# FCC SAR EVALUATION REPORT

**In accordance with the requirements of**
**FCC 47 CFR Part 2(2.1093), ANSI/IEEE C95.1-1992 and**
**IEEE Std 1528-2013**

**Product Name：** Medical Guardian FRG01000
**Trademark：** Omate
**Model Name：** O3VC
**Serial Model：** S4, Medical Guardian FRG01000
**Report No.：** SER180108603001E
**FCC ID：** 2ABF5-O3VC

**Prepared for**

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# TEST RESULT CERTIFICATION

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**Manufacturer's Name**.....: Omate Limited

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**Product description**

Product name.....: Medical Guardian FRG01000

Trademark .....: Omate

Model and/or type reference .: O3VC

Serial Model.....: S4, Medical Guardian FRG01000

**Standards** .....: FCC 47 CFR Part 2(2.1093)
ANSI/IEEE C95.1-1992
IEEE Std 1528-2013
Published RF exposure KDB procedures

This device described above has been tested by NTEK. In accordance with the measurement methods and procedures specified in IEEE Std 1528-2013 and KDB 865664 D01. Testing has shown that this device is capable of compliance with localized specific absorption rate (SAR) specified in FCC 47 CFR Part 2(2.1093) and ANSI/IEEE C95.1-1992. The test results in this report apply only to the tested sample of the stated device/equipment. Other similar device/equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

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**Date of Test**

Date (s) of performance of tests .....: Jan. 23, 2018 ~ Jan. 25, 2018

Date of Issue .....: Feb. 08, 2018

Test Result.....: **Pass**

Prepared By (Test Engineer) : Cheng Jiawen

(Cheng Jiawen)

Approved By (Lab Manager) : Sam. Chen

(Sam Chen)

# ※ ※ Revision History ※ ※

| REV. | DESCRIPTION | ISSUED DATE | REMARK |
|---|---|---|---|
| Rev.1.0 | Initial Test Report Release | Feb. 08, 2018 | Cheng Jiawen |
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# TABLE OF CONTENTS


1. General Information ..... 6
   1.1. RF exposure limits ..... 6
   1.2. Statement of Compliance ..... 7
   1.3. EUT Description ..... 8
   1.4. Test specification(s) ..... 9
   1.5. Ambient Condition ..... 9
2. SAR Measurement System ..... 10
   2.1. SATIMO SAR Measurement Set-up Diagram ..... 10
   2.2. Robot ..... 11
   2.3. E-Field Probe ..... 12
      2.3.1. E-Field Probe Calibration ..... 12
   2.4. SAM phantoms ..... 13
      2.4.1. Technical Data ..... 13
   2.5. Device Holder ..... 15
   2.6. Test Equipment List ..... 16
3. SAR Measurement Procedures ..... 18
   3.1. Power Reference ..... 18
   3.2. Area scan & Zoom scan ..... 18
   3.3. Description of interpolation/extrapolation scheme ..... 20
   3.4. Volumetric Scan ..... 20
   3.5. Power Drift ..... 20
4. System Verification Procedure ..... 21
   4.1. Tissue Verification ..... 21
      4.1.1. Tissue Dielectric Parameter Check Results ..... 22
   4.2. System Verification Procedure ..... 23
      4.2.1. System Verification Results ..... 24
5. SAR Measurement variability and uncertainty ..... 25
   5.1. SAR measurement variability ..... 25
   5.2. SAR measurement uncertainty ..... 25
6. RF Exposure Positions ..... 26
   6.1. Wrist watch and wrist-worn transmitters ..... 26
7. RF Output Power ..... 27
   7.1. Maximum Tune-up Limit ..... 27
   7.2. GSM Conducted Power ..... 28
   7.3. WCDMA Conducted Power ..... 28
   7.4. WLAN & Bluetooth Output Power ..... 31
      7.4.1. Output Power Results Of WLAN ..... 31
      7.4.2. Output Power Results Of Bluetooth ..... 31
8. Antenna Location ..... 32

9. Standalone SAR test exclusion and estimated ..... 33
10. SAR Results ..... 34
10.1. SAR measurement results ..... 34
10.1.1. SAR measurement Result of GSM850 ..... 34
10.1.2. SAR measurement Result of GSM1900 ..... 34
10.1.3. SAR measurement Result of WCDMA Band V ..... 35
10.1.4. SAR measurement Result of WCDMA Band II ..... 35
10.1.5. SAR measurement Result of WLAN 2.4G ..... 35
10.2. Simultaneous Transmission Analysis ..... 36
10.3. SAR Summation Scenario ..... 36
11. Appendix A. Photo documentation ..... 39
12. Appendix B. System Check Plots ..... 43
13. Appendix C. Plots of High SAR Measurement ..... 50
14. Appendix D. Calibration Certificate ..... 56

# 1. General Information

## 1.1. RF exposure limits

(A).Limits for Occupational/Controlled Exposure (W/kg)

| Whole-Body | Partial-Body | Hands, Wrists, Feet and Ankles |
|---|---|---|
| 0.4 | 8.0 | 20.0 |

(B).Limits for General Population/Uncontrolled Exposure (W/kg)

| Whole-Body | Partial-Body | Hands, Wrists, Feet and Ankles |
|---|---|---|
| 0.08 | 1.6 | 4.0 |

NOTE: ***Whole-Body SAR*** is averaged over the entire body, ***partial-body SAR*** is averaged over any 1 gram of tissue defined as a tissue volume in the shape of a cube. ***SAR for hands, wrists, feet and ankles*** is averaged over any 10 grams of tissue defined as a tissue volume in the shape of a cube.

**Occupational/Controlled Environments:**

Are defined as locations where there is exposure that may be incurred by people who are aware of the potential for exposure, (i.e. as a result of employment or occupation).

**General Population/Uncontrolled Environments:**

Are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

| NOTE |
|---|
| Face Limit 1.6 W/kg and Wristbands 4.0W/kg |
| APPLIED TO THIS EUT |

## 1.2. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for O3VC are as follows.

| Band | Max Reported SAR Value(W/kg) | | Max. SAR Summation |
|---|---|---|---|
| | 1-g Front-of-Face (Separation distance of 10mm) | 10-g Back-of-Wristbands (Separation distance of 0mm) | |
| GSM 850 | 0.114 | 0.152 | 1.391 |
| GSM 1900 | 0.459 | 0.953 | |
| WCDMA Band V | 0.026 | 0.420 | |
| WCDMA Band II | 0.285 | 0.986 | |
| WLAN 2.4G | 0.364 | 0.405 | |

NOTE: The Max. SAR Summation is calculated based on the same configuration and test position.
This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg) specified in FCC 47 CFR Part 2(2.1093) and ANSI/IEEE C95.1-1992, and had been tested in accordance with the measurement methods and procedures specified in IEEE Std 1528-2013 & KDB 865664 D01.

### 1.3. EUT Description

| Device Information | | | |
|---|---|---|---|
| Product Name | Medical Guardian FRG01000 | | |
| Trademark | Omate | | |
| Model Name | O3VC | | |
| Serial Model | S4, Medical Guardian FRG01000 | | |
| FCC ID | 2ABF5-O3VC | | |
| Device Phase | Identical Prototype | | |
| Exposure Category | General population / Uncontrolled environment | | |
| Antenna | LDS Antenna | | |
| Battery Information | DC 3.7V, 580mAh | | |
| Device Operating Configurations | | | |
| Supporting Mode(s) | GSM 850/1900, WCDMA Band V/II, WLAN 2.4G, Bluetooth | | |
| Test Modulation | GSM(GMSK), WCDMA(QPSK), WLAN(DSSS/OFDM), Bluetooth (GFSK, π/4-DQPSK, 8DPSK) | | |
| Device Class | B | | |
| Operating Frequency Range(s) | Band | Tx (MHz) | Rx (MHz) |
| | GSM 850 | 824-849 | 869-894 |
| | GSM 1900 | 1850-1910 | 1930-1990 |
| | WCDMA Band V | 824-849 | 869-894 |
| | WCDMA Band II | 1850-1910 | 1930-1990 |
| | WLAN 2.4G | 2412-2462 | |
| | Bluetooth | 2402-2480 | |
| GPRS Multislot Class(12) | Max Number of Timeslots in Uplink | 4 | |
| | Max Number of Timeslots in Downlink | 4 | |
| | Max Total Timeslot | 5 | |
| HSDPA UE Category | 14 | | |
| HSUPA UE Category | 6 | | |
| Power Class | 4, tested with power level 5(GSM 850) | | |
| | 1, tested with power level 0(GSM 1900) | | |
| | 3, tested with power control “all 1”(WCDMA Band V) | | |
| | 3, tested with power control “all 1”(WCDMA Band II) | | |
| Test Channels (low-mid-high) | 128-189-251(GSM 850) | | |
| | 512-661-810(GSM 1900) | | |
| | 4132-4182-4233(WCDMA Band V) | | |
| | 9262-9400-9538(WCDMA Band II) | | |
| | 802.11 b/g/n:1-6-11(WLAN 2.4G) | | |

### 1.4. Test specification(s)

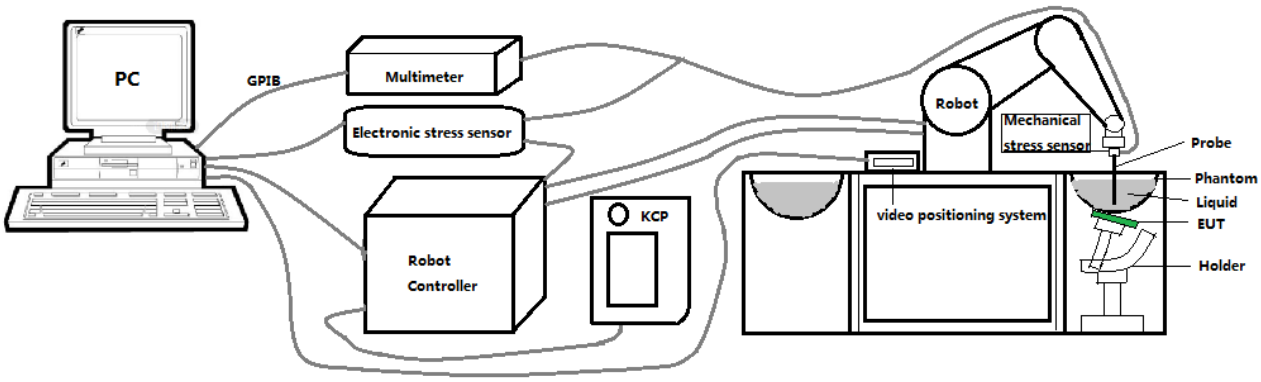
| |
|---|
| FCC 47 CFR Part 2(2.1093) |
| ANSI/IEEE C95.1-1992 |
| IEEE Std 1528-2013 |
| KDB 865664 D01 SAR measurement 100 MHz to 6 GHz |
| KDB 865664 D02 RF Exposure Reporting |
| KDB 447498 D01 General RF Exposure Guidance |
| KDB 248227 D01 802.11 Wi-Fi SAR |
| KDB 941225 D01 3G SAR Procedures |

### 1.5. Ambient Condition

| | |
|---|---|
| Ambient temperature | 20°C – 24°C |
| Relative Humidity | 30% – 70% |

# 2. SAR Measurement System

## 2.1. SATIMO SAR Measurement Set-up Diagram




These measurements were performed with the automated near-field scanning system OPENSAR from SATIMO. The system is based on a high precision robot (working range: 901 mm), which positions the probes with a positional repeatability of better than ±0.03 mm. The SAR measurements were conducted with dosimetric probe (manufactured by SATIMO), designed in the classical triangular configuration and optimized for dosimetric evaluation.

The first step of the field measurement is the evaluation of the voltages induced on the probe by the device under test. Probe diode detectors are nonlinear. Below the diode compression point, the output voltage is proportional to the square of the applied E-field; above the diode compression point, it is linear to the applied E-field. The compression point depends on the diode, and a calibration procedure is necessary for each sensor of the probe.

The Keithley multimeter reads the voltage of each sensor and send these three values to the PC. The corresponding E field value is calculated using the probe calibration factors, which are stored in the working directory. This evaluation includes linearization of the diode characteristics. The field calculation is done separately for each sensor. Each component of the E field is displayed on the "Dipole Area Scan Interface" and the total E field is displayed on the "3D Interface"

## 2.2. Robot

The SATIMO SAR system uses the high precision robots from KUKA. For the 6-axis controller system, the robot controller version (KUKA) from KUKA is used. The KUKA robot series have many features that are important for our application:

- High precision (repeatability ±0.03 mm)
- High reliability (industrial design)
- Jerk-free straight movements
- Low ELF interference (the closed metallic construction shields against motor control fields)

## 2.3. E-Field Probe

This E-field detection probe is composed of three orthogonal dipoles linked to special Schottky diodes with low detection thresholds. The probe allows the measurement of electric fields in liquids such as the one defined in the IEEE and CENELEC standards.

For the measurements the Specific Dosimetric E-Field Probe SN 08/16 EPGO287 with following specifications is used

- Dynamic range: 0.01-100 W/kg
- Tip Diameter : 2.5 mm
- Distance between probe tip and sensor center: 1 mm
- Distance between sensor center and the inner phantom surface: 2 mm (repeatability better than ±1 mm).
- Probe linearity: ±0.08 dB
- Axial isotropy: <0.25 dB
- Hemispherical Isotropy: <0.50 dB
- Calibration range: 650MHz to 5900MHz for head & body simulating liquid.
- Lower detection limit: 7mW/kg

Angle between probe axis (evaluation axis) and surface normal line: less than 30°.

### 2.3.1. E-Field Probe Calibration

Each probe needs to be calibrated according to a dosimetric assessment procedure with accuracy better than ±10%. The spherical isotropy shall be evaluated and within ±0.25dB. The sensitivity parameters (Norm X, Norm Y, and Norm Z), the diode compression parameter (DCP) and the conversion factor (Conv F) of the probe are tested. The calibration data can be referred to appendix D of this report.

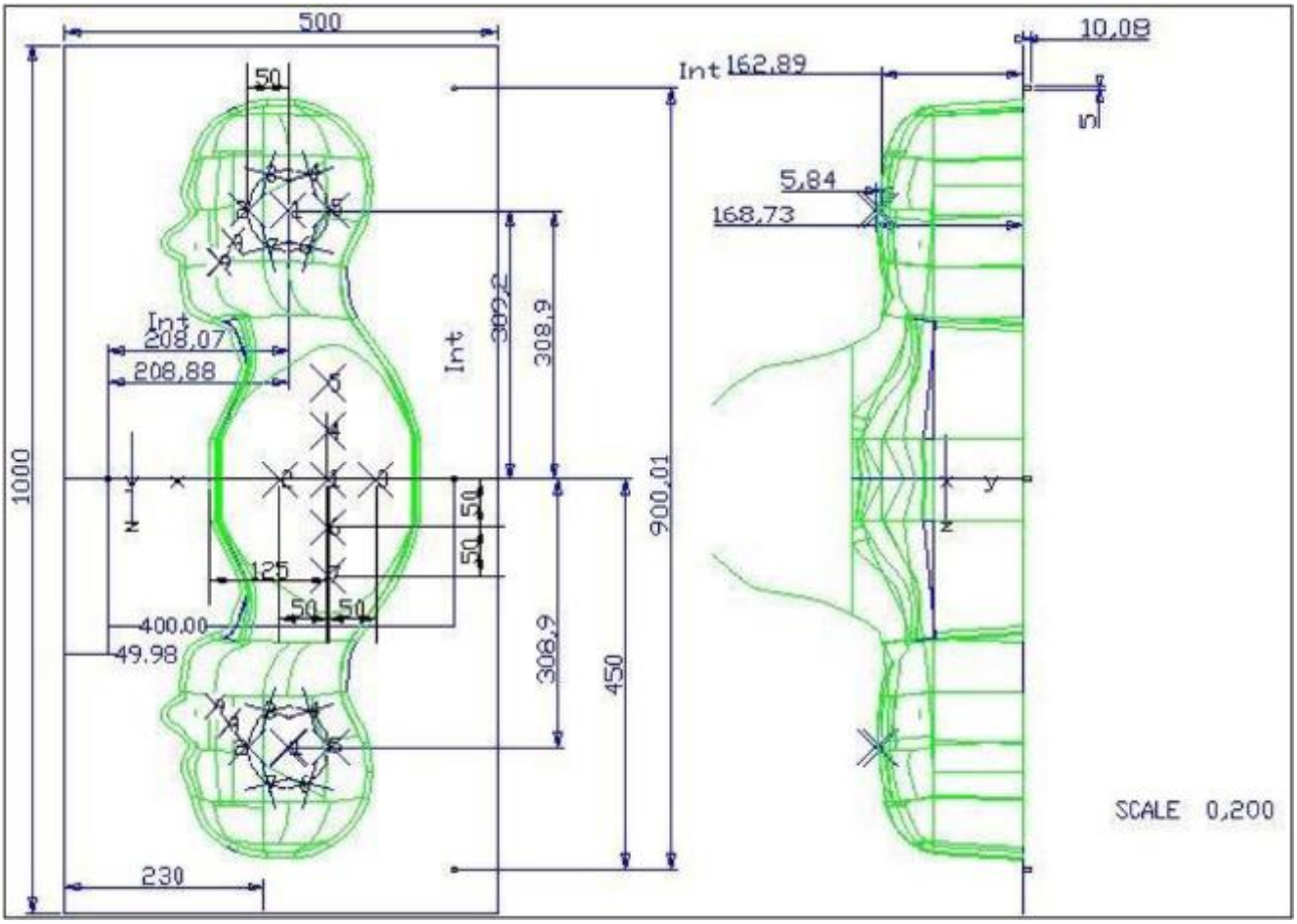
## 2.4. SAM phantoms

Photo of SAM phantom SN 16/15 SAM119

The SAM phantom is used to measure the SAR relative to people exposed to electro-magnetic field radiated by mobile phones.

### 2.4.1. Technical Data

| Serial Number | Shell thickness | Filling volume | Dimensions | Positionner Material | Permittivity | Loss Tangent |
|---|---|---|---|---|---|---|
| **SN 16/15 SAM119** | 2 mm ±0.2 mm | 27 liters | Length:1000 mm<br>Width:500 mm<br>Height:200 mm | Gelcoat with fiberglass | 3.4 | 0.02 |

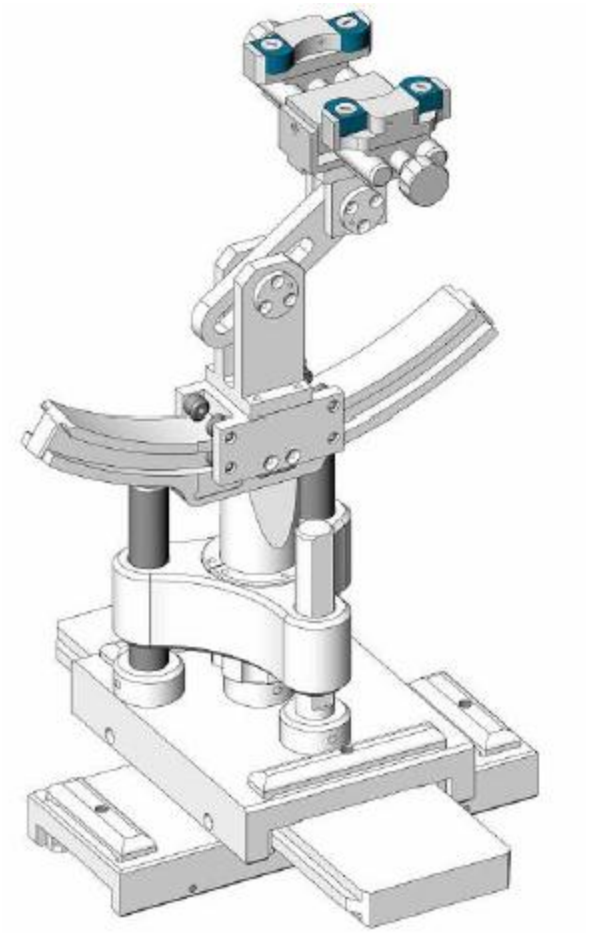



| Serial Number | Left Head | | Right Head | | Flat Part | |
|---|---|---|---|---|---|---|
| SN 16/15 SAM119 | 2 | 2.02 | 2 | 2.08 | 1 | 2.09 |
| | 3 | 2.05 | 3 | 2.06 | 2 | 2.06 |
| | 4 | 2.07 | 4 | 2.07 | 3 | 2.08 |
| | 5 | 2.08 | 5 | 2.08 | 4 | 2.10 |
| | 6 | 2.05 | 6 | 2.07 | 5 | 2.10 |
| | 7 | 2.05 | 7 | 2.05 | 6 | 2.07 |
| | 8 | 2.07 | 8 | 2.06 | 7 | 2.07 |
| | 9 | 2.08 | 9 | 2.06 | - | - |

The test, based on ultrasonic system, allows measuring the thickness with an accuracy of 10 µm.

## 2.5. Device Holder

The positioning system allows obtaining cheek and tilting position with a very good accuracy. In compliance with CENELEC, the tilt angle uncertainty is lower than 1 degree.



| Serial Number | Holder Material | Permittivity | Loss Tangent |
|---|---|---|---|
| SN 16/15 MSH100 | Delrin | 3.7 | 0.005 |

## 2.6. Test Equipment List

This table gives a complete overview of the SAR measurement equipment.
Devices used during the test described are marked ☒

| | Manufacturer | Name of Equipment | Type/Model | Serial Number | Calibration | |
|---|---|---|---|---|---|---|
| | | | | | Last Cal. | Due Date |
| ☒ | MVG | E FIELD PROBE | SSE2 | SN 08/16 EPGO287 | Sep. 18, 2017 | Sep. 17, 2018 |
| ☐ | MVG | 450 MHz Dipole | SID450 | SN 03/15 DIP 0G450-345 | Apr. 06, 2015 | Apr. 05, 2018 |
| ☐ | MVG | 750 MHz Dipole | SID750 | SN 03/15 DIP 0G750-355 | Apr. 06, 2015 | Apr. 05, 2018 |
| ☒ | MVG | 835 MHz Dipole | SID835 | SN 03/15 DIP 0G835-347 | Apr. 06, 2015 | Apr. 05, 2018 |
| ☐ | MVG | 900 MHz Dipole | SID900 | SN 03/15 DIP 0G900-348 | Apr. 06, 2015 | Apr. 05, 2018 |
| ☐ | MVG | 1800 MHz Dipole | SID1800 | SN 03/15 DIP 1G800-349 | Apr. 06, 2015 | Apr. 05, 2018 |
| ☒ | MVG | 1900 MHz Dipole | SID1900 | SN 03/15 DIP 1G900-350 | Apr. 06, 2015 | Apr. 05, 2018 |
| ☐ | MVG | 2000 MHz Dipole | SID2000 | SN 03/15 DIP 2G000-351 | Apr. 06, 2015 | Apr. 05, 2018 |
| ☒ | MVG | 2450 MHz Dipole | SID2450 | SN 03/15 DIP 2G450-352 | Apr. 06, 2015 | Apr. 05, 2018 |
| ☐ | MVG | 2600 MHz Dipole | SID2600 | SN 03/15 DIP 2G600-356 | Apr. 06, 2015 | Apr. 05, 2018 |
| ☐ | MVG | 5000 MHz Dipole | SWG5500 | SN 13/14 WGA 33 | Apr. 06, 2015 | Apr. 05, 2018 |
| ☒ | MVG | Liquid measurement Kit | SCLMP | SN 21/15 OCPG 72 | NCR | NCR |
| ☒ | MVG | Power Amplifier | N.A | AMPLISAR_28/14_003 | NCR | NCR |
| ☒ | KEITHLEY | Millivoltmeter | 2000 | 4072790 | NCR | NCR |
| ☒ | R&S | Universal radio communication tester | CMU200 | 117858 | Aug. 07, 2017 | Aug. 06, 2018 |
| ☐ | R&S | Wideband radio communication tester | CMW500 | 103917 | Oct. 26, 2017 | Oct. 25, 2018 |
| ☒ | HP | Network Analyzer | 8753D | 3410J01136 | Aug. 07, 2017 | Aug. 06, 2018 |

| | | | | | | |
|---|---|---|---|---|---|---|
| ☒ | Agilent | PSG Analog Signal Generator | E8257D | MY51110112 | Aug. 07, 2017 | Aug. 06, 2018 |
| ☒ | Agilent | Power meter | E4419B | MY45102538 | Aug. 07, 2017 | Aug. 06, 2018 |
| ☒ | Agilent | Power sensor | E9301A | MY41495644 | Aug. 07, 2017 | Aug. 06, 2018 |
| ☒ | Agilent | Power sensor | E9301A | US39212148 | Aug. 07, 2017 | Aug. 06, 2018 |
| ☒ | MCLI/USA | Directional Coupler | CB11-20 | 0D2L51502 | Aug. 07, 2017 | Aug. 06, 2018 |

# 3. SAR Measurement Procedures

The measurement procedures are as follows:

<Conducted power measurement>

(a) For WWAN power measurement, use base station simulator to configure EUT WWAN transmission in conducted connection with RF cable, at maximum power in each supported wireless interface and frequency band.

(b) Read the WWAN RF power level from the base station simulator.

(c) For Wi-Fi/BT power measurement, use engineering software to configure EUT Wi-Fi/BT continuously transmission, at maximum RF power in each supported wireless interface and frequency band.

(d) Connect EUT RF port through RF cable to the power meter, and measure Wi-Fi/BT output power.

<SAR measurement>

(a) Use base station simulator to configure EUT WWAN transmission in radiated connection, and engineering software to configure EUT Wi-Fi/BT continuously transmission, at maximum RF power, in the highest power channel.

(b) Place the EUT in the positions as Appendix A demonstrates.

(c) Set scan area, grid size and other setting on the OPENSAR software.

(d) Measure SAR results for the highest power channel on each testing position.

(e) Find out the largest SAR result on these testing positions of each band.

(f) Measure SAR results for other channels in worst SAR testing position if the reported SAR of highest power channel is larger than 0.8 W/kg.

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

(a) Power reference measurement

(b) Area scan

(c) Zoom scan

(d) Power drift measurement

## 3.1. Power Reference

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.

## 3.2. Area scan & Zoom scan

The area scan is a 2D scan to find the hot spot location on the DUT. The zoom scan is a 3D scan above the hot spot to calculate the 1g and 10g SAR value.

Measurement of the SAR distribution with a grid of 8 to 16 mm * 8 to 16 mm and a constant distance to

the inner surface of the phantom. Since the sensors cannot directly measure at the inner phantom surface, the values between the sensors and the inner phantom surface are extrapolated. With these values the area of the maximum SAR is calculated by an interpolation scheme. Around this point, a cube of 30 * 30 *30 mm or 32 * 32 * 32 mm is assessed by measuring 5 or 8 * 5 or 8 * 4 or 5 mm. With these data, the peak spatial-average SAR value can be calculated.

From the scanned SAR distribution, identify the position of the maximum SAR value, in addition identify the positions of any local maxima with SAR values within 2 dB of the maximum value that will not be within the zoom scan of other peaks; additional peaks shall be measured only when the primary peak is within 2 dB of the SAR compliance limit (e.g., 1 W/kg for 1,6 W/kg 1 g limit, or 1,26 W/kg for 2 W/kg, 10 g limit).

Area scan & Zoom scan 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: $\Delta x_{Area}$, $\Delta y_{Area}$ | | | ≤ 2 GHz: ≤ 15 mm<br>2 – 3 GHz: ≤ 12 mm | 3 – 4 GHz: ≤ 12 mm<br>4 – 6 GHz: ≤ 10 mm |
| | | | When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device. | |
| Maximum zoom scan spatial resolution: $\Delta x_{Zoom}$, $\Delta y_{Zoom}$ | | | ≤ 2 GHz: ≤ 8 mm<br>2 – 3 GHz: ≤ 5 mm* | 3 – 4 GHz: ≤ 5 mm*<br>4 – 6 GHz: ≤ 4 mm* |
| Maximum zoom scan spatial resolution, normal to phantom surface | uniform grid: $\Delta z_{Zoom}(n)$ | | ≤ 5 mm | 3 – 4 GHz: ≤ 4 mm<br>4 – 5 GHz: ≤ 3 mm<br>5 – 6 GHz: ≤ 2 mm |
| | graded grid | $\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface | ≤ 4 mm | 3 – 4 GHz: ≤ 3 mm<br>4 – 5 GHz: ≤ 2.5 mm<br>5 – 6 GHz: ≤ 2 mm |
| | | $\Delta z_{Zoom}(n>1)$: between subsequent points | $\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$ | |
| Minimum zoom scan volume | x, y, z | | ≥ 30 mm | 3 – 4 GHz: ≥ 28 mm<br>4 – 5 GHz: ≥ 25 mm<br>5 – 6 GHz: ≥ 22 mm |

Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.

* When zoom scan is required and the *reported* SAR from the *area scan based 1-g SAR estimation* procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.

### 3.3. Description of interpolation/extrapolation scheme

The local SAR inside the phantom is measured using small dipole sensing elements inside a probe body. The probe tip must not be in contact with the phantom surface in order to minimise measurements errors, but the highest local SAR will occur at the surface of the phantom.
An extrapolation is using to determinate this highest local SAR values. The extrapolation is based on a fourth-order least-square polynomial fit of measured data. The local SAR value is then extrapolated from the liquid surface with a 1 mm step.
The measurements have to be performed over a limited time (due to the duration of the battery) so the step of measurement is high. It could vary between 5 and 8 mm. To obtain an accurate assessment of the maximum SAR averaged over 10 grams and 1 gram requires a very fine resolution in the three dimensional scanned data array.

### 3.4. Volumetric Scan

The volumetric scan consists to a full 3D scan over a specific area. This 3D scan is useful form multi Tx SAR measurement. Indeed, it is possible with OpenSAR to add, point by point, several volumetric scan to calculate the SAR value of the combined measurement as it is define in the standard IEEE1528 and IEC62209.

### 3.5. Power Drift

All SAR testing is under the EUT install full charged battery and transmit maximum output power. In OpenSAR 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 V/m. If the power drifts more than ±5%, the SAR will be retested.

# 4. System Verification Procedure

## 4.1. Tissue Verification

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

| **Ingredients** (% of weight) | Head Tissue | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Frequency Band (MHz) | 750 | 835 | 900 | 1800 | 1900 | 2000 | 2450 | 2600 |
| Water | 34.40 | 34.40 | 34.40 | 55.36 | 55.36 | 57.87 | 57.87 | 57.87 |
| NaCl | 0.79 | 0.79 | 0.79 | 0.35 | 0.35 | 0.16 | 0.16 | 0.16 |
| 1,2-Propanediol | 64.81 | 64.81 | 64.81 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Triton X-100 | 0.00 | 0.00 | 0.00 | 30.45 | 30.45 | 19.97 | 19.97 | 19.97 |
| DGBE | 0.00 | 0.00 | 0.00 | 13.84 | 13.84 | 22.00 | 22.00 | 22.00 |
| **Ingredients** (% of weight) | Body Tissue | | | | | | | |
| Frequency Band (MHz) | 750 | 835 | 900 | 1800 | 1900 | 2000 | 2450 | 2600 |
| Water | 50.30 | 50.30 | 50.30 | 69.91 | 69.91 | 71.88 | 71.88 | 71.88 |
| NaCl | 0.60 | 0.60 | 0.60 | 0.13 | 0.13 | 0.16 | 0.16 | 0.16 |
| 1,2-Propanediol | 49.10 | 49.10 | 49.10 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Triton X-100 | 0.00 | 0.00 | 0.00 | 9.99 | 9.99 | 19.97 | 19.97 | 19.97 |
| DGBE | 0.00 | 0.00 | 0.00 | 19.97 | 19.97 | 7.99 | 7.99 | 7.99 |

### 4.1.1. Tissue Dielectric Parameter Check Results

The simulating liquids should be checked at the beginning of a series of SAR measurements to determine of the dielectric parameter are within the tolerances of the specified target values. The measured conductivity and relative permittivity should be within ±5% of the target values.

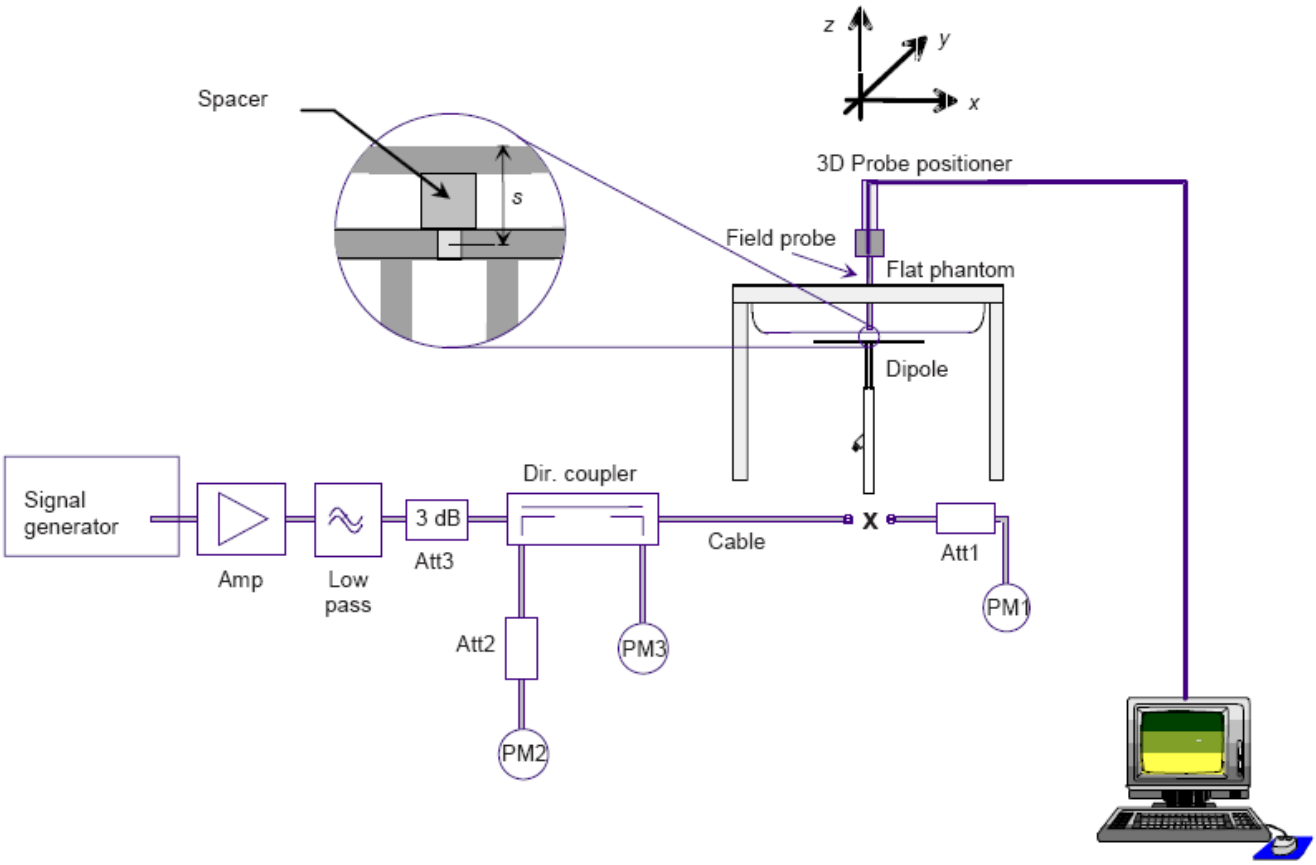
| Tissue Type | Measured Frequency (MHz) | Target Tissue | | Measured Tissue | | Liquid Temp. | Test Date |
|---|---|---|---|---|---|---|---|
| | | εr (±5%) | σ (S/m) (±5%) | εr | σ (S/m) | | |
| Head 850 | 835 | 41.50 (39.43~43.57) | 0.90 (0.86~0.94) | 41.77 | 0.90 | 21.4 °C | Jan. 24, 2018 |
| Body 850 | 835 | 55.20 (52.44~57.96) | 0.97 (0.92~1.01) | 55.06 | 0.99 | 21.3 °C | Jan. 24, 2018 |
| Head 1900 | 1900 | 40.00 (38.00~42.00) | 1.40 (1.33~1.47) | 39.40 | 1.43 | 21.2 °C | Jan. 25, 2018 |
| Body 1900 | 1900 | 53.30 (50.64~55.96) | 1.52 (1.44~1.59) | 53.19 | 1.55 | 21.4 °C | Jan. 25, 2018 |
| Head 2450 | 2450 | 39.20 (37.24~41.16) | 1.80 (1.71~1.89) | 39.49 | 1.78 | 21.4 °C | Jan. 23, 2018 |
| Body 2450 | 2450 | 52.70 (50.07~55.33) | 1.95 (1.85~2.04) | 52.66 | 1.95 | 21.4 °C | Jan. 23, 2018 |

NOTE: The dielectric parameters of the tissue-equivalent liquid should be measured under similar ambient conditions and within 2 °C of the conditions expected during the SAR evaluation to satisfy protocol requirements.

### 4.2. System Verification Procedure

The system verification is performed for verifying the accuracy of the complete measurement system and performance of the software. The dipole is connected to the signal source consisting of signal generator and amplifier via a directional coupler, N-connector cable and adaption to SMA. It is fed with a power of 100mW (below 5GHz) or 100mW (above 5GHz). To adjust this power a power meter is used. The power sensor is connected to the cable before the system verification to measure the power at this point and do adjustments at the signal generator. At the outputs of the directional coupler both return loss as well as forward power are controlled during the system verification to make sure that emitted power at the dipole is kept constant. This can also be checked by the power drift measurement after the test (result on plot).

The system verification is shown as below picture:



### 4.2.1. System Verification Results

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

| System Verification | Target SAR (1W) (±10%) | | Measured SAR (Normalized to 1W) | | Liquid Temp. | Test Date |
|---|---|---|---|---|---|---|
| | 1-g (W/Kg) | 10-g (W/Kg) | 1-g (W/Kg) | 10-g (W/Kg) | | |
| 835MHz Head | 9.56 (8.60~10.51) | 6.22 (5.60~6.84) | 9.84 | 6.24 | 21.4 °C | Jan. 24, 2018 |
| 835MHz Body | 9.48 (8.53~10.42) | 6.29 (5.66~6.91) | 9.31 | 6.21 | 21.3 °C | Jan. 24, 2018 |
| 1900MHz Head | 39.70 (35.73~43.67) | 20.50 (18.45~22.55) | 38.50 | 19.15 | 21.2 °C | Jan. 25, 2018 |
| 1900MHz Body | 38.43 (34.59~42.27) | 20.34 (18.31~22.37) | 39.63 | 18.87 | 21.4 °C | Jan. 25, 2018 |
| 2450MHz Head | 52.40 (47.16~57.64) | 24.00 (21.60~26.40) | 51.53 | 24.05 | 21.4 °C | Jan. 23, 2018 |
| 2450MHz Body | 49.32 (44.39~54.25) | 22.89 (20.60~25.17) | 50.15 | 22.21 | 21.4 °C | Jan. 23, 2018 |

# 5. SAR Measurement variability and uncertainty

## 5.1. SAR measurement variability

Per KDB865664 D01 SAR measurement 100 MHz to 6 GHz, SAR measurement variability must be assessed for each frequency band, which is determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. The additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2) through 4) do not apply.
2) When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.
3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).
4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

## 5.2. SAR measurement uncertainty

Per KDB865664 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. The equivalent ratio (1.5/1.6) is applied to extremity and occupational exposure conditions.

# 6. RF Exposure Positions

## 6.1. Wrist watch and wrist-worn transmitters

Refer to KDB 447498 D01. Transmitters that are built-in within a wrist watch or similar wrist-worn devices typically operate in speaker mode for voice communication, with the device worn on the wrist and positioned next to the mouth. Next to the mouth exposure requires 1-g SAR and the wrist-worn condition requires 10-g extremity SAR. The 10-g extremity and 1-g SAR test exclusions may be applied to the wrist and face exposure conditions. When SAR evaluation is required, next to the mouth use is evaluated with the front of the device positioned at 10 mm from a flat phantom filled with head tissue-equivalent medium. The wrist bands should be strapped together to represent normal use conditions. SAR for wrist exposure is evaluated with the back of the device positioned in direct contact against a flat phantom filled with body tissue-equivalent medium. The wrist bands should be unstrapped and touching the phantom.

# 7. RF Output Power

## 7.1. Maximum Tune-up Limit

| Band | Mode | The Tune-up Maximum Power (Customer Declared)(dBm) | Range | Measured Maximum Output Power(dBm) |
|---|---|---|---|---|
| GSM 850 | GSM (GMSK) | 32±1 | 31~33 | 32.09 |
| | GPRS(GMSK, 1 Tx slot) | 32±1 | 31~33 | 32.09 |
| | GPRS(GMSK, 2 Tx slot) | 31±1 | 30~32 | 31.20 |
| | GPRS(GMSK, 3 Tx slot) | 29±1 | 28~30 | 29.52 |
| | GPRS(GMSK, 4 Tx slot) | 28±1 | 27~29 | 28.53 |
| GSM 1900 | GSM (GMSK) | 29±1 | 28~30 | 29.05 |
| | GPRS(GMSK, 1 Tx slot) | 29±1 | 28~30 | 29.04 |
| | GPRS(GMSK, 2 Tx slot) | 28±1 | 27~29 | 28.51 |
| | GPRS(GMSK, 3 Tx slot) | 27±1 | 26~28 | 27.31 |
| | GPRS(GMSK, 4 Tx slot) | 26±1 | 25~27 | 26.51 |
| WCDMA Band V | RMC 12.2Kbps | 22±1 | 21~23 | 22.91 |
| | HSDPA Subtest-1 | 21±1 | 20~22 | 21.92 |
| | HSDPA Subtest-2 | 21±1 | 20~22 | 21.44 |
| | HSDPA Subtest-3 | 21±1 | 20~22 | 21.46 |
| | HSDPA Subtest-4 | 21±1 | 20~22 | 21.51 |
| | HSUPA Subtest-1 | 21±1 | 20~22 | 21.44 |
| | HSUPA Subtest-2 | 21±1 | 20~22 | 21.42 |
| | HSUPA Subtest-3 | 21±1 | 20~22 | 21.38 |
| | HSUPA Subtest-4 | 21±1 | 20~22 | 21.45 |
| | HSUPA Subtest-5 | 21±1 | 20~22 | 21.89 |
| WCDMA Band V | RMC 12.2Kbps | 22±1 | 21~23 | 22.96 |
| | HSDPA Subtest-1 | 21±1 | 20~22 | 21.93 |
| | HSDPA Subtest-2 | 21±1 | 20~22 | 21.49 |
| | HSDPA Subtest-3 | 21±1 | 20~22 | 21.53 |
| | HSDPA Subtest-4 | 21±1 | 20~22 | 21.48 |
| | HSUPA Subtest-1 | 21±1 | 20~22 | 21.50 |
| | HSUPA Subtest-2 | 21±1 | 20~22 | 21.48 |
| | HSUPA Subtest-3 | 21±1 | 20~22 | 21.45 |
| | HSUPA Subtest-4 | 21±1 | 20~22 | 21.51 |
| | HSUPA Subtest-5 | 21±1 | 20~22 | 21.92 |
| WLAN 2.4G | 802.11b | 14.5±1 | 13.5~15.5 | 15.1 |
| | 802.11g | 12.5±1 | 11.5~13.5 | 12.8 |
| | 802.11n-HT20 | 12.5±1 | 11.5~13.5 | 12.6 |

| | | | | |
|---|---|---|---|---|
| | 802.11n-HT40 | 10.5±1 | 9.5~11.5 | 11.3 |
| Bluetooth | BDR+EDR | 3±1 | 2~4 | 3.19 |
| | BLE | -5±1 | -6~-4 | -4.53 |

### 7.2. GSM Conducted Power

Per KDB 447498 D01, the maximum output power (including tune-up tolerance) channel is used for SAR testing and for further SAR test reduction. Therefore, the EUT was set in GSM850 GPRS (4TS) and GSM1900 GPRS (4TS).

| Band GSM850 | Burst-Averaged output Power (dBm) | | | | Frame-Averaged output Power (dBm) | | | |
|---|---|---|---|---|---|---|---|---|
| Tx Channel | Tune-up | 128 | 189 | 251 | Tune-up | 128 | 189 | 251 |
| Frequency (MHz) | (dBm) | 824.2 | 836.4 | 848.8 | (dBm) | 824.2 | 836.4 | 848.8 |
| GSM (GMSK) | 33.00 | 32.06 | 32.09 | 32.05 | 23.97 | 23.03 | 23.06 | 23.02 |
| GPRS(GMSK, 1 TS) | 33.00 | 32.06 | 32.09 | 32.05 | 23.97 | 23.03 | 23.06 | 23.02 |
| GPRS(GMSK, 2 TS) | 32.00 | 31.20 | 31.20 | 31.18 | 25.98 | 25.18 | 25.18 | 25.16 |
| GPRS(GMSK, 3 TS) | 30.00 | 29.52 | 29.46 | 29.38 | 25.74 | 25.26 | 25.20 | 25.12 |
| GPRS(GMSK, 4 TS) | 29.00 | 28.53 | 28.51 | 28.43 | 25.99 | 25.52 | 25.50 | 25.42 |
| Band GSM1900 | Burst-Averaged output Power (dBm) | | | | Frame-Averaged output Power (dBm) | | | |
| Tx Channel | Tune-up | 512 | 661 | 810 | Tune-up | 512 | 661 | 810 |
| Frequency (MHz) | (dBm) | 1850.2 | 1880.0 | 1909.8 | (dBm) | 1850.2 | 1880.0 | 1909.8 |
| GSM (GMSK) | 30.00 | 28.69 | 29.05 | 29.02 | 20.97 | 19.66 | 20.02 | 19.99 |
| GPRS(GMSK, 1 TS) | 30.00 | 28.69 | 29.04 | 29.01 | 20.97 | 19.66 | 20.01 | 19.98 |
| GPRS(GMSK, 2 TS) | 29.00 | 28.12 | 28.48 | 28.51 | 22.98 | 22.10 | 22.46 | 22.49 |
| GPRS(GMSK, 3 TS) | 28.00 | 27.31 | 27.24 | 27.28 | 23.74 | 23.05 | 22.98 | 23.02 |
| GPRS(GMSK, 4 TS) | 27.00 | 26.44 | 26.39 | 26.51 | 23.99 | 23.43 | 23.38 | 23.50 |

Note: The frame-averaged power is linearly scaled the maximum burst averaged power over 8 time slots. The calculated method are shown as below:

Frame-averaged power = Maximum burst averaged power (1 TS) - 9.03 dB

Frame-averaged power = Maximum burst averaged power (2 TS) - 6.02 dB

Frame-averaged power = Maximum burst averaged power (3 TS) - 4.26 dB

Frame-averaged power = Maximum burst averaged power (4 TS) - 3.01 dB

### 7.3. WCDMA Conducted Power

The following tests were conducted according to the test requirements outlines in 3GPP TS 34.121 specification. A summary of these settings are illustrated below:

1. Release99 Setup Configuration

| Mode | Subtest | Rel99 |
|---|---|---|
| WCDMA General Settings | Loopback Mode | Test Mode 1 |
| | Rel99 RMC | 12.2kbps RMC |
| | Power Control Algorithm | Algorithm2 |
| | βc/βd | 8/15 |

2. HSDPA Setup Configuration

| | Mode | HSDPA | HSDPA | HSDPA | HSDPA |
|---|---|---|---|---|---|
| | Subtest | 1 | 2 | 3 | 4 |
| WCDMA General Settings | Loopback Mode | Test Mode 1 | | | |
| | Rel99 RMC | 12.2kbps RMC | | | |
| | HSDPA FRC | H-Set1 | | | |
| | Power Control Algorithm | Algorithm 2 | | | |
| | βc | 2/15 | 12/15 | 15/15 | 15/15 |
| | βd | 15/15 | 15/15 | 8/15 | 4/15 |
| | Bd (SF) | 64 | | | |
| | βc/βd | 2/15 | 12/15 | 15/8 | 15/4 |
| | βhs | 4/15 | 24/15 | 30/15 | 30/15 |
| HSDPA Specific Settings | $D_{ACK}$ | 8 | | | |
| | $D_{NAK}$ | 8 | | | |
| | DCQI | 8 | | | |
| | Ack-Nack repetition factor | 3 | | | |
| | CQI Feedback (Table 5.2B.4) | 4ms | | | |
| | CQI Repetition Factor (Table 5.2B.4) | 2 | | | |
| | Ahs =βhs/βc | 30/15 | | | |

3. HSUPA Setup Configuration

| | Mode | HSUPA | HSUPA | HSUPA | HSUPA | HSUPA |
|---|---|---|---|---|---|---|
| | Subtest | 1 | 2 | 3 | 4 | 5 |
| WCDMA General Settings | Loopback Mode | Test Mode 1 | | | | |
| | Rel99 RMC | 12.2kbps RMC | | | | |
| | HSDPA FRC | H-Set1 | | | | |
| | HSUPA Test | HSUPA Loopback | | | | |
| | Power Control Algorithm | Algorithm2 | | | | |
| | βc | 11/15 | 6/15 | 15/15 | 2/15 | 15/15 |
| | βd | 15/15 | 15/15 | 9/15 | 15/15 | 15/15 |
| | βec | 209/225 | 12/15 | 30/15 | 2/15 | 24/15 |
| | βc/βd | 11/15 | 6/15 | 15/9 | 2/15 | 15/15 |
| | βhs | 22/15 | 12/15 | 30/15 | 4/15 | 30/15 |
| | βed | 1309/225 | 94/75 | 47/15<br>47/15 | 56/75 | 134/15 |
| | CM (dB) | 1.0 | 3.0 | 2.0 | 3.0 | 1.0 |
| HSDPA Specific Settings | $D_{ACK}$ | 8 | | | | |
| | $D_{NAK}$ | 8 | | | | |
| | DCQI | 8 | | | | |
| | Ack-Nack repetition factor | 3 | | | | |
| | CQI Feedback (Table 5.2B.4) | 4ms | | | | |
| | CQI Repetition Factor (Table 5.2B.4) | 2 | | | | |
| | Ahs = βhs/βc | 30/15 | | | | |
| HSUPA Specific Settings | D E-DPCCH | 6 | 8 | 8 | 5 | 7 |
| | DHARQ | 0 | 0 | 0 | 0 | 0 |
| | AG Index | 20 | 12 | 15 | 17 | 21 |
| | ETFCI (from 34.121 Table C.11.1.3) | 75 | 67 | 92 | 71 | 81 |
| | Associated Max UL Data Rate kbps | 242.1 | 174.9 | 482.8 | 205.8 | 308.9 |

4. WCDMA Conducted Power Results

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

2) Per KDB 941225 D01, RMC 12.2kbps setting is used to evaluate SAR. If the maximum output power and tune-up tolerance specified for production units in HSDPA / HSUPA is ≤ ¼ dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio of specified maximum output power and tune-up tolerance of HSDPA / HSUPA to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA.

| Band | WCDMA Band V | | | |
|---|---|---|---|---|
| Tx Channel | Tune-up | 4132 | 4182 | 4233 |
| Frequency (MHz) | | 826.4 | 836.4 | 846.6 |
| RMC 12.2Kbps | 23.00 | 22.91 | 22.75 | 22.51 |
| HSDPA Subtest-1 | 22.00 | 21.92 | 21.79 | 21.44 |
| HSDPA Subtest-2 | 22.00 | 21.44 | 21.33 | 20.95 |
| HSDPA Subtest-3 | 22.00 | 21.46 | 21.35 | 20.96 |
| HSDPA Subtest-4 | 22.00 | 21.51 | 21.32 | 20.98 |
| HSUPA Subtest-1 | 22.00 | 21.44 | 21.33 | 21.01 |
| HSUPA Subtest-2 | 22.00 | 21.42 | 21.32 | 21.05 |
| HSUPA Subtest-3 | 22.00 | 21.38 | 21.35 | 21.07 |
| HSUPA Subtest-4 | 22.00 | 21.45 | 21.28 | 20.95 |
| HSUPA Subtest-5 | 22.00 | 21.89 | 21.82 | 21.53 |
| Band | WCDMA Band II | | | |
| Tx Channel | Tune-up | 9262 | 9400 | 9538 |
| Frequency (MHz) | | 1852.4 | 1880 | 1907.6 |
| RMC 12.2Kbps | 23.00 | 22.58 | 22.92 | 22.96 |
| HSDPA Subtest-1 | 22.00 | 21.66 | 21.91 | 21.93 |
| HSDPA Subtest-2 | 22.00 | 21.11 | 21.38 | 21.49 |
| HSDPA Subtest-3 | 22.00 | 21.15 | 21.40 | 21.53 |
| HSDPA Subtest-4 | 22.00 | 21.12 | 21.35 | 21.48 |
| HSUPA Subtest-1 | 22.00 | 21.21 | 21.39 | 21.50 |
| HSUPA Subtest-2 | 22.00 | 21.25 | 21.27 | 21.48 |
| HSUPA Subtest-3 | 22.00 | 21.18 | 21.35 | 21.45 |
| HSUPA Subtest-4 | 22.00 | 21.21 | 21.31 | 21.51 |
| HSUPA Subtest-5 | 22.00 | 21.65 | 21.92 | 21.92 |

## 7.4. WLAN & Bluetooth Output Power

### 7.4.1. Output Power Results Of WLAN

The output power of WLAN is as following:

| Mode | Channel | Frequency (MHz) | Tune-up | Output Power (dBm) |
|---|---|---|---|---|
| 802.11b | 1 | 2412 | 15.5 | 14.5 |
| | 6 | 2437 | 15.5 | 14.7 |
| | 11 | 2462 | 15.5 | 15.1 |
| 802.11g | 1 | 2412 | 13.5 | 12.6 |
| | 6 | 2437 | 13.5 | 12.4 |
| | 11 | 2462 | 13.5 | 12.8 |
| 802.11n (HT20) | 1 | 2412 | 13.5 | 11.7 |
| | 6 | 2437 | 13.5 | 12.6 |
| | 11 | 2462 | 13.5 | 12.6 |
| 802.11n (HT40) | 3 | 2422 | 11.5 | 10.6 |
| | 6 | 2437 | 11.5 | 11.0 |
| | 9 | 2452 | 11.5 | 11.3 |

### 7.4.2. Output Power Results Of Bluetooth

The output power of Bluetooth is as following:

| | Output Power (dBm) | | | | |
|---|---|---|---|---|---|
| | Channel | Tune-up | Data Rates | | |
| | | | 0CH | 39CH | 78CH |
| BDR+EDR | 1M | 4.00 | 2.73 | 3.19 | 2.89 |
| | 2M | 4.00 | 2.31 | 2.66 | 2.23 |
| | 3M | 4.00 | 2.55 | 2.99 | 2.65 |

| | Channel | Tune-up | Output Power (dBm) |
|---|---|---|---|
| BLE | 0CH | -4.00 | -4.53 |
| | 19CH | -4.00 | -4.57 |
| | 39CH | -4.00 | -5.14 |

## 8. Antenna Location

# 9. Standalone SAR test exclusion and estimated

Refer to FCC KDB 447498D01, the 1-g SAR 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)]·[$\sqrt{f_{(GHZ)}}$] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where:

- $f_{(GHZ)}$ 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

When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

| Mode | $P_{max}$ (dBm) | $P_{max}$ (mW) | Distance (mm) | f (GHz) | Calculation Result | SAR Exclusion threshold | SAR test exclusion |
|---|---|---|---|---|---|---|---|
| Bluetooth | 4 | 2.51 | 5 | 2.480 | 0.79 | 3.0 | Yes |
| Bluetooth | 4 | 2.51 | 5 | 2.480 | 0.79 | 7.5 | Yes |

NOTE: Standalone SAR test exclusion for Bluetooth

When standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] * [$\sqrt{f_{(GHZ)}}$/x] W/kg for test separation distances ≤ 50mm, where x = 7.5 for 1-g SAR and x = 18.75 for 10-g SAR.

When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

| Mode | Position | $P_{max}$ (dBm) | $P_{max}$ (mW) | Distance (mm) | f (GHz) | x | Estimated SAR (W/Kg) |
|---|---|---|---|---|---|---|---|
| Bluetooth | Front-of-Face | 4 | 2.51 | 10 | 2.480 | 7.5 | 0.053 |
| Bluetooth | Back-of-Wristbands | 4 | 2.51 | 5 | 2.480 | 18.75 | 0.042 |

NOTE: Estimated SAR calculation for Bluetooth

# 10. SAR Results

## 10.1. SAR measurement results

### 10.1.1. SAR measurement Result of GSM850

| Test Position of Front-of-Face with 10mm | | | | | | | |
|---|---|---|---|---|---|---|---|
| Test channel /Freq. | Test Mode | SAR Value (W/kg) | | Power Drift (±5%) | Conducted power (dBm) | Tune-up power (dBm) | Scaled SAR 1-g (W/Kg) |
| | | 1-g | 10-g | | | | |
| 128/824.2 | GPRS(GMSK 4TS) | 0.102 | 0.077 | -0.08 | 28.53 | 29.00 | 0.114 |
| Test Position of Back-of-Wristbands with 0mm | | | | | | | |
| Test channel /Freq. | Test Mode | SAR Value (W/kg) | | Power Drift (±5%) | Conducted power (dBm) | Tune-up power (dBm) | Scaled SAR 10-g (W/Kg) |
| | | 1-g | 10-g | | | | |
| 128/824.2 | GPRS(GMSK 4TS) | 0.219 | 0.136 | 3.40 | 28.53 | 29.00 | 0.152 |

### 10.1.2. SAR measurement Result of GSM1900

| Test Position of Front-of-Face with 10mm | | | | | | | |
|---|---|---|---|---|---|---|---|
| Test channel /Freq. | Test Mode | SAR Value (W/kg) | | Power Drift (±5%) | Conducted power (dBm) | Tune-up power (dBm) | Scaled SAR 1-g (W/Kg) |
| | | 1-g | 10-g | | | | |
| 810/1909.8 | GPRS(GMSK 4TS) | 0.410 | 0.221 | -3.86 | 26.51 | 27.00 | 0.459 |
| Test Position of Back-of-Wristbands with 0mm | | | | | | | |
| Test channel /Freq. | Test Mode | SAR Value (W/kg) | | Power Drift (±5%) | Conducted power (dBm) | Tune-up power (dBm) | Scaled SAR 10-g (W/Kg) |
| | | 1-g | 10-g | | | | |
| 810/1909.8 | GPRS(GMSK 4TS) | 1.455 | 0.851 | 3.08 | 26.51 | 27.00 | 0.953 |

### 10.1.3. SAR measurement Result of WCDMA Band V

| Test Position of Front-of-Face with 10mm | | | | | | | |
|---|---|---|---|---|---|---|---|
| Test channel /Freq. | Test Mode | SAR Value (W/kg) | | Power Drift (±5%) | Conducted power (dBm) | Tune-up power (dBm) | Scaled SAR 1-g (W/Kg) |
| | | 1-g | 10-g | | | | |
| 4132/826.4 | RMC12.2K | 0.025 | 0.014 | -4.75 | 22.91 | 23.00 | 0.026 |
| Test Position of Back-of-Wristbands with 0mm | | | | | | | |
| Test channel /Freq. | Test Mode | SAR Value (W/kg) | | Power Drift (±5%) | Conducted power (dBm) | Tune-up power (dBm) | Scaled SAR 10-g (W/Kg) |
| | | 1-g | 10-g | | | | |
| 4132/826.4 | RMC12.2K | 0.712 | 0.411 | 0.38 | 22.91 | 23.00 | 0.420 |

### 10.1.4. SAR measurement Result of WCDMA Band II

| Test Position of Front-of-Face with 10mm | | | | | | | |
|---|---|---|---|---|---|---|---|
| Test channel /Freq. | Test Mode | SAR Value (W/kg) | | Power Drift (±5%) | Conducted power (dBm) | Tune-up power (dBm) | Scaled SAR 1-g (W/Kg) |
| | | 1-g | 10-g | | | | |
| 9538/1907.6 | RMC12.2K | 0.282 | 0.150 | -2.32 | 22.96 | 23.00 | 0.285 |
| Test Position of Back-of-Wristbands with 0mm | | | | | | | |
| Test channel /Freq. | Test Mode | SAR Value (W/kg) | | Power Drift (±5%) | Conducted power (dBm) | Tune-up power (dBm) | Scaled SAR 10-g (W/Kg) |
| | | 1-g | 10-g | | | | |
| 9538/1907.6 | RMC12.2K | 1.785 | 0.977 | -0.06 | 22.96 | 23.00 | 0.986 |

### 10.1.5. SAR measurement Result of WLAN 2.4G

| Test Position of Front-of-Face with 10mm | | | | | | | |
|---|---|---|---|---|---|---|---|
| Test channel /Freq. | Test Mode | SAR Value (W/kg) | | Power Drift (±5%) | Conducted power (dBm) | Tune-up power (dBm) | Scaled SAR 1-g (W/Kg) |
| | | 1-g | 10-g | | | | |
| 11/2462 | 802.11 b | 0.332 | 0.138 | -4.24 | 15.10 | 15.50 | 0.364 |
| Test Position of Back-of-Wristbands with 0mm | | | | | | | |
| Test channel /Freq. | Test Mode | SAR Value (W/kg) | | Power Drift (±5%) | Conducted power (dBm) | Tune-up power (dBm) | Scaled SAR 10-g (W/Kg) |
| | | 1-g | 10-g | | | | |
| 11/2462 | 802.11 b | 1.099 | 0.369 | -2.41 | 15.10 | 15.50 | 0.405 |

## 10.2. Simultaneous Transmission Analysis

1) This device supported VoIP in GPRS and WCDMA (e.g. 2rd party VoIP).
2) WLAN 2.4GHz and Bluetooth share the same antenna, and cannot transmit simultaneously.
3) EUT will choose each GSM and WCDMA according to the network signal condition; therefore, they will not operate simultaneously at any moment.
4) The Scaled SAR summation is calculated based on the same configuration and test position.

## 10.3. SAR Summation Scenario

Refer to FCC KDB 447498D01, simultaneous transmission SAR is compliant if,

1) Scalar SAR summation < 1.6W/kg for 1-g SAR, and < 4.0W/kg for 10-g SAR.
2) SPLSR = $(SAR_1 + SAR_2)^{1.5}$ / (min. separation distance, mm), and the peak separation distance is determined from the square root of $[(x_1-x_2)^2 + (y_1-y_2)^2 + (z_1-z_2)^2]$, where $(x_1, y_1, z_1)$ and $(x_2, y_2, z_2)$ are the coordinates of the extrapolated peak SAR locations in the zoom scan. If SPLSR≤0.04 for 1-g SAR and SPLSR≤ 0.10 for 10-g SAR, simultaneously transmission SAR measurement is not necessary.

| Test Position | Scaled $SAR_{MAX}$ | | ∑1-g SAR (W/Kg) | SPLSR | Remark |
|---|---|---|---|---|---|
| | GSM 850 | WLAN 2.4G | | | |
| Front-of-Face | 0.114 | 0.364 | 0.478 | n/a | n/a |

NOTE: 1-g SAR Simultaneous Tx Combination of GSM850 and WLAN 2.4G.

| Test Position | Scaled $SAR_{MAX}$ | | ∑1-g SAR (W/Kg) | SPLSR | Remark |
|---|---|---|---|---|---|
| | GSM 1900 | WLAN 2.4G | | | |
| Front-of-Face | 0.459 | 0.364 | 0.823 | n/a | n/a |

NOTE: 1-g SAR Simultaneous Tx Combination of GSM1900 and WLAN 2.4G.

| Test Position | Scaled $SAR_{MAX}$ | | ∑1-g SAR (W/Kg) | SPLSR | Remark |
|---|---|---|---|---|---|
| | WCDMA Band V | WLAN 2.4G | | | |
| Front-of-Face | 0.026 | 0.364 | 0.390 | n/a | n/a |

NOTE: 1-g SAR Simultaneous Tx Combination of WCDMA Band V and WLAN 2.4G.

| Test Position | Scaled $SAR_{MAX}$ | | ∑1-g SAR (W/Kg) | SPLSR | Remark |
|---|---|---|---|---|---|
| | WCDMA Band II | WLAN 2.4G | | | |
| Front-of-Face | 0.285 | 0.364 | 0.649 | n/a | n/a |

NOTE: 1-g SAR Simultaneous Tx Combination of WCDMA Band II and WLAN 2.4G.

| Test Position | Scaled $SAR_{MAX}$ | | ∑1-g SAR (W/Kg) | SPLSR | Remark |
|---|---|---|---|---|---|
| | GSM 850 | Bluetooth | | | |
| Front-of-Face | 0.114 | 0.053 | 0.166 | n/a | n/a |

NOTE: 1-g SAR Simultaneous Tx Combination of GSM850 and Bluetooth.

| Test Position | Scaled $SAR_{MAX}$ | | ∑1-g SAR (W/Kg) | SPLSR | Remark |
|---|---|---|---|---|---|
| | GSM 1900 | Bluetooth | | | |
| Front-of-Face | 0.459 | 0.053 | 0.512 | n/a | n/a |

NOTE: 1-g SAR Simultaneous Tx Combination of GSM1900 and Bluetooth.

| Test Position | Scaled $SAR_{MAX}$ | | ∑1-g SAR (W/Kg) | SPLSR | Remark |
|---|---|---|---|---|---|
| | WCDMA Band V | Bluetooth | | | |
| Front-of-Face | 0.026 | 0.053 | 0.078 | n/a | n/a |

NOTE: 1-g SAR Simultaneous Tx Combination of WCDMA Band V and Bluetooth.

| Test Position | Scaled $SAR_{MAX}$ | | ∑1-g SAR (W/Kg) | SPLSR | Remark |
|---|---|---|---|---|---|
| | WCDMA Band II | Bluetooth | | | |
| Front-of-Face | 0.285 | 0.053 | 0.337 | n/a | n/a |

NOTE: 1-g SAR Simultaneous Tx Combination of WCDMA Band II and Bluetooth.

| Test Position | Scaled $SAR_{MAX}$ | | ∑10-g SAR (W/Kg) | SPLSR | Remark |
|---|---|---|---|---|---|
| | GSM 850 | WLAN 2.4G | | | |
| Back-of-Wristbands | 0.152 | 0.405 | 0.556 | n/a | n/a |

NOTE: 10-g SAR Simultaneous Tx Combination of GSM850 and WLAN 2.4G.

| Test Position | Scaled $SAR_{MAX}$ | | ∑10-g SAR (W/Kg) | SPLSR | Remark |
|---|---|---|---|---|---|
| | GSM 1900 | WLAN 2.4G | | | |
| Back-of-Wristbands | 0.953 | 0.405 | 1.357 | n/a | n/a |

NOTE: 10-g SAR Simultaneous Tx Combination of GSM1900 and WLAN 2.4G.

| Test Position | Scaled $SAR_{MAX}$ | | ∑10-g SAR (W/Kg) | SPLSR | Remark |
|---|---|---|---|---|---|
| | WCDMA Band V | WLAN 2.4G | | | |
| Back-of-Wristbands | 0.420 | 0.405 | 0.824 | n/a | n/a |

NOTE: 10-g SAR Simultaneous Tx Combination of WCDMA Band V and WLAN 2.4G.

| Test Position | Scaled $SAR_{MAX}$ | | ∑10-g SAR (W/Kg) | SPLSR | Remark |
|---|---|---|---|---|---|
| | WCDMA Band II | WLAN 2.4G | | | |
| Back-of-Wristbands | 0.986 | 0.405 | 1.391 | n/a | n/a |

NOTE: 10-g SAR Simultaneous Tx Combination of WCDMA Band II and WLAN 2.4G.

| Test Position | Scaled $SAR_{MAX}$ | | ∑10-g SAR (W/Kg) | SPLSR | Remark |
|---|---|---|---|---|---|
| | GSM 850 | Bluetooth | | | |
| Back-of-Wristbands | 0.152 | 0.042 | 0.194 | n/a | n/a |

NOTE: 10-g SAR Simultaneous Tx Combination of GSM850 and Bluetooth.

| Test Position | Scaled $SAR_{MAX}$ | | ∑10-g SAR (W/Kg) | SPLSR | Remark |
|---|---|---|---|---|---|
| | GSM 1900 | Bluetooth | | | |
| Back-of-Wristbands | 0.953 | 0.042 | 0.995 | n/a | n/a |

NOTE: 10-g SAR Simultaneous Tx Combination of GSM1900 and Bluetooth.

| Test Position | Scaled $SAR_{MAX}$ | | ∑10-g SAR (W/Kg) | SPLSR | Remark |
|---|---|---|---|---|---|
| | WCDMA Band V | Bluetooth | | | |
| Back-of-Wristbands | 0.420 | 0.042 | 0.462 | n/a | n/a |

NOTE: 10-g SAR Simultaneous Tx Combination of WCDMA Band V and Bluetooth.

| Test Position | Scaled $SAR_{MAX}$ | | ∑10-g SAR (W/Kg) | SPLSR | Remark |
|---|---|---|---|---|---|
| | WCDMA Band II | Bluetooth | | | |
| Back-of-Wristbands | 0.986 | 0.042 | 1.028 | n/a | n/a |

NOTE: 10-g SAR Simultaneous Tx Combination of WCDMA Band II and Bluetooth.

# 11. Appendix A. Photo documentation

| Table of contents |
| --- |
| **Test Facility** |
| **Product Photo** |
| **Test Positions** |
| **Liquid depth** |

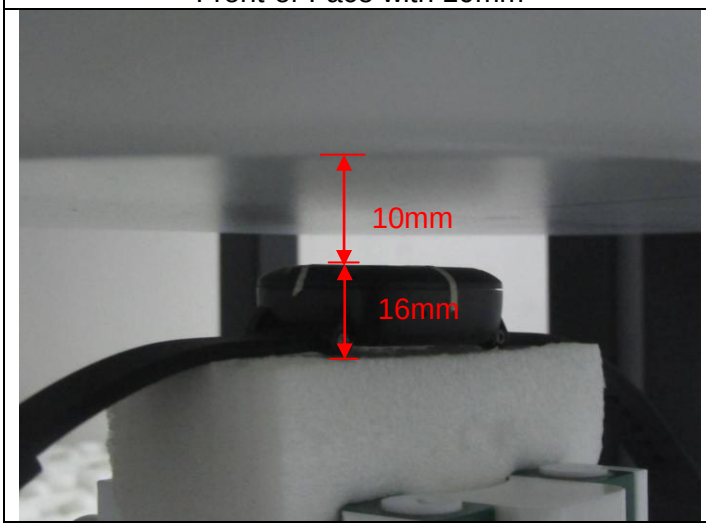
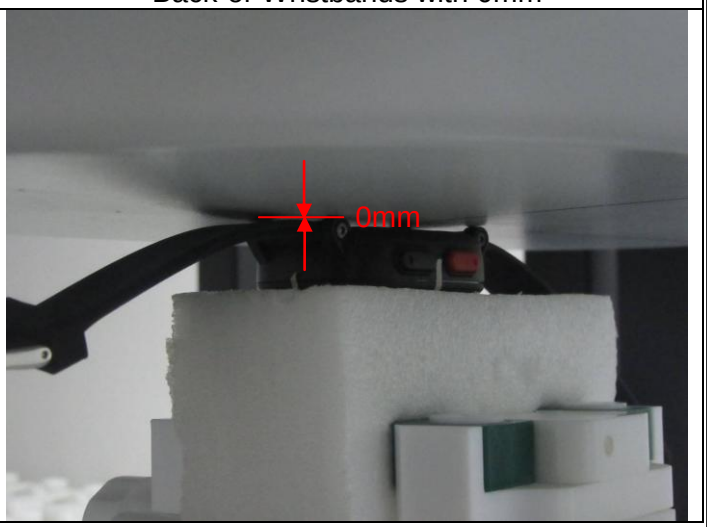
**Test Facility**

Measurement System SATIMO

**Product Photo**

| Front View | Back View |
|---|---|
| | |

**Test Positions**

| Front-of-Face with 10mm | Back-of-Wristbands with 0mm |
|---|---|
|   |   |

**Liquid depth**

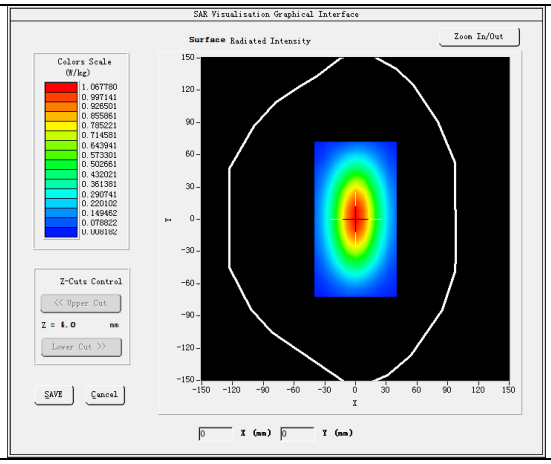
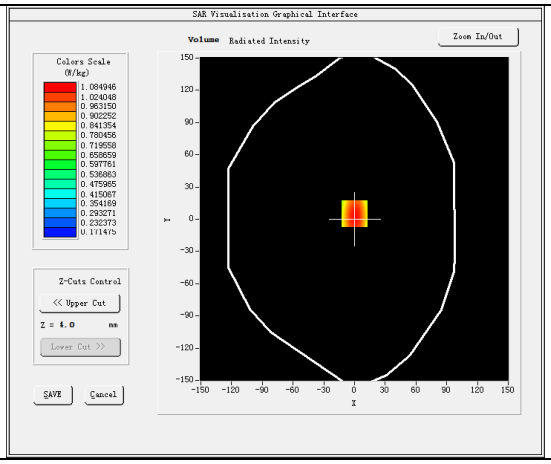
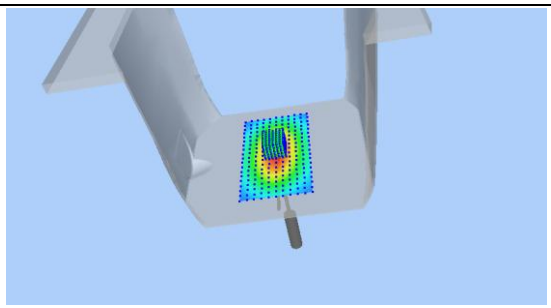
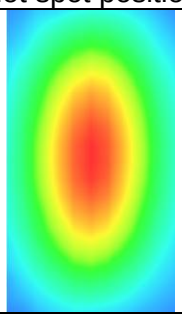
| Body Position with 850MHz head liquid depth (15.2cm) | Body Position with 850MHz Body liquid depth (15.1cm) |
|---|---|
| | |
| Body Position with 1900MHz head liquid depth (15.3cm) | Body Position with 1900MHz Body liquid depth (15.2cm) |
| | |
| Body Position with 2450MHz head liquid depth (15.2cm) | Body Position with 2450MHz Body liquid depth (15.3cm) |
| | |

# 12. Appendix B. System Check Plots

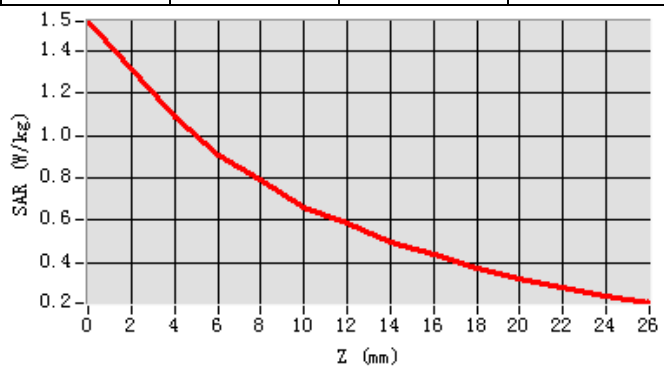
| Table of contents |
|---|
| System Performance Check - SID835 - Head |
| System Performance Check - SID835 - Body |
| System Performance Check - SID1900 - Head |
| System Performance Check - SID1900 - Body |
| System Performance Check - SID2450 - Head |
| System Performance Check - SID2450 - Body |

**System Performance Check - SID835-Head**

| | |
|---|---|
| Date of measurement: | Jan. 24, 2018 |
| Signal: | Communication System: CW; Frequency: 835.00MHz; Duty Cycle: 1:1.00 |
| ConvF: | 1.48 |
| Liquid Parameters: | Relative permittivity (real part): 41.77; Conductivity (S/m): 0.90; |
| Device Position: | Dipole |
| Area Scan: | dx=8mm dy=8mm, h=5.00mm |
| Zoom Scan: | 7x7x12, dx=4mm dy=4mm dz=2mm, h=5.00mm |

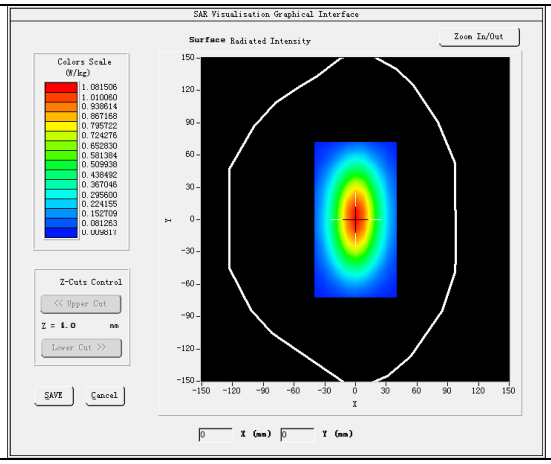
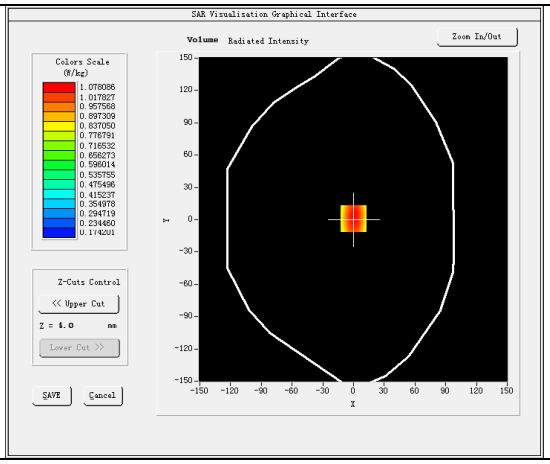
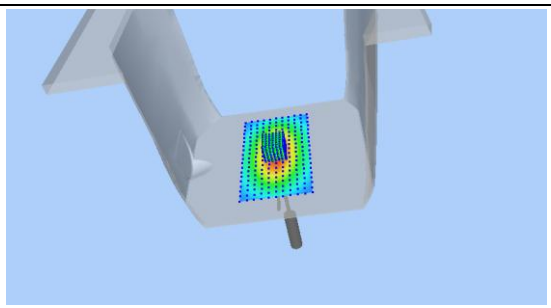
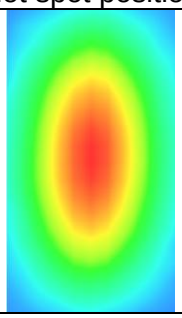
| Surface SAR | Volume SAR |
|---|---|
|  |  |
| 3D screen shot | Hot spot position |
|  |  |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Maximum location: X=0.00, Y=5.00<br>SAR Peak: 1.52 W/kg | | | | | | | |
| SAR 1g (W/Kg) | | | | 0.984 | | | |
| SAR 10g (W/Kg) | | | | 0.624 | | | |
| Power Drift (±5%): | | | | -0.04 | | | |
| Z (mm) | 0.00 | 6.00 | 10.00 | 14.00 | 18.00 | 22.00 | 24.00 |
| SAR (W/Kg) | 1.5410 | 0.9093 | 0.6611 | 0.4956 | 0.3748 | 0.2802 | 0.2415 |



**System Performance Check - SID835-Body**

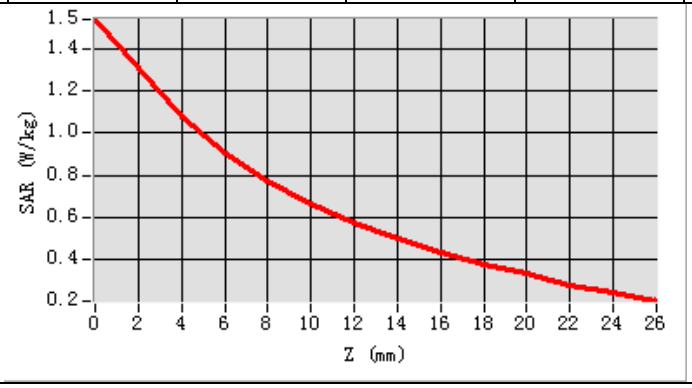
| | |
|---|---|
| Date of measurement: | Jan. 24, 2018 |
| Signal: | Communication System: CW; Frequency: 835.00MHz; Duty Cycle: 1:1.00 |
| ConvF: | 1.53 |
| Liquid Parameters: | Relative permittivity (real part): 55.06; Conductivity (S/m): 0.99; |
| Device Position: | Dipole |
| Area Scan: | dx=8mm dy=8mm, h=5.00mm |
| Zoom Scan: | 7x7x12, dx=4mm dy=4mm dz=2mm, h=5.00mm |

| Surface SAR | Volume SAR |
|---|---|
|  |  |
| 3D screen shot | Hot spot position |
|  |  |

Maximum location: X=0.00, Y=1.00
SAR Peak: 1.55 W/kg

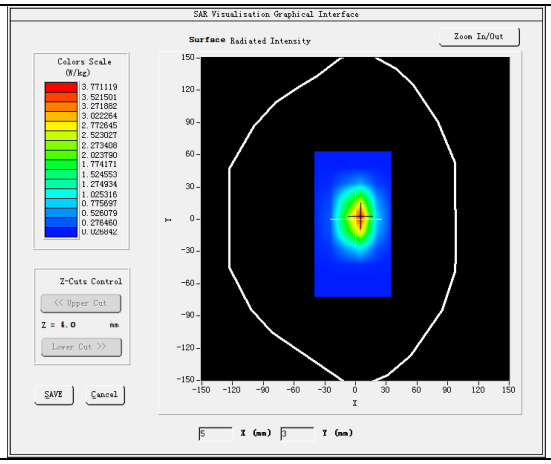
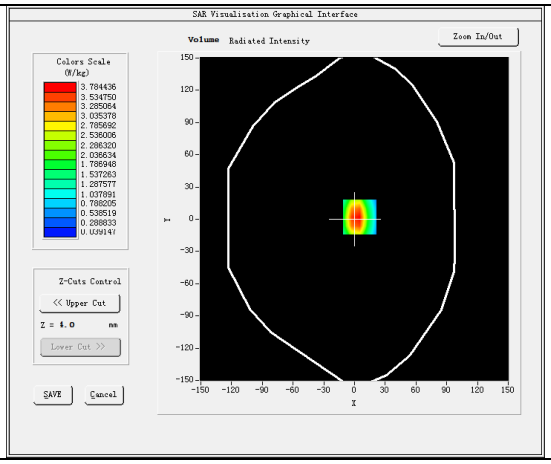
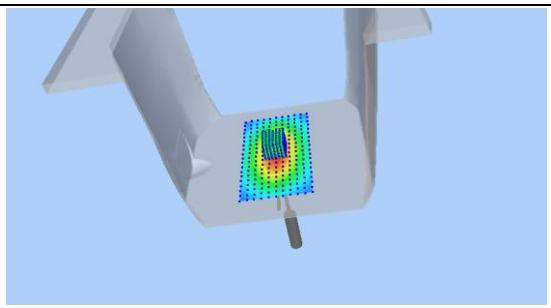
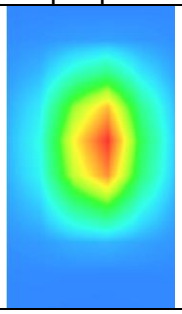
| | |
|---|---|
| SAR 1g (W/Kg) | 0.931 |
| SAR 10g (W/Kg) | 0.621 |
| Power Drift (±5%): | 0.20 |

| Z (mm) | 0.00 | 6.00 | 10.00 | 14.00 | 18.00 | 22.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| SAR (W/Kg) | 1.5398 | 0.9083 | 0.6645 | 0.4973 | 0.3772 | 0.2811 | 0.2435 |



**System Performance Check - SID1900-Head**

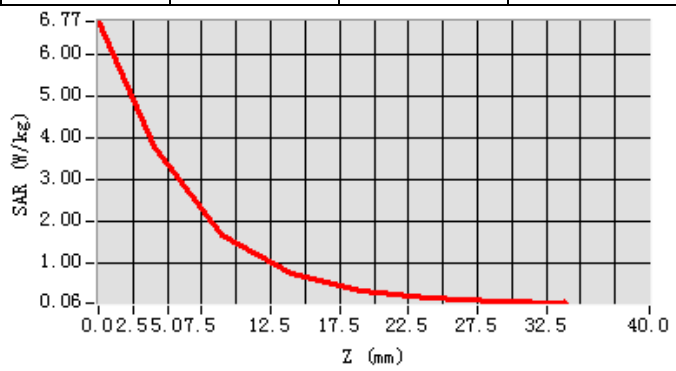
| | |
|---|---|
| Date of measurement: | Jan. 25, 2018 |
| Signal: | Communication System: CW; Frequency: 1900.00MHz; Duty Cycle: 1:1.00 |
| ConvF: | 2.00 |
| Liquid Parameters: | Relative permittivity (real part):39.40; Conductivity (S/m): 1.43; |
| Device Position: | Dipole |
| Area Scan: | dx=8mm dy=8mm, h=5.00mm |
| Zoom Scan: | 7x7x12, dx=4mm dy=4mm dz=2mm, h=5.00mm |

| Surface SAR | Volume SAR |
|---|---|
|  |  |
| 3D screen shot | Hot spot position |
|  |  |

Maximum location: X=5.00, Y=2.00
SAR Peak: 7.11 W/kg

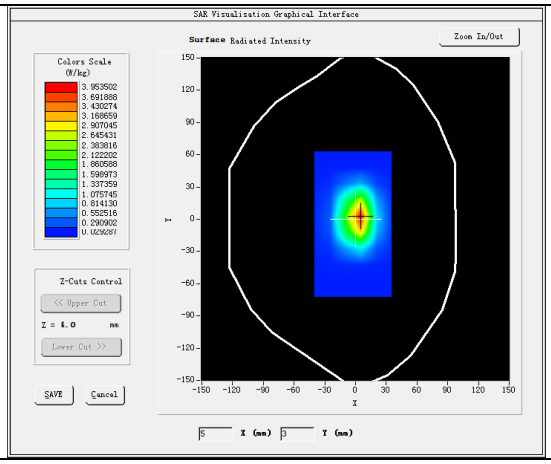
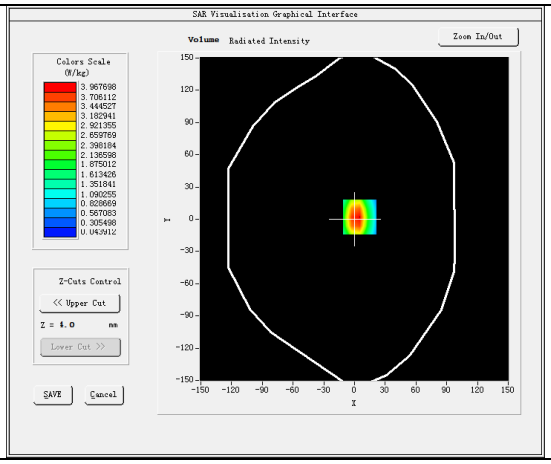
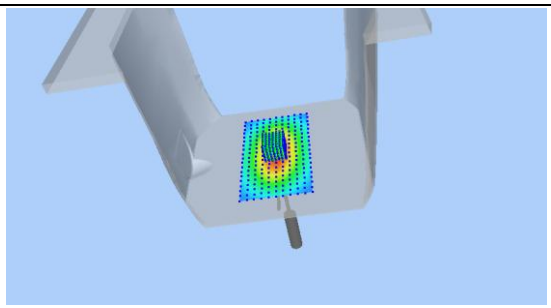
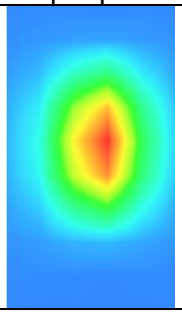
| | |
|---|---|
| SAR 1g (W/Kg) | 3.850 |
| SAR 10g (W/Kg) | 1.915 |
| Power Drift (±5%): | -0.04 |

| Z (mm) | 0.00 | 4.00 | 9.00 | 14.00 | 19.00 | 24.00 | 29.00 |
|---|---|---|---|---|---|---|---|
| SAR (W/Kg) | 6.7661 | 3.7844 | 1.6820 | 0.7731 | 0.3664 | 0.1847 | 0.1000 |



**System Performance Check - SID1900-Body**

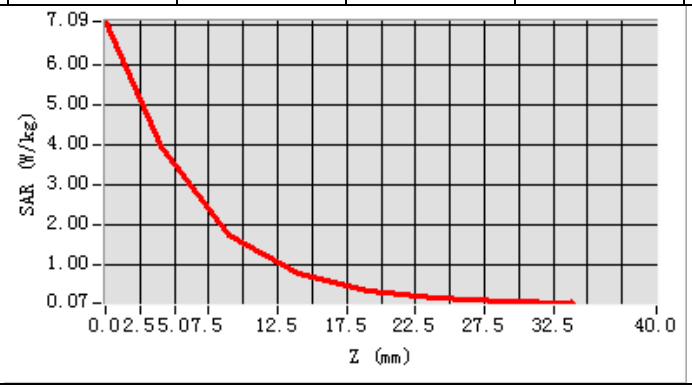
| | |
|---|---|
| Date of measurement: | Jan. 25, 2018 |
| Signal: | Communication System: CW; Frequency: 1900.00MHz; Duty Cycle: 1:1.00 |
| ConvF: | 2.07 |
| Liquid Parameters: | Relative permittivity (real part): 53.19; Conductivity (S/m): 1.55; |
| Device Position: | Dipole |
| Area Scan: | dx=8mm dy=8mm, h=5.00mm |
| Zoom Scan: | 7x7x12, dx=4mm dy=4mm dz=2mm, h=5.00mm |

| Surface SAR | Volume SAR |
|---|---|
|  |  |
| 3D screen shot | Hot spot position |
|  |  |

Maximum location: X=5.00, Y=2.00
SAR Peak: 7.45 W/kg

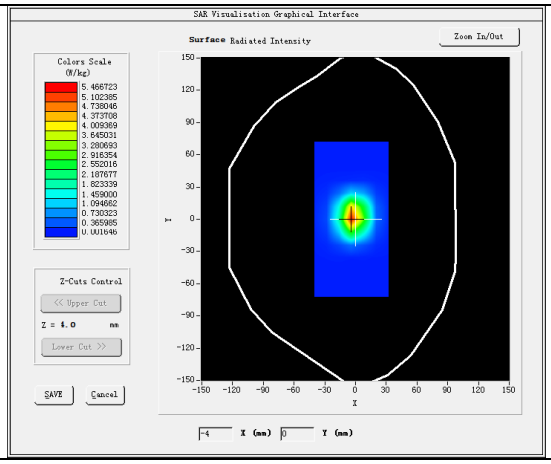
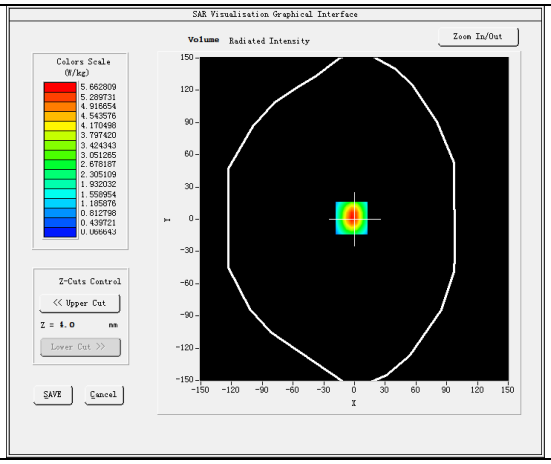
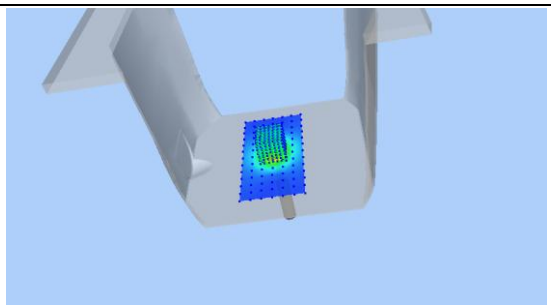
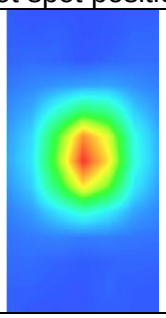
| | |
|---|---|
| SAR 1g (W/Kg) | 3.963 |
| SAR 10g (W/Kg) | 1.887 |
| Power Drift (±5%): | 0.06 |

| Z (mm) | 0.00 | 4.00 | 9.00 | 14.00 | 19.00 | 24.00 | 29.00 |
|---|---|---|---|---|---|---|---|
| SAR (W/Kg) | 7.0908 | 3.9677 | 1.7667 | 0.8143 | 0.3884 | 0.1966 | 0.1063 |



**System Performance Check - SID2450-Head**

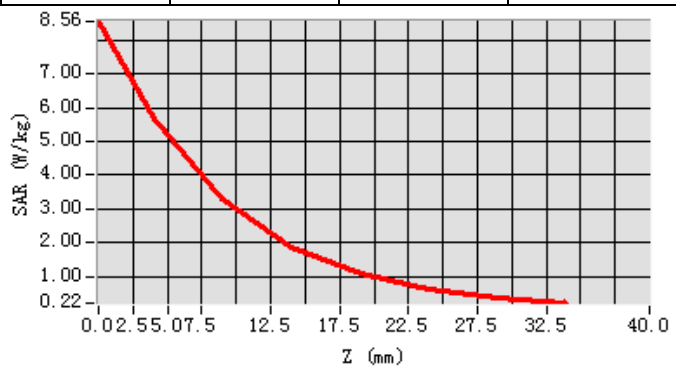
| | |
|---|---|
| Date of measurement: | Jan. 23, 2018 |
| Signal: | Communication System: CW; Frequency: 2450.00MHz; Duty Cycle: 1:1.00 |
| ConvF: | 2.18 |
| Liquid Parameters: | Relative permittivity (real part): 39.49; Conductivity (S/m): 1.78; |
| Device Position: | Dipole |
| Area Scan: | dx=8mm dy=8mm, h=5.00mm |
| Zoom Scan: | 7x7x12, dx=4mm dy=4mm dz=2mm, h=5.00mm |

| Surface SAR | Volume SAR |
|---|---|
|  |  |
| 3D screen shot | Hot spot position |
|  |  |

Maximum location: X=-3.00, Y=1.00
SAR Peak: 8.61 W/kg

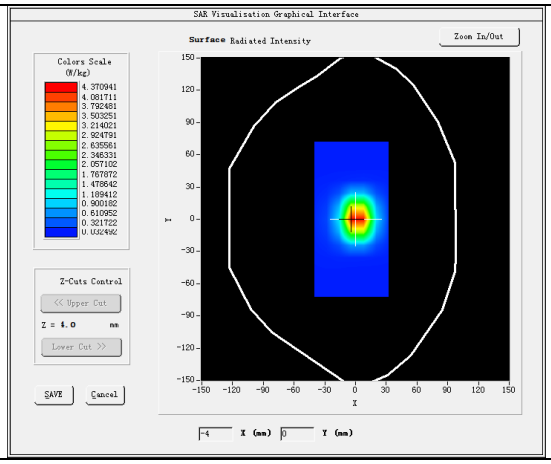
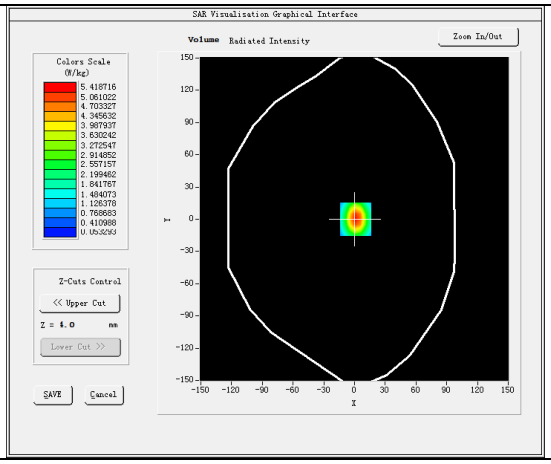
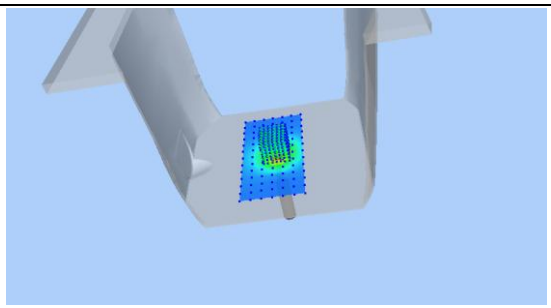
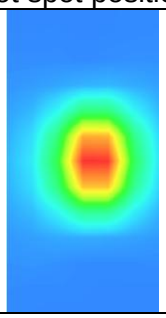
| | |
|---|---|
| SAR 1g (W/Kg) | 5.153 |
| SAR 10g (W/Kg) | 2.405 |
| Power Drift (±5%): | -0.27 |

| Z (mm) | 0.00 | 4.00 | 9.00 | 14.00 | 19.00 | 24.00 | 29.00 |
|---|---|---|---|---|---|---|---|
| SAR (W/Kg) | 8.5559 | 5.6628 | 3.2925 | 1.8608 | 1.0801 | 0.6279 | 0.3653 |



**System Performance Check - SID2450-Body**

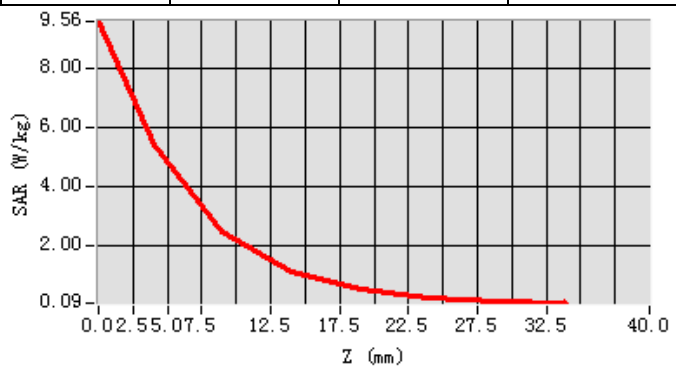
| | |
|---|---|
| Date of measurement: | Jan. 23, 2018 |
| Signal: | Communication System: CW; Frequency: 2450.00MHz; Duty Cycle: 1:1.00 |
| ConvF: | 2.27 |
| Liquid Parameters: | Relative permittivity (real part): 52.66; Conductivity (S/m): 1.95; |
| Device Position: | Dipole |
| Area Scan: | dx=8mm dy=8mm, h=5.00mm |
| Zoom Scan: | 7x7x12, dx=4mm dy=4mm dz=2mm, h=5.00mm |

| Surface SAR | Volume SAR |
|---|---|
|  |  |
| 3D screen shot | Hot spot position |
|  |  |

Maximum location: X=1.00, Y=0.00
SAR Peak: 9.46 W/kg

| | |
|---|---|
| SAR 1g (W/Kg) | 5.015 |
| SAR 10g (W/Kg) | 2.221 |
| Power Drift (±5%): | -0.04 |

| Z (mm) | 0.00 | 4.00 | 9.00 | 14.00 | 19.00 | 24.00 | 29.00 |
|---|---|---|---|---|---|---|---|
| SAR (W/Kg) | 9.5562 | 5.4187 | 2.4710 | 1.1436 | 0.5549 | 0.2762 | 0.1471 |

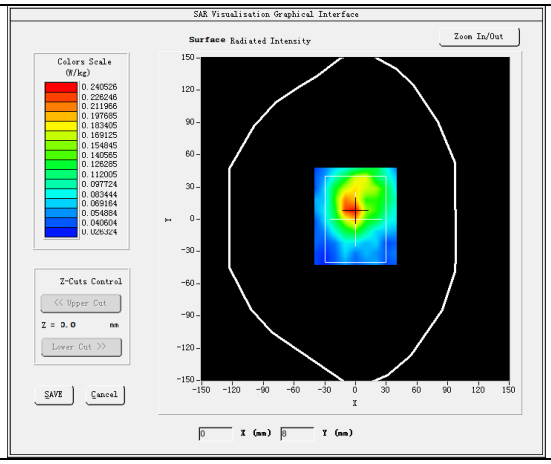
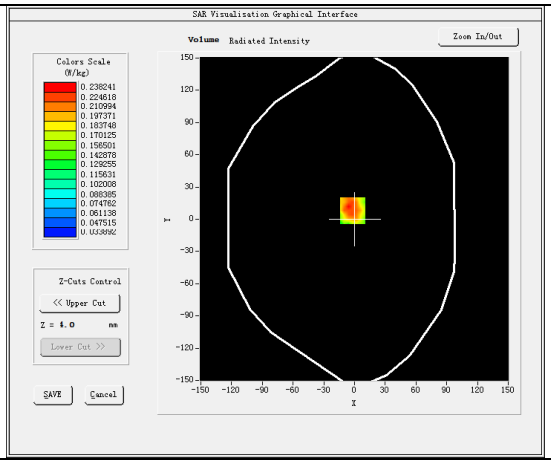
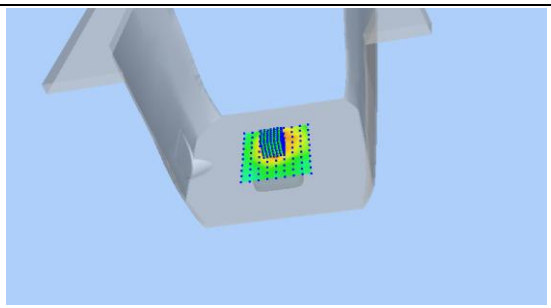
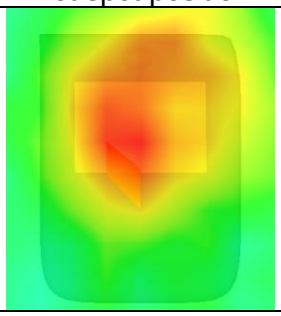


# 13. Appendix C. Plots of High SAR Measurement

| Table of contents |
|---|
| GSM 850 |
| GSM 1900 |
| WCDMA Band V |
| WCDMA Band II |
| WLAN 2.4G |

**GSM850_GPRS(GMSK 4TS)_Ch128_Back-of-Wristbands_0mm**

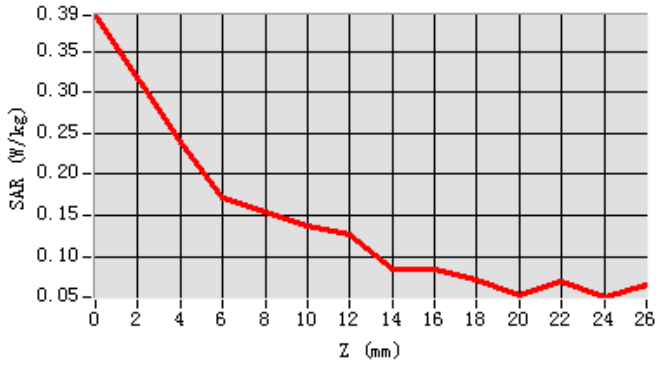
| | |
|---|---|
| Date of measurement: | Jan. 24, 2018 |
| Signal: | Communication System: GPRS(GMSK 4TS); Frequency: 824.20MHz; Duty Cycle: 1:2.08 |
| ConvF: | 1.53 |
| Liquid Parameters: | Relative permittivity (real part): 55.10; Conductivity (S/m):0.97; |
| Device Position: | Body |
| Area Scan: | dx=8mm dy=8mm, h=5.00mm |
| Zoom Scan: | 7x7x12, dx=4mm dy=4mm dz=2mm, h=5.00mm |

| Surface SAR | Volume SAR |
|---|---|
|  |  |
| 3D screen shot | Hot spot position |
|  |  |

Maximum location: X=-2.00, Y=8.00
SAR Peak: 0.39 W/kg

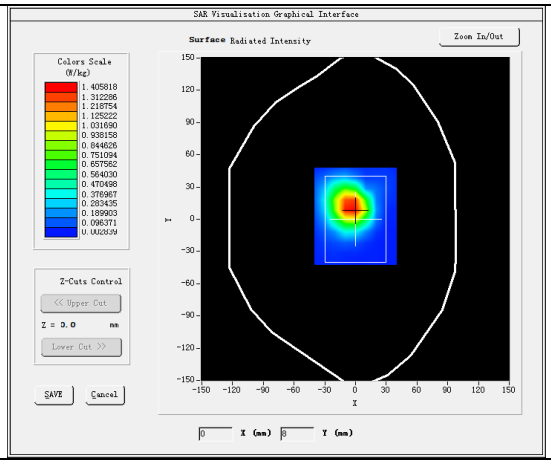
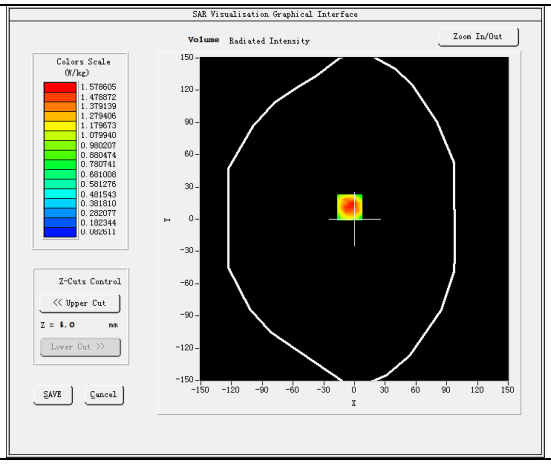
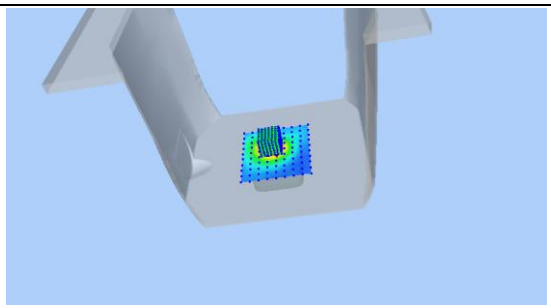
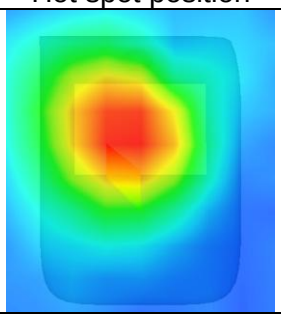
| | |
|---|---|
| SAR 1g (W/Kg) | 0.219 |
| SAR 10g (W/Kg) | 0.136 |
| Power Drift (±5%): | 3.40 |

| Z (mm) | 0.00 | 6.00 | 10.00 | 14.00 | 18.00 | 22.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| SAR (W/Kg) | 0.3943 | 0.1714 | 0.1367 | 0.0846 | 0.0718 | 0.0683 | 0.0502 |



**GSM1900_GPRS(GMSK 4TS)_Ch810_Back-of-Wristbands_0mm**

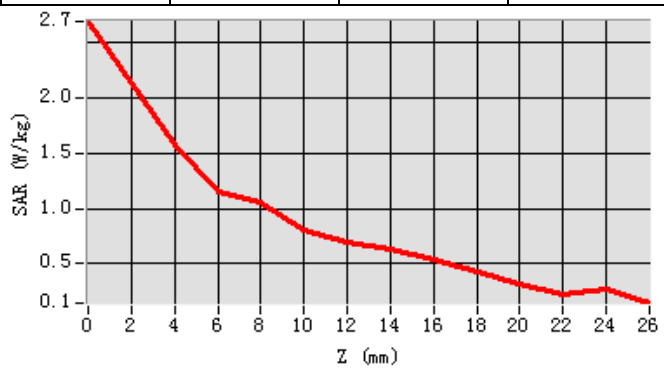
| | |
|---|---|
| Date of measurement: | Jan. 25, 2018 |
| Signal: | Communication System: GPRS(GMSK 4TS); Frequency: 1909.80MHz; Duty Cycle: 1:2.08 |
| ConvF: | 2.07 |
| Liquid Parameters: | Relative permittivity (real part): 53.19; Conductivity (S/m):1.56; |
| Device Position: | Body |
| Area Scan: | dx=8mm dy=8mm, h=5.00mm |
| Zoom Scan: | 7x7x12, dx=4mm dy=4mm dz=2mm, h=5.00mm |

| Surface SAR | Volume SAR |
|---|---|
|  |  |
| 3D screen shot | Hot spot position |
|  |  |

Maximum location: X=-5.00, Y=11.00
SAR Peak: 2.48 W/kg

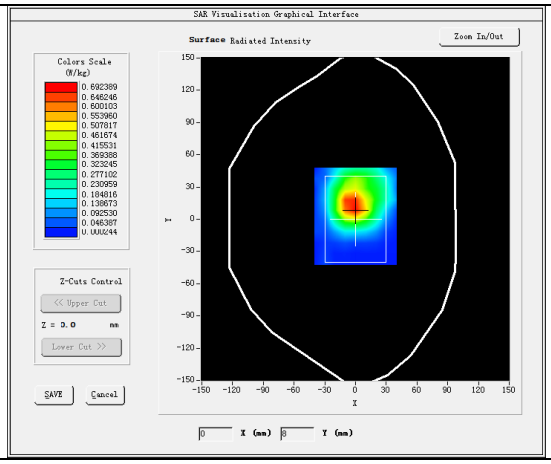
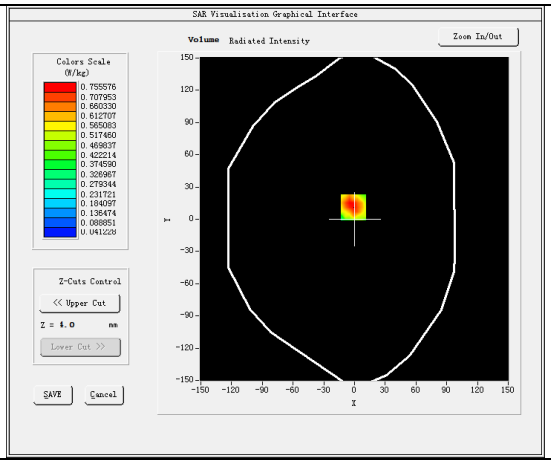
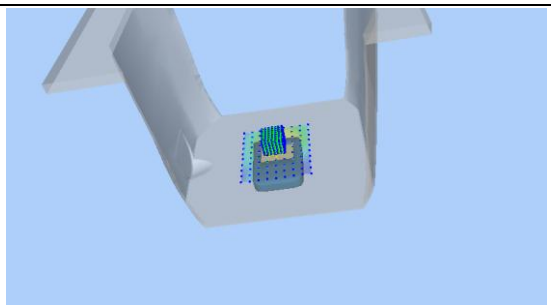
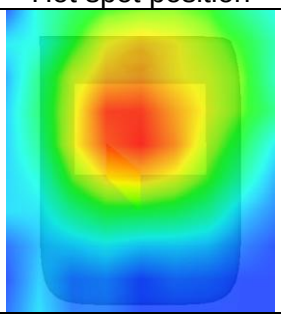
| | |
|---|---|
| SAR 1g (W/Kg) | 1.455 |
| SAR 10g (W/Kg) | 0.851 |
| Power Drift (±5%): | 3.08 |

| Z (mm) | 0.00 | 6.00 | 10.00 | 14.00 | 18.00 | 22.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| SAR (W/Kg) | 2.6892 | 1.1548 | 0.8047 | 0.6309 | 0.4272 | 0.2193 | 0.2760 |



**WCDMA Band V_RMC 12.2Kbps_Ch4132_Back-of-Wristbands_0mm**

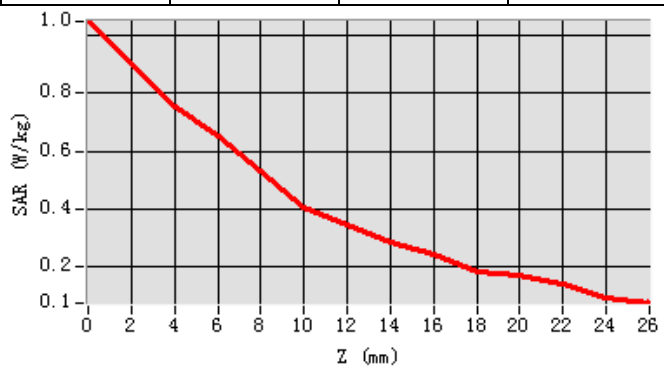
| | |
|---|---|
| Date of measurement: | Jan. 24, 2018 |
| Signal: | Communication System: WCDMA-FDD(WCDMA); Frequency: 826.40MHz; Duty Cycle: 1:1.00 |
| ConvF: | 1.53 |
| Liquid Parameters: | Relative permittivity (real part): 55.15; Conductivity (S/m): 0.97; |
| Device Position: | Body |
| Area Scan: | dx=8mm dy=8mm, h=5.00mm |
| Zoom Scan: | 7x7x12, dx=4mm dy=4mm dz=2mm, h=5.00mm |

| Surface SAR | Volume SAR |
|---|---|
|  |  |
| 3D screen shot | Hot spot position |
|  |  |

Maximum location: X=-1.00, Y=11.00
SAR Peak: 1.35 W/kg

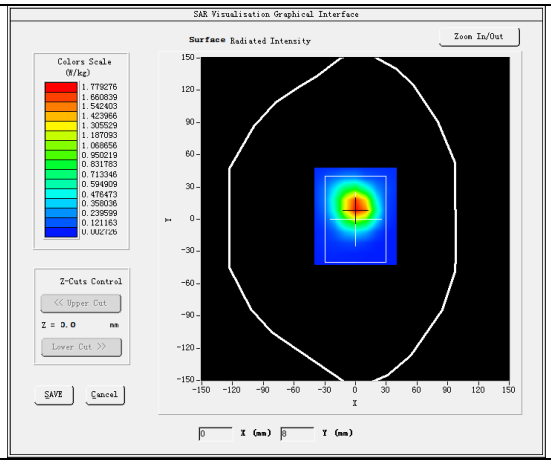
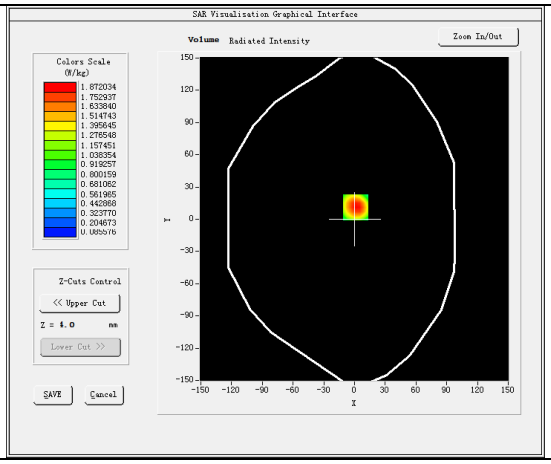
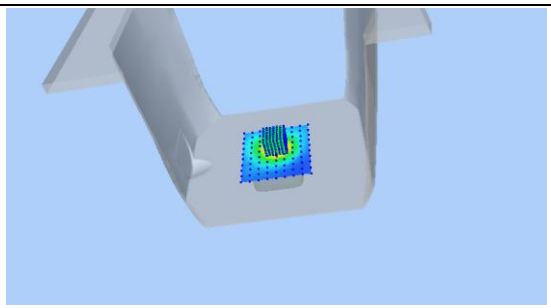
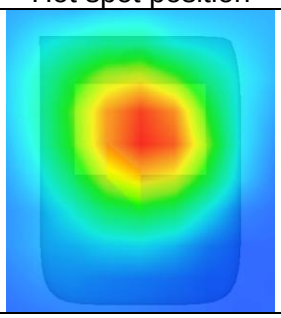
| | |
|---|---|
| SAR 1g (W/Kg) | 0.712 |
| SAR 10g (W/Kg) | 0.411 |
| Power Drift (±5%): | 0.38 |

| Z (mm) | 0.00 | 6.00 | 10.00 | 14.00 | 18.00 | 22.00 | 24.00 |
|---|---|---|---|---|---|---|---|
| SAR (W/Kg) | 1.0476 | 0.6490 | 0.4074 | 0.2862 | 0.1842 | 0.1415 | 0.0947 |

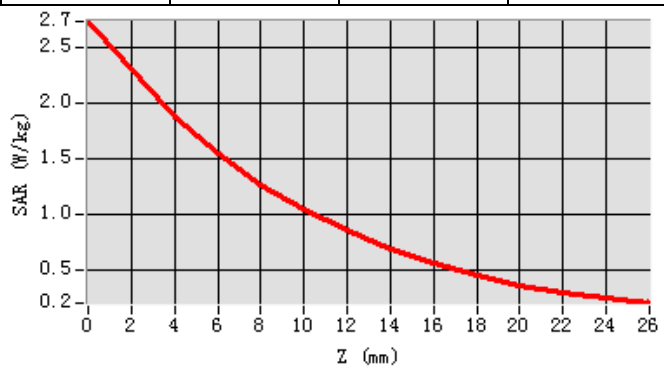


**WCDMA Band II_RMC 12.2Kbps_Ch9538_Back-of-Wristbands_0mm**

| | |
|---|---|
| Date of measurement: | Jan. 25, 2018 |
| Signal: | Communication System: WCDMA-FDD(WCDMA); Frequency: 1907.60MHz; Duty Cycle: 1:1.00 |
| ConvF: | 2.07 |
| Liquid Parameters: | Relative permittivity (real part): 53.18; Conductivity (S/m): 1.55; |
| Device Position: | Body |
| Area Scan: | dx=8mm dy=8mm, h=5.00mm |
| Zoom Scan: | 7x7x12, dx=4mm dy=4mm dz=2mm, h=5.00mm |

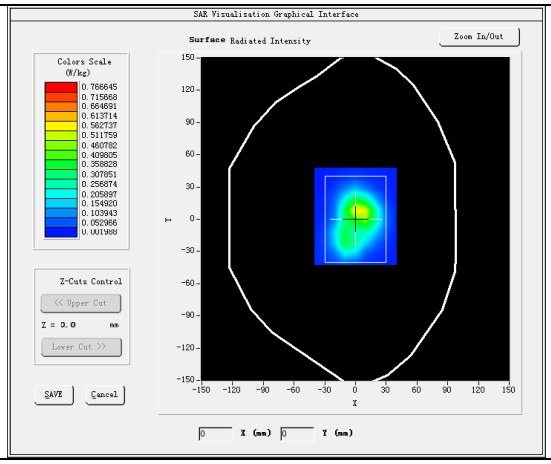
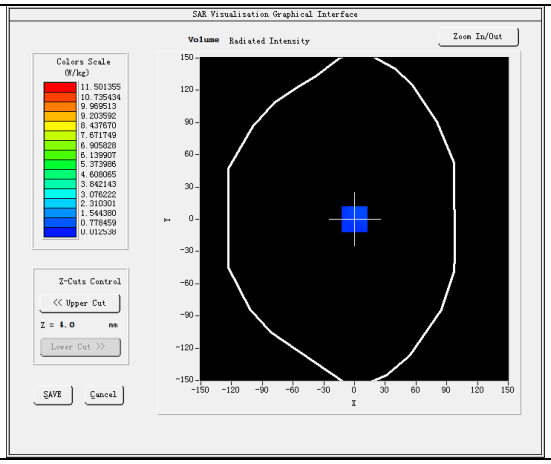
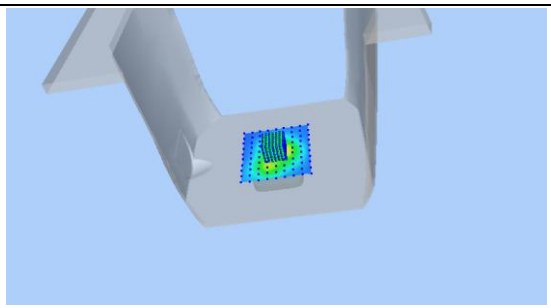
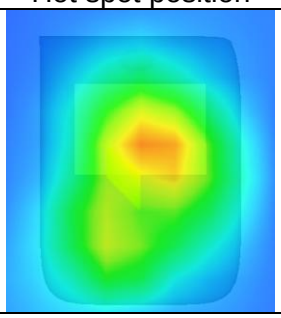
| Surface SAR | Volume SAR |
|---|---|
|  |  |
| 3D screen shot | Hot spot position |
|  |  |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Maximum location: X=1.00, Y=11.00<br>SAR Peak: 2.77 W/kg | | | | | | | |
| SAR 1g (W/Kg) | | | | 1.785 | | | |
| SAR 10g (W/Kg) | | | | 0.977 | | | |
| Power Drift (±5%): | | | | -0.06 | | | |
| Z (mm) | 0.00 | 6.00 | 10.00 | 14.00 | 18.00 | 22.00 | 24.00 |
| SAR (W/Kg) | 2.7331 | 1.5367 | 1.0414 | 0.6888 | 0.4533 | 0.2964 | 0.2383 |

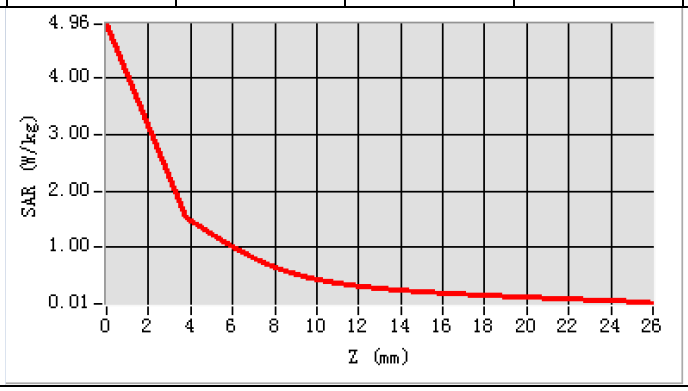


**WLAN 2.4G_802.11b_Ch11_Back-of-Wristbands_0mm**

| | |
|---|---|
| Date of measurement: | Jan. 23, 2018 |
| Signal: | Communication System: WLAN 802.11a/b/g/n/ac; Frequency: 2462.00MHz; Duty Cycle: 1:1.00 |
| ConvF: | 2.27 |
| Liquid Parameters: | Relative permittivity (real part): 52.58; Conductivity (S/m): 1.97; |
| Device Position: | Body |
| Area Scan: | dx=8mm dy=8mm, h=5.00mm |
| Zoom Scan: | 7x7x12, dx=4mm dy=4mm dz=2mm, h=5.00mm |

| Surface SAR | Volume SAR |
|---|---|
|  |  |
| 3D screen shot | Hot spot position |
|  |  |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Maximum location: X=0.00, Y=0.00<br>SAR Peak: 4.94 W/kg | | | | | | | |
| SAR 1g (W/Kg) | | | | 1.099 | | | |
| SAR 10g (W/Kg) | | | | 0.369 | | | |
| Power Drift (±5%): | | | | -2.41 | | | |
| Z (mm) | 0.00 | 6.00 | 10.00 | 14.00 | 18.00 | 22.00 | 24.00 |
| SAR (W/Kg) | 4.9566 | 1.0583 | 0.5235 | 0.3001 | 0.1895 | 0.1051 | 0.0642 |



# 14. Appendix D. Calibration Certificate

| Table of contents |
|---|
| E Field Probe - SN 08/16 EPGO287 |
| 835 MHz Dipole - SN 03/15 DIP 0G835-347 |
| 1900 MHz Dipole - SN 03/15 DIP 1G900-350 |
| 2450 MHz Dipole - SN 03/15 DIP 2G450-352 |
| Extended Calibration Certificate |

# COMOSAR E-Field Probe Calibration Report

Ref : ACR.261.2.17.SATU.A

**Shenzhen NTEK Testing Technology Co., Ltd.**
**BUILDING E, FENDA SCIENCE PARK,**
**SANWEI COMMUNITY, XIXIANG STREET,**
**BAO'AN DISTRICT, SHENZHEN, GUANGDONG, CHINA**

**MVG COMOSAR DOSIMETRIC E-FIELD PROBE**
**SERIAL NO.: SN 08/16 EPGO287**

**Calibrated at MVG US**
**2105 Barrett Park Dr. - Kennesaw, GA 30144**

ACCREDITED
Calibration CERT #2246-02

**Calibration Date: 09/18/2017**

*Summary:*

This document presents the method and results from an accredited COMOSAR Dosimetric E-Field Probe calibration performed in MVG USA using the CALISAR / CALIBAIR test bench, for use with a COMOSAR system only. All calibration results are traceable to national metrology institutions.

**COMOSAR E-FIELD PROBE CALIBRATION REPORT**

Ref: ACR.261.2.17.SATU.A

| | *Name* | *Function* | *Date* | *Signature* |
|---|---|---|---|---|
| *Prepared by :* | Jérôme LUC | Product Manager | 9/18/2017 | |
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| *Distribution :* | NTEK TESTING TECHNOLOGY CO., LTD. |

| *Issue* | *Date* | *Modifications* |
|---|---|---|
| A | 9/18/2017 | Initial release |
| | | |
| | | |
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# TABLE OF CONTENTS


1 DEVICE UNDER TEST ..... 4

2 PRODUCT DESCRIPTION GENERAL INFORMATION ..... 4

3 MEASUREMENT METHOD ..... 4

3.1 Linearity ..... 4

3.2 Sensitivity ..... 4

3.3 Lower Detection Limit ..... 5

3.4 Isotropy ..... 5

3.5 Boundary Effect ..... 5

4 MEASUREMENT UNCERTAINTY ..... 5

5 CALIBRATION MEASUREMENT RESULTS ..... 6

5.1 Sensitivity in air ..... 6

5.2 Linearity ..... 7

5.3 Sensitivity in liquid ..... 7

5.4 Isotropy ..... 8

6 LIST OF EQUIPMENT ..... 10




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