# FCC SAR TEST REPORT

| | |
|---|---|
| **Application No.**: | KSCR2110000181AT(SZCR2110023370AT) |
| **FCC ID:** | 2AOJNGBS-2104-G |
| **Applicant:** | Zhongshan Transtek Electronics Co.,Ltd |
| **Address of Applicant:** | No. 23,Jin'an Road, Minzhong, Zhongshan ,Guangdong, China |
| **Manufacturer:** | Zhongshan Transtek Electronics Co.,Ltd |
| **Address of Manufacturer:** | No. 23,Jin'an Road, Minzhong, Zhongshan ,Guangdong, China |
| **Factory:** | Zhongshan Transtek Electronics Co.,Ltd |
| **Address of Factory:** | No. 23,Jin'an Road, Minzhong, Zhongshan ,Guangdong, China |
| **Product Name:** | Cellular Body Scale |
| **Model No.(EUT):** | GBS-2104-G |
| **Trade mark:** | N/A |
| **Standard(s) :** | FCC 47CFR §2.1093 |
| **Date of Receipt:** | 2021-10-25 |
| **Date of Test:** | 2021-11-29 to 2021-12-03 |
| **Date of Issue:** | 2021-12-06 |
| **Test Result:** | **Pass*** |

* In the configuration tested, the EUT complied with the standards specified above.

Eric Lin

Laboratory Manager

程智电子科技（昆山）有限公司 检验检测专用章 Inspection & Testing Services

Compliance Certification Services (Kunshan) Inc. EMC Laboratory

# REVISION HISTORY

| Revision Record | | | |
|---|---|---|---|
| **Version** | **Description** | **Date** | **Remark** |
| 00 | Original | 2021-12-06 | / |
| | | | |
| | | | |

**Authorized for issue by:**

**Richard.Kong/ Project Engineer**

**Eric.Lin/Reviewer**

# TEST SUMMARY

| Frequency Band | Maximum Reported SAR(W/kg) | SAR Limited(W/kg) 10-g |
|---|---|---|
| | Extremity | |
| GSM 850 | 0.60 | 4.0 |
| PCS 1900 | 1.33 | 4.0 |
| LTE CatM1 Band 2 | 0.19 | 4.0 |
| LTE CatM1 Band 4 | 0.21 | 4.0 |
| LTE CatM1 Band 12 | 0.53 | 4.0 |
| LTE CatM1 Band 13 | 0.59 | 4.0 |
| LTE CatM1 Band 25 | 0.21 | 4.0 |

# CONTENTS

# 1 General Information

## 1.1 General Description of EUT

| | | | |
|---|---|---|---|
| Device Type : | Portable device | | |
| Exposure Category: | Uncontrolled environment / General population | | |
| Product Phase: | Production unit | | |
| IMEI: | 867420041930134 | | |
| Hardware Version: | TSH2104 20211210 | | |
| Software Version: | A6 | | |
| Antenna Type: | PIFA Antenna | | |
| Antenna Gain: | GSM 850: 0.5dBi ( Provided by Manufacturer)<br>PCS 1900: 3.5dBi ( Provided by Manufacturer)<br>LTE CatM1 Band 2: 3.5dBi ( Provided by Manufacturer)<br>LTE CatM1 Band 4: 3.1dBi ( Provided by Manufacturer)<br>LTE CatM1 Band 12: 1.3dBi ( Provided by Manufacturer)<br>LTE CatM1 Band 13: 1.1dBi ( Provided by Manufacturer)<br>LTE CatM1 Band 25: 3.5dBi ( Provided by Manufacturer) | | |
| Device Operating Configurations : | | | |
| Modulation Mode: | WIFI: CCK, DSSS, OFDM | | |
| Frequency Bands: | Band | Tx (MHz) | Rx (MHz) |
| | GSM 850 | 824~849 | 869~894 |
| | PCS 1900 | 1850~1910 | 1930~1989 |
| | LTE CatM1 Band 2 | 1850~1910 | 1930~1990 |
| | LTE CatM1 Band 4 | 1710~1755 | 2110~2155 |
| | LTE CatM1 Band 12 | 699~716 | 729~746 |
| | LTE CatM1 Band 13 | 777~787 | 746~756 |
| | LTE CatM1 Band 25 | 1850~1915 | 1930~1995 |
| Power supplier: | 4*AA LR6 1.5V | | |



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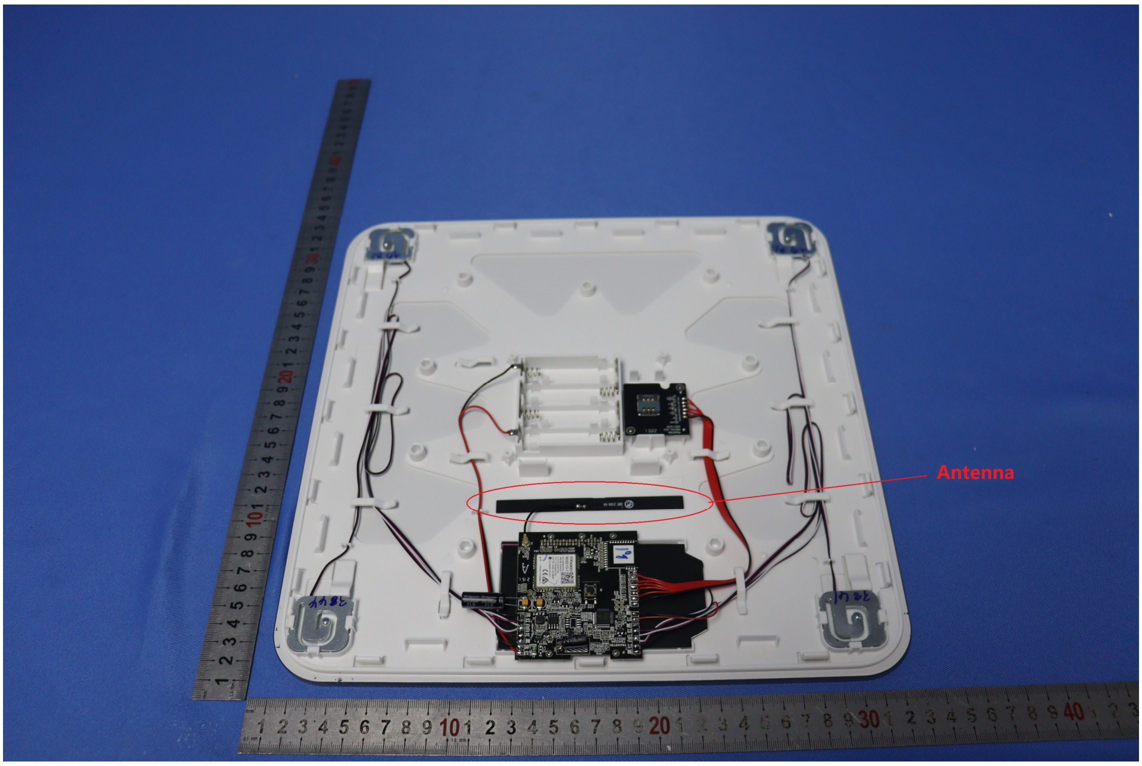
## 1.2 DUT Antenna Locations(Front View)



## 1.3 Test Specification

| Identity | Document Title |
|---|---|
| FCC 47CFR §2.1093 | Radio frequency Radiation Exposure Evaluation: Portable Devices |
| IEEE Std C95.1 – 2019 | IEEE Standard for Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz to 300 GHz |
| IEEE 1528-2013 | Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques |
| KDB447498 D01 General RF Exposure Guidance v06 | Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies |
| KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04 | SAR Measurement Requirements for 100 MHz to 6 GHz |
| KDB 865664 D02 RF Exposure Reporting v01r02 | RF Exposure Compliance Reporting and Documentation Considerations |
| KDB 941225 D05 v02r05 | SAR EVALUATION CONSIDERATIONS FOR LTE DEVICES |

## 1.4 RF exposure limits

| Human Exposure | Uncontrolled Environment General Population | Controlled Environment Occupational |
|---|---|---|
| **Spatial Peak SAR*** (Brain*Trunk) | 1.60 W/kg | 8.00 W/kg |
| **Spatial Average SAR**** (Whole Body) | 0.08 W/kg | 0.40 W/kg |
| **Spatial Peak SAR***** (Hands/Feet/Ankle/Wrist) | **4.00 W/kg** | 20.00 W/kg |

**Notes:**

* The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time

** The Spatial Average value of the SAR averaged over the whole body.

*** The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

**Uncontrolled Environments** are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

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

## 1.5 Test Location

| | |
|---|---|
| Company: | Compliance Certification Services (Kunshan) Inc. |
| Address: | No.10 Weiye Rd., Innovation park, Eco&Tec, Development Zone, Kunshan City, Jiangsu, China |
| Post code: | 215300 |
| Telephone: | 86-512-57355888 |
| Fax: | 86-512-57370818 |

## 1.6 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **CNAS (No. CNAS L4354)**

CNAS has accredited Compliance Certification Services (Kunshan) Inc. to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

- **A2LA (Certificate No. 2541.01)**

Compliance Certification Services (Kunshan) Inc. is accredited by the American Association for Laboratory Accreditation (A2LA). Certificate No. 2541.01.

- **FCC –Designation Number: CN1172**

Compliance Certification Services (Kunshan) Inc. has been recognized as an accredited testing laboratory.

Designation Number: CN1172.

- **ISED (CAB identifier: CN0072)**

Compliance Certification Services (Kunshan) Inc. has been recognized by Innovation, Science and Economic Development Canada (ISED) as an accredited testing laboratory

CAB Identifier: CN0072.

- **VCCI (Member No.: 1938)**

The 3m and 10m Semi-anechoic chamber and Shielded Room of Compliance Certification Services (Kunshan) Inc. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: : R-20134, R-11600,C-11707, T-11499, G-10216 respectively.

# 2 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. | |

Table 1： The Ambient Conditions

# 3 SAR Measurements System Configuration

## 3.1 The SAR Measurement System

This SAR Measurement System uses a Computer-controlled 3-D stepper motor system (SPEAG DASY5 professional system). A E-field probe is used to determine the internal electric fields. The SAR can be obtained from the equation SAR= σ (|Ei|2)/ ρ where σ and ρ are the conductivity and mass density of the tissue-Simulate.

The DASY5 system for performing compliance tests consists of the following items:

A standard high precision 6-axis robot (Stabile RX family) with controller, teach pendant and software .An arm extension for accommodation the data acquisition electronics (DAE).

A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.

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 between optical and electrical of the signals for the digital communication to DAE and for the analog signal from the optical surface detection. The EOC is connected to the measurement server.



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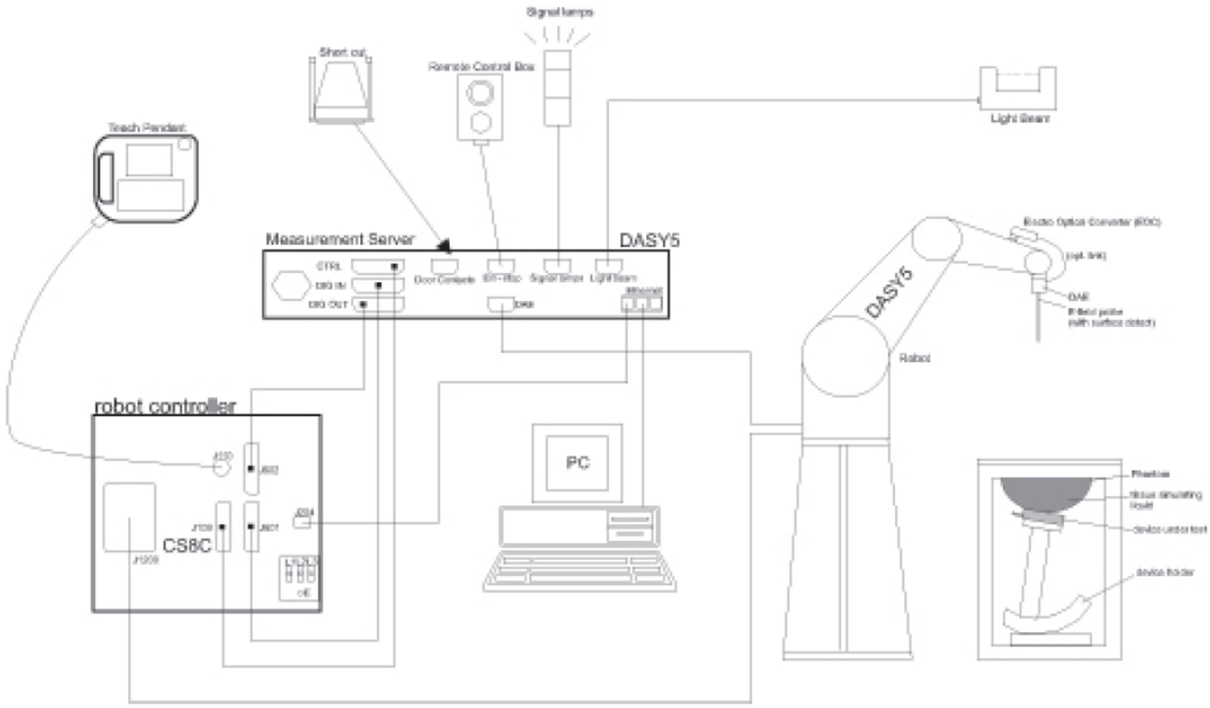


F-1. SAR Measurement System Configuration

- 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.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- A computer operating Windows 7.
- DASY5 software.
- Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom enabling testing left-hand, right-hand and Body Worn usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- Validation dipole kits allowing to validat the proper functioning of the system.

## 3.2 Isotropic E-field Probe EX3DV4



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| | |
|---|---|
|  | 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 (30 MHz to 6 GHz) |
| **Directivity** | ± 0.3 dB in TSL (rotation around probe axis)<br>± 0.5 dB in TSL (rotation normal to probe axis) |
| **Dynamic Range** | 10 µW/g to > 100 mW/g<br>Linearity: ± 0.2 dB (noise: typically < 1 µW/g) |
| **Dimensions** | Overall length: 337 mm (Tip: 20 mm)<br>Tip diameter: 2.5 mm (Body: 12 mm)<br>Typical distance from probe tip to dipole centers: 1 mm |
| **Application** | High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields); the only probe that enables compliance testing for frequencies up to 6 GHz with precision of better 30%. |
| **Compatibility** | DASY3, DASY4, DASY52 SAR and higher, EASY4/MRI |



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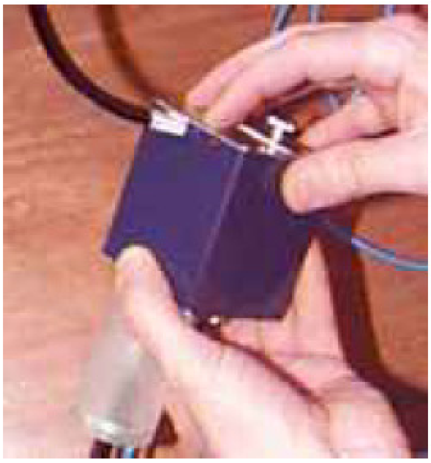
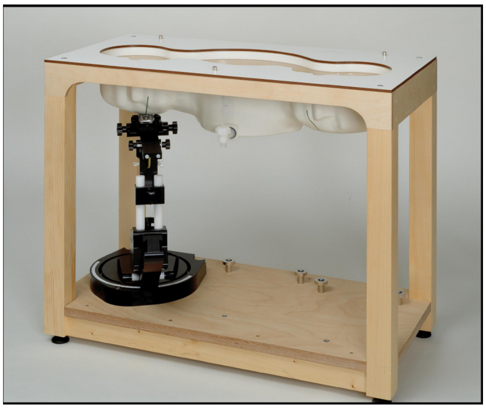
## 3.3 Data Acquisition Electronics (DAE)

| Model | DAE4 |
|---|---|
| Construction | Signal amplifier, multiplexer, A/D converter and control logic. Serial optical link for communication with DASY4/5 embedded system (fully remote controlled). Two step probe touch detector for mechanical surface detection and emergency robot stop. |
| Measurement Range | -100 to +300 mV (16 bit resolution and two range settings: 4mV,400mV) |
| Input Offset Voltage | < 5μV (with auto zero) |
| Input Bias Current | < 50 f A |
| Dimensions | 60 x 60 x 68 mm |



## 3.4 SAM Twin Phantom

| Material | Vinylester, glass fiber reinforced (VE-GF) |
|---|---|
| Liquid Compatibility | Compatible with all SPEAG tissue simulating liquids (incl. DGBE type) |
| Shell Thickness | 2 ± 0.2 mm (6 ± 0.2 mm at ear point) |
| Dimensions<br><br>(incl. Wooden Support) | Length: 1000 mm<br>Width: 500 mm<br>Height: adjustable feet |
| Filling Volume | approx. 25 liters |
| Wooden Support | SPEAG standard phantom table |



The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528 and IEC 62209-1. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by teaching three points with the robot.

Twin SAM V5.0 has the same shell geometry and is manufactured from the same material as Twin SAM V4.0, but has reinforced top structure.

## 3.5 ELI Phantom

| | |
|---|---|
| **Material** | Vinylester, glass fiber reinforced (VE-GF) |
| **Liquid Compatibility** | Compatible with all SPEAG tissue simulating liquids (incl. DGBE type) |
| **Shell Thickness** | 2.0 ± 0.2 mm (bottom plate) |
| **Dimensions** | Major axis: 600 mm<br>Minor axis: 400 mm |
| **Filling Volume** | approx. 30 liters |
| **Wooden Support** | SPEAG standard phantom table |

Phantom for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI is fully compatible with the IEC 62209-2 standard and all known tissue simulating liquids. ELI has been optimized regarding its performance and can be integrated into our standard phantom tables. A cover prevents evaporation of the liquid. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points. The phantom is compatible with all SPEAG dosimetric probes and dipoles.

ELI V5.0 has the same shell geometry and is manufactured from the same material as ELI4, but has reinforced top structure.



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## 3.6 Device Holder for Transmitters

F-2. **Device Holder for Transmitters**

- The DASY device holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation centres for both scales are the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.

- The DASY device holder has been made out of low-loss POM material having the following dielectric parameters: relative permittivity ε=3 and loss tangent δ=0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.

## 3.7 Measurement procedure

### 3.7.1 Scanning procedure

**Step 1: Power reference measurement**

The “reference” and “drift” measurements are located at the beginning and end of the batch process. They measure the field drift at one single point in the liquid over the complete procedure.

**Step 2: *Area scan***

The SAR distribution at the exposed side of the head was measured at a distance of 4mm from the inner surface of the shell. The area covered the entire dimension of the head and the horizontal grid spacing was 15mm*15mm or 12mm*12mm or 10mm*10mm.Based on the area scan data, the area of the maximum absorption was determined by spline interpolation.

**Step 3: *Zoom scan***

Around this point, a volume of 30mm*30mm*30mm (fine resolution volume scan, zoom scan) was assessed by measuring 5x5x7 points (≤2GHz) and 7x7x7 points (≥2GHz). On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure:

The data at the surface was extrapolated, since the centre of the dipoles is 2.0mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.2mm. (This can be variable. Refer to the probe specification).The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip. The maximum interpolated value was searched with a straight-forward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1g or 10g) were computed using the 3D-Spline interpolation algorithm. The volume was integrated with the trapezoidal algorithm. One thousand points were interpolated to calculate the average. All neighbouring volumes were evaluated until no neighboring volume with a higher average value was found.

The area and zoom scan resolutions specified in the table below must be applied to the SAR measurements Probe boundary effect error compensation is required for measurements with the probe tip closer than half a probe tip diameter to the phantom surface. Both the probe tip diameter and sensor offset distance must satisfy measurement protocols; to ensure probe boundary effect errors are minimized and the higher fields closest to the phantom surface can be correctly measured and extrapolated to the phantom surface for computing 1-g SAR. Tolerances of the post-processing algorithms must be verified by the test laboratory for the scan resolutions used in the SAR measurements, according to the reference distribution functions specified in IEEE Std. 1528-2013.



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<table>
<tr><td colspan="3"></td><td>$\leq$ 3 GHz</td><td>> 3 GHz</td></tr>
<tr><td colspan="3">Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface</td><td>5 ± 1 mm</td><td>½·δ·ln(2) ± 0.5 mm</td></tr>
<tr><td colspan="3">Maximum probe angle from probe axis to phantom surface normal at the measurement location</td><td>30° ± 1°</td><td>20° ± 1°</td></tr>
<tr><td colspan="3" rowspan="2">Maximum area scan spatial resolution: $\Delta x_{Area}$, $\Delta y_{Area}$</td><td>$\leq$ 2 GHz: $\leq$ 15 mm<br>2 – 3 GHz: $\leq$ 12 mm</td><td>3 – 4 GHz: $\leq$ 12 mm<br>4 – 6 GHz: $\leq$ 10 mm</td></tr>
<tr><td colspan="2">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 $\leq$ the corresponding x or y dimension of the test device with at least one measurement point on the test device.</td></tr>
<tr><td colspan="3">Maximum zoom scan spatial resolution: $\Delta x_{Zoom}$, $\Delta y_{Zoom}$</td><td>$\leq$ 2 GHz: $\leq$ 8 mm<br>2 – 3 GHz: $\leq$ 5 mm*</td><td>3 – 4 GHz: $\leq$ 5 mm*<br>4 – 6 GHz: $\leq$ 4 mm*</td></tr>
<tr><td rowspan="3">Maximum zoom scan spatial resolution, normal to phantom surface</td><td colspan="2">uniform grid: $\Delta z_{Zoom}(n)$</td><td>$\leq$ 5 mm</td><td>3 – 4 GHz: $\leq$ 4 mm<br>4 – 5 GHz: $\leq$ 3 mm<br>5 – 6 GHz: $\leq$ 2 mm</td></tr>
<tr><td rowspan="2">graded grid</td><td>$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface</td><td>$\leq$ 4 mm</td><td>3 – 4 GHz: $\leq$ 3 mm<br>4 – 5 GHz: $\leq$ 2.5 mm<br>5 – 6 GHz: $\leq$ 2 mm</td></tr>
<tr><td>$\Delta z_{Zoom}(n>1)$: between subsequent points</td><td colspan="2">$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$</td></tr>
<tr><td>Minimum zoom scan volume</td><td colspan="2">x, y, z</td><td>$\geq$ 30 mm</td><td>3 – 4 GHz: $\geq$ 28 mm<br>4 – 5 GHz: $\geq$ 25 mm<br>5 – 6 GHz: $\geq$ 22 mm</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 $\leq$ 1.4 W/kg, $\leq$ 8 mm, $\leq$ 7 mm and $\leq$ 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.</td></tr>
</table>

**Step 4: Power reference measurement (drift)**

The Power Drift Measurement job measures the field at the same location as the most recent power reference measurement job within the same procedure, and with the same settings. The indicated drift is mainly the variation of the DUT's output power and should vary max. ± 5 %

### 3.7.2 Data Storage

The DASY software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension ".DAE3". The software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be re-evaluated. The measured data can be visualized or exported in different units or formats, depending on the selected probe type ([V/m], [A/m], [°C], [m W/g], [m W/cm²], [dBrel], etc.). Some of these units are not available in certain situations or show meaningless results, e.g., a SAR output in a lossless media will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

### 3.7.3 Data Evaluation by SEMCAD

The SEMCAD software automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software:

Probe parameters: - Sensitivity Normi, ai0, ai1, ai2

- Conversion factor ConvFi
- Diode compression point Dcpi

Device parameters: - Frequency f

- Crest factor cf

Media parameters: - Conductivity ε

- Density ρ

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY components. In the direct measuring mode of the multimeter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics.

If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given as:

$$V_i = U_i + U_i^2 \cdot cf / dcp_i$$

With Vi = compensated signal of channel i ( i = x, y, z )

Ui = input signal of channel i ( i = x, y, z )

cf = crest factor of exciting field (DASY parameter)

dcp i = diode compression point (DASY parameter)

From the compensated input signals the primary field data for each channel can be evaluated:

E-field probes:

$$E_i = (V_i / Norm_i \cdot ConvF)^{1/2}$$

H-field probes:

$$H_i = (V_i)^{1/2} \cdot (a_{i0} + a_{i1} f + a_{i2} f^2) / f$$

With Vi = compensated signal of channel i (i = x, y, z)
Normi = sensor sensitivity of channel I (i = x, y, z)
[mV/(V/m)2] for E-field Probes
ConvF = sensitivity enhancement in solution
aij = sensor sensitivity factors for H-field probes
f = carrier frequency [GHz]
Ei = electric field strength of channel i in V/m
Hi = magnetic field strength of channel i in A/m

The RSS value of the field components gives the total field strength (Hermitian magnitude):

$$E_{tot} = (E_x^2 + E_Y^2 + E_z^2)^{1/2}$$

The primary field data are used to calculate the derived field units.

$$SAR = (Etot^2 \cdot \sigma) / (\varepsilon \cdot 1000)$$

With SAR = local specific absorption rate in mW/g
Etot = total field strength in V/m
σ= conductivity in [mho/m] or [Siemens/m]
ε= equivalent tissue density in g/cm3

Note that the density is normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid. The power flow density is calculated assuming the excitation field to be a free space field.

$$P_{pwe} = E_{tot}{}^2{}_2 / 3770 \quad \text{or} \quad P_{pwe} = H_{tot}{}^2 \cdot 37.7$$

with Ppwe = equivalent power density of a plane wave in mW/cm2
Etot = total electric field strength in V/m
Htot = total magnetic field strength in A/m





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# 4 SAR measurement variability and uncertainty

## 4.1 SAR measurement variability

Per KDB865664 D01 SAR measurement 100 MHz to 6 GHz v01r04, 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.

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

## 4.2 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.



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# 5 Description of Test Position

## 5.1 Extremity exposure conditions

Devices that are designed or intended for use on extremities, or mainly operated in extremity only exposure conditions, i.e., hands, wrists, feet and ankles, may require extremity SAR evaluation.

The closest distance from the antenna to an adjacent device surface is used to determine if SAR testing is required for the adjacent surfaces, with the adjacent surface positioned against the phantom and the surface containing the antenna positioned perpendicular to the phantom

# 6 SAR System Verification Procedure

## 6.1 Tissue Simulate Liquid

### 6.1.1 Recipes for Tissue Simulate Liquid

The bellowing tables give the recipes for tissue simulating liquids to be used in different frequency bands：

| Ingredients (% by weight) | Frequency (MHz) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 450 | | 835 | | 915 | | 1900 | | 2450 | |
| Tissue Type | Head | Body | Head | Body | Head | Body | Head | Body | Head | Body |
| Water | 38.56 | 51.16 | 41.45 | 52.4 | 41.05 | 56.0 | 54.9 | 40.4 | 62.7 | 73.2 |
| Salt (NaCl) | 3.95 | 1.49 | 1.45 | 1.4 | 1.35 | 0.76 | 0.18 | 0.5 | 0.5 | 0.04 |
| Sugar | 56.32 | 46.78 | 56.0 | 45.0 | 56.5 | 41.76 | 0.0 | 58.0 | 0.0 | 0.0 |
| HEC | 0.98 | 0.52 | 1.0 | 1.0 | 1.0 | 1.21 | 0.0 | 1.0 | 0.0 | 0.0 |
| Bactericide | 0.19 | 0.05 | 0.1 | 0.1 | 0.1 | 0.27 | 0.0 | 0.1 | 0.0 | 0.0 |
| Triton X-100 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 36.8 | 0.0 |
| DGBE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 44.92 | 0.0 | 0.0 | 26.7 |
| Dielectric Constant | 43.42 | 58.0 | 42.54 | 56.1 | 42.0 | 56.8 | 39.9 | 54.0 | 39.8 | 52.5 |
| Conductivity (S/m) | 0.85 | 0.83 | 0.91 | 0.95 | 1.0 | 1.07 | 1.42 | 1.45 | 1.88 | 1.78 |
| HSL5GHz is composed of the following ingredients：<br>Water：50-65%<br>Mineral oil：10-30%<br>Emulsifiers：8-25%<br>Sodium salt：0-1.5% | | | | | | | | | | |
| MSL5GHz is composed of the following ingredients：<br>Water：64-78%<br>Mineral oil：11-18%<br>Emulsifiers：9-15%<br>Sodium salt：2-3% | | | | | | | | | | |

Table 2： Recipe of Tissue Simulate Liquid

### 6.1.2 Test Liquids Confirmation

**Simulated tissue liquid parameter confirmation**

The dielectric parameters were checked prior to assessment using the SPEAG DAK3.5 dielectric probe kit. The dielectric parameters measured are reported in each correspondent section.

**IEEE SCC-34/SC-2 P1528 recommended tissue dielectric parameters**

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in P1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in a human head. Other head and body tissue parameters that have not been specified in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations and extrapolated according to the head parameters specified in P1528

| Target Frequency (MHz) | Head | | Body | |
|---|---|---|---|---|
| | $\varepsilon_r$ | σ (S/m) | $\varepsilon_r$ | σ (S/m) |
| 150 | 52.3 | 0.76 | 61.9 | 0.80 |
| 300 | 45.3 | 0.87 | 58.2 | 0.92 |
| 450 | 43.5 | 0.87 | 56.7 | 0.94 |
| 835 | 41.5 | 0.90 | 55.2 | 0.97 |
| 900 | 41.5 | 0.97 | 55.0 | 1.05 |
| 915 | 41.5 | 0.98 | 55.0 | 1.06 |
| 1450 | 40.5 | 1.20 | 54.0 | 1.30 |
| 1610 | 40.3 | 1.29 | 53.8 | 1.40 |
| 1800-2000 | 40.0 | 1.40 | 53.3 | 1.52 |
| 2450 | 39.2 | 1.80 | 52.7 | 1.95 |
| 3000 | 38.5 | 2.40 | 52.0 | 2.73 |
| 5800 | 35.3 | 5.27 | 48.2 | 6.00 |

($\varepsilon_r$ = relative permittivity, $\sigma$ = conductivity and $\rho$ = 1000 kg/m$^3$)

### 6.1.3 Measurement for Tissue Simulate Liquid

The dielectric properties for this Tissue Simulate Liquids were measured by using the SPEAG DAK3.5 dielectric probe kit in conjunction with Agilent E5071B Network Analyzer (300 KHz-8500 MHz). The Conductivity (σ) and Permittivity (ρ) are listed in bellow table. For the SAR measurement given in this report. The temperature variation of the Tissue Simulate Liquids was 22±2℃.

| Tissue Type | Measured Frequency （MHz） | Conductivity (σ) | Permittivity ($\varepsilon_r$) | Conductivity Target (σ) | Permittivity Target ($\varepsilon_r$) | Delta (σ) (%) | Delta ($\varepsilon_r$) (%) | Limit (%) | Liquid Temp. (℃) | Date |
|---|---|---|---|---|---|---|---|---|---|---|
| 750 Head | 750 | 0.879 | 42.786 | 0.89 | 41.90 | -1.24 | 2.11 | ±5 | 22 | 2021/11/30 |
| 835 Head | 835 | 0.905 | 42.113 | 0.90 | 41.50 | 0.56 | 1.48 | ±5 | 22 | 2021/11/29 |
| 1800 Head | 1800 | 1.386 | 40.249 | 1.40 | 40.00 | -1.00 | 0.62 | ±5 | 21.9 | 2021/12/03 |
| 1900 Head | 1900 | 1.372 | 40.640 | 1.40 | 40.00 | -2.00 | 1.60 | ±5 | 22.1 | 2021/12/02 |

## 6.2 SAR System Check

The microwave circuit arrangement for system check is sketched in bellow figure. The daily system accuracy verification occurs within the flat section of the SAM phantom. A SAR measurement was performed to see if the measured SAR was within +/- 10% from the target SAR values. The tests were conducted on the same days as the measurement of the EUT. The obtained results from the system accuracy verification are displayed in the following table. During the tests, the ambient temperature of the laboratory was in the range 22±2℃, the relative humidity was in the range 60% and the liquid depth above the ear reference points was above 15 cm in all the cases. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values.



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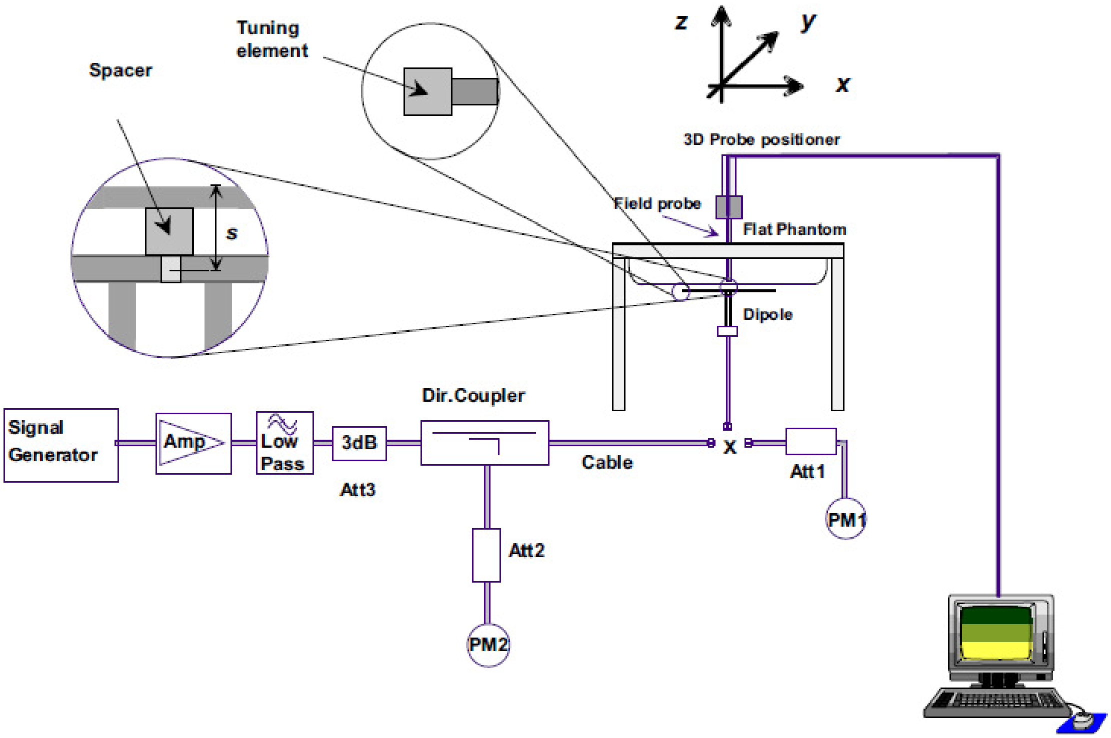


F-3. the microwave circuit arrangement used for SAR system verification

### 6.2.1 Justification for Extended SAR Dipole Calibrations

1) Referring to KDB865664 D01 requirements for dipole calibration, instead of the typical annual calibration recommended by measurement standards, longer calibration intervals of up to three years may be considered when it is demonstrated that the SAR target, impedance and return loss of a dipole have remain stable according to the following requirements. Each measured dipole is expected to evaluate with the following criteria at least on annual interval in Appendix C.

a) There is no physical damage on the dipole;

b) System check with specific dipole is within 10% of calibrated value;

c) Return-loss is within 10% of calibrated measurement;

d) Impedance is within 5Ω from the previous measurement.

2) Network analyzer probe calibration against air, distilled water and a shorting block performed before measuring liquid parameters.

### 6.2.2 Summary System Check Result(s)

| Validation Kit | | Measured SAR 250mW | Measured SAR 250mW | Measured SAR (normalized to 1w) | Measured SAR (normalized to 1w) | Target SAR (normalized to 1w) (±10%) | Target SAR (normalized to 1w) (±10%) | Liquid Temp. (℃) | Measured Date |
|---|---|---|---|---|---|---|---|---|---|
| | | 1g (W/kg) | 10g (W/kg) | 1g (W/kg) | 10g (W/kg) | 1-g(W/kg) | 10-g(W/kg) | | |
| D750V3 | Head | 1.92 | 1.28 | 7.68 | 5.12 | 8.23 (7.41~9.05) | 5.41 (4.87~5.95) | 22.1 | 2021/11/30 |
| D835V2 | Head | 2.36 | 1.53 | 9.44 | 6.12 | 9.41 (8.47~10.35) | 6.25 (5.63~6.88) | 22.1 | 2021/11/29 |
| D1800V2 | Head | 9.44 | 4.99 | 37.76 | 19.96 | 38.4 (34.56~42.24) | 20.2 (18.18~22.22) | 21.9 | 2021/12/03 |
| D1900V2 | Head | 9.66 | 5.01 | 38.64 | 20.04 | 39.7 (35.73~43.67) | 20.5 (18.45~22.55) | 22.0 | 2021/12/02 |

### 6.2.3 Detailed System Check Results

Please see the Appendix A

## 6.2.4 System Valitation

Per FCC KDB 865664 D02, SAR system verification is required to confirm measurement accuracy. The SAR systems (including SAR probes, system components and software versions) used for this device were validated against its performance specifications prior to the SAR measurements. Reference dipoles are used with the required tissue-equivalent media for system validation, according to the procedures outlined in FCC KDB 865664 D01 and IEEE 1528-2013.Since SAR probe calibrations are frequency dependent, each probe calibration point must be validated at a frequency within the valid frequency range of the probe calibration point, using the system that normally operates with the probe for routine SAR measurements and according to the required tissue-equivalent media.

a tabulated summary of the system validation status, measurement frequencies, SAR probes, calibrated signal type(s) and tissue dielectric parameters has been included.

**Table of SAR System validation summary:**

| Frequency (MHz) | Date | Probe SN | Probe Type | Probe CAL Point | | PERM (εr) | COND (σ) | CW Validation | | | MOD.Validation | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Sensitivity | Probe Linarity | Probe Isotropy | Modulation | Duty. Factore | PAR |
| 750 | 2021/7/14 | 3798 | EX3DV4 | 750 | Head | 41.66 | 0.89 | PASS | PASS | PASS | N/A | N/A | N/A |
| 835 | 2021/7/14 | 3798 | EX3DV4 | 835 | Head | 42.11 | 0.91 | PASS | PASS | PASS | GMSK | PASS | N/A |
| 1800 | 2021/7/14 | 3798 | EX3DV4 | 1750 | Head | 40.20 | 1.39 | PASS | PASS | PASS | N/A | N/A | N/A |
| 1900 | 2021/7/14 | 3798 | EX3DV4 | 1900 | Head | 40.58 | 1.37 | PASS | PASS | PASS | GMSK | PASS | N/A |
| 2450 | 2021/7/14 | 3798 | EX3DV4 | 2450 | Head | 40.16 | 1.83 | PASS | PASS | PASS | OFDM | PASS | N/A |
| 2600 | 2021/7/14 | 3798 | EX3DV4 | 2600 | Head | 38.59 | 1.98 | PASS | PASS | PASS | TDD | PASS | N/A |
| 5250 | 2021/7/14 | 3798 | EX3DV4 | 5250 | Head | 36.01 | 4.72 | PASS | PASS | PASS | OFDM | PASS | N/A |
| 5600 | 2021/7/14 | 3798 | EX3DV4 | 5600 | Head | 35.06 | 5.11 | PASS | PASS | PASS | OFDM | PASS | N/A |
| 5750 | 2021/7/14 | 3798 | EX3DV4 | 5750 | Head | 34.70 | 5.28 | PASS | PASS | PASS | OFDM | PASS | N/A |

NOTE: While the probes have been calibrated for both CW and modulated signals, all measurements were performed using communication systems calibrated for CW signals only. Modulations in the table above represent test configurations for which the measurement system has been validated per FCC KDB Publication 865664D01 for scenarios when CW probe calibrations are used with other signal types. SAR systems were validated for modulated signals with a periodic duty cycle, such as GMSK, or with a high peak to average ratio (>5dB), such as OFDM according to KDB 865664.

# 7 Test Configuration

## 7.1 Operation Configurations

### 7.1.1 GSM Test Configuration

SAR tests for GSM900 and GSM1800, a communication link is set up with a base station by air link. Using CMW500 the power lever is set to "5"and "0" in SAR of GSM900 and GSM1800. The tests in the band of GSM900 and GSM1800 are performed in the mode of GPRS/EGPRS function. Since the GPRS class is 12 for this EUT, it has at most 4 timeslots in uplink and at most 4 timeslots in downlink, the maximum total timeslot is 5. The EGPRS class is 12 for this EUT, it has at most 4 timeslots in uplink, and at most 4 timeslots in downlink, the maximum total timeslot is 5.

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

When SAR tests for EGPRS mode is necessary, GMSK modulation should be used to minimize SAR measurement error due to higher peak-to-average power (PAR) ratios inherent in 8-PSK.

The 3G SAR test reduction procedure is applied to 8-PSK EDGE with GMSK GPRS/EDGE as the primary mode.

### 7.1.2 LTE Test Configuration

Establishing connections with base station simulators ensure a consistent means for testing SAR and are recommended for evaluating SAR. 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.

| 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 |

**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 measured SAR is ≤ 1.0 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 measured SAR of a required test channel is > 1.80 W/kg, SAR is required for all three RB offset configurations for that required test channel.

2) QPSK with 50% RB allocation

For QPSK with 50% RB allocation, SAR is only required measure for the worst case of 1RB allocation used the highest maximum output power.

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 measured SAR for 1 RB and 50% RB allocation in 1) and 2) are ≤ 1.0 W/kg. Otherwise, SAR is measured for the highest output power channel and if the measured SAR is > 1.80 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 measured SAR for the QPSK configuration is > 1.80 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 measured SAR of a configuration for the largest channel bandwidth is > 1.80 W/kg.

# 8 Test Result

## 8.1 Measurement of RF Conducted Power

### 8.1.1 Conducted Power Of GSM

| GSM 850 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Burst Output Power(dBm) | | | | | Tune up | Division Factors | Frame-Average Output Power(dBm) | | | Tune up |
| Channel | | 128 | 190 | 251 | | | 128 | 190 | 251 | |
| GPRS/EGPRS (GMSK) | 1 TX Slot | 33.08 | 33.1 | 33.26 | 34 | -9.01 | 24.07 | 24.09 | 24.25 | 24.99 |
| | 2 TX Slots | 32.38 | 31.68 | 31.85 | 33 | -6.02 | 26.36 | 25.66 | 25.83 | 26.98 |
| | 3 TX Slots | 29.36 | 29.51 | 29.69 | 30 | -4.26 | 25.1 | 25.25 | 25.43 | 25.74 |
| | 4 TX Slots | 29.07 | 29.24 | 29.45 | 30 | -3.01 | 26.06 | 26.23 | 26.44 | **26.99** |
| EGPRS(8PSK) | 1 TX Slot | 27.29 | 27.22 | 27.22 | 28 | -9.01 | 18.28 | 18.21 | 18.21 | 18.99 |
| | 2 TX Slots | 25.89 | 25.67 | 25.79 | 26.5 | -6.02 | 19.87 | 19.65 | 19.77 | **20.48** |
| | 3 TX Slots | 24.62 | 23.12 | 23.17 | 25 | -4.26 | 20.36 | 18.86 | 18.91 | 20.74 |
| | 4 TX Slots | 22.6 | 22.51 | 22.54 | 23 | -3.01 | 19.59 | 19.5 | 19.53 | 19.99 |
| GSM 1900 | | | | | | | | | | |
| Burst Output Power(dBm) | | | | | Tune up | Division Factors | Frame-Average Output Power(dBm) | | | Tune up |
| Channel | | 512 | 661 | 810 | | | 512 | 661 | 810 | |
| GPRS/EGPRS (GMSK) | 1 TX Slot | 18.95 | 18.67 | 18.36 | 19 | -9.01 | 9.94 | 9.66 | 9.35 | 9.99 |
| | 2 TX Slots | 18.9 | 18.66 | 18.35 | 19 | -6.02 | 12.88 | 12.64 | 12.33 | 12.98 |
| | 3 TX Slots | 18.72 | 18.55 | 18.24 | 19 | -4.26 | 14.46 | 14.29 | 13.98 | 14.74 |
| | 4 TX Slots | 18.57 | 18.42 | 18.12 | 19 | -3.01 | 15.56 | 15.41 | 15.11 | 15.99 |
| EGPRS(8PSK) | 1 TX Slot | 25.8 | 25.46 | 25.53 | 26 | -9.01 | 16.79 | 16.45 | 16.52 | 16.99 |
| | 2 TX Slots | 24.55 | 24.37 | 25.17 | 26 | -6.02 | 18.53 | 18.35 | 19.15 | **19.98** |
| | 3 TX Slots | 21.06 | 20.93 | 20.87 | 21.5 | -4.26 | 16.8 | 16.67 | 16.61 | 17.24 |
| | 4 TX Slots | 20.7 | 20.65 | 20.51 | 21 | -3.01 | 17.69 | 17.64 | 17.5 | 17.99 |


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## 8.1.2 Conducted Power of CatM1

| LTE Band 2 | | | | Conducted Power(dBm) | | | |
|---|---|---|---|---|---|---|---|
| **Bandwidth** | Modulation | RB size | RB offset | Channel 18607 | Channel 18900 | Channel 19193 | Tune up |
| **1.4MHz** | QPSK | 1 | 0 | 22.03 | 23.06 | 21.93 | 23.5 |
| | | 1 | 2 | 21.97 | 23.1 | 21.91 | 23.5 |
| | | 1 | 5 | 22.05 | 23.05 | 21.87 | 23.5 |
| | | 3 | 0 | 22.08 | 22.98 | 21.88 | 23.5 |
| | | 3 | 2 | 22.11 | 23.04 | 21.95 | 23.5 |
| | | 3 | 3 | 22.09 | 23 | 21.97 | 23.5 |
| | | 6 | 0 | 21.1 | 22.09 | 20.89 | 22.5 |
| | 16QAM | 1 | 0 | 21.36 | 21.62 | 21.12 | 22.5 |
| | | 1 | 2 | 21.25 | 21.56 | 21.09 | 22.5 |
| | | 1 | 5 | 21.27 | 21.62 | 21 | 22.5 |
| | | 3 | 0 | 21.27 | 22.05 | 20.79 | 22.5 |
| | | 3 | 2 | 21.36 | 21.98 | 20.79 | 22.5 |
| | | 3 | 3 | 21.31 | 21.99 | 20.77 | 22.5 |
| | | 6 | 0 | 20.08 | 21.06 | 19.87 | 21.5 |
| **Bandwidth** | Modulation | RB size | RB offset | Channel 18615 | Channel 18900 | Channel 19185 | Tune up |
| **3MHz** | QPSK | 1 | 0 | 22.07 | 23.08 | 21.87 | 23.5 |
| | | 1 | 2 | 21.94 | 23.07 | 21.92 | 23.5 |
| | | 1 | 5 | 22.05 | 23.06 | 21.9 | 23.5 |
| | | 3 | 0 | 22.09 | 23.06 | 21.85 | 22.5 |
| | | 3 | 2 | 22.09 | 23.01 | 21.96 | 22.5 |
| | | 3 | 3 | 22.13 | 23.01 | 21.9 | 22.5 |
| | | 6 | 0 | 21.1 | 22.05 | 20.9 | 22.5 |
| | 16QAM | 1 | 0 | 21.31 | 21.6 | 21.1 | 23 |
| | | 1 | 2 | 21.25 | 21.53 | 21.15 | 23 |
| | | 1 | 5 | 21.21 | 21.59 | 21.05 | 23 |
| | | 3 | 0 | 21.28 | 22.1 | 20.78 | 22 |
| | | 3 | 2 | 21.32 | 22.02 | 20.79 | 22 |
| | | 3 | 3 | 21.27 | 21.96 | 20.76 | 22 |
| | | 6 | 0 | 20.11 | 21.02 | 19.94 | 21.5 |
| **Bandwidth** | Modulation | RB size | RB offset | Channel 18625 | Channel 18900 | Channel 19175 | Tune up |
| **5MHz** | QPSK | 1 | 0 | 22.1 | 23.06 | 21.85 | 23.5 |
| | | 1 | 2 | 22.02 | 23.12 | 21.93 | 23.5 |
| | | 1 | 5 | 22.06 | 23.01 | 21.91 | 23.5 |
| | | 3 | 0 | 22.05 | 23.03 | 21.85 | 22.5 |
| | | 3 | 2 | 22.09 | 23.03 | 21.94 | 22.5 |
| | | 3 | 3 | 22.12 | 22.98 | 21.98 | 22.5 |
| | | 6 | 0 | 21.06 | 22.09 | 20.83 | 22.5 |
| | 16QAM | 1 | 0 | 21.34 | 21.6 | 21.05 | 23 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 21.26 | 21.56 | 21.12 | 23 |
| | | 1 | 5 | 21.2 | 21.6 | 21 | 23 |
| | | 3 | 0 | 21.28 | 22.07 | 20.8 | 22 |
| | | 3 | 2 | 21.35 | 22.01 | 20.81 | 22 |
| | | 3 | 3 | 21.23 | 21.98 | 20.72 | 22 |
| | | 6 | 0 | 20.01 | 21.07 | 19.88 | 21.5 |
| **Bandwidth** | Modulation | RB size | RB offset | Channel | Channel | Channel | Tune up |
| | | | | 18650 | 18900 | 19150 | |
| **10MHz** | QPSK | 1 | 0 | 22.09 | 22.99 | 21.9 | 23.5 |
| | | 1 | 2 | 21.93 | 23.02 | 21.89 | 23.5 |
| | | 1 | 5 | 22.07 | 23.05 | 21.91 | 23.5 |
| | | 3 | 0 | 22.08 | 23.01 | 21.83 | 22.5 |
| | | 3 | 2 | 22.14 | 23.02 | 22 | 22.5 |
| | | 3 | 3 | 22.1 | 22.98 | 21.91 | 22.5 |
| | | 6 | 0 | 21.05 | 22.06 | 20.83 | 22.5 |
| | 16QAM | 1 | 0 | 21.34 | 21.65 | 21.07 | 23 |
| | | 1 | 2 | 21.29 | 21.55 | 21.07 | 23 |
| | | 1 | 5 | 21.24 | 21.57 | 21.07 | 23 |
| | | 3 | 0 | 21.3 | 22.03 | 20.76 | 22 |
| | | 3 | 2 | 21.35 | 22.06 | 20.8 | 22 |
| | | 3 | 3 | 21.33 | 21.97 | 20.77 | 22 |
| | | 6 | 0 | 20.01 | 21.07 | 19.9 | 21.5 |
| **Bandwidth** | Modulation | RB size | RB offset | Channel | Channel | Channel | Tune up |
| | | | | 18675 | 18900 | 19125 | |
| **15MHz** | QPSK | 1 | 0 | 22.1 | 23 | 21.93 | 23.5 |
| | | 1 | 2 | 22.01 | 23.04 | 21.94 | 23.5 |
| | | 1 | 5 | 22.06 | 23.06 | 21.92 | 23.5 |
| | | 3 | 0 | 22.02 | 23.05 | 21.89 | 22.5 |
| | | 3 | 2 | 22.13 | 23.02 | 21.96 | 22.5 |
| | | 3 | 3 | 22.04 | 22.98 | 21.92 | 22.5 |
| | | 6 | 0 | 21.07 | 22.08 | 20.85 | 22.5 |
| | 16QAM | 1 | 0 | 21.27 | 21.67 | 21.08 | 23 |
| | | 1 | 2 | 21.28 | 21.56 | 21.1 | 23 |
| | | 1 | 5 | 21.23 | 21.6 | 21.03 | 23 |
| | | 3 | 0 | 21.32 | 22.04 | 20.76 | 22 |
| | | 3 | 2 | 21.32 | 22.04 | 20.83 | 22 |
| | | 3 | 3 | 21.24 | 22.03 | 20.76 | 22 |
| | | 6 | 0 | 20.07 | 21 | 19.94 | 21.5 |
| **Bandwidth** | Modulation | RB size | RB offset | Channel | Channel | Channel | Tune up |
| | | | | 18700 | 18900 | 19100 | |
| **20MHz** | QPSK | 1 | 0 | 22.03 | **23.3** | 21.88 | 23.5 |
| | | 1 | 2 | 21.96 | 23.1 | 21.87 | 23.5 |
| | | 1 | 5 | 22.01 | 23.02 | 21.94 | 23.5 |
| | | 3 | 0 | 22.05 | 23.06 | 21.82 | 22.5 |
| | | 3 | 2 | 22.07 | 22.97 | 22.02 | 22.5 |
| | | 3 | 3 | 22.13 | 22.96 | 21.9 | 22.5 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | 6 | 0 | 21.06 | 22 | 20.87 | 22.5 |
| | 16QAM | 1 | 0 | 21.29 | 21.67 | 21.09 | 23 |
| | | 1 | 2 | 21.24 | 21.58 | 21.1 | 23 |
| | | 1 | 5 | 21.25 | 21.55 | 21.01 | 23 |
| | | 3 | 0 | 21.29 | 22.06 | 20.82 | 22 |
| | | 3 | 2 | 21.3 | 22.02 | 20.85 | 22 |
| | | 3 | 3 | 21.28 | 22.04 | 20.78 | 22 |
| | | 6 | 0 | 20.08 | 21.03 | 19.94 | 21.5 |

| LTE Band 4 | | | | Conducted Power(dBm) | | | |
|---|---|---|---|---|---|---|---|
| **Bandwidth** | Modulation | RB size | RB offset | Channel 19957 | Channel 20175 | Channel 20393 | Tune up |
| **1.4MHz** | QPSK | 1 | 0 | 22.08 | 22.99 | 21.87 | 23.5 |
| | | 1 | 2 | 22.01 | 23.09 | 21.93 | 23.5 |
| | | 1 | 5 | 22.04 | 23.07 | 21.91 | 23.5 |
| | | 3 | 0 | 22.1 | 23.03 | 21.85 | 23.5 |
| | | 3 | 2 | 22.06 | 23.03 | 21.95 | 23.5 |
| | | 3 | 3 | 22.04 | 23 | 21.97 | 23.5 |
| | | 6 | 0 | 21.07 | 22.02 | 20.83 | 23 |
| | 16QAM | 1 | 0 | 21.33 | 21.62 | 21.13 | 23 |
| | | 1 | 2 | 21.23 | 21.55 | 21.07 | 23 |
| | | 1 | 5 | 21.21 | 21.61 | 20.99 | 23 |
| | | 3 | 0 | 21.28 | 22.1 | 20.76 | 23 |
| | | 3 | 2 | 21.31 | 22.05 | 20.76 | 23 |
| | | 3 | 3 | 21.3 | 22.05 | 20.79 | 23 |
| | | 6 | 0 | 20.03 | 21.07 | 19.89 | 22 |
| **Bandwidth** | Modulation | RB size | RB offset | Channel 19965 | Channel 20175 | Channel 20385 | Tune up |
| **3MHz** | QPSK | 1 | 0 | 22.03 | 23.03 | 21.9 | 23.5 |
| | | 1 | 2 | 21.97 | 23.08 | 21.88 | 23.5 |
| | | 1 | 5 | 22.09 | 23.09 | 21.95 | 23.5 |
| | | 3 | 0 | 22.03 | 22.99 | 21.86 | 23.5 |
| | | 3 | 2 | 22.14 | 22.98 | 21.96 | 23.5 |
| | | 3 | 3 | 22.09 | 23.02 | 21.96 | 23.5 |
| | | 6 | 0 | 21.06 | 22.04 | 20.82 | 23 |
| | 16QAM | 1 | 0 | 21.29 | 21.64 | 21.12 | 23 |
| | | 1 | 2 | 21.23 | 21.52 | 21.07 | 23 |
| | | 1 | 5 | 21.27 | 21.55 | 21.05 | 23 |
| | | 3 | 0 | 21.27 | 22.09 | 20.81 | 22 |
| | | 3 | 2 | 21.34 | 21.99 | 20.81 | 22 |
| | | 3 | 3 | 21.32 | 22.01 | 20.8 | 22 |
| | | 6 | 0 | 20.03 | 21.06 | 19.89 | 22 |
| **Bandwidth** | Modulation | RB size | RB offset | Channel 19975 | Channel 20175 | Channel 20375 | Tune up |
| **5MHz** | QPSK | 1 | 0 | 22.02 | 23 | 21.86 | 23.5 |

| Bandwidth | Modulation | RB size | RB offset | Channel | Channel | Channel | Tune up |
|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 21.97 | 23.1 | 21.86 | 23.5 |
| | | 1 | 5 | 22.08 | 23.08 | 21.93 | 23.5 |
| | | 3 | 0 | 22.11 | 23.03 | 21.86 | 23.5 |
| | | 3 | 2 | 22.07 | 22.97 | 22.02 | 23.5 |
| | | 3 | 3 | 22.09 | 23 | 21.89 | 23.5 |
| | | 6 | 0 | 21.12 | 22.02 | 20.84 | 23 |
| | 16QAM | 1 | 0 | 21.28 | 21.68 | 21.05 | 23 |
| | | 1 | 2 | 21.26 | 21.57 | 21.14 | 23 |
| | | 1 | 5 | 21.25 | 21.55 | 21.06 | 23 |
| | | 3 | 0 | 21.31 | 22.03 | 20.82 | 22 |
| | | 3 | 2 | 21.35 | 21.99 | 20.82 | 22 |
| | | 3 | 3 | 21.25 | 22.02 | 20.72 | 22 |
| | | 6 | 0 | 20.08 | 21.05 | 19.92 | 22 |
| **Bandwidth** | Modulation | RB size | RB offset | Channel 20000 | Channel 20175 | Channel 20350 | Tune up |
| **10MHz** | QPSK | 1 | 0 | 22.06 | 23.01 | 21.88 | 23.5 |
| | | 1 | 2 | 21.97 | 23.04 | 21.86 | 23.5 |
| | | 1 | 5 | 22.04 | 23.04 | 21.86 | 23.5 |
| | | 3 | 0 | 22.03 | 23.07 | 21.84 | 23.5 |
| | | 3 | 2 | 22.11 | 22.97 | 22 | 23.5 |
| | | 3 | 3 | 22.04 | 22.99 | 21.93 | 23.5 |
| | | 6 | 0 | 21.06 | 22.01 | 20.8 | 23 |
| | 16QAM | 1 | 0 | 21.27 | 21.64 | 21.08 | 23 |
| | | 1 | 2 | 21.25 | 21.55 | 21.15 | 23 |
| | | 1 | 5 | 21.23 | 21.54 | 21.05 | 23 |
| | | 3 | 0 | 21.33 | 22.05 | 20.77 | 22 |
| | | 3 | 2 | 21.31 | 22.01 | 20.76 | 22 |
| | | 3 | 3 | 21.28 | 22.03 | 20.74 | 22 |
| | | 6 | 0 | 20.07 | 21.04 | 19.92 | 22 |
| **Bandwidth** | Modulation | RB size | RB offset | Channel 20025 | Channel 20175 | Channel 20325 | Tune up |
| **15MHz** | QPSK | 1 | 0 | 22.04 | 23.06 | 21.94 | 23.5 |
| | | 1 | 2 | 21.94 | 23.05 | 21.87 | 23.5 |
| | | 1 | 5 | 22.07 | 23.03 | 21.85 | 23.5 |
| | | 3 | 0 | 22.05 | 22.98 | 21.84 | 23.5 |
| | | 3 | 2 | 22.04 | 22.97 | 21.95 | 23.5 |
| | | 3 | 3 | 22.08 | 23.03 | 21.95 | 23.5 |
| | | 6 | 0 | 21.14 | 22.06 | 20.83 | 23 |
| | 16QAM | 1 | 0 | 21.35 | 21.61 | 21.08 | 23 |
| | | 1 | 2 | 21.26 | 21.57 | 21.16 | 23 |
| | | 1 | 5 | 21.21 | 21.59 | 21.04 | 23 |
| | | 3 | 0 | 21.36 | 22.04 | 20.78 | 22 |
| | | 3 | 2 | 21.33 | 21.98 | 20.79 | 22 |
| | | 3 | 3 | 21.25 | 22.01 | 20.73 | 22 |
| | | 6 | 0 | 20.06 | 21.03 | 19.92 | 22 |
| **Bandwidth** | Modulation | RB | RB offset | Channel | Channel | Channel | Tune up |

| | | size | | 20050 | 20175 | 20300 | |
|---|---|---|---|---|---|---|---|
| **20MHz** | QPSK | 1 | 0 | 22.1 | **23.09** | 21.93 | 24 |
| | | 1 | 2 | 21.94 | 23.08 | 21.88 | 24 |
| | | 1 | 5 | 22.07 | 23.08 | 21.9 | 24 |
| | | 3 | 0 | 22.11 | 23.06 | 21.86 | 24 |
| | | 3 | 2 | 22.11 | 23.02 | 22 | 24 |
| | | 3 | 3 | 22.08 | 23 | 21.99 | 24 |
| | | 6 | 0 | 21.04 | 22.03 | 20.85 | 23 |
| | 16QAM | 1 | 0 | 21.32 | 21.68 | 21.12 | 23 |
| | | 1 | 2 | 21.21 | 21.49 | 21.06 | 23 |
| | | 1 | 5 | 21.23 | 21.61 | 21.04 | 23 |
| | | 3 | 0 | 21.35 | 22.08 | 20.74 | 22 |
| | | 3 | 2 | 21.31 | 22 | 20.77 | 22 |
| | | 3 | 3 | 21.32 | 21.96 | 20.78 | 22 |
| | | 6 | 0 | 20.1 | 21.09 | 19.88 | 22 |

| **LTE FDD Band 12** | | | | **Conducted Power(dBm)** | | | |
|---|---|---|---|---|---|---|---|
| **Bandwidth** | Modulation | RB size | RB offset | Channel 23017 | Channel 23095 | Channel 23173 | Tune up |
| **1.4MHz** | QPSK | 1 | 0 | 22.11 | 23.02 | 21.86 | 24 |
| | | 1 | 2 | 22.01 | 23.04 | 21.88 | 24 |
| | | 1 | 5 | 22.01 | 23.02 | 21.91 | 24 |
| | | 3 | 0 | 22.04 | 23.03 | 21.89 | 24 |
| | | 3 | 2 | 22.08 | 22.98 | 21.98 | 24 |
| | | 3 | 3 | 22.11 | 22.98 | 21.92 | 24 |
| | | 6 | 0 | 21.11 | 22.01 | 20.9 | 23 |
| | 16QAM | 1 | 0 | 21.33 | 21.68 | 21.14 | 23 |
| | | 1 | 2 | 21.29 | 21.51 | 21.13 | 23 |
| | | 1 | 5 | 21.26 | 21.61 | 21.07 | 23 |
| | | 3 | 0 | 21.27 | 22.03 | 20.78 | 23 |
| | | 3 | 2 | 21.32 | 22.03 | 20.83 | 23 |
| | | 3 | 3 | 21.3 | 21.98 | 20.78 | 23 |
| | | 6 | 0 | 20.06 | 21.05 | 19.89 | 22 |
| **Bandwidth** | Modulation | RB size | RB offset | Channel 23025 | Channel 23095 | Channel 23165 | Tune up |
| **3MHz** | QPSK | 1 | 0 | 22.11 | 23.06 | 21.91 | 24 |
| | | 1 | 2 | 21.97 | 23.07 | 21.93 | 24 |
| | | 1 | 5 | 22.1 | 23 | 21.86 | 24 |
| | | 3 | 0 | 22.09 | 23 | 21.9 | 23 |
| | | 3 | 2 | 22.12 | 22.96 | 21.96 | 23 |
| | | 3 | 3 | 22.09 | 23.06 | 21.93 | 23 |
| | | 6 | 0 | 21.06 | 22.02 | 20.81 | 23 |
| | 16QAM | 1 | 0 | 21.3 | 21.63 | 21.05 | 23 |
| | | 1 | 2 | 21.27 | 21.5 | 21.14 | 23 |
| | | 1 | 5 | 21.2 | 21.58 | 21.06 | 23 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | 3 | 0 | 21.28 | 22.05 | 20.74 | 22 |
| | | 3 | 2 | 21.35 | 22.02 | 20.78 | 22 |
| | | 3 | 3 | 21.28 | 22.01 | 20.76 | 22 |
| | | 6 | 0 | 20.09 | 21.04 | 19.9 | 22 |
| **Bandwidth** | Modulation | RB size | RB offset | Channel | Channel | Channel | Tune up |
| | | | | 23035 | 23095 | 23155 | |
| **5MHz** | QPSK | 1 | 0 | 22.03 | 23.03 | 21.86 | 24 |
| | | 1 | 2 | 21.98 | 23.06 | 21.94 | 24 |
| | | 1 | 5 | 22.05 | 23.01 | 21.87 | 24 |
| | | 3 | 0 | 22.03 | 23.03 | 21.87 | 23 |
| | | 3 | 2 | 22.13 | 23.04 | 21.93 | 23 |
| | | 3 | 3 | 22.09 | 22.96 | 21.96 | 23 |
| | | 6 | 0 | 21.14 | 22.01 | 20.89 | 23 |
| | 16QAM | 1 | 0 | 21.34 | 21.6 | 21.14 | 23 |
| | | 1 | 2 | 21.21 | 21.55 | 21.06 | 23 |
| | | 1 | 5 | 21.22 | 21.63 | 21.04 | 23 |
| | | 3 | 0 | 21.33 | 22.09 | 20.73 | 22 |
| | | 3 | 2 | 21.29 | 22.01 | 20.79 | 22 |
| | | 3 | 3 | 21.28 | 22.03 | 20.74 | 22 |
| | | 6 | 0 | 20.03 | 21 | 19.95 | 22 |
| **Bandwidth** | Modulation | RB size | RB offset | Channel | Channel | Channel | Tune up |
| | | | | 23060 | 23095 | 23130 | |
| **10MHz** | QPSK | 1 | 0 | 23 | 23.02 | 23.09 | 24 |
| | | 1 | 2 | 22.98 | 23.05 | 21.87 | 24 |
| | | 1 | 5 | 22.03 | 23.08 | 21.9 | 24 |
| | | 3 | 0 | 22.09 | 23.02 | 21.88 | 23 |
| | | 3 | 2 | 22.09 | 23 | 21.94 | 23 |
| | | 3 | 3 | 22.1 | 22.98 | 21.96 | 23 |
| | | 6 | 0 | 21.08 | 22.02 | 20.83 | 23 |
| | 16QAM | 1 | 0 | 21.3 | 21.6 | 21.06 | 23 |
| | | 1 | 2 | 21.29 | 21.56 | 21.07 | 23 |
| | | 1 | 5 | 21.2 | 21.61 | 21.04 | 23 |
| | | 3 | 0 | 21.36 | 22.09 | 20.81 | 22 |
| | | 3 | 2 | 21.3 | 22.02 | 20.77 | 22 |
| | | 3 | 3 | 21.25 | 22.03 | 20.75 | 22 |
| | | 6 | 0 | 20.03 | 21.07 | 19.87 | 22 |

| **LTE FDD Band 13** | | | | **Conducted Power(dBm)** | | | |
|---|---|---|---|---|---|---|---|
| **Bandwidth** | Modulation | RB size | RB offset | Channel | Channel | Channel | Tune up |
| | | | | 23205 | 23230 | 23255 | |
| **5MHz** | QPSK | 1 | 0 | 22.1 | 23 | 21.91 | 24 |
| | | 1 | 2 | 22.03 | 23.11 | 21.93 | 24 |
| | | 1 | 5 | 22.08 | 23.07 | 21.87 | 24 |
| | | 3 | 0 | 22.03 | 23.01 | 21.89 | 23.5 |
| | | 3 | 2 | 22.1 | 22.96 | 22 | 23.5 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | 3 | 3 | 22.08 | 23.04 | 21.94 | 23.5 |
| | | 6 | 0 | 21.1 | 22.03 | 20.84 | 23.5 |
| | 16QAM | 1 | 0 | 21.3 | 21.69 | 21.08 | 23 |
| | | 1 | 2 | 21.3 | 21.58 | 21.11 | 23 |
| | | 1 | 5 | 21.26 | 21.59 | 21 | 23 |
| | | 3 | 0 | 21.37 | 22.01 | 20.79 | 23 |
| | | 3 | 2 | 21.37 | 22.07 | 20.79 | 23 |
| | | 3 | 3 | 21.31 | 22 | 20.75 | 23 |
| | | 6 | 0 | 20.06 | 21.05 | 19.91 | 23 |
| **Bandwidth** | Modulation | RB size | RB offset | Channel | Channel | Channel | Tune up |
| | | | | NA | 23230 | NA | |
| **10MHz** | QPSK | 1 | 0 | NA | 22.99 | NA | 24 |
| | | 1 | 2 | NA | 23.09 | NA | 24 |
| | | 1 | 5 | NA | 23.06 | NA | 24 |
| | | 3 | 0 | NA | 23.03 | NA | 23.5 |
| | | 3 | 2 | NA | 23.02 | NA | 23.5 |
| | | 3 | 3 | NA | 23.01 | NA | 23.5 |
| | | 6 | 0 | NA | 22.02 | NA | 23.5 |
| | 16QAM | 1 | 0 | NA | 22.08 | NA | 23 |
| | | 1 | 2 | NA | 22.01 | NA | 23 |
| | | 1 | 5 | NA | 22.09 | NA | 23 |
| | | 3 | 0 | NA | 22.07 | NA | 23 |
| | | 3 | 2 | NA | 22.05 | NA | 23 |
| | | 3 | 3 | NA | 22.06 | NA | 23 |
| | | 6 | 0 | NA | 21.05 | NA | 23 |

| **LTE Band 25** | | | | **Conducted Power(dBm)** | | | |
|---|---|---|---|---|---|---|---|
| **Bandwidth** | Modulation | RB size | RB offset | Channel | Channel | Channel | Tune up |
| | | | | 26047 | 26365 | 26683 | |
| **1.4MHz** | QPSK | 1 | 0 | 22.08 | 23.04 | 21.85 | 23.5 |
| | | 1 | 2 | 22.02 | 23.11 | 21.88 | 23.5 |
| | | 1 | 5 | 22.08 | 23.09 | 21.91 | 23.5 |
| | | 3 | 0 | 22.07 | 23.03 | 21.86 | 23.5 |
| | | 3 | 2 | 22.14 | 22.96 | 21.97 | 23.5 |
| | | 3 | 3 | 22.04 | 23 | 21.93 | 23.5 |
| | | 6 | 0 | 21.05 | 22.1 | 20.83 | 23 |
| | 16QAM | 1 | 0 | 21.33 | 21.68 | 21.14 | 23 |
| | | 1 | 2 | 21.22 | 21.49 | 21.08 | 23 |
| | | 1 | 5 | 21.26 | 21.57 | 21.07 | 23 |
| | | 3 | 0 | 21.3 | 22.08 | 20.8 | 22.5 |
| | | 3 | 2 | 21.36 | 22.04 | 20.78 | 22.5 |
| | | 3 | 3 | 21.33 | 21.99 | 20.72 | 22.5 |
| | | 6 | 0 | 20.05 | 21.02 | 19.91 | 22.5 |
| **Bandwidth** | Modulation | RB size | RB offset | Channel | Channel | Channel | Tune up |
| | | | | 26055 | 26365 | 26675 | |

| Bandwidth | Modulation | RB size | RB offset | Channel | Channel | Channel | Tune up |
|---|---|---|---|---|---|---|---|
| 3MHz | QPSK | 1 | 0 | 22.12 | 23.05 | 21.86 | 23.5 |
| | | 1 | 2 | 22.01 | 23.08 | 21.85 | 23.5 |
| | | 1 | 5 | 22.06 | 23.04 | 21.9 | 23.5 |
| | | 3 | 0 | 22.07 | 22.99 | 21.86 | 23.5 |
| | | 3 | 2 | 22.09 | 22.98 | 21.97 | 23.5 |
| | | 3 | 3 | 22.08 | 23.04 | 21.93 | 23.5 |
| | | 6 | 0 | 21.05 | 22.09 | 20.86 | 23 |
| | 16QAM | 1 | 0 | 21.33 | 21.6 | 21.09 | 23 |
| | | 1 | 2 | 21.25 | 21.56 | 21.16 | 23 |
| | | 1 | 5 | 21.26 | 21.58 | 21.04 | 23 |
| | | 3 | 0 | 21.37 | 22.06 | 20.79 | 22.5 |
| | | 3 | 2 | 21.37 | 22.03 | 20.82 | 22.5 |
| | | 3 | 3 | 21.33 | 22.05 | 20.73 | 22.5 |
| | | 6 | 0 | 20.1 | 21.08 | 19.9 | 22.5 |
| **Bandwidth** | Modulation | RB size | RB offset | Channel 26065 | Channel 26365 | Channel 26665 | Tune up |
| 5MHz | QPSK | 1 | 0 | 22.03 | 23.02 | 21.87 | 23.5 |
| | | 1 | 2 | 21.99 | 23.07 | 21.86 | 23.5 |
| | | 1 | 5 | 22.05 | 23.05 | 21.85 | 23.5 |
| | | 3 | 0 | 22.07 | 23.05 | 21.86 | 23.5 |
| | | 3 | 2 | 22.08 | 23 | 22.02 | 23.5 |
| | | 3 | 3 | 22.08 | 23.06 | 21.93 | 23.5 |
| | | 6 | 0 | 21.09 | 22.06 | 20.84 | 23 |
| | 16QAM | 1 | 0 | 21.27 | 21.65 | 21.06 | 23 |
| | | 1 | 2 | 21.27 | 21.58 | 21.12 | 23 |
| | | 1 | 5 | 21.2 | 21.62 | 21.07 | 23 |
| | | 3 | 0 | 21.34 | 22.09 | 20.82 | 22.5 |
| | | 3 | 2 | 21.33 | 21.97 | 20.8 | 22.5 |
| | | 3 | 3 | 21.23 | 22.04 | 20.75 | 22.5 |
| | | 6 | 0 | 20.03 | 20.99 | 19.88 | 22.5 |
| **Bandwidth** | Modulation | RB size | RB offset | Channel 26090 | Channel 26365 | Channel 26640 | Tune up |
| 10MHz | QPSK | 1 | 0 | 22.08 | 23.04 | 21.87 | 23.5 |
| | | 1 | 2 | 21.98 | 23.09 | 21.94 | 23.5 |
| | | 1 | 5 | 22.01 | 23.07 | 21.9 | 23.5 |
| | | 3 | 0 | 22.12 | 23.02 | 21.82 | 23.5 |
| | | 3 | 2 | 22.11 | 23.01 | 21.96 | 23.5 |
| | | 3 | 3 | 22.08 | 23.01 | 21.95 | 23.5 |
| | | 6 | 0 | 21.09 | 22.08 | 20.85 | 23 |
| | 16QAM | 1 | 0 | 21.28 | 21.64 | 21.13 | 23 |
| | | 1 | 2 | 21.22 | 21.55 | 21.14 | 23 |
| | | 1 | 5 | 21.19 | 21.55 | 21.03 | 23 |
| | | 3 | 0 | 21.35 | 22.08 | 20.78 | 22.5 |
| | | 3 | 2 | 21.38 | 22.07 | 20.8 | 22.5 |
| | | 3 | 3 | 21.24 | 22.04 | 20.71 | 22.5 |
| | | 6 | 0 | 20.01 | 21.02 | 19.92 | 22.5 |

| Bandwidth | Modulation | RB size | RB offset | Channel 26115 | Channel 26365 | Channel 26615 | Tune up |
|---|---|---|---|---|---|---|---|
| 15MHz | QPSK | 1 | 0 | 22.07 | 23.03 | 21.91 | 23.5 |
| | | 1 | 2 | 22.02 | 23.03 | 21.94 | 23.5 |
| | | 1 | 5 | 22.04 | 23.04 | 21.89 | 23.5 |
| | | 3 | 0 | 22.08 | 23.05 | 21.82 | 23.5 |
| | | 3 | 2 | 22.13 | 23.01 | 22.02 | 23.5 |
| | | 3 | 3 | 22.09 | 22.98 | 21.93 | 23.5 |
| | | 6 | 0 | 21.05 | 22.07 | 20.9 | 23 |
| | 16QAM | 1 | 0 | 21.27 | 21.65 | 21.1 | 23 |
| | | 1 | 2 | 21.25 | 21.53 | 21.12 | 23 |
| | | 1 | 5 | 21.29 | 21.56 | 21.06 | 23 |
| | | 3 | 0 | 21.35 | 22.02 | 20.74 | 22.5 |
| | | 3 | 2 | 21.3 | 22.04 | 20.84 | 22.5 |
| | | 3 | 3 | 21.28 | 22.03 | 20.76 | 22.5 |
| | | 6 | 0 | 20.1 | 21.09 | 19.93 | 22.5 |
| **Bandwidth** | Modulation | RB size | RB offset | Channel 26140 | Channel 26365 | Channel 26590 | Tune up |
| 20MHz | QPSK | 1 | 0 | 22.06 | 22.99 | 21.91 | 23.5 |
| | | 1 | 2 | 21.97 | 23.06 | 21.88 | 23.5 |
| | | 1 | 5 | 22.04 | 23.01 | 21.93 | 23.5 |
| | | 3 | 0 | 22.03 | 23.05 | 21.85 | 23.5 |
| | | 3 | 2 | 22.06 | 23.03 | 21.99 | 23.5 |
| | | 3 | 3 | 22.1 | 22.96 | 21.91 | 23.5 |
| | | 6 | 0 | 21.05 | 22 | 20.84 | 23 |
| | 16QAM | 1 | 0 | 21.3 | 21.63 | 21.05 | 23 |
| | | 1 | 2 | 21.28 | 21.54 | 21.1 | 23 |
| | | 1 | 5 | 21.28 | 21.56 | 21.06 | 23 |
| | | 3 | 0 | 21.35 | 22.02 | 20.75 | 22.5 |
| | | 3 | 2 | 21.39 | 22.03 | 20.82 | 22.5 |
| | | 3 | 3 | 21.27 | 21.97 | 20.81 | 22.5 |
| | | 6 | 0 | 20.1 | 21.07 | 19.94 | 22.5 |

## 8.2 Stand-alone SAR test evaluation

Unless specifically required by the published RF exposure KDB procedures, standalone 1-g head or body and 10-g extremity SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding SAR Test Exclusion Threshold condition is satisfied. These test exclusion conditions are based on source-based time-averaged maximum conducted output power of the RF channel requiring evaluation, adjusted for tune-up tolerance, and the minimum test separation distance required for the exposure conditions.

| Freq. Band | Frequency (GHz) | Position | Average Power | | Test Separation (mm) | Calculate Value | Exclusion Threshold | Exclusion (Y/N) |
|---|---|---|---|---|---|---|---|---|
| | | | dBm | mW | | | | |



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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| GSM850 | 0.848 | Extremity | 33 | 1995.3 | 0 | 367.5 | 7.5 | N |
| GSM1900 | 1.909 | Extremity | 26 | 398.1 | 0 | 110.0 | 7.5 | N |
| LTE Band 2 | 1.91 | Extremity | 23.5 | 223.9 | 0 | 61.9 | 7.5 | N |
| LTE Band 4 | 1.755 | Extremity | 24 | 251.2 | 0 | 66.6 | 7.5 | N |
| LTE Band 12 | 0.716 | Extremity | 24 | 251.2 | 0 | 42.5 | 7.5 | N |
| LTE Band 13 | 0.787 | Extremity | 24 | 251.2 | 0 | 44.6 | 7.5 | N |
| LTE Band 25 | 1.915 | Extremity | 23.5 | 223.9 | 0 | 62.0 | 7.5 | N |

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, 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

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

## 8.3 Measurement of SAR Data

### 8.3.1 SAR Result Of GSM 850

| Test position | Test mode | Test Ch./Freq. | Duty Cycle | SAR (W/kg) 1-g | SAR (W/kg) 10-g | Power Drift (dB) | Conducted Power (dBm) | Tune up Limit (dBm) | Scaled factor | Scaled SAR (W/kg) 10-g | Liquid Temp | SAR limit (W/kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Extremity test data(0mm) | | | | | | | | | | | | |
| Front side | GPRS 4TS | 128/824.2 | 1:2.075 | 0.817 | 0.487 | -0.18 | 29.07 | 30 | 1.239 | **0.603** | 22.1 | 4 |

Note:

1) The maximum Scaled SAR value is marked in bold. Graph Results refer to Appendix B

2) 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 (2.0W/kg for 10g) then testing at the other channels is not required for such test configuration(s).

### 8.3.2 SAR Result Of PCS 1900

| Test position | Test mode | Test Ch./Freq. | Duty Cycle | SAR (W/kg) 1-g | SAR (W/kg) 10-g | Power Drift(dB) | Conducted Power (dBm) | Tune up Limit (dBm) | Scaled factor | Scaled SAR (W/kg) 10-g | Liquid Temp | SAR limit (W/kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Extremity test data(0mm) | | | | | | | | | | | | |
| Front side | GPRS 4TS | 512/1850.2 | 1:2.075 | 2.17 | 1.2 | 0.03 | 18.57 | 19 | 1.104 | **1.325** | 22.3 | 4 |

Note:

3) The maximum Scaled SAR value is marked in bold. Graph Results refer to Appendix B

4) 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 (2.0W/kg for 10g) then testing at the other channels is not required for such test configuration(s).

### 8.3.3 SAR Result Of LTE CatM1 band 2

| Test position | Test mode | Test Ch./Freq. | Duty Cycle | SAR (W/kg) 1-g | SAR (W/kg) 10-g | Power Drift (dB) | Conducted Power (dBm) | Tune up Limit (dBm) | Scaled factor | Scaled SAR (W/kg) 10-g | Liquid Temp | SAR limit (W/kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Extremity test data(0mm) | | | | | | | | | | | | |
| Front side | 20M_QPSK 1RB_0 | 18900/1880 | 1:1 | 0.328 | 0.185 | -0.07 | 23.3 | 23.5 | 1.047 | 0.194 | 22.3 | 4 |

Note:

5) The maximum Scaled SAR value is marked in bold. Graph Results refer to Appendix B

6) 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 (2.0W/kg for 10g) then testing at the other channels is not required for such test configuration(s).



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### 8.3.4 SAR Result Of LTE CatM1 band 4

| Test position | Test mode | Test Ch./Freq. | Duty Cycle | SAR (W/kg) 1-g | SAR (W/kg) 10-g | Power Drift (dB) | Conducted Power (dBm) | Tune up Limit (dBm) | Scaled factor | Scaled SAR (W/kg) 10-g | Liquid Temp | SAR limit (W/kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Extremity test data(0mm) | | | | | | | | | | | | |
| Front side | 20M_QPSK 1RB_0 | 20175/1732.5 | 1:1 | 0.306 | 0.173 | -0.07 | 23.09 | 24 | 1.233 | **0.213** | 22.2 | 4 |

Note:

7) The maximum Scaled SAR value is marked in bold. Graph Results refer to Appendix B

8) 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 (2.0W/kg for 10g) then testing at the other channels is not required for such test configuration(s).



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### 8.3.5 SAR Result Of LTE CatM1 band 12

| Test position | Test mode | Test Ch./Freq. | Duty Cycle | SAR (W/kg) 1-g | SAR (W/kg) 10-g | Power Drift (dB) | Conducted Power (dBm) | Tune up Limit (dBm) | Scaled factor | Scaled SAR (W/kg) 10-g | Liquid Temp | SAR limit (W/kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Extremity test data(0mm) | | | | | | | | | | | | |
| Front side | 10M_QPSK 1RB_2 | 23130/711 | 1:1 | 0.71 | 0.426 | -0.18 | 23.09 | 24 | 1.233 | **0.525** | 22.1 | 4 |

Note:

9) The maximum Scaled SAR value is marked in bold. Graph Results refer to Appendix B

10) 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 (2.0W/kg for 10g) then testing at the other channels is not required for such test configuration(s).

### 8.3.6 SAR Result Of LTE CatM1 band 13

| Test position | Test mode | Test Ch./Freq. | Duty Cycle | SAR (W/kg) 1-g | SAR (W/kg) 10-g | Power Drift (dB) | Conducted Power (dBm) | Tune up Limit (dBm) | Scaled factor | Scaled SAR (W/kg) 10-g | Liquid Temp | SAR limit (W/kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Extremity test data(0mm) | | | | | | | | | | | | |
| Front side | 10M_QPSK 1RB_2 | 23230/782 | 1:1 | 0.798 | 0.479 | -0.08 | 23.09 | 24 | 1.233 | **0.591** | 22.1 | 4 |

Note:

11) The maximum Scaled SAR value is marked in bold. Graph Results refer to Appendix B

12) 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 (2.0W/kg for 10g) then testing at the other channels is not required for such test configuration(s).

### 8.3.7 SAR Result Of LTE CatM1 band 25

| Test position | Test mode | Test Ch./Freq. | Duty Cycle | SAR (W/kg) 1-g | SAR (W/kg) 10-g | Power Drift (dB) | Conducted Power (dBm) | Tune up Limit (dBm) | Scaled factor | Scaled SAR (W/kg) 10-g | Liquid Temp | SAR limit (W/kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Extremity test data(0mm) | | | | | | | | | | | | |
| Front side | 20M_QPSK 1RB_2 | 26365/1882.5 | 1:1 | 0.328 | 0.186 | -0.07 | 23.06 | 23.5 | 1.107 | **0.206** | 22.1 | 4 |

Note:

13) The maximum Scaled SAR value is marked in bold. Graph Results refer to Appendix B

14) 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 (2.0W/kg for 10g) then testing at the other channels is not required for such test configuration(s).

## 8.4 Multiple Transmitter Evaluation

### 8.4.1Simultaneous SAR SAR test evaluation

**Simultaneous Transmission**

| NO. | Simultaneous Transmission Configuration | Extremity |
|---|---|---|
| 1 | GSM + LTE | No |

# 9 Equipment list

| | |
|---|---|
| Test Platform | SPEAG DASY5 Professional |
| Location | Compliance Certification Services (Kunshan) Inc. |
| Software Reference | DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331) |

**Hardware Reference**

| | Equipment | Manufacturer | Model | Serial Number | Calibration Date | Due date of calibration |
|---|---|---|---|---|---|---|
| ☒ | P C | HP | Core(rm)3.16G | CZCO48171H | N/A | N/A |
| ☒ | Signal Generator | Agilent | N5182A | MY50142015 | 2021/09/24 | 2022/09/23 |
| ☒ | S-Parameter Network Analyzer | Agilent | E5071B | MY42301382 | 2021/02/01 | 2022/01/31 |
| ☒ | DAK-3.5 probe | SPEAG | DAK-3.5 | 1102 | N/A | N/A |
| ☒ | Power meter | Anritsu | ML2495A | 1445010 | 2021/04/15 | 2022/04/14 |
| ☒ | Power sensor | Anritsu | MA2411B | 1339220 | 2021/04/15 | 2022/04/14 |
| ☒ | DAE | SPEAG | DAE4 | 1245 | 2021/05/19 | 2022/05/18 |
| ☒ | E-field PROBE | SPEAG | EX3DV4 | 3798 | 2021/05/31 | 2022/05/30 |
| ☒ | Dipole | SPEAG | D750V2 | 1188 | 2019/03/07 | 2022/03/06 |
| ☒ | Dipole | SPEAG | D900V2 | 1d079 | 2019/06/13 | 2022/06/12 |
| ☒ | Dipole | SPEAG | D1800V2 | 2d170 | 2019/06/11 | 2022/06/10 |
| ☒ | Electro Thermometer | DTM | DTM3000 | 3030 | 2021/10/17 | 2022/10/16 |
| ☒ | Amplifier | Mini-circuits | ZVE-8G | 110405 | N/A | N/A |
| ☒ | Amplifier | Mini-circuits | ZHL-42 | QA1331003 | N/A | N/A |
| ☒ | 3db ATTENUATOR | MINI | MCL BW-S3W5 | 0533 | N/A | N/A |
| ☒ | DUMMY PROBE | SPEAG | DP_2 | SPDP2001AA | N/A | N/A |
| ☒ | Dual Directional Coupler | Woken | 20W couple | DOM2BHW1A1 | N/A | N/A |
| ☒ | SAM PHANTOM (ELI4 v4.0) | SPEAG | QDOVA001BB | 1102 | N/A | N/A |
| ☐ | Twin SAM Phantom | SPEAG | QD000P40CD | 1609 | N/A | N/A |
| ☒ | ROBOT | SPEAG | TX60 | F10/5E6AA1/A101 | N/A | N/A |
| ☒ | ROBOT KRC | SPEAG | CS8C | F10/5E6AA1/C101 | N/A | N/A |
| ☒ | LIQUID CALIBRATION KIT | ANTENNESSA | 41/05 OCP9 | 00425167 | N/A | N/A |

Note: All the equipments are within the valid period when the tests are performed.

All measurement facilities used to collect the measurement data are located at

☒ No.10, Weiye Rd., Innovation Park, Eco & Tec. Development Part, Kunshan City, Jiangsu Province, China.

# 10 Calibration certificate

Please see the Appendix C

# 11 Photographs

Please see the Appendix D



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# Appendix A: Detailed System Check Results

**The plots are showing as followings.**

Date: 2021/11/30

Test Laboratory: Compliance Certification Services (Kunshan) Inc.

**System Performance Check-Head D750**

**DUT: Dipole 750 MHz D750V3; Type: D750V3; Serial: 1188**

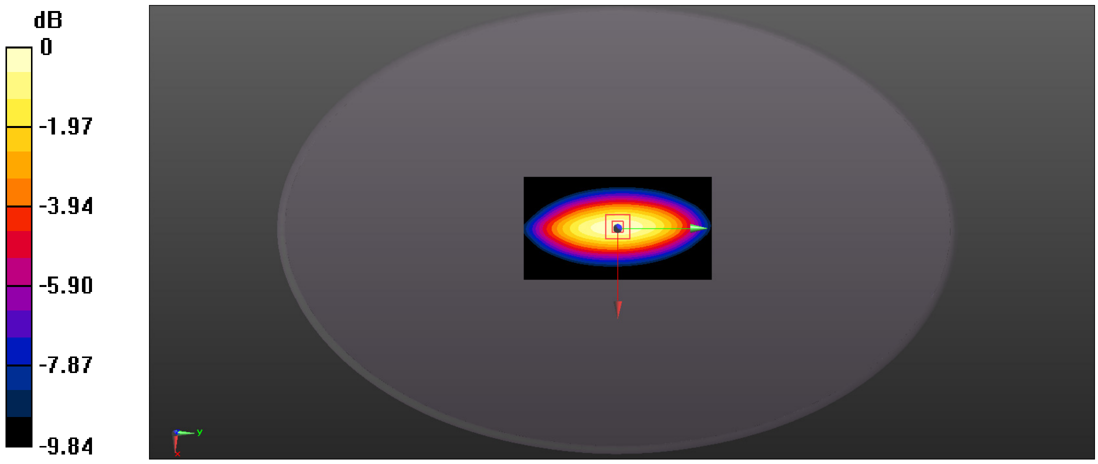
Communication System: UID 0, CW (0); Frequency: 750 MHz;Duty Cycle: 1:1
Medium parameters used: f = 750 MHz; σ = 0.879 S/m; $\varepsilon_r$ = 42.786; ρ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3798; ConvF(9.78, 9.78, 9.78); Calibrated: 2021/05/31;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1245; Calibrated: 2021/05/19
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1102
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**System Performance Check at Frequencies Low 1 GHz/Pin=250 mW, dist=15 mm (EX-Probe)/Area Scan (61x111x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 2.53 W/kg

**System Performance Check at Frequencies Low 1 GHz/Pin=250 mW, dist=15 mm (EX-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 53.17 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 2.87 W/kg
**SAR(1 g) = 1.92 W/kg; SAR(10 g) = 1.28 W/kg**
Maximum value of SAR (measured) = 2.55 W/kg




0 dB = 2.55 W/kg = 4.07 dBW/kg

Date: 2021/11/29

Test Laboratory: Compliance Certification Services (Kunshan) Inc.

**System Performance Check-Head D835**

**DUT: Dipole 835 MHz D835V2; Type: D835V2; Serial: D835V2 - SN4d114**

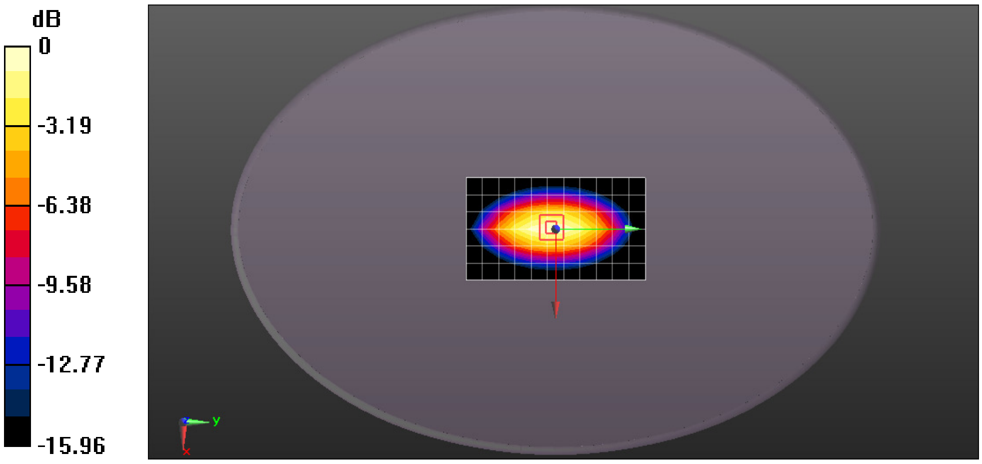
Communication System: UID 0, CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; $\sigma$ = 0.905 S/m; $\varepsilon_r$ = 42.113; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3798; ConvF(9.52, 9.52, 9.52); Calibrated: 2021/05/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1245; Calibrated: 2021/05/19
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1102
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**System Performance Check at Frequencies Low 1 GHz/d=15mm, Pin=250 mW, dist=3.0mm (EX-Probe)/Area Scan (61x111x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 3.67 W/kg

**System Performance Check at Frequencies Low 1 GHz/d=15mm, Pin=250 mW, dist=3.0mm (EX-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 61.51 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 6.98 W/kg
**SAR(1 g) = 2.36 W/kg; SAR(10 g) = 1.53 W/kg**
Maximum value of SAR (measured) = 4.10 W/kg




0 dB = 4.10 W/kg = 6.13 dBW/kg

Date: 2021/12/03

Test Laboratory: Compliance Certification Services (Kunshan) Inc.

**System Performance Check-D1800**

**DUT: Dipole 1800 MHz D1800V2; Type: D1800V2; Serial: 2d052**

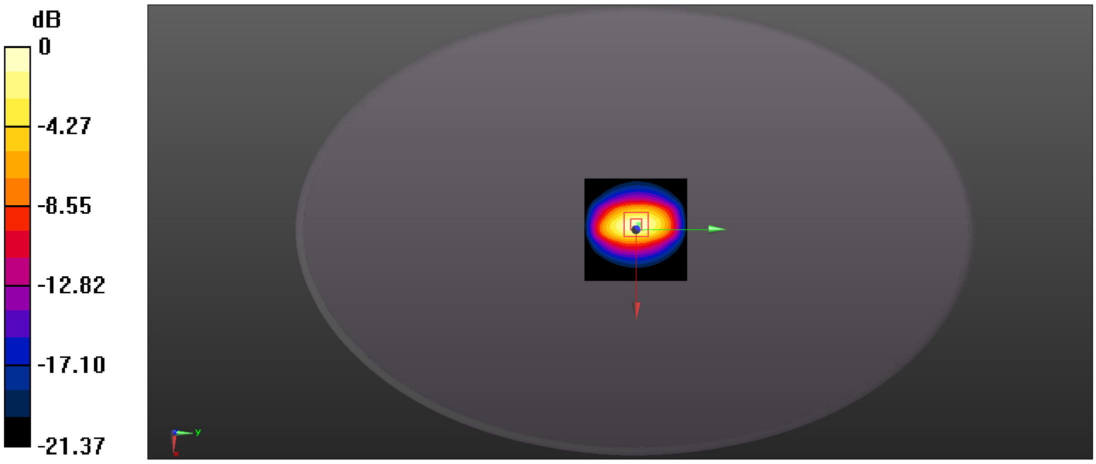
Communication System: UID 10000, CW; Frequency: 1800 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1800 MHz; $\sigma$ = 1.386 S/m; $\varepsilon_r$ = 40.249; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3798; ConvF(8.22, 8.22, 8.22); Calibrated: 2021/05/31;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1245; Calibrated: 2021/05/19
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1102
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**System Performance Check at Frequencies above 1 GHz/d=10mm, Pin=250 mW(EX-Probe) (23.6 dBm)/Area Scan (61x61x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 13.4 W/kg

**System Performance Check at Frequencies above 1 GHz/d=10mm, Pin=250 mW(EX-Probe) (23.6 dBm)/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 98.63 V/m; Power Drift = 0.19 dB
Peak SAR (extrapolated) = 18.5 W/kg
**SAR(1 g) = 9.44 W/kg; SAR(10 g) = 4.99 W/kg**
Maximum value of SAR (measured) = 14.7 W/kg




0 dB = 14.7 W/kg = 11.67 dBW/kg

Date: 2021/12/02

Test Laboratory: Compliance Certification Services (Kunshan) Inc.

**System Performance Check-Head D1900**

**DUT: Dipole 1900 MHz D1900V2; Type: D1900V2; Serial: 5d136**

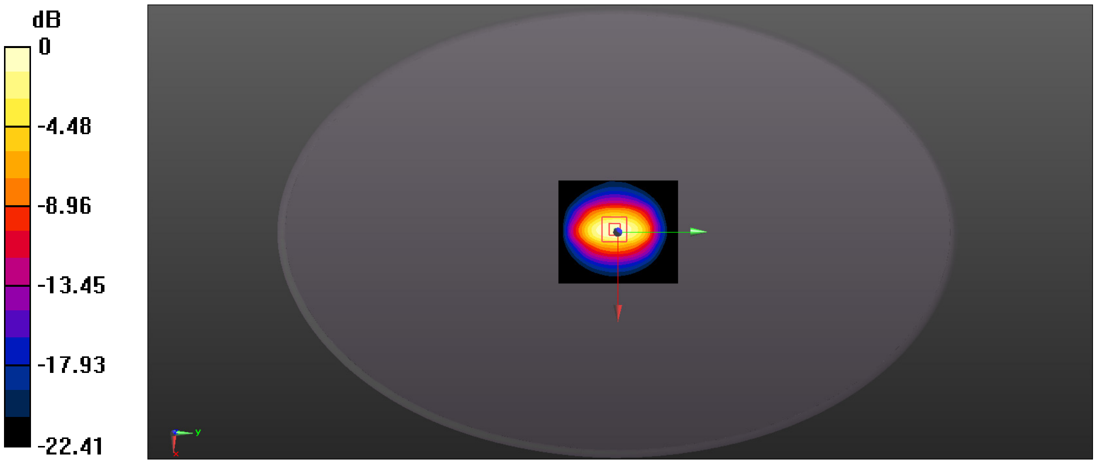
Communication System: UID 0, CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; $\sigma$ = 1.372 S/m; $\varepsilon_r$ = 40.64; $\rho$ = 1000 kg/$m^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3798; ConvF(7.89, 7.89, 7.89); Calibrated: 2021/05/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1245; Calibrated: 2021/05/19
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1102
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**System Performance Check at Frequencies above 1 GHz/Pin=250 mW, dist=10mm (EX-Probe)/Area Scan (61x71x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 12.5 W/kg

**System Performance Check at Frequencies above 1 GHz/Pin=250 mW, dist=10mm (EX-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 92.84 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 16.6 W/kg
**SAR(1 g) = 9.66 W/kg; SAR(10 g) = 5.01 W/kg**
Maximum value of SAR (measured) = 11.9 W/kg




0 dB = 11.9 W/kg = 10.76 dBW/kg

# Appendix B: Detailed Test Results

**The plots of worse case are showing as followings.**

Date: 2021/11/29

Test Laboratory: Compliance Certification Services (Kunshan) Inc.

**GSM850 GPRS4TS Back side 0mm Ch128**

**DUT: Cellular Body Scale; Type: GBS-2104-G**

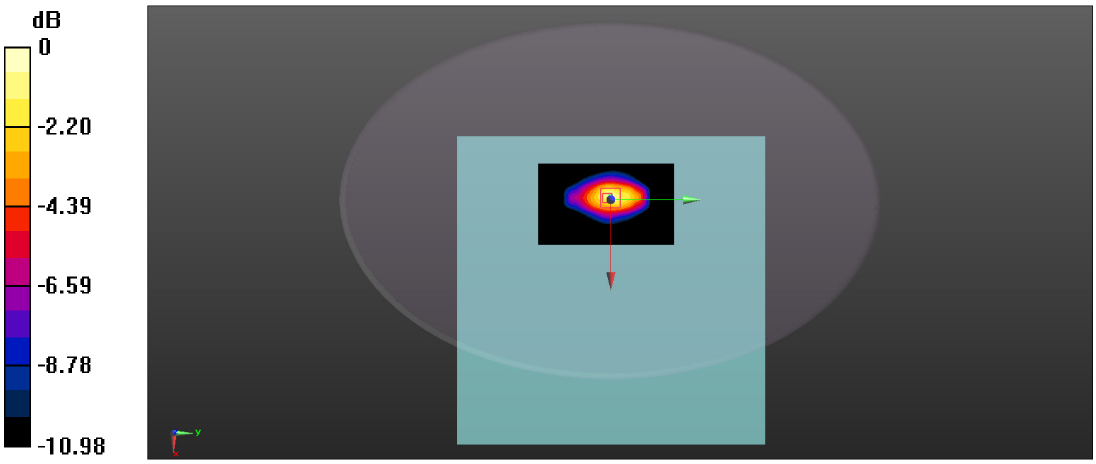
Communication System: UID 0, GPRS/EGPRS 4TX Slots (0); Frequency: 824.2 MHz;Duty Cycle: 1:2.0797
Medium parameters used (interpolated): f = 824.2 MHz; σ = 0.897 S/m; $\varepsilon_r$ = 42.371; ρ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3798; ConvF(9.52, 9.52, 9.52); Calibrated: 2021/05/31;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1245; Calibrated: 2021/05/19
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1102
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Configuration/Body/Area Scan (61x101x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.01 W/kg

**Configuration/Body/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 36.29 V/m; Power Drift = -0.18 dB
Peak SAR (extrapolated) = 1.44 W/kg
**SAR(1 g) = 0.817 W/kg; SAR(10 g) = 0.487 W/kg**
Maximum value of SAR (measured) = 1.24 W/kg




0 dB = 1.24 W/kg = 0.93 dBW/kg

Date: 2021/12/02

Test Laboratory: Compliance Certification Services (Kunshan) Inc.

**GSM1900 GPRS4TS Back side 0mm Ch512**

**DUT: Cellular Body Scale; Type: GBS-2104-G**

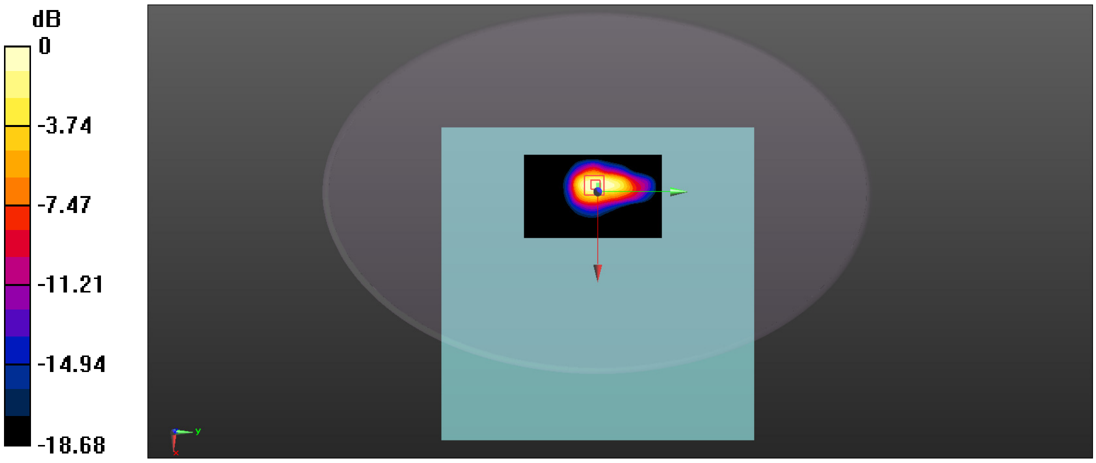
Communication System: UID 0, GPRS/EGPRS 4TX Slots (0); Frequency: 1850.2 MHz;Duty Cycle: 1:2.0797
Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.353 S/m; $\varepsilon_r$ = 40.778; ρ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3798; ConvF(7.89, 7.89, 7.89); Calibrated: 2021/05/31;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1245; Calibrated: 2021/05/19
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1102
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Configuration/Body/Area Scan (61x101x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 3.60 W/kg

**Configuration/Body/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 42.01 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 4.00 W/kg
**SAR(1 g) = 2.17 W/kg; SAR(10 g) = 1.2 W/kg**
Maximum value of SAR (measured) = 3.21 W/kg




0 dB = 3.21 W/kg = 5.07 dBW/kg

Date: 2021/12/02

Test Laboratory: Compliance Certification Services (Kunshan) Inc.

**LTE CatM1 Band 2 20M QPSK 1RB0 Front side 0mm Ch18900**

**DUT: Cellular Body Scale; Type: GBS-2104-G**

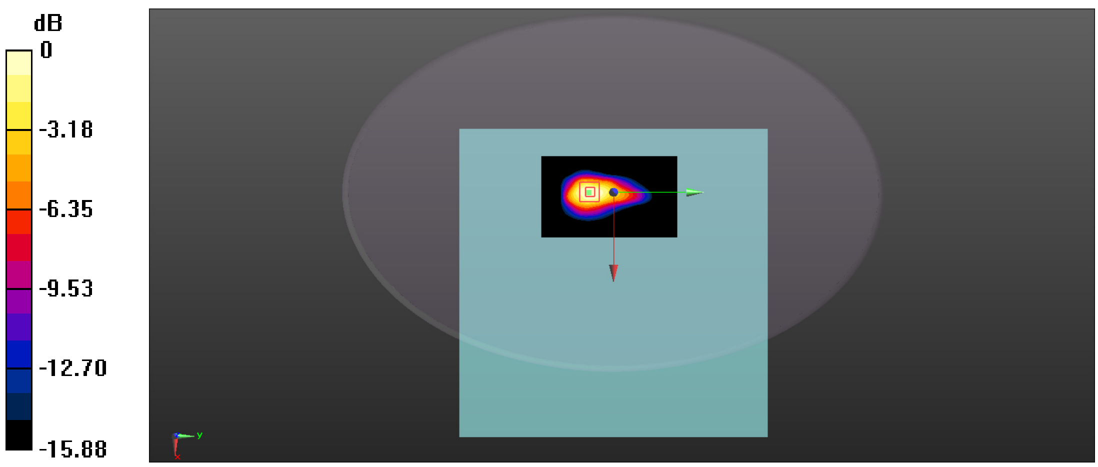
Communication System: UID 0, FDD_LTE (0); Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; $\sigma$ = 1.36 S/m; $\varepsilon_r$ = 40.732; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3798; ConvF(7.89, 7.89, 7.89); Calibrated: 2021/05/31;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1245; Calibrated: 2021/05/19
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1102
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Configuration/Body/Area Scan (61x101x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.532 W/kg

**Configuration/Body/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.76 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 0.559 W/kg
**SAR(1 g) = 0.328 W/kg; SAR(10 g) = 0.185 W/kg**
Maximum value of SAR (measured) = 0.466 W/kg




0 dB = 0.466 W/kg = -3.32 dBW/kg

Date: 2021/12/03

Test Laboratory: Compliance Certification Services (Kunshan) Inc.

**LTE CatM1 Band 4 20M QPSK 1RB0 Back side 0mm Ch20175**

**DUT: Cellular Body Scale; Type: GBS-2104-G**

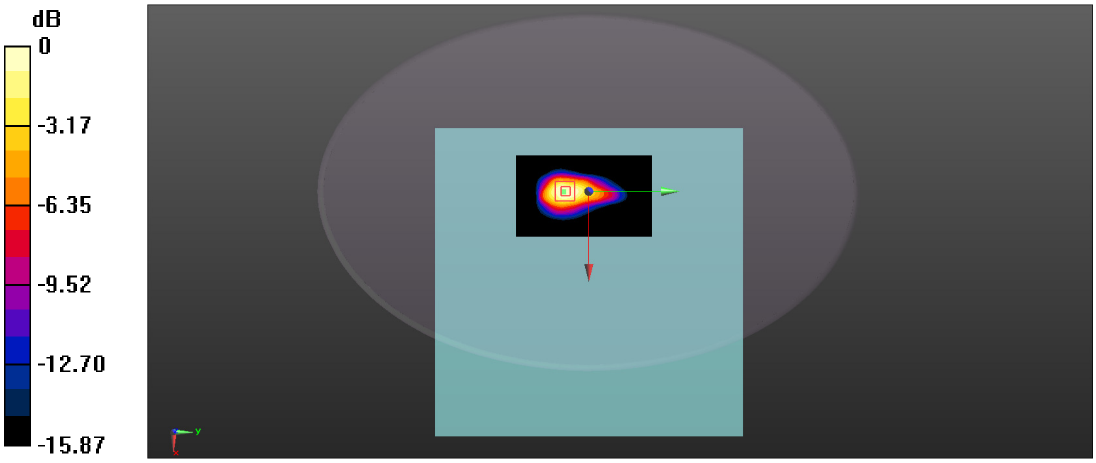
Communication System: UID 0, FDD_LTE (0); Frequency: 1732.5 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1732.5 MHz; $\sigma$ = 1.322 S/m; $\varepsilon_r$ = 40.586; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3798; ConvF(8.22, 8.22, 8.22); Calibrated: 2021/05/31;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1245; Calibrated: 2021/05/19
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1102
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Configuration/Body/Area Scan (61x101x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.495 W/kg

**Configuration/Body/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.48 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 0.520 W/kg
**SAR(1 g) = 0.306 W/kg; SAR(10 g) = 0.173 W/kg**
Maximum value of SAR (measured) = 0.434 W/kg




0 dB = 0.434 W/kg = -3.63 dBW/kg



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Date: 2021/11/30

Test Laboratory: Compliance Certification Services (Kunshan) Inc.

**LTE CatM1 Band 12 10M QPSK 1RB2 Back side 0mm Ch23130**

**DUT: Cellular Body Scale; Type: GBS-2104-G**

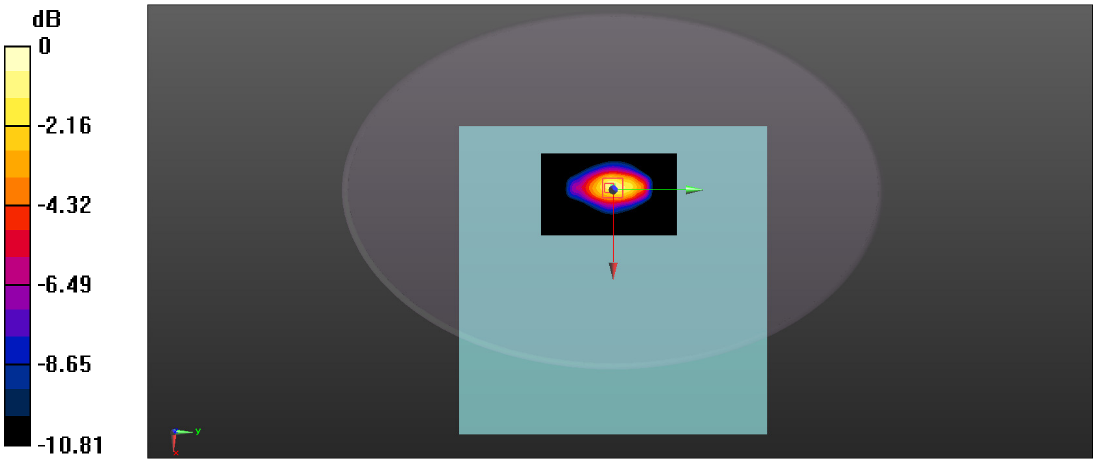
Communication System: UID 0, FDD_LTE (0); Frequency: 711 MHz;Duty Cycle: 1:1
Medium parameters used: f = 711 MHz; $\sigma$ = 0.829 S/m; $\varepsilon_r$ = 43.316; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3798; ConvF(9.78, 9.78, 9.78); Calibrated: 2021/05/31;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1245; Calibrated: 2021/05/19
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1102
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Configuration/Body/Area Scan (61x101x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.877 W/kg

**Configuration/Body/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 35.11 V/m; Power Drift = -0.18 dB
Peak SAR (extrapolated) = 1.23 W/kg
**SAR(1 g) = 0.710 W/kg; SAR(10 g) = 0.426 W/kg**
Maximum value of SAR (measured) = 1.06 W/kg




0 dB = 1.06 W/kg = 0.25 dBW/kg

Date: 2021/11/30

Test Laboratory: Compliance Certification Services (Kunshan) Inc.

**LTE CatM1 Band 13 10M QPSK 1RB2 Back side 0mm Ch23230**

**DUT: Cellular Body Scale; Type: GBS-2104-G**

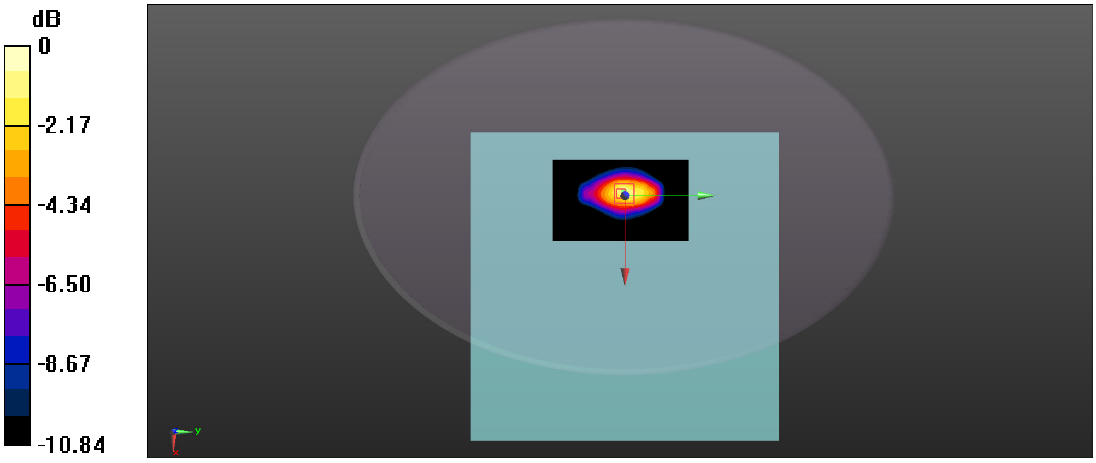
Communication System: UID 0, FDD_LTE (0); Frequency: 782 MHz;Duty Cycle: 1:1
Medium parameters used: f = 782 MHz; $\sigma$ = 0.911 S/m; $\varepsilon_r$ = 42.087; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3798; ConvF(9.78, 9.78, 9.78); Calibrated: 2021/05/31;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1245; Calibrated: 2021/05/19
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1102
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Configuration/Body/Area Scan (61x101x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.985 W/kg

**Configuration/Body/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 35.52 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 1.38 W/kg
**SAR(1 g) = 0.798 W/kg; SAR(10 g) = 0.479 W/kg**
Maximum value of SAR (measured) = 1.20 W/kg




0 dB = 1.20 W/kg = 0.79 dBW/kg

Date: 2021/12/02

Test Laboratory: Compliance Certification Services (Kunshan) Inc.

**LTE CatM1 Band 25 20M QPSK 1RB2 Back side 0mm Ch26365**

**DUT: Cellular Body Scale; Type: GBS-2104-G**

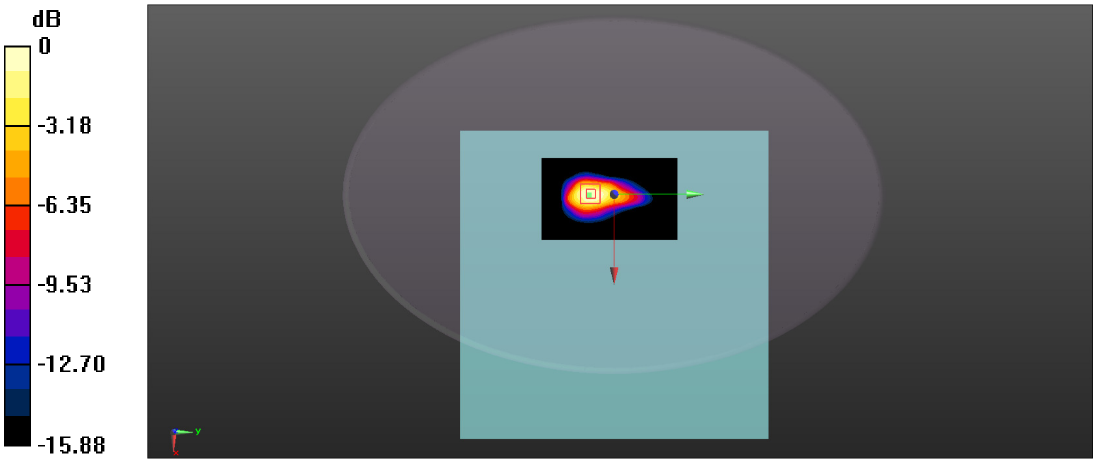
Communication System: UID 0, FDD_LTE (0); Frequency: 1882.5 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1882.5 MHz; $\sigma$ = 1.362 S/m; $\varepsilon_r$ = 40.623; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3798; ConvF(7.89, 7.89, 7.89); Calibrated: 2021/05/31;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1245; Calibrated: 2021/05/19
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1102
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Configuration/Body/Area Scan (61x101x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.533 W/kg

**Configuration/Body/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.76 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 0.560 W/kg
**SAR(1 g) = 0.328 W/kg; SAR(10 g) = 0.186 W/kg**
Maximum value of SAR (measured) = 0.467 W/kg




0 dB = 0.467 W/kg = -3.31 dBW/kg

# Appendix C: Calibration certificate

# Appendix D: Photographs

**---END---**