# FCC SAR Test Report

## FCC ID: YR8ES820

| | | |
|---|---|---|
| **Project No.** | : | 2108H047 |
| **Equipment** | : | 4G waterproof GPS Tracker |
| **Brand Name** | : | esky |
| **Test Model** | : | ES820 |
| **Series Model** | : | N/A |
| **Date of Receipt** | : | Aug. 26, 2021 |
| **Date of Test** | : | Sep. 02, 2021 ~ Sep. 26, 2021 |
| **Issued Date** | : | Nov. 08, 2021 |
| **Report Version** | : | R01 |
| **Test Sample** | : | Engineering Sample No.: SH2021082426. |
| **Standard(s)** | : | Please refer to page 2. |
| **Applicant** | : | eSky wireless Inc. |
| **Address** | : | A311#,258,Road Ren'ai suzhou china |
| **Manufacturer** | : | eSky wireless Inc. |
| **Address** | : | A311#,258,Road Ren'ai suzhou china |

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.

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TESTING CERT #5123.02

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| | | |
|---|---|---|
| **Standard(s)** | : | **ANSI Std C95.1-1992** Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz – 300 GHz. (IEEE Std C95.1-1991)<br><br>**IEEE Std 1528-2013** Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques<br><br>**KDB941225 D01** 3G SAR Procedures v03r01<br>**KDB941225 D05** SAR for LTE Devices v02r05<br>**KDB447498 D01** General RF Exposure Guidance v06<br>**KDB865664 D01** SAR measurement 100 MHz to 6 GHz v01r04<br>**KDB865664 D02** SAR Reporting v01r02<br>**KDB690783 D01** SAR Listings on Grants v01r03 |

**Declaration**

**BTL** represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with standards traceable to international standard(s) and/or national standard(s).

**BTL**'s reports apply only to the specific samples tested under conditions. It is manufacture's responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. **BTL** shall have no liability for any declarations, inferences or generalizations drawn by the client or others from **BTL** issued reports.

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**BTL**'s laboratory quality assurance procedures are in compliance with the **ISO/IEC 17025** requirements, and accredited by the conformity assessment authorities listed in this test report.

**BTL** is not responsible for the sampling stage, so the results only apply to the sample as received.

The information, data and test plan are provided by manufacturer which may affect the validity of results, so it is manufacturer's responsibility to ensure that the apparatus meets the essential requirements of applied standards and in all the possible configurations as representative of its intended use.

**Limitation**

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

Please note that the measurement uncertainty is provided for informational purpose only and are not use in determining the Pass/Fail results.

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# REPORT ISSUED HISTORY

| Report Version | Description | Issued Date |
| --- | --- | --- |
| R00 | Original Issue. | Nov. 05, 2021 |
| R01 | Modified the comments of TCB. | Nov. 08, 2021 |

# 1. GENERAL INFORMATION

## 1.1 STATEMENT OF COMPLIANCE

| Mode | Highest Reported PTT (10mm) SAR-1g (W/kg) | Highest Reported Extremity (0mm) SAR-10g (W/kg) |
|---|---|---|
| UMTS B2 | 0.926 | 3.598 |
| UMTS B4 | 0.838 | 3.699 |
| UMTS B5 | 0.066 | 1.787 |
| LTE B2 | 0.773 | 3.264 |
| LTE B4 | 0.859 | 3.004 |
| LTE B5 | 0.493 | 2.401 |
| LTE B12 | 0.080 | 3.930 |
| LTE B13 | 0.294 | 2.908 |
| LTE B14 | 0.309 | 2.794 |
| LTE B66 | 0.961 | 3.521 |
| LTE B71 | 0.060 | 3.796 |

Note:
1) The device is in compliance with Specific Absorption Rate (SAR) for general population uncontrolled exposure limits according to the FCC rule §2.1093, the ANSI C95.1:1992/IEEE C95.1:1991, the NCRP Report Number 86 for uncontrolled environment and had been tested in accordance with the measurement methods and procedures specified in IEEE Std 1528-2013.

## 1.2 LABORATORY ENVIRONMENT

| | |
|---|---|
| Temperature | Min. = 18ºC, Max. = 25ºC |
| Relative humidity | Min. = 30%, Max. = 70% |
| Ground system resistance | < 0.5Ω |
| 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. | |

## 1.3 GENERAL DESCRIPTION OF EUT

| | | | |
|---|---|---|---|
| Equipment | 4G waterproof GPS Tracker | | |
| Brand Name | esky | | |
| Test Model | ES820 | | |
| Series Model | N/A | | |
| Model Difference(s) | N/A | | |
| Hardware Version | ES820-MB-H102 | | |
| Modulation | UMTS(QPSK/16QAM), LTE(QPSK/16QAM/64QAM) | | |
| Operation Frequency Range(s) | Band | TX (MHz) | RX (MHz) |
| | UMTS B2 | 1850~1910 | 1930~1990 |
| | UMTS B4 | 1710~1755 | 2110~2155 |
| | UMTS B5 | 824~849 | 869~894 |
| | LTE B2 | 1850~1910 | 1930~1990 |
| | LTE B4 | 1710~1755 | 2110~2155 |
| | LTE B5 | 824~849 | 869~894 |
| | LTE B12 | 699~716 | 729~746 |
| | LTE B13 | 777~787 | 746~756 |
| | LTE B14 | 788~798 | 758~768 |
| | LTE B66 | 1710~1780 | 2110~2180 |
| | LTE B71 | 663~698 | 617~652 |
| HSDPA UE Category | 24 | | |
| HSUPA UE Category | 6 | | |
| DC-HSDPA Category | 24 | | |
| HSPA+ Category | 6 | | |
| Power Class | 3, tested with power control “all up bits” (UMTS B2/4/5) | | |
| | 3, tested with power control “all Max” (LTE B2/4/5/12/13/14/66/71) | | |
| Test Channels (low-mid-high) | 9262-9400-9538 (UMTS B2) | | |
| | 1312-1413-1513 (UMTS B4) | | |
| | 4132-4182-4233 (UMTS B5) | | |
| | 18700-18900-19100 (LTE B2 BW=20MHz) | | |
| | 20050-20175-20300 (LTE B4 BW=20MHz) | | |
| | 20450-20525-20600 (LTE B5 BW=10MHz) | | |
| | 20850-21100-21350 (LTE B7 BW=20MHz) | | |
| | 23060-23095-23130 (LTE B12 BW=10MHz) | | |
| | 23230 (LTE B13 BW=10MHz) | | |
| | 23330 (LTE B14 BW=10MHz) | | |
| | 132072-132322-132572 (LTE B66 BW=20MHz) | | |
| | 133222-133322-133372 (LTE B71 BW=20MHz) | | |

| | Band | Gain |
|---|---|---|
| Antenna Gain (dBi) | UMTS B2 | 1.997112536 |
| | UMTS B4 | 2.983971461 |
| | UMTS B5 | -4.448946567 |
| | LTE B2 | 1.997112536 |
| | LTE B4 | 2.983971461 |
| | LTE B5 | -4.448946567 |
| | LTE B12 | -1.293400945 |
| | LTE B13 | -1.293400945 |
| | LTE B14 | -1.293400945 |
| | LTE B66 | 2.983971461 |
| | LTE B71 | -0.861487628 |
| **Other Information** | | |
| Battery | Model Name | YL 753943 |
| | Power Rating | DC 3.7V, 1500mAh, 5.55Wh |

## 1.4 MAIN TEST INSTRUMENTS

| Item | Equipment | Manufacturer | Model | Serial No. | Cal. Date | Cal. Interval |
|---|---|---|---|---|---|---|
| 1 | Data Acquisition Electronics | Speag | DAE4 | 1390 | Nov. 06, 2020 | 1 Year |
| 2 | Data Acquisition Electronics | Speag | DAE4 | 420 | Dec. 09, 2020 | 1 Year |
| 3 | Data Acquisition Electronics | Speag | DAE4 | 1423 | Dec. 11, 2020 | 1 Year |
| 4 | E-field Probe | Speag | ES3DV3 | 3162 | Jun. 15, 2021 | 1 Year |
| 5 | E-field Probe | Speag | EX3DV4 | 3974 | Dec. 18, 2020 | 1 Year |
| 6 | E-field Probe | Speag | EX3DV4 | 7544 | Oct. 29, 2020 | 1 Year |
| 7 | System Validation Dipole | Speag | D750V3 | 1095 | Jun. 01, 2021 | 3 Years |
| 8 | System Validation Dipole | Speag | D835V2 | 4d160 | Jun. 01, 2021 | 3 Years |
| 9 | System Validation Dipole | Speag | D1750V2 | 1101 | Jun. 01, 2021 | 3 Years |
| 10 | System Validation Dipole | Speag | D1900V2 | 5d179 | May 31, 2021 | 3 Years |
| 11 | Twin Sam Phantom | Speag | Twin Sam Phantom V5.0 | 1784 | N/A | N/A |
| 12 | Twin Sam Phantom | Speag | Twin Sam Phantom V5.0 | 1896 | N/A | N/A |
| 13 | Radio Communication Analver | Anritsu | MT8821C | 6261915479 | Jul. 24, 2021 | 1 Year |
| 14 | Wideband Radio Communication Tester | R&S | CMW500 | 104462 | Jul. 27, 2021 | 1 Year |
| 15 | Power Amplifier | Mini-Circuits | ZHL-42W+ | QA1333003 | Dec. 29, 2020 | 1 Year |
| 16 | DC Source metter | Iteck | IT6154 | 0061041267682 01001 | Jul. 24, 2021 | 1 Year |
| 17 | Signal Analyzer | R&S | FSV7 | 103120 | Jul. 10, 2021 | 1 Year |
| 18 | Vector Network Analyzer | Agilent | E5071C | MY46102965 | Feb. 28, 2021 | 1 Year |
| 19 | Signal Generator | Agilent | N5172B | MY53050758 | Feb. 27, 2021 | 1 Year |
| 20 | Smart Power Sensor | R&S | NRP-Z21 | 102209 | Feb. 28, 2021 | 1 Year |
| 21 | 3.5mm Economy Calibration Kit | Agilent | 85052D | MY43252246 | Dec. 10, 2020 | 1 Year |
| 22 | Dielectric Assessment Kit | Speag | DAK-3.5 | 1226 | N/A | N/A |
| 23 | Directional Coupler | Woken | TS-PCC0M-05 | 0107090019 | Feb. 27, 2021 | 1 Year |
| 24 | Coupler | Woken | 0110A05601O-10 | COM5BNW1A2 | Feb. 27, 2021 | 1 Year |
| 25 | Digital Themometer | LKM | DTM3000 | 3519 | Jun. 24, 2021 | 1 Year |

Remark:
1. “N/A” denotes no model name, serial No. or calibration specified.
2.
1) Per KDB865664 D01 requirements for dipole calibration, the test laboratory has adopted three-year extended calibration interval. 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) The most recent return-loss result, measured at least annually, deviates by no more than 20% from the previous measurement;
d) The most recent measurement of the real or imaginary parts of the impedance, measured at least annually is within 5Ω from the previous measurement.
2) Network analyzer probe calibration against air, distilled water and a short block performed before measuring liquid parameters.

# 2. RF EMISSIONS MEASUREMENT

## 2.1 TEST FACILITY

The test facilities used to collect the test data in this report is SAR room at the location of Room 108, Building 2, No.1, Yile Road, Songshan Lake Zone, Dongguan City, Guangdong, People's Republic of China.

## 2.2 MEASUREMENT UNCERTAINTY

Note: 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.

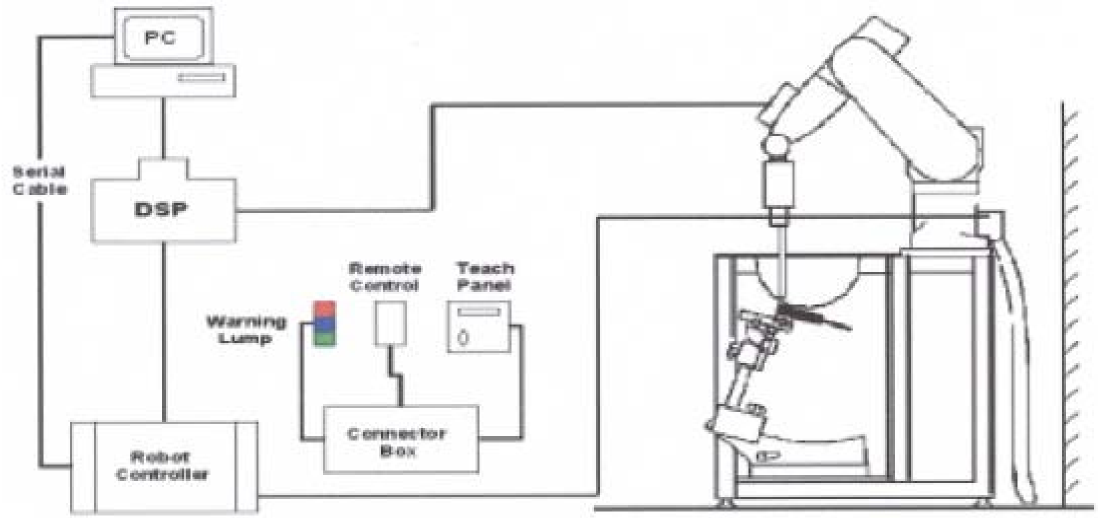
# 3. SAR MEASUREMENTS SYSTEM CONFIGURATION

## 3.1 SAR MEASUREMENT SET-UP

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

1. A standard high precision 6-axis robot (Stäubli RX family) with controller and software. An arm extension for accommodating the data acquisition electronics (DAE).
2. 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.
3. A data acquisition electronic (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.
4. A unit to operate the optical surface detector which is connected to the EOC.
5. The Electro-Optical Coupler (EOC) performs the conversion from the optical into a digital electric signal of the DAE. The EOC is connected to the DASY5 measurement server.
6. TheDASY5 measurement server, which performs all real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operation. A computer operating Windows 7
7. DASY5 software and SEMCAD data evaluation software.
8. Remote control with teach panel and additional circuitry for robot safety such as warning lamps, etc.
9. The generic twin phantom enabling the testing of left-hand and right-hand usage.
10. The device holder for handheld mobile phones.
11. Tissue simulating liquid mixed according to the given recipes.
12. System validation dipoles allowing to validate the proper functioning of the system.

### 3.1.1 TEST SETUP LAYOUT



### 3.2 DASY5 E-FIELD PROBE SYSTEM

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

#### 3.2.1 PROBE SPECIFICATION

| | |
|---|---|
| Construction | Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges 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 HSL (rotation around probe axis)<br>± 0.5 dB in tissue material (rotation normal to probe axis) |
| Dynamic Range | 10 µW/g to > 100 mW/g<br>Linearity:± 0.2dB |
| Dimensions | Overall length: 330 mm (Tip: 20 mm)<br>Tip diameter: 2.5 mm (Body: 12 mm) Distance from probe tip to dipole centers: 1.0 mm |

**E-field Probe**

### 3.2.2 E-FIELD PROBE CALIBRATION

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

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

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

$$SAR = C\frac{\Delta T}{\Delta t}$$

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

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

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

Or $$SAR = \frac{|E|^2 \sigma}{\rho}$$

Where: $\sigma$ = Simulated tissue conductivity,

$\rho$ = Tissue density (kg/m3).

### 3.2.3 OTHER TEST EQUIPMENT

#### 3.2.3.1. Device Holder for Transmitters

**Construction:** Simple but effective and easy-to-use extension for Mounting Device that facilitates the testing of larger devices (e.g., laptops, cameras, etc.) It is light weight and fits easily on the upper part of the Mounting Device in place of the phone positioner. The extension is fully compatible with the Twin SAM, ELI and SAM v6.0 Phantoms.
**Material:** POM, Acrylic glass, Foam

#### 3.2.3.2 Phantom

<table>
<tr><td>Model</td><td>Twin SAM</td><td rowspan="6"></td></tr>
<tr><td>Construction</td><td>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.</td></tr>
<tr><td>Shell Thickness</td><td>2 ± 0.2 mm</td></tr>
<tr><td>Filling Volume</td><td>Approx. 25 liters</td></tr>
<tr><td>Dimensions</td><td>Length:1000mm; Width: 500mm<br>Height: adjustable feet</td></tr>
<tr><td>Aailable</td><td>Special</td></tr>
</table>

### 3.2.4 SCANNING PROCEDURE

The DASY5 installation includes predefined files with recommended procedures for measurements and validation. They are read-only document files and destined as fully defined but unmeasured masks. All test positions (head or body-worn) are tested with the same configuration of test steps differing only in the grid definition for the different test positions.

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. The indicated drift is mainly the variation of the DUT’s output power and should vary max. ± 5 %.

The “surface check” measurement tests the optical surface detection system of the DASY5 system by repeatedly detecting the surface with the optical and mechanical surface detector and comparing the results. The output gives the detecting heights of both systems, the difference between the two systems and the standard deviation of the detection repeatability. Air bubbles or refraction in the liquid due to separation of the sugar-water mixture gives poor repeatability (above ± 0.1mm). To prevent wrong results tests are only executed when the liquid is free of air bubbles. The difference between the optical surface detection and the actual surface depends on the probe and is specified with each probe. (It does not depend on the surface reflectivity or the probe angle to the surface within ± 30°.)

- Area Scan

The “area scan” measures the SAR above the DUT or verification dipole on a parallel plane to the surface. It is used to locate the approximate location of the peak SAR with 2D spline interpolation. The robot performs a stepped movement along one grid axis while the local electrical field strength is measured by the probe. The probe is touching the surface of the SAM during acquisition of measurement values. The standard scan uses large grid spacing for faster measurement. Standard grid spacing for head measurements is 15 mm in x- and y- dimension (≤2GHz), 12 mm in x- and y- dimension (2-4 GHz) and 10mm in x- and y- dimension (4-6GHz). If a finer resolution is needed, the grid spacing can be reduced. Grid spacing and orientation have no influence on the SAR result. For special applications where the standard scan method does not find the peak SAR within the grid, e.g. mobile phones with flip cover, the grid can be adapted in orientation.

- Zoom Scan

A “zoom scan” measures the field in a volume around the 2D peak SAR value acquired in the previous “coarse” scan. This is a fine grid with maximum scan spatial resolution: $\Delta x_{zoom}$, $\Delta y_{zoom}$≤2GHz -≤8mm, 2-4GHz -≤5 mm and 4-6 GHz-≤4mm; $\Delta z_{zoom}$≤3GHz -≤5 mm, 3-4 GHz-≤4mm and 4-6GHz-≤2mm where the robot additionally moves the probe along the z-axis away from the bottom of the Phantom. DASY is also able to perform repeated zoom scans if more than 1 peak is found during area scan. In this document, the evaluated peak 1g and 10g averaged SAR values are shown in the 2D-graphics in Appendix B. Test results relevant for the specified standard (see chapter 1.4.) are shown in table form in chapter 7.2.

A Z-axis scan measures the total SAR value at the x-and y-position of the maximum SAR value found during the cube scan. The probe is moved away in z-direction from the bottom of the SAM phantom in 2 mm steps. This measurement shows the continuity of the liquid and can - depending in the field strength – also show the liquid depth.

The following table summarizes the area scan and zoom scan resolutions per FCC KDB 865664D01:

| Frequency | Maximun Area Scan resolution ($\Delta x_{area}$, $\Delta y_{area}$) | Maximun Zoom Scan spatial resolution ($\Delta x_{Zoom}$, $\Delta y_{Zoom}$) | Maximun Zoom Scan spatial resolution | | | Minimum zoom scan volume (x,y,z) |
|---|---|---|---|---|---|---|
| | | | Uniform Grid | Graded Grad | | |
| | | | $\Delta z_{Zoom}(n)$ | $\Delta z_{Zoom}(1)$* | $\Delta z_{Zoom}(n>1)$* | |
| ≤2GHz | ≤15mm | ≤8mm | ≤5mm | ≤4mm | ≤1.5*$\Delta z_{Zoom}$(n-1) | ≥30mm |
| 2-3GHz | ≤12mm | ≤5mm | ≤5mm | ≤4mm | ≤1.5*$\Delta z_{Zoom}$(n-1) | ≥30mm |
| 3-4GHz | ≤12mm | ≤5mm | ≤4mm | ≤3mm | ≤1.5*$\Delta z_{Zoom}$(n-1) | ≥28mm |
| 4-5GHz | ≤10mm | ≤4mm | ≤3mm | ≤2.5mm | ≤1.5*$\Delta z_{Zoom}$(n-1) | ≥25mm |
| 5-6GHz | ≤10mm | ≤4mm | ≤2mm | ≤2mm | ≤1.5*$\Delta z_{Zoom}$(n-1) | ≥22mm |

### 3.2.5 SPATIAL PEAK SAR EVALUATION

The spatial peak SAR - value for 1 and 10 g is evaluated after the Cube measurements have been done. The basis of the evaluation are the SAR values measured at the points of the fine cube grid consisting of 5 x 5 x 7 points (with 8mm horizontal resolution) or 7 x 7 x 7 points (with 5mm horizontal resolution) or 8 x 8 x 7 points (with 4mm horizontal resolution). The algorithm that finds the maximal averaged volume is separated into three different stages.

- The data between the dipole center of the probe and the surface of the phantom are extrapolated. This data cannot be measured since the center of the dipole is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is about 1 mm (see probe calibration sheet). The extrapolated data from a cube measurement can be visualized by selecting “Graph Evaluated”.
- The maximum interpolated value is searched with a straight-forward algorithm. Around this maximum the SAR - values averaged over the spatial volumes (1g or 10 g) are computed using the 3d-spline interpolation algorithm. If the volume cannot be evaluated (i.e., if a part of the grid was cut off by the boundary of the measurement area) the evaluation will be started on the corners of the bottom plane of the cube.
- All neighboring volumes are evaluated until no neighboring volume with a higher average value is found.

**Extrapolation**

The extrapolation is based on a least square algorithm [W. Gander, Computer mathematic, p.168-180]. Through the points in the first 3 cm along the z-axis, polynomials of order four are calculated. These polynomials are then used to evaluate the points between the surface and the probe tip. The points, calculated from the surface, have a distance of 1 mm from each other.

**Interpolation**

The interpolation of the points is done with a 3d-Spline. The 3d-Spline is composed of three one-dimensional splines with the "Not a knot"-condition [W. Gander, Computer mathematic, p.141-150] (x, y and z -direction) [Numerical Recipes in C, Second Edition, p.123ff].

**Volume Averaging**

At First the size of the cube is calculated. Then the volume is integrated with the trapezoidal algorithm. 8000 points (20x20x20) are interpolated to calculate the average.

**Advanced Extrapolation**

DASY5 uses the advanced extrapolation option which is able to compensate boundary effects on E-field probes.

### 3.2.6 DATA STORAGE AND EVALUATION

#### 3.2.6.1 Data Storage

The DASY5 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 “DAE”. 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], [mW/g], [mW/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.

### 3.2.7 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, $a_{i0}$, $a_{i1}$, $a_{i2}$ |
| | Conversion factor | $ConvF_i$ |
| | Diode compression point | $Dcp_i$ |
| Device parameters: | Frequency | f |
| | Crest factor | cf |
| Media parameters: | Conductivity | |
| | Density | |

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 DASY5 components. In the direct measuring mode of the multi meter 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 | $V_i$ = compensated signal of channel i | ( i = x, y, z ) |
| | $U_i$ = 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 $V_i$ = compensated signal of channel i ( i = x, y, z )

$Norm_i$ = 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]

$E_i$ = electric field strength of channel i in V/m

$H_i$ = 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.

$$SAR = (E_{tot})^2 \cdot \boldsymbol{\sigma} / (\boldsymbol{\rho} \cdot 1000)$$

With SAR = local specific absorption rate in mW/g

$E_{tot}$ = total field strength in V/m

= conductivity in [mho/m] or [Siemens/m]

= equivalent tissue density in $g/cm^3$

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.

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

With $P_{pwe}$ = equivalent power density of a plane wave in $mW/cm^2$

$E_{tot}$ = total field strength in V/m

$H_{tot}$ = total magnetic field strength in A/m

# 4. SYSTEM VERIFICATION PROCEDURE

## 4.1 TISSUE VERIFICATION

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

The following materials are used for producing the tissue-equivalent materials.

| Tissue Type | Bactericide | DGBE | HEC | NaCl | Sucrose | Triton X-100 | Water | Diethylene Glycol Mono-hexylether |
|---|---|---|---|---|---|---|---|---|
| Head 750 | 0.2 | - | 0.2 | 1.5 | 56.0 | - | 42.1 | - |
| Head 835 | 0.2 | - | 0.2 | 1.5 | 57.0 | - | 41.1 | - |
| Head 1750 | - | 47.0 | - | 0.4 | - | - | 52.6 | - |
| Head 1900 | - | 44.5 | - | 0.2 | - | - | 55.3 | - |

Salt: 99+% Pure Sodium Chloride; Sugar: 98+% Pure Sucrose; Water: De-ionized, 16M + resistivity
HEC: Hydroxyethyl Cellulose; DGBE: 99+% Di(ethylene glycol) butyl ether,[2-(2-butoxyethoxy)ethanol]
Triton X-100(ultra pure): Polyethylene glycol mono [4-(1,1,3,3-tetramethylbutyl)phenyl]ether

| Tissue Verification | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Tissue Type | Frequency (MHz) | Liquid Temp. (℃) | Conductivity (σ) | Permittivity (εr) | Targeted Conductivity (σ) | Targeted Permittivity (εr) | Deviation Conductivity (σ) (%) | Deviation Permittivity (εr) (%) | Date |
| Head | 750 | 22.2 | 0.887 | 42.826 | 0.89 | 41.9 | -0.34 | 2.21 | Sep. 02, 2021 |
| Head | 750 | 22.0 | 0.882 | 42.860 | 0.89 | 41.9 | -0.90 | 2.29 | Sep. 26, 2021 |
| Head | 835 | 22.2 | 0.914 | 42.151 | 0.90 | 41.5 | 1.56 | 1.57 | Sep. 02, 2021 |
| Head | 835 | 22.4 | 0.908 | 42.186 | 0.90 | 41.5 | 0.89 | 1.65 | Sep. 25, 2021 |
| Head | 1750 | 22.5 | 1.391 | 39.715 | 1.37 | 40.1 | 1.53 | -0.96 | Sep. 03, 2021 |
| Head | 1750 | 22.5 | 1.390 | 39.947 | 1.37 | 40.1 | 1.46 | -0.38 | Sep. 24, 2021 |
| Head | 1900 | 22.3 | 1.335 | 40.760 | 1.40 | 40.0 | -4.64 | 1.90 | Sep. 04, 2021 |
| Head | 1900 | 22.3 | 1.335 | 40.897 | 1.40 | 40.0 | -4.64 | 2.24 | Sep. 24, 2021 |

Note:
1) 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.
2) KDB 865664 was ensured to be applied for probe calibration frequencies greater than or equal to 50MHz of the EUT frequencies.
3) The above measured tissue parameters were used in the DASY software to perform interpolation via the DASY software to determine actual dielectric parameters at the test frequencies. The SAR test plots may slightly differ from the table above since the DASY rounds to three significant digits.

## 4.2 SYSTEM CHECK

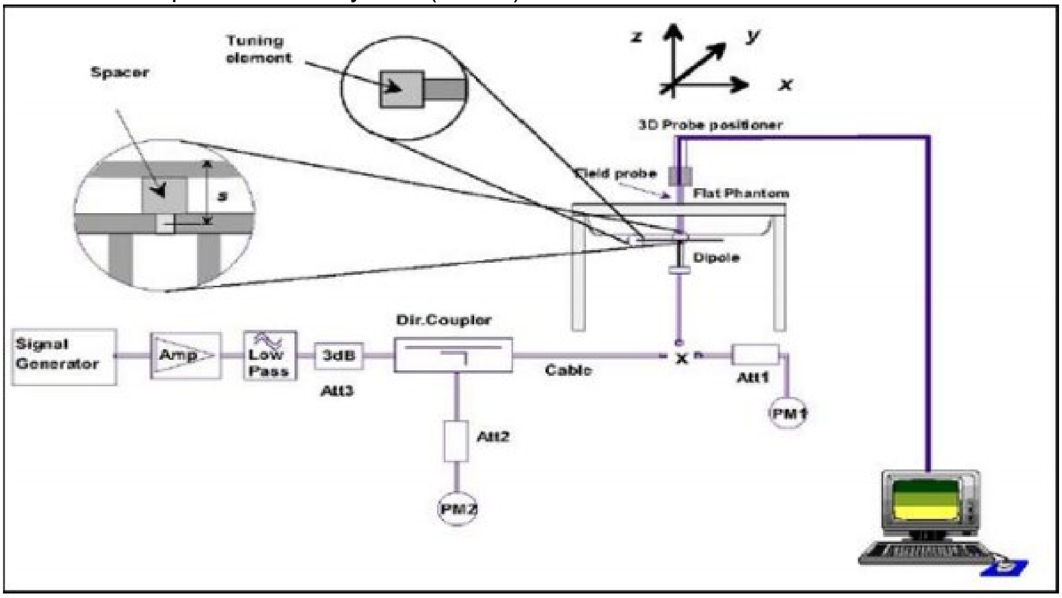
The system check is performed for verifying the accuracy of the complete measurement system and performance of the software. The system check is performed with tissue equivalent material according to IEEE Std 1528 (described above). The following table shows system check results for all frequency bands and tissue liquids used during the tests.

| System Check | Date | Frequency (MHz) | Targeted SAR-1g (W/kg) | Measured SAR-1g (W/kg) | normalized SAR-1g (W/kg) | Deviation (%) | Dipole S/N |
|---|---|---|---|---|---|---|---|
| Head | Sep. 02, 2021 | 750 | 8.59 | 2.02 | 8.08 | -5.94 | 1095 |
| Head | Sep. 26, 2021 | 750 | 8.59 | 2.10 | 8.40 | -2.21 | 1095 |
| Head | Sep. 02, 2021 | 835 | 9.52 | 2.46 | 9.84 | 3.36 | 4d160 |
| Head | Sep. 25, 2021 | 835 | 9.52 | 2.28 | 9.12 | -4.20 | 4d160 |
| Head | Sep. 03, 2021 | 1750 | 36.40 | 9.05 | 36.20 | -0.55 | 1101 |
| Head | Sep. 24, 2021 | 1750 | 36.40 | 8.72 | 34.88 | -4.18 | 1101 |
| Head | Sep. 04, 2021 | 1900 | 39.60 | 9.88 | 39.52 | -0.20 | 5d179 |
| Head | Sep. 24, 2021 | 1900 | 39.60 | 9.58 | 38.32 | -3.23 | 5d179 |

## 4.3 SYSTEM CHECK PROCEDURE

The system check is performed by using a system check dipole which is positioned parallel to the planar part of the SAM phantom at the reference point. The distance of the dipole to the SAM phantom is determined by a plexiglass spacer. 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 250mW (below 3GHz) or 100mW (3-6GHz). To adjust this power a power meter is used.
The power sensor is connected to the cable before the system check 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 check 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.

System check results have to be equal or near the values determined during dipole calibration (target SAR in table above) with the relevant liquids and test system (±10 %).



# 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.

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.

The detailed repeated measurement results are shown in Section 7.2.

# 6. OPERATIONAL CONDITIONS DURING TEST

## 6.1 SAR TEST CONFIGURATION

### 6.1.1 UMTS TEST CONFIGURATION

1. Output Power Verification

Maximum output power is verified on the High, Middle and Low channels according to the procedures description in section 5.2 of 3GPP TS 34.121, using the appropriate RMC or AMR with TPC (transmit power control) set to all “1s” for WCDMA/HSDPA or by applying the required inner loop power control procedures to maintain maximum output power while HSUPA is active. Result for all applicable physical channel configurations (DPCCH, DPDCHn and spreading codes, HSDPA, HSPA) should be tabulated in the SAR report. All configuration that are not supported by the DUT or cannot be measured due to technical or equipment limitation should be clearly identified.

2. WCDMA

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

(2) Body SAR Measurements
SAR for body-worn accessory is measured using the 12.2 kbps RMC with the TPC bits configured to all “1s”. The 3G SAR test reduction procedure is applied to other spreading codes and multiple DPDCHn configurations supported by handset with 12.2 kbps RMC as the primary mode.

3. HSDPA

SAR for body exposure configurations is measured according to the “Body SAR Measurements” procedures of 3G device. When the maximum output power and tune-up tolerance specified for production units in a secondary mode is ≤ ¼ dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2W/kg, SAR measurement is not required for the secondary mode. This is referred to as the 3G SAR test reduction procedure in the following SAR test guidance, where the primary mode is identified in the applicable wireless mode test procedures and the secondary mode is wireless mode being considered for SAR test reduction by that procedure. When the 3G SAR test reduction procedure is not satisfied, it is identified as “otherwise” in the applicable procedures; SAR measurement is required for the secondary mode.

Per KDB941225 D01, the 3G SAR test reduction procedure is applied to HSDPA body configurations with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured for HSDPA using the HSDPA body SAR procedures for the highest reported SAR body exposure configuration in 12.2 kbps RMC.

HSDPA should be configured according to UE category of a test device. The number of HS-DSCH/HS-PDSCHs, HAPRQ processes, minimum inter-TTI interval, transport block sizes and RV coding sequence are defined by the H-set. To maintain a consistent test configuration and stable transmission condition, QPSK is used in the H-set for SAR testing. HS-DPCCH should be configured with a CQI feedback cycle of 4ms with a CQI repetition factor of 2 to maintain a constant rate of active CQI slots. The $\beta_c$ and $\beta_d$ gain factors for DPCCH and DPDCH were set according to the values in the below table, $\beta_{hs}$ for HS-DPCCH is set automatically to the correct value when ΔACK, ΔNACK, ΔCQI = 8. The variation of the $\beta_c$ / $\beta_d$ ratio causes a power reduction at sub-tests 2 - 4.

| Sub-test | $\beta_c$ | $\beta_d$ | $\beta_d$ (SF) | $\beta_c$ / $\beta_d$ | $\beta_{hs}$ (1) | CM(dB)(2) | MPR (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2/15 | 15/15 | 64 | 2/15 | 4/15 | 0.0 | 0 |
| 2 | 12/15(3) | 15/15(3) | 64 | 12/15(3) | 24/15 | 1.0 | 0 |
| 3 | 15/15 | 8/15 | 64 | 15/8 | 30/15 | 1.5 | 0.5 |
| 4 | 15/15 | 4/15 | 64 | 15/4 | 30/15 | 1.5 | 0.5 |

Note 1: ΔACK, ΔNACK and ΔCQI = 8 $A_{hs} = \beta_{hs}/\beta_c = 30/15$ $\beta_{hs} = 30/15 * \beta_c$
Note 2 : CM=1 for $\beta_c/\beta_d$ = 12/15, $\beta_{hs}/\beta_c = 24/15$. For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.
Note 3 : For subtest 2 the $\beta_c/\beta_d$ ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1,TF1) to $\beta_c$ = 11/15 and $\beta_d$ = 15/15

The measurements were performed with a Fixed Reference Channel (FRC) and H-Set 1 QPSK.

Settings of required H-Set 1 QPSK acc. to 3GPP 34.121

| Parameter | Value |
|---|---|
| Nominal average inf. bit rate | 534 kbit/s |
| Inter-TTI Distance | 3 TTI"s |
| Number of HARQ Processes | 2 Processes |
| Information Bit Payload | 3202 Bits |
| MAC-d PDU size | 336 Bits |
| Number Code Blocks | 1 Block |
| Binary Channel Bits Per TTI | 4800 Bits |
| Total Available SMLs in UE | 19200 SMLs |
| Number of SMLs per HARQ Process | 9600 SMLs |
| Coding Rate | 0.67 |
| Number of Physical Channel Codes | 5 |

HSDPA UE category

| HS-DSCH Category | Maximum HS-DSCH Codes Received | Minimum Inter-TTI Interval | Maximum HS-DSCH Transport Block Bits/HS-DSCH TTI | Total Soft Channel Bits |
|---|---|---|---|---|
| 1 | 5 | 3 | 7298 | 19200 |
| 2 | 5 | 3 | 7298 | 28800 |
| 3 | 5 | 2 | 7298 | 28800 |
| 4 | 5 | 2 | 7298 | 38400 |
| 5 | 5 | 1 | 7298 | 57600 |
| 6 | 5 | 1 | 7298 | 67200 |
| 7 | 10 | 1 | 14411 | 115200 |
| 8 | 10 | 1 | 14411 | 134400 |
| 9 | 15 | 1 | 25251 | 172800 |
| 10 | 15 | 1 | 27952 | 172800 |
| 11 | 5 | 2 | 3630 | 14400 |
| 12 | 5 | 1 | 3630 | 28800 |
| 13 | 15 | 1 | 34800 | 259200 |
| 14 | 15 | 1 | 42196 | 259200 |
| 15 | 15 | 1 | 23370 | 345600 |
| 16 | 15 | 1 | 27952 | 345600 |

4. HSUPA

SAR for Body exposure configurations is measured according to the "Body SAR Measurements" procedures of 3G device. When the maximum output power and tune-up tolerance specified for production units in a secondary mode is ≤ ¼ dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2W/kg, SAR measurement is not required for the secondary mode.

Per KDB941225 D01, the 3G SAR test reduction procedures is applied to HSPA (HSUPA/HSDPA with RMC) body configurations with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured for HSPA using the HSPA body SAR procedures for the highest reported body exposure SAR configuration in 12.2 kbps RMC.

Due to inner loop power control requirements in HSUPA, a commercial communication test set should be used for the output power and SAR tests. The 12.2 kbps RMC, FRC H-set 1 and E-DCH configurations for HSDPA should be configured according to the values indicated below as well as other applicable procedures described in the "WCDMA Handset" and "Release 5 HSDPA Data Device" sections of 3G device.

Subtests for WCDMA Release 6 HSUPA

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

Note 1: ΔACK, ΔNACK and ΔCQI = 8 $A_{hs} = \beta_{hs}/\beta_c = 30/15$ $\beta_{hs} = 30/15 * \beta_c$

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

Note 3 : For subtest 1 the $\beta_c/\beta_d$ ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1,TF1) to $\beta_c = 10/15$ and $\beta_d = 15/15$

Note 4 : For subtest 5 the $\beta_c/\beta_d$ ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1,TF1) to $\beta_c = 14/15$ and $\beta_d = 15/15$

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

Note 6: $\beta_{ed}$ can not be set directly; it is set by Absolute Grant Value.

HSUPA UE category

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

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

5. DC-HSDPA

SAR is required for Rel. 8 DC-HSDPA when SAR is required for Rel.5 HSDPA; otherwise, the 3G SAR test reduction procedure is applied to DC-HSDPA with 12.2 kbps RMC as the primary mode.
Power is measured for DC-HSDPA according to the H-Set 12, FRC configuration in Table C.8.1.12 of 3GPP TS 34.121-1 to determine SAR test reduction. A primary and a Second serving HS-DSCH cell are required to perform the power measurement and for the results to be acceptable.

The following tests were completed according to procedures in section 7.3.13 of 3GPP TS 34.108 v9.5.0. A summary of these settings are illustrated below:

Downlink Physical Channels are set as per 3GPP TS34.121-1 v9.0.0 E.5.0
Levels for HSDPA connection setup

| Parameter During Connection setup | Unit | Value |
|---|---|---|
| P-CPICH_Ec/Ior | dB | -10 |
| P-CCPCH and SCH_Ec/Ior | dB | -12 |
| PICH _Ec/Ior | dB | -15 |
| HS-PDSCH | dB | off |
| HS-SCCH_1 | dB | off |
| DPCH_Ec/Ior | dB | -5 |
| OCNS_Ec/Ior | dB | -3.1 |

Call is set up as per 3GPP TS34.108 v9.5.0 sub clause 7.3.13
The configurations of the fixed reference channels for HSDPA RF tests are described in 3GPP TS 34.121, annex C for FDD and 3GPP TS 34.122.
The measurements were performed with a Fixed Reference Channel (FRC) H-Set 12 with QPSK

| Parameter | Value |
|---|---|
| Nominal average inf. bit rate | 60 kbit/s |
| Inter-TTI Distance | 1 TTI"s |
| Number of HARQ Processes | 6 Processes |
| Information Bit Payload | 120 Bits |
| Number Code Blocks | 1 Block |
| Binary Channel Bits Per TTI | 960 Bits |
| Total Available SMLs in UE | 19200 SMLs |
| Number of SMLs per HARQ Process | 3200 SMLs |
| Coding Rate | 0.15 |
| Number of Physical Channel Codes | 1 |

Note:
1.The RMC is intended to be used for DC-HSDPA mode and both cells shall transmit with identical parameters as listed in the table above.
2.Maximum number of transmission is limited to 1,i.e.,retransmission is not allowed. The redundancy and constellation version 0 shall be used.

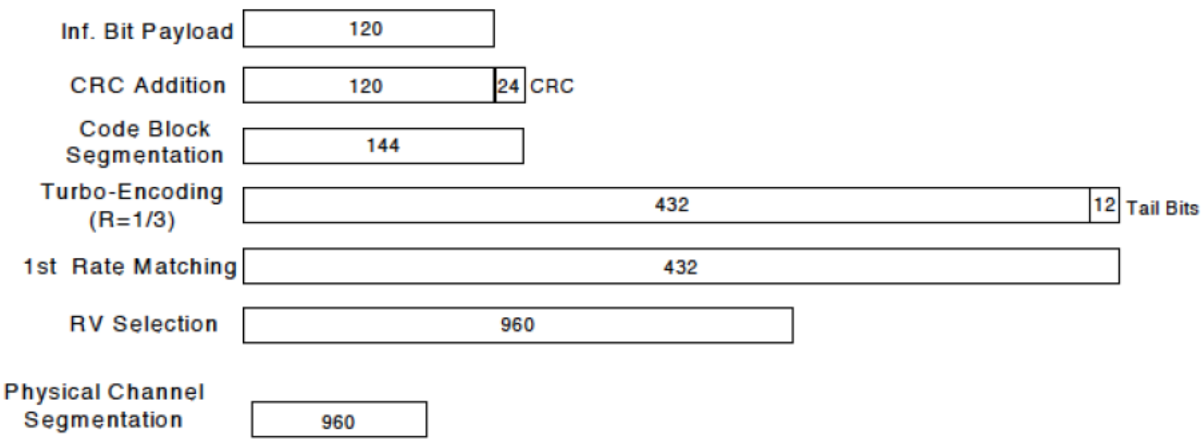



**Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)**

The following 4 Sub-tests for HSDPA were completed according to Release 5 procedures. A summary of subtest settings are illustrated below:

| Sub-test | $\beta_c$ | $\beta_d$ | $\beta_d$ (SF) | $\beta_c/\beta_d$ | $\beta_{hs}$ (1) | CM(dB)(2) | MPR (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2/15 | 15/15 | 64 | 2/15 | 4/15 | 0.0 | 0 |
| 2 | 12/15(3) | 15/15(3) | 64 | 12/15(3) | 24/15 | 1.0 | 0 |
| 3 | 15/15 | 8/15 | 64 | 15/8 | 30/15 | 1.5 | 0.5 |
| 4 | 15/15 | 4/15 | 64 | 15/4 | 30/15 | 1.5 | 0.5 |

Note 1: ΔACK, ΔNACK and ΔCQI = 8  $A_{hs}=\beta_{hs}/\beta_c=30/15$  $\beta_{hs}=30/15*\beta_c$
Note 2 : CM=1 for $\beta_c/\beta_d=12/15$, $\beta_{hs}/\beta_c=24/15$. For all other combinations of DPDCH,DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.
Note 3 : For subtest 2 the $\beta_c/\beta_d$ ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1,TF1) to $\beta_c=11/15$ and $\beta_d=15/15$

Up commands are set continuously to set the UE to Max power.

6. HSPA+

An E-DCH call is set up according to TS 34.108 [3] 7.3.9 with the following exceptions in the RADIO BEARER SETUP messages. These exceptions allow the beta values to be set according to table C.11.1.4 and each UL physical channel to be at constant power at the start of the measurement. RF parameters are set up according to table E.5.A.1. Settings for the serving cell are defined in table 5.2E.4. Uplink SRB for DCCH mapped on E-DCH and downlink SRB for DCCH on DCH. E-DCH is configured with 2ms TTI.

**Table C.11.1.4: β values for transmitter characteristics tests with HS-DPCCH and E-DCH with 16QAM**

| Sub-test | $\beta_c$ (Note3) | $\beta_d$ | $\beta_{HS}$ (Note1) | $\beta_{ec}$ | $\beta_{ed}$ (2xSF2) (Note 4) | $\beta_{ed}$ (2xSF4) (Note 4) | CM (dB) (Note 2) | MPR (dB) (Note 2) | AG Index (Note 4) | E-TFCI (Note 5) | E-TFCI (boost) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 0 | 30/15 | 30/15 | $\beta_{ed}$1: 30/15<br>$\beta_{ed}$2: 30/15 | $\beta_{ed}$3: 24/15<br>$\beta_{ed}$4: 24/15 | 3.5 | 2.5 | 14 | 105 | 105 |

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

Note 2: CM = 3.5 and the MPR is based on the relative CM difference, MPR = MAX(CM-1,0).

Note 3: DPDCH is not configured, therefore the $\beta_c$ is set to 1 and $\beta_d$ = 0 by default.

Note 4: $\beta_{ed}$ can not be set directly; it is set by Absolute Grant Value.

Note 5: All the sub-tests require the UE to transmit 2SF2+2SF4 16QAM EDCH and they apply for UE using E-DPDCH category 7. E-DCH TTI is set to 2ms TTI and E-DCH table index = 2. To support these E-DCH configurations DPDCH is not allocated. The UE is signaled to use the extrapolation algorithm.

Note:
1. The Dual Carriers transmission support HSDPA and HSUPA physical channels.
2. The Dual Carriers belong to the same Node and are on adjacent carriers.
3. The Dual Carriers do not support MIMO to serve UEs configured for dual cell operation.
4. The Dual Carriers operate in the same frequency band.
5. The device doesn't support the modulation of 16QAM in uplink but 64QAM in downlink for DC-HSDPA mode.
6. The device doesn’t support carrier aggregation for it just can operate in Release 8.

### 6.1.2 LTE TEST CONFIGURATION

SAR for LTE band exposure configurations is measured according to the procedures of KDB 941225 D05 SAR for LTE Devices. The CMW500 Wide Band Radio Communication Tester was used for LTE output power measurements and SAR testing. Closed loop power control was used so the UE transmits with maximum output power during SAR testing. SAR test were performed with the same number of RB and RB offsets transmitting on all TTI frames (Maximum TTI).

**1. Spectrum Plots for RB configurations**
A properly configured base station simulator was used for LTE output power measurements and SAR testing. Therefore, spectrum plots for RB configurations were not required to be included in this report.

**2. MPR**
When MPR is implemented permanently within the UE, regardless of network requirements, only those RB configurations allowed by 3GPP for the channel bandwidth and modulation. Combinations may be tested with MPR active. Configurations with RB allocations less than the RB thresholds required by 3GPP must be tested without MPR.
The allowed Maximum Power Reduction (MPR) for the maximum output power due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1 of the 3GPP TS36.101:

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

| Modulation | Channel bandwidth / Transmission bandwidth ($N_{RB}$) | | | | | | MPR (dB) |
|---|---|---|---|---|---|---|---|
| | 1.4 MHz | 3.0 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz | |
| QPSK | > 5 | > 4 | > 8 | > 12 | > 16 | > 18 | ≤ 1 |
| 16 QAM | ≤ 5 | ≤ 4 | ≤ 8 | ≤ 12 | ≤ 16 | ≤ 18 | ≤ 1 |
| 16 QAM | > 5 | > 4 | > 8 | > 12 | > 16 | > 18 | ≤ 2 |

**3. A-MPR**

A-MPR (Additional MPR) has been disabled for all SAR tests by using Network Signalling Value of “NS_01” on the base station simulator.

**4. LTE procedures for SAR testing**

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

i) QPSK with 1 RB allocation

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

ii) QPSK with 50% RB allocation

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

iii) QPSK with 100% RB allocation

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

iv) Higher order modulations

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

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

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

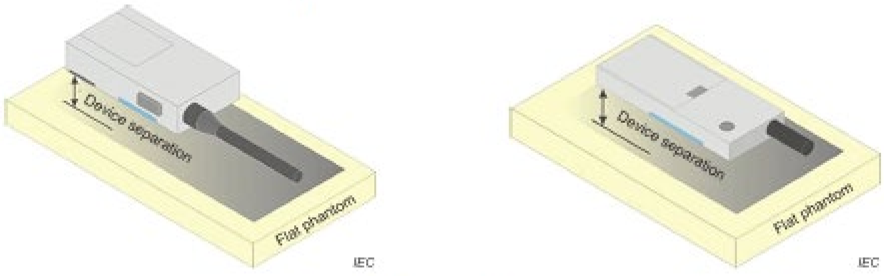
## 6.2 TEST POSITION

### 6.2.1 TEST MODE

The device does not have telephone receiver. Next to the ear operation is not supported. So the additional Head SAR testing for this device is not required.

The device connects to UMTS/LTE network once every 5 mins to send data for report location, each data transmission takes about 2 secs, for this mode is belong the body-worn mode, but it's below the low duty cycle device, so the body-worn SAR is not required.
The SAR Test Exclusion Power Thresholds please refer the MPE report refer the "BTL-FCCP-3-2108H047".

The device is support the push-tp-talk function, when the user push button, device will be start the emergency call. User can talk on front face, so we test front face at 10m.




b) Two-way radios

When user is on calling, the device will be hold on the hand, so we test the hand-held for front face, rear face, right side, left side, top side and bottom side at 0mm.

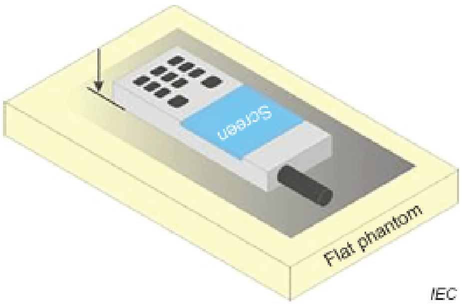
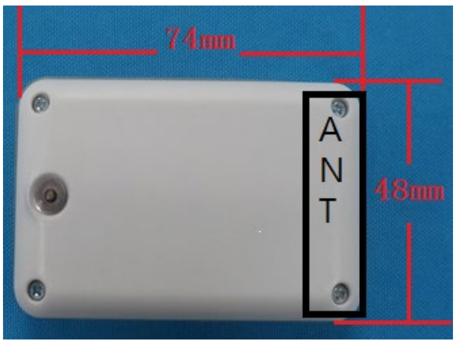



**Figure 11 – Test position for hand-held devices, not used at the head or torso**

### 6.2.2 ANTENNAS DETAILS

The location of the antennas inside EUT is shown as below picture:



### 6.2.3 HANDHELD PUSH-TO-TALK TEST CONFIGURATION

Per FCC KDB 447498 D01, when a body-worn accessory is not supplied with the PTT radio, a test separation distance ≤ 10 mm, applicable to the device form factor, must be applied to determine body-worn accessory SAR test exclusion. A test separation distance of 25 mm must be applied for in-front-of the face SAR test exclusion and SAR measurements.

### 6.2.4 EXTREMITY EXPOSURE TEST CONFIGURATION

Per KDB 447498 D01, 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. When the device also operates in close proximity to the user's body, SAR compliance for the body is also required. The 1-g body and 10-g extremity SAR Test Exclusion Thresholds in 4.3 should be applied to determine SAR test requirements. When extremity SAR testing is required, a flat phantom must be used if the exposure condition is more conservative than the actual use conditions; otherwise, a KDB inquiry is required to determine the phantom and test requirements. Body SAR compliance is also tested with a flat phantom. For devices with irregular shapes or form factors that do not conform to a flat phantom, and/or unusual operating configurations and exposure conditions, a KDB inquiry is also required to determine the appropriate SAR measurement procedures.

# 7. TEST RESULT

## 7.1 CONDUCTED POWER RESULTS

The conducted power measurement result please refer to Appendix E.

## 7.2 SAR TEST RESULTS

**General Notes:**
1) Per KDB447498 D01, all measurement SAR results are scaled to the maximum tune-up tolerance limit to demonstrate compliant.
2) Per KDB447498 D01, testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is: ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz. When the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel must be used.
3) Per KDB865664 D01, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥ 0.8W/kg; if the deviation among the repeated measurement is ≤ 20%, and the measured SAR < 1.45W/kg, only one repeated measurement is required.
4) Per KDB941225 D06, the DUT Dimension is bigger than 9 cm x 5 cm, so 10mm is chosen as the test separation distance for Hotspot mode. When the antenna-to-edge distance is greater than 2.5cm, such position does not need to be tested.
5) Per KDB648474 D04, SAR is evaluated without a headset connected to the device. When the standalone reported body-worn SAR is ≤1.2 W/kg, no additional SAR evaluations using a headset are required.
6) Per KDB865664 D02, SAR plot is only required for the highest measured SAR in each exposure configuration, wireless mode and frequency band combination; Plots are also required when the measured SAR is > 1.5 W/kg, or > 7.0 W/kg for occupational exposure. The published RF exposure KDB procedures may require additional plots; for example, to support SAR to peak location separation ratio test exclusion and/or volume scan post-processing.

**UMTS Notes:**

Per KDB941225 D01, When the maximum output power and tune-up tolerance specified for production units in a secondary mode is ≤ ¼ dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode.

**LTE notes:**

1) The LTE test configurations are determined according to KDB941225 D05 SAR for LTE Devices. The general test procedures used for SAR testing can be found in Section 7.1.3.
2) A-MPR was disabled for all SAR test by setting NS_01 on the base station simulator. SAR tests were performed with the same number of RB and RB offsets transmitting on all TTI frames (maximum TTI).

### 7.2.1 SAR MEASUREMENT RESULT OF PTT

1. PTT SAR test results of UMTS

| Test No. | Band | Mode | Channel | Test Position | Separation Distance (cm) | Maximum Tune-up (dBm) | Conducted Power (dBm) | Power Drift (dB) | SAR 1g (W/kg) | SAR 10g (W/kg) | Reported 1g SAR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U29 | UMTS B2 | RMC12.2K | 9400 | Front Face | 1.0 | 25 | 23.15 | -0.07 | **0.605** | **0.372** | **0.926** |
| U30 | UMTS B2 | RMC12.2K | 9262 | Front Face | 1.0 | 25 | 23.13 | 0.05 | 0.600 | 0.334 | 0.923 |
| U31 | UMTS B2 | RMC12.2K | 9538 | Front Face | 1.0 | 25 | 23.16 | 0.18 | 0.545 | 0.305 | 0.833 |
| U33 | UMTS B4 | RMC12.2K | 1413 | Front Face | 1.0 | 25 | 23.35 | -0.14 | **0.573** | **0.359** | **0.838** |
| U34 | UMTS B4 | RMC12.2K | 1312 | Front Face | 1.0 | 25 | 23.23 | 0.01 | 0.502 | 0.320 | 0.755 |
| U35 | UMTS B4 | RMC12.2K | 1513 | Front Face | 1.0 | 25 | 23.36 | -0.16 | 0.490 | 0.297 | 0.715 |
| U37 | UMTS B5 | RMC12.2K | 4182 | Front Face | 1.0 | 25 | 23.01 | 0.17 | **0.042** | **0.030** | **0.066** |

Note: The value with boldface is the maximum SAR Value of each test band.

2. PTT SAR test results of LTE

| Test No. | Band | Mode | Channel | RB | offset | Test Position | Separation Distance (cm) | Maximum Tune-up (dBm) | Conducted Power (dBm) | Power Drift (dB) | SAR 1g (W/kg) | SAR 10g (W/kg) | Reported 1g SAR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L161 | LTE B2 | QPSK20M | 18900 | 1 | 99 | Front Face | 1.0 | 23.5 | 23.32 | 0.04 | **0.741** | **0.455** | **0.773** |
| L162 | LTE B2 | QPSK20M | 18900 | 50 | 25 | Front Face | 1.0 | 22.5 | 22.30 | 0.01 | 0.682 | 0.386 | 0.715 |
| L164 | LTE B4 | QPSK20M | 20300 | 1 | 50 | Front Face | 1.0 | 23.5 | 23.21 | 0.16 | **0.804** | **0.509** | **0.859** |
| L165 | LTE B4 | QPSK20M | 20050 | 50 | 25 | Front Face | 1.0 | 22.5 | 21.98 | -0.01 | 0.756 | 0.443 | 0.852 |
| L166 | LTE B4 | QPSK20M | 20050 | 1 | 50 | Front Face | 1.0 | 23.5 | 22.94 | -0.12 | 0.698 | 0.392 | 0.795 |
| L167 | LTE B4 | QPSK20M | 20175 | 1 | 0 | Front Face | 1.0 | 23.5 | 22.86 | -0.14 | 0.710 | 0.362 | 0.823 |
| L168 | LTE B4 | QPSK20M | 20175 | 50 | 25 | Front Face | 1.0 | 22.5 | 21.82 | 0.13 | 0.719 | 0.395 | 0.840 |
| L169 | LTE B4 | QPSK20M | 20300 | 50 | 0 | Front Face | 1.0 | 22.5 | 21.92 | 0.11 | 0.746 | 0.476 | 0.852 |
| L170 | LTE B4 | QPSK20M | 20050 | 100 | 0 | Front Face | 1.0 | 22.5 | 21.94 | 0.02 | 0.677 | 0.430 | 0.770 |
| L171 | LTE B4 | QPSK20M | 20300 | 1 | 50 | Front Face (Repeated) | 1.0 | 23.5 | 23.21 | -0.10 | 0.800 | 0.496 | 0.855 |
| L173 | LTE B5 | QPSK10M | 20450 | 1 | 24 | Front Face | 1.0 | 25 | 23.58 | 0.05 | **0.355** | **0.241** | **0.493** |
| L174 | LTE B5 | QPSK10M | 20525 | 25 | 12 | Front Face | 1.0 | 24 | 22.56 | 0.13 | 0.229 | 0.141 | 0.319 |
| L176 | LTE B12 | QPSK10M | 23060 | 1 | 49 | Front Face | 1.0 | 25 | 23.72 | 0.01 | **0.059** | **0.041** | **0.080** |
| L177 | LTE B12 | QPSK10M | 23130 | 25 | 0 | Front Face | 1.0 | 24 | 22.68 | 0.09 | 0.051 | 0.031 | 0.069 |
| L179 | LTE B13 | QPSK10M | 23230 | 1 | 49 | Front Face | 1.0 | 25 | 23.75 | 0.06 | **0.220** | **0.151** | **0.294** |
| L180 | LTE B13 | QPSK10M | 23230 | 25 | 12 | Front Face | 1.0 | 24 | 22.63 | 0.03 | 0.129 | 0.078 | 0.177 |
| L182 | LTE B14 | QPSK10M | 23330 | 1 | 24 | Front Face | 1.0 | 25 | 23.88 | 0.06 | **0.239** | **0.162** | **0.309** |
| L183 | LTE B14 | QPSK10M | 23330 | 25 | 12 | Front Face | 1.0 | 24 | 22.66 | -0.13 | 0.147 | 0.089 | 0.200 |
| L185 | LTE B66 | QPSK20M | 132572 | 1 | 50 | Front Face | 1.0 | 23.5 | 23.27 | -0.06 | **0.911** | **0.585** | **0.961** |
| L186 | LTE B66 | QPSK20M | 132572 | 50 | 50 | Front Face | 1.0 | 22.5 | 22.00 | 0.01 | 0.628 | 0.389 | 0.704 |
| L187 | LTE B66 | QPSK20M | 132072 | 1 | 50 | Front Face | 1.0 | 23.5 | 22.61 | -0.02 | 0.782 | 0.497 | 0.960 |
| L188 | LTE B66 | QPSK20M | 132322 | 1 | 0 | Front Face | 1.0 | 23.5 | 22.99 | 0.09 | 0.804 | 0.526 | 0.904 |
| L189 | LTE B66 | QPSK20M | 132072 | 100 | 0 | Front Face | 1.0 | 22.5 | 21.78 | -0.14 | 0.603 | 0.374 | 0.712 |
| L190 | LTE B66 | QPSK20M | 132572 | 1 | 50 | Front Face (Repeated) | 1.0 | 23.5 | 23.27 | 0.05 | 0.784 | 0.478 | 0.827 |
| L192 | LTE B71 | QPSK20M | 133322 | 1 | 50 | Front Face | 1.0 | 25 | 23.46 | 0.07 | **0.042** | **0.029** | **0.060** |
| L193 | LTE B71 | QPSK20M | 133372 | 50 | 0 | Front Face | 1.0 | 24 | 22.58 | 0.02 | 0.031 | 0.016 | 0.043 |

Note: The value with boldface is the maximum SAR Value of each test band.

### 7.2.2 SAR MEASUREMENT RESULT OF EXTREMITY

1. Extremity SAR test results of UMTS

| Test No. | Band | Mode | Channel | Test Position | Separation Distance (cm) | Maximum Tune-up (dBm) | Conducted Power (dBm) | Power Drift (dB) | SAR 1g (W/kg) | SAR 10g (W/kg) | Reported 10g SAR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U01 | UMTS B2 | RMC12.2K | 9400 | Front Face | 0 | 25 | 23.15 | -0.04 | 1.520 | 0.774 | 1.185 |
| U02 | UMTS B2 | RMC12.2K | 9400 | Rear Face | 0 | 25 | 23.15 | 0.13 | **5.460** | **2.350** | **3.598** |
| U03 | UMTS B2 | RMC12.2K | 9400 | Left Side | 0 | 25 | 23.15 | 0.10 | 1.400 | 0.729 | 1.116 |
| U04 | UMTS B2 | RMC12.2K | 9400 | Right Side | 0 | 25 | 23.15 | -0.13 | 1.810 | 0.946 | 1.448 |
| U05 | UMTS B2 | RMC12.2K | 9400 | Top Side | 0 | 25 | 23.15 | -0.04 | 3.450 | 1.210 | 1.853 |
| U06 | UMTS B2 | RMC12.2K | 9400 | Bottom Side | 0 | 25 | 23.15 | -0.02 | 0.141 | 0.077 | 0.117 |
| U21 | UMTS B2 | RMC12.2K | 9262 | Rear Face | 0 | 25 | 23.13 | -0.05 | 3.970 | 1.690 | 2.599 |
| U22 | UMTS B2 | RMC12.2K | 9538 | Rear Face | 0 | 25 | 23.16 | 0.16 | 2.900 | 1.430 | 2.184 |
| U23 | UMTS B2 | RMC12.2K | 9400 | Rear Face (Repeated) | 0 | 25 | 23.15 | 0.01 | 5.240 | 2.250 | 3.445 |
| U08 | UMTS B4 | RMC12.2K | 1413 | Front Face | 0 | 25 | 23.35 | -0.04 | 2.410 | 1.310 | 1.915 |
| U09 | UMTS B4 | RMC12.2K | 1413 | Rear Face | 0 | 25 | 23.35 | 0.00 | 5.100 | 2.380 | 3.480 |
| U10 | UMTS B4 | RMC12.2K | 1413 | Left Side | 0 | 25 | 23.35 | 0.03 | 1.540 | 0.710 | 1.038 |
| U11 | UMTS B4 | RMC12.2K | 1413 | Right Side | 0 | 25 | 23.35 | 0.06 | 1.740 | 0.800 | 1.170 |
| U12 | UMTS B4 | RMC12.2K | 1413 | Top Side | 0 | 25 | 23.35 | -0.19 | **5.870** | **2.530** | **3.699** |
| U13 | UMTS B4 | RMC12.2K | 1413 | Bottom Side | 0 | 25 | 23.35 | 0.14 | 0.210 | 0.101 | 0.148 |
| U27 | UMTS B4 | RMC12.2K | 1312 | Rear Face | 0 | 25 | 23.23 | 0.02 | 4.450 | 2.120 | 3.187 |
| U28 | UMTS B4 | RMC12.2K | 1513 | Rear Face | 0 | 25 | 23.36 | 0.07 | 4.790 | 2.210 | 3.224 |
| U24 | UMTS B4 | RMC12.2K | 1312 | Top Side | 0 | 25 | 23.23 | 0.02 | 5.270 | 2.030 | 3.051 |
| U25 | UMTS B4 | RMC12.2K | 1513 | Top Side | 0 | 25 | 23.36 | -0.15 | 5.810 | 2.430 | 3.545 |
| U26 | UMTS B4 | RMC12.2K | 1413 | Top Side (Repeated) | 0 | 25 | 23.35 | 0.13 | 5.670 | 2.350 | 3.436 |
| U15 | UMTS B5 | RMC12.2K | 4182 | Front Face | 0 | 25 | 23.01 | -0.14 | 0.838 | 0.524 | 0.829 |
| U16 | UMTS B5 | RMC12.2K | 4182 | Rear Face | 0 | 25 | 23.01 | 0.10 | **2.460** | **1.130** | **1.787** |
| U17 | UMTS B5 | RMC12.2K | 4182 | Left Side | 0 | 25 | 23.01 | -0.10 | 0.633 | 0.409 | 0.647 |
| U18 | UMTS B5 | RMC12.2K | 4182 | Right Side | 0 | 25 | 23.01 | 0.12 | 0.183 | 0.159 | 0.251 |
| U19 | UMTS B5 | RMC12.2K | 4182 | Top Side | 0 | 25 | 23.01 | 0.06 | 0.430 | 0.224 | 0.354 |
| U20 | UMTS B5 | RMC12.2K | 4182 | Bottom Side | 0 | 25 | 23.01 | -0.16 | 0.074 | 0.043 | 0.068 |

Note: The value with boldface is the maximum SAR Value of each test band.

2. Extremity SAR test results of LTE

| Test No. | Band | Mode | Channel | RB | offset | Test Position | Separation Distance (cm) | Maximum Tune-up (dBm) | Conducted Power (dBm) | Power Drift (dB) | SAR 1g (W/kg) | SAR 10g (W/kg) | Reported 10g SAR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L01 | LTE B2 | QPSK20M | 18900 | 1 | 99 | Front Face | 0 | 23.5 | 23.32 | 0.04 | 2.080 | 1.060 | 1.105 |
| L02 | LTE B2 | QPSK20M | 18900 | 1 | 99 | Rear Face | 0 | 23.5 | 23.32 | 0 | **7.580** | **3.130** | **3.264** |
| L03 | LTE B2 | QPSK20M | 18900 | 1 | 99 | Left Side | 0 | 23.5 | 23.32 | 0.09 | 1.880 | 0.898 | 0.936 |
| L04 | LTE B2 | QPSK20M | 18900 | 1 | 99 | Right Side | 0 | 23.5 | 23.32 | -0.04 | 1.450 | 0.755 | 0.787 |
| L05 | LTE B2 | QPSK20M | 18900 | 1 | 99 | Top Side | 0 | 23.5 | 23.32 | 0.12 | 5.020 | 2.160 | 2.252 |
| L06 | LTE B2 | QPSK20M | 18900 | 1 | 99 | Bottom Side | 0 | 23.5 | 23.32 | -0.11 | 0.199 | 0.112 | 0.117 |
| L56 | LTE B2 | QPSK20M | 18900 | 50 | 25 | Front Face | 0 | 22.5 | 22.30 | 0.02 | 1.820 | 0.910 | 0.954 |
| L57 | LTE B2 | QPSK20M | 18900 | 50 | 25 | Rear Face | 0 | 22.5 | 22.30 | -0.06 | 4.810 | 2.490 | 2.610 |
| L58 | LTE B2 | QPSK20M | 18900 | 50 | 25 | Left Side | 0 | 22.5 | 22.30 | 0.05 | 1.590 | 0.772 | 0.809 |
| L59 | LTE B2 | QPSK20M | 18900 | 50 | 25 | Right Side | 0 | 22.5 | 22.30 | 0.13 | 2.160 | 1.040 | 1.090 |
| L60 | LTE B2 | QPSK20M | 18900 | 50 | 25 | Top Side | 0 | 22.5 | 22.30 | 0.07 | 4.600 | 1.820 | 1.907 |
| L61 | LTE B2 | QPSK20M | 18900 | 50 | 25 | Bottom Side | 0 | 22.5 | 22.30 | -0.09 | 0.083 | 0.044 | 0.046 |
| L103 | LTE B2 | QPSK20M | 18700 | 1 | 50 | Rear Face | 0 | 23.5 | 23.16 | 0.16 | 6.380 | 2.990 | 3.231 |
| L104 | LTE B2 | QPSK20M | 19100 | 1 | 0 | Rear Face | 0 | 23.5 | 23.17 | -0.09 | 6.830 | 2.970 | 3.204 |
| L105 | LTE B2 | QPSK20M | 18700 | 1 | 50 | Top Side | 0 | 23.5 | 23.16 | -0.02 | 6.830 | 2.640 | 2.853 |
| L106 | LTE B2 | QPSK20M | 19100 | 1 | 0 | Top Side | 0 | 23.5 | 23.17 | -0.08 | 7.010 | 3.010 | 3.247 |
| L107 | LTE B2 | QPSK20M | 18700 | 50 | 25 | Rear Face | 0 | 22.5 | 22.26 | 0.04 | 5.780 | 2.670 | 2.823 |
| L108 | LTE B2 | QPSK20M | 19100 | 50 | 25 | Rear Face | 0 | 22.5 | 22.11 | -0.07 | 5.600 | 2.520 | 2.758 |
| L109 | LTE B2 | QPSK20M | 18700 | 100 | 0 | Rear Face | 0 | 22.5 | 22.14 | -0.1 | 5.690 | 2.630 | 2.859 |
| L110 | LTE B2 | QPSK20M | 18900 | 1 | 99 | Rear Face (Repeated) | 0 | 23.5 | 23.32 | 0.11 | 6.190 | 3.090 | 3.222 |
| L08 | LTE B4 | QPSK20M | 20300 | 1 | 50 | Front Face | 0 | 23.5 | 23.21 | -0.06 | 2.840 | 1.520 | 1.625 |
| L09 | LTE B4 | QPSK20M | 20300 | 1 | 50 | Rear Face | 0 | 23.5 | 23.21 | 0.11 | 5.500 | 2.610 | 2.790 |
| L10 | LTE B4 | QPSK20M | 20300 | 1 | 50 | Left Side | 0 | 23.5 | 23.21 | -0.02 | 2.030 | 1.070 | 1.144 |
| L11 | LTE B4 | QPSK20M | 20300 | 1 | 50 | Right Side | 0 | 23.5 | 23.21 | -0.1 | 1.900 | 1.070 | 1.144 |
| L12 | LTE B4 | QPSK20M | 20300 | 1 | 50 | Top Side | 0 | 23.5 | 23.21 | 0.08 | **6.480** | **2.810** | **3.004** |
| L13 | LTE B4 | QPSK20M | 20300 | 1 | 50 | Bottom Side | 0 | 23.5 | 23.21 | 0.16 | 0.468 | 0.241 | 0.258 |
| L62 | LTE B4 | QPSK20M | 20050 | 50 | 25 | Front Face | 0 | 22.5 | 21.98 | 0.02 | 2.350 | 1.420 | 1.601 |
| L63 | LTE B4 | QPSK20M | 20050 | 50 | 25 | Rear Face | 0 | 22.5 | 21.98 | -0.04 | 3.660 | 1.860 | 2.097 |
| L64 | LTE B4 | QPSK20M | 20050 | 50 | 25 | Left Side | 0 | 22.5 | 21.98 | 0.13 | 1.550 | 0.822 | 0.927 |
| L65 | LTE B4 | QPSK20M | 20050 | 50 | 25 | Right Side | 0 | 22.5 | 21.98 | 0.09 | 1.470 | 0.792 | 0.893 |
| L66 | LTE B4 | QPSK20M | 20050 | 50 | 25 | Top Side | 0 | 22.5 | 21.98 | 0.06 | 4.770 | 1.930 | 2.175 |
| L67 | LTE B4 | QPSK20M | 20050 | 50 | 25 | Bottom Side | 0 | 22.5 | 21.98 | 0.01 | 0.209 | 0.122 | 0.138 |
| L111 | LTE B4 | QPSK20M | 20050 | 1 | 50 | Rear Face | 0 | 23.5 | 22.94 | 0.15 | 4.860 | 2.370 | 2.698 |
| L112 | LTE B4 | QPSK20M | 20175 | 1 | 0 | Rear Face | 0 | 23.5 | 22.86 | 0.18 | 4.610 | 2.300 | 2.665 |
| L113 | LTE B4 | QPSK20M | 20050 | 1 | 50 | Top Side | 0 | 23.5 | 22.94 | -0.07 | 6.170 | 2.470 | 2.812 |
| L114 | LTE B4 | QPSK20M | 20175 | 1 | 0 | Top Side | 0 | 23.5 | 22.86 | 0.12 | 6.190 | 2.505 | 2.903 |
| L115 | LTE B4 | QPSK20M | 20175 | 50 | 25 | Rear Face | 0 | 22.5 | 21.82 | 0.01 | 3.810 | 1.910 | 2.232 |
| L116 | LTE B4 | QPSK20M | 20300 | 50 | 0 | Rear Face | 0 | 22.5 | 21.92 | 0.05 | 3.600 | 1.880 | 2.147 |
| L117 | LTE B4 | QPSK20M | 20175 | 50 | 25 | Top Side | 0 | 22.5 | 21.82 | 0.05 | 4.460 | 1.890 | 2.209 |
| L118 | LTE B4 | QPSK20M | 20300 | 50 | 0 | Top Side | 0 | 22.5 | 21.92 | 0.17 | 4.280 | 1.830 | 2.090 |
| L119 | LTE B4 | QPSK20M | 20050 | 100 | 0 | Top Side | 0 | 22.5 | 21.94 | -0.06 | 4.940 | 1.970 | 2.241 |
| L120 | LTE B4 | QPSK20M | 20300 | 1 | 50 | Top Side (Repeated) | 0 | 23.5 | 23.21 | 0.04 | 4.870 | 2.140 | 2.288 |

| Test No. | Band | Mode | Channel | RB | offset | Test Position | Separation Distance (cm) | Maximum Tune-up (dBm) | Conducted Power (dBm) | Power Drift (dB) | SAR 1g (W/kg) | SAR 10g (W/kg) | Reported 10g SAR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L15 | LTE B5 | QPSK10M | 20450 | 1 | 24 | Front Face | 0 | 25 | 23.58 | 0.15 | 1.050 | 0.671 | 0.931 |
| L16 | LTE B5 | QPSK10M | 20450 | 1 | 24 | Rear Face | 0 | 25 | 23.58 | -0.04 | **3.790** | **1.730** | **2.401** |
| L17 | LTE B5 | QPSK10M | 20450 | 1 | 24 | Left Side | 0 | 25 | 23.58 | 0.02 | 1.110 | 0.705 | 0.978 |
| L18 | LTE B5 | QPSK10M | 20450 | 1 | 24 | Right Side | 0 | 25 | 23.58 | 0.17 | 0.406 | 0.267 | 0.371 |
| L19 | LTE B5 | QPSK10M | 20450 | 1 | 24 | Top Side | 0 | 25 | 23.58 | -0.03 | 1.440 | 0.577 | 0.801 |
| L20 | LTE B5 | QPSK10M | 20450 | 1 | 24 | Bottom Side | 0 | 25 | 23.58 | 0 | 0.204 | 0.098 | 0.137 |
| L68 | LTE B5 | QPSK10M | 20525 | 25 | 12 | Front Face | 0 | 24 | 22.56 | 0.02 | 1.180 | 0.773 | 1.077 |
| L69 | LTE B5 | QPSK10M | 20525 | 25 | 12 | Rear Face | 0 | 24 | 22.56 | 0.07 | 3.200 | 1.550 | 2.160 |
| L70 | LTE B5 | QPSK10M | 20525 | 25 | 12 | Left Side | 0 | 24 | 22.56 | -0.02 | 0.944 | 0.588 | 0.819 |
| L71 | LTE B5 | QPSK10M | 20525 | 25 | 12 | Right Side | 0 | 24 | 22.56 | 0.09 | 0.364 | 0.236 | 0.329 |
| L72 | LTE B5 | QPSK10M | 20525 | 25 | 12 | Top Side | 0 | 24 | 22.56 | 0.01 | 2.030 | 0.795 | 1.108 |
| L73 | LTE B5 | QPSK10M | 20525 | 25 | 12 | Bottom Side | 0 | 24 | 22.56 | 0.13 | 0.116 | 0.064 | 0.088 |
| L121 | LTE B5 | QPSK10M | 20525 | 1 | 24 | Rear Face | 0 | 25 | 23.55 | 0.13 | 3.740 | 1.680 | 2.347 |
| L122 | LTE B5 | QPSK10M | 20600 | 1 | 24 | Rear Face | 0 | 25 | 23.53 | -0.19 | 3.240 | 1.460 | 2.046 |
| L123 | LTE B5 | QPSK10M | 20450 | 25 | 0 | Rear Face | 0 | 24 | 22.54 | -0.03 | 2.910 | 1.280 | 1.791 |
| L124 | LTE B5 | QPSK10M | 20600 | 25 | 12 | Rear Face | 0 | 24 | 22.41 | -0.09 | 2.620 | 1.180 | 1.701 |
| L125 | LTE B5 | QPSK10M | 20450 | 50 | 0 | Rear Face | 0 | 24 | 22.54 | -0.03 | 2.940 | 1.300 | 1.821 |
| L126 | LTE B5 | QPSK10M | 20450 | 1 | 24 | Rear Face (Repeated) | 0 | 25 | 23.58 | 0.19 | 3.620 | 1.610 | 2.234 |
| L22 | LTE B12 | QPSK10M | 23060 | 1 | 49 | Front Face | 0 | 25 | 23.72 | 0.05 | 0.251 | 0.151 | 0.203 |
| L23 | LTE B12 | QPSK10M | 23060 | 1 | 49 | Rear Face | 0 | 25 | 23.72 | 0 | **7.140** | **2.930** | **3.930** |
| L24 | LTE B12 | QPSK10M | 23060 | 1 | 49 | Left Side | 0 | 25 | 23.72 | -0.11 | 0.147 | 0.101 | 0.135 |
| L25 | LTE B12 | QPSK10M | 23060 | 1 | 49 | Right Side | 0 | 25 | 23.72 | 0.02 | 0.057 | 0.040 | 0.054 |
| L26 | LTE B12 | QPSK10M | 23060 | 1 | 49 | Top Side | 0 | 25 | 23.72 | 0.08 | 0.997 | 0.398 | 0.534 |
| L27 | LTE B12 | QPSK10M | 23060 | 1 | 49 | Bottom Side | 0 | 25 | 23.72 | -0.14 | 0.117 | 0.055 | 0.073 |
| L74 | LTE B12 | QPSK10M | 23130 | 25 | 0 | Front Face | 0 | 24 | 22.68 | 0.01 | 0.204 | 0.131 | 0.178 |
| L75 | LTE B12 | QPSK10M | 23130 | 25 | 0 | Rear Face | 0 | 24 | 22.68 | 0.09 | 6.504 | 2.740 | 3.715 |
| L76 | LTE B12 | QPSK10M | 23130 | 25 | 0 | Left Side | 0 | 24 | 22.68 | 0.13 | 0.129 | 0.082 | 0.111 |
| L77 | LTE B12 | QPSK10M | 23130 | 25 | 0 | Right Side | 0 | 24 | 22.68 | 0.07 | 0.044 | 0.031 | 0.041 |
| L78 | LTE B12 | QPSK10M | 23130 | 25 | 0 | Top Side | 0 | 24 | 22.68 | -0.08 | 0.948 | 0.391 | 0.530 |
| L79 | LTE B12 | QPSK10M | 23130 | 25 | 0 | Bottom Side | 0 | 24 | 22.68 | 0.04 | 0.059 | 0.033 | 0.044 |
| L127 | LTE B12 | QPSK10M | 23095 | 1 | 24 | Rear Face | 0 | 25 | 23.63 | 0.18 | 7.120 | 2.590 | 3.547 |
| L128 | LTE B12 | QPSK10M | 23130 | 1 | 24 | Rear Face | 0 | 25 | 23.66 | 0.1 | 6.980 | 2.730 | 3.718 |
| L129 | LTE B12 | QPSK10M | 23060 | 25 | 25 | Rear Face | 0 | 24 | 22.67 | 0.12 | 5.460 | 2.210 | 3.002 |
| L130 | LTE B12 | QPSK10M | 23095 | 25 | 25 | Rear Face | 0 | 24 | 22.66 | -0.13 | 5.400 | 2.190 | 2.982 |
| L131 | LTE B12 | QPSK10M | 23130 | 50 | 0 | Rear Face | 0 | 24 | 22.60 | 0.17 | 5.320 | 2.150 | 2.968 |
| L132 | LTE B12 | QPSK10M | 23060 | 1 | 49 | Rear Face (Repeated) | 0 | 25 | 23.72 | 0.06 | 6.827 | 2.790 | 3.742 |

| Test No. | Band | Mode | Channel | RB | offset | Test Position | Separation Distance (cm) | Maximum Tune-up (dBm) | Conducted Power (dBm) | Power Drift (dB) | SAR 1g (W/kg) | SAR 10g (W/kg) | Reported 10g SAR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L29 | LTE B13 | QPSK10M | 23230 | 1 | 49 | Front Face | 0 | 25 | 23.75 | 0.04 | 0.766 | 0.438 | 0.584 |
| L30 | LTE B13 | QPSK10M | 23230 | 1 | 49 | Rear Face | 0 | 25 | 23.75 | -0.13 | **5.410** | **2.180** | **2.908** |
| L31 | LTE B13 | QPSK10M | 23230 | 1 | 49 | Left Side | 0 | 25 | 23.75 | 0.05 | 0.605 | 0.379 | 0.506 |
| L32 | LTE B13 | QPSK10M | 23230 | 1 | 49 | Right Side | 0 | 25 | 23.75 | 0.03 | 0.223 | 0.139 | 0.185 |
| L33 | LTE B13 | QPSK10M | 23230 | 1 | 49 | Top Side | 0 | 25 | 23.75 | -0.12 | 1.860 | 0.746 | 0.995 |
| L34 | LTE B13 | QPSK10M | 23230 | 1 | 49 | Bottom Side | 0 | 25 | 23.75 | 0.11 | 0.179 | 0.096 | 0.128 |
| L80 | LTE B13 | QPSK10M | 23230 | 25 | 12 | Front Face | 0 | 24 | 22.63 | 0.02 | 0.617 | 0.375 | 0.514 |
| L81 | LTE B13 | QPSK10M | 23230 | 25 | 12 | Rear Face | 0 | 24 | 22.63 | -0.07 | 4.490 | 1.860 | 2.550 |
| L82 | LTE B13 | QPSK10M | 23230 | 25 | 12 | Left Side | 0 | 24 | 22.63 | 0.13 | 0.421 | 0.255 | 0.350 |
| L83 | LTE B13 | QPSK10M | 23230 | 25 | 12 | Right Side | 0 | 24 | 22.63 | 0.08 | 0.155 | 0.097 | 0.134 |
| L84 | LTE B13 | QPSK10M | 23230 | 25 | 12 | Top Side | 0 | 24 | 22.63 | 0.07 | 1.710 | 0.673 | 0.923 |
| L85 | LTE B13 | QPSK10M | 23230 | 25 | 12 | Bottom Side | 0 | 24 | 22.63 | 0.12 | 0.131 | 0.065 | 0.089 |
| L133 | LTE B13 | QPSK10M | 23230 | 1 | 0 | Rear Face | 0 | 25 | 23.43 | -0.01 | 5.450 | 1.890 | 2.713 |
| L134 | LTE B13 | QPSK10M | 23230 | 1 | 24 | Rear Face | 0 | 25 | 23.61 | 0.1 | 4.920 | 1.850 | 2.549 |
| L135 | LTE B13 | QPSK10M | 23230 | 25 | 0 | Rear Face | 0 | 24 | 22.57 | 0.03 | 3.850 | 1.410 | 1.960 |
| L136 | LTE B13 | QPSK10M | 23230 | 25 | 25 | Rear Face | 0 | 24 | 22.48 | -0.08 | 3.630 | 1.330 | 1.887 |
| L137 | LTE B13 | QPSK10M | 23230 | 50 | 0 | Rear Face | 0 | 24 | 22.53 | 0.08 | 3.800 | 1.390 | 1.950 |
| L138 | LTE B13 | QPSK10M | 23230 | 1 | 49 | Rear Face (Repeated) | 0 | 25 | 23.75 | -0.01 | 5.070 | 1.974 | 2.633 |
| L36 | LTE B14 | QPSK10M | 23330 | 1 | 24 | Front Face | 0 | 25 | 23.88 | 0.05 | 0.949 | 0.586 | 0.758 |
| L37 | LTE B14 | QPSK10M | 23330 | 1 | 24 | Rear Face | 0 | 25 | 23.88 | -0.01 | **4.900** | **2.160** | **2.794** |
| L38 | LTE B14 | QPSK10M | 23330 | 1 | 24 | Left Side | 0 | 25 | 23.88 | 0.11 | 0.566 | 0.391 | 0.506 |
| L39 | LTE B14 | QPSK10M | 23330 | 1 | 24 | Right Side | 0 | 25 | 23.88 | 0.14 | 0.215 | 0.151 | 0.195 |
| L40 | LTE B14 | QPSK10M | 23330 | 1 | 24 | Top Side | 0 | 25 | 23.88 | 0.09 | 1.850 | 0.758 | 0.981 |
| L41 | LTE B14 | QPSK10M | 23330 | 1 | 24 | Bottom Side | 0 | 25 | 23.88 | -0.05 | 0.183 | 0.088 | 0.114 |
| L86 | LTE B14 | QPSK10M | 23330 | 25 | 12 | Front Face | 0 | 24 | 22.66 | -0.02 | 0.572 | 0.402 | 0.547 |
| L87 | LTE B14 | QPSK10M | 23330 | 25 | 12 | Rear Face | 0 | 24 | 22.66 | 0.05 | 3.930 | 1.800 | 2.451 |
| L88 | LTE B14 | QPSK10M | 23330 | 25 | 12 | Left Side | 0 | 24 | 22.66 | 0.09 | 0.423 | 0.289 | 0.393 |
| L89 | LTE B14 | QPSK10M | 23330 | 25 | 12 | Right Side | 0 | 24 | 22.66 | -0.13 | 0.154 | 0.109 | 0.148 |
| L90 | LTE B14 | QPSK10M | 23330 | 25 | 12 | Top Side | 0 | 24 | 22.66 | 0.08 | 1.460 | 0.670 | 0.912 |
| L91 | LTE B14 | QPSK10M | 23330 | 25 | 12 | Bottom Side | 0 | 24 | 22.66 | 0.07 | 0.072 | 0.047 | 0.064 |
| L139 | LTE B14 | QPSK10M | 23330 | 1 | 0 | Rear Face | 0 | 25 | 23.50 | -0.06 | 4.270 | 1.950 | 2.754 |
| L140 | LTE B14 | QPSK10M | 23330 | 1 | 49 | Rear Face | 0 | 25 | 23.75 | -0.06 | 4.190 | 2.000 | 2.667 |
| L141 | LTE B14 | QPSK10M | 23330 | 25 | 0 | Rear Face | 0 | 24 | 22.61 | 0.12 | 3.550 | 1.680 | 2.314 |
| L142 | LTE B14 | QPSK10M | 23330 | 25 | 25 | Rear Face | 0 | 24 | 22.59 | 0.1 | 3.270 | 1.550 | 2.145 |
| L143 | LTE B14 | QPSK10M | 23330 | 50 | 0 | Rear Face | 0 | 24 | 22.60 | -0.14 | 3.330 | 1.570 | 2.167 |
| L144 | LTE B14 | QPSK10M | 23330 | 1 | 24 | Rear Face (Repeated) | 0 | 25 | 23.88 | 0.13 | 4.340 | 2.050 | 2.652 |

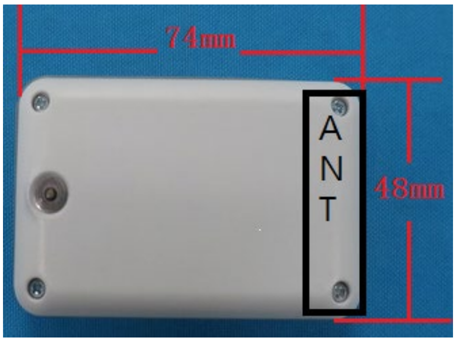
| Test No. | Band | Mode | Channel | RB | offset | Test Position | Separation Distance (cm) | Maximum Tune-up (dBm) | Conducted Power (dBm) | Power Drift (dB) | SAR 1g (W/kg) | SAR 10g (W/kg) | Reported 10g SAR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L43 | LTE B66 | QPSK20M | 132572 | 1 | 50 | Front Face | 0 | 23.5 | 23.27 | -0.04 | 2.550 | 1.420 | 1.497 |
| L44 | LTE B66 | QPSK20M | 132572 | 1 | 50 | Rear Face | 0 | 23.5 | 23.27 | -0.07 | 4.820 | 2.370 | 2.499 |
| L45 | LTE B66 | QPSK20M | 132572 | 1 | 50 | Left Side | 0 | 23.5 | 23.27 | 0.12 | 1.480 | 0.747 | 0.788 |
| L46 | LTE B66 | QPSK20M | 132572 | 1 | 50 | Right Side | 0 | 23.5 | 23.27 | 0.03 | 1.780 | 0.925 | 0.975 |
| L47 | LTE B66 | QPSK20M | 132572 | 1 | 50 | Top Side | 0 | 23.5 | 23.27 | 0.17 | **7.610** | **3.340** | **3.521** |
| L48 | LTE B66 | QPSK20M | 132572 | 1 | 50 | Bottom Side | 0 | 23.5 | 23.27 | 0 | 0.338 | 0.156 | 0.164 |
| L92 | LTE B66 | QPSK20M | 132572 | 50 | 50 | Front Face | 0 | 22.5 | 22.00 | 0.03 | 2.240 | 1.200 | 1.346 |
| L93 | LTE B66 | QPSK20M | 132572 | 50 | 50 | Rear Face | 0 | 22.5 | 22.00 | 0.08 | 4.070 | 2.150 | 2.411 |
| L94 | LTE B66 | QPSK20M | 132572 | 50 | 50 | Left Side | 0 | 22.5 | 22.00 | 0.09 | 1.070 | 0.549 | 0.616 |
| L95 | LTE B66 | QPSK20M | 132572 | 50 | 50 | Right Side | 0 | 22.5 | 22.00 | 0.13 | 1.410 | 0.725 | 0.813 |
| L96 | LTE B66 | QPSK20M | 132572 | 50 | 50 | Top Side | 0 | 22.5 | 22.00 | -0.07 | 4.600 | 1.800 | 2.018 |
| L97 | LTE B66 | QPSK20M | 132572 | 50 | 50 | Bottom Side | 0 | 22.5 | 22.00 | 0.04 | 0.079 | 0.041 | 0.046 |
| L145 | LTE B66 | QPSK20M | 132072 | 1 | 50 | Rear Face | 0 | 23.5 | 22.61 | 0.02 | 4.680 | 2.220 | 2.723 |
| L146 | LTE B66 | QPSK20M | 132322 | 1 | 0 | Rear Face | 0 | 23.5 | 22.99 | -0.1 | 4.270 | 2.020 | 2.270 |
| L147 | LTE B66 | QPSK20M | 132072 | 1 | 50 | Top Side | 0 | 23.5 | 22.61 | 0.04 | 5.678 | 2.280 | 2.797 |
| L148 | LTE B66 | QPSK20M | 132322 | 1 | 0 | Top Side | 0 | 23.5 | 22.99 | 0.13 | 5.529 | 2.203 | 2.475 |
| L149 | LTE B66 | QPSK20M | 132072 | 50 | 0 | Rear Face | 0 | 22.5 | 21.81 | 0.05 | 3.880 | 1.740 | 2.041 |
| L150 | LTE B66 | QPSK20M | 132322 | 50 | 25 | Rear Face | 0 | 22.5 | 21.88 | -0.15 | 3.319 | 1.665 | 1.921 |
| L151 | LTE B66 | QPSK20M | 132072 | 50 | 0 | Top Side | 0 | 22.5 | 21.81 | 0.06 | 4.940 | 1.810 | 2.123 |
| L152 | LTE B66 | QPSK20M | 132322 | 50 | 25 | Top Side | 0 | 22.5 | 21.88 | 0.02 | 4.670 | 1.882 | 2.172 |
| L153 | LTE B66 | QPSK20M | 132072 | 100 | 0 | Top Side | 0 | 22.5 | 21.78 | 0.16 | 5.006 | 1.841 | 2.173 |
| L154 | LTE B66 | QPSK20M | 132572 | 1 | 50 | Top Side (Repeated) | 0 | 23.5 | 23.27 | -0.09 | 5.678 | 2.330 | 2.457 |
| L50 | LTE B71 | QPSK20M | 133322 | 1 | 50 | Front Face | 0 | 25 | 23.46 | -0.05 | 0.150 | 0.071 | 0.101 |
| L51 | LTE B71 | QPSK20M | 133322 | 1 | 50 | Rear Face | 0 | 25 | 23.46 | -0.01 | **8.140** | **2.660** | **3.796** |
| L52 | LTE B71 | QPSK20M | 133322 | 1 | 50 | Left Side | 0 | 25 | 23.46 | 0.02 | 0.070 | 0.018 | 0.025 |
| L53 | LTE B71 | QPSK20M | 133322 | 1 | 50 | Right Side | 0 | 25 | 23.46 | 0.09 | 0.009 | 0.007 | 0.010 |
| L54 | LTE B71 | QPSK20M | 133322 | 1 | 50 | Top Side | 0 | 25 | 23.46 | 0.01 | 0.769 | 0.277 | 0.395 |
| L55 | LTE B71 | QPSK20M | 133322 | 1 | 50 | Bottom Side | 0 | 25 | 23.46 | 0.06 | 0.085 | 0.014 | 0.020 |
| L98 | LTE B71 | QPSK20M | 133372 | 50 | 0 | Front Face | 0 | 24 | 22.58 | -0.12 | 0.081 | 0.033 | 0.045 |
| L99 | LTE B71 | QPSK20M | 133372 | 50 | 0 | Rear Face | 0 | 24 | 22.58 | 0.06 | 6.130 | 1.980 | 2.746 |
| L100 | LTE B71 | QPSK20M | 133372 | 50 | 0 | Left Side | 0 | 24 | 22.58 | -0.01 | 0.050 | 0.015 | 0.021 |
| L101 | LTE B71 | QPSK20M | 133372 | 50 | 0 | Right Side | 0 | 24 | 22.58 | -0.12 | 0.024 | 0.007 | 0.010 |
| L102 | LTE B71 | QPSK20M | 133372 | 50 | 0 | Top Side | 0 | 24 | 22.58 | 0.13 | 0.724 | 0.220 | 0.305 |
| L155 | LTE B71 | QPSK20M | 133222 | 1 | 50 | Rear Face | 0 | 25 | 23.09 | 0.08 | 6.660 | 2.320 | 3.601 |
| L156 | LTE B71 | QPSK20M | 133372 | 1 | 50 | Rear Face | 0 | 25 | 23.44 | 0.09 | 6.620 | 2.330 | 3.336 |
| L157 | LTE B71 | QPSK20M | 133222 | 50 | 25 | Rear Face | 0 | 24 | 22.55 | 0.07 | 5.098 | 1.734 | 2.421 |
| L158 | LTE B71 | QPSK20M | 133322 | 50 | 50 | Rear Face | 0 | 24 | 22.57 | -0.08 | 5.270 | 1.810 | 2.514 |
| L159 | LTE B71 | QPSK20M | 133222 | 100 | 0 | Rear Face | 0 | 24 | 22.49 | -0.06 | 5.213 | 1.780 | 2.521 |
| L160 | LTE B71 | QPSK20M | 133322 | 1 | 50 | Rear Face (Repeated) | 0 | 25 | 23.46 | 0.01 | 8.500 | 2.410 | 3.438 |

Note: The value with boldface is the maximum SAR Value of each test band.

## 7.3 MULTIPLE TRANSMITTER EVALUATION

The following tables list information which is relevant for the decision if a simultaneous transmit evaluation is necessary according to FCC KDB 447498D01 General RF Exposure Guidance v06.

The location of the antennas inside EUT is shown as below picture:

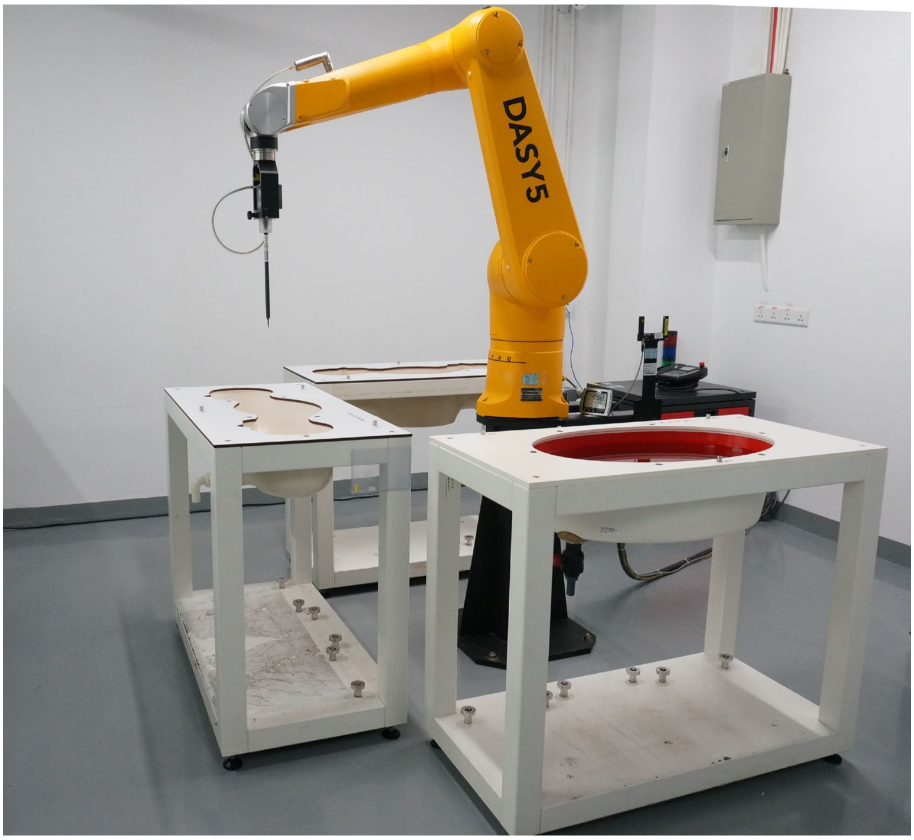



Note: The EUT only has one antenna and does not have synchronous transmission function.

# APPENDIX

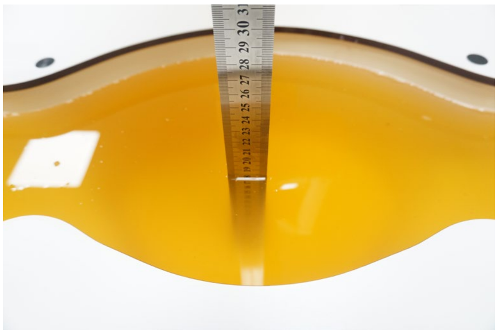
## 1. TEST LAYOUT

**Specific Absorption Rate Test Layout**

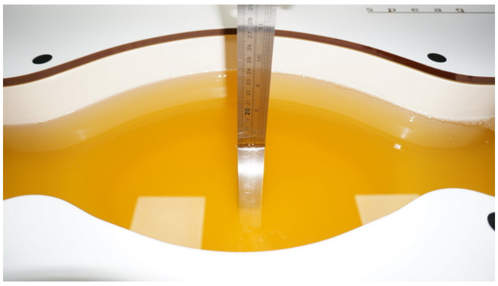


**Liquid depth in the flat Phantom (≥15cm depth)**

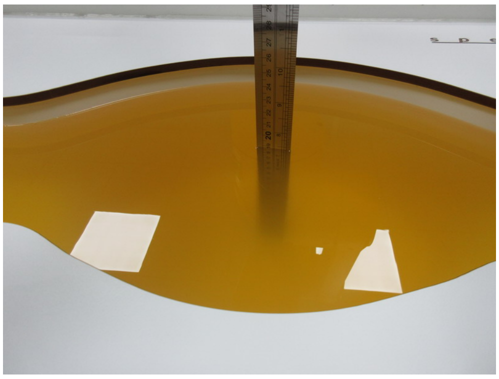
HSL_690MHz-925MHz_Body_18.5cm



HSL_1700MHz-1900MHz_Body_16.2cm



HSL_1900MHz-2300MHz_Body_18.8cm



## Appendix A. SAR Plots of System Verification

**(Pls See BTL-FCC SAR-1-2108H047_Appendix A.)**

## Appendix B. SAR Plots of SAR Measurement

**(Pls See BTL-FCC SAR-1-2108H047_Appendix B.)**

## Appendix C. Calibration Certificate

**(Pls See BTL-FCC SAR-1-2108H047_Appendix C.)**

## Appendix D. Photographs of the Test Set-Up

**(Pls See BTL-FCC SAR-1-2108H047_Appendix D.)**

## Appendix E. Conducted Power Measurement Result

**(Pls See BTL-FCC SAR-1-2108H047_Appendix E.)**

**End of Test Report**