



## FCC SAR Compliance Test Report

**Product Name:** Fixed Wireless Terminal

**Model:** F258, H258C

**Report No.:** SYBH(Z-SAR) 030012015-2

**FCC ID:** QISF256-BVW

|      | APPROVED<br>(Lab Manager) | PREPARED<br>(Test Engineer) |
|------|---------------------------|-----------------------------|
| BY   | <i>Wei Huanbin</i>        | <i>Pan Man</i>              |
| DATE | 2015-02-06                | 2015-02-06                  |

The test results of this test report relate exclusively to the item(s) tested . The HUAWEI does not assume responsibility for any conclusions and generalisations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of HUAWEI.

**Reliability Laboratory of Huawei Technologies Co., Ltd.**

## Table of Contents

|       |                                                   |    |
|-------|---------------------------------------------------|----|
| 1     | General Information.....                          | 4  |
| 1.1   | Statement of Compliance .....                     | 4  |
| 1.2   | RF exposure limits.....                           | 5  |
| 1.3   | EUT Description .....                             | 6  |
| 1.3.1 | General Description .....                         | 7  |
| 1.3.2 | Test position specification.....                  | 7  |
| 1.4   | Test specification(s).....                        | 8  |
| 1.5   | Testing laboratory.....                           | 8  |
| 1.6   | Applicant and Manufacturer .....                  | 8  |
| 1.7   | Application details.....                          | 8  |
| 1.8   | Ambient Condition .....                           | 8  |
| 2     | SAR Measurement System.....                       | 9  |
| 2.1   | SAR Measurement Set-up .....                      | 9  |
| 2.2   | Test environment.....                             | 10 |
| 2.3   | Data Acquisition Electronics description .....    | 10 |
| 2.4   | Probe description.....                            | 11 |
| 2.5   | Phantom description.....                          | 12 |
| 2.6   | Device holder description .....                   | 13 |
| 2.7   | Test Equipment List.....                          | 14 |
| 3     | SAR Measurement Procedure .....                   | 15 |
| 3.1   | Scanning procedure .....                          | 15 |
| 3.2   | Spatial Peak SAR Evaluation .....                 | 16 |
| 3.3   | Data Storage and Evaluation .....                 | 17 |
| 4     | System Verification Procedure .....               | 19 |
| 4.1   | Tissue Verification .....                         | 19 |
| 4.2   | System Check .....                                | 20 |
| 4.3   | System check Procedure.....                       | 21 |
| 5     | SAR measurement variability and uncertainty ..... | 22 |
| 5.1   | SAR measurement variability .....                 | 22 |
| 5.2   | SAR measurement uncertainty .....                 | 22 |
| 6     | SAR Test Configuration.....                       | 23 |
| 6.1   | CDMA Test Configuration.....                      | 23 |
| 6.1.1 | CDMA 1x Devices .....                             | 23 |
| 7     | SAR Measurement Results .....                     | 24 |
| 7.1   | Conducted power measurements .....                | 24 |
| 7.1.1 | Conducted power measurements of CDMA BC0 .....    | 24 |
| 7.1.2 | Conducted power measurements of CDMA BC1 .....    | 24 |
| 7.2   | SAR measurement Results .....                     | 25 |
| 7.2.1 | SAR measurement Result of CDMA BC0.....           | 26 |
| 7.2.2 | SAR measurement Result of CDMA BC1.....           | 27 |
|       | Appendix A. System Check Plots.....               | 28 |
|       | Appendix B. SAR Measurement Plots.....            | 28 |
|       | Appendix C. Calibration Certificate .....         | 28 |
|       | Appendix D. Photo documentation.....              | 28 |

※ ※ **Modified History** ※ ※

| REV.    | DESCRIPTION                 | ISSUED<br>DATE | REMARK  |
|---------|-----------------------------|----------------|---------|
| Rev.1.0 | Initial Test Report Release | 2015-02-06     | Pan Man |
|         |                             |                |         |
|         |                             |                |         |

## 1 General Information

### 1.1 Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for F258, H258C are as below Table 1.

| Band     | Max Reported SAR(W/kg) |
|----------|------------------------|
|          | 1-g Body(25mm)         |
| CDMA BC0 | 0.772                  |
| CDMA BC1 | 1.031                  |

Table 1:Summary of test result

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/IEEE C95.1:1992, the NCRP Report Number 86 for uncontrolled environment, according to the Industry Canada Radio Standards Specification RSS-102 for General Population/Uncontrolled exposure, and had been tested in accordance with the measurement methods and procedures specified in IEEE Std 1528-2003 & IEEE Std 1528a-2005.

## 1.2 RF exposure limits

| Human Exposure                                         | Uncontrolled Environment<br>General Population | Controlled Environment<br>Occupational |
|--------------------------------------------------------|------------------------------------------------|----------------------------------------|
| <b>Spatial Peak SAR*</b><br>(Brain/Body/Arms/Legs)     | <b>1.60 mW/g</b>                               | 8.00 mW/g                              |
| <b>Spatial Average SAR**</b><br>(Whole Body)           | 0.08 mW/g                                      | 0.40 mW/g                              |
| <b>Spatial Peak SAR***</b><br>(Hands/Feet/Ankle/Wrist) | 4.00 mW/g                                      | 20.00 mW/g                             |

Table 2: RF exposure limits

The limit applied in this test report is shown in **bold** letters

**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).

### 1.3 EUT Description

| Device Information:              |                                               |           |           |
|----------------------------------|-----------------------------------------------|-----------|-----------|
| DUT Name:                        | Fixed Wireless Terminal                       |           |           |
| Type Identification:             | F258, H258C                                   |           |           |
| FCC ID :                         | QISF256-BVW                                   |           |           |
| SN No.:                          | FXD0115115000279                              |           |           |
| Device Type :                    | Portable device                               |           |           |
| Exposure Category:               | Uncontrolled environment / general population |           |           |
| Hardware Version :               | WL1F256BI                                     |           |           |
| Software Version :               | V100R001                                      |           |           |
| Antenna Type :                   | External antenna                              |           |           |
| Device Operating Configurations: |                                               |           |           |
| Supporting Mode(s)               | CDMA BC0/BC1 (tested)                         |           |           |
| Test Modulation                  | QPSK                                          |           |           |
| Operating Frequency Range(s)     | Band                                          | Tx (MHz)  | Rx (MHz)  |
|                                  | CDMA BC0                                      | 824-849   | 869-894   |
|                                  | CDMA BC1                                      | 1850-1910 | 1930-1990 |
| Power Class:                     | Tested with power control all up (CDMA BC0)   |           |           |
|                                  | Tested with power control all up (CDMA BC1)   |           |           |
| Test Channels (low-mid-high):    | 1013-384-777 (CDMA BC0)                       |           |           |
|                                  | 25-600-1175 (CDMA BC1)                        |           |           |

Table 3: Device information and operating configuration

### 1.3.1 General Description

F258/H258C is a CDMA Fixed Wireless Terminal. It's operated in Band Class 0 and Band Class 1. The Wireless Terminal implements such functions as RF signal receiving / Transmitting, CDMA protocol processing, voice etc. The TX is 824MHz-849MHz, the RX is 869MHz-894MHz for Band Class 0; the TX is 1850MHz-1910MHz, the RX is 1930MHz-1990MHz for Band Class 1. It supports A-GPS service and CDMA2000 1X advanced. Externally it provides USB interface (to computers for upgrade), antenna interface, RJ11 ports and power interface.

#### Battery information:

| Name               | Manufacture                 | Serials number                         | Description                                                                                                                                                                                                                                                                       |
|--------------------|-----------------------------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Rechargeable Ni-MH | HUAWEI Technologies Co.LTD. | 1#:GRP14111001709<br>2#:HGY14111103195 | Battery Model: HGB-15AAx3<br>Rated capacity: 1500mAh<br>Nominal Voltage:  +3.6V<br>Charging Voltage:  +4.2V |

#### Difference description:

F258,H258C and F256-B have the same PCB layout and enclosure, the difference is: they have different enclosure and adapters.

The following table shows the 2 Models.

| Model                       | F258 ,H258C  | F256-B       |
|-----------------------------|--------------|--------------|
| CDMA BC 0 and BC 1          | support      | support      |
| external antenna            | The same     | The same     |
| PCB layout and PCB design   | The same     | The same     |
| Adapters                    | HW-120050U1W | CNR2260      |
| battery                     | The same     | The same     |
| USB port                    | The same     | The same     |
| RJ11 ports                  | The same     | The same     |
| enclosure and ID appearance | Not the same | Not the same |
| Other Accessory             | no           | no           |

Note: According to the difference description above, the SAR of F258 is tested at the worst position of F256(report No.: SYBH(Z-SAR) 031022014-2) for each band and RF exposure condition.

### 1.3.2 Test position specification

The device only has an external swivel transmitting antenna. The antenna is located on the top side of the DUT, and can be oriented in two ways: with antenna horizontal and with antenna vertical. According to the usage scenarios, the following positions with the transmitting antenna located at a distance 25mm from the Flat phantom are tested(Refer to Appendix D photo for details):

- 1) Top side with antenna horizontal(25mm)
- 2) Top side with antenna vertical(25mm)
- 3) Front side with antenna horizontal (25mm)

#### 1.4 Test specification(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)                                                                                                               |
| IEEE Std 1528-2003  | Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques                                                                  |
| IEEE Std 1528a-2005 | IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques<br>Amendment 1: CAD File for Human Head Model (SAM Phantom) |
| RSS-102             | Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands (Issue 4 of March 2010)                                                                                                                             |
| KDB941225 D01       | SAR test for 3G devices v02                                                                                                                                                                                                                  |
| KDB447498 D01       | General RF Exposure Guidance v05r02                                                                                                                                                                                                          |
| KDB865664 D01       | SAR measurement 100 MHz to 6 GHz v01r03                                                                                                                                                                                                      |
| KDB865664 D02       | SAR Reporting v01r01                                                                                                                                                                                                                         |

#### 1.5 Testing laboratory

|                        |                                                                                                                                                  |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Site              | The Reliability Laboratory of Huawei Technologies Co., Ltd.                                                                                      |
| Test Location          | Zone K3,Huawei Industrial Base, Bantian Industry Area, Longgang District, Shenzhen, Guangdong, China                                             |
| Telephone              | +86 755 28780808                                                                                                                                 |
| Fax                    | +86 755 89652518                                                                                                                                 |
| State of accreditation | The Test laboratory (area of testing) is accredited according to ISO/IEC 17025.<br>CNAS Registration number: L0310<br>A2LA TESTING CERT #2174.01 |

#### 1.6 Applicant and Manufacturer

|              |                                                                                                                             |
|--------------|-----------------------------------------------------------------------------------------------------------------------------|
| Company Name | HUAWEI TECHNOLOGIES CO., LTD                                                                                                |
| Address      | Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C |

#### 1.7 Application details

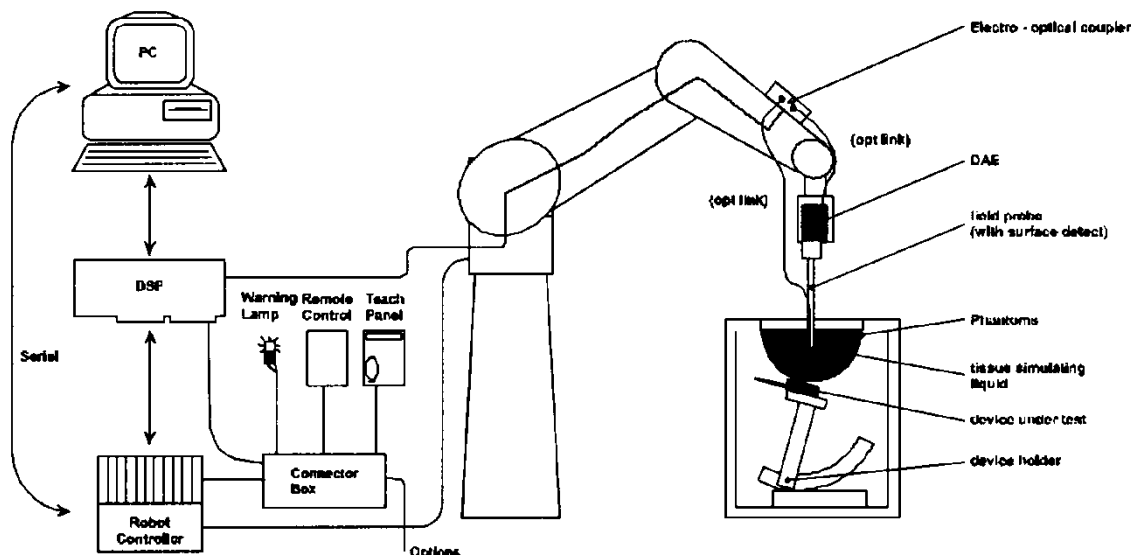
|                    |            |
|--------------------|------------|
| Start Date of test | 2015-02-03 |
| End Date of test   | 2015-02-03 |

#### 1.8 Ambient Condition

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

## 2 SAR Measurement System

### 2.1 SAR Measurement Set-up



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

- A standard high precision 6-axis robot (Stäubli RX family) with controller and software. An arm extension for accommodating 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 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.
- A unit to operate the optical surface detector which is connected to the EOC.
- 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.
- The DASY5 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.
- DASY5 software and SEMCAD data evaluation software.
- Remote control with teach panel and additional circuitry for robot safety such as warning lamps, etc.
- The generic twin phantom enabling the testing of left-hand and right-hand usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- System check dipoles allowing to validate the proper functioning of the system.

## 2.2 Test environment

The DASY4 measurement system is placed at the head end of a room with dimensions: 5 x 2.5 x 3 m<sup>3</sup>, the SAM phantom is placed in a distance of 75 cm from the side walls and 1.1m from the rear wall. Above the test system a 1.5 x 1.5 m<sup>2</sup> array of pyramid absorbers is installed to reduce reflections from the ceiling.

Picture 1 of the photo documentation shows a complete view of the test environment.

The system allows the measurement of SAR values larger than 0.005 mW/g.

## 2.3 Data Acquisition Electronics description

The data acquisition electronics (DAE) consist of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converte and a command decoder with a control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information, as well as an optical uplink for commands and the clock.

The mechanical probe mounting device includes two different sensor systems for frontal and sideways probe contacts. They are used for mechanical surface detection and probe collision detection.

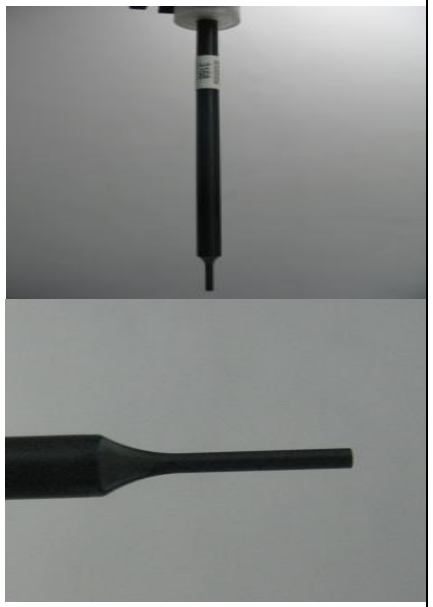
### DAE4

|                       |                          |                                                                                      |
|-----------------------|--------------------------|--------------------------------------------------------------------------------------|
| Input Impedance       | 200MOhm                  |  |
| The Inputs            | symmetrical and floating |                                                                                      |
| Common mode rejection | above 80 dB              |                                                                                      |

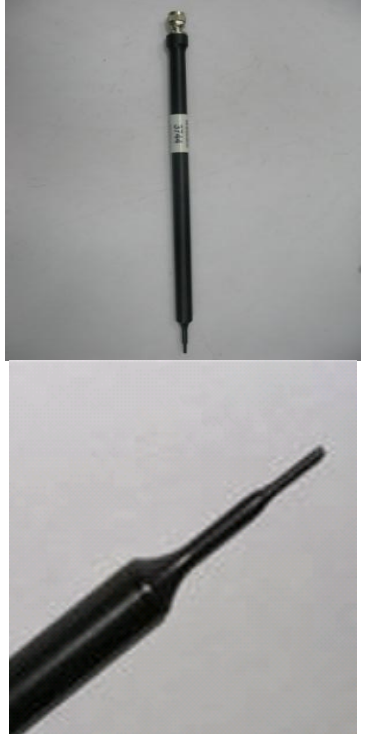
## 2.4 Probe description

These probes are specially designed and calibrated for use in liquids with high permittivities. They should not be used in air, since the spherical isotropy in air is poor ( $\pm 2$  dB). The dosimetric probes have special calibrations in various liquids at different frequencies.

### Isotropic E-Field Probe ES3DV3 for Dosimetric Measurements

|               |                                                                                                                                                                                    |                                                                                      |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| Construction  | Symmetrical design with triangular core<br>Interleaved sensors<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 4 GHz; Linearity: $\pm 0.2$ dB (30 MHz to 4 GHz)                                                                                                                         |                                                                                      |
| Directivity   | $\pm 0.2$ dB in HSL (rotation around probe axis)<br>$\pm 0.3$ dB in tissue material (rotation normal to probe axis)                                                                |                                                                                      |
| Dynamic range | 5 $\mu$ W/g to > 100 mW/g; Linearity: $\pm 0.2$ dB                                                                                                                                 |                                                                                      |
| Dimensions    | Overall length: 337 mm (Tip: 20 mm)<br>Tip diameter: 3.9 mm (Body: 12 mm)<br>Distance from probe tip to dipole centers: 2.0 mm                                                     |                                                                                      |
| Application   | General dosimetry up to 4 GHz<br>Dosimetry in strong gradient fields<br>Compliance tests of mobile phones                                                                          |                                                                                      |

### Isotropic E-Field Probe EX3DV4 for Dosimetric Measurements

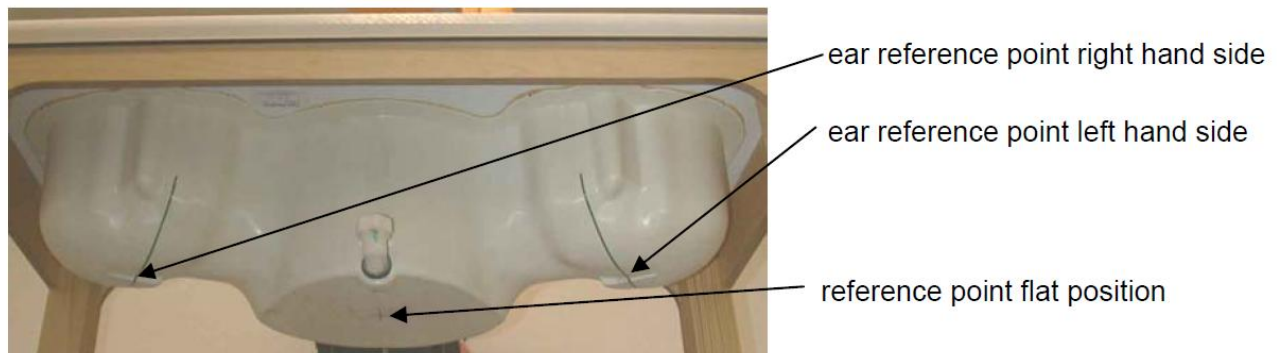
|               |                                                                                                                                                                                                              |                                                                                       |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Construction  | Symmetrical design with triangular core<br>Built-in shielding against static charges<br>PEEK enclosure material (resistant to organic solvents, e.g., DGBE)                                                  |  |
| Calibration   | ISO/IEC 17025 calibration service available.                                                                                                                                                                 |                                                                                       |
| Frequency     | 10 MHz to >6 GHz; Linearity: $\pm 0.2$ dB (30 MHz to 6 GHz)                                                                                                                                                  |                                                                                       |
| Directivity   | $\pm 0.3$ dB in HSL (rotation around probe axis)<br>$\pm 0.5$ dB in tissue material (rotation normal to probe axis)                                                                                          |                                                                                       |
| Dynamic range | 10 $\mu$ W/g to > 100 mW/g;<br>Linearity: $\pm 0.2$ dB (noise: typically < 1 $\mu$ W/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).<br>Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30% |                                                                                       |

## 2.5 Phantom description

### SAM Twin Phantom

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                     |                                                                                     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|-------------------------------------------------------------------------------------|
| Shell Thickness                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 2mm +/- 0.2 mm; The ear region: 6mm                 |  |
| Filling Volume                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Approximately 30 liters                             |                                                                                     |
| Dimensions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Length:1000mm; Width:500mm; Height: adjustable feet |                                                                                     |
| Measurement Areas                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Left hand<br>Right hand<br>Flat phantom             |                                                                                     |
| <p>The bottom plate contains three pairs of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections.</p> <p>A white cover is provided to cover the phantom during off-periods to prevent water evaporation and changes in the liquid parameters. Free space scans of devices on top of this phantom cover are possible. Three reference marks are provided on the phantom counter. These reference marks are used to teach the absolute phantom position relative to the robot.</p> |                                                     |                                                                                     |

The following figure shows the definition of reference point:



### ELI4 Phantom

|                                                                                                                                                                                                                                                                       |                                                        |                                                                                       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|---------------------------------------------------------------------------------------|
| ELI4 Phantom                                                                                                                                                                                                                                                          |                                                        |  |
| Shell Thickness                                                                                                                                                                                                                                                       | 2mm +/- 0.2 mm                                         |                                                                                       |
| Filling Volume                                                                                                                                                                                                                                                        | Approximately 30 liters                                |                                                                                       |
| Dimensions                                                                                                                                                                                                                                                            | Length:1000mm; Width:500mm;<br>Height: adjustable feet |                                                                                       |
| Measurement Areas                                                                                                                                                                                                                                                     | Flat phantom                                           |                                                                                       |
| <p>The ELI4 phantom is intended for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30MHz to 6GHz. ELI4 is fully compatible with the latest draft of the standard IEC 62209-2 and all known tissue simulating liquids.</p> |                                                        |                                                                                       |

The phantom shell material is resistant to all ingredients used in the tissue-equivalent liquid recipes. The shell of the phantom including ear spacers is constructed from low permittivity and low loss material, with a relative permittivity  $\leq 5$  and a loss tangent  $\leq 0.05$ .

## 2.6 Device holder description

The DASY5 device holder has two scales for device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear openings). The plane between the ear openings and the mouth tip has a rotation angle of  $65^\circ$ . The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. This device holder is used for standard mobile phones or PDA's only. If necessary an additional support of polystyrene material is used.



The DASY device holder is constructed of low-loss POM material having the following dielectric parameters: relative permittivity  $\epsilon = 3$  and loss tangent  $\sigma = 0.02$ . 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.

The device holder permits the device to be positioned with a tolerance of  $\pm 1^\circ$  in the tilt angle.

Larger DUT's (e.g. notebooks) cannot be tested using this device holder. Instead a support of bigger polystyrene cubes and thin polystyrene plates is used to position the DUT in all relevant positions to find and measure spots with maximum SAR values.

Therefore those devices are normally only tested at the flat part of the SAM.

## 2.7 Test Equipment List

This table gives a complete overview of the SAR measurement equipment.

Devices used during the test described are marked ☒

|                                     | Manufacturer  | Device                               | Type     | Serial number | Date of last calibration | Valid period |
|-------------------------------------|---------------|--------------------------------------|----------|---------------|--------------------------|--------------|
| <input checked="" type="checkbox"/> | SPEAG         | Dosimetric E-Field Probe             | EX3DV4   | 3744          | 2014-07-24               | One year     |
| <input checked="" type="checkbox"/> | SPEAG         | 835 MHz Dipole                       | D835V2   | 4d059         | 2013-05-02               | Three years  |
| <input checked="" type="checkbox"/> | SPEAG         | 1900 MHz Dipole                      | D1900V2  | 5d143         | 2014-09-23               | Three years  |
| <input checked="" type="checkbox"/> | SPEAG         | Data acquisition electronics         | DAE4     | 851           | 2014-07-24               | One year     |
| <input checked="" type="checkbox"/> | SPEAG         | Software                             | DASY 5   | N/A           | NCR                      | NCR          |
| <input checked="" type="checkbox"/> | SPEAG         | Twin Phantom                         | SAM1     | TP-1475       | NCR                      | NCR          |
| <input checked="" type="checkbox"/> | SPEAG         | Twin Phantom                         | SAM2     | TP-1474       | NCR                      | NCR          |
| <input type="checkbox"/>            | SPEAG         | Twin Phantom                         | SAM3     | TP-1597       | NCR                      | NCR          |
| <input type="checkbox"/>            | SPEAG         | Twin Phantom                         | SAM4     | TP-1620       | NCR                      | NCR          |
| <input type="checkbox"/>            | SPEAG         | Flat Phantom                         | ELI 4.0  | TP-1038       | NCR                      | NCR          |
| <input type="checkbox"/>            | SPEAG         | Flat Phantom                         | ELI 5.0  | TP-1111       | NCR                      | NCR          |
| <input checked="" type="checkbox"/> | R & S         | Universal Radio Communication Tester | CMU 200  | 113989        | 2014-07-11               | One year     |
| <input checked="" type="checkbox"/> | Agilent       | Network Analyser                     | E5071C   | MY46213349    | 2014-02-25               | One year     |
| <input checked="" type="checkbox"/> | Agilent       | Dielectric Probe Kit                 | 85070E   | 2484          | NCR                      | NCR          |
| <input checked="" type="checkbox"/> | Agilent       | Signal Generator                     | N5181A   | MY47420989    | 2015-01-07               | One year     |
| <input checked="" type="checkbox"/> | MINI-CIRCUITS | Amplifier                            | ZHL-42W  | QA1402001     | NCR                      | NCR          |
| <input checked="" type="checkbox"/> | AR            | Directional Coupler                  | DC7144M1 | 0423264       | 2014-04-02               | One year     |
| <input checked="" type="checkbox"/> | R & S         | Power Meter                          | NRP      | 100740        | 2014-07-11               | One year     |
| <input checked="" type="checkbox"/> | R & S         | Power Meter Sensor                   | NRP-Z11  | 106288        | 2014-07-11               | One year     |
| <input checked="" type="checkbox"/> | Agilent       | Power Meter                          | E4417A   | MY45101339    | 2015-01-07               | One year     |
| <input checked="" type="checkbox"/> | Agilent       | Power Meter Sensor                   | E9321A   | MY44420359    | 2015-01-07               | One year     |

Note:

1) Per KDB865664D01 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.

- There is no physical damage on the dipole;
- System check with specific dipole is within 10% of calibrated value;
- The most recent return-loss result, measured at least annually, deviates by no more than 20% from the previous measurement.
- 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 shorting block performed before measuring liquid parameters.

### 3 SAR Measurement Procedure

#### 3.1 Scanning procedure

The DASY5 installation includes predefined files with recommended procedures for measurements and system check. 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  $\pm 0.1\text{mm}$ ). 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  $\pm 30^\circ$ .)
- 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 ( $\leq 2\text{GHz}$ ), 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. Results of this coarse scan are shown in Appendix B.
- 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:  $\Delta x_{\text{zoom}}, \Delta y_{\text{zoom}} \leq 2\text{GHz} - \leq 8\text{mm}$ , 2-4GHz -  $\leq 5\text{ mm}$  and 4-6 GHz- $\leq 4\text{mm}$ ;  $\Delta z_{\text{zoom}} \leq 3\text{GHz} - \leq 5\text{ mm}$ , 3-4 GHz-  $\leq 4\text{mm}$  and 4-6GHz- $\leq 2\text{mm}$  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. A z-axis scan of the measurement with maximum SAR value is shown in Appendix B.

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

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

### 3.2 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  $5 \times 5 \times 7$  points( with 8mm horizontal resolution) or  $7 \times 7 \times 7$  points( with 5mm horizontal resolution) or  $8 \times 8 \times 7$  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, Computermathematik, 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, Computermathematik, 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 ( $20 \times 20 \times 20$ ) are interpolated to calculate the average.

#### Advanced Extrapolation

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

### 3.3 Data Storage and Evaluation

#### 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 "DAE4". 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.

#### 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             | $\text{Norm}_i, a_{i0}, a_{i1}, a_{i2}$ |
|                    | - Conversion factor       | $\text{ConvF}_i$                        |
|                    | - Diode compression point | $\text{Dcpi}$                           |
| Device parameters: | - Frequency               | $f$                                     |
|                    | - Crest factor            | $cf$                                    |
| Media parameters:  | - Conductivity            | $\sigma$                                |
|                    | - Density                 | $\rho$                                  |

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 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 | $V_i$   | = 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:  $E_i = (V_i / \text{Norm}_i \cdot \text{ConvF})^{1/2}$   
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)  
 $\text{Norm}_i$  = sensor sensitivity of channel i (i = x, y, z)  
[mV/(V/m)<sup>2</sup>] for E-field Probes  
ConvF = sensitivity enhancement in solution  
 $a_{ij}$  = 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):

$$E_{\text{tot}} = (E_x^2 + E_y^2 + E_z^2)^{1/2}$$

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

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

with SAR = local specific absorption rate in mW/g  
 $E_{\text{tot}}$  = total field strength in V/m  
 $\sigma$  = conductivity in [mho/m] or [Siemens/m]  
 $\rho$  = equivalent tissue density in g/cm<sup>3</sup>

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.

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

with  $P_{\text{pwe}}$  = equivalent power density of a plane wave in mW/cm<sup>2</sup>  
 $E_{\text{tot}}$  = total electric field strength in V/m  
 $H_{\text{tot}}$  = 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 if the dielectric parameters are within the tolerances of the specified target values. The measured conductivity and relative permittivity should be within  $\pm 5\%$  of the target values.

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

| Ingredients (% of weight) | Body Tissue |      |       |       |      |        |
|---------------------------|-------------|------|-------|-------|------|--------|
| Frequency Band (MHz)      | 450         | 835  | 1800  | 1900  | 2450 | 2600   |
| Water                     | 51.16       | 52.4 | 69.91 | 69.91 | 73.2 | 64.493 |
| Salt (NaCl)               | 1.49        | 1.40 | 0.13  | 0.13  | 0.04 | 0.024  |
| Sugar                     | 46.78       | 45.0 | 0.0   | 0.0   | 0.0  | 0.0    |
| HEC                       | 0.52        | 1.0  | 0.0   | 0.0   | 0.0  | 0.0    |
| Bactericide               | 0.05        | 0.1  | 0.0   | 0.0   | 0.0  | 0.0    |
| Triton X-100              | 0.0         | 0.0  | 0.0   | 0.0   | 0.0  | 0.0    |
| DGBE                      | 0.0         | 0.0  | 29.96 | 29.96 | 26.7 | 32.252 |

Table 4: Tissue Dielectric Properties

Salt: 99+% Pure Sodium Chloride; Sugar: 98+% Pure Sucrose; Water: De-ionized,  $16\text{M}\Omega$ + 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 Type (MHz) | Measured Frequency (MHz) | Target Tissue          |                        | Measured Tissue |                | Liquid Temp. | Test Date  |
|-------------------|--------------------------|------------------------|------------------------|-----------------|----------------|--------------|------------|
|                   |                          | $\epsilon_r$ (+/-5%)   | $\sigma$ (S/m) (+/-5%) | $\epsilon_r$    | $\sigma$ (S/m) |              |            |
| 835 Body          | 825                      | 55.20<br>(52.44~57.96) | 0.97<br>(0.92~1.02)    | 53.76           | 0.94           | 21.4°C       | 2015-02-03 |
|                   | 835                      | 55.20<br>(52.44~57.96) | 0.97<br>(0.92~1.02)    | 53.65           | 0.95           |              |            |
|                   | 850                      | 55.20<br>(52.44~57.96) | 0.99<br>(0.94~1.04)    | 53.48           | 0.96           |              |            |
| 1900 Body         | 1850                     | 53.30<br>(50.64~55.97) | 1.52<br>(1.44~1.60)    | 51.51           | 1.48           | 21.4°C       | 2015-02-03 |
|                   | 1880                     | 53.30<br>(50.64~55.97) | 1.52<br>(1.44~1.60)    | 51.41           | 1.51           |              |            |
|                   | 1900                     | 53.30<br>(50.64~55.97) | 1.52<br>(1.44~1.60)    | 51.35           | 1.53           |              |            |
|                   | 1910                     | 53.30<br>(50.64~55.97) | 1.52<br>(1.44~1.60)    | 51.31           | 1.54           |              |            |

$\epsilon_r$ = Relative permittivity,  $\sigma$ = Conductivity

Table 5: Measured Tissue Parameter

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 P1528 (described above). The following table shows system check results for all frequency bands and tissue liquids used during the tests(Graphic Plot(s) see Appendix A).

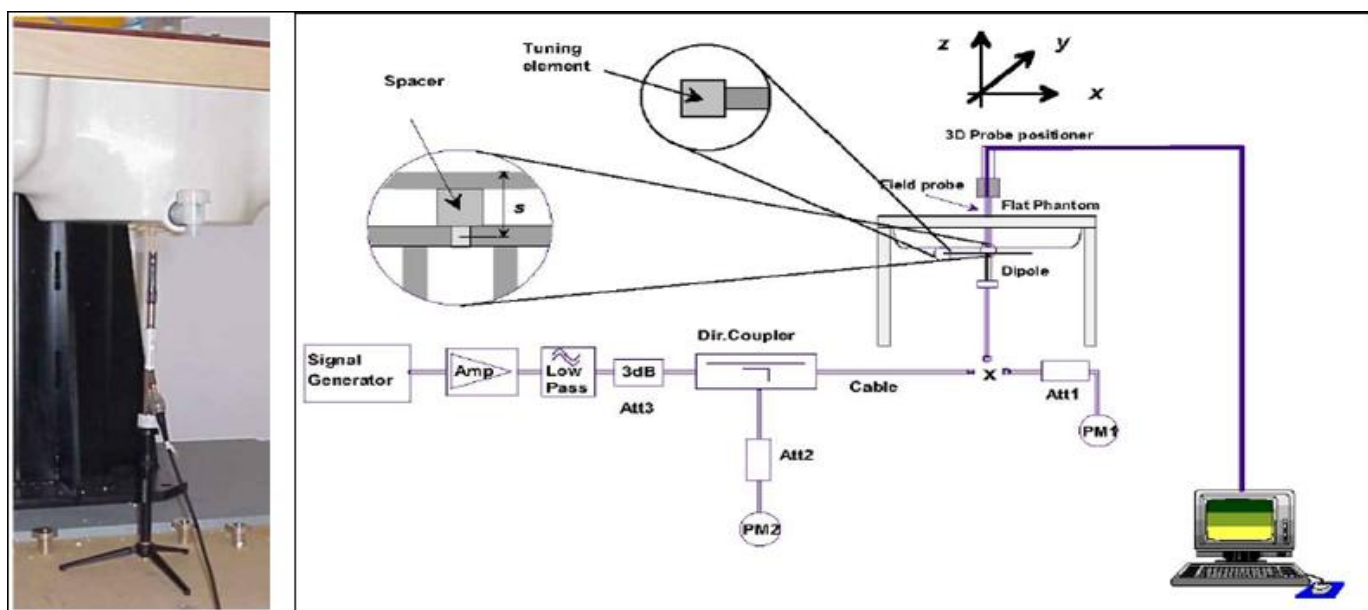
| System Check | Target SAR (1W)<br>(+/-10%) |                        | Measured SAR<br>(Normalized to 1W) |                | Liquid Temp. | Test Date  |
|--------------|-----------------------------|------------------------|------------------------------------|----------------|--------------|------------|
|              | 1-g<br>(mW/g)               | 10-g<br>(mW/g)         | 1-g<br>(mW/g)                      | 10-g<br>(mW/g) |              |            |
| 835MHz Body  | 9.42<br>(8.48~10.36)        | 6.19<br>(5.57~6.80)    | 9.60                               | 6.32           | 21.4°C       | 2015-02-03 |
| 1900MHz Body | 40.20<br>(36.18~44.22)      | 21.30<br>(19.17~23.43) | 42.80                              | 22.16          | 21.4°C       | 2015-02-03 |

Table 6: System Check Results

### 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 250 mW(below 5GHz) or 100mW(above 5GHz). To adjust this power a power meter is used. The power sensor is connected to the cable before the system 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 (result on plot).

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.



## 5 SAR measurement variability and uncertainty

### 5.1 SAR measurement variability

Per KDB865664 D01 SAR measurement 100 MHz to 6 GHz v01r03, 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  $\geq 0.80$  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  $\geq 1.45$  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  $\geq 1.5$  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.

### 5.2 SAR measurement uncertainty

Per KDB865664 D01 SAR Measurement 100 MHz to 6 GHz v01r03, 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 1528-2003 is not required in SAR reports submitted for equipment approval. The equivalent ratio (1.5/1.6) is applied to extremity and occupational exposure conditions.

## 6 SAR Test Configuration

### 6.1 CDMA Test Configuration

#### 6.1.1 CDMA 1x Devices

For SAR test, the maximum power output is very important and essential; it is identical under the measurement uncertainty. It is proper to use typical Test Mode 3(FW RC3, RVS RC3, SO55) as the worst case for SAR test.

Test Parameter setup for maximum RF output power according to section 4.4.5 of 3GPP2;

| Parameter        | Units       | Value |
|------------------|-------------|-------|
| I or             | dBm/1.23MHz | -104  |
| PilotE c/I or    | dB          | -7    |
| TrafficE c /I or | dB          | -7.4  |

#### Body SAR measurement

Per KDB 941225D01 v02, Body SAR is measured in RC3 with the handset configured in TDSO/SO32 to transmit at full rate on FCH only with all other code channels disabled. The body SAR procedures in KDB Publication 447498 are applied. The 3G SAR test reduction procedure is applied to the multiple code channel configuration (FCH+SCHn), with FCH only as the primary mode. Otherwise, SAR is required for multiple code channel configuration (FCH + SCHn), with FCH at full rate and SCH0 enabled at 9600 bps, using the highest reported SAR configuration for FCH only.7 When multiple code channels are enabled, the transmitter output can shift by more than 0.5 dB and may lead to higher SAR drifts and SCH dropouts.

This device only supports CDMA SO55(Loopback service) mode. Per KDB 941225D01 v02, the 3G SAR test reduction procedure is applied to body SAR in RC1 with RC3 as the primary mode. Otherwise, SAR is required for RC1, with SO55 and full rate, using the highest reported SAR configuration for body-worn accessory exposure in RC3.

Test communication setup meet as followings:

|                                                                          |                                                  |
|--------------------------------------------------------------------------|--------------------------------------------------|
| Communication standard between mobile station and base station simulator | 3GPP2 C.S0011-B                                  |
| Radio configuration                                                      | RC3(Supporting CDMA 1X)                          |
| Spreading Rate                                                           | SR1                                              |
| Data Rate                                                                | 9600bps                                          |
| Service Options                                                          | SO55(Loopback service)                           |
| Service Options                                                          | SO32(Test Data service)                          |
| Multiplex Options                                                        | The mobile station does not support this service |

## 7 SAR Measurement Results

### 7.1 Conducted power measurements

For the measurements a Rohde & Schwarz Radio Communication Tester CMU 200 was used.

SAR drift measured at the same position in liquid before and after each SAR test as below 7.2 chapter.

#### 7.1.1 Conducted power measurements of CDMA BC0

| CDMA BC0 |      | Tune-up Limit<br>(dBm) | Average Power (dBm) |              |              |
|----------|------|------------------------|---------------------|--------------|--------------|
|          |      |                        | 1013CH              | 384CH        | 777CH        |
| RC1      | SO55 | 25.50                  | 23.66               | 23.59        | 23.62        |
| RC3      | SO55 | <b>25.50</b>           | <b>23.63</b>        | <b>23.56</b> | <b>23.53</b> |

Table 7:Conducted power measurement results of CDMA BC0

Note:

- 1) The conducted power of CDMA BC0 is measured with RMS detector.
- 2) This device only supports CDMA SO55(Loopback service) mode. Body SAR is measured in RC3. Per KDB 941225D01 v02, the 3G SAR test reduction procedure is applied to body SAR in RC1 with RC3 as the primary mode. Otherwise, SAR is required for RC1, with SO55 and full rate, using the highest reported SAR configuration for body-worn accessory exposure in RC3.

#### 7.1.2 Conducted power measurements of CDMA BC1

| CDMA BC1 |      | Tune-up Limit<br>(dBm) | Average Power (dBm) |              |              |
|----------|------|------------------------|---------------------|--------------|--------------|
|          |      |                        | 25CH                | 600CH        | 1175CH       |
| RC1      | SO55 | 25.50                  | 24.62               | 24.65        | 24.37        |
| RC3      | SO55 | <b>25.50</b>           | <b>24.66</b>        | <b>24.56</b> | <b>24.29</b> |

Table 8:Conducted power measurement results of CDMA BC1

Note:

- 1) The conducted power of CDMA BC1 is measured with RMS detector.
- 2) This device only supports CDMA SO55(Loopback service) mode. Body SAR is measured in RC3. Per KDB 941225D01 v02, the 3G SAR test reduction procedure is applied to body SAR in RC1 with RC3 as the primary mode. Otherwise, SAR is required for RC1, with SO55 and full rate, using the highest reported SAR configuration for body-worn accessory exposure in RC3.

## 7.2 SAR measurement Results

### General Notes:

- 1) Per KDB447498 D01v05r02, all measurement SAR results are scaled to the maximum tune-up tolerance limit to demonstrate compliant.
- 2) Per KDB447498 D01v05r02, 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:  $\leq 0.8$  W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is  $\leq 100$  MHz. When the maximum output power variation across the required test channels is  $> \frac{1}{2}$  dB, instead of the middle channel, the highest output power channel must be used.
- 3) Per KDB865664 D01v01r03, for each frequency band, repeated SAR measurement is required only when the measured SAR is  $\geq 0.8$  W/Kg; if the deviation among the repeated measurement is  $\leq 20\%$ , and the measured SAR  $< 1.45$  W/Kg, only one repeated measurement is required.
- 4) Per KDB865664 D02v01r01, 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 (Refer to appendix B for details).
- 5) All measurement SAR result is scaled-up to account for tune-up tolerance is compliant.
- 6) Per KDB 941225D01 v02, the mode tested for SAR is referred to as the primary mode. The equivalent modes considered for SAR test reduction are denoted as secondary modes. Both primary and secondary modes must be in the same frequency band. When the maximum output power and tune-up tolerance specified for production units in a secondary mode is  $\leq \frac{1}{4}$  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  $\leq 1.2$  W/kg, SAR measurement is not required for the secondary mode.

### CDMA Notes:

- 1) Per KDB 941225D01 v02, the 3G SAR test reduction procedure is applied to body SAR in RC1 with RC3 as the primary mode. Otherwise, SAR is required for RC1, with SO55 and full rate, using the highest reported SAR configuration for body exposure in RC3.

### 7.2.1 SAR measurement Result of CDMA BC0

| Test Position of Body with 25mm                                         | Test channel /Frequency | Test Mode | SAR Value (W/kg) |       | Power Drift (dB) | Conducted Power (dBm) | Tune-up Power (dBm) | Scaled SAR1-g (W/kg) | Liquid Temp. |
|-------------------------------------------------------------------------|-------------------------|-----------|------------------|-------|------------------|-----------------------|---------------------|----------------------|--------------|
|                                                                         |                         |           | 1-g              | 10-g  |                  |                       |                     |                      |              |
| The data of F256-B from Report No.: SYBH(Z-SAR)031022014-2              |                         |           |                  |       |                  |                       |                     |                      |              |
| Test data with battery 1#                                               |                         |           |                  |       |                  |                       |                     |                      |              |
| Top Side-antenna horizontal                                             | 384/836.52              | RC3 SO55  | 0.337            | 0.241 | 0.010            | 23.56                 | 25.50               | 0.527                | 21.8°C       |
| Top Side-antenna vertical                                               | 384/836.52              | RC3 SO55  | 0.309            | 0.222 | 0.000            | 23.56                 | 25.50               | 0.483                | 21.8°C       |
| Front Side-antenna horizontal                                           | 384/836.52              | RC3 SO55  | 0.290            | 0.208 | -0.020           | 23.56                 | 25.50               | 0.453                | 21.8°C       |
| Test data at the worst position with battery 2#                         |                         |           |                  |       |                  |                       |                     |                      |              |
| Top Side-antenna horizontal                                             | 384/836.52              | RC3 SO55  | 0.369            | 0.261 | -0.010           | 23.56                 | 25.50               | 0.577                | 21.8°C       |
| Test data at the worst position with battery 2# and adapter             |                         |           |                  |       |                  |                       |                     |                      |              |
| Top Side-antenna horizontal                                             | 384/836.52              | RC3 SO55  | 0.345            | 0.246 | -0.060           | 23.56                 | 25.50               | 0.539                | 21.8°C       |
| F258 Tested at the worst position of F256-B with battery 1#             |                         |           |                  |       |                  |                       |                     |                      |              |
| Top Side-antenna horizontal                                             | 384/836.52              | RC3 SO55  | 0.481            | 0.343 | 0.040            | 23.56                 | 25.50               | 0.752                | 21.4°C       |
| F258 Tested at the worst position of F256-B with battery 2#             |                         |           |                  |       |                  |                       |                     |                      |              |
| Top Side-antenna horizontal                                             | 384/836.52              | RC3 SO55  | 0.494            | 0.353 | -0.040           | 23.56                 | 25.50               | <b>0.772</b>         | 21.4°C       |
| F258 Tested at the worst position of F256-B with battery 2# and adapter |                         |           |                  |       |                  |                       |                     |                      |              |
| Top Side-antenna horizontal                                             | 384/836.52              | RC3 SO55  | 0.460            | 0.330 | 0.040            | 23.56                 | 25.50               | 0.719                | 21.4°C       |

Table 9: Body SAR Test results of CDMA BC0

Note: 1) The maximum SAR value of each test band is marked **bold**.

### 7.2.2 SAR measurement Result of CDMA BC1

| Test Position of Body with 25mm                                         | Test channel /Frequency | Test Mode | SAR Value (W/kg) |       | Power Drift (dB) | Conducted Power (dBm) | Tune-up Power (dBm) | Scaled SAR1-g (W/kg) | Liquid Temp. |
|-------------------------------------------------------------------------|-------------------------|-----------|------------------|-------|------------------|-----------------------|---------------------|----------------------|--------------|
|                                                                         |                         |           | 1-g              | 10-g  |                  |                       |                     |                      |              |
| The data of F256-B from Report No.: SYBH(Z-SAR)031022014-2              |                         |           |                  |       |                  |                       |                     |                      |              |
| Test data with battery 1#                                               |                         |           |                  |       |                  |                       |                     |                      |              |
| Top Side-antenna horizontal                                             | 600/1880                | RC3 SO55  | 0.615            | 0.391 | 0.020            | 24.56                 | 25.50               | 0.764                | 21.8°C       |
| Top Side-antenna vertical                                               | 600/1880                | RC3 SO55  | 0.510            | 0.328 | 0.120            | 24.56                 | 25.50               | 0.633                | 21.8°C       |
| Front Side-antenna horizontal                                           | 600/1880                | RC3 SO55  | 0.540            | 0.342 | 0.050            | 24.56                 | 25.50               | 0.670                | 21.8°C       |
| Tested data at the worst position with battery 2#                       |                         |           |                  |       |                  |                       |                     |                      |              |
| Top Side-antenna horizontal                                             | 600/1880                | RC3 SO55  | 0.563            | 0.324 | -0.040           | 24.56                 | 25.50               | 0.699                | 21.8°C       |
| Test data at the worst position with battery 1# and adapter             |                         |           |                  |       |                  |                       |                     |                      |              |
| Top Side-antenna horizontal                                             | 600/1880                | RC3 SO55  | 0.479            | 0.305 | 0.090            | 24.56                 | 25.50               | 0.595                | 21.8°C       |
| F258 Tested at the worst position of F256-B with battery 1#             |                         |           |                  |       |                  |                       |                     |                      |              |
| Top Side-antenna horizontal                                             | 600/1880                | RC3 SO55  | 0.607            | 0.381 | 0.030            | 24.56                 | 25.50               | 0.754                | 21.4°C       |
| F258 Tested at the worst position of F256-B with battery 2#             |                         |           |                  |       |                  |                       |                     |                      |              |
| Top Side-antenna horizontal                                             | 600/1880                | RC3 SO55  | 0.655            | 0.409 | 0.010            | 24.56                 | 25.50               | 0.813                | 21.4°C       |
| Top Side-antenna horizontal                                             | 25/1851.25              | RC3 SO55  | 0.528            | 0.331 | 0.020            | 24.66                 | 25.50               | 0.641                | 21.4°C       |
| Top Side-antenna horizontal                                             | 1175/1908.75            | RC3 SO55  | 0.573            | 0.355 | -0.120           | 24.29                 | 25.50               | 0.757                | 21.4°C       |
| F258 Tested at the worst position of F256-B with battery 2# and adapter |                         |           |                  |       |                  |                       |                     |                      |              |
| Top Side-antenna horizontal                                             | 600/1880                | RC3 SO55  | 0.830            | 0.402 | -0.030           | 24.56                 | 25.50               | 1.031                | 21.4°C       |
| Top Side-antenna horizontal-Repeated                                    | 600/1880                | RC3 SO55  | 0.761            | 0.403 | -0.010           | 24.56                 | 25.50               | 0.945                | 21.4°C       |

Table 10: Body SAR Test results of CDMA BC1

Note: 1) The maximum SAR value of each test band is marked **bold**.



**Appendix A. System Check Plots**  
**(Pls See Appendix A.)**

**Appendix B. SAR Measurement Plots**  
**(Pls See Appendix B.)**

**Appendix C. Calibration Certificate**  
**(Pls See Appendix C.)**

**Appendix D. Photo documentation**  
**(Pls See Appendix D.)**

---

**End**