAR results can be used to support phablet mode 10-g extremity SAR.

c) The simultaneous transmission operating configurations applicable to voice and data transmissions for both phone and mini-tablet modes must be taken into consideration separately for 1-g and 10-g SAR to determine the simultaneous transmission SAR test exclusion and measurement requirements for the relevant wireless modes and exposure conditions.

## 5.2 Measurement Variability

Per FCC KDB Publication 865664 D01, SAR measurement variability was assessed for each frequency band, which was determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media were required for SAR measurements in a frequency band, the variability measurement procedures were applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium. These additional measurements were repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device was returned to ambient conditions (normal room temperature) with the battery fully charged before it was re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

SAR Measurement Variability was assessed using the following procedures for each frequency band:
1) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.
2) A second repeated measurement was preformed only if the ratio of largest to smallest SAR for the original and first repeated measurements was > 1.20 or when the original or repeated measurement was ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).
3) A third repeated measurement was performed only if the original, first or second repeated measurement was ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.
4) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg

The same procedures should be adapted for measurements according to extremity and occupational exposure limits by applying a factor of 2.5 for extremity exposure and a factor of 5 for occupational exposure to the corresponding SAR thresholds.

## 5.3 Test Configuration

### 5.3.1 GSM Test Configuration

According to specification 3GPP TS 51.010, the maximum power of the GSM can do the power reduction for the multi-slot. The allowed power reduction in the multi-slot configuration is as following:

Output power of reductions:

**Table 5.1: The allowed power reduction in the multi-slot configuration**

| Number of timeslots in uplink assignment | Permissible nominal reduction of maximum output power,(dB) |
|---|---|
| 1 | 0 |
| 2 | 0 to 3,0 |
| 3 | 1,8 to 4,8 |
| 4 | 3,0 to 6,0 |

### 5.3.2 3G Test Configuration

**3G SAR Test Reduction Procedure**

In the following procedures, the mode tested for SAR is referred to as the primary mode. The equivalent modes considered for SAR test reduction are denoted as secondary modes. Both primary and secondary modes must be in the same frequency band. 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.3 This is referred to as the 3G SAR test reduction procedure in the following SAR test guidance, where the primary mode is identified in the applicable wireless mode test procedures and the secondary mode is wireless mode being considered for SAR test reduction by that procedure. When the 3G SAR test reduction procedure is not satisfied, it is identified as “otherwise” in the applicable procedures; SAR measurement is required for the secondary mode.

#### 5.3.2.1 WCDMA Test Configuration

**Output power Verification**

Maximum output power is verified on the high, middle and low channels according to procedures described in section 5.2 of 3GPP TS 34.121, using the appropriate RMC or AMR with TPC (transmit power control) set to all “1’s” for WCDMA/HSDPA or by applying the required inner loop power control procedures to maintain maximum output power while HSUPA is active. Results for all applicable physical channel configurations (DPCCH, DPDCHn and spreading codes, HSDPA, HSPA) are requied in the SAR report. All configurations that are not supported by the handset or cannot be measured due to technical or equipment limitations must be clearly identified.

**Head SAR**

SAR for next to the ear head exposure is measured using a 12.2 kbps RMC with TPC bits configured to all “1’s”. The 3G SAR test reduction procedure is applied to AMR configurations with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured for 12.2 kbps AMR in 3.4 kbps SRB (signaling radio bearer) using the highest reported SAR configuration in 12.2 kbps RMC for head exposure.

**Body-Worn Accessory SAR**

SAR for body-worn accessory configurations is measured using a 12.2 kbps RMC with TPC bits configured to all “1’s”. The 3G SAR test reduction procedure is applied to other spreading codes and multiple DPDCHn configurations supported by the handset with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured using an applicable RMC configuration with the corresponding spreaing code or DPDCHn, for the highest reported body-worn accessory exposure SAR configuration in 12.2 kbps RMC. When more than 2 DPDCHn are supported by the handset, it may be necessary to configure additional DPDCHn using FTM (Factory Test Mode) or other chipset based test approaches with parameters similar to those used in 384 kbps and 768 kbps RMC.

**Handsets with Release 5 HSDPA**

The 3G SAR test reduction procedure is applied to HSDPA body-worn accessory configurations with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured for HSDPA using the HSDPA body SAR procedures in the “Release 5 HSDPA Data Devices” section of this document, for the highest reported SAR body-worn accessory exposure configuration in 12.2 kbps RMC. Handsets with both HSDPA and HSUPA are tested according to Release 6 HSPA test procedures.

HSDPA should be configured according to the UE category of a test device.The number of HSDSCH/ HS-PDSCHs, HARQ processes, minimum inter-TTI interval, transport block sizes and RV coding sequence are defined by the H-set. To maintain a consistent test configuration and stable transmission conditions, QPSK is used in the H-set for SAR testing. HS-DPCCH should be configured with a CQI feedback cycle of 4 ms with a CQI repetition factor of 2 to maintain a constant rate of active CQI slots. DPCCH and DPDCH gain factors(βc, βd), and HS-DPCCH power offset parameters (ΔACK, ΔNACK, ΔCQI) should be set according to values indicated in the Table below. The CQI value is determined by the UE category, transport block size, number of HS-PDSCHs and modulation used in the H-set.

**Table 5.2: Subtests for UMTS Release 5 HSDPA**

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

Note1: $\Delta_{ACK}$, $\Delta_{NACK}$ and $\Delta_{CQI}$= 8$\Leftrightarrow$$A_{hs}$ = $\beta_{hs}/\beta_c$=30/15 $\Leftrightarrow$ $\beta_{hs}$=30/15*$\beta_c$

Note2: CM=1 for $\beta_c/\beta_d$ =12/15, $\beta_{hs}/\beta_c$=24/15.

Note3: For subtest 2 the $\beta_c\beta_d$ ratio of 12/15 for the TFC during the measurement period(TF1,TF0) is achieved by setting the signaled gain factors for the reference TFC (TFC1,TF1) to $\beta_c$=11/15 and $\beta_d$=15/15.

**HSUPA Test Configuration**

The 3G SAR test reduction procedure is applied to HSPA (HSUPA/HSDPA with RMC) body-worn accessory configurations with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured for HSPA using the HSPA body SAR procedures in the “Release 6 HSPA Data Devices” section of this document, for the highest reported body-worn accessory exposure SAR configuration in 12.2 kbps RMC. When VOIP is applicable for next to the ear head exposure in HSPA, the 3G SAR test reduction procedure is applied to HSPA with 12.2 kbps RMC as the primary mode; otherwise, the same HSPA configuration used for body-worn accessory measurements is tested for next to the ear head exposure.

Due to inner loop power control requirements in HSPA, a communication test set is required for output power and SAR tests. The 12.2 kbps RMC, FRC H-set 1 and E-DCH configurations for HSPA are configured according to the β values indicated in Table 2 and other applicable procedures described in the ‘WCDMA Handset’ and ‘Release 5 HSDPA Data Devices’ sections of this document

**Table 5.3：Sub-Test 5 Setup for Release 6 HSUPA**

| Sub-set | $\beta_c$ | $\beta_d$ | $\beta_d$ (SF) | $\beta_c/\beta_d$ | $\beta_{hs}$ (1) | $\beta_{ec}$ | $\beta_{ed}$ | $\beta_{ed}$ (SF) | $\beta_{ed}$ (codes) | CM (2) (dB) | MPR (dB) | AG (4) Index | E-TFCI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 11/15 (3) | 15/15 (3) | 64 | 11/15 (3) | 22/15 | 209/225 | 1039/225 | 4 | 1 | 1.0 | 0.0 | 20 | 75 |
| 2 | 6/15 | 15/15 | 64 | 6/15 | 12/15 | 12/15 | 94/75 | 4 | 1 | 3.0 | 2.0 | 12 | 67 |
| 3 | 15/15 | 9/15 | 64 | 15/9 | 30/15 | 30/15 | $\beta_{ed1}$:47/15 $\beta_{ed2}$:47/15 | 4 | 2 | 2.0 | 1.0 | 15 | 92 |
| 4 | 2/15 | 15/15 | 64 | 2/15 | 4/15 | 2/15 | 56/75 | 4 | 1 | 3.0 | 2.0 | 17 | 71 |
| 5 | 15/15 (4) | 15/15 (4) | 64 | 15/15 (4) | 30/15 | 24/15 | 134/15 | 4 | 1 | 1.0 | 0.0 | 21 | 81 |

Note 1: $\Delta_{ACK}$, $\Delta$NACK and $\Delta_{CQI}$ = 8 $\Leftrightarrow$ $A_{hs}$ = $\beta_{hs}/\beta_c$ = 30/15 $\Leftrightarrow$ $\beta_{hs}$= 30/15 *$\beta_c$.

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

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

Note 4: For subtest 5 the βc/βd ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to βc = 14/15 and βd = 15/15.

Note 5: Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Figure 5.1g.

Note 6: βed can not be set directly; it is set by Absolute Grant Value.

**Table 5.4: HSUPA UE category**

| UE E-DCH Category | Maximum E-DCH Codes Transmitted | Number of HARQ Processes | E-DCH TTI (ms) | Minimum Spreading Factor | Maximum E-DCH Transport Block Bits | Max Rate (Mbps) |
|---|---|---|---|---|---|---|
| 1 | 1 | 4 | 10 | 4 | 7110 | 0.7296 |
| 2 | 2 | 8 | 2 | 4 | 2798 | 1.4592 |
| | 2 | 4 | 10 | 4 | 14484 | |
| 3 | 2 | 4 | 10 | 4 | 14484 | 1.4592 |
| 4 | 2 | 8 | 2 | 2 | 5772 | 2.9185 |
| | 2 | 4 | 10 | 2 | 20000 | 2.00 |
| 5 | 2 | 4 | 10 | 2 | 20000 | 2.00 |
| 6 (No DPDCH) | 4 | 8 | 2 | 2 SF2 & 2 SF4 | 11484 | 5.76 |
| | 4 | 4 | 10 | | 20000 | 2.00 |
| 7 (No DPDCH) | 4 | 8 | 2 | 2 SF2 & 2 SF4 | 22996 | ? |
| | 4 | 4 | 10 | | 20000 | ? |

NOTE: When 4 codes are transmitted in parallel, two codes shall be transmitted with SF2 and two with SF4.
UE Categories 1 to 6 supports QPSK only. UE Category 7 supports QPSK and 16QAM. (TS25.306-7.3.0)

**HSPA, HSPA+ and DC-HSDPA Test Configuration**

Measurement is required for HSPA, HSPA+ or DC-HSDPA, a KDB inquiry is required to confirm that the wireless mode configurations in the test setup have remained stable throughout the SAR measurements.35 Without prior KDB confirmation to determine the SAR results are acceptable, a PBA is required for TCB approval.
SAR test exclusion for HSPA, HSPA+ and DC-HSDPA is determined according to the following:
1) The HSPA procedures are applied to configure 3GPP Rel. 6 HSPA devices in the required sub-test mode(s) to determine SAR test exclusion.
2) SAR is required for Rel. 7 HSPA+ when SAR is required for Rel. 6 HSPA; otherwise, the 3G SAR test reduction procedure is applied to (uplink) HSPA+ with 12.2 kbps RMC as the primary mode.36 Power is measured for HSPA+ that supports uplink 16 QAM according to configurations in Table C.11.1.4 of 3GPP TS 34.121-1 to determine SAR test reduction.
3) SAR is required for Rel. 8 DC-HSDPA when SAR is required for Rel. 5 HSDPA; otherwise, the 3G SAR test reduction procedure is applied to DC-HSDPA with 12.2 kbps RMC as the primary mode. Power is measured for DC-HSDPA according to the H-Set 12, FRC configuration in Table C.8.1.12 of 3GPP TS 34.121-1 to determine SAR test reduction. A primary and a secondary serving HS-DSCH Cell are required to perform the power measurement and for the results to be acceptable.
4) Regardless of whether a PBA is required, the following information must be verified and included in the SAR report for devices supporting HSPA, HSPA+ or DC-HSDPA: a) The output power measurement results and applicable release version(s) of 3GPP TS 34.121.

i) Power measurement difficulties due to test equipment setup or availability must be resolved between the grantee and its test lab.

b) The power measurement results are in agreement with the individual device implementation and specifications. When Enhanced MPR (E-MPR) applies, the normal MPR targets may be modified according to the Cubic Metric (CM) measured by the device, which must be taken into consideration.
c) The UE category, operating parameters, such as the β and Δ values used to configure the device for testing, power setback procedures described in 3GGPP TS 34.121 for the power measurements, and HSPA/HSPA+ channel conditions (active and stable) for the entire duration of the measurement according to the required E-TFCI and AG index values.

5) When SAR measurement is required, the test configurations, procedures and power measurement results must be clearly described to confirm that the required test parameters are used, including E-TFCI and AG index stability and output power conditions.

**Table 5.5: HS-DSCH UE category**

Table 5.1a: FDD HS-DSCH physical layer categories

| HS-DSCH category | Maximum number of HS-DSCH codes received | Minimum inter-TTI interval | Maximum number of bits of an HS-DSCH transport block received within an HS-DSCH TTI NOTE 1 | Total number of soft channel bits | Supported modulations without MIMO operation or dual cell operation | Supported modulations with MIMO operation and without dual cell operation | Supported modulations with dual cell operation |
|---|---|---|---|---|---|---|---|
| Category 1 | 5 | 3 | 7298 | 19200 | QPSK, 16QAM | Not applicable (MIMO not supported) | Not applicable (dual cell operation not supported) |
| Category 2 | 5 | 3 | 7298 | 28800 | | | |
| Category 3 | 5 | 2 | 7298 | 28800 | | | |
| Category 4 | 5 | 2 | 7298 | 38400 | | | |
| Category 5 | 5 | 1 | 7298 | 57600 | | | |
| Category 6 | 5 | 1 | 7298 | 67200 | | | |
| Category 7 | 10 | 1 | 14411 | 115200 | | | |
| Category 8 | 10 | 1 | 14411 | 134400 | | | |
| Category 9 | 15 | 1 | 20251 | 172800 | | | |
| Category 10 | 15 | 1 | 27952 | 172800 | | | |
| Category 11 | 5 | 2 | 3630 | 14400 | QPSK | | |
| Category 12 | 5 | 1 | 3630 | 28800 | | | |
| Category 13 | 15 | 1 | 35280 | 259200 | QPSK, 16QAM, 64QAM | | |
| Category 14 | 15 | 1 | 42192 | 259200 | | | |
| Category 15 | 15 | 1 | 23370 | 345600 | QPSK, 16QAM | | |
| Category 16 | 15 | 1 | 27952 | 345600 | | | |
| Category 17 NOTE 2 | 15 | 1 | 35280 | 259200 | QPSK, 16QAM, 64QAM | – | |
| | | | 23370 | 345600 | – | QPSK, 16QAM | |
| Category 18 NOTE 3 | 15 | 1 | 42192 | 259200 | QPSK, 16QAM, 64QAM | – | |
| | | | 27952 | 345600 | – | QPSK, 16QAM | |
| Category 19 | 15 | 1 | 35280 | 518400 | QPSK, 16QAM, 64QAM | | |
| Category 20 | 15 | 1 | 42192 | 518400 | | | |
| Category 21 | 15 | 1 | 23370 | 345600 | - | - | QPSK, 16QAM |
| Category 22 | 15 | 1 | 27952 | 345600 | | | |
| Category 23 | 15 | 1 | 35280 | 518400 | | | QPSK, 16QAM, 64QAM |
| Category 24 | 15 | 1 | 42192 | 518400 | | | |

### 5.3.3 LTE Test Configuration

LTE modes were tested according to FCC KDB 941225 D05 publication. Please see notes after the tabulated SAR data for required test configurations. Establishing connections with base station simulators ensure a consistent means for testing SAR and are recommended for evaluating SAR [4]. The R&S CMW500 was used for LTE output power measurements and SAR testing. Max power control was used so the UE transmits with maximum output power during SAR testing. SAR must be measured with the maximum TTI (transmit time interval) supported by the device in each LTE configuration.

**A) Spectrum Plots for RB Configurations**

A properly configured base station simulator was used for SAR tests and power measurements. Therefore, spectrum plots for RB configurations were not required to be included in this report.

**B) MPR**

MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36.101 Section 6.2.3 – 6.2.5 under Table 6.2.3-1.

**C) A-MPR**

A-MPR (Additional MPR) has been disabled for all SAR tests by setting NS=01 on the base station simulator.

**D) Largest channel bandwidth standalone SAR test requirements**

1) QPSK with 1 RB allocation

Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel. When the reported SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required for 1 RB allocation; otherwise, SAR is required for the remaining required test channels and only for the RB offset configuration with the highest output power for that channel. When the reported SAR of a required test channel is > 1.45 W/kg, SAR is required for all three RB offset configurations for that required test channel.

2) QPSK with 50% RB allocation

The procedures required for 1 RB allocation in 1) are applied to measure the SAR for QPSK with 50% RB allocation.

3) QPSK with 100% RB allocation

For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation in 1) and 2) are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.

4) Higher order modulations

For each modulation besides QPSK; e.g., 16-QAM, 64-QAM, apply the QPSK procedures in above sections to determine the QAM configurations that may need SAR measurement. For each configuration identified as required for testing, SAR is required only when the highest maximum output power for the configuration in the higher order modulation is > ½ dB higher than the same configuration in QPSK or when the reported SAR for the QPSK configuration is > 1.45 W/kg.

**E) Other channel bandwidth standalone SAR test requirements**

For the other channel bandwidths used by the device in a frequency band, apply all the procedures required for the largest channel bandwidth in section A) to determine the channels and RB configurations that need SAR testing and only measure SAR when the highest maximum output power of a configuration requiring testing in the smaller channel bandwidth is > ½ dB higher than the equivalent channel configurations in the largest channel bandwidth configuration or the *reported* SAR of a configuration for the largest channel bandwidth is > 1.45 W/kg.

### 5.3.4 Wi-Fi Test Configuration

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.

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.

A Wi-Fi device must be configured to transmit continuously at the required data rate, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools for SAR measurement.

### 5.3.5 BT Test Configuration

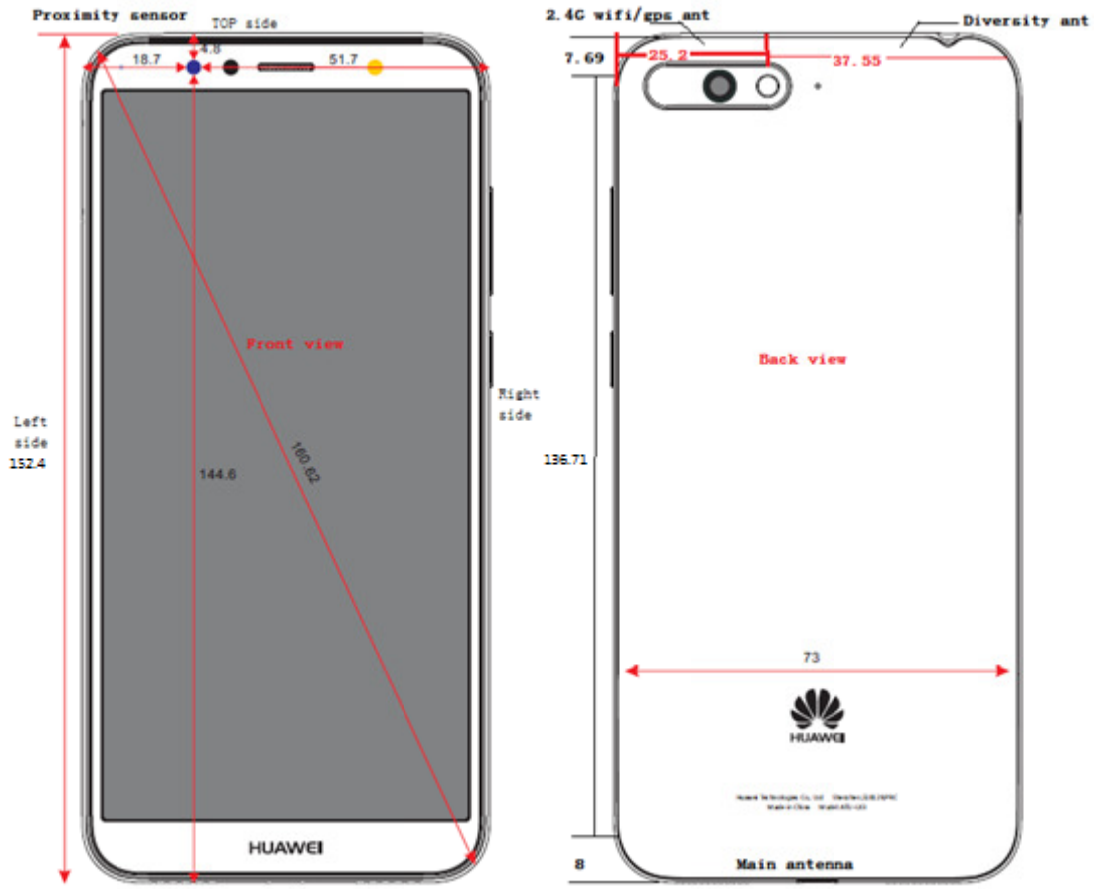
For BT SAR testing, BT engineering testing software installed on the EUT can provide continuous transmitting RF signal with maximum output power. And the CBT contrl the EUT operating with hoping off and data rate set for DH5.

### 5.1.1 IR Proximity sensor configuration

This device uses an infrared proximity sensor to facilitate triggering in typical user interactivity with the device.

Due to the operating configurations and exposure conditions required by the device, the proximity sensor is used to indicate when the phone is held close to a user's ear exposure condition or when the phone is used in body front side scenario exposure condition. It utilizes the proximity sensor to reduce the output power of Wi-Fi antenna when Wi-Fi and 2G&3G&4G main antenna voice mode transmit simultaneously in held-to-ear scenario or body front side scenario.

1) Antennas and sensor placement details

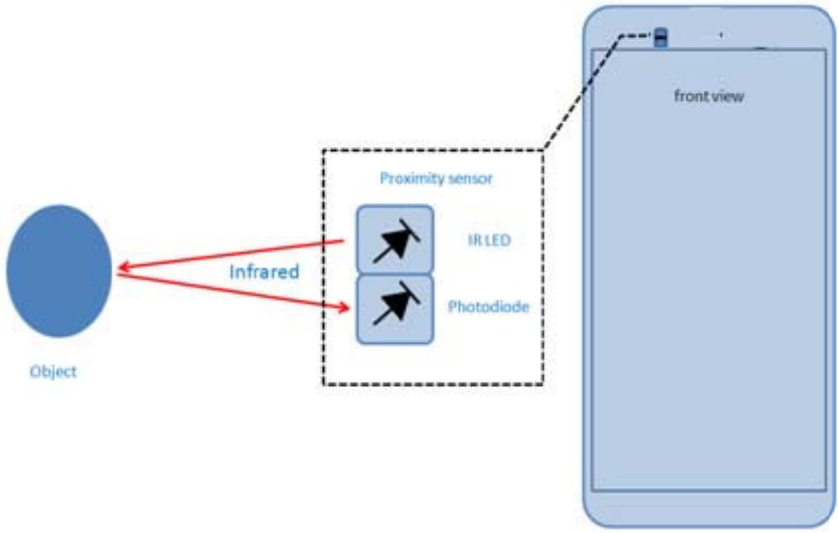



The location of the antennas and the IR proximity sensor

Note: The device has one GSM&UMTS&LTE main antenna and one WiFi 2.4G/BT antenna.

| Antenna and sensor distances (front view，unit: mm) | | | | | | |
|---|---|---|---|---|---|---|
| **Antenna** | **Front side** | **Back side** | **Left side** | **Right side** | **Top side** | **Bottom side** |
| Main Antenna | 0 | 0 | 0 | 0 | 152.4 | 0 |
| 2.4G WiFi Antenna | 0 | 0 | 37.55 | 0 | 0 | 152.4 |
| IR Proximity Sensor | 0 | 0 | 18.7 | 51.7 | 4.8 | 144.6 |
| **The IR proximity sensor locates on the front face of the device and detects objects approaching only from the front side** | | | | | | |

2) Proximity sensor clarifications

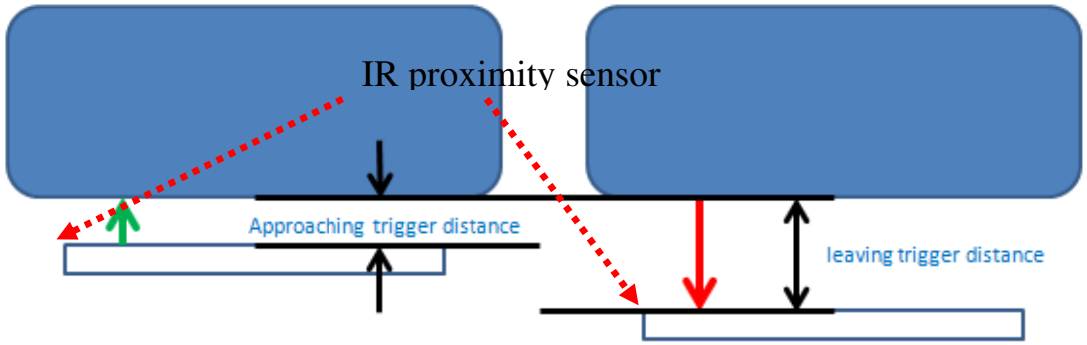



The picture of the proximity sensor

3) Proximity sensor coverage, distance and angle

**a) Procedures for determining proximity sensor triggering distances**

As the proximity sensor locates on the front face of the device and detects objects approaching only from the front side, so triggering distance only need to be checked for the front side of Wi-Fi band when Wi-Fi and 2G&3G&4G main antenna voice mode transmit simultaneously.




Proximity sensor triggering distances assessment (Front side)

The DUT is moved towards from the flat phantom:

| Distance between phantom to DUT in mm | 45 | 40 | 35 | 30 | 25 | 20 | 15 |
|---|---|---|---|---|---|---|---|
| Condition of Sensor in the front side of the device(under voice mode) | off | off | off | off | off | on | on |

The DUT is moved away from the flat phantom:

| Distance between phantom to DUT in mm | 75 | 70 | 65 | 60 | 55 | 50 | 45 |
|---|---|---|---|---|---|---|---|
| Condition of Sensor in the front side of the device(under voice mode) | off | off | off | off | off | on | on |

Conclusion: The Proximity sensor triggering distance is N mm (about 20-50 mm), so it can be ensured that the proximity sensor Power reduction is valid for the Head and body front side exposure condition.

**b) Procedures for determining antenna and proximity sensor coverage**

As the proximity sensor locates on the front face of the device and detects objects approaching only from the front side, so triggering distance only need to be checked for the front side of Wi-Fi band when Wi-Fi and 2G&3G&4G main antenna voice mode transmit simultaneously.

**c) Procedures for determining device tilt angle influences to proximity sensor triggering**

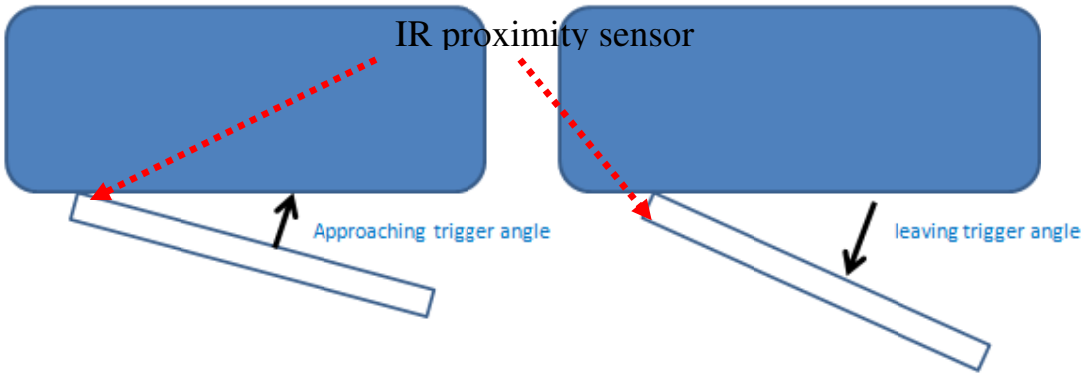
The following procedure is used to determine the triggering angle. Distance need to be check when device under voice mode so that sensor is working.

1）For Body exposure condition, as the proximity sensor triggering power reduction is only applicable for the front side, so tilt angle influences for the other edges does not need to be assessed.

2) For Head exposure condition, device tilt angle influences to proximity sensor triggering is determined as below:

Firstly, the DUT was positioned directly touch the SAM phantom (Left&Right hand touch cheek position) for each band. Rotate the DUT around the ear reference point of the phantom in 5° increments until the DUT is 15° or more away from the touch cheek position at 0°

Then the DUT is positioned at 15° or more away from the touch cheek position and moved towards the phantom in 5°increments until the DUT directly touch the SAM phantom at 0°(Left & Right hand touch cheek position).



The DUT is moved towards and away from SAM phantom.

| angle between phantom to DUT in degree | 0 | 5 | 10 | 15 | 20 | 25 | 30 |
|---|---|---|---|---|---|---|---|
| Condition of Sensor | on | on | on | on | on | on | on |

Based on the validation results above, angle tilt coverage can ensure that the proximity sensor is triggered for all the Head test positions(Left/Right Hand Touched cheek, Left/Right Hand tiled 15 °)

4) Summary SAR test Plan for Proximity sensor power reduction

To sum up, as the device uses proximity sensor triggering power reduction when Wi-Fi antenna transmits simultaneously with main antenna(Voice mode) in held-to-ear scenarios or body front face scenario, therefore:

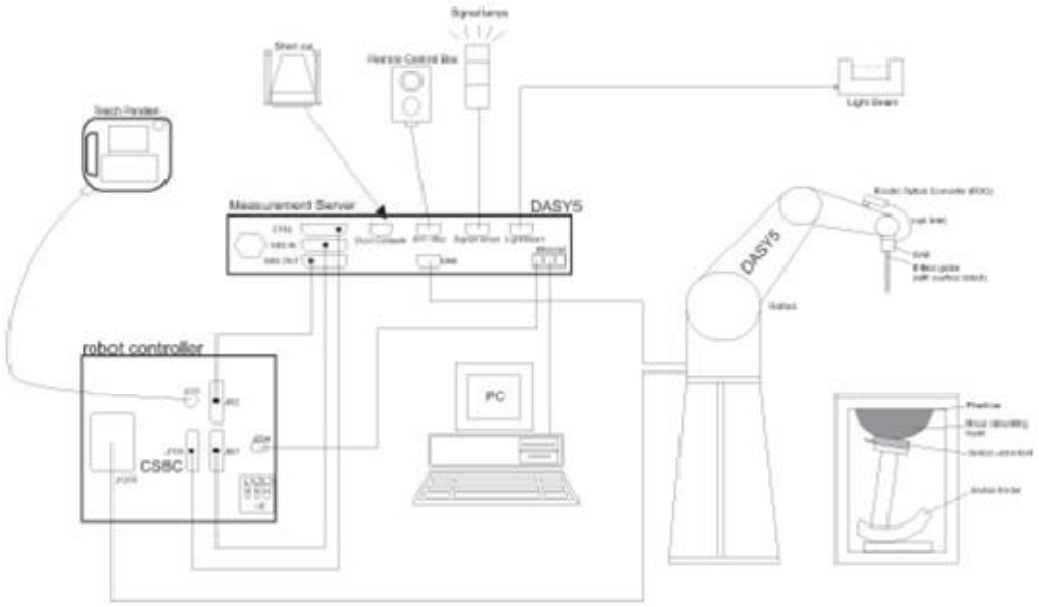
a) For Head SAR compliance: The standalone SAR compliance still uses the standalone SAR results tested at the maximum output power level without any power reduction. Additional Head SAR for Wi-Fi antenna is evaluated at reduced power levels when 2G&3G&4G antenna in voice mode and Wi-Fi antennas transmit simultaneously.

b) For Body SAR compliance, the standalone SAR compliance still uses the standalone SAR results tested at the maximum output power level without any power reduction.

# 6 SAR Measurements System Configuration

## 6.1 SAR Measurement Set-up

The DASY system 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 DASY software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

## 6.2 DASY5 E-field Probe System

The SAR measurements were conducted with the dosimetric probe EX3DV4 (manufactured by SPEAG), designed in the classical triangular configuration and optimized for dosimetric evaluation.

**EX3DV4 Probe Specification**

| | |
|---|---|
| Construction | Symmetrical design with triangular core<br>Built-in shielding against static charges<br>PEEK enclosure material (resistant to organic solvents, e.g., DGBE) |
| Calibration | ISO/IEC 17025 calibration service available |
| Frequency | 10 MHz to > 6 GHz<br>Linearity: ± 0.2 dB<br>(30 MHz to 6 GHz) |
| Directivity | ± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis) |
| Dynamic Range | 10 μW/g to > 100 mW/g Linearity: ± 0.2dB (noise: typically < 1 μW/g) |
| Dimensions | Overall length: 330 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm)<br>Typical distance from probe tip to dipole centers: 1 mm |
| Application | High precision dosimetric measurements in any exposure Scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%. |

**E-field Probe Calibration**

Each probe is calibrated according to a dosimetric assessment procedure with accuracy better than ± 10%. The spherical isotropy was evaluated and found to be better than ± 0.25dB. The sensitivity parameters (NormX, NormY, NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe are tested.

The free space E-field from amplified probe outputs is determined in a test chamber. This is performed in a TEM cell for frequencies bellow 1 GHz, and in a wave guide above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees.

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated brain tissue. The measured free space E-field in the medium correlates to temperature rise in a dielectric medium. For temperature correlation calibration a RF transparent thermistor-based

temperature probe is used in conjunction with the E-field probe.

$$SAR = C\Delta T / \Delta t$$

Where: $\Delta t$ = Exposure time (30 seconds),

$C$ = Heat capacity of tissue (brain or muscle),

$\Delta T$ = Temperature increase due to RF exposure.

Or

$$SAR = |E|^2 \sigma / \rho$$

Where: $\sigma$ = Simulated tissue conductivity,

$\rho$ = Tissue density (kg/m$^3$).

## 6.3 SAR Measurement Procedure

**Power Reference Measurement**

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

**Area Scan**

The area scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASY software can find the maximum found in the scanned area, within a range of the global maximum. The range (in 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 FCC 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: ΔxArea, ΔyArea | ≤ 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. | |

**Zoom Scan**

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

Zoom scan parameters extracted from FCC KDB 865664 D01 SAR measurement 100 MHz to 6 GHz.

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

**Volume Scan Procedures**

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

**Power Drift Monitoring**

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

# 7 Main Test Equipment

| Name of Equipment | Manufacturer | Type/Model | Serial Number | Last Cal. | Cal. Due Date |
|---|---|---|---|---|---|
| Network analyzer | Agilent | E5071B | MY42404014 | 2017-05-20 | 2018-05-19 |
| Dielectric Probe Kit | HP | 85070E | US44020115 | 2017-05-20 | 2018-05-19 |
| Power meter | Agilent | E4417A | GB41291714 | 2017-05-21 | 2018-05-20 |
| Power sensor | Agilent | N8481H | MY50350004 | 2017-05-21 | 2018-05-20 |
| Power sensor | Agilent | E9327A | US40441622 | 2017-05-20 | 2018-05-19 |
| Dual directional coupler | Agilent | 778D-012 | 50519 | 2017-05-21 | 2018-05-20 |
| Dual directional coupler | Agilent | 777D | 50146 | 2017-05-20 | 2018-05-19 |
| Amplifier | INDEXSAR | IXA-020 | 0401 | 2017-05-20 | 2018-05-19 |
| Wideband radio communication tester | R&S | CMW 500 | 113645 | 2017-05-20 | 2018-05-19 |
| BT Base Station Simulator | R&S | CBT | 100271 | 2017-05-14 | 2018-05-13 |
| E-field Probe | SPEAG | EX3DV4 | 3898 | 2017-06-27 | 2018-06-26 |
| DAE | SPEAG | DAE4 | 1291 | 2017-10-31 | 2018-10-30 |
| Validation Kit 835MHz | SPEAG | D835V2 | 4d020 | 2017-08-28 | 2020-08-27 |
| Validation Kit 1900MHz | SPEAG | D1900V2 | 5d060 | 2017-08-26 | 2020-08-25 |
| Validation Kit 2450MHz | SPEAG | D2450V2 | 786 | 2017-08-29 | 2020-08-28 |
| Validation Kit 2600MHz | SPEAG | D2600V2 | 1058 | 2017-06-27 | 2020-06-26 |
| Temperature Probe | Tianjin jinming | JM222 | AA1009129 | 2017-05-17 | 2018-05-16 |
| Hygrothermograph | Anymetr | NT-311 | 20150731 | 2017-05-17 | 2018-05-16 |
| Software for Test | Speag | DASY5 | 52.8.8.1222 | / | / |
| Software for Tissue | Agilent | 85070 | E06.01.36 | / | / |

# 8 Tissue Dielectric Parameter Measurements & System Verification

## 8.1 Tissue Verification

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.

**Target values**

| Frequency (MHz) | | Water (%) | Salt (%) | Sugar (%) | Glycol (%) | Preventol (%) | Cellulose (%) | $\varepsilon_r$ | σ(s/m) |
|---|---|---|---|---|---|---|---|---|---|
| Head | 835 | 41.45 | 1.45 | 56 | 0 | 0.1 | 1.0 | 41.5 | 0.90 |
| | 1900 | 55.242 | 0.306 | 0 | 44.452 | 0 | 0 | 40.0 | 1.40 |
| | 2450 | 62.7 | 0.5 | 0 | 36.8 | 0 | 0 | 39.2 | 1.80 |
| | 2600 | 55.242 | 0.306 | 0 | 44.452 | 0 | 0 | 39.0 | 1.96 |
| Body | 835 | 52.5 | 1.4 | 45 | 0 | 0.1 | 1.0 | 55.2 | 0.97 |
| | 1900 | 69.91 | 0.13 | 0 | 29.96 | 0 | 0 | 53.3 | 1.52 |
| | 2450 | 73.2 | 0.1 | 0 | 26.7 | 0 | 0 | 52.7 | 1.95 |
| | 2600 | 72.6 | 0.1 | 0 | 27.3 | 0 | 0 | 52.5 | 2.16 |

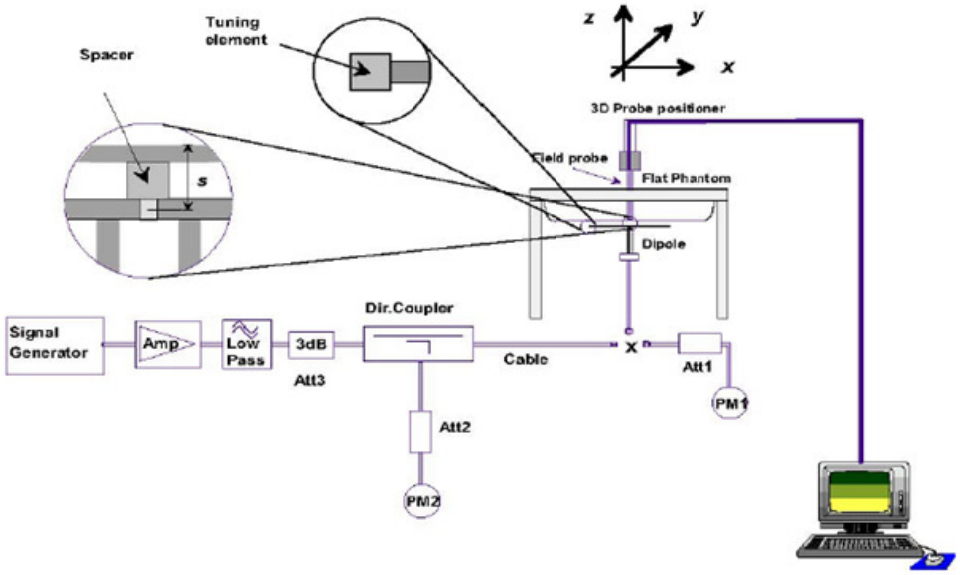
**Measurements results**

| Frequency (MHz) | | Test Date | Temp ℃ | Measured Dielectric Parameters | | Target Dielectric Parameters | | Limit (Within ±5%) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | $\varepsilon_r$ | σ(s/m) | $\varepsilon_r$ | σ(s/m) | Dev $\varepsilon_r$(%) | Dev σ(%) |
| 835 | Head | 2/26/2018 | 21.5 | 41.4 | 0.88 | 41.5 | 0.90 | -0.24 | -2.22 |
| | Body | 2/27/2018 | 21.5 | 54.2 | 0.96 | 55.2 | 0.97 | -1.81 | -1.03 |
| 1900 | Head | 2/26/2018 | 21.5 | 40.1 | 1.41 | 40.0 | 1.40 | 0.25 | 0.71 |
| | Body | 2/29/2018 | 21.5 | 52.6 | 1.51 | 53.3 | 1.52 | -1.31 | -0.66 |
| 2450 | Head | 3/7/2018 | 21.5 | 38.6 | 1.81 | 39.2 | 1.80 | -1.53 | 0.56 |
| | Body | 3/5/2018 | 21.5 | 52.5 | 1.98 | 52.7 | 1.95 | -0.38 | 1.54 |
| 2600 | Head | 2/28/2018 | 21.5 | 38.2 | 2.01 | 39.0 | 1.96 | -2.05 | 2.55 |
| | Body | 2/28/2018 | 21.5 | 51.5 | 2.23 | 52.5 | 2.16 | -1.90 | 3.24 |
| Note: 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. | | | | | | | | | |

## 8.2 System Performance Check

The manufacturer calibrates the probes annually. Dielectric parameters of the tissue simulates were measured using the dielectric probe kit and the network analyzer. A system check measurement for every day was made following the determination of the dielectric parameters of the Tissue simulates, using the dipole validation kit. The dipole antenna was placed under the flat section of the twin SAM phantom.

System check is performed regularly on all frequency bands where tests are performed with the DASY system.




**Picture 1 System Performance Check setup**

**Picture 2 Setup Photo**

**System Check results**

| Frequency (MHz) | | Test Date | Temp ℃ | 250mW Measured $SAR_{1g}$ (W/kg) | 1W Normalized $SAR_{1g}$ (W/kg) | 1W Target $SAR_{1g}$ (W/kg) | Δ % (Limit ±10%) | Plot No. |
|---|---|---|---|---|---|---|---|---|
| 835 | Head | 2/26/2018 | 21.5 | 2.44 | 9.76 | 9.45 | 3.28 | 1 |
| | Body | 2/27/2018 | 21.5 | 2.41 | 9.64 | 9.75 | -1.13 | 2 |
| 1900 | Head | 2/26/2018 | 21.5 | 9.88 | 39.52 | 40.10 | -1.45 | 3 |
| | Body | 2/29/2018 | 21.5 | 9.93 | 39.72 | 39.50 | 0.56 | 4 |
| 2450 | Head | 3/7/2018 | 21.5 | 13.70 | 54.80 | 52.60 | 4.18 | 5 |
| | Body | 3/5/2018 | 21.5 | 12.50 | 50.00 | 50.80 | -1.57 | 6 |
| 2600 | Head | 2/28/2018 | 21.5 | 13.90 | 55.60 | 57.00 | -2.46 | 7 |
| | Body | 2/28/2018 | 21.5 | 13.50 | 54.00 | 54.30 | -0.55 | 8 |
| Note：Target Values used derive from the calibration certificate Data Storage and Evaluation. | | | | | | | | |

# 9 Normal and Maximum Output Power

KDB 447498 D01 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.

## 9.1 GSM Mode

| GSM 850 | | Burst Average Power(dBm) | | | Division Factors (dB) | Frame-Average Power(dBm) | | | Burst Tune-up Limit (dBm) |
|---|---|---|---|---|---|---|---|---|---|
| Tx Channel | | 128 | 190 | 251 | | 128 | 190 | 251 | |
| Frequency(MHz) | | 824.2 | 836.6 | 848.8 | | 824.2 | 836.6 | 848.8 | |
| GSM(GMSK) | | 32.99 | 32.62 | 32.53 | 9.03 | 23.96 | 23.59 | 23.50 | 34.00 |
| GPRS (GMSK) | 1Txslot | 32.78 | 32.81 | 32.78 | 9.03 | **23.75** | **23.78** | **23.75** | 34.00 |
| | 2Txslots | 29.66 | 29.68 | 29.68 | 6.02 | 23.64 | 23.66 | 23.66 | 31.00 |
| | 3Txslots | 27.85 | 27.82 | 27.95 | 4.26 | 23.59 | 23.56 | 23.69 | 29.00 |
| | 4Txslots | 26.68 | 26.65 | 26.67 | 3.01 | 23.67 | 23.64 | 23.66 | 28.00 |
| EGPRS (GMSK) | 1Txslot | 32.65 | 32.64 | 32.65 | 9.03 | 23.62 | 23.61 | 23.62 | 34.00 |
| | 2Txslots | 29.57 | 29.66 | 29.62 | 6.02 | 23.55 | 23.64 | 23.60 | 31.00 |
| | 3Txslots | 27.89 | 27.84 | 27.86 | 4.26 | 23.63 | 23.58 | 23.60 | 29.00 |
| | 4Txslots | 26.61 | 26.68 | 26.64 | 3.01 | 23.60 | 23.67 | 23.63 | 28.00 |
| EGPRS (8PSK) | 1Txslot | 25.19 | 24.89 | 24.55 | 9.03 | 16.16 | 15.86 | 15.52 | 26.50 |
| | 2Txslots | 22.76 | 22.41 | 22.28 | 6.02 | 16.74 | 16.39 | 16.26 | 24.00 |
| | 3Txslots | 20.82 | 20.33 | 20.14 | 4.26 | 16.56 | 16.07 | 15.88 | 21.50 |
| | 4Txslots | 19.80 | 19.66 | 19.00 | 3.01 | 16.79 | 16.65 | 15.99 | 20.50 |
| GSM 1900 (Hotspot Off) | | Power(dBm) | | | Division Factors (dB) | Power(dBm) | | | Burst Tune-up Limit (dBm) |
| Tx Channel | | 512 | 661 | 810 | | 512 | 661 | 810 | |
| Frequency(MHz) | | 1850.2 | 1880 | 1909.8 | | 1850.2 | 1880 | 1909.8 | |
| GSM(GMSK) | | 30.20 | 30.17 | 30.14 | 9.03 | 21.17 | 21.14 | 21.11 | 31.00 |
| GPRS (GMSK) | 1Txslot | 30.45 | 30.34 | 30.21 | 9.03 | **21.42** | **21.31** | **21.18** | 31.00 |
| | 2Txslots | 27.14 | 27.23 | 27.27 | 6.02 | 21.12 | 21.21 | 21.25 | 27.50 |
| | 3Txslots | 25.37 | 25.25 | 25.17 | 4.26 | 21.11 | 20.99 | 20.91 | 25.50 |
| | 4Txslots | 24.20 | 24.31 | 24.24 | 3.01 | 21.19 | 21.30 | 21.23 | 24.50 |
| EGPRS (GMSK) | 1Txslot | 30.40 | 30.32 | 30.13 | 9.03 | 21.37 | 21.29 | 21.10 | 31.00 |
| | 2Txslots | 27.11 | 27.22 | 27.14 | 6.02 | 21.09 | 21.20 | 21.12 | 27.50 |
| | 3Txslots | 25.36 | 25.21 | 25.12 | 4.26 | 21.10 | 20.95 | 20.86 | 25.50 |
| | 4Txslots | 24.16 | 24.22 | 24.20 | 3.01 | 21.15 | 21.21 | 21.19 | 24.50 |
| EGPRS (8PSK) | 1Txslot | 24.43 | 24.35 | 24.28 | 9.03 | 15.40 | 15.32 | 15.25 | 25.50 |
| | 2Txslots | 22.37 | 22.48 | 22.35 | 6.02 | 16.35 | 16.46 | 16.33 | 22.50 |
| | 3Txslots | 20.32 | 20.37 | 20.36 | 4.26 | 16.06 | 16.11 | 16.10 | 20.50 |
| | 4Txslots | 19.31 | 19.37 | 19.32 | 3.01 | 16.30 | 16.36 | 16.31 | 19.50 |

| GSM 1900 (Hotspot On) | | Power(dBm) | | | Division Factors (dB) | Power(dBm) | | | Burst Tune-up Limit (dBm) |
|---|---|---|---|---|---|---|---|---|---|
| Tx Channel | | 512 | 661 | 810 | | 512 | 661 | 810 | |
| Frequency(MHz) | | 1850.2 | 1880 | 1909.8 | | 1850.2 | 1880 | 1909.8 | |
| GSM(GMSK) | | 28.45 | 28.25 | 28.19 | 9.03 | 19.42 | 19.22 | 19.16 | 29.00 |
| GPRS (GMSK) | 1Txslot | 28.62 | 28.54 | 28.12 | 9.03 | **19.59** | **19.51** | **19.09** | 29.00 |
| | 2Txslots | 25.23 | 25.32 | 25.21 | 6.02 | 19.21 | 19.30 | 19.19 | 25.50 |
| | 3Txslots | 23.32 | 23.38 | 22.87 | 4.26 | 19.06 | 19.12 | 18.61 | 23.50 |
| | 4Txslots | 22.11 | 22.29 | 22.35 | 3.01 | 19.10 | 19.28 | 19.34 | 22.50 |
| EGPRS (GMSK) | 1Txslot | 28.56 | 28.52 | 28.12 | 9.03 | 19.53 | 19.49 | 19.09 | 29.00 |
| | 2Txslots | 25.20 | 25.33 | 25.26 | 6.02 | 19.18 | 19.31 | 19.24 | 25.50 |
| | 3Txslots | 23.27 | 23.35 | 22.73 | 4.26 | 19.01 | 19.09 | 18.47 | 23.50 |
| | 4Txslots | 22.01 | 22.23 | 22.37 | 3.01 | 19.00 | 19.22 | 19.36 | 22.50 |
| EGPRS (8PSK) | 1Txslot | 22.77 | 22.68 | 22.28 | 9.03 | 13.74 | 13.65 | 13.25 | 23.50 |
| | 2Txslots | 20.11 | 20.19 | 20.12 | 6.02 | 14.09 | 14.17 | 14.10 | 20.50 |
| | 3Txslots | 18.32 | 18.35 | 17.23 | 4.26 | 14.06 | 14.09 | 12.97 | 18.50 |
| | 4Txslots | 17.25 | 17.32 | 17.36 | 3.01 | 14.24 | 14.31 | 14.35 | 17.50 |

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

1. Standalone: GSM 850 GMSK (GPRS) mode with 1 time slot for Max power, GSM 1900 GMSK (GPRS) mode with 1 time slot for Max power, based on the output power measurements above.
2. SAR is not required for EGPRS (8PSK) mode because its output power is less than that of GPRS Mode.

## 9.2 WCDMA Mode

The following tests were completed according to the test requirements outlined in the 3GPP TS34.121 specification.

| WCDMA | | Band II(dBm) (Hopspot Off) | | | | Band II(dBm) (Hopspot On) | | | | Band V(dBm) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tx Channel | | 9262 | 9400 | 9538 | Tune-up Limit (dBm) | 9262 | 9400 | 9538 | Tune-up Limit (dBm) | 4132 | 4183 | 4233 | Tune-up Limit (dBm) |
| Frequency(MHz) | | 1852.4 | 1880 | 1907.6 | | 1852.4 | 1880 | 1907.6 | | 826.4 | 836.6 | 846.6 | |
| RMC | 12.2kbps | 23.20 | 23.10 | 23.12 | 24.50 | 19.03 | 19.04 | 18.82 | 22.50 | 23.86 | 23.78 | 23.85 | 25.00 |
| | 64kbps | 23.19 | 23.10 | 23.11 | 24.50 | 19.02 | 19.03 | 18.81 | 22.50 | 23.86 | 23.77 | 23.84 | 25.00 |
| | 144kbps | 23.18 | 23.08 | 23.11 | 24.50 | 19.00 | 19.03 | 18.80 | 22.50 | 23.84 | 23.74 | 23.82 | 25.00 |
| | 384kbps | 23.18 | 23.09 | 23.10 | 24.50 | 19.01 | 19.02 | 18.80 | 22.50 | 23.85 | 23.75 | 23.83 | 25.00 |
| HSDPA | Sub 1 | 22.25 | 22.05 | 22.14 | 23.50 | 18.12 | 18.01 | 18.00 | 21.50 | 22.77 | 22.71 | 22.76 | 24.00 |
| | Sub 2 | 22.24 | 22.06 | 22.09 | 23.50 | 17.92 | 17.82 | 17.96 | 21.50 | 22.81 | 22.77 | 22.74 | 24.00 |
| | Sub 3 | 21.68 | 21.58 | 21.60 | 23.00 | 17.45 | 17.45 | 17.40 | 21.00 | 22.26 | 22.30 | 22.33 | 23.50 |
| | Sub 4 | 21.78 | 21.59 | 21.60 | 23.00 | 17.59 | 17.57 | 17.51 | 21.00 | 22.33 | 22.32 | 22.30 | 23.50 |
| HSUPA | Sub 1 | 22.31 | 22.14 | 22.15 | 23.00 | 18.00 | 17.90 | 17.92 | 21.00 | 22.76 | 22.80 | 22.82 | 24.00 |
| | Sub 2 | 21.71 | 21.62 | 21.63 | 22.50 | 17.53 | 17.53 | 17.52 | 20.50 | 22.41 | 22.30 | 22.31 | 23.00 |
| | Sub 3 | 21.88 | 21.74 | 21.87 | 22.00 | 17.88 | 17.87 | 17.91 | 20.00 | 22.87 | 22.78 | 22.84 | 23.00 |
| | Sub 4 | 22.27 | 22.09 | 22.17 | 23.00 | 17.99 | 17.89 | 17.88 | 21.00 | 22.87 | 22.81 | 22.78 | 23.50 |
| | Sub 5 | 22.23 | 22.07 | 22.17 | 23.50 | 17.92 | 17.84 | 17.86 | 21.50 | 22.81 | 22.80 | 22.81 | 24.00 |
| DC-HSDPA | Sub 1 | 22.11 | 22.01 | 22.03 | 23.50 | 18.06 | 18.07 | 17.95 | 21.50 | 22.74 | 22.69 | 22.76 | 24.00 |
| | Sub 2 | 22.10 | 22.01 | 22.02 | 23.50 | 18.05 | 18.06 | 17.94 | 21.50 | 22.77 | 22.68 | 22.75 | 24.00 |
| | Sub 3 | 22.09 | 21.99 | 22.00 | 23.50 | 18.05 | 18.03 | 17.93 | 21.50 | 22.75 | 22.65 | 22.72 | 24.00 |
| | Sub 4 | 22.04 | 22.00 | 22.01 | 23.50 | 18.01 | 18.05 | 17.90 | 21.50 | 22.76 | 22.64 | 22.74 | 24.00 |

Note: 1.Per KDB 941225 D01, SAR for Head / Hotspot / Body-worn exposure is measured using a 12.2 kbps AMR with TPC bits configured to all “1’s”.

2. 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.

## 9.3 LTE Mode

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

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

| Modulation | Channel bandwidth / Transmission bandwidth ($N_{RB}$) | | | | | | 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 |

| LTE FDD Band 5 | | | | Conducted Power(dBm) | | | Tune-up Limit (dBm) |
|---|---|---|---|---|---|---|---|
| Bandwidth | Modulation | RB size | RB offset | Channel/Frequency (MHz) | | | |
| | | | | 20407/824.7 | 20525/836.5 | 20643/848.3 | |
| 1.4MHz | QPSK | 1 | 0 | 23.28 | 23.47 | 23.43 | 24.50 |
| | | 1 | 2 | 23.42 | 23.64 | 23.55 | 24.50 |
| | | 1 | 5 | 23.37 | 23.44 | 23.55 | 24.50 |
| | | 3 | 0 | 23.26 | 23.31 | 23.32 | 24.50 |
| | | 3 | 2 | 23.19 | 23.33 | 23.35 | 24.50 |
| | | 3 | 3 | 23.26 | 23.23 | 23.32 | 24.50 |
| | | 6 | 0 | 22.29 | 22.37 | 22.47 | 23.50 |
| | 16QAM | 1 | 0 | 21.96 | 21.85 | 21.99 | 23.50 |
| | | 1 | 2 | 22.23 | 22.13 | 22.22 | 23.50 |
| | | 1 | 5 | 22.09 | 22.07 | 22.12 | 23.50 |
| | | 3 | 0 | 22.12 | 22.13 | 22.27 | 23.50 |
| | | 3 | 2 | 22.24 | 22.25 | 22.28 | 23.50 |
| | | 3 | 3 | 22.08 | 22.20 | 22.14 | 23.50 |
| | | 6 | 0 | 21.20 | 21.48 | 21.36 | 22.50 |
| Bandwidth | Modulation | RB size | RB offset | Channel/Frequency (MHz) | | | Tune-up Limit (dBm) |
| | | | | 20415/825.5 | 20525/836.5 | 20635/847.5 | |
| 3MHz | QPSK | 1 | 0 | 23.30 | 23.51 | 23.46 | 24.50 |
| | | 1 | 7 | 23.45 | 23.69 | 23.59 | 24.50 |
| | | 1 | 14 | 23.40 | 23.49 | 23.59 | 24.50 |
| | | 8 | 0 | 22.36 | 22.43 | 22.45 | 23.50 |
| | | 8 | 4 | 22.31 | 22.43 | 22.47 | 23.50 |
| | | 8 | 7 | 22.36 | 22.34 | 22.42 | 23.50 |
| | | 15 | 0 | 22.32 | 22.41 | 22.50 | 23.50 |
| | 16QAM | 1 | 0 | 21.99 | 21.87 | 22.02 | 23.50 |
| | | 1 | 7 | 22.26 | 22.18 | 22.26 | 23.50 |
| | | 1 | 14 | 22.11 | 22.11 | 22.15 | 23.50 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | 8 | 0 | 21.23 | 21.26 | 21.39 | 22.50 |
| | | 8 | 4 | 21.35 | 21.38 | 21.40 | 22.50 |
| | | 8 | 7 | 21.18 | 21.32 | 21.27 | 22.50 |
| | | 15 | 0 | 21.23 | 21.52 | 21.39 | 22.50 |
| **Bandwidth** | Modulation | RB size | RB offset | Channel/Frequency (MHz) | | | Tune-up Limit (dBm) |
| | | | | 20425/826.5 | 20525/836.5 | 20625/846.5 | |
| **5MHz** | QPSK | 1 | 0 | 23.27 | 23.49 | 23.42 | 24.50 |
| | | 1 | 13 | 23.43 | 23.65 | 23.56 | 24.50 |
| | | 1 | 24 | 23.37 | 23.44 | 23.55 | 24.50 |
| | | 12 | 0 | 22.33 | 22.38 | 22.41 | 23.50 |
| | | 12 | 6 | 22.29 | 22.39 | 22.42 | 23.50 |
| | | 12 | 13 | 22.34 | 22.32 | 22.38 | 23.50 |
| | | 25 | 0 | 22.30 | 22.40 | 22.48 | 23.50 |
| | 16QAM | 1 | 0 | 21.96 | 21.83 | 21.99 | 23.50 |
| | | 1 | 13 | 22.23 | 22.16 | 22.23 | 23.50 |
| | | 1 | 24 | 22.08 | 22.09 | 22.11 | 23.50 |
| | | 12 | 0 | 21.21 | 21.22 | 21.36 | 22.50 |
| | | 12 | 6 | 21.32 | 21.33 | 21.36 | 22.50 |
| | | 12 | 13 | 21.15 | 21.27 | 21.23 | 22.50 |
| | | 25 | 0 | 21.21 | 21.48 | 21.34 | 22.50 |
| **Bandwidth** | Modulation | RB size | RB offset | Channel/Frequency (MHz) | | | Tune-up Limit (dBm) |
| | | | | 20450/829 | 20525/836.5 | 20600/844 | |
| **10MHz** | QPSK | 1 | 0 | 23.25 | 23.42 | 23.40 | 24.50 |
| | | 1 | 25 | 23.43 | 23.65 | 23.55 | 24.50 |
| | | 1 | 49 | 23.34 | 23.42 | 23.51 | 24.50 |
| | | 25 | 0 | 22.31 | 22.34 | 22.38 | 23.50 |
| | | 25 | 13 | 22.27 | 22.35 | 22.39 | 23.50 |
| | | 25 | 25 | 22.30 | 22.28 | 22.35 | 23.50 |
| | | 50 | 0 | 22.33 | 22.33 | 22.43 | 23.50 |
| | 16QAM | 1 | 0 | 21.91 | 21.80 | 21.94 | 23.50 |
| | | 1 | 25 | 22.20 | 22.15 | 22.20 | 23.50 |
| | | 1 | 49 | 22.06 | 22.04 | 22.09 | 23.50 |
| | | 25 | 0 | 21.18 | 21.21 | 21.34 | 22.50 |
| | | 25 | 13 | 21.28 | 21.30 | 21.32 | 22.50 |
| | | 25 | 25 | 21.13 | 21.23 | 21.20 | 22.50 |
| | | 50 | 0 | 21.19 | 21.44 | 21.31 | 22.50 |

| LTE FDD Band 7 (Hotspot Off) | | | | Conducted Power(dBm) | | | Tune-up Limit (dBm) |
|---|---|---|---|---|---|---|---|
| Bandwidth | Modulation | RB size | RB offset | Channel/Frequency (MHz) | | | |
| | | | | 20775/2502.5 | 21100/2535 | 21425/2567.5 | |
| 5MHz | QPSK | 1 | 0 | 22.73 | 22.64 | 22.76 | 24.00 |
| | | 1 | 13 | 22.78 | 22.78 | 22.81 | 24.00 |
| | | 1 | 24 | 22.75 | 22.54 | 22.68 | 24.00 |
| | | 12 | 0 | 21.80 | 21.72 | 21.64 | 23.00 |
| | | 12 | 6 | 21.78 | 21.68 | 21.73 | 23.00 |
| | | 12 | 13 | 21.72 | 21.60 | 21.54 | 23.00 |
| | | 25 | 0 | 21.65 | 21.62 | 21.65 | 23.00 |
| | 16QAM | 1 | 0 | 21.32 | 21.33 | 21.33 | 23.00 |
| | | 1 | 13 | 21.29 | 21.13 | 21.36 | 23.00 |
| | | 1 | 24 | 21.23 | 21.27 | 21.21 | 23.00 |
| | | 12 | 0 | 20.86 | 20.58 | 20.63 | 22.00 |
| | | 12 | 6 | 20.72 | 20.63 | 20.60 | 22.00 |
| | | 12 | 13 | 20.56 | 20.59 | 20.51 | 22.00 |
| | | 25 | 0 | 20.58 | 20.55 | 20.54 | 22.00 |
| Bandwidth | Modulation | RB size | RB offset | Channel/Frequency (MHz) | | | Tune-up Limit (dBm) |
| | | | | 20800/2505 | 21100/2535 | 21400/2565 | |
| 10MHz | QPSK | 1 | 0 | 22.75 | 22.65 | 22.79 | 24.00 |
| | | 1 | 25 | 22.81 | 22.83 | 22.85 | 24.00 |
| | | 1 | 49 | 22.77 | 22.58 | 22.71 | 24.00 |
| | | 25 | 0 | 21.83 | 21.77 | 21.68 | 23.00 |
| | | 25 | 13 | 21.81 | 21.73 | 21.77 | 23.00 |
| | | 25 | 25 | 21.74 | 21.64 | 21.59 | 23.00 |
| | | 50 | 0 | 21.73 | 21.64 | 21.69 | 23.00 |
| | 16QAM | 1 | 0 | 21.34 | 21.36 | 21.35 | 23.00 |
| | | 1 | 25 | 21.32 | 21.17 | 21.39 | 23.00 |
| | | 1 | 49 | 21.26 | 21.29 | 21.24 | 23.00 |
| | | 25 | 0 | 20.89 | 20.63 | 20.67 | 22.00 |
| | | 25 | 13 | 20.74 | 20.67 | 20.63 | 22.00 |
| | | 25 | 25 | 20.59 | 20.64 | 20.55 | 22.00 |
| | | 50 | 0 | 20.61 | 20.60 | 20.58 | 22.00 |
| Bandwidth | Modulation | RB size | RB offset | Channel/Frequency (MHz) | | | Tune-up Limit (dBm) |
| | | | | 20825/2507.5 | 21100/2535 | 21375/2562.5 | |
| 15MHz | QPSK | 1 | 0 | 22.74 | 22.61 | 22.77 | 24.00 |
| | | 1 | 38 | 22.79 | 22.82 | 22.82 | 24.00 |
| | | 1 | 74 | 22.74 | 22.53 | 22.67 | 24.00 |
| | | 36 | 0 | 21.81 | 21.73 | 21.65 | 23.00 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | 36 | 18 | 21.78 | 21.68 | 21.73 | 23.00 |
| | | 36 | 39 | 21.71 | 21.61 | 21.55 | 23.00 |
| | | 75 | 0 | 21.71 | 21.60 | 21.64 | 23.00 |
| | | 1 | 0 | 21.29 | 21.34 | 21.33 | 23.00 |
| | | 1 | 38 | 21.30 | 21.14 | 21.37 | 23.00 |
| | | 1 | 74 | 21.23 | 21.25 | 21.21 | 23.00 |
| | 16QAM | 36 | 0 | 20.86 | 20.61 | 20.64 | 22.00 |
| | | 36 | 18 | 20.71 | 20.62 | 20.59 | 22.00 |
| | | 36 | 39 | 20.57 | 20.60 | 20.52 | 22.00 |
| | | 75 | 0 | 20.58 | 20.55 | 20.54 | 22.00 |

| **Bandwidth** | Modulation | RB size | RB offset | Channel/Frequency (MHz) | | | Tune-up Limit (dBm) |
|---|---|---|---|---|---|---|---|
| | | | | 20850/2510 | 21100/2535 | 21350/2560 | |
| **20MHz** | QPSK | 1 | 0 | 22.71 | 22.57 | 22.74 | 24.00 |
| | | 1 | 50 | 22.78 | 22.78 | 22.80 | 24.00 |
| | | 1 | 99 | 22.72 | 22.52 | 22.64 | 24.00 |
| | | 50 | 0 | 21.78 | 21.68 | 21.61 | 23.00 |
| | | 50 | 25 | 21.76 | 21.64 | 21.70 | 23.00 |
| | | 50 | 50 | 21.68 | 21.56 | 21.51 | 23.00 |
| | | 100 | 0 | 21.68 | 21.55 | 21.60 | 23.00 |
| | 16QAM | 1 | 0 | 21.27 | 21.30 | 21.28 | 23.00 |
| | | 1 | 50 | 21.26 | 21.12 | 21.33 | 23.00 |
| | | 1 | 99 | 21.21 | 21.22 | 21.19 | 23.00 |
| | | 50 | 0 | 20.83 | 20.57 | 20.61 | 22.00 |
| | | 50 | 25 | 20.68 | 20.60 | 20.56 | 22.00 |
| | | 50 | 50 | 20.54 | 20.55 | 20.48 | 22.00 |
| | | 100 | 0 | 20.56 | 20.51 | 20.51 | 22.00 |

| **LTE FDD Band 7 (Hotspot On)** | | | | **Conducted Power(dBm)** | | | Tune-up Limit (dBm) |
|---|---|---|---|---|---|---|---|
| **Bandwidth** | Modulation | RB size | RB offset | Channel/Frequency (MHz) | | | |
| | | | | 20775/2502.5 | 21100/2535 | 21425/2567.5 | |
| **5MHz** | QPSK | 1 | 0 | 20.65 | 20.83 | 20.75 | 22.00 |
| | | 1 | 13 | 20.77 | 20.78 | 20.82 | 22.00 |
| | | 1 | 24 | 20.58 | 20.69 | 20.65 | 22.00 |
| | | 12 | 0 | 20.76 | 20.76 | 20.70 | 22.00 |
| | | 12 | 6 | 20.73 | 20.72 | 20.69 | 22.00 |
| | | 12 | 13 | 20.68 | 20.63 | 20.50 | 22.00 |
| | | 25 | 0 | 20.62 | 20.77 | 20.74 | 22.00 |
| | 16QAM | 1 | 0 | 20.47 | 20.40 | 20.70 | 22.00 |
| | | 1 | 13 | 20.76 | 20.67 | 20.81 | 22.00 |
| | | 1 | 24 | 20.36 | 20.38 | 20.38 | 22.00 |
| | | 12 | 0 | 20.68 | 20.64 | 20.60 | 22.00 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | 12 | 6 | 20.73 | 20.82 | 20.78 | 22.00 |
| | | 12 | 13 | 20.68 | 20.75 | 20.59 | 22.00 |
| | | 25 | 0 | 20.57 | 20.69 | 20.71 | 22.00 |
| **Bandwidth** | Modulation | RB size | RB offset | Channel/Frequency (MHz) | | | Tune-up Limit (dBm) |
| | | | | 20800/2505 | 21100/2535 | 21400/2565 | |
| **10MHz** | QPSK | 1 | 0 | 20.67 | 20.84 | 20.78 | 22.00 |
| | | 1 | 25 | 20.80 | 20.83 | 20.86 | 22.00 |
| | | 1 | 49 | 20.60 | 20.73 | 20.68 | 22.00 |
| | | 25 | 0 | 20.79 | 20.81 | 20.74 | 22.00 |
| | | 25 | 13 | 20.76 | 20.77 | 20.73 | 22.00 |
| | | 25 | 25 | 20.70 | 20.67 | 20.55 | 22.00 |
| | | 50 | 0 | 20.70 | 20.79 | 20.78 | 22.00 |
| | 16QAM | 1 | 0 | 20.49 | 20.43 | 20.72 | 22.00 |
| | | 1 | 25 | 20.79 | 20.71 | 20.84 | 22.00 |
| | | 1 | 49 | 20.39 | 20.40 | 20.41 | 22.00 |
| | | 25 | 0 | 20.71 | 20.69 | 20.64 | 22.00 |
| | | 25 | 13 | 20.75 | 20.86 | 20.81 | 22.00 |
| | | 25 | 25 | 20.71 | 20.80 | 20.63 | 22.00 |
| | | 50 | 0 | 20.60 | 20.74 | 20.75 | 22.00 |
| **Bandwidth** | Modulation | RB size | RB offset | Channel/Frequency (MHz) | | | Tune-up Limit (dBm) |
| | | | | 20825/2507.5 | 21100/2535 | 21375/2562.5 | |
| **15MHz** | QPSK | 1 | 0 | 20.66 | 20.80 | 20.76 | 22.00 |
| | | 1 | 38 | 20.78 | 20.82 | 20.83 | 22.00 |
| | | 1 | 74 | 20.57 | 20.68 | 20.64 | 22.00 |
| | | 36 | 0 | 20.77 | 20.77 | 20.71 | 22.00 |
| | | 36 | 18 | 20.73 | 20.72 | 20.69 | 22.00 |
| | | 36 | 39 | 20.67 | 20.64 | 20.51 | 22.00 |
| | | 75 | 0 | 20.68 | 20.75 | 20.73 | 22.00 |
| | 16QAM | 1 | 0 | 20.44 | 20.41 | 20.70 | 22.00 |
| | | 1 | 38 | 20.77 | 20.68 | 20.82 | 22.00 |
| | | 1 | 74 | 20.36 | 20.36 | 20.38 | 22.00 |
| | | 36 | 0 | 20.68 | 20.67 | 20.61 | 22.00 |
| | | 36 | 18 | 20.72 | 20.81 | 20.77 | 22.00 |
| | | 36 | 39 | 20.69 | 20.76 | 20.60 | 22.00 |
| | | 75 | 0 | 20.57 | 20.69 | 20.71 | 22.00 |
| **Bandwidth** | Modulation | RB size | RB offset | Channel/Frequency (MHz) | | | Tune-up Limit (dBm) |
| | | | | 20850/2510 | 21100/2535 | 21350/2560 | |
| **20MHz** | QPSK | 1 | 0 | 20.63 | 20.76 | 20.73 | 22.00 |
| | | 1 | 50 | 20.77 | 20.78 | 20.81 | 22.00 |
| | | 1 | 99 | 20.55 | 20.67 | 20.61 | 22.00 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | 50 | 0 | 20.74 | 20.72 | 20.67 | 22.00 |
| | | 50 | 25 | 20.71 | 20.68 | 20.66 | 22.00 |
| | | 50 | 50 | 20.64 | 20.59 | 20.47 | 22.00 |
| | | 100 | 0 | 20.65 | 20.70 | 20.69 | 22.00 |
| | 16QAM | 1 | 0 | 20.42 | 20.37 | 20.65 | 22.00 |
| | | 1 | 50 | 20.73 | 20.66 | 20.78 | 22.00 |
| | | 1 | 99 | 20.34 | 20.33 | 20.36 | 22.00 |
| | | 50 | 0 | 20.65 | 20.63 | 20.58 | 22.00 |
| | | 50 | 25 | 20.69 | 20.79 | 20.74 | 22.00 |
| | | 50 | 50 | 20.66 | 20.71 | 20.56 | 22.00 |
| | | 100 | 0 | 20.55 | 20.65 | 20.68 | 22.00 |

## 9.4 WLAN Mode

| Wi-Fi 2.4G (WIFI data standalone) | Channel | Frequency (MHz) | Average Conducted Power (dBm) for Data Rates (bps) | Tune-up Limit (dBm) | TX Power Setting level |
|---|---|---|---|---|---|
| Mode | | | 1M | | |
| 802.11b | 1 | 2412 | 17.05 | 18.50 | 17.5 |
| | 6 | 2437 | 17.61 | 18.50 | 17.5 |
| | 11 | 2462 | 17.17 | 18.50 | 17.5 |
| Mode | Channel | Frequency (MHz) | 6M | Tune-up Limit (dBm) | TX Power Setting level |
| 802.11g | 1 | 2412 | 14.18 | 15.50 | 14.5 |
| | 2 | 2417 | 16.55 | 18.00 | 17.0 |
| | 3 | 2422 | 16.69 | 18.00 | 17.0 |
| | 6 | 2437 | 16.73 | 18.00 | 17.0 |
| | 9 | 2452 | 16.71 | 18.00 | 17.0 |
| | 10 | 2457 | 16.66 | 18.00 | 17.0 |
| | 11 | 2462 | 15.61 | 17.00 | 16.0 |
| Mode | Channel | Frequency (MHz) | 6.5M | Tune-up Limit (dBm) | TX Power Setting level |
| 802.11n (HT20) | 1 | 2412 | 14.10 | 15.00 | 14.0 |
| | 6 | 2437 | 14.19 | 15.00 | 14.0 |
| | 11 | 2462 | 13.60 | 15.00 | 14.0 |
| Mode | Channel | Frequency (MHz) | 13.5M | Tune-up Limit (dBm) | TX Power Setting level |
| 802.11n (HT40) | 3 | 2422 | 12.67 | 14.50 | 13.5 |
| | 6 | 2437 | 13.19 | 14.50 | 13.5 |
| | 9 | 2452 | 13.46 | 14.50 | 13.5 |

Note. 1) Initial test configuration is 802.11b mode, since the highest maximum output power.

2) For 802.11g, the Tx power is set to 14.5 for CH1, set to 16.0 for CH11, and set to 17.0 for other channel by software.

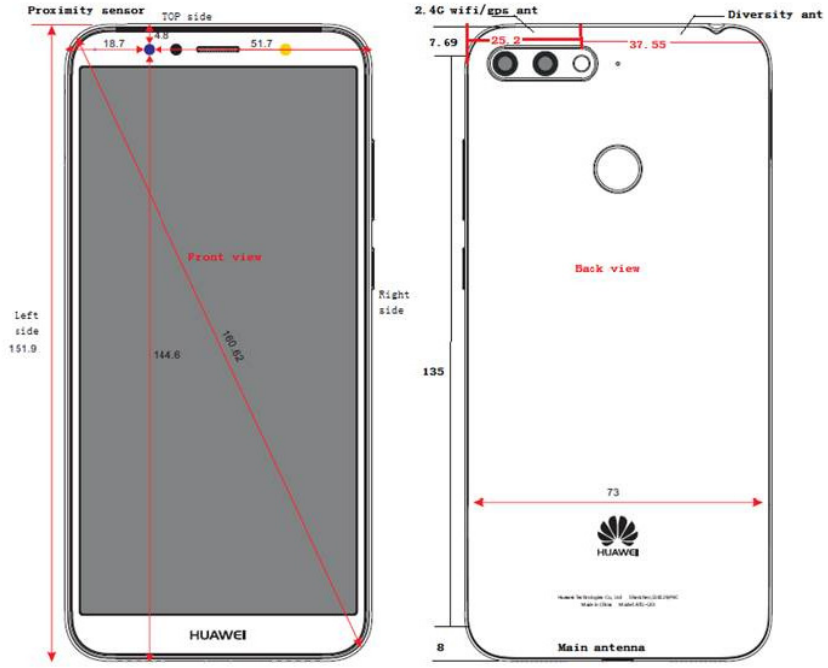
| Wi-Fi 2.4G (Sensor on) | Channel | Frequency (MHz) | Average Conducted Power (dBm) for Data Rates (bps) | Tune-up Limit (dBm) | TX Power Setting level |
|---|---|---|---|---|---|
| Mode | | | 1M | | |
| 802.11b | 1 | 2412 | 12.68 | 14.00 | 13 |
| | 6 | 2437 | 12.52 | 14.00 | 13 |
| | 11 | 2462 | 12.88 | 14.00 | 13 |
| Mode | Channel | Frequency (MHz) | 6M | Tune-up Limit (dBm) | TX Power Setting level |
| 802.11g | 1 | 2412 | 12.27 | 14.00 | 13 |
| | 6 | 2437 | 12.15 | 14.00 | 13 |
| | 11 | 2462 | 12.66 | 14.00 | 13 |
| Mode | Channel | Frequency (MHz) | 6.5M | Tune-up Limit (dBm) | TX Power Setting level |
| 802.11n (HT20) | 1 | 2412 | 12.23 | 14.00 | 13 |
| | 6 | 2437 | 12.19 | 14.00 | 13 |
| | 11 | 2462 | 12.66 | 14.00 | 13 |
| Mode | Channel | Frequency (MHz) | 13.5M | Tune-up Limit (dBm) | TX Power Setting level |
| 802.11n (HT40) | 3 | 2422 | 12.28 | 14.00 | 13 |
| | 6 | 2437 | 12.92 | 14.00 | 13 |
| | 9 | 2452 | 12.97 | 14.00 | 13 |
| Note: Initial test configuration is 802.11n HT40 mode, since the highest maximum output power and the largest channel bandwidth. | | | | | |

## 9.5 Bluetooth Mode

| BT | Conducted Power(dBm) | | | Tune-up Limit (dBm) |
|---|---|---|---|---|
| | Channel/Frequency(MHz) | | | |
| | Ch 0/2402 MHz | Ch 39/2441 MHz | Ch 78/2480 MHz | |
| GFSK | 9.09 | 9.46 | 8.70 | 11.00 |
| π/4DQPSK | 7.65 | 7.98 | 7.30 | 11.00 |
| 8DPSK | 7.73 | 8.10 | 7.26 | 11.00 |
| **BLE** | **Ch 0/2402 MHz** | **Ch 19/2440 MHz** | **Ch 39/2480 MHz** | **Tune-up Limit (dBm)** |
| GFSK | -2.06 | -1.45 | -2.21 | 1.00 |

# 10 Measured and Reported (Scaled) SAR Results

## 10.1 EUT Antenna Locations




| Overall (Length x Width): 151.9 mm x 73 mm<br>Overall Diagonal: 160.62 mm | | | | | | |
|---|---|---|---|---|---|---|
| Distance of the Antenna to the EUT surface/edge | | | | | | |
| Antenna | Back Side | Front side | Left Edge | Right Edge | Top Edge | Bottom Edge |
| Main-Antenna | 0 | 0 | ＜25mm | ＜25mm | ＞25mm | ＜25mm |
| BT/Wi-Fi Antenna | 0 | 0 | ＞25mm | ＜25mm | ＜25mm | ＞25mm |
| Hotspot mode, Positions for SAR tests | | | | | | |
| Mode | Back Side | Front side | Left Edge | Right Edge | Top Edge | Bottom Edge |
| Main-Antenna | Yes | Yes | Yes | Yes | N/A | Yes |
| BT/Wi-Fi Antenna | Yes | Yes | N/A | Yes | Yes | N/A |

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

2. For smart phones with an overall diagonal dimension is 160.62mm. Per KDB 648474 D04, for smart phones with a display diagonal dimension > 15.0 cm or an overall diagonal dimension> 16.0 cm, 10-g extremity SAR must be tested as a phablet to determine SAR compliance. For Phablet, Since hotspot mode 1-g *reported* SAR < 1.2 W/kg, 10-g extremity SAR is no required.

3. Per FCC KDB Publication 447498 D01, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg (for 1g SAR) or ≤ 2 W/kg (for 10g SAR) then testing at the other channels is not required for such test configuration(s).

4. When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.

5. Per FCC KDB Publication 648474 D04, SAR was evaluated without a headset connected to the device. Since the reported SAR was ≤ 1.2 W/kg, no additional SAR evaluations using a headset cable were required.

## 10.2 Standalone SAR test exclusion considerations

Per KDB 447498 D01, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:
[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] ·[√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR

- f(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison

Per KDB 447498 D01, when the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

| Bluetooth | Distance (mm) | MAX Power (dBm) | Frequency (MHz) | Ratio | Evaluation |
|---|---|---|---|---|---|
| Head | 5 | 11.00 | 2480 | 3.97 | Yes |
| Body-worn | 15 | 11.00 | 2480 | 1.32 | No |
| Hotspot | 10 | 11.00 | 2480 | 1.98 | No |
| Extremity | 5 | 11.00 | 2480 | 3.97 | No |

## 10.3 Measured SAR Results

**Table 1: GSM 850**

| Test Position | Cover Type | Channel/ Frequency (MHz) | Time slot | Duty Cycle | Tune-up limit (dBm) | Conducted Power (dBm) | Drift (dB) | Measured $SAR_{1g}$ (W/kg) | Scaling Factor | Reported $SAR_{1g}$ (W/kg) | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Head SAR** | | | | | | | | | | | |
| Left Cheek | standard | 190/836.6 | GSM | 1:8.3 | 34.00 | 32.62 | -0.022 | 0.151 | 1.37 | 0.207 | / |
| Left Tilt | standard | 190/836.6 | GSM | 1:8.3 | 34.00 | 32.62 | 0.090 | 0.091 | 1.37 | 0.124 | / |
| Right Cheek | standard | 190/836.6 | GSM | 1:8.3 | 34.00 | 32.62 | -0.045 | 0.211 | 1.37 | 0.290 | 9 |
| Right Tilt | standard | 190/836.6 | GSM | 1:8.3 | 34.00 | 32.62 | 0.040 | 0.113 | 1.37 | 0.155 | / |
| Right Cheek | Battery 2 | 190/836.6 | GSM | 1:8.3 | 34.00 | 32.62 | 0.021 | 0.201 | 1.37 | 0.276 | / |
| Right Cheek | Battery 3 | 190/836.6 | GSM | 1:8.3 | 34.00 | 32.62 | 0.030 | 0.195 | 1.37 | 0.268 | / |
| **Body-worn (Distance 15mm)** | | | | | | | | | | | |
| Back Side | standard | 190/836.6 | GSM | 1:8.3 | 34.00 | 32.62 | 0.020 | 0.261 | 1.37 | 0.359 | 10 |
| Front Side | standard | 190/836.6 | GSM | 1:8.3 | 34.00 | 32.62 | -0.030 | 0.178 | 1.37 | 0.245 | / |
| Back Side | Battery 2 | 190/836.6 | GSM | 1:8.3 | 34.00 | 32.62 | 0.017 | 0.240 | 1.37 | 0.330 | / |
| Back Side | Battery 3 | 190/836.6 | GSM | 1:8.3 | 34.00 | 32.62 | 0.033 | 0.244 | 1.37 | 0.335 | / |
| **Hotspot (Distance 10mm)** | | | | | | | | | | | |
| Back Side | standard | 190/836.6 | 1Txslot | 1:8.3 | 34.00 | 32.81 | 0.090 | 0.264 | 1.32 | 0.347 | 11 |
| Front Side | standard | 190/836.6 | 1Txslot | 1:8.3 | 34.00 | 32.81 | -0.010 | 0.167 | 1.32 | 0.220 | / |
| Left Edge | standard | 190/836.6 | 1Txslot | 1:8.3 | 34.00 | 32.81 | -0.046 | 0.037 | 1.32 | 0.049 | / |
| Right Edge | standard | 190/836.6 | 1Txslot | 1:8.3 | 34.00 | 32.81 | 0.032 | 0.025 | 1.32 | 0.032 | / |
| Top Edge | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Bottom Edge | standard | 190/836.6 | 1Txslot | 1:8.3 | 34.00 | 32.81 | -0.060 | 0.050 | 1.32 | 0.066 | / |

Note: 1.The value with blue color is the maximum SAR Value of each test band.

2. When multiple slots are used, SAR should be tested to account for the maximum source-based time-averaged output power.

**Table 2: GSM 1900**

| Test Position | Cover Type | Channel/ Frequency (MHz) | Time slot | Duty Cycle | Tune-up limit (dBm) | Conducted Power (dBm) | Drift (dB) | Measured $SAR_{1g}$ (W/kg) | Scaling Factor | Reported $SAR_{1g}$ (W/kg) | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Head SAR** | | | | | | | | | | | |
| Left Cheek | standard | 661/1880 | GSM | 1:8.3 | 31.00 | 30.17 | -0.079 | 0.157 | 1.21 | 0.190 | 12 |
| Left Tilt | standard | 661/1880 | GSM | 1:8.3 | 31.00 | 30.17 | -0.110 | 0.057 | 1.21 | 0.069 | / |
| Right Cheek | standard | 661/1880 | GSM | 1:8.3 | 31.00 | 30.17 | 0.075 | 0.095 | 1.21 | 0.115 | / |
| Right Tilt | standard | 661/1880 | GSM | 1:8.3 | 31.00 | 30.17 | -0.190 | 0.080 | 1.21 | 0.096 | / |
| Left Cheek | Battery 2 | 661/1880 | GSM | 1:8.3 | 31.00 | 30.17 | -0.084 | 0.148 | 1.21 | 0.179 | / |
| Left Cheek | Battery 3 | 661/1880 | GSM | 1:8.3 | 31.00 | 30.17 | 0.052 | 0.153 | 1.21 | 0.185 | / |
| **Body-worn (Distance 15mm)** | | | | | | | | | | | |
| Back Side | standard | 661/1880 | GSM | 1:8.3 | 31.00 | 30.17 | 0.140 | 0.170 | 1.21 | 0.206 | 13 |
| Front Side | standard | 661/1880 | GSM | 1:8.3 | 31.00 | 30.17 | -0.070 | 0.110 | 1.21 | 0.133 | / |
| **Hotspot (Distance 10mm)** | | | | | | | | | | | |
| Back Side | standard | 661/1880 | 1Txslot | 1:8.3 | 29.00 | 28.54 | -0.080 | 0.333 | 1.11 | 0.370 | / |
| Front Side | standard | 661/1880 | 1Txslot | 1:8.3 | 29.00 | 28.54 | 0.110 | 0.252 | 1.11 | 0.280 | / |
| Left Edge | standard | 661/1880 | 1Txslot | 1:8.3 | 29.00 | 28.54 | 0.016 | 0.065 | 1.11 | 0.072 | / |
| Right Edge | standard | 661/1880 | 1Txslot | 1:8.3 | 29.00 | 28.54 | 0.024 | 0.042 | 1.11 | 0.046 | / |
| Top Edge | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Bottom Edge | standard | 661/1880 | 1Txslot | 1:8.3 | 29.00 | 28.54 | 0.150 | 0.561 | 1.11 | 0.624 | 14 |
| Bottom Edge | Battery 2 | 661/1880 | 1Txslot | 1:8.3 | 29.00 | 28.54 | 0.087 | 0.548 | 1.11 | 0.609 | / |
| Bottom Edge | Battery 3 | 661/1880 | 1Txslot | 1:8.3 | 29.00 | 28.54 | -0.120 | 0.551 | 1.11 | 0.613 | / |

Note: 1.The value with blue color is the maximum SAR Value of each test band.

2. When multiple slots are used, SAR should be tested to account for the maximum source-based time-averaged output power.

**Table 3: UMTS Band II**

| Test Position | Cover Type | Channel/ Frequency (MHz) | Channel Type | Duty Cycle | Tune-up limit (dBm) | Conducted Power (dBm) | Drift (dB) | Measured $SAR_{1g}$ (W/kg) | Scaling Factor | Reported $SAR_{1g}$ (W/kg) | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Head SAR** | | | | | | | | | | | |
| Left Cheek | standard | 9400/1880 | RMC 12.2K | 1:1 | 24.50 | 23.10 | 0.120 | 0.313 | 1.38 | 0.432 | 15 |
| Left Tilt | standard | 9400/1880 | RMC 12.2K | 1:1 | 24.50 | 23.10 | -0.023 | 0.119 | 1.38 | 0.164 | / |
| Right Cheek | standard | 9400/1880 | RMC 12.2K | 1:1 | 24.50 | 23.10 | 0.040 | 0.198 | 1.38 | 0.273 | / |
| Right Tilt | standard | 9400/1880 | RMC 12.2K | 1:1 | 24.50 | 23.10 | -0.040 | 0.182 | 1.38 | 0.251 | / |
| Left Cheek | Battery 2 | 9400/1880 | RMC 12.2K | 1:1 | 24.50 | 23.10 | 0.024 | 0.289 | 1.38 | 0.399 | / |
| Left Cheek | Battery 3 | 9400/1880 | RMC 12.2K | 1:1 | 24.50 | 23.10 | -0.035 | 0.281 | 1.38 | 0.388 | / |
| **Body-worn (Distance 15mm)** | | | | | | | | | | | |
| Back Side | standard | 9400/1880 | RMC 12.2K | 1:1 | 24.50 | 23.10 | 0.190 | 0.255 | 1.38 | 0.352 | 16 |
| Front Side | standard | 9400/1880 | RMC 12.2K | 1:1 | 24.50 | 23.10 | -0.030 | 0.194 | 1.38 | 0.268 | / |
| **Hotspot (Distance 10mm)** | | | | | | | | | | | |
| Back Side | standard | 9538/1907.6 | RMC 12.2K | 1:1 | 20.00 | 19.04 | -0.021 | 0.406 | 1.25 | 0.506 | / |
| Front Side | standard | 9400/1880 | RMC 12.2K | 1:1 | 20.00 | 19.04 | 0.018 | 0.355 | 1.25 | 0.443 | / |
| Left Edge | standard | 9400/1880 | RMC 12.2K | 1:1 | 20.00 | 19.04 | 0.120 | 0.071 | 1.25 | 0.089 | / |
| Right Edge | standard | 9400/1880 | RMC 12.2K | 1:1 | 20.00 | 19.04 | 0.025 | 0.052 | 1.25 | 0.065 | / |
| Top Edge | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Bottom Edge | standard | 9400/1880 | RMC 12.2K | 1:1 | 20.00 | 19.04 | 0.033 | 0.601 | 1.25 | 0.750 | 17 |
| Bottom Edge | Battery 2 | 9262/1852.4 | RMC 12.2K | 1:1 | 20.00 | 19.04 | 0.041 | 0.586 | 1.25 | 0.731 | / |
| Bottom Edge | Battery 3 | 9262/1852.4 | RMC 12.2K | 1:1 | 20.00 | 19.04 | -0.058 | 0.579 | 1.25 | 0.722 | / |

Note: 1.The value with blue color is the maximum SAR Value of each test band.

2. 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.

**Table 4: UMTS Band V**

| Test Position | Cover Type | Channel/ Frequency (MHz) | Channel Type | Duty Cycle | Tune-up limit (dBm) | Conducted Power (dBm) | Drift (dB) | Measured $SAR_{1g}$ (W/kg) | Scaling Factor | Reported $SAR_{1g}$ (W/kg) | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Head SAR** | | | | | | | | | | | |
| Left Cheek | standard | 4183/836.6 | RMC 12.2K | 1:1 | 25.00 | 23.78 | -0.069 | 0.274 | 1.32 | 0.363 | / |
| Left Tilt | standard | 4183/836.6 | RMC 12.2K | 1:1 | 25.00 | 23.78 | 0.075 | 0.172 | 1.32 | 0.228 | / |
| Right Cheek | standard | 4183/836.6 | RMC 12.2K | 1:1 | 25.00 | 23.78 | 0.050 | 0.290 | 1.32 | 0.384 | 18 |
| Right Tilt | standard | 4183/836.6 | RMC 12.2K | 1:1 | 25.00 | 23.78 | 0.140 | 0.181 | 1.32 | 0.240 | / |
| Right Cheek | Battery 2 | 4183/836.6 | RMC 12.2K | 1:1 | 25.00 | 23.78 | 0.024 | 0.281 | 1.32 | 0.372 | / |
| Right Cheek | Battery 3 | 4183/836.6 | RMC 12.2K | 1:1 | 25.00 | 23.78 | -0.039 | 0.273 | 1.32 | 0.362 | / |
| **Body-worn (Distance 15mm)** | | | | | | | | | | | |
| Back Side | standard | 4183/836.6 | RMC 12.2K | 1:1 | 25.00 | 23.78 | 0.030 | 0.356 | 1.32 | 0.471 | 19 |
| Front Side | standard | 4183/836.6 | RMC 12.2K | 1:1 | 25.00 | 23.78 | 0.050 | 0.246 | 1.32 | 0.326 | / |
| **Hotspot (Distance 10mm)** | | | | | | | | | | | |
| Back Side | standard | 4183/836.6 | RMC 12.2K | 1:1 | 25.00 | 23.78 | 0.010 | 0.381 | 1.32 | 0.505 | 20 |
| Front Side | standard | 4183/836.6 | RMC 12.2K | 1:1 | 25.00 | 23.78 | 0.030 | 0.271 | 1.32 | 0.359 | / |
| Left Edge | standard | 4183/836.6 | RMC 12.2K | 1:1 | 25.00 | 23.78 | 0.018 | 0.037 | 1.32 | 0.049 | / |
| Right Edge | standard | 4183/836.6 | RMC 12.2K | 1:1 | 25.00 | 23.78 | 0.047 | 0.029 | 1.32 | 0.038 | / |
| Top Edge | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Bottom Edge | standard | 4183/836.6 | RMC 12.2K | 1:1 | 25.00 | 23.78 | 0.060 | 0.069 | 1.32 | 0.091 | / |
| Back Side | Battery 2 | 4183/836.6 | RMC 12.2K | 1:1 | 25.00 | 23.78 | 0.120 | 0.376 | 1.32 | 0.498 | / |
| Back Side | Battery 3 | 4183/836.6 | RMC 12.2K | 1:1 | 25.00 | 23.78 | -0.036 | 0.369 | 1.32 | 0.489 | / |

Note: 1.The value with blue color is the maximum SAR Value of each test band.

2. 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

**Table 5: LTE Band 5 (10MHz)**

| Test Position | Cover Type | RB size | RB offset | Channel/ Frequency (MHz) | Maximum Allowed Power (dBm) | Conducted Power (dBm) | Drift (dB) | Measured $SAR_{1g}$ (W/kg) | Scaling Factor | Reported $SAR_{1g}$ (W/kg) | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Head SAR (QPSK)** | | | | | | | | | | | |
| Left Cheek | standard | 1RB | 25 | 20525/836.5 | 24.50 | 23.65 | 0.037 | 0.235 | 1.22 | 0.286 | / |
| Left Tilt | standard | 1RB | 25 | 20525/836.5 | 24.50 | 23.65 | 0.013 | 0.154 | 1.22 | 0.187 | / |
| Right Cheek | standard | 1RB | 25 | 20525/836.5 | 24.50 | 23.65 | 0.150 | 0.247 | 1.22 | 0.300 | 21 |
| Right Tilt | standard | 1RB | 25 | 20525/836.5 | 24.50 | 23.65 | 0.042 | 0.168 | 1.22 | 0.204 | / |
| Left Cheek | standard | 50%RB | 13 | 20600/844 | 23.50 | 22.39 | 0.024 | 0.177 | 1.29 | 0.229 | / |
| Left Tilt | standard | 50%RB | 13 | 20600/844 | 23.50 | 22.39 | 0.070 | 0.114 | 1.29 | 0.147 | / |
| Right Cheek | standard | 50%RB | 13 | 20600/844 | 23.50 | 22.39 | 0.030 | 0.181 | 1.29 | 0.234 | / |
| Right Tilt | standard | 50%RB | 13 | 20600/844 | 23.50 | 22.39 | 0.019 | 0.136 | 1.29 | 0.176 | / |
| Right Cheek | Battery 2 | 1RB | 25 | 20525/836.5 | 24.50 | 23.65 | 0.012 | 0.239 | 1.22 | 0.291 | / |
| Right Cheek | Battery 3 | 1RB | 25 | 20525/836.5 | 24.50 | 23.65 | 0.087 | 0.234 | 1.22 | 0.285 | / |
| **Body-worn (QPSK, Distance 15mm)** | | | | | | | | | | | |
| Back Side | standard | 1RB | 25 | 20525/836.5 | 24.50 | 23.65 | 0.150 | 0.243 | 1.22 | 0.296 | 22 |
| Front Side | standard | 1RB | 25 | 20525/836.5 | 24.50 | 23.65 | -0.040 | 0.173 | 1.22 | 0.210 | / |
| Back Side | standard | 50%RB | 13 | 20600/844 | 23.50 | 22.39 | 0.120 | 0.204 | 1.29 | 0.263 | / |
| Front Side | standard | 50%RB | 13 | 20600/844 | 23.50 | 22.39 | 0.010 | 0.145 | 1.29 | 0.187 | / |
| **Hotspot (QPSK, Distance 10mm)** | | | | | | | | | | | |
| Back Side | standard | 1RB | 25 | 20525/836.5 | 24.50 | 23.65 | 0.010 | 0.297 | 1.22 | 0.361 | 23 |
| Front Side | standard | 1RB | 25 | 20525/836.5 | 24.50 | 23.65 | -0.030 | 0.231 | 1.22 | 0.281 | / |
| Left Edge | standard | 1RB | 25 | 20525/836.5 | 24.50 | 23.65 | 0.021 | 0.033 | 1.22 | 0.040 | / |
| Right Edge | standard | 1RB | 25 | 20525/836.5 | 24.50 | 23.65 | -0.014 | 0.029 | 1.22 | 0.036 | / |
| Top Edge | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Bottom Edge | standard | 1RB | 25 | 20525/836.5 | 24.50 | 23.65 | 0.080 | 0.079 | 1.22 | 0.096 | / |
| Back Side | standard | 50%RB | 13 | 20600/844 | 23.50 | 22.39 | 0.130 | 0.218 | 1.29 | 0.281 | / |
| Front Side | standard | 50%RB | 13 | 20600/844 | 23.50 | 22.39 | 0.000 | 0.164 | 1.29 | 0.212 | / |
| Left Edge | standard | 50%RB | 13 | 20600/844 | 23.50 | 22.39 | -0.034 | 0.028 | 1.29 | 0.037 | / |
| Right Edge | standard | 50%RB | 13 | 20600/844 | 23.50 | 22.39 | 0.074 | 0.022 | 1.29 | 0.028 | / |
| Top Edge | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Bottom Edge | standard | 50%RB | 13 | 20600/844 | 23.50 | 22.39 | 0.150 | 0.059 | 1.29 | 0.076 | / |
| Back Side | Battery 2 | 1RB | 25 | 20525/836.5 | 24.50 | 23.65 | 0.036 | 0.224 | 1.22 | 0.272 | / |
| Back Side | Battery 3 | 1RB | 25 | 20525/836.5 | 24.50 | 23.65 | 0.130 | 0.231 | 1.22 | 0.281 | / |

Note: 1.The value with blue color is the maximum SAR Value of each test band.

2. For QPSK with 100% RB allocation, SAR is required when and the highest reported SAR for 1 RB and 50% RB allocation in are ≥ 0.8 W/kg.

**Table 6: LTE Band 7 (20MHz, Main-antenna)**

| Test Position | Cover Type | RB size | RB offset | Channel/ Frequency (MHz) | Maximum Allowed Power (dBm) | Conducted Power (dBm) | Drift (dB) | Measured $SAR_{1g}$ (W/kg) | Scaling Factor | Reported $SAR_{1g}$ (W/kg) | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Head SAR (QPSK)** | | | | | | | | | | | |
| Right Cheek | standard | 1RB | 50 | 21350/2560 | 24.00 | 22.80 | 0.061 | 0.109 | 1.32 | 0.143 | 24 |
| Left Cheek | standard | 1RB | 50 | 21350/2560 | 24.00 | 22.80 | 0.021 | 0.061 | 1.32 | 0.080 | / |
| Left Tilt | standard | 1RB | 50 | 21350/2560 | 24.00 | 22.80 | 0.141 | 0.072 | 1.32 | 0.094 | / |
| Right Tilt | standard | 1RB | 50 | 21350/2560 | 24.00 | 22.80 | 0.083 | 0.061 | 1.32 | 0.081 | / |
| Left Cheek | standard | 50%RB | 0 | 20850/2510 | 23.00 | 21.87 | 0.096 | 0.095 | 1.30 | 0.123 | / |
| Left Tilt | standard | 50%RB | 0 | 20850/2510 | 23.00 | 21.87 | 0.057 | 0.062 | 1.30 | 0.081 | / |
| Right Cheek | standard | 50%RB | 0 | 20850/2510 | 23.00 | 21.87 | 0.023 | 0.081 | 1.30 | 0.105 | / |
| Right Tilt | standard | 50%RB | 0 | 20850/2510 | 23.00 | 21.87 | 0.021 | 0.067 | 1.30 | 0.087 | / |
| Left Cheek | Battery 2 | 1RB | 50 | 21350/2560 | 24.00 | 22.80 | 0.054 | 0.099 | 1.32 | 0.131 | / |
| Left Cheek | Battery 3 | 1RB | 50 | 21350/2560 | 24.00 | 22.80 | -0.087 | 0.094 | 1.32 | 0.124 | / |
| **Body-worn (QPSK, Distance 15mm)** | | | | | | | | | | | |
| Back Side | standard | 1RB | 50 | 21350/2560 | 24.00 | 22.80 | -0.101 | 0.257 | 1.32 | 0.339 | 25 |
| Front Side | standard | 1RB | 50 | 21350/2560 | 24.00 | 22.80 | 0.102 | 0.144 | 1.32 | 0.190 | / |
| Back Side | standard | 50%RB | 0 | 20850/2510 | 23.00 | 21.87 | 0.114 | 0.218 | 1.30 | 0.283 | / |
| Front Side | standard | 50%RB | 0 | 20850/2510 | 23.00 | 21.87 | 0.167 | 0.127 | 1.30 | 0.165 | / |
| **Hotspot (QPSK, Distance 10mm)** | | | | | | | | | | | |
| Back Side | standard | 1RB | 50 | 21350/2560 | 22.00 | 20.81 | 0.039 | 0.366 | 1.32 | 0.481 | / |
| Front Side | standard | 1RB | 50 | 21350/2560 | 22.00 | 20.81 | 0.100 | 0.225 | 1.32 | 0.296 | / |
| Left Edge | standard | 1RB | 50 | 21350/2560 | 22.00 | 20.81 | 0.044 | 0.092 | 1.32 | 0.121 | / |
| Right Edge | standard | 1RB | 50 | 21350/2560 | 22.00 | 20.81 | 0.032 | 0.077 | 1.32 | 0.101 | / |
| Top Edge | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Bottom Edge | standard | 1RB | 50 | 21350/2560 | 22.00 | 20.81 | 0.090 | 0.490 | 1.32 | 0.644 | / |
| Back Side | standard | 50%RB | 0 | 20850/2510 | 22.00 | 20.74 | 0.027 | 0.275 | 1.34 | 0.368 | / |
| Front Side | standard | 50%RB | 0 | 20850/2510 | 22.00 | 20.74 | 0.012 | 0.203 | 1.34 | 0.271 | / |
| Left Edge | standard | 50%RB | 0 | 20850/2510 | 22.00 | 20.74 | 0.016 | 0.085 | 1.34 | 0.114 | / |
| Right Edge | standard | 50%RB | 0 | 20850/2510 | 22.00 | 20.74 | 0.033 | 0.062 | 1.34 | 0.083 | / |
| Top Edge | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Bottom Edge | standard | 50%RB | 0 | 20850/2510 | 22.00 | 20.74 | -0.080 | 0.554 | 1.34 | 0.740 | 26 |
| Bottom Edge | Battery 2 | 50%RB | 0 | 20850/2510 | 22.00 | 20.74 | -0.045 | 0.524 | 1.34 | 0.700 | / |
| Bottom Edge | Battery 3 | 50%RB | 0 | 20850/2510 | 22.00 | 20.74 | 0.037 | 0.537 | 1.34 | 0.718 | / |

Note: 1.The value with blue color is the maximum SAR Value of each test band.

2. For QPSK with 100% RB allocation, SAR is required when and the highest reported SAR for 1 RB and 50% RB allocation in are ≥ 0.8 W/kg.

**Table 7: Wi-Fi (2.4G)**

**WIFI data standalone**

| Test Position | Cover Type | Channel/ Frequency (MHz) | Mode 802.11b | Duty Cycle | Tune-up limit (dBm) | Conducted Power (dBm) | Drift (dB) | Area Scan Max.SAR (W/Kg) | Measured $SAR_{1g}$ (W/kg) | Scaling Factor | Reported $SAR_{1g}$ (W/kg) | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Head SAR** | | | | | | | | | | | | |
| Left Cheek | standard | 11/2462 | DSSS | 97.72% | 18.50 | 17.17 | 0.096 | 0.876 | 0.772 | 1.39 | 1.073 | 27 |
| | | 6/2437 | DSSS | 97.72% | 18.50 | 17.61 | 0.069 | 0.783 | 0.767 | 1.26 | 0.963 | / |
| | | 1/2412 | DSSS | 97.72% | 18.50 | 17.05 | 0.120 | 0.743 | 0.742 | 1.43 | 1.060 | / |
| Left Tilt | standard | 6/2437 | DSSS | 97.72% | 18.50 | 17.61 | 0.080 | 0.686 | 0.693 | 1.26 | 0.870 | / |
| Right Cheek | standard | 6/2437 | DSSS | 97.72% | 18.50 | 17.61 | 0.039 | 0.492 | 0.513 | 1.26 | 0.644 | / |
| Right Tilt | standard | 6/2437 | DSSS | 97.72% | 18.50 | 17.61 | 0.030 | 0.435 | 0.457 | 1.26 | 0.574 | / |
| Left Cheek | Battery 2 | 11/2462 | DSSS | 97.72% | 18.50 | 17.17 | 0.069 | 0.822 | 0.753 | 1.39 | 1.047 | / |
| Left Cheek | Battery 3 | 11/2462 | DSSS | 97.72% | 18.50 | 17.17 | 0.038 | 0.841 | 0.766 | 1.39 | 1.065 | / |
| **Body-worn (Distance 15mm)** | | | | | | | | | | | | |
| Back Side | standard | 6/2437 | DSSS | 97.72% | 18.50 | 17.61 | 0.031 | 0.098 | 0.099 | 1.26 | 0.125 | 28 |
| Front Side | standard | 6/2437 | DSSS | 97.72% | 18.50 | 17.61 | 0.090 | 0.084 | 0.085 | 1.26 | 0.107 | / |
| **Hotspot (Distance 10mm)** | | | | | | | | | | | | |
| Back Side | standard | 6/2437 | DSSS | 97.72% | 18.50 | 17.61 | -0.070 | 0.186 | 0.191 | 1.26 | 0.240 | 29 |
| Front Side | standard | 6/2437 | DSSS | 97.72% | 18.50 | 17.61 | 0.068 | 0.156 | 0.163 | 1.26 | 0.205 | / |
| Left Edge | standard | 6/2437 | DSSS | 97.72% | 18.50 | 17.61 | 0.087 | 0.013 | 0.014 | 1.26 | 0.018 | / |
| Right Edge | standard | 6/2437 | DSSS | 97.72% | 18.50 | 17.61 | 0.130 | 0.074 | 0.082 | 1.26 | 0.103 | / |
| Top Edge | standard | 6/2437 | DSSS | 97.72% | 18.50 | 17.61 | 0.100 | 0.179 | 0.183 | 1.26 | 0.230 | / |
| Bottom Edge | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Back Side | Battery 2 | 6/2437 | DSSS | 97.72% | 18.50 | 17.61 | 0.036 | 0.181 | 0.186 | 1.26 | 0.234 | / |
| Back Side | Battery 3 | 6/2437 | DSSS | 97.72% | 18.50 | 17.61 | -0.030 | 0.177 | 0.189 | 1.26 | 0.237 | / |

Note: 1. The value with blue color is the maximum SAR Value of each test band.

2. Initial test configuration is 802.11b mode, since the highest maximum output power.

**Sensor on**

| Test Position | Cover Type | Channel/ Frequency (MHz) | Mode 802.11n HT40 | Duty Cycle | Tune-up limit (dBm) | Conducted Power (dBm) | Drift (dB) | Area Scan Max.SAR (W/Kg) | Measured $SAR_{1g}$ (W/kg) | Scaling Factor | Reported $SAR_{1g}$ (W/kg) | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Head SAR** | | | | | | | | | | | | |
| Left Cheek | standard | 9/2452 | OFDM | 76.92% | 14.00 | 12.97 | 0.024 | 0.359 | 0.424 | 1.65 | 0.699 | 30 |
| Left Tilt | standard | 9/2452 | OFDM | 76.92% | 14.00 | 12.97 | 0.027 | 0.342 | 0.398 | 1.65 | 0.656 | / |
| Right Cheek | standard | 9/2452 | OFDM | 76.92% | 14.00 | 12.97 | 0.031 | 0.21 | 0.268 | 1.65 | 0.442 | / |
| Right Tilt | standard | 9/2452 | OFDM | 76.92% | 14.00 | 12.97 | 0.120 | 0.199 | 0.246 | 1.65 | 0.405 | / |
| Left Cheek | Battery 2 | 9/2452 | OFDM | 76.92% | 14.00 | 12.97 | 0.016 | 0.373 | 0.422 | 1.65 | 0.695 | / |
| Left Cheek | Battery 3 | 9/2452 | OFDM | 76.92% | 14.00 | 12.97 | 0.044 | 0.380 | 0.419 | 1.65 | 0.690 | / |

Note: 1. The value with blue color is the maximum SAR Value of each test band.

2. Initial test configuration is 802.11n HT40 mode, since the highest maximum output power and the largest channel bandwidth.

| MAX Adjusted SAR | | | | | | | |
|---|---|---|---|---|---|---|---|
| Mode | Test Position | Channel/ Frequency(MHz) | MAX Reported $SAR_{1g}$ (W/kg) | 802.11b Tune-up limit (dBm) | Tune-up limit (dBm) | Scaling Factor | Adjusted $SAR_{1g}$ (W/kg) |
| 802.11g | Left Cheek | 11/2462 | 1.073 | 18.50 | 18.00 | 0.89 | 0.956 |
| 802.11n HT20 | Left Cheek | 11/2462 | 1.073 | 18.50 | 15.00 | 0.45 | 0.479 |
| 802.11n HT40 | Left Cheek | 11/2462 | 1.073 | 18.50 | 14.50 | 0.40 | 0.427 |
| Note: SAR is not required for OFDM 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. | | | | | | | |

**Table 8: BT**

| Test Position | Cover Type | Channel/ Frequency (MHz) | Mode | Duty Cycle | Tune-up limit (dBm) | Conducted Power (dBm) | Drift (dB) | Area Scan Max.SAR (W/Kg) | Measured $SAR_{1g}$ (W/kg) | Scaling Factor | Reported $SAR_{1g}$ (W/kg) | Plot No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Head SAR** | | | | | | | | | | | | |
| Left Cheek | standard | 39/2441 | GFSK | 76.92% | 11.00 | 9.46 | 0.110 | 0.089 | 0.097 | 1.85 | 0.180 | 31 |
| Left Tilt | standard | 39/2441 | GFSK | 76.92% | 11.00 | 9.46 | 0.012 | 0.058 | 0.064 | 1.85 | 0.118 | / |
| Right Cheek | standard | 39/2441 | GFSK | 76.92% | 11.00 | 9.46 | 0.020 | 0.047 | 0.058 | 1.85 | 0.107 | / |
| Right Tilt | standard | 39/2441 | GFSK | 76.92% | 11.00 | 9.46 | 0.066 | 0.024 | 0.023 | 1.85 | 0.042 | / |
| Left Cheek | Battery 2 | 39/2441 | GFSK | 76.92% | 11.00 | 9.46 | 0.044 | 0.091 | 0.093 | 1.85 | 0.172 | / |
| Left Cheek | Battery 3 | 39/2441 | GFSK | 76.92% | 11.00 | 9.46 | 0.032 | 0.088 | 0.090 | 1.85 | 0.166 | / |

Note: 1. The value with blue color is the maximum SAR Value of each test band.

2. Initial test configuration is 802.11b mode, since the highest maximum output power.

| Band | Configuration | Frequency (MHz) | Maximum Power (dBm) | Separation Distance (mm) | Estimated SAR (W/kg) |
|---|---|---|---|---|---|
| Bluetooth | Body-worn | 2480 | 11.00 | 15 | 0.176 |
| | Hotspot | 2480 | 11.00 | 10 | 0.264 |
| | Extremity | 2480 | 11.00 | 5 | 0.211 |

For simultaneous transmission analysis, Bluetooth SAR is estimated per KDB 447498 D01 based on the formula below.

(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)]·[√f(GHz)/x] W/kg for test separation distances ≤ 50 mm; where x = 7.5 for 1-g SAR, and x = 18.75 for 10-g SAR.

## 10.4 Simultaneous Transmission Analysis

| Simultaneous Transmission Configurations | Head | Body-worn | Hotspot | Product Specific 10-g SAR (Separation 0mm) |
|---|---|---|---|---|
| GSM(Voice) + Bluetooth(data) | Yes | Yes | N/A | Yes |
| GPRS/EDGE(Data) + Bluetooth(data) | N/A | Yes | Yes | Yes |
| WCDMA(Voice) + Bluetooth(data) | Yes | Yes | N/A | Yes |
| WCDMA(Data) + Bluetooth(data) | N/A | Yes | Yes | Yes |
| LTE(Data) + Bluetooth(data) | Yes | Yes | Yes | Yes |
| GSM(Voice) + Wi-Fi-2.4GHz(data) | Yes | Yes | N/A | Yes |
| GPRS/EDGE(Data) + Wi-Fi-2.4GHz(data) | N/A | Yes | Yes | Yes |
| WCDMA(Voice) + Wi-Fi-2.4GHz(data) | Yes | Yes | N/A | Yes |
| WCDMA(Data) + Wi-Fi-2.4GHz(data) | N/A | Yes | Yes | Yes |
| LTE(Data) + Wi-Fi-2.4GHz(data) | Yes | Yes | Yes | Yes |
| Wi-Fi-2.4GHz(data) + Bluetooth(data) | N/A | N/A | N/A | N/A |

**General Note:**

1. The Scaled SAR summation is calculated based on the same configuration and test position.
2. Per KDB 447498 D01, simultaneous transmission SAR is compliant if,

i) Scalar SAR summation < 1.6W/kg, simultaneously transmission SAR measurement is not necessary.

ii) SPLSR = (SAR1 + SAR2)^1.5 / (min. separation distance, mm), and the peak separation distance is determined from the square root of [(x1-x2)2 + (y1-y2)2 + (z1-z2)2], where (x1, y1, z1) and (x2, y2, z2) are the coordinates of the extrapolated peak SAR locations in the zoom scan.

iii) If SPLSR ≤ 0.04, simultaneously transmission SAR measurement is not necessary.

**The maximum $SAR_{1g}$ Value for Main- Antenna**

| $SAR_{1g}$(W/kg) / Test Position | | GSM 850 | GSM 1900 | WCDMA Band II | WCDMA Band V | LTE FDD 5 | LTE FDD 7 | MAX. $SAR_{1g}$ |
|---|---|---|---|---|---|---|---|---|
| Left Cheek | | 0.207 | 0.190 | 0.432 | 0.363 | 0.286 | 0.143 | 0.432 |
| Left Tilt | | 0.124 | 0.069 | 0.164 | 0.228 | 0.187 | 0.081 | 0.228 |
| Right Cheek | | 0.290 | 0.115 | 0.273 | 0.384 | 0.300 | 0.105 | 0.384 |
| Right Tilt | | 0.155 | 0.096 | 0.251 | 0.240 | 0.204 | 0.087 | 0.251 |
| Body worn | Back Side | 0.359 | 0.206 | 0.352 | 0.471 | 0.296 | 0.339 | 0.471 |
| | Front Side | 0.245 | 0.133 | 0.268 | 0.326 | 0.210 | 0.190 | 0.326 |
| Hotspot | Back Side | 0.347 | 0.370 | 0.506 | 0.505 | 0.361 | 0.481 | 0.506 |
| | Front Side | 0.220 | 0.280 | 0.443 | 0.359 | 0.281 | 0.296 | 0.443 |
| | Left Edge | 0.049 | 0.072 | 0.089 | 0.049 | 0.040 | 0.121 | 0.121 |
| | Right Edge | 0.032 | 0.046 | 0.065 | 0.038 | 0.036 | 0.101 | 0.101 |
| | Top Edge | N/A | N/A | N/A | N/A | N/A | N/A | 0 |
| | Bottom Edge | 0.066 | 0.624 | 0.750 | 0.091 | 0.096 | 0.740 | 0.75 |

**About BT and Main- Antenna**

| $SAR_{1g}$(W/kg) Test Position | | Main-antenna | BT | MAX. $\Sigma SAR_{1g}$ |
|---|---|---|---|---|
| Left, Cheek | | 0.432 | 0.180 | 0.612 |
| Left, Tilt | | 0.228 | 0.118 | 0.346 |
| Right, Cheek | | 0.384 | 0.107 | 0.491 |
| Right, Tilt | | 0.251 | 0.042 | 0.293 |
| Body worn | Back Side | 0.471 | 0.176 | 0.647 |
| | Front Side | 0.326 | 0.176 | 0.502 |
| Hotspot | Back Side | 0.506 | 0.264 | 0.770 |
| | Front Side | 0.443 | 0.264 | 0.707 |
| | Left Edge | 0.121 | 0.264 | 0.385 |
| | Right Edge | 0.101 | 0.264 | 0.365 |
| | Top Edge | 0 | 0.264 | 0.264 |
| | Bottom Edge | 0.750 | 0 | 0.750 |
| Note: 1.The value with blue color is the maximum $\Sigma SAR_{1g}$ Value.<br>2. MAX. $\Sigma SAR_{1g}$ =Unlicensed $SAR_{MAX}$ +Licensed $SAR_{MAX}$ | | | | |

MAX. $\Sigma SAR_{1g}$ = 0.770 W/kg <1.6 W/kg, so the Simultaneous transimition SAR with volum scan are not required for BT and Main-Antenna.

**About Wi-Fi and Main- Antenna**

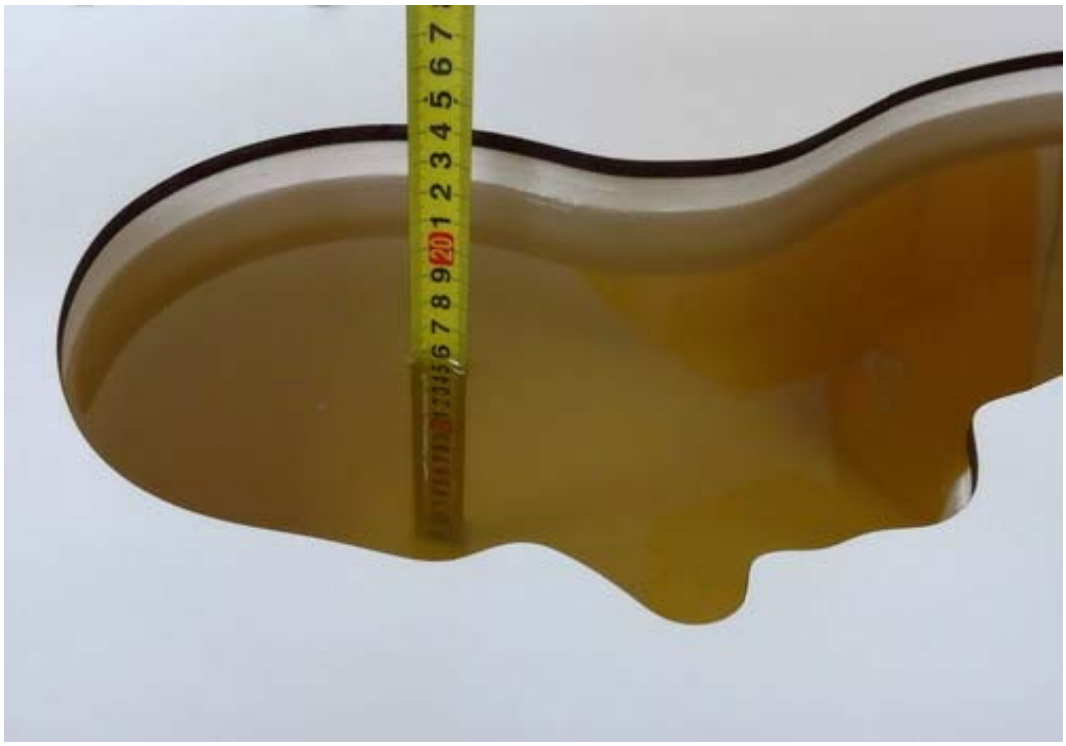
| $SAR_{1g}$(W/kg) Test Position | | Main-antenna | Wi-Fi 2.4G | MAX. $\Sigma SAR_{1g}$ |
|---|---|---|---|---|
| Left, Cheek | | 0.432 | 0.699 | 1.131 |
| Left, Tilt | | 0.228 | 0.656 | 0.884 |
| Right, Cheek | | 0.384 | 0.442 | 0.826 |
| Right, Tilt | | 0.251 | 0.405 | 0.656 |
| Body worn | Back Side | 0.471 | 0.125 | 0.596 |
| | Front Side | 0.326 | 0.107 | 0.433 |
| Hotspot | Back Side | 0.506 | 0.240 | 0.746 |
| | Front Side | 0.443 | 0.205 | 0.648 |
| | Left Edge | 0.121 | 0.018 | 0.139 |
| | Right Edge | 0.101 | 0.103 | 0.204 |
| | Top Edge | 0 | 0.230 | 0.230 |
| | Bottom Edge | 0.750 | N/A | 0.750 |
| Note: 1.The value with blue color is the maximum $\Sigma SAR_{1g}$ Value.<br>2. MAX. $\Sigma SAR_{1g}$ =Unlicensed $SAR_{MAX}$ +Licensed $SAR_{MAX}$ | | | | |

MAX. $\Sigma SAR_{1g}$ = 1.131 W/kg <1.6 W/kg, so the Simultaneous transimition SAR with volum scan are not required for Wi-Fi and Main-Antenna.

# 11 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, the extensive SAR measurement uncertainty analysis described in IEEE Std 1528- 2013 is not required in SAR reports submitted for equipment approval. This also applies to the 10-g SAR required for phablets in KDB Publication 648474.

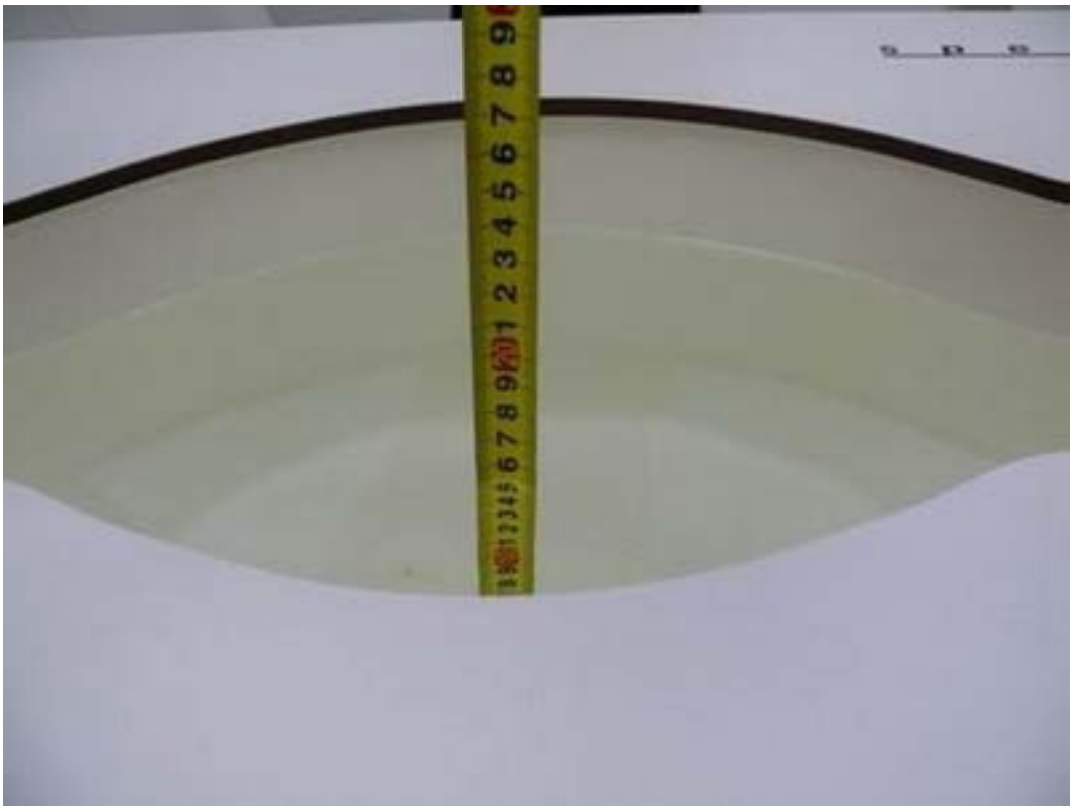
# ANNEX A: Test Layout



Picture 3: Liquid depth in the head Phantom (835MHz, 15.3cm depth)

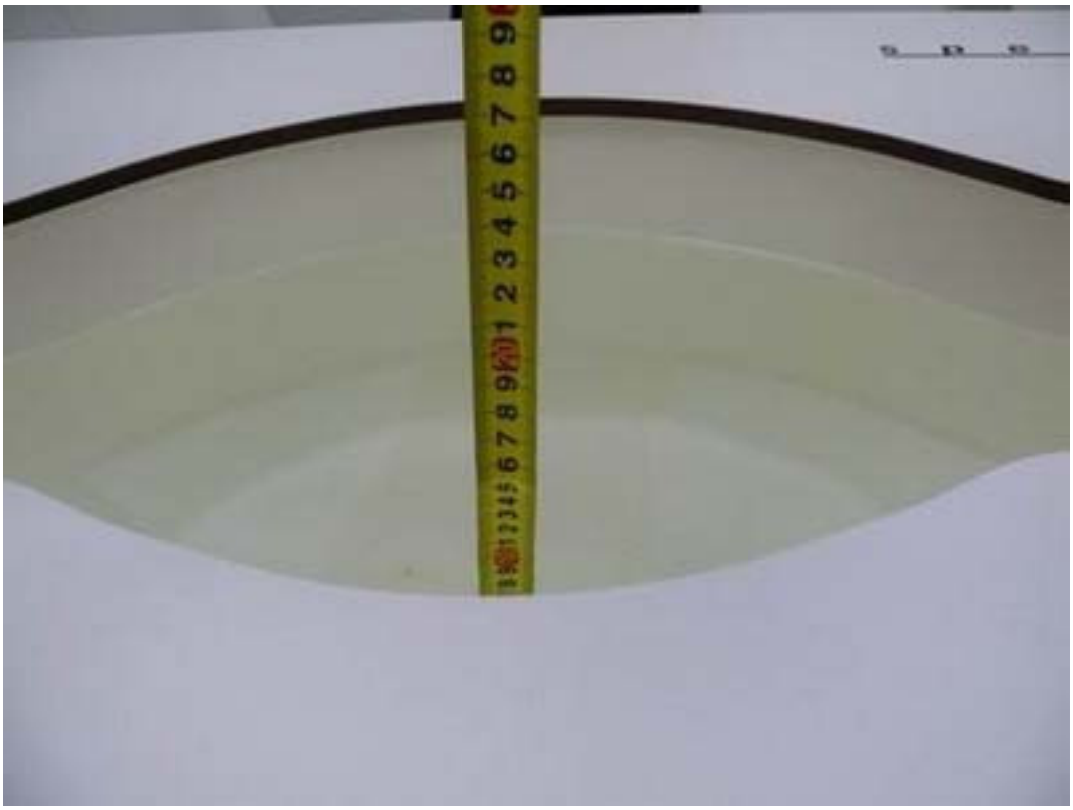
Picture 4: Liquid depth in the flat Phantom (835MHz, 15.4cm depth)

Picture 5: liquid depth in the head Phantom (1900 MHz, 15.3cm depth)



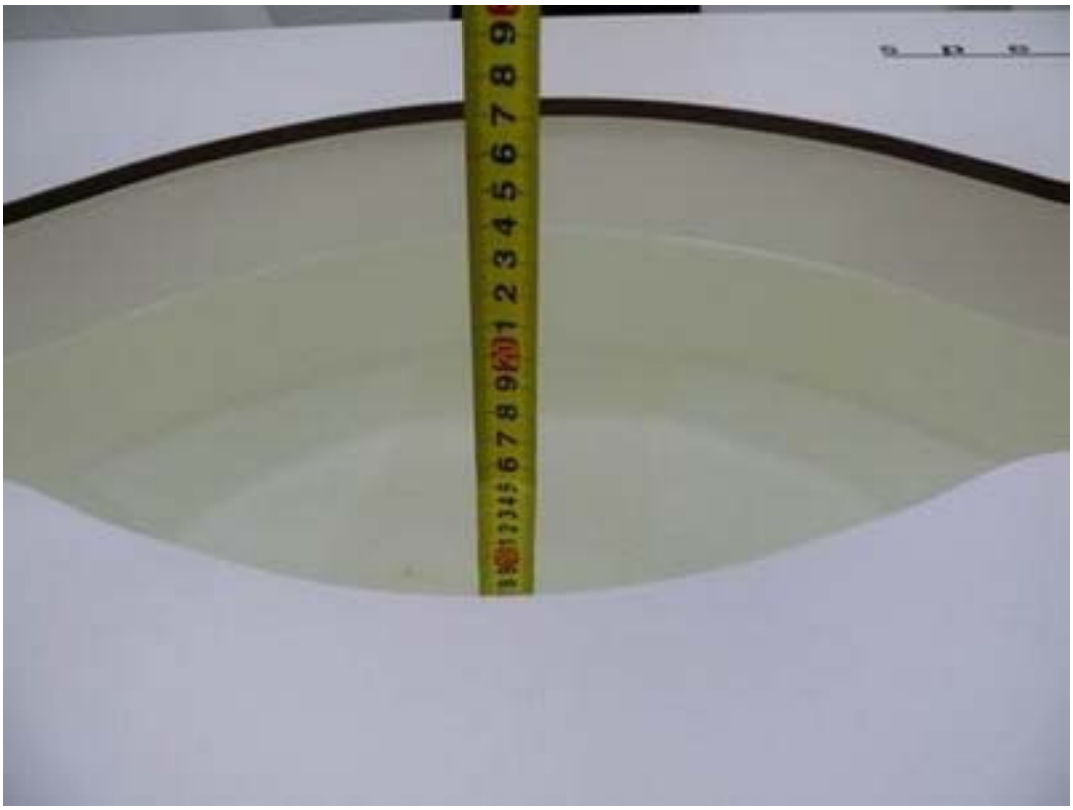
Picture 6: Liquid depth in the flat Phantom (1900 MHz, 15.2cm depth)

Picture 7: Liquid depth in the head Phantom (2450 MHz, 15.4cm depth)



Picture 8: Liquid depth in the flat Phantom (2450 MHz, 15.3cm depth)

Picture 9: Liquid depth in the head Phantom (2600 MHz, 15.4cm depth)



Picture 10: Liquid depth in the flat Phantom (2600 MHz, 15.3cm depth)

# ANNEX B: System Check Results

## Plot 1 System Performance Check at 835 MHz Head TSL

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d020**

Date: 2/26/2018

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1

Medium parameters used: f = 835 MHz; $\sigma$ = 0.88 mho/m; $\varepsilon_r$ = 41.4; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3898; ConvF(10.23, 10.23, 10.23); Calibrated: 6/27/2017;

Electronics: DAE4 Sn1291; Calibrated: 10/31/2017

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**d=15mm, Pin=250mW/Area Scan (41x121x1):** Measurement grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 2.64 mW/g

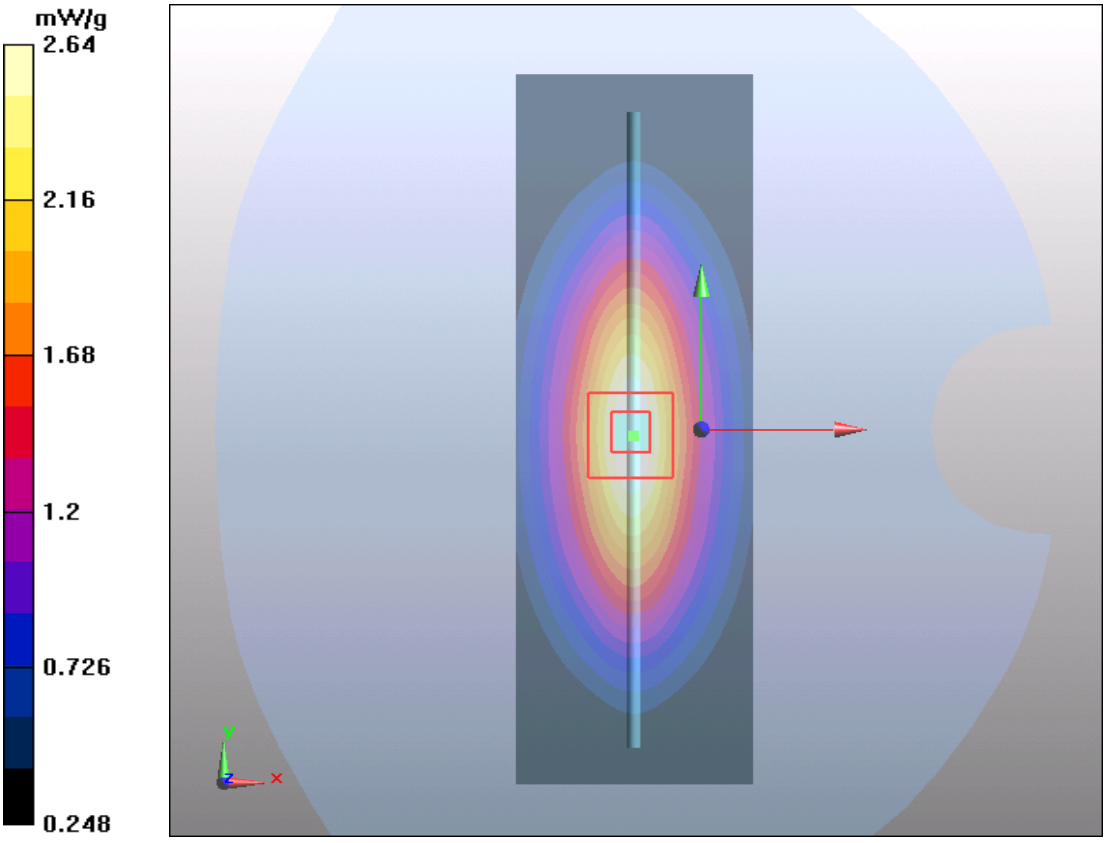
**d=15mm, Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 54.4 V/m; Power Drift = -0.076 dB

Peak SAR (extrapolated) = 3.67 W/kg

**SAR(1 g) = 2.44 mW/g; SAR(10 g) = 1.6 mW/g**

Maximum value of SAR (measured) = 2.64 mW/g



## Plot 2 System Performance Check at 835 MHz Body TSL

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d020**

Date: 2/27/2018

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1

Medium parameters used: f = 835 MHz; $\sigma$ = 0.96 mho/m; $\varepsilon_r$ = 54.2; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3898; ConvF(10.40, 10.40, 10.40); Calibrated: 6/27/2017;

Electronics: DAE4 Sn1291; Calibrated: 10/31/2017

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**d=15mm, Pin=250mW/Area Scan (41x121x1):** Measurement grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 2.58 mW/g

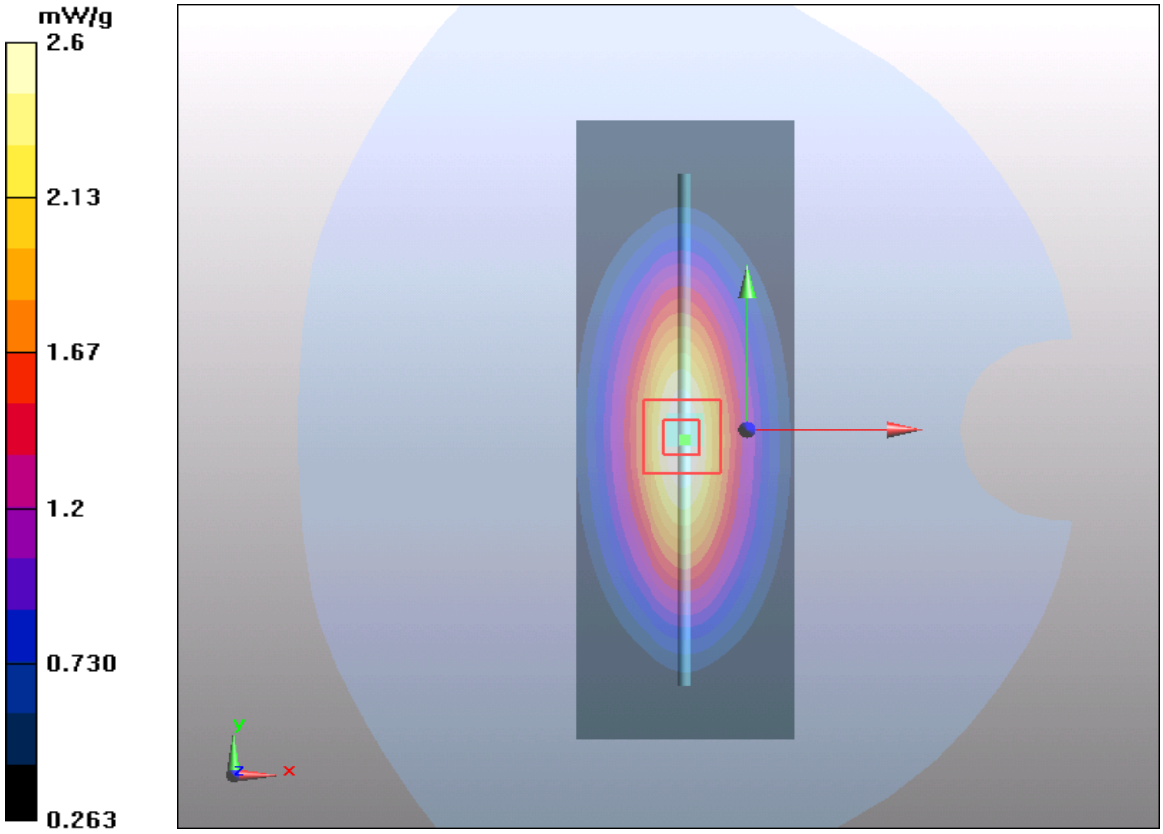
**d=15mm, Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 51.9 V/m; Power Drift = -0.058 dB

Peak SAR (extrapolated) = 3.5 W/kg

**SAR(1 g) = 2.41 mW/g; SAR(10 g) = 1.6 mW/g**

Maximum value of SAR (measured) = 2.6 mW/g



## Plot 3 System Performance Check at 1900 MHz Head TSL

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d060**

Date: 2/26/2018

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1

Medium parameters used: f = 1900 MHz; $\sigma$ = 1.41 mho/m; $\varepsilon_r$ = 40.1; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3898; ConvF(8.37, 8.37, 8.37); Calibrated: 6/27/2017;

Electronics: DAE4 Sn1291; Calibrated: 10/31/2017

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**d=10mm, Pin=250mW/Area Scan (41x71x1):** Measurement grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 11.3 mW/g

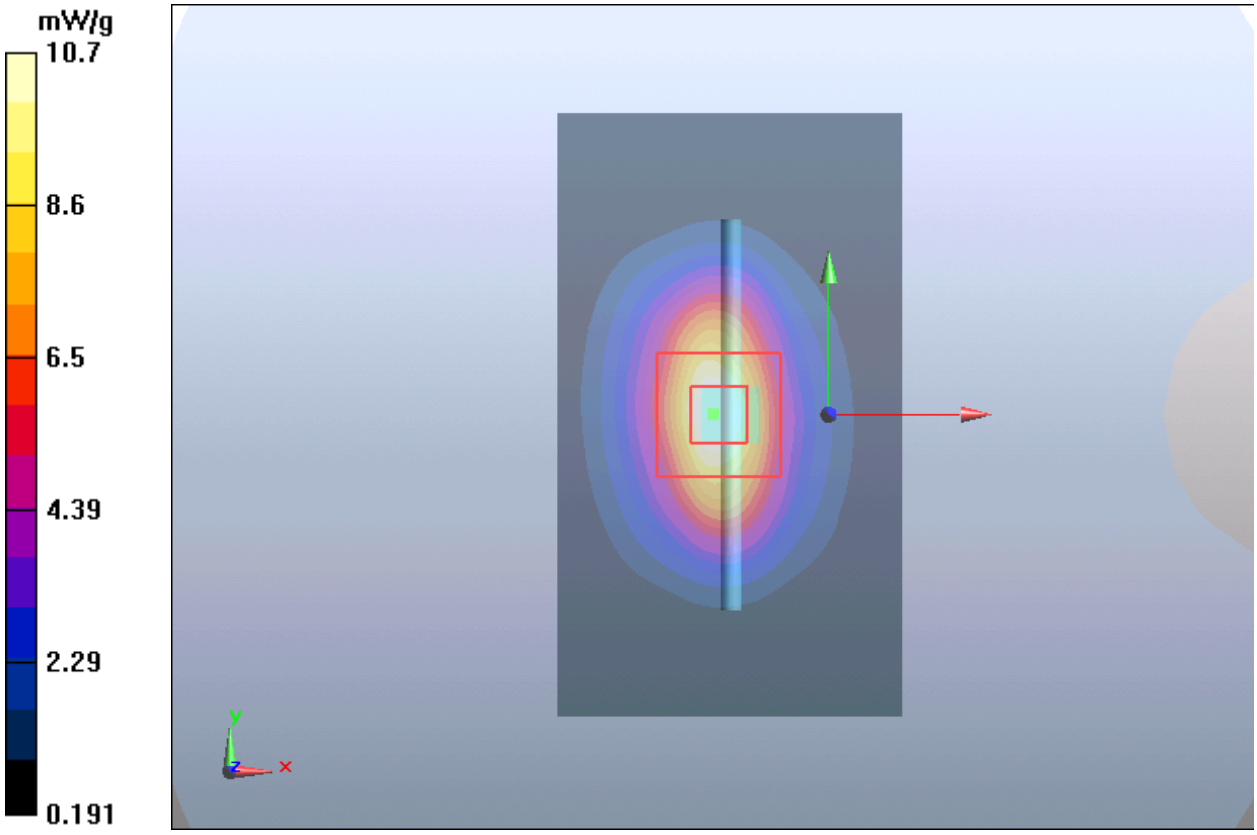
**d=10mm, Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 85.5 V/m; Power Drift = 0.028 dB

Peak SAR (extrapolated) = 17.8 W/kg

**SAR(1 g) = 9.88 mW/g; SAR(10 g) = 4.9 mW/g**

Maximum value of SAR (measured) = 10.7 mW/g



## Plot 4 System Performance Check at 1900 MHz Body TSL

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d060**

Date: 2/29/2018

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1

Medium parameters used: f = 1900 MHz; $\sigma$ = 1.51 mho/m; $\varepsilon_r$ = 52.6; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3898; ConvF(8.17, 8.17, 8.17); Calibrated: 6/27/2017;

Electronics: DAE4 Sn1291; Calibrated: 10/31/2017

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**d=10mm, Pin=250mW/Area Scan (41x71x1):** Measurement grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 12.2 mW/g

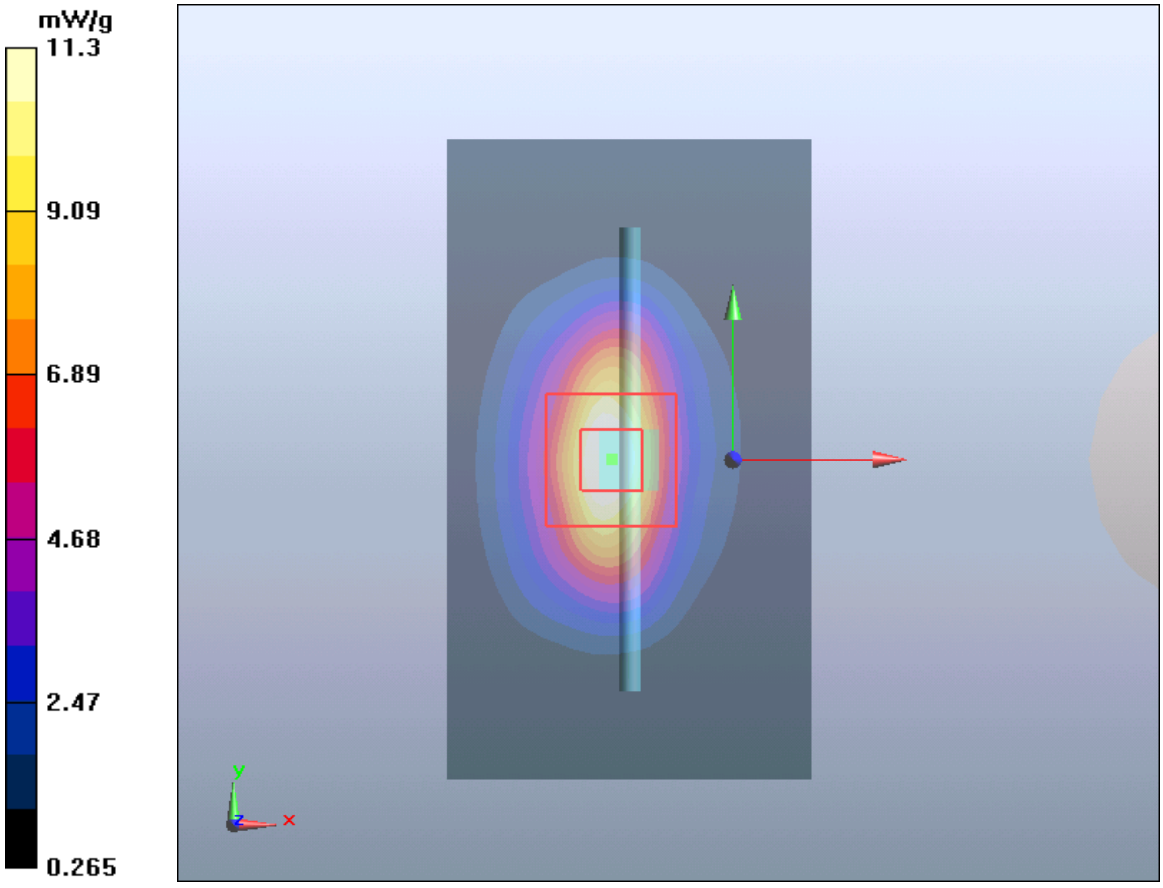
**d=10mm, Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 82.3 V/m; Power Drift = 0.068 dB

Peak SAR (extrapolated) = 17.8 W/kg

**SAR(1 g) = 9.93 mW/g; SAR(10 g) = 5.25 mW/g**

Maximum value of SAR (measured) = 11.3 mW/g



## Plot 5 System Performance Check at 2450 MHz Head TSL

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 786**

Date: 3/7/2018

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1

Medium parameters used: f = 2450 MHz; $\sigma$ = 1.81 mho/m; $\varepsilon_r$ = 38.6; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3898; ConvF(7.55, 7.55, 7.55); Calibrated: 6/27/2017;

Electronics: DAE4 Sn1291; Calibrated: 10/31/2017

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**d=10mm, Pin=250mW/Area Scan (41x71x1):** Measurement grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 18.2 mW/g

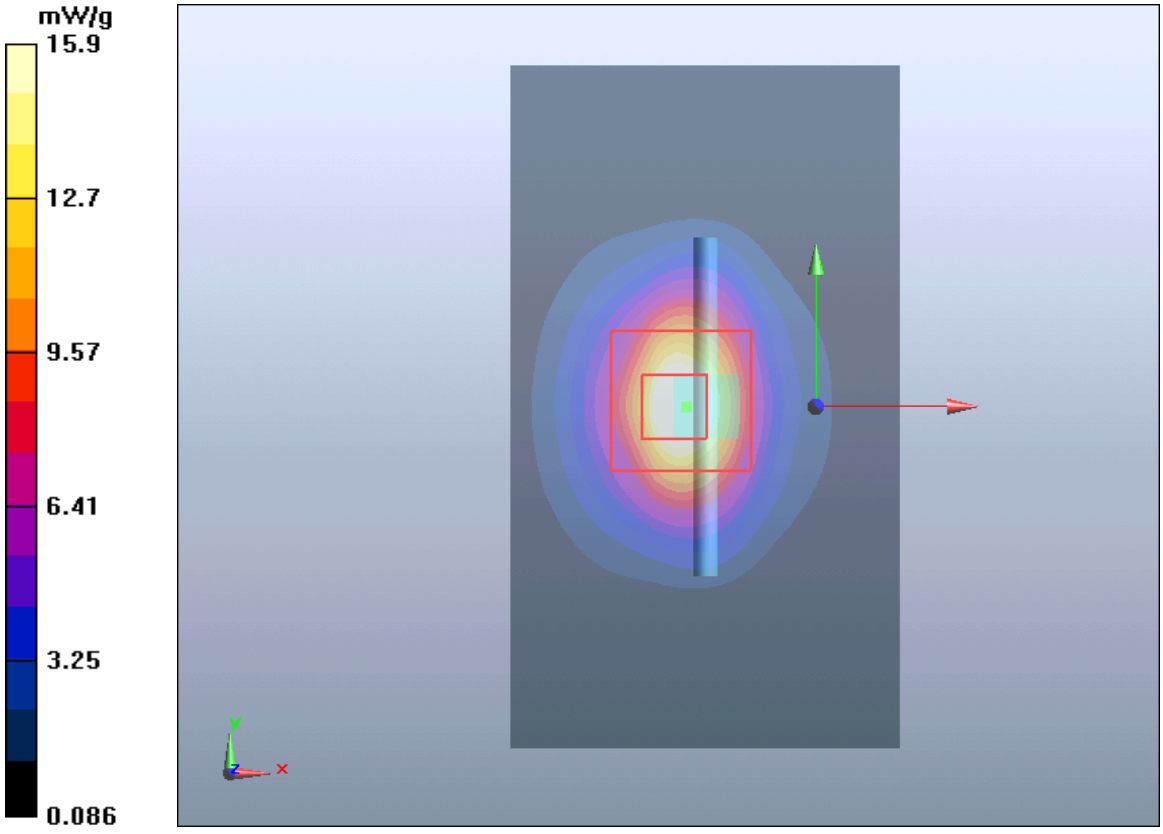
**d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 88.8 V/m; Power Drift = 0.075 dB

Peak SAR (extrapolated) = 30 W/kg

**SAR(1 g) = 13.7 mW/g; SAR(10 g) = 6.22 mW/g**

Maximum value of SAR (measured) = 15.9 mW/g



## Plot 6 System Performance Check at 2450 MHz Body TSL

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 786**

Date: 3/5/2018

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1

Medium parameters used: f = 2450 MHz; $\sigma$ = 1.98 mho/m; $\varepsilon_r$ = 52.5; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3898; ConvF(7.85, 7.85, 7.85); Calibrated: 6/27/2017;

Electronics: DAE4 Sn1291; Calibrated: 10/31/2017

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**d=10mm, Pin=250mW/Area Scan (41x71x1):** Measurement grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 16 mW/g

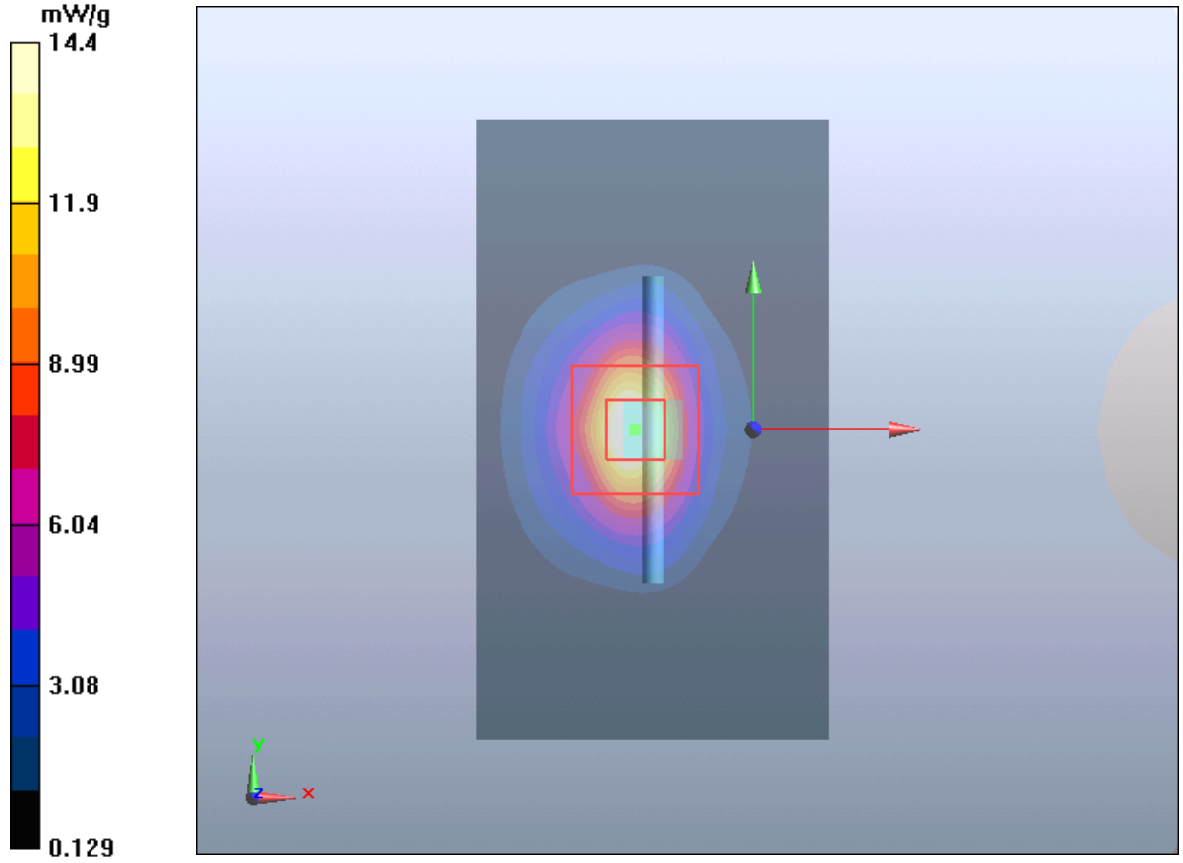
**d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 81.2 V/m; Power Drift = 0.003 dB

Peak SAR (extrapolated) = 25.4 W/kg

**SAR(1 g) = 12.5 mW/g; SAR(10 g) = 6.20 mW/g**

Maximum value of SAR (measured) = 14.4 mW/g



## Plot 7 System Performance Check at 2600 MHz Head TSL

**DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1058**

Date: 2/28/2018

Communication System: CW; Frequency: 2600 MHz

Medium parameters used: f = 2600 MHz; $\sigma$ = 2.01 mho/m; $\varepsilon_r$ = 38.2; $\rho$ = 1000 kg/m$^3$

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3898; ConvF(7.37, 7.37, 7.37); Calibrated: 6/27/2017;

Electronics: DAE4 Sn1291; Calibrated: 10/31/2017

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**d=10mm, Pin=250mW/Area Scan (41x71x1):** Measurement grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 17.439 mW/g

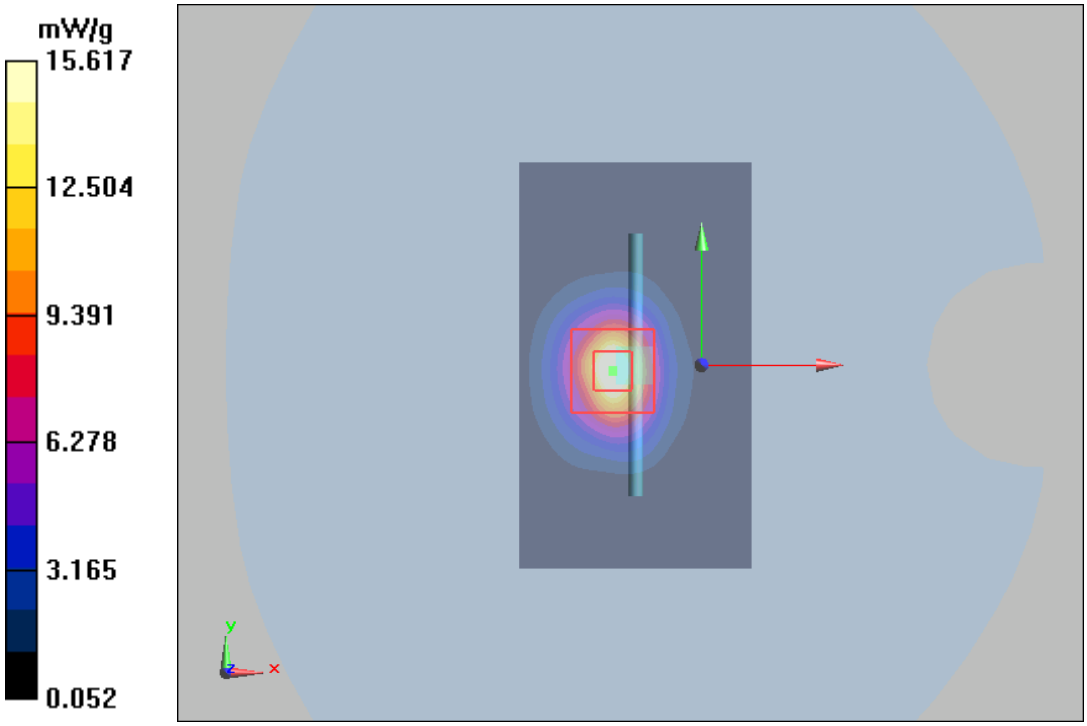
**d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 87.998 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 31.858 W/kg

**SAR(1 g) = 13.9 mW/g; SAR(10 g) = 6.07 mW/g**

Maximum value of SAR (measured) = 15.617 mW/g



## Plot 8 System Performance Check at 2600 MHz Body TSL

**DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1058**

Date: 2/28/2018

Communication System: CW; Frequency: 2600 MHz;Duty Cycle: 1:1

Medium parameters used: f = 2600 MHz; $\sigma$ = 2.23 mho/m; $\varepsilon_r$ = 51.5; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3898; ConvF(7.51, 7.51, 7.51); Calibrated: 6/27/2017;

Electronics: DAE4 Sn1291; Calibrated: 10/31/2017

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**d=10mm, Pin=250mW /Area Scan (41x71x1):** Measurement grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 17.7 mW/g

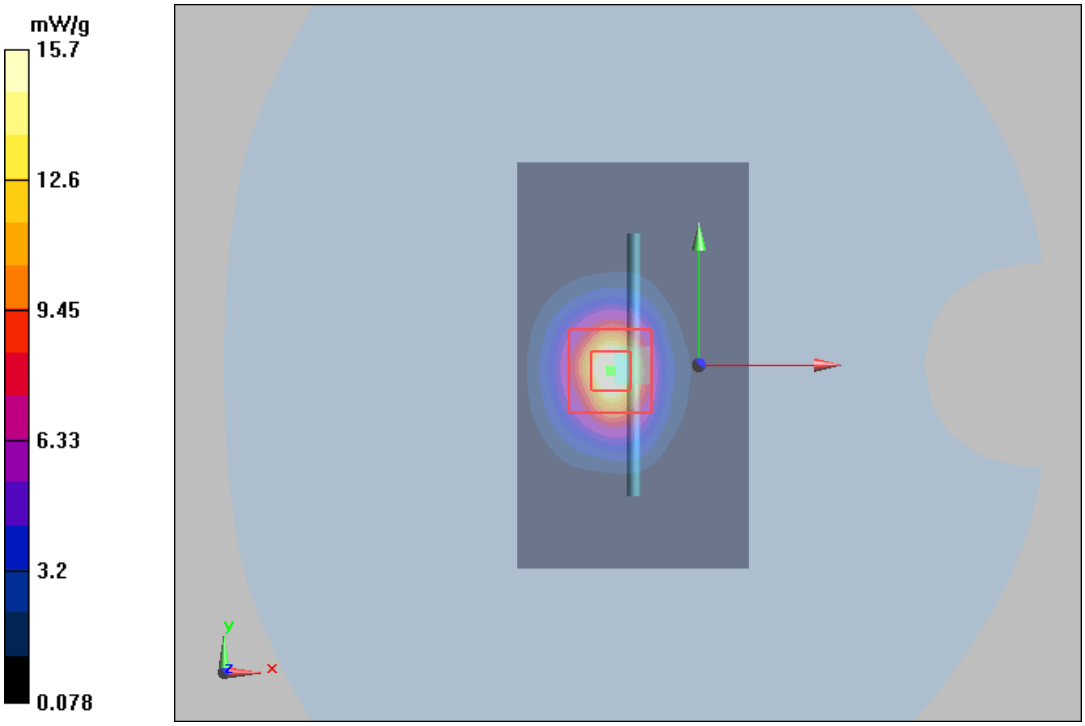
**d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 74 V/m; Power Drift = -0.0027 dB

Peak SAR (extrapolated) = 28.5 W/kg

**SAR(1 g) = 13.5 mW/g; SAR(10 g) = 5.99 mW/g**

Maximum value of SAR (measured) = 15.7 mW/g



# ANNEX C: Highest Graph Results

## Plot 9 GSM 850 Right Cheek Middle

Date: 2/26/2018

Communication System: UID 0, GSM (0); Frequency: 836.6 MHz;Duty Cycle: 1:8.30042

Medium parameters used: f = 837 MHz; $\sigma$ = 0.923 S/m; $\varepsilon_r$ = 41.229; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Right Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3898; ConvF(10.23, 10.23, 10.23); Calibrated: 6/27/2017;

Electronics: DAE4 Sn1291; Calibrated: 10/31/2017

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Right Cheek Middle/Area Scan (71x121x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.217 W/kg

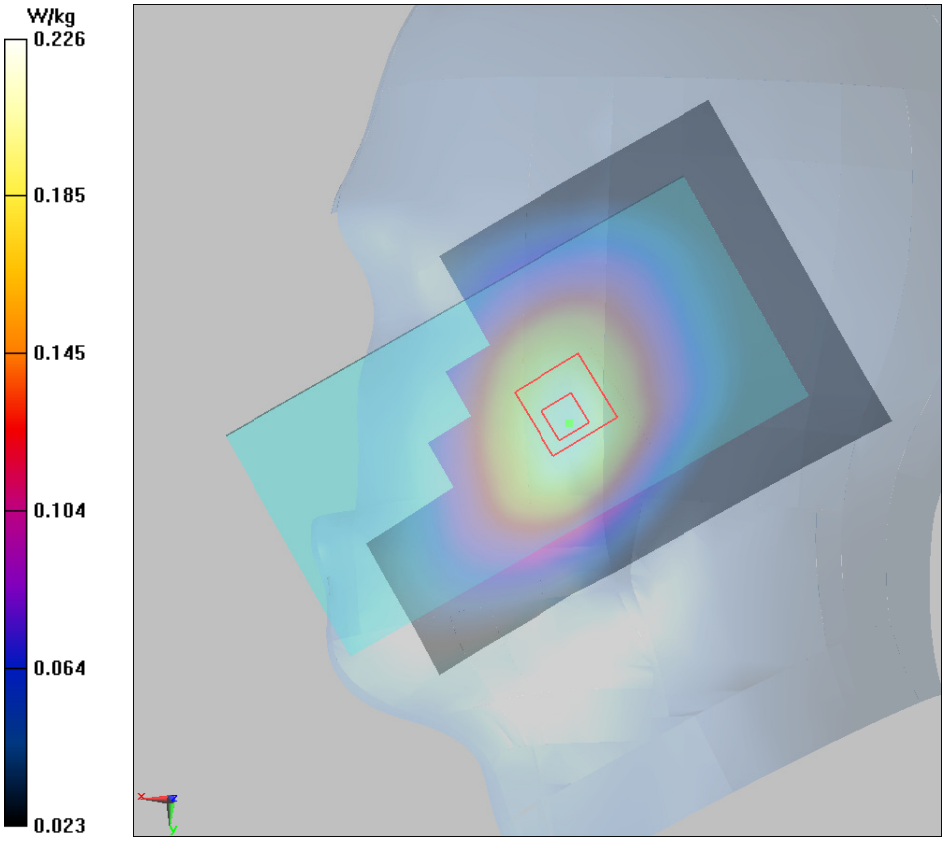
**Right Cheek Middle/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 5.717 V/m; Power Drift = -0.045 dB

Peak SAR (extrapolated) = 0.261 W/kg

**SAR(1 g) = 0.211 W/kg; SAR(10 g) = 0.157 W/kg**

Maximum value of SAR (measured) = 0.226 W/kg



## Plot 10 GSM 850 Back Side Middle (Distance 15mm)

Date: 2/27/2018

Communication System: UID 0, GSM (0); Frequency: 836.6 MHz;Duty Cycle: 1:8.30042

Medium parameters used: f = 837 MHz; $\sigma$ = 1.013 S/m; $\varepsilon_r$ = 55.395; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3898; ConvF(10.40, 10.40, 10.40); Calibrated: 6/27/2017;

Electronics: DAE4 Sn1291; Calibrated: 10/31/2017

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Back Side Middle/Area Scan (71x121x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.274 W/kg

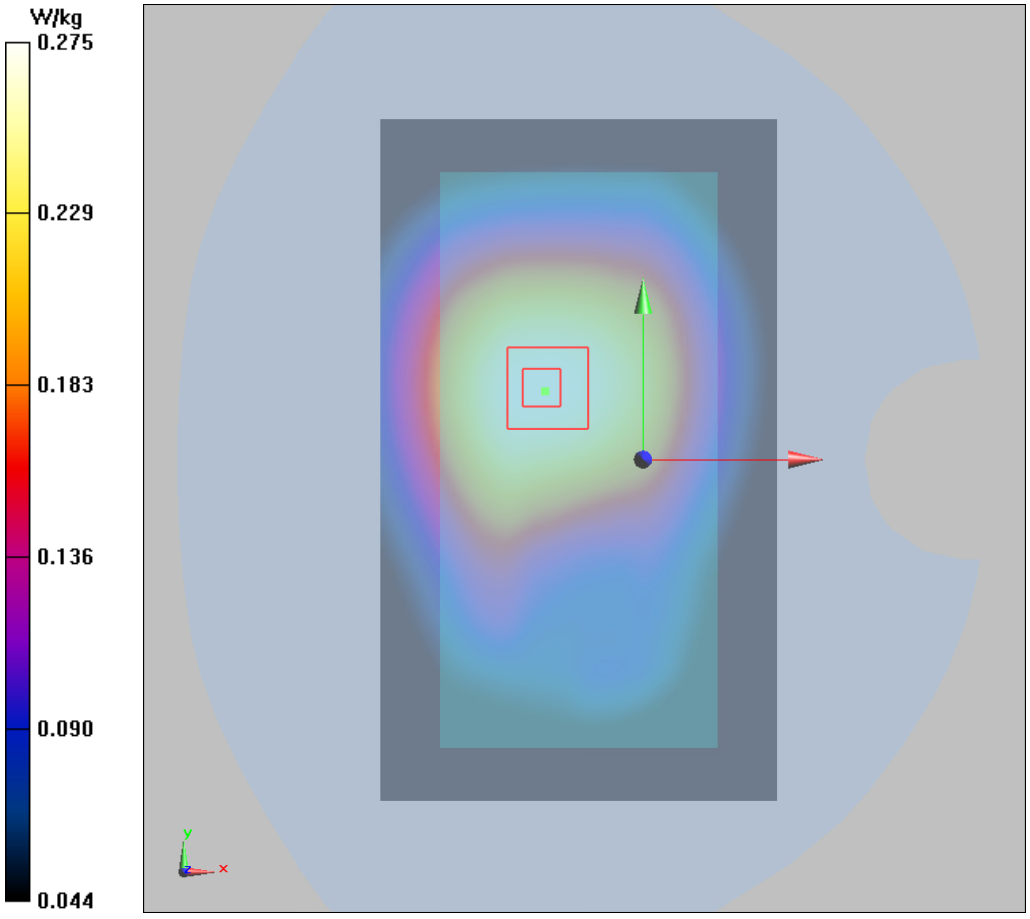
**Back Side Middle/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 15.25 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.325 W/kg

**SAR(1 g) = 0.261 W/kg; SAR(10 g) = 0.199 W/kg**

Maximum value of SAR (measured) = 0.275 W/kg



## Plot 11 GSM 850 GPRS (1Txslot) Back Side Middle (Distance 10mm)

Date: 2/27/2018

Communication System: UID 0, 1 slot GPRS (0); Frequency: 836.6 MHz;Duty Cycle: 1:8.30042

Medium parameters used: f = 837 MHz; $\sigma$ = 1.013 S/m; $\varepsilon_r$ = 55.395; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3898; ConvF(10.40, 10.40, 10.40); Calibrated: 6/27/2017;

Electronics: DAE4 Sn1291; Calibrated: 10/31/2017

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Back Side Middle/Area Scan (71x121x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.276 W/kg

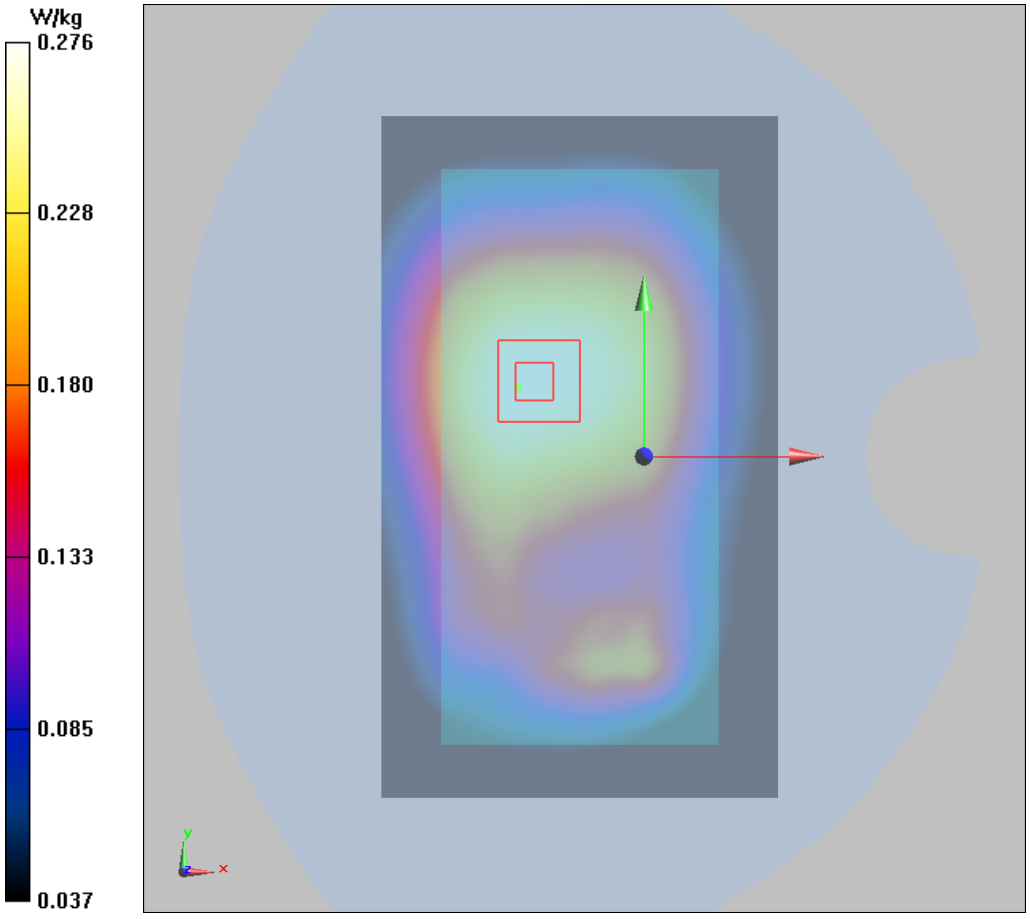
**Back Side Middle/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 15.06 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 0.328 W/kg

**SAR(1 g) = 0.264 W/kg; SAR(10 g) = 0.202 W/kg**

Maximum value of SAR (measured) = 0.276 W/kg



## Plot 12 GSM 1900 Left Cheek Middle

Date: 2/26/2018

Communication System: UID 0, GSM (0); Frequency: 1880 MHz;Duty Cycle: 1:8.30042

Medium parameters used: f = 1880 MHz; $\sigma$ = 1.364 S/m; $\varepsilon_r$ = 40.415; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Left Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3898; ConvF(8.37, 8.37, 8.37); Calibrated: 6/27/2017;

Electronics: DAE4 Sn1291; Calibrated: 10/31/2017

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Left Cheek Middle/Area Scan (71x121x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.174 W/kg

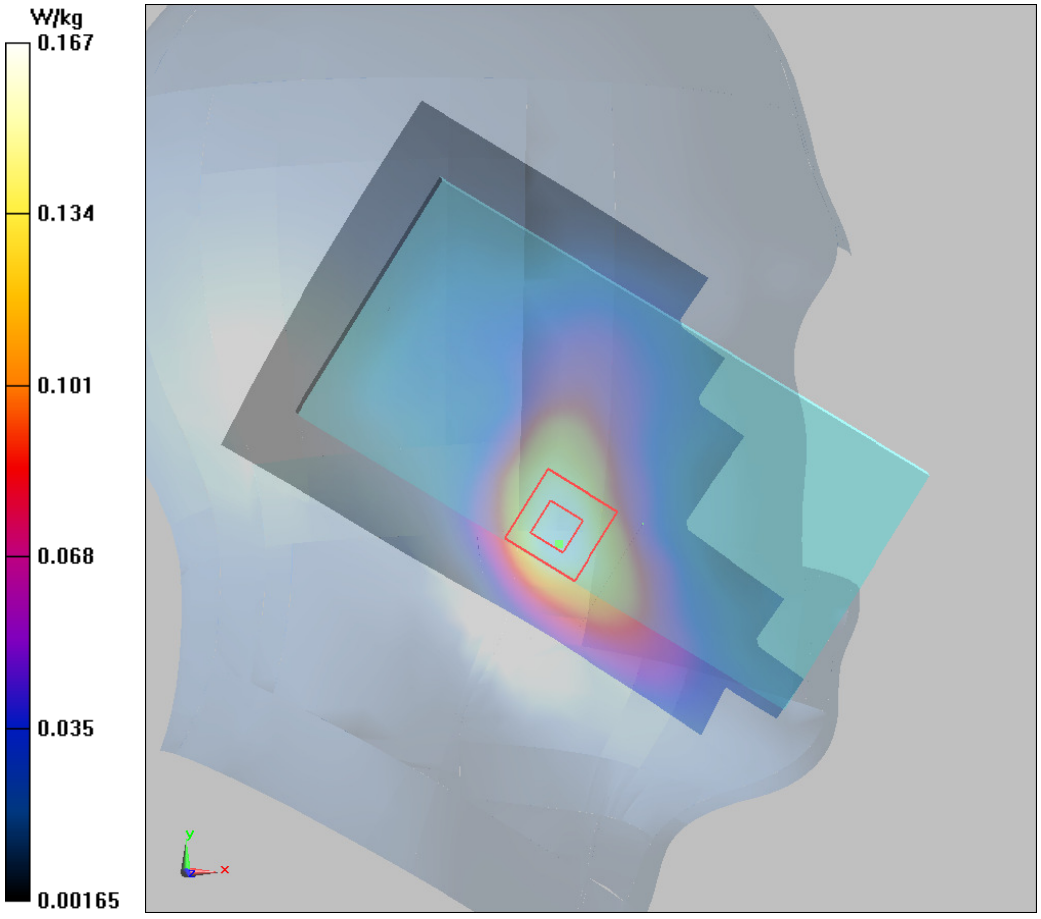
**Left Cheek Middle/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 3.473 V/m; Power Drift = -0.079 dB

Peak SAR (extrapolated) = 0.245 W/kg

**SAR(1 g) = 0.157 W/kg; SAR(10 g) = 0.097 W/kg**

Maximum value of SAR (measured) = 0.167 W/kg



## Plot 13 GSM 1900 Back Side Middle (Distance 15mm)

Date: 2/29/2018

Communication System: UID 0, GSM (0); Frequency: 1880 MHz;Duty Cycle: 1:8.30042

Medium parameters used: f = 1880 MHz; $\sigma$ = 1.475 S/m; $\varepsilon_r$ = 51.872; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3898; ConvF(8.17, 8.17, 8.17); Calibrated: 6/27/2017;

Electronics: DAE4 Sn1291; Calibrated: 10/31/2017

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Back Side Middle/Area Scan (71x121x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.183 W/kg

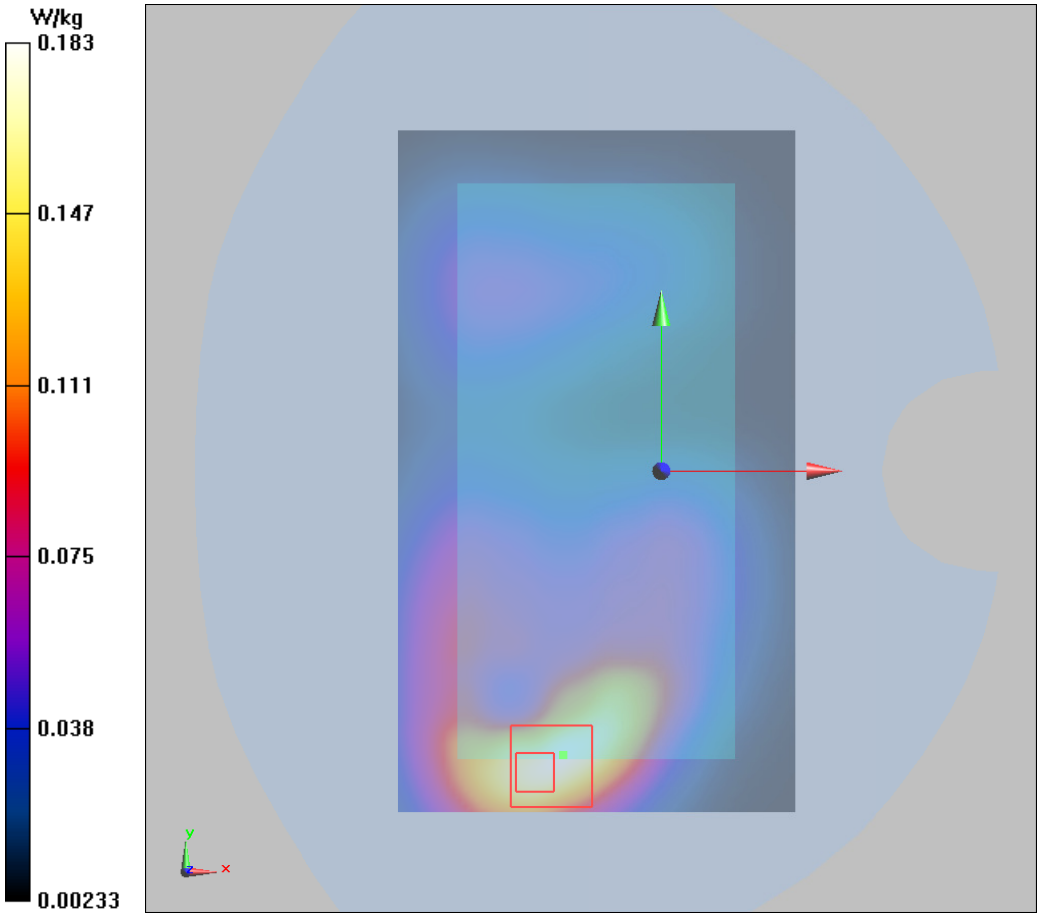
**Back Side Middle/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 3.959 V/m; Power Drift = 0.14 dB

Peak SAR (extrapolated) = 0.277 W/kg

**SAR(1 g) = 0.170 W/kg; SAR(10 g) = 0.098 W/kg**

Maximum value of SAR (measured) = 0.183 W/kg



## Plot 14 GSM 1900 GPRS (1Txslot) Bottom Edge Middle (Distance 10mm)

Date: 2/29/2018

Communication System: UID 0, 1 slot GPRS (0); Frequency: 1880 MHz;Duty Cycle: 1:8.30042

Medium parameters used: f = 1880 MHz; $\sigma$ = 1.475 S/m; $\varepsilon_r$ = 51.872; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3898; ConvF(8.17, 8.17, 8.17); Calibrated: 6/27/2017;

Electronics: DAE4 Sn1291; Calibrated: 10/31/2017

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Bottom Edge Middle/Area Scan (31x71x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.630 W/kg

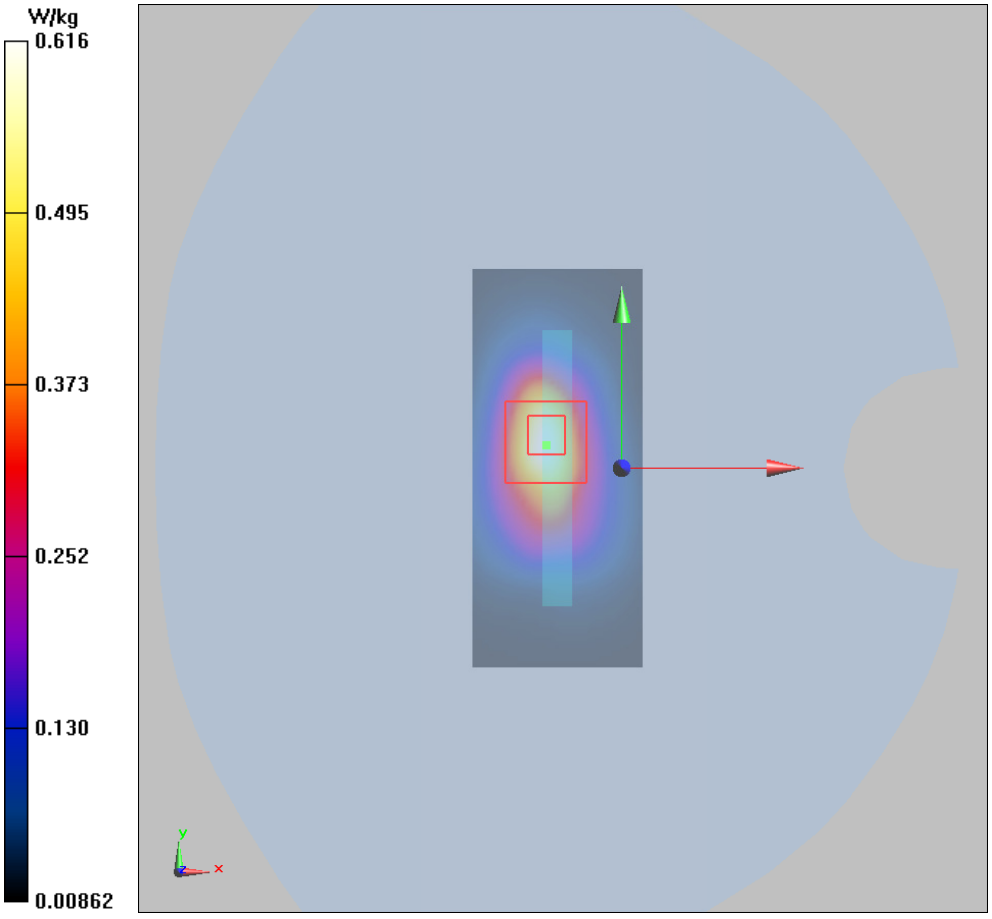
**Bottom Edge Middle/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 18.75 V/m; Power Drift = 0.15 dB

Peak SAR (extrapolated) = 0.985 W/kg

**SAR(1 g) = 0.561 W/kg; SAR(10 g) = 0.290 W/kg**

Maximum value of SAR (measured) = 0.616 W/kg



## Plot 15 UMTS Band II Left Cheek Middle

Date: 2/26/2018

Communication System: UID 0, WCDMA (0); Frequency: 1880 MHz;Duty Cycle: 1:1

Medium parameters used: f = 1880 MHz; $\sigma$ = 1.364 S/m; $\varepsilon_r$ = 40.415; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Left Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3898; ConvF(8.37, 8.37, 8.37); Calibrated: 6/27/2017;

Electronics: DAE4 Sn1291; Calibrated: 10/31/2017

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Left Cheek Middle/Area Scan (71x121x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.349 W/kg

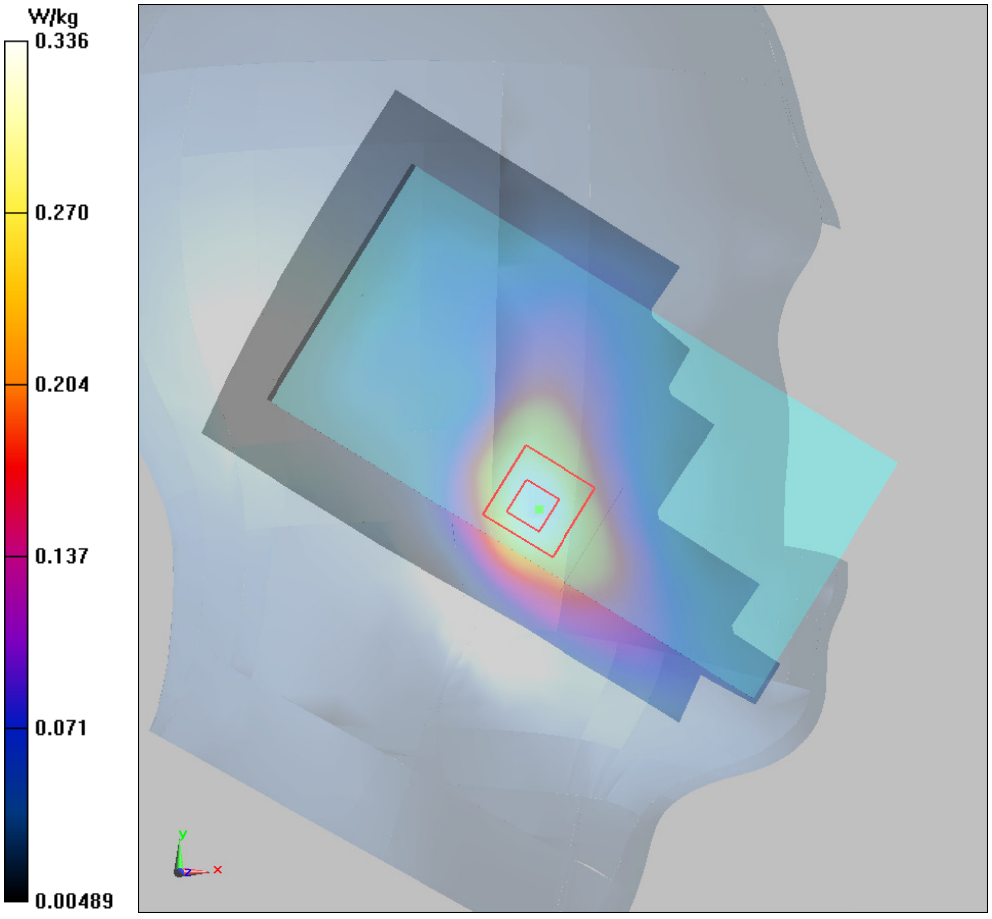
**Left Cheek Middle/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.554 V/m; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 0.488 W/kg

**SAR(1 g) = 0.313 W/kg; SAR(10 g) = 0.195 W/kg**

Maximum value of SAR (measured) = 0.336 W/kg



## Plot 16 UMTS Band II Back Side Middle (Distance 15mm)

Date: 2/29/2018

Communication System: UID 0, WCDMA (0); Frequency: 1880 MHz;Duty Cycle: 1:1

Medium parameters used: f = 1880 MHz; $\sigma$ = 1.475 S/m; $\varepsilon_r$ = 51.872; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3898; ConvF(8.17, 8.17, 8.17); Calibrated: 6/27/2017;

Electronics: DAE4 Sn1291; Calibrated: 10/31/2017

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Back Side Middle/Area Scan (71x121x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.257 W/kg

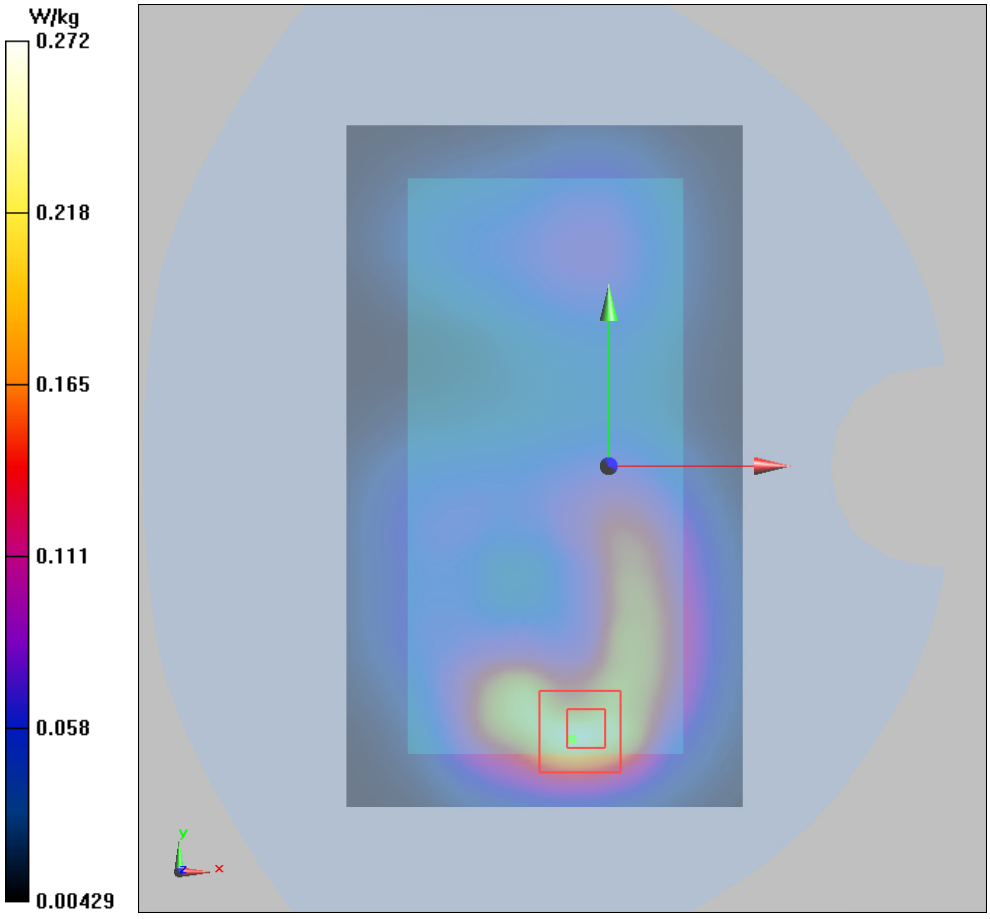
**Back Side Middle/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.396 V/m; Power Drift = 0.19 dB

Peak SAR (extrapolated) = 0.417 W/kg

**SAR(1 g) = 0.255 W/kg; SAR(10 g) = 0.141 W/kg**

Maximum value of SAR (measured) = 0.272 W/kg



## Plot 17 UMTS Band II Bottom Edge Middle (Distance 10mm)

Date: 2/29/2018

Communication System: UID 0, WCDMA (0); Frequency: 1880 MHz;Duty Cycle: 1:1

Medium parameters used: f = 1880 MHz; $\sigma$ = 1.475 S/m; $\varepsilon_r$ = 51.872; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3898; ConvF(8.17, 8.17, 8.17); Calibrated: 6/27/2017;

Electronics: DAE4 Sn1291; Calibrated: 10/31/2017

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Bottom Edge Middle/Area Scan (31x71x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.682 W/kg

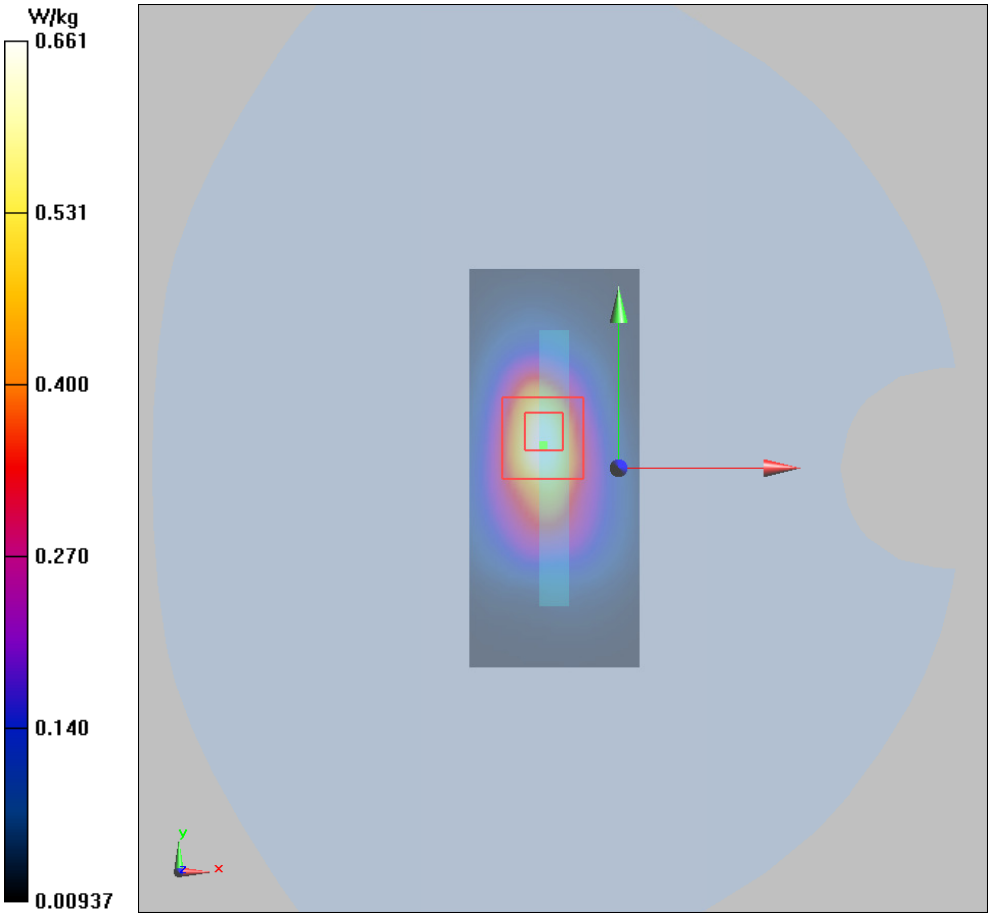
**Bottom Edge Middle/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 19.43 V/m; Power Drift = 0.033 dB

Peak SAR (extrapolated) = 1.06 W/kg

**SAR(1 g) = 0.601 W/kg; SAR(10 g) = 0.308 W/kg**

Maximum value of SAR (measured) = 0.661 W/kg



## Plot 18 UMTS Band V Right Cheek Middle

Date: 2/26/2018

Communication System: UID 0, WCDMA (0); Frequency: 836.6 MHz;Duty Cycle: 1:1

Medium parameters used: f = 837 MHz; $\sigma$ = 0.923 S/m; $\varepsilon_r$ = 41.229; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Right Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3898; ConvF(10.23, 10.23, 10.23); Calibrated: 6/27/2017;

Electronics: DAE4 Sn1291; Calibrated: 10/31/2017

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Right Cheek Middle/Area Scan (71x121x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.302 W/kg

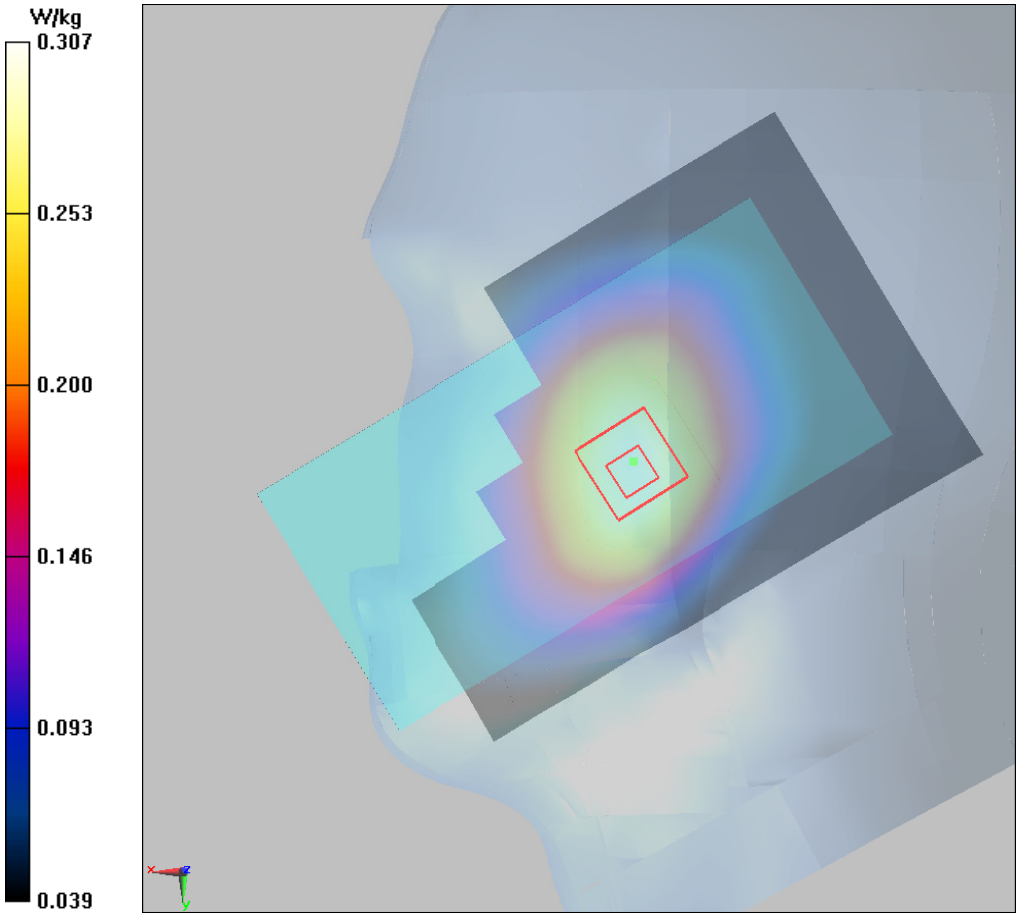
**Right Cheek Middle/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.726 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 0.355 W/kg

**SAR(1 g) = 0.290 W/kg; SAR(10 g) = 0.220 W/kg**

Maximum value of SAR (measured) = 0.307 W/kg



## Plot 19 UMTS Band V Back Side Middle (Distance 15mm)

Date: 2/27/2018

Communication System: UID 0, WCDMA (0); Frequency: 836.6 MHz;Duty Cycle: 1:1

Medium parameters used: f = 837 MHz; $\sigma$ = 1.013 S/m; $\varepsilon_r$ = 55.395; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3898; ConvF(10.40, 10.40, 10.40); Calibrated: 6/27/2017;

Electronics: DAE4 Sn1291; Calibrated: 10/31/2017

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Back Side Middle/Area Scan (71x121x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.376 W/kg

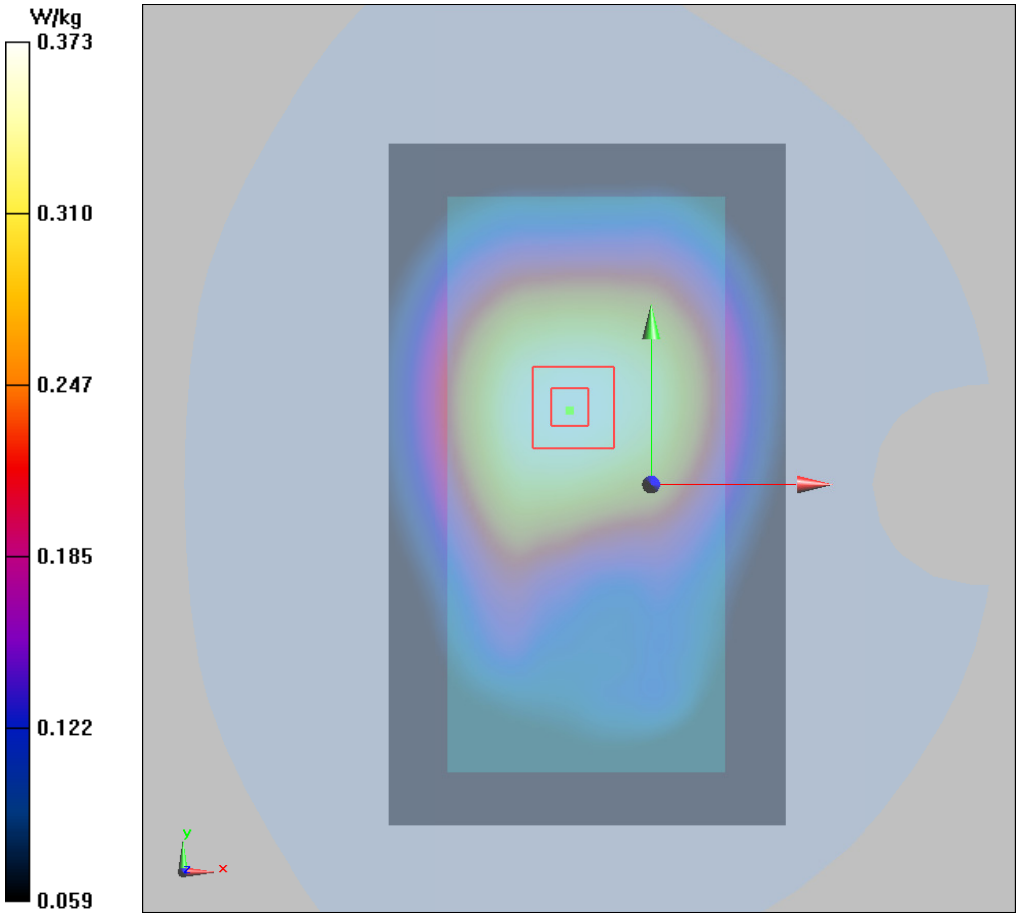
**Back Side Middle/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 17.70 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 0.442 W/kg

**SAR(1 g) = 0.356 W/kg; SAR(10 g) = 0.271 W/kg**

Maximum value of SAR (measured) = 0.373 W/kg



## Plot 20 UMTS Band V Back Side Middle (Distance 10mm)

Date: 2/27/2018

Communication System: UID 0, WCDMA (0); Frequency: 836.6 MHz;Duty Cycle: 1:1

Medium parameters used: f = 837 MHz; $\sigma$ = 1.013 S/m; $\varepsilon_r$ = 55.395; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3898; ConvF(10.40, 10.40, 10.40); Calibrated: 6/27/2017;

Electronics: DAE4 Sn1291; Calibrated: 10/31/2017

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Back Side Middle/Area Scan (71x121x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.401 W/kg

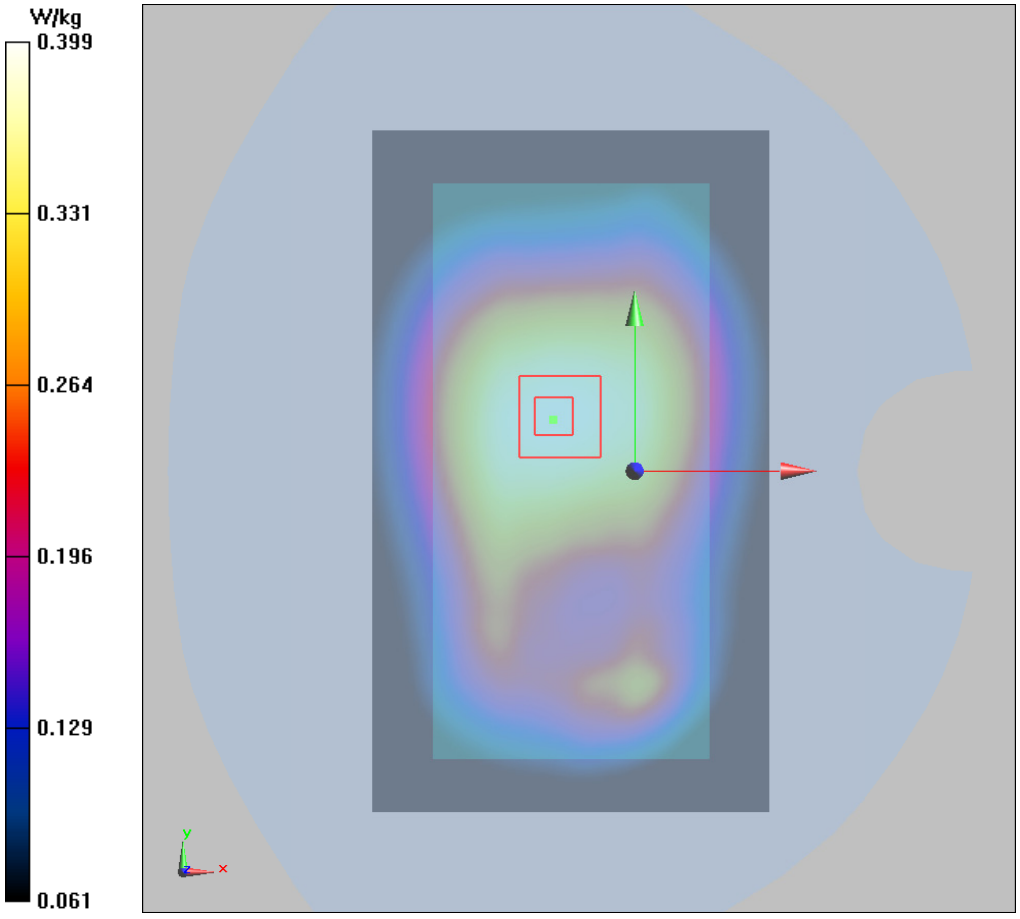
**Back Side Middle/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 19.30 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 0.470 W/kg

**SAR(1 g) = 0.381 W/kg; SAR(10 g) = 0.293 W/kg**

Maximum value of SAR (measured) = 0.399 W/kg



## Plot 21 LTE Band 5 1RB Right Cheek Middle

Date: 2/26/2018

Communication System: UID 0, LTE_FDD (0); Frequency: 852 MHz;Duty Cycle: 1:1

Medium parameters used: f = 852 MHz; $\sigma$ = 0.936 S/m; $\varepsilon_r$ = 41.056; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Right Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3898; ConvF(10.23, 10.23, 10.23); Calibrated: 6/27/2017;

Electronics: DAE4 Sn1291; Calibrated: 10/31/2017

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Right Cheek Middle/Area Scan (71x121x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.255 W/kg

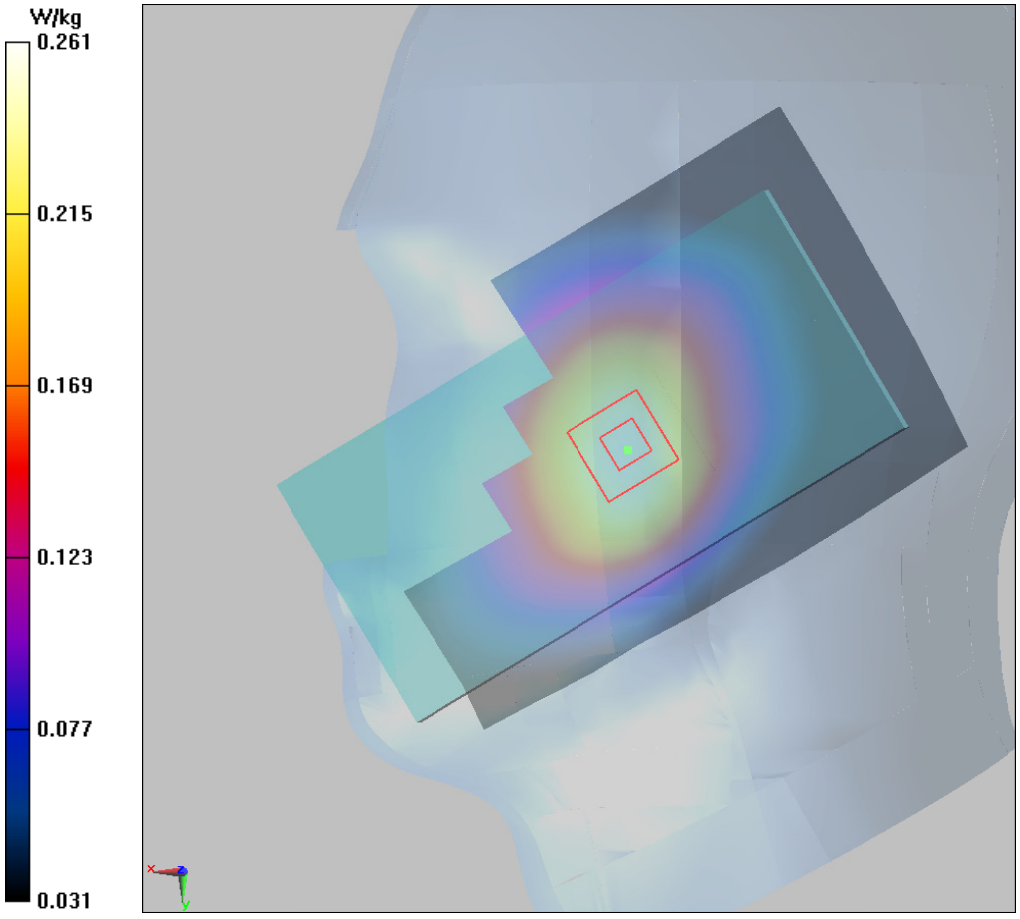
**Right Cheek Middle/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.609 V/m; Power Drift = 0.15 dB

Peak SAR (extrapolated) = 0.307 W/kg

**SAR(1 g) = 0.247 W/kg; SAR(10 g) = 0.185 W/kg**

Maximum value of SAR (measured) = 0.261 W/kg



## Plot 22 LTE Band 5 1RB Back Side Middle (Distance 15mm)

Date: 2/27/2018

Communication System: UID 0, LTE_FDD (0); Frequency: 836.5 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 836.5 MHz; $\sigma$ = 1.013 S/m; $\varepsilon_r$ = 55.404; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3898; ConvF(10.40, 10.40, 10.40); Calibrated: 6/27/2017;

Electronics: DAE4 Sn1291; Calibrated: 10/31/2017

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Back Side Middle/Area Scan (71x121x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.254 W/kg

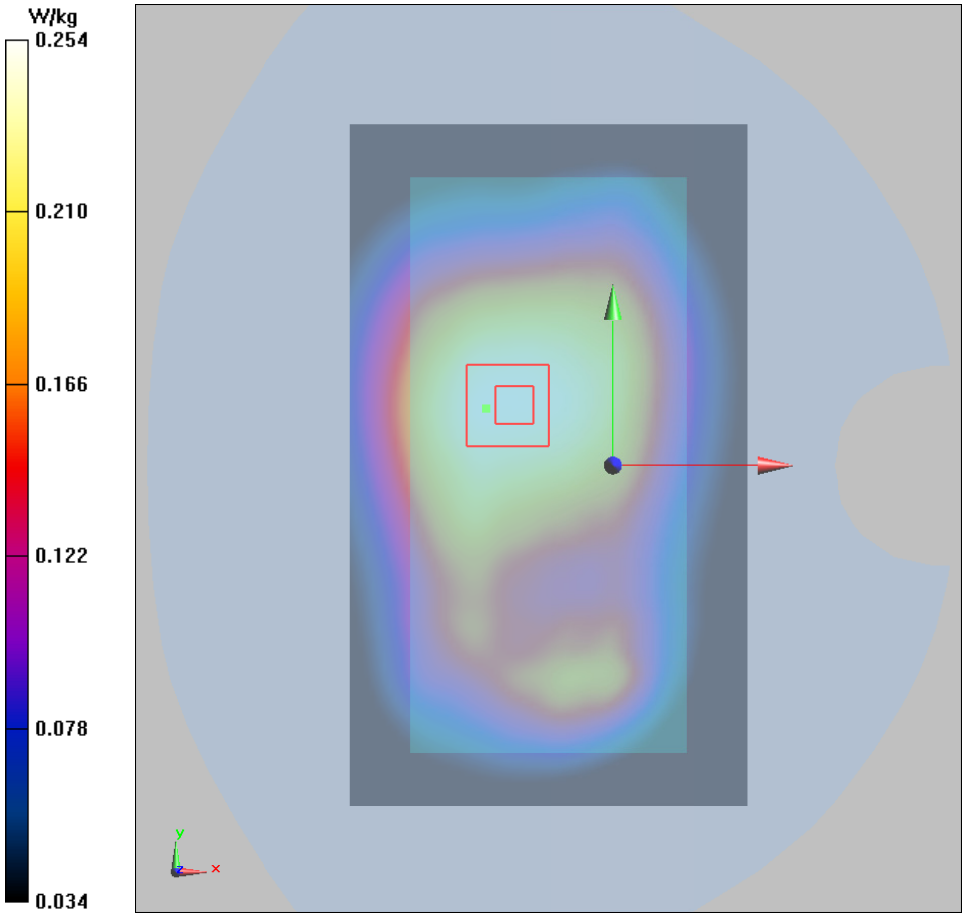
**Back Side Middle/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 15.00 V/m; Power Drift = 0.15 dB

Peak SAR (extrapolated) = 0.310 W/kg

**SAR(1 g) = 0.243 W/kg; SAR(10 g) = 0.187 W/kg**

Maximum value of SAR (measured) = 0.254 W/kg



## Plot 23 LTE Band 5 1RB Back Side Middle (Distance 10mm)

Date: 2/27/2018

Communication System: UID 0, LTE_FDD (0); Frequency: 836.5 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 836.5 MHz; $\sigma$ = 1.013 S/m; $\varepsilon_r$ = 55.404; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3898; ConvF(10.40, 10.40, 10.40); Calibrated: 6/27/2017;

Electronics: DAE4 Sn1291; Calibrated: 10/31/2017

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Back Side Middle/Area Scan (71x121x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.310 W/kg

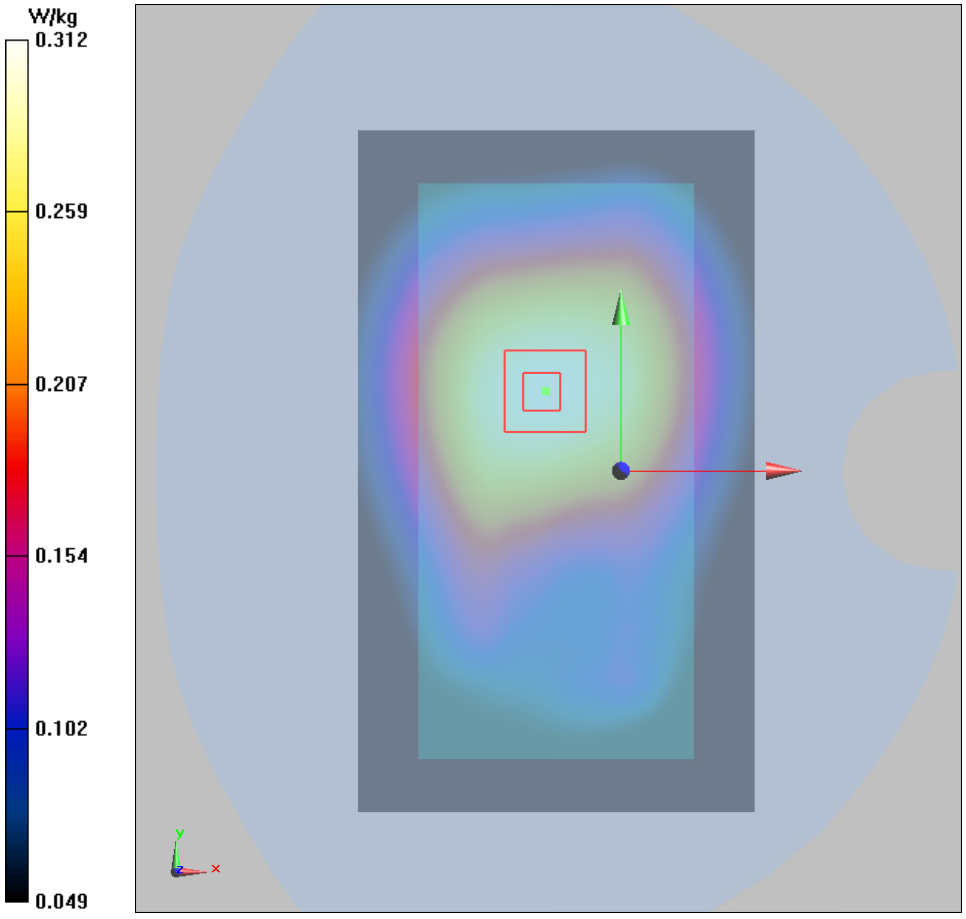
**Back Side Middle/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 16.15 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 0.368 W/kg

**SAR(1 g) = 0.297 W/kg; SAR(10 g) = 0.227 W/kg**

Maximum value of SAR (measured) = 0.312 W/kg



## Plot 24 LTE Band 7 1RB Right Cheek High

Date: 2/28/2018

Communication System: UID 0, LTE_FDD (0); Frequency: 2560 MHz;Duty Cycle: 1:1

Medium parameters used: f = 2560 MHz; $\sigma$ = 1.944 S/m; $\varepsilon_r$ = 38.953; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Left Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3898; ConvF(7.37, 7.37, 7.37); Calibrated: 6/27/2017;

Electronics: DAE4 Sn1291; Calibrated: 10/31/2017

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Left Cheek High/Area Scan (91x151x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 0.146 W/kg

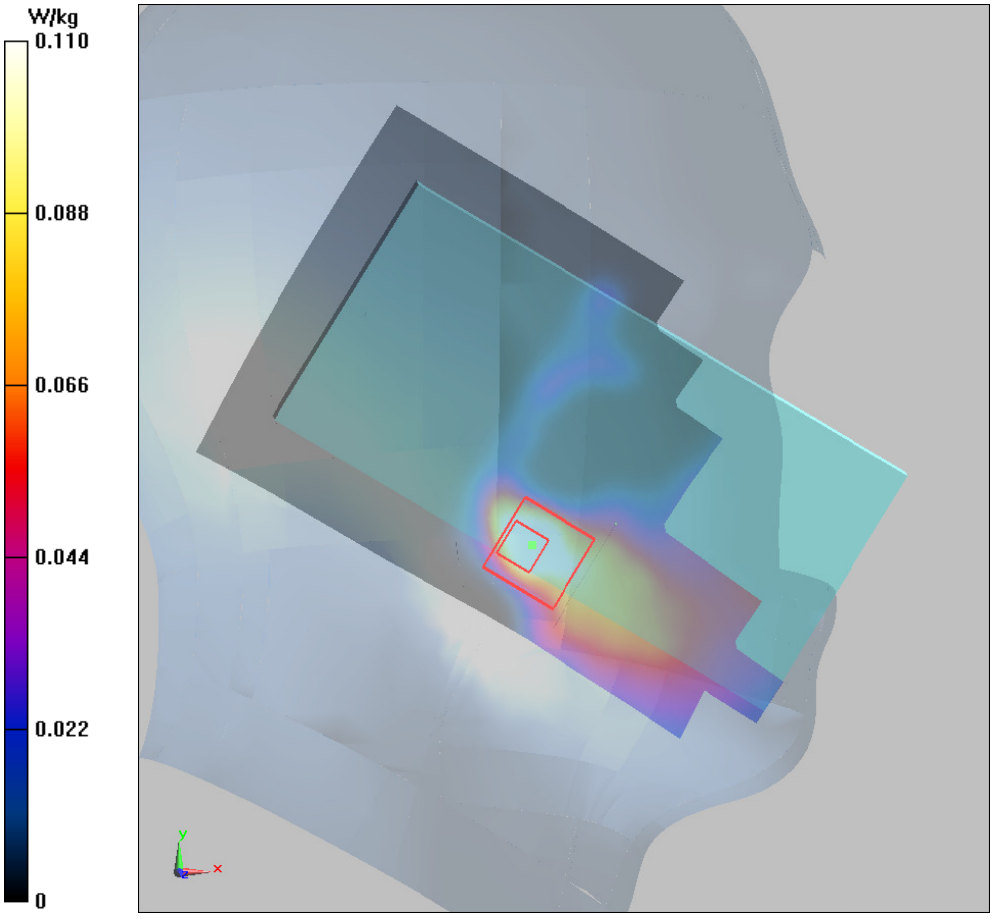
**Left Cheek High/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 0.9440 V/m; Power Drift = 0.061 dB

Peak SAR (extrapolated) = 0.204 W/kg

**SAR(1 g) = 0.109 W/kg; SAR(10 g) = 0.079 W/kg**

Maximum value of SAR (measured) = 0.110 W/kg



## Plot 25 LTE Band 7 1RB Back Side High (Distance 15mm)

Date: 2/28/2018

Communication System: UID 0, LTE_FDD (0); Frequency: 2560 MHz;Duty Cycle: 1:1

Medium parameters used: f = 2560 MHz; $\sigma$ = 2.077 S/m; $\varepsilon_r$ = 52.374; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3898; ConvF(7.51, 7.51, 7.51); Calibrated: 6/27/2017;

Electronics: DAE4 Sn1291; Calibrated: 10/31/2017

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Back Side High/Area Scan (91x151x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 0.281 W/kg

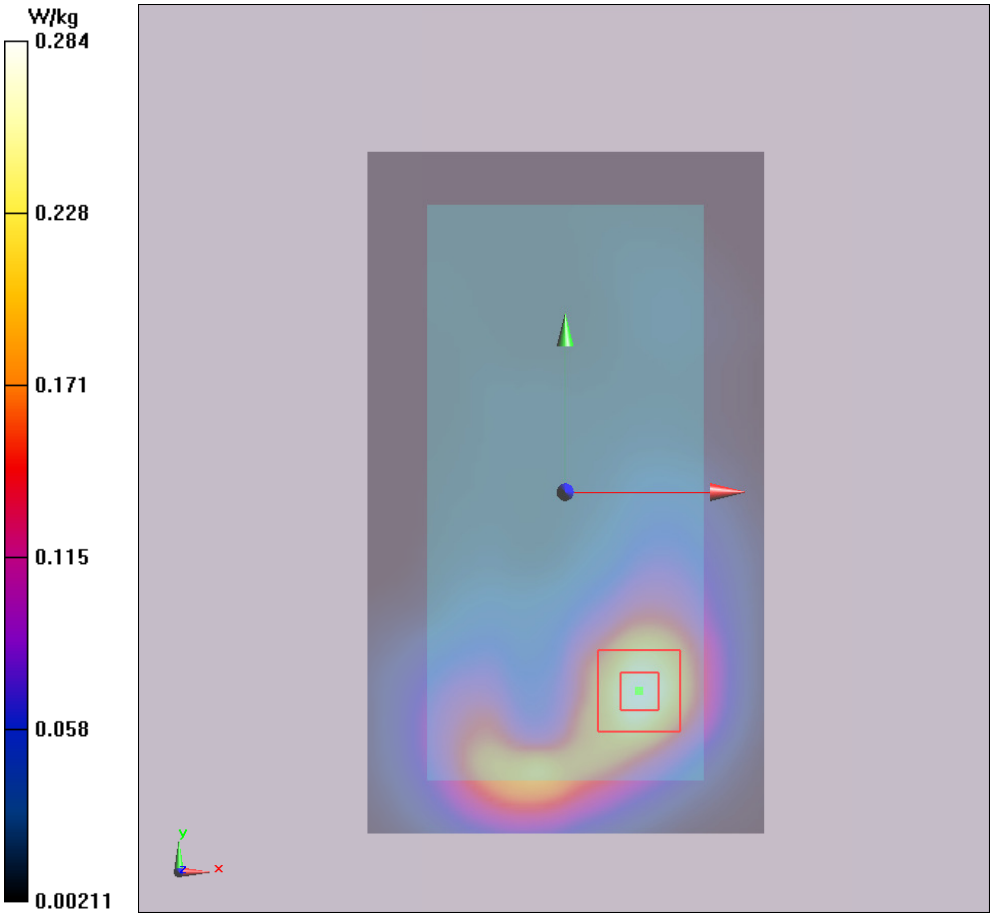
**Back Side High/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 2.910 V/m; Power Drift = -0.101 dB

Peak SAR (extrapolated) = 0.490 W/kg

**SAR(1 g) = 0.257 W/kg; SAR(10 g) = 0.135 W/kg**

Maximum value of SAR (measured) = 0.284 W/kg



## Plot 26 LTE Band 7 50%RB Bottom Edge High (Distance 10mm)

Date: 2/28/2018

Communication System: UID 0, LTE_FDD (0); Frequency: 2510 MHz;Duty Cycle: 1:1

Medium parameters used: f = 2510 MHz; $\sigma$ = 2.017 S/m; $\varepsilon_r$ = 52.518; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3898; ConvF(7.51, 7.51, 7.51); Calibrated: 6/27/2017;

Electronics: DAE4 Sn1291; Calibrated: 10/31/2017

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Bottom Edge Low/Area Scan (51x111x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.609 W/kg

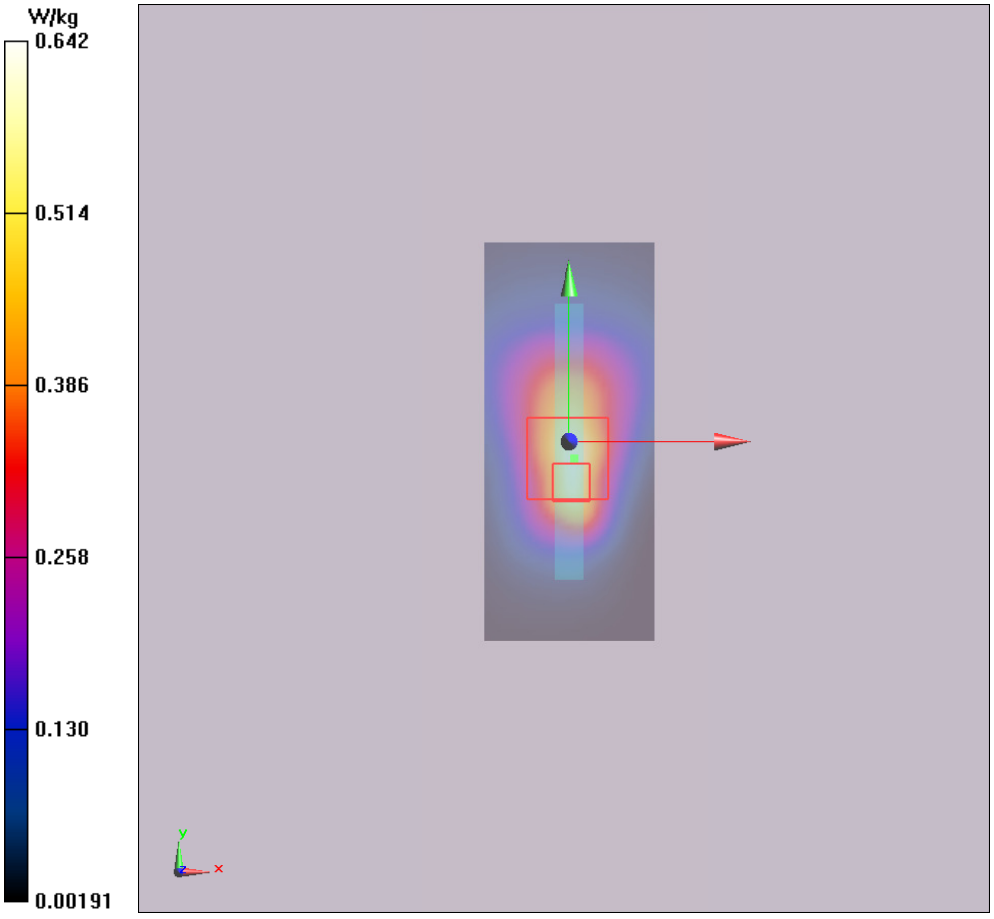
**Bottom Edge Low/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 16.78 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 1.21 W/kg

**SAR(1 g) = 0.554 W/kg; SAR(10 g) = 0.257 W/kg**

Maximum value of SAR (measured) = 0.642 W/kg



## Plot 27 802.11b Left Cheek High (WIFI data standalone)

Date: 3/7/2018

Communication System: UID 0, WiFi (0); Frequency: 2462 MHz;Duty Cycle: 1:1.023

Medium parameters used: f = 2462 MHz; $\sigma$ = 1.87 S/m; $\varepsilon_r$ = 39.707; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Left Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3898; ConvF(7.55, 7.55, 7.55); Calibrated: 6/27/2017;

Electronics: DAE4 Sn1291; Calibrated: 10/31/2017

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Left Cheek High/Area Scan (91x151x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 1.13 W/kg

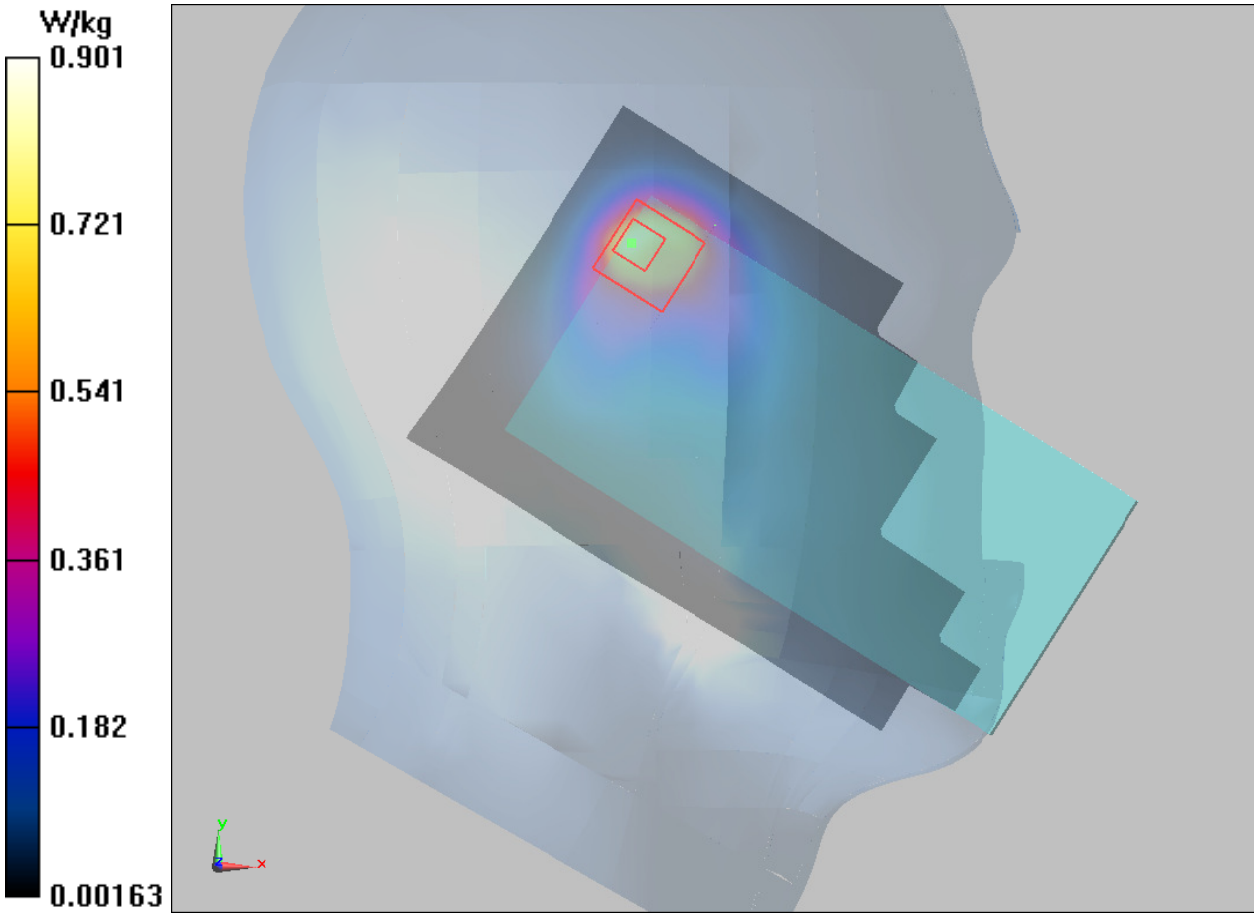
**Left Cheek High/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 14.95 V/m; Power Drift = 0.096 dB

Peak SAR (extrapolated) = 1.82 W/kg

**SAR(1 g) = 0.772 W/kg; SAR(10 g) = 0.346 W/kg**

Maximum value of SAR (measured) = 0.901 W/kg



## Plot 28 802.11b Back Side Middle (WIFI data standalone, Distance 15mm)

Date: 3/5/2018

Communication System: UID 0, WiFi (0); Frequency: 2437 MHz;Duty Cycle: 1:1.023

Medium parameters used: f = 2437 MHz; $\sigma$ = 1.929 S/m; $\varepsilon_r$ = 52.727; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3898; ConvF(7.85, 7.85, 7.85); Calibrated: 6/27/2017;

Electronics: DAE4 Sn1291; Calibrated: 10/31/2017

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Back Side Middle/Area Scan (91x151x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 0.110 W/kg

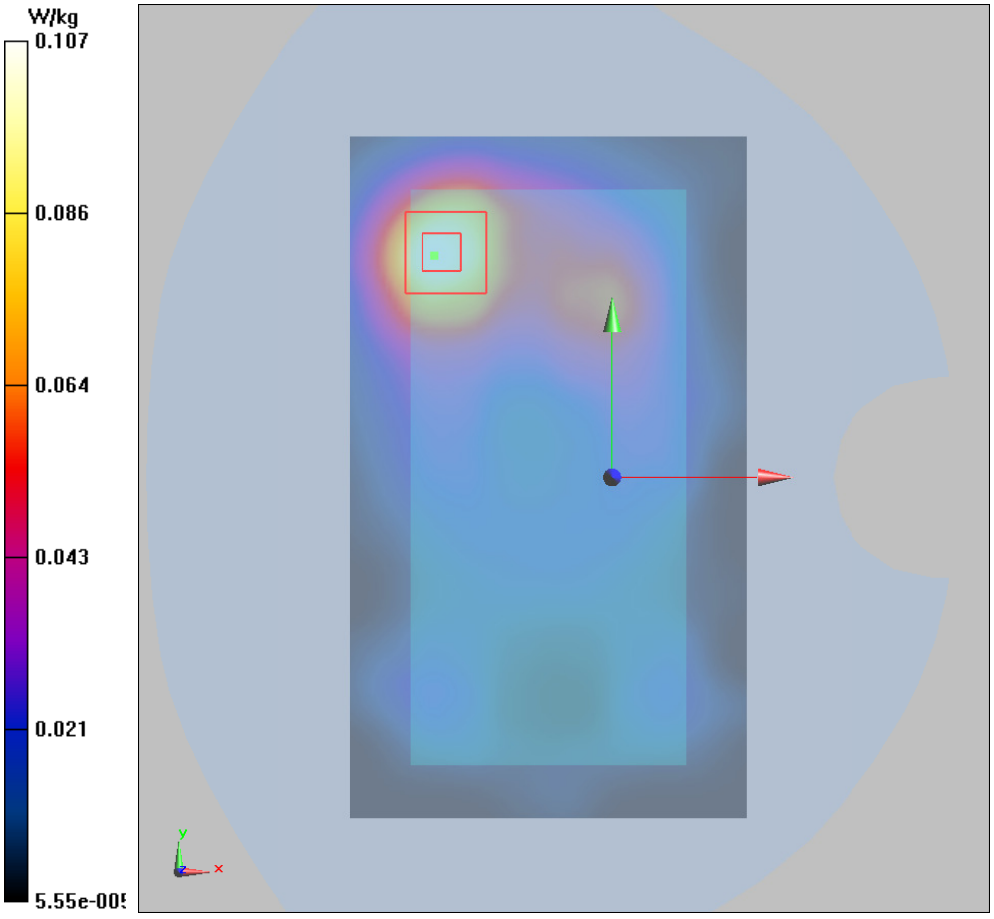
**Back Side Middle/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 2.797 V/m; Power Drift = 0.031 dB

Peak SAR (extrapolated) = 0.189 W/kg

**SAR(1 g) = 0.099 W/kg; SAR(10 g) = 0.053 W/kg**

Maximum value of SAR (measured) = 0.107 W/kg



## Plot 29 802.11b Back Side Middle (WIFI data standalone, Distance 10mm)

Date: 3/5/2018

Communication System: UID 0, WiFi (0); Frequency: 2437 MHz;Duty Cycle: 1:1.023

Medium parameters used: f = 2437 MHz; $\sigma$ = 1.929 S/m; $\varepsilon_r$ = 52.727; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3898; ConvF(7.85, 7.85, 7.85); Calibrated: 6/27/2017;

Electronics: DAE4 Sn1291; Calibrated: 10/31/2017

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Back Side Middle/Area Scan (91x151x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 0.212 W/kg

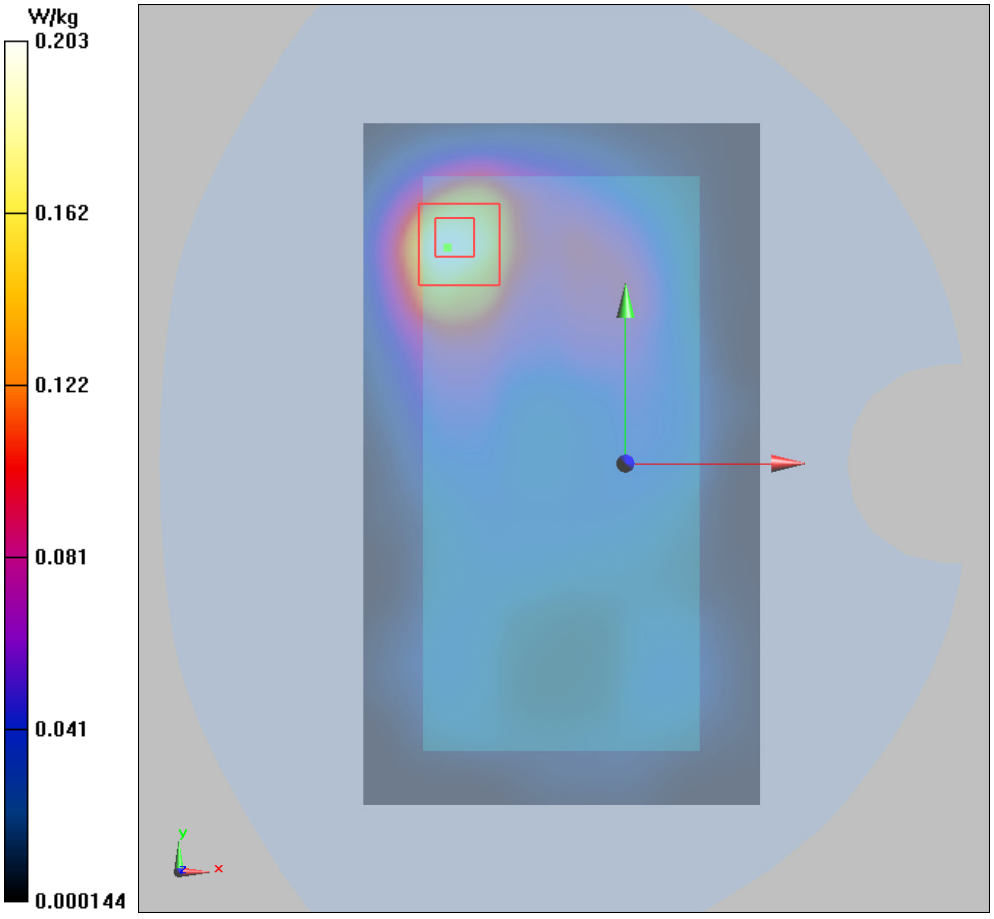
**Back Side Middle/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 4.267 V/m; Power Drift = -0.070 dB

Peak SAR (extrapolated) = 0.378 W/kg

**SAR(1 g) = 0.191 W/kg; SAR(10 g) = 0.100 W/kg**

Maximum value of SAR (measured) = 0.203 W/kg



## Plot 30 802.11n HT40 Left Cheek High (Sensor on)

Date: 3/7/2018

Communication System: UID 0, WiFi (0); Frequency: 2437 MHz;Duty Cycle: 1:1.300

Medium parameters used: f = 2437 MHz; $\sigma$ = 1.841 S/m; $\varepsilon_r$ = 39.795; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Left Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3898; ConvF(7.55, 7.55, 7.55); Calibrated: 6/27/2017;

Electronics: DAE4 Sn1291; Calibrated: 10/31/2017

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Left Cheek High/Area Scan (91x151x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 0.568 W/kg

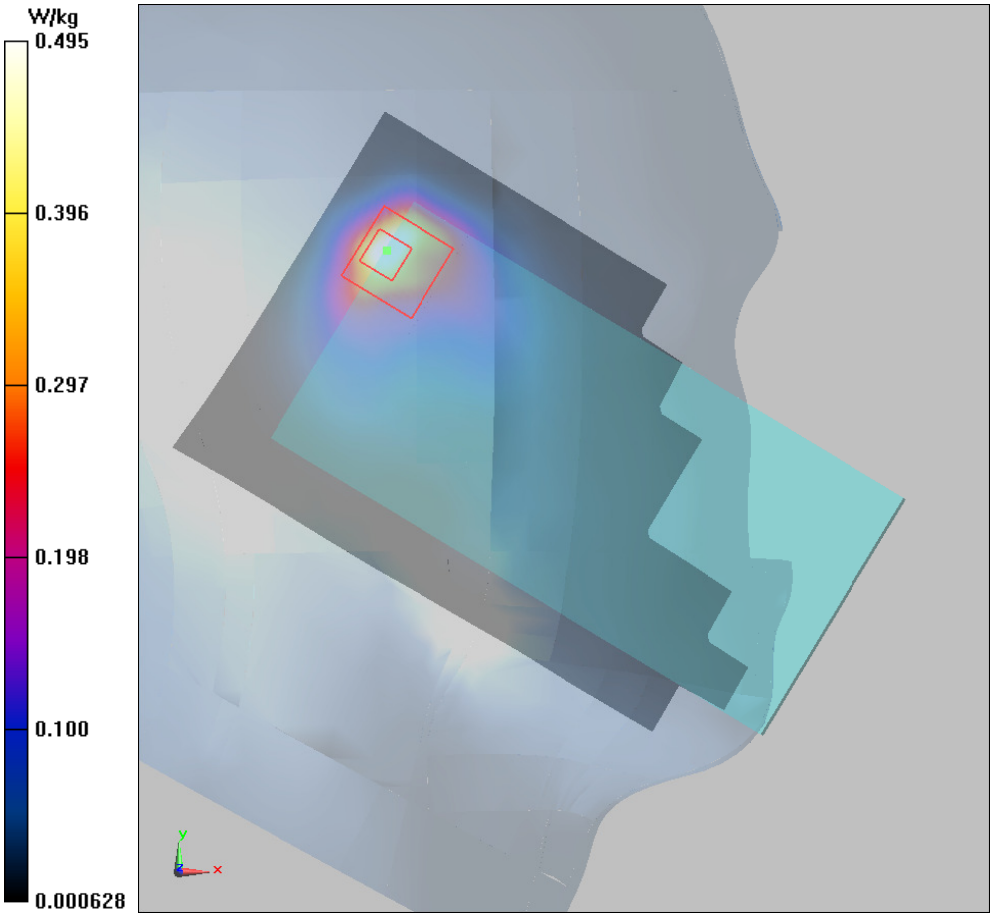
**Left Cheek High/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 9.691 V/m; Power Drift = 0.024 dB

Peak SAR (extrapolated) = 1.03 W/kg

**SAR(1 g) = 0.424 W/kg; SAR(10 g) = 0.189 W/kg**

Maximum value of SAR (measured) = 0.495 W/kg



## Plot 31 BT Left Cheek Middle

Date: 3/7/2018

Communication System: UID 0, WiFi (0); Frequency: 2437 MHz;Duty Cycle: 1:1.300

Medium parameters used: f = 2437 MHz; $\sigma$ = 1.841 S/m; $\varepsilon_r$ = 39.795; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Left Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3898; ConvF(7.55, 7.55, 7.55); Calibrated: 6/27/2017;

Electronics: DAE4 Sn1291; Calibrated: 10/31/2017

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Left Cheek Middle/Area Scan (91x151x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 0.139 W/kg

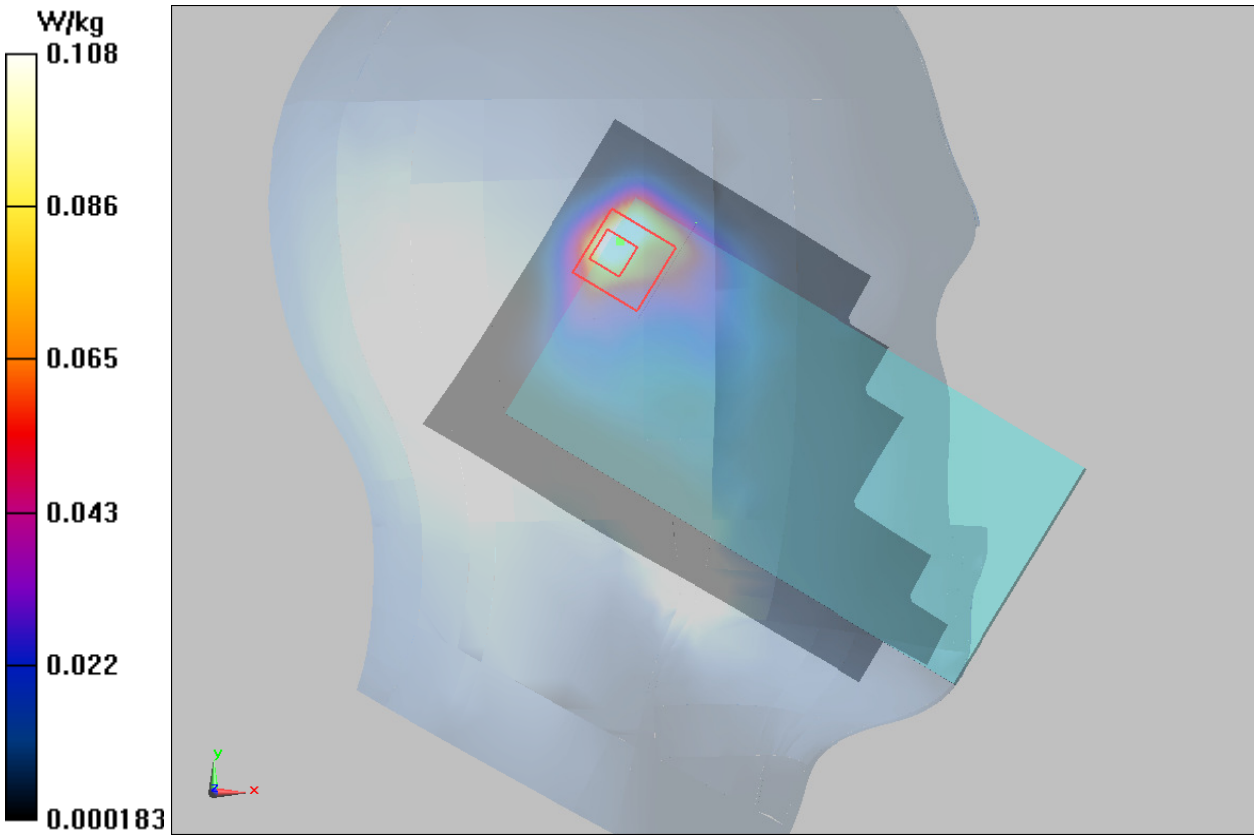
**Left Cheek Middle/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 4.232 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 0.234 W/kg

**SAR(1 g) = 0.097 W/kg; SAR(10 g) = 0.044 W/kg**

Maximum value of SAR (measured) = 0.108 W/kg



# ANNEX D: Probe Calibration Certificate

**Calibration Laboratory of**
Schmid & Partner
Engineering AG
**Zeughausstrasse 43, 8004 Zurich, Switzerland**

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
**The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates**

Accreditation No.: **SCS 0108**

Client **Auden** Certificate No: **EX3-3898_Jun17**

## CALIBRATION CERTIFICATE

Object EX3DV4 - SN:3898

Calibration procedure(s) QA CAL-01.v9, QA CAL-14.v4, QA CAL-23.v5, QA CAL-25.v6
Calibration procedure for dosimetric E-field probes

Calibration date: June 27, 2017

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID | Cal Date (Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power meter NRP | SN: 104778 | 04-Apr-17 (No. 217-02521/02522) | Apr-18 |
| Power sensor NRP-Z91 | SN: 103244 | 04-Apr-17 (No. 217-02521) | Apr-18 |
| Power sensor NRP-Z91 | SN: 103245 | 04-Apr-17 (No. 217-02525) | Apr-18 |
| Reference 20 dB Attenuator | SN: S5277 (20x) | 07-Apr-17 (No. 217-02528) | Apr-18 |
| Reference Probe ES3DV2 | SN: 3013 | 31-Dec-16 (No. ES3-3013_Dec16) | Dec-17 |
| DAE4 | SN: 660 | 7-Dec-16 (No. DAE4-660_Dec16) | Dec-17 |
| | | | |
| Secondary Standards | ID | Check Date (in house) | Scheduled Check |
| Power meter E4419B | SN: GB41293874 | 06-Apr-16 (in house check Jun-16) | In house check: Jun-18 |
| Power sensor E4412A | SN: MY41498087 | 06-Apr-16 (in house check Jun-16) | In house check: Jun-18 |
| Power sensor E4412A | SN: 000110210 | 06-Apr-16 (in house check Jun-16) | In house check: Jun-18 |
| RF generator HP 8648C | SN: US3642U01700 | 04-Aug-99 (in house check Jun-16) | In house check: Jun-18 |
| Network Analyzer HP 8753E | SN: US37390585 | 18-Oct-01 (in house check Oct-16) | In house check: Oct-17 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Leif Klysner | Laboratory Technician | |
| Approved by: | Katja Pokovic | Technical Manager | |

Issued: June 28, 2017

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Certificate No: EX3-3898_Jun17 Page 1 of 38