



FCC SAR Compliance Test Report

Project Name: LTE 2D USB Rotator
Model : E397Bu-502
FCC ID : QISE397BU-502
Report No. : SYBH(Z-SAR) 027042012-2

| | APPROVED | CHECKED | PREPARED |
|------|--------------------|-----------------|------------------|
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| DATE | 2012-04-25 | 2012-04-25 | 2012-04-25 |

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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..... | 4 |
| 1.3 | EUT Description | 5 |
| 1.3.1 | General Description | 6 |
| 1.3.2 | LTE information Summary | 6 |
| 1.4 | Test specification(s) | 7 |
| 1.5 | Testing laboratory..... | 7 |
| 1.6 | Applicant and Manufacturer | 7 |
| 1.7 | Application details | 7 |
| 1.8 | Ambient Condition..... | 7 |
| 2 | SAR Measurement System | 8 |
| 2.1 | SAR Measurement Set-up..... | 8 |
| 2.2 | Test environment..... | 9 |
| 2.3 | Data Acquisition Electronics description..... | 9 |
| 2.4 | Probe description | 10 |
| 2.5 | Phantom description | 11 |
| 2.6 | Device holder description..... | 11 |
| 2.7 | Test Equipment List | 12 |
| 3 | SAR Measurement Procedure..... | 13 |
| 3.1 | Scanning procedure..... | 13 |
| 3.2 | Spatial Peak SAR Evaluation | 14 |
| 3.3 | Data Storage and Evaluation..... | 15 |
| 4 | System Verification Procedure | 17 |
| 4.1 | Tissue Verification | 17 |
| 4.2 | System Check..... | 19 |
| 4.3 | Validation Procedure S..... | 19 |
| 5 | Measurement Uncertainty Evaluation | 20 |
| 5.1 | Measurement uncertainty evaluation for SAR test..... | 20 |
| 5.2 | Measurement uncertainty evaluation for system validation | 21 |
| 6 | SAR Test Configuration..... | 22 |
| 6.1 | CDMA Test Configuration | 22 |
| 6.1.1 | CDMA 1x Devices | 22 |
| 6.1.2 | CDMA Ev-Do Devices | 23 |
| 6.2 | LTE Test Configurations..... | 23 |
| 7 | SAR Measurement Results..... | 26 |
| 7.1 | Conducted power measurements..... | 26 |
| 7.1.1 | Conducted power measurements CDMA 800 | 26 |
| 7.1.2 | Conducted power measurements CDMA 1700 | 26 |
| 7.1.3 | Conducted power measurements CDMA 1900 | 26 |
| 7.1.4 | Conducted power measurements LTE Band II..... | 27 |
| 7.1.5 | Conducted power measurements LTE Band IV | 30 |
| 7.1.6 | Conducted power measurements LTE Band V | 32 |
| 7.1.7 | Conducted power measurements LTE FDD Band XII | 35 |
| 7.2 | SAR measurement Result..... | 38 |
| 7.2.1 | SAR measurement Result of CDMA 800 | 38 |
| 7.2.2 | SAR measurement Result of CDMA 1700 | 38 |
| 7.2.3 | SAR measurement Result of CDMA 1900 | 38 |
| 7.2.4 | SAR measurement Result of LTE Band II..... | 39 |
| 7.2.5 | SAR measurement Result of LTE Band IV | 40 |
| 7.2.6 | SAR measurement Result of LTE Band V | 41 |
| 7.2.7 | SAR measurement Result of LTE Band XII | 42 |
| 7.3 | simultaneous transmission SAR | 50 |
| | Appendix A. System Check Plots | 51 |
| | Appendix B. SAR Measurement Plots | 51 |
| | Appendix C. Calibration Certificate | 51 |
| | Appendix D. Photo documentation..... | 51 |

※ ※ Modified History ※ ※

| REV. | DESCRIPTION | ISSUED DATE | REMARK |
|-------------|-----------------------------|--------------------|---------------|
| Rev. 1.0 | Initial Test Report Release | 2012-04-25 | Yanghang |
| | | | |
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| | | | |
| | | | |

1 General Information

1.1 Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for HUAWEI E397Bu-502 are as below Table 1.

| Band | Position | Test Mode | Measured MAX SAR _{1g} (W/kg) | MAX Conducted Power (dBm) | Tune-up Power (dBm) | Extrapolated Result (W/kg) |
|--------------|----------------|------------|---------------------------------------|---------------------------|---------------------|----------------------------|
| CDMA 800 | Rear side 5mm | EVDO Rev.0 | 1.180 | 23.76 | 25.00 | 1.570 |
| CDMA 1700 | Front side 5mm | EVDO Rev.0 | 0.911 | 23.84 | 25.00 | 1.190 |
| CDMA 1900 | Front side 5mm | EVDO Rev.A | 1.120 | 23.63 | 25.00 | 1.535 |
| LTE Band II | Front side 5mm | QPSK | 1.070 | 22.05 | 23.00 | 1.332 |
| | Front side 5mm | 16QAM | 1.160 | 21.16 | 22.00 | 1.408 |
| LTE Band IV | Front side 5mm | QPSK | 0.906 | 22.14 | 23.00 | 1.104 |
| | Front side 5mm | 16QAM | 0.880 | 22.18 | 23.00 | 1.063 |
| LTE Band V | Rear side 5mm | QPSK | 0.915 | 22.01 | 23.00 | 1.149 |
| | Rear side 5mm | 16QAM | 0.854 | 22.20 | 23.00 | 1.027 |
| LTE Band XII | Rear side 5mm | QPSK | 0.882 | 23.34 | 24.00 | 1.027 |
| | Rear side 5mm | 16QAM | 0.697 | 22.51 | 23.00 | 0.780 |

Table 1: Summary of test result

The device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits of 1.6 W/Kg as averaged over any 1 g tissue according to the FCC rule §2.1093, the ANSI/IEEE C 95.1:1999, the NCRP Report Number 86 for uncontrolled environment, according to the Health Canada's Safety Code 6 and 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 1528-2003 and FCC OET Bulletin 65 Supplement.

1.2 RF exposure limits

| Human Exposure | Uncontrolled Environment General Population | Controlled Environment Occupational |
|--|--|--|
| Spatial Peak SAR* (Brain) | 1.60 mW/g | 8.00 mW/g |
| Spatial Average SAR** (Whole Body) | 0.08 mW/g | 0.40 mW/g |
| Spatial Peak SAR*** (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: | LTE 2D USB Rotator | | |
| Type Identification: | E397Bu-502 | | |
| FCC ID : | QISE397BU-502 | | |
| S/N No: | P2S01A9230600036 | | |
| IMEI No: | 99000079300074 | | |
| Device Type : | portable device | | |
| Exposure Category: | uncontrolled environment / general population | | |
| Hardware Version : | CD2E397UM | | |
| Software Version : | 11.515.05.00.000 | | |
| Antenna Type : | internal antenna | | |
| Device Operating Configurations: | | | |
| Supporting Mode(s) | CDMA 800/1700/1900,LTE Band II/IV/V/XII, | | |
| Test Modulation | QPSK,16QAM | | |
| Device Class | B | | |
| Operating Frequency Range(s) | Band | Tx (MHz) | Rx (MHz) |
| | CDMA 800 | 824-849 | 869-894 |
| | CDMA 1700 | 1710-1755 | 2110-2155 |
| | CDMA 1900 | 824-849 | 1930-1990 |
| | LTE Band II | 1850-1910 | 1930-1990 |
| | LTE Band IV | 1710-1755 | 2110-2155 |
| | LTE Band V | 824-849 | 869-894 |
| | LTE Band XII | 698-716 | 728-746 |
| Power Class : | Tested with power control all up (CDMA800) | | |
| | Tested with power control all up (CDMA1700) | | |
| | Tested with power control all up (CDMA1900) | | |
| | 3, tested with power control all Max.(LTE Band II) | | |
| | 3, tested with power control all Max.(LTE Band IV) | | |
| | 3, tested with power control all Max.(LTE Band V) | | |
| | 3, tested with power control all Max.(LTE Band XII) | | |
| Test Channels (low-mid-high) : | 1013-384-777 (CDMA 800) | | |
| | 25-450-850 (CDMA 1700) | | |
| | 25-600-1175 (CDMA 1900) | | |
| | 18607-18900-19193(LTE Band II BW=1.4MHz) | | |
| | 18615-18900-19185(LTE Band II BW=3MHz) | | |
| | 18625-18900-19175(LTE Band II BW=5MHz) | | |
| | 18650-18900-19150(LTE Band II BW=10MHz) | | |
| | 19975-20175-20375(LTE Band IV BW=5MHz) | | |
| | 20000-20175-20350(LTE Band IV BW=10MHz) | | |
| | 20407-20525-20643(LTE Band V BW=1.4MHz) | | |
| | 20415-20525-20635(LTE Band V BW=3MHz) | | |
| | 20425-20525-20625(LTE Band V BW=5MHz) | | |
| | 20450-20525-20600(LTE Band V BW=10MHz) | | |
| | 23017-23095-23173(LTE Band XII BW=1.4MHz) | | |
| | 23025-23095-23165(LTE Band XII BW=3MHz) | | |
| 23035-23095-23155(LTE Band XII BW=5MHz) | | | |
| 23060-23095-23130(LTE Band XII BW=10MHz) | | | |

Table 3: Device information and operating configuration

1.3.1 General Description

E397Bu-502 LTE/EVDO/CDMA dual mode 7 bands 2D USB Rotator is subscriber equipment in the LTE/CDMA system. E397Bu-502 implement such functions as RF signal receiving/transmitting, LTE and EVDO/CDMA protocol processing, data service etc. Externally it provides USB interface (to connect to the notebook etc.), USIM card interface and Micro SD card interface.

Note:

1.The antennas used in the EUT are listed as below table:

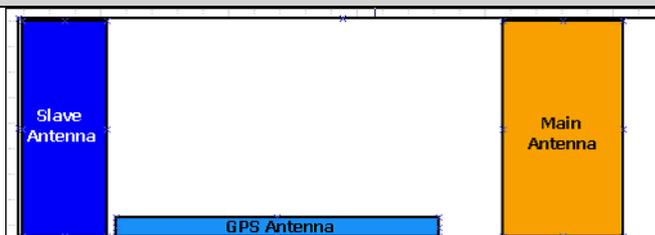
| Antenna Type | Function | Antenna Location |
|---------------|---|--|
| Main antenna | Transmit and receive signal from base station |  |
| Slave antenna | Only receive signal from base station | |
| GPS antenna | Only receive GPS signal from satellite. | |

Table 4: Antenna Type

1.3.2 LTE information Summary

| Items | Device Operating Configurations for LTE | Remark |
|-------|---|--|
| 1 | Frequency Range of each LTE transmission band | Refer to table 3 |
| 2 | Channel Bandwidths | Band II/V/XII(1.4MHz,3MHz,5MHz,10MHz)BW Band IV (5 MHz,10MHz)BW |
| 3 | H,M,L channel numbers and frequencies | Refer to table 3 |
| 4a | UE Category | 3 |
| 4b | Modulations Supported in UL | QPSK, 16QAM |
| 5 | Description of LTE Tx and Ant. Implementation | Refer to table 4 |
| 6 | LTE Voice available | No |
| | Hotspot with LTE + WIFI | No |
| 7 | LTE MPR Permanently implement per 3GPP TS36.101 section 6.2.3~6.2.5?(manufacturer attestation to be provided) | Yes |
| 8 | Conducted power table provided for 1RB(Low and high offset),50%RB(centered),100%RB | Yes |
| 9~10 | Non-LTE operating Modes and Band | Refer to table 3 |
| 11 | Simultaneous Tx Conditions | Refer to Section 7.3 |
| 12 | Power Reduction used for SAR Compliance | No |
| 13~15 | Supporting descriptions for power reduction | No |

Table 5: LTE information Summary per FCC KDB 941225 D05

1.4 Test specification(s)

| | |
|---|--|
| IEEE Std C95.1 – 1999 | IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz – 300 GHz. |
| IEEE 1528-2003 | Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques |
| OET Bulletin No. 65, Supplement C– 2001 | Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields---Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions |
| Canada’s Safety Code 6 | Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz (99-EHD-237) |
| 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 |
| KDB941225 D05 | SAR for LTE Devices v01 |
| KDB447489 D02 | SAR Procedures for Dongle Xmtr v02 |
| Lab PBA | Tracking number: 535501 |

1.5 Testing laboratory

| | |
|------------------------|---|
| Test Site | Reliability Laboratory of Huawei Technologies Co., Ltd. |
| Test Location | Section K3,Bantian, Longgang District, Shenzhen, P.R.China |
| Telephone | +86-755-28785513 |
| Fax | +86-755-36834474 |
| State of accreditation | The Test laboratory (area of testing) is accredited according to ISO/IEC 17025. CNAS Registration number: L0310 |

1.6 Applicant and Manufacturer

| | |
|--------------|--|
| Company Name | HUAWEI TECHNOLOGIES CO., LTD |
| Address | Huawei Base, Bantian, Longgang District, Shenzhen, P.R.China |

1.7 Application details

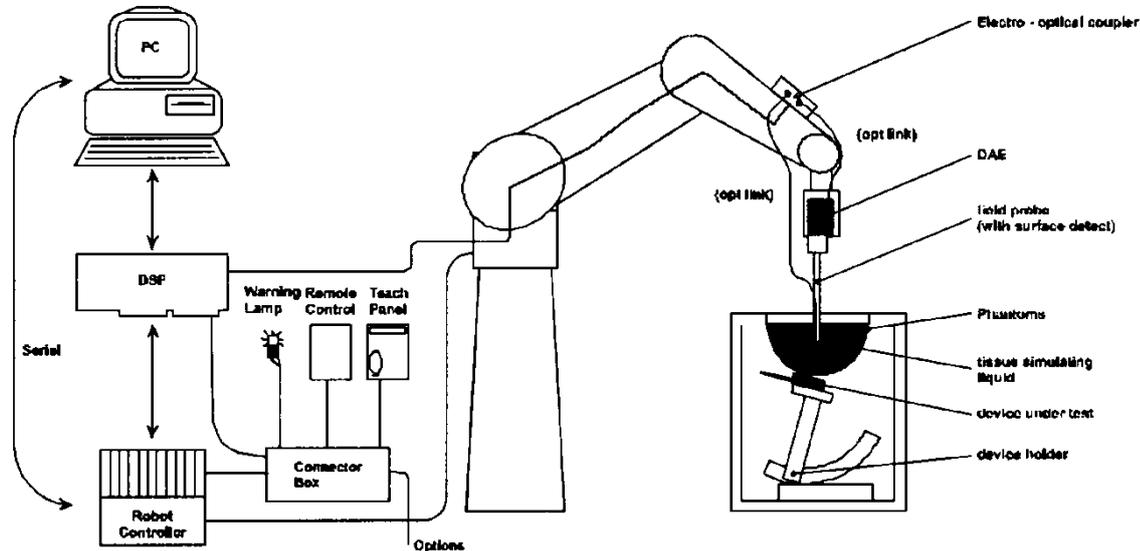
| | |
|--------------------|------------|
| Start Date of test | 2012-04-13 |
| End Date of test | 2012-04-21 |

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 XP.
- 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 validation 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 m³, 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 m² 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.

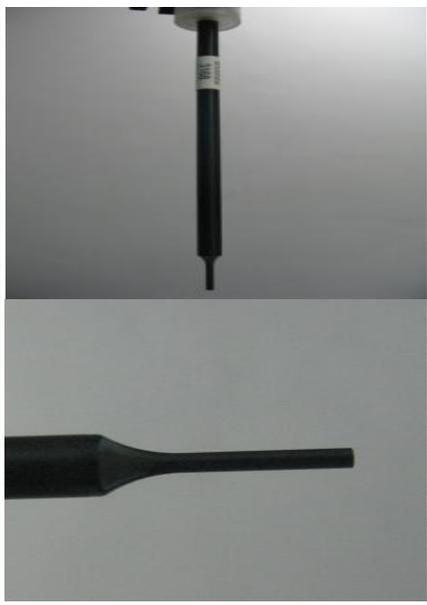
DAE4

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

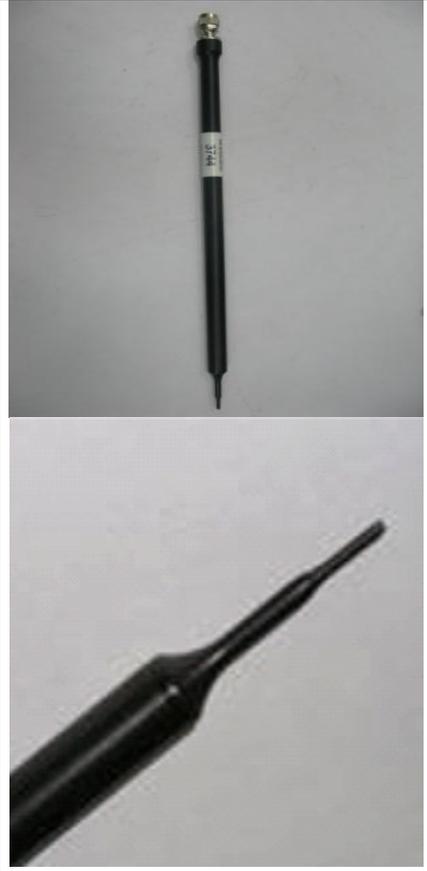
2.4 Probe description

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 (± 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 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 4 GHz; Linearity: ± 0.2 dB (30 MHz to 4 GHz) | |
| Directivity | ± 0.2 dB in HSL (rotation around probe axis) ± 0.3 dB in tissue material (rotation normal to probe axis) | |
| Dynamic range | 5 μ W/g to > 100 mW/g; Linearity: ± 0.2 dB | |
| Dimensions | Overall length: 330 mm (Tip: 20 mm) Tip diameter: 3.9 mm (Body: 12 mm) Distance from probe tip to dipole centers: 2.0 mm | |
| Application | General dosimetry up to 4 GHz Dosimetry in strong gradient fields Compliance tests of mobile phones | |

Isotropic E-Field Probe EX3DV4 for Dosimetric Measurements

| | | |
|---------------------------|---|---|
| Construction | Symmetrical design with triangular core Built-in optical fiber for surface detection system Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., glycolether) |  |
| Calibration | In air from 10 MHz to 2.5 GHz In head tissue simulating liquid (HSL) at 900 (800-1000) MHz and 1.8 GHz (1700-1910 MHz) (accuracy $\pm 11\%$; k=2) Calibration for other liquids and frequencies upon request | |
| Frequency | 10 MHz to 3 GHz (dosimetry); Linearity: ± 0.2 dB (30 MHz to 3 GHz) | |
| Directivity | ± 0.2 dB in HSL (rotation around probe axis) ± 0.4 dB in HSL (rotation normal to probe axis) | |
| Dynamic range | 5 μ W/g to > 100 mW/g; Linearity: ± 0.2 dB | |
| Optical Surface Detection | ± 0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces (EX3DV4 only) | |
| Dimensions | Overall length: 337 mm Tip length: 9 mm Body diameter: 10 mm Tip diameter: 2.5 mm Distance from probe tip to dipole centers: 1.0 mm | |
| Application | General dosimetry up to 3 GHz Compliance tests of mobile phones Fast automatic scanning in arbitrary phantoms (EX3DV4) | |

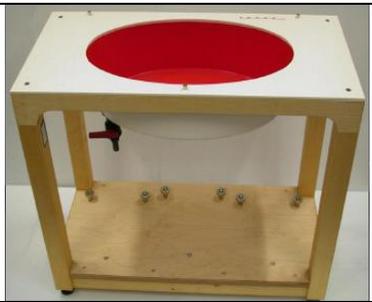
2.5 Phantom description

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 Right hand Flat phantom | |

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. 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.

ELI4 Phantom

| | | |
|-------------------|--|--|
| Shell Thickness | 2mm +/- 0.2 mm |  |
| Filling Volume | Approximately 30 liters | |
| Dimensions | Length:1000mm; Width:500mm; Height: adjustable feet | |
| Measurement Areas | Flat phantom | |

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.

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°. 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.



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) * |
|-------------------------------------|---------------|--------------------------------------|---------|-----------------------|---------------------------------|
| <input checked="" type="checkbox"/> | SPEAG | Dosimetric E-Field Probe | ES3DV3 | 3168(750MHz) | 2011-10-26 |
| <input checked="" type="checkbox"/> | SPEAG | Dosimetric E-Field Probe | ES3DV3 | 3168 (Other Bands) | 2011-09-27 |
| <input checked="" type="checkbox"/> | SPEAG | 750 MHz Validation Dipole | D750V3 | 1044 | 2011-09-16 |
| <input checked="" type="checkbox"/> | SPEAG | 900 MHz Validation Dipole | D835V2 | 4d126 | 2011-11-07 |
| <input checked="" type="checkbox"/> | SPEAG | 1800 MHz Validation Dipole | D1800V2 | 2d184 | 2011-03-08 |
| <input checked="" type="checkbox"/> | SPEAG | 1900 MHz Validation Dipole | D1900V2 | 5d143 | 2011-09-26 |
| <input checked="" type="checkbox"/> | SPEAG | Data acquisition electronics | DAE4 | 914 | 2011-12-08 |
| <input checked="" type="checkbox"/> | SPEAG | Software | DASY 5 | N/A | N/A |
| <input checked="" type="checkbox"/> | SPEAG | Twin Phantom | SAM1 | TP-1475 | N/A |
| <input checked="" type="checkbox"/> | SPEAG | Twin Phantom | SAM2 | TP-1474 | N/A |
| <input type="checkbox"/> | SPEAG | Twin Phantom | SAM3 | TP-1597 | N/A |
| <input type="checkbox"/> | SPEAG | Twin Phantom | SAM4 | TP-1620 | N/A |
| <input type="checkbox"/> | SPEAG | Flat Phantom | ELI 4.0 | TP-1038 | N/A |
| <input type="checkbox"/> | SPEAG | Flat Phantom | ELI 4.0 | TP-1111 | N/A |
| <input checked="" type="checkbox"/> | R & S | WideBand Radio Communication Tester | CMW 500 | 112936 | 2011-08-17 |
| <input type="checkbox"/> | R & S | Universal Radio Communication Tester | CMU 200 | 113989 | 2011-06-02 |
| <input checked="" type="checkbox"/> | Agilent)* | Network Analyser | E5071B | MY42404956 | 2012-02-14 |
| <input checked="" type="checkbox"/> | Agilent | Dielectric Probe Kit | 85070E | 2484 | N/A |
| <input checked="" type="checkbox"/> | Agilent | Signal Generator | N5181A | MY47420989 | 2012-02-14 |
| <input checked="" type="checkbox"/> | MINI-CIRCUITS | Amplifier | ZHL-42W | QA0746001 | N/A |
| <input checked="" type="checkbox"/> | Agilent | Power Meter | E4417A | MY45101339 | 2012-02-14 |
| <input checked="" type="checkbox"/> | Agilent | Power Meter Sensor | E9321A | MY44420359 | 2012-02-14 |

Note: The calibration interval of validation dipoles is 3 years.

1) Per KDB 450824 D02 requirements for dipole calibration, Huawei SAR lab has adopted three years calibration interval. But 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 validation with specific dipole is within 10% of calibrated value;
- c) Return-loss is within 10% of calibrated measurement;
- d) Impedance is within 5Ω from the previous measurement.

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

3 SAR Measurement Procedure

3.1 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 $\pm 0.1\text{mm}$). 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. 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 7x7x7 zoom scan measures the field in a volume around the 2D peak SAR value acquired in the previous coarse scan. This is a fine 7x7 grid where the robot additionally moves the probe in 7 steps along the z-axis away from the bottom of the Phantom. Grid spacing for the cube measurement is 5 mm in x and y-direction and 5 mm in z-direction. DASY5 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 7x7x7 scan. The probe is moved away in z-direction from the bottom of the SAM phantom in 2mm 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.

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 7 x 7 x 7 points. 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 (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.

3.3 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 | Norm _i , a ₁₀ , a ₁₁ , a ₁₂ |
| | - Conversion factor | ConvF _i |
| | - Diode compression point | Dcpi |
| Device parameters: | - Frequency | f |
| | - Crest factor | cf |
| Media parameters: | - Conductivity | σ |
| | - Density | ρ |

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the 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:
$$E_i = (V_i / Norm_i \cdot ConvF)^{1/2}$$

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
 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):

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

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

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

with SAR = local specific absorption rate in mW/g
 E_{tot} = total field strength in V/m
 σ = conductivity in [mho/m] or [Siemens/m]
 ρ = equivalent tissue density in g/cm³

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

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

with P_{pwe} = equivalent power density of a plane wave in mW/cm²
 E_{tot} = total electric 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 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 | | | | | |
|---------------------------|-------------|------|-------|-------|-------|------|
| | 750 | 835 | 900 | 1800 | 1900 | 2450 |
| Frequency Band (MHz) | 750 | 835 | 900 | 1800 | 1900 | 2450 |
| Water | 50.3 | 52.4 | 56.0 | 69.91 | 69.91 | 73.2 |
| Salt (NaCl) | 1.6 | 1.40 | 0.76 | 0.13 | 0.13 | 0.04 |
| Sugar | 47 | 45.0 | 41.76 | 0.0 | 0.0 | 0.0 |
| HEC | 0.0 | 1.0 | 1.21 | 0.0 | 0.0 | 0.0 |
| Bactericide | 0.0 | 0.1 | 0.27 | 0.0 | 0.0 | 0.0 |
| Cellulose | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| DGBE | 0.0 | 0.0 | 0.0 | 29.96 | 29.96 | 26.7 |
| Preventol | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

Table 6: Tissue Dielectric Properties

Salt: 99+% Pure Sodium Chloride; Sugar: 98+% Pure Sucrose; Water: De-ionized, 16M Ω + 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

| Used Target Frequency | Target Tissue | | Measured Tissue | | Liquid Temp. | Test Date |
|-----------------------|------------------------|------------------------|-----------------|----------------|--------------|------------|
| | ϵ_r (+/-5%) | σ (S/m) (+/-5%) | ϵ_r | σ (S/m) | | |
| 710MHz Body | 55.69 (52.91~58.47) | 0.96 (0.912~1.008) | 53.43 | 0.942 | 21.5°C | 2012-04-20 |
| 750MHz Body | 55.53 (52.75~58.31) | 0.96 (0.912~1.008) | 52.99 | 0.989 | | |
| 825MHz Body | 55.2 (52.44~57.96) | 0.97 (0.92~1.02) | 56.73 | 0.992 | 21.5°C | 2012-04-14 |
| 835MHz Body | 55.2 (52.44~57.96) | 0.97 (0.92~1.02) | 56.61 | 0.988 | | |
| 850MHz Body | 55.2 (52.44~57.96) | 0.99 (0.94~1.04) | 56.40 | 1.013 | | |
| 825MHz Body | 55.2 (52.44~57.96) | 0.97 (0.92~1.02) | 56.72 | 0.994 | 21.5°C | 2012-04-17 |
| 835MHz Body | 55.2 (52.44~57.96) | 0.97 (0.92~1.02) | 56.71 | 0.998 | | |
| 850MHz Body | 55.2 (52.44~57.96) | 0.99 (0.94~1.04) | 56.72 | 1.013 | | |
| 1710MHz Body | 53.5 (50.83~56.18) | 1.46 (1.39~1.53) | 53.32 | 1.476 | 21.5°C | 2012-04-15 |
| 1730MHz Body | 53.5 (50.83~56.18) | 1.48 (1.41~1.55) | 53.11 | 1.496 | | |
| 1750MHz Body | 53.4 (50.73~56.07) | 1.49 (1.42~1.56) | 53.13 | 1.522 | | |
| 1800MHz Body | 53.3 (50.64~55.97) | 1.52 (1.44~1.60) | 52.99 | 1.579 | | |

| | | | | | | |
|---|-----------------------|---------------------|-------|-------|--------|------------|
| 1710MHz Body | 53.5 (50.83~56.18) | 1.46 (1.39~1.53) | 53.11 | 1.482 | 21.5°C | 2012-04-17 |
| 1730MHz Body | 53.5 (50.83~56.18) | 1.48 (1.41~1.55) | 52.90 | 1.502 | | |
| 1750MHz Body | 53.4 (50.73~56.07) | 1.49 (1.42~1.56) | 52.92 | 1.529 | | |
| 1800MHz Body | 53.3 (50.64~55.97) | 1.52 (1.44~1.60) | 52.77 | 1.585 | | |
| 1850MHz Body | 53.3 (50.64~55.97) | 1.52 (1.44~1.60) | 52.68 | 1.461 | 21.5°C | 2012-04-13 |
| 1880MHz Body | 53.3 (50.64~55.97) | 1.52 (1.44~1.60) | 52.57 | 1.496 | | |
| 1910MHz Body | 53.3 (50.64~55.97) | 1.52 (1.44~1.60) | 52.44 | 1.528 | | |
| 1900MHz Body | 53.3 (50.64~55.97) | 1.52 (1.44~1.60) | 52.58 | 1.523 | | |
| 1850MHz Body | 53.3 (50.64~55.97) | 1.52 (1.44~1.60) | 52.45 | 1.475 | 21.5°C | 2012-04-19 |
| 1880MHz Body | 53.3 (50.64~55.97) | 1.52 (1.44~1.60) | 52.33 | 1.51 | | |
| 1910MHz Body | 53.3 (50.64~55.97) | 1.52 (1.44~1.60) | 52.21 | 1.542 | | |
| 1900MHz Body | 53.3 (50.64~55.97) | 1.52 (1.44~1.60) | 52.35 | 1.537 | | |
| ϵ_r = Relative permittivity, σ = Conductivity | | | | | | |

Table 7: Measured Tissue Parameter

- 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 450824 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) For LTE and CDMA measurements in AWS band, and for 1800 MHz system verification the same TSL and 1750 MHz SAR probe calibration point have been used.

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 validation is performed with tissue equivalent material according to IEEE P1528 (described above). The following table shows validation results for all frequency bands and tissue liquids used during the tests (Graphic Plot(s) see Appendix A).

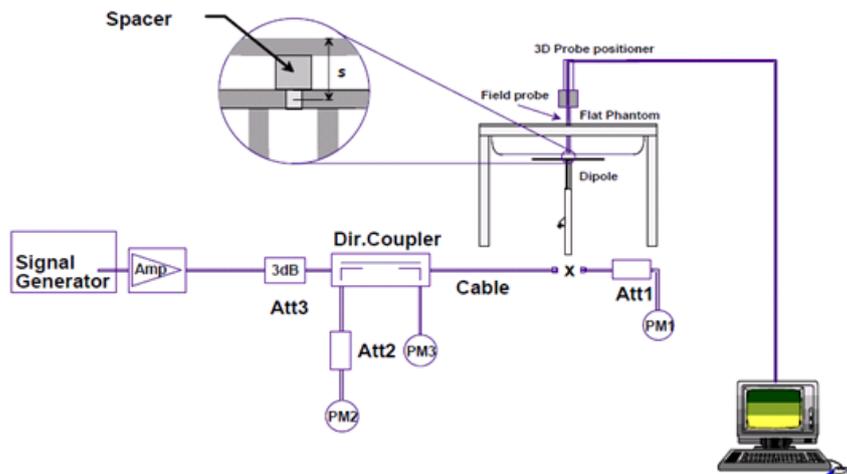
| System Check | Target SAR (1W) (+/-10%) | | Measured SAR (Normalized to 1W) | | Liquid Temp. | Test Date |
|--------------|--------------------------|------------------------|---------------------------------|-------------|--------------|------------|
| | 1-g (mW/g) | 10-g (mW/g) | 1-g (mW/g) | 10-g (mW/g) | | |
| D750V2 Body | 8.80 (7.92~9.68) | 5.84 (5.26~6.42) | 9.44 | 6.08 | 21.4°C | 2012-04-20 |
| D835V2 Body | 9.54 (8.59~10.49) | 6.29 (5.66~6.92) | 10.20 | 6.64 | 21.4°C | 2012-04-14 |
| D835V2 Body | 9.54 (8.59~10.49) | 6.29 (5.66~6.92) | 10.00 | 6.52 | 21.4°C | 2012-04-17 |
| D1800V2 Body | 38.80 (34.92~42.68) | 20.40 (18.36~22.44) | 40.40 | 20.92 | 21.5°C | 2012-04-15 |
| D1800V2 Body | 38.80 (34.92~42.68) | 20.40 (18.36~22.44) | 41.20 | 21.28 | 21.5°C | 2012-04-17 |
| D1900V2 Body | 41.40 (37.26~45.54) | 21.80 (19.62~23.98) | 38.04 | 19.64 | 21.5°C | 2012-04-13 |
| D1900V2 Body | 41.40 (37.26~45.54) | 21.80 (19.62~23.98) | 41.60 | 21.40 | 21.5°C | 2012-04-19 |

Table 8: System Check Results

4.3 Validation Procedure

The validation is performed by using a validation 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. To adjust this power a power meter is used. The power sensor is connected to the cable before the validation 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 validation 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).

Validation 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 Measurement Uncertainty Evaluation

5.1 Measurement uncertainty evaluation for SAR test

The overall combined measurement uncertainty of the measurement system is $\pm 10.9\%$ ($K=1$).

The expanded uncertainty ($k=2$) is assessed to be $\pm 21.9\%$

This measurement uncertainty budget is suggested by IEEE P1528 and determined by Schmid & Partner Engineering AG. The breakdown of the individual uncertainties is as follows:

| Error Sources | Uncertainty Value | Probability Distribution | Divisor | c_i 1g | c_i 10g | Standard Uncertainty 1g | Standard Uncertainty 10g | v_i^2 or v_{eff} |
|----------------------------------|-------------------|--------------------------|------------|----------|-----------|-------------------------|--------------------------|----------------------|
| Measurement System | | | | | | | | |
| Probe calibration | $\pm 6.0\%$ | Normal | 1 | 1 | 1 | $\pm 6.0\%$ | $\pm 6.0\%$ | ∞ |
| Axial isotropy | $\pm 4.7\%$ | Rectangular | $\sqrt{3}$ | 0.7 | 0.7 | $\pm 1.9\%$ | $\pm 1.9\%$ | ∞ |
| Hemispherical isotropy | $\pm 9.6\%$ | Rectangular | $\sqrt{3}$ | 0.7 | 0.7 | $\pm 3.9\%$ | $\pm 3.9\%$ | ∞ |
| Spatial resolution | $\pm 0.0\%$ | Rectangular | $\sqrt{3}$ | 1 | 1 | $\pm 0.0\%$ | $\pm 0.0\%$ | ∞ |
| Boundary effects | $\pm 1.0\%$ | Rectangular | $\sqrt{3}$ | 1 | 1 | $\pm 0.6\%$ | $\pm 0.6\%$ | ∞ |
| Probe linearity | $\pm 4.7\%$ | Rectangular | $\sqrt{3}$ | 1 | 1 | $\pm 2.7\%$ | $\pm 2.7\%$ | ∞ |
| System detection limits | $\pm 1.0\%$ | Rectangular | $\sqrt{3}$ | 1 | 1 | $\pm 0.6\%$ | $\pm 0.6\%$ | ∞ |
| Readout electronics | $\pm 0.3\%$ | Normal | 1 | 1 | 1 | $\pm 0.3\%$ | $\pm 0.3\%$ | ∞ |
| Response time | $\pm 0.8\%$ | Rectangular | $\sqrt{3}$ | 1 | 1 | $\pm 0.5\%$ | $\pm 0.5\%$ | ∞ |
| Integration time | $\pm 2.6\%$ | Rectangular | $\sqrt{3}$ | 1 | 1 | $\pm 1.5\%$ | $\pm 1.5\%$ | ∞ |
| RF ambient conditions | $\pm 3.0\%$ | Rectangular | $\sqrt{3}$ | 1 | 1 | $\pm 1.7\%$ | $\pm 1.7\%$ | ∞ |
| Probe positioner | $\pm 0.4\%$ | Rectangular | $\sqrt{3}$ | 1 | 1 | $\pm 0.2\%$ | $\pm 0.2\%$ | ∞ |
| Probe positioning | $\pm 2.9\%$ | Rectangular | $\sqrt{3}$ | 1 | 1 | $\pm 1.7\%$ | $\pm 1.7\%$ | ∞ |
| Max. SAR evaluation | $\pm 1.0\%$ | Rectangular | $\sqrt{3}$ | 1 | 1 | $\pm 0.6\%$ | $\pm 0.6\%$ | ∞ |
| Test Sample Related | | | | | | | | |
| Device positioning | $\pm 2.9\%$ | Normal | 1 | 1 | 1 | $\pm 2.9\%$ | $\pm 2.9\%$ | 145 |
| Device holder uncertainty | $\pm 3.6\%$ | Normal | 1 | 1 | 1 | $\pm 3.6\%$ | $\pm 3.6\%$ | 5 |
| Power drift | $\pm 5.0\%$ | Rectangular | $\sqrt{3}$ | 1 | 1 | $\pm 2.9\%$ | $\pm 2.9\%$ | ∞ |
| Phantom and Set-up | | | | | | | | |
| Phantom uncertainty | $\pm 4.0\%$ | Rectangular | $\sqrt{3}$ | 1 | 1 | $\pm 2.3\%$ | $\pm 2.3\%$ | ∞ |
| Liquid conductivity (target) | $\pm 5.0\%$ | Rectangular | $\sqrt{3}$ | 0.64 | 0.43 | $\pm 1.8\%$ | $\pm 1.2\%$ | ∞ |
| Liquid conductivity (meas.) | $\pm 2.5\%$ | Normal | 1 | 0.64 | 0.43 | $\pm 1.6\%$ | $\pm 1.1\%$ | ∞ |
| Liquid permittivity (target) | $\pm 5.0\%$ | Rectangular | $\sqrt{3}$ | 0.6 | 0.49 | $\pm 1.7\%$ | $\pm 1.4\%$ | ∞ |
| Liquid permittivity (meas.) | $\pm 2.5\%$ | Normal | 1 | 0.6 | 0.49 | $\pm 1.5\%$ | $\pm 1.2\%$ | ∞ |
| Combined Uncertainty | | | | | | $\pm 10.9\%$ | $\pm 10.7\%$ | 387 |
| Expanded Std. Uncertainty | | | | | | $\pm 21.9\%$ | $\pm 21.4\%$ | |

Table 9: Measurement uncertainties

5.2 Measurement uncertainty evaluation for system validation

The overall combined measurement uncertainty of the measurement system is $\pm 9.5\%$ ($K=1$).

The expanded uncertainty ($k=2$) is assessed to be $\pm 18.9\%$

This measurement uncertainty budget is suggested by IEEE P1528 and determined by Schmid & Partner Engineering AG. The breakdown of the individual uncertainties is as follows:

| Error Sources | Uncertainty Value | Probability Distribution | Divisor | c_i 1g | c_i 10g | Standard Uncertainty 1g | Standard Uncertainty 10g | v_i^2 or v_{eff} |
|----------------------------------|-------------------|--------------------------|------------|----------|-----------|--------------------------------|--------------------------------|----------------------|
| Measurement System | | | | | | | | |
| Probe calibration | $\pm 6.0\%$ | Normal | 1 | 1 | 1 | $\pm 6.0\%$ | $\pm 6.0\%$ | ∞ |
| Axial isotropy | $\pm 4.7\%$ | Rectangular | $\sqrt{3}$ | 1 | 1 | $\pm 2.7\%$ | $\pm 2.7\%$ | ∞ |
| Hemispherical isotropy | $\pm 9.6\%$ | Rectangular | $\sqrt{3}$ | 0.7 | 0.7 | $\pm 0.0\%$ | $\pm 0.0\%$ | ∞ |
| Boundary effects | $\pm 1.0\%$ | Rectangular | $\sqrt{3}$ | 1 | 1 | $\pm 0.6\%$ | $\pm 0.6\%$ | ∞ |
| Probe linearity | $\pm 4.7\%$ | Rectangular | $\sqrt{3}$ | 1 | 1 | $\pm 2.7\%$ | $\pm 2.7\%$ | ∞ |
| System detection limits | $\pm 1.0\%$ | Rectangular | $\sqrt{3}$ | 1 | 1 | $\pm 0.6\%$ | $\pm 0.6\%$ | ∞ |
| Readout electronics | $\pm 0.3\%$ | Normal | 1 | 1 | 1 | $\pm 0.3\%$ | $\pm 0.3\%$ | ∞ |
| Response time | $\pm 0.0\%$ | Rectangular | $\sqrt{3}$ | 1 | 1 | $\pm 0.0\%$ | $\pm 0.0\%$ | ∞ |
| Integration time | $\pm 0.0\%$ | Rectangular | $\sqrt{3}$ | 1 | 1 | $\pm 0.0\%$ | $\pm 0.0\%$ | ∞ |
| RF ambient conditions | $\pm 1.0\%$ | Rectangular | $\sqrt{3}$ | 1 | 1 | $\pm 0.6\%$ | $\pm 0.6\%$ | ∞ |
| Probe positioner | $\pm 0.4\%$ | Rectangular | $\sqrt{3}$ | 1 | 1 | $\pm 0.2\%$ | $\pm 0.2\%$ | ∞ |
| Probe positioning | $\pm 2.9\%$ | Rectangular | $\sqrt{3}$ | 1 | 1 | $\pm 1.7\%$ | $\pm 1.7\%$ | ∞ |
| Max. SAR evaluation | $\pm 1.0\%$ | Rectangular | $\sqrt{3}$ | 1 | 1 | $\pm 0.6\%$ | $\pm 0.6\%$ | ∞ |
| Dipole | | | | | | | | |
| Deviation of experimental dipole | $\pm 5.5\%$ | Rectangular | $\sqrt{3}$ | 1 | 1 | $\pm 3.2\%$ | $\pm 3.2\%$ | ∞ |
| Dipole axis to liquid distance | $\pm 2.0\%$ | Rectangular | 1 | 1 | 1 | $\pm 1.2\%$ | $\pm 1.2\%$ | ∞ |
| Power drift | $\pm 4.7\%$ | Rectangular | $\sqrt{3}$ | 1 | 1 | $\pm 2.7\%$ | $\pm 2.7\%$ | ∞ |
| Phantom and Set-up | | | | | | | | |
| Phantom uncertainty | $\pm 4.0\%$ | Rectangular | $\sqrt{3}$ | 1 | 1 | $\pm 2.3\%$ | $\pm 2.3\%$ | ∞ |
| Liquid conductivity (target) | $\pm 5.0\%$ | Rectangular | $\sqrt{3}$ | 0.64 | 0.43 | $\pm 1.8\%$ | $\pm 1.2\%$ | ∞ |
| Liquid conductivity (meas.) | $\pm 2.5\%$ | Normal | 1 | 0.64 | 0.43 | $\pm 1.6\%$ | $\pm 1.1\%$ | ∞ |
| Liquid permittivity (target) | $\pm 5.0\%$ | Rectangular | $\sqrt{3}$ | 0.6 | 0.49 | $\pm 1.7\%$ | $\pm 1.4\%$ | ∞ |
| Liquid permittivity (meas.) | $\pm 2.5\%$ | Normal | 1 | 0.6 | 0.49 | $\pm 1.5\%$ | $\pm 1.2\%$ | ∞ |
| Combined Uncertainty | | | | | | $\pm 9.5\%$ | $\pm 9.2\%$ | |
| Expanded Std. Uncertainty | | | | | | $\pm 18.9\%$ | $\pm 18.4\%$ | |

Table 10: Measurement uncertainties

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 |

SAR for head exposure configurations is measured in RC3 with the DUT configured to transmit at full rate using Loopback Service Option SO55. SAR for RC1 is not required when the maximum average output of each channel is less than ¼ dB higher than that measured in RC3. Otherwise, SAR is measured on the maximum output channel in RC1 using the exposure configuration that results in the highest SAR for that channel in RC3.

SAR for body exposure configurations is measured in RC3 with the DUT configured using TDSO / SO32, to transmit at full rate on FCH with all other code channels disabled. SAR for multiple code channels (FCH + SCHn) is not required when the maximum average output of each RF channel is less than ¼ dB higher than that measured with FCH only. Otherwise, SAR is measured on the maximum output channel (FCH + SCHn) with FCH at full rate and SCH0 enabled at 9600 bps, using the exposure configuration that results in the highest SAR for that channel with FCH only. When multiple code channels are enabled, the DUT output may shift by more than 0.5 dB and lead to higher SAR drifts and SCH dropouts.

Body SAR in RC1 is not required when the maximum average output of each channel is less than ¼ dB higher than that measured in RC3. Otherwise, SAR is measured on the maximum output channel in RC1; with Loopback Service Option SO55, at full rate, using the body exposure configuration that results in the highest SAR for that channel 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 |

6.1.2 CDMA Ev-Do Devices

For handsets with Ev-Do capabilities, when the maximum average output of each channel in Rev.0 is less than ¼ dB higher than that measured in RC3 (1x RTT), body SAR for Ev-Do is not required. Otherwise, SAR for Rev. 0 is measured on the maximum output channel at 153.6 kbps using the body exposure configuration that results in the highest SAR for that channel in RC3. SAR for Rev.A is not required when the maximum average output of each channel is less than that measured in Rev.0 or less than ¼ dB higher than that measured in RC3. Otherwise, SAR is measured on the maximum output channel for Rev.A using a Reverse Data Channel payload size of 4096 bits and a Termination Target of 16 slots defined for Subtype 2 Physical Layer configurations. A Forward Traffic Channel data rate corresponding to the 2-slot version of 307.2 kbps with the ACK Channel transmitting in all slots should be configured in the downlink for both Rev.0 and Rev.A.

6.2 LTE Test Configurations

SAR for body exposure configurations is measured according to the “Body SAR Measurements” Procedures of KDB941225 D05 SAR for LTE.

1) The procedures shall be applied independently to the device and exposure configurations required for body, USB dongle orientations and antenna diversity conditions etc. applying the test positions in KDB 447498 for USB dongles.

2) When MPR is implemented permanently within the UE, regardless of network requirements, only those RB configurations allowed (see 3GPP standards) for the channel bandwidth and modulation combinations may be tested with MPR. Configurations with RB allocations below the required RB thresholds must be tested without MPR. A-MPR must always be disabled.

LTE Band II/V/XII MPR as follows:

| Modulation | Channel bandwidth / Transmission bandwidth configuration [RB] | | | | MPR |
|------------|---|-----|-----|------|-----|
| | 1.4 | 3 | 5 | 10 | |
| | MHz | MHz | MHz | MHz | |
| QPSK | 1 | 1 | 1 | 1 | 0 |
| QPSK | ≤ 5 | ≤ 4 | ≤ 8 | ≤ 12 | 0 |
| QPSK | > 5 | > 4 | > 8 | > 12 | 1 |
| 16 QAM | ≤ 5 | ≤ 4 | ≤ 8 | ≤ 12 | 1 |
| 16 QAM | > 5 | > 4 | > 8 | > 12 | 2 |

LTE Band IV MPR as follows:

| Modulation | Channel bandwidth / Transmission bandwidth configuration [RB] | | MPR |
|------------|---|------|-----|
| | 5 | 10 | |
| | MHz | MHz | |
| QPSK | 1 | 1 | 0 |
| QPSK | ≤ 8 | ≤ 12 | 0 |
| QPSK | > 8 | > 12 | 1 |
| 16 QAM | ≤ 8 | ≤ 12 | 1 |
| 16 QAM | > 8 | > 12 | 2 |

3) For each LTE frequency band, detail reduce test information is referred to section 7.2.5 to 7.2.6 and final test summary is as follows:

LTE Band II

| Bandwidth | Modulation Type | RB Size and Allocation | Test Channel | SAR Test |
|----------------|-----------------|------------------------|----------------|----------|
| 10MHz | QPSK | 50% Centered | High Channel | No Test* |
| | | | Middle Channel | Tested* |
| | | | Low Channel | No Test* |
| | | 1RB Lower EDGE | High Channel | No Test |
| | | | Middle Channel | No Test |
| | | | Low Channel | Tested |
| | | 1RB Upper EDGE | High Channel | No Test |
| | | | Middle Channel | No Test |
| | | | Low Channel | Tested |
| | 16QAM | 50% Centered | High Channel | Tested |
| | | | Middle Channel | No Test |
| | | | Low Channel | No Test |
| | | 1RB Lower EDGE | High Channel | No Test |
| | | | Middle Channel | No Test |
| | | | Low Channel | Tested |
| 1RB Upper EDGE | | High Channel | No Test | |
| | | Middle Channel | No Test | |
| | | Low Channel | Tested | |

*Please check SAR test result table of middle channel is <0.8W/kg, other channels are not required.

LTE Band IV

| Bandwidth | Modulation Type | RB Size and Allocation | Test Channel | SAR Test |
|----------------|-----------------|------------------------|----------------|----------|
| 10MHz | QPSK | 50% Centered | High Channel | No Test* |
| | | | Middle Channel | Tested* |
| | | | Low Channel | No Test* |
| | | 1RB Lower EDGE | High Channel | Tested |
| | | | Middle Channel | No Test |
| | | | Low Channel | No Test |
| | | 1RB Upper EDGE | High Channel | No Test |
| | | | Middle Channel | Tested |
| | | | Low Channel | No Test |
| | 16QAM | 50% Centered | High Channel | No Test |
| | | | Middle Channel | Tested |
| | | | Low Channel | No Test |
| | | 1RB Lower EDGE | High Channel | Tested |
| | | | Middle Channel | No Test |
| | | | Low Channel | No Test |
| 1RB Upper EDGE | | High Channel | Tested | |
| | | Middle Channel | No Test | |
| | | Low Channel | No Test | |

*Please check SAR test result table of middle channel is <0.8W/kg, other channels are not required.

LTE Band V

| Bandwidth | Modulation Type | RB Size and Allocation | Test Channel | SAR Test |
|----------------|-----------------|------------------------|----------------|----------|
| 10MHz | QPSK | 50% Centered | High Channel | No Test* |
| | | | Middle Channel | Tested* |
| | | | Low Channel | No Test* |
| | | 1RB Lower EDGE | High Channel | No Test |
| | | | Middle Channel | Tested |
| | | | Low Channel | No Test |
| | | 1RB Upper EDGE | High Channel | No Test |
| | | | Middle Channel | Tested |
| | | | Low Channel | No Test |
| | 16QAM | 50% Centered | High Channel | Tested |
| | | | Middle Channel | No Test |
| | | | Low Channel | No Test |
| | | 1RB Lower EDGE | High Channel | Tested |
| | | | Middle Channel | No Test |
| | | | Low Channel | Tested |
| 1RB Upper EDGE | High Channel | No Test | | |
| | Middle Channel | No Test | | |
| | Low Channel | Tested | | |

*Please check SAR test result table of middle channel is <0.8W/kg, other channels are not required.

LTE Band XII

| Bandwidth | Modulation Type | RB Size and Allocation | Test Channel | SAR Test |
|----------------|-----------------|------------------------|----------------|----------|
| 10MHz | QPSK | 50% Centered | High Channel | No Test* |
| | | | Middle Channel | Tested* |
| | | | Low Channel | No Test* |
| | | 1RB Lower EDGE | High Channel | Tested |
| | | | Middle Channel | No Test |
| | | | Low Channel | No Test |
| | | 1RB Upper EDGE | High Channel | No Test |
| | | | Middle Channel | Tested |
| | | | Low Channel | No Test |
| | 16QAM | 50% Centered | High Channel | No Test |
| | | | Middle Channel | Tested |
| | | | Low Channel | No Test |
| | | 1RB Lower EDGE | High Channel | Tested |
| | | | Middle Channel | No Test |
| | | | Low Channel | No Test |
| 1RB Upper EDGE | High Channel | No Test | | |
| | Middle Channel | Tested | | |
| | Low Channel | No Test | | |

*Please check SAR test result table of middle channel is <0.8W/kg, other channels are not required.

7 SAR Measurement Results

7.1 Conducted power measurements

For the measurements a Rohde & Schwarz Radio Communication Tester CMU 200 and WideBand Radio Communication Tester CMW 500 were used.

The output power was measured using an integrated RF connector and attached RF cable.

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

7.1.1 Conducted power measurements CDMA 800

| CDMA&EVDO 800 | | Conducted Power (dBm) | | |
|---------------|------------------|-----------------------|-------|-------|
| | | 1013CH | 384CH | 777CH |
| RC1 | SO55 | 24.08 | 24.07 | 23.99 |
| RC3 | SO55 | 24.11 | 24.22 | 24.11 |
| | TDSO32 (FCH) | 23.99 | 24.05 | 23.97 |
| | TDSO32 (FCH+SCH) | 24.05 | 23.96 | 23.95 |
| Rev 0 | RTAP 153.6 | 23.76 | 23.85 | 23.56 |
| Rev A | RETAP 4096 | 23.71 | 23.76 | 23.59 |

Table 11: Test results conducted power measurement CDMA800 MHz

7.1.2 Conducted power measurements CDMA 1700

| CDMA&EVDO AWS | | Conducted Power (dBm) | | |
|---------------|------------------|-----------------------|-------|-------|
| | | 25CH | 450CH | 850CH |
| RC1 | SO55 | 24.06 | 24.07 | 24.02 |
| RC3 | SO55 | 23.98 | 24.14 | 24.11 |
| | TDSO32 (FCH) | 24.01 | 24.19 | 24.10 |
| | TDSO32 (FCH+SCH) | 24.09 | 24.15 | 23.98 |
| Rev 0 | RTAP 153.6 | 23.69 | 23.84 | 23.77 |
| Rev A | RETAP 4096 | 23.74 | 23.99 | 23.78 |

Table 12: Test results conducted power measurement CDMA 1700 MHz

7.1.3 Conducted power measurements CDMA 1900

| CDMA&EVDO1900 | | Conducted Power (dBm) | | |
|---------------|------------------|-----------------------|-------|--------|
| | | 25CH | 600CH | 1175CH |
| RC1 | SO55 | 23.89 | 23.85 | 23.82 |
| RC3 | SO55 | 23.98 | 23.83 | 23.79 |
| | TDSO32 (FCH) | 23.96 | 23.86 | 23.77 |
| | TDSO32 (FCH+SCH) | 23.89 | 23.79 | 23.74 |
| Rev 0 | RTAP 153.6 | 23.77 | 23.58 | 23.65 |
| Rev A | RETAP 4096 | 23.66 | 23.67 | 23.63 |

Table 13: Test results conducted power measurement CDMA 1900 MHz

7.1.4 Conducted power measurements LTE Band II

| LTE Band II | Uplink Channel Number | BW [MHz] | RB Size | RB Offset | Mod | Conducted Power (dBm) |
|-------------|-----------------------|----------|---------|-----------|--------|-----------------------|
| Low Channel | 18607 | 1.4 | 1 | 0 | QPSK | 23.30 |
| | | | 1 | 5 | QPSK | 23.42 |
| | | | 3 | 2 | QPSK | 23.29 |
| | | | 6 | 0 | QPSK | 22.21 |
| | | | 1 | 0 | 16-QAM | 22.15 |
| | | | 1 | 5 | 16-QAM | 22.20 |
| | | | 3 | 2 | 16-QAM | 22.53 |
| | | | 6 | 0 | 16-QAM | 21.43 |
| | 18615 | 3 | 1 | 0 | QPSK | 23.31 |
| | | | 1 | 14 | QPSK | 23.39 |
| | | | 8 | 4 | QPSK | 22.30 |
| | | | 15 | 0 | QPSK | 22.25 |
| | | | 1 | 0 | 16-QAM | 21.85 |
| | | | 1 | 14 | 16-QAM | 22.01 |
| | | | 8 | 4 | 16-QAM | 21.51 |
| | | | 15 | 0 | 16-QAM | 21.35 |
| | 18625 | 5 | 1 | 0 | QPSK | 23.32 |
| | | | 1 | 24 | QPSK | 23.23 |
| | | | 12 | 6 | QPSK | 22.31 |
| | | | 25 | 0 | QPSK | 22.35 |
| | | | 1 | 0 | 16-QAM | 22.47 |
| | | | 1 | 24 | 16-QAM | 22.43 |
| | | | 12 | 6 | 16-QAM | 21.17 |
| | | | 25 | 0 | 16-QAM | 21.59 |
| | 18650 | 10 | 1 | 0 | QPSK | 23.32 |
| | | | 1 | 49 | QPSK | 23.26 |
| | | | 25 | 13 | QPSK | 22.25 |
| | | | 50 | 0 | QPSK | 22.23 |
| | | | 1 | 0 | 16-QAM | 22.05 |
| | | | 1 | 49 | 16-QAM | 22.01 |
| | | | 25 | 13 | 16-QAM | 21.20 |
| | | | 50 | 0 | 16-QAM | 21.35 |

Table 14: Test results conducted power measurement LTE Band II Low Channel

| LTE Band II | Uplink Channel Number | BW [MHz] | RB Size | RB Offset | Mod | Conducted Power (dBm) |
|-------------|-----------------------|----------|---------|-----------|--------|-----------------------|
| Mid Channel | 18900 | 1.4 | 1 | 0 | QPSK | 23.40 |
| | | | 1 | 5 | QPSK | 23.38 |
| | | | 3 | 2 | QPSK | 23.22 |
| | | | 6 | 0 | QPSK | 22.30 |
| | | | 1 | 0 | 16-QAM | 22.15 |
| | | | 1 | 5 | 16-QAM | 22.07 |
| | | | 3 | 2 | 16-QAM | 22.5 |
| | | | 6 | 0 | 16-QAM | 21.38 |
| | | 3 | 1 | 0 | QPSK | 23.20 |
| | | | 1 | 14 | QPSK | 23.20 |
| | | | 8 | 4 | QPSK | 22.22 |
| | | | 15 | 0 | QPSK | 22.19 |
| | | | 1 | 0 | 16-QAM | 22.11 |
| | | | 1 | 14 | 16-QAM | 22.19 |
| | | | 8 | 4 | 16-QAM | 21.43 |
| | | | 15 | 0 | 16-QAM | 21.20 |
| | | 5 | 1 | 0 | QPSK | 23.22 |
| | | | 1 | 24 | QPSK | 23.26 |
| | | | 12 | 6 | QPSK | 22.13 |
| | | | 25 | 0 | QPSK | 22.18 |
| | | | 1 | 0 | 16-QAM | 22.00 |
| | | | 1 | 24 | 16-QAM | 22.04 |
| | | | 12 | 6 | 16-QAM | 20.89 |
| | | | 25 | 0 | 16-QAM | 21.39 |
| | | 10 | 1 | 0 | QPSK | 23.27 |
| | | | 1 | 49 | QPSK | 23.16 |
| | | | 25 | 13 | QPSK | 22.19 |
| | | | 50 | 0 | QPSK | 22.20 |
| | | | 1 | 0 | 16-QAM | 21.88 |
| | | | 1 | 49 | 16-QAM | 21.8 |
| | | | 25 | 13 | 16-QAM | 21.25 |
| | | | 50 | 0 | 16-QAM | 21.44 |

Table 15: Test results conducted power measurement LTE Band II Mid Channel

| LTE Band II | Uplink Channel Number | BW [MHz] | RB Size | RB Offset | Mod | Conducted Power (dBm) |
|--------------|-----------------------|----------|---------|-----------|--------|-----------------------|
| High Channel | 19193 | 1.4 | 1 | 0 | QPSK | 23.31 |
| | | | 1 | 5 | QPSK | 23.25 |
| | | | 3 | 2 | QPSK | 23.20 |
| | | | 6 | 0 | QPSK | 22.25 |
| | | | 1 | 0 | 16-QAM | 22.55 |
| | | | 1 | 5 | 16-QAM | 23.50 |
| | | | 3 | 2 | 16-QAM | 22.10 |
| | | | 6 | 0 | 16-QAM | 22.40 |
| | 19185 | 3 | 1 | 0 | QPSK | 23.26 |
| | | | 1 | 14 | QPSK | 23.05 |
| | | | 8 | 4 | QPSK | 22.10 |
| | | | 15 | 0 | QPSK | 22.15 |
| | | | 1 | 0 | 16-QAM | 22.50 |
| | | | 1 | 14 | 16-QAM | 22.20 |
| | | | 8 | 4 | 16-QAM | 21.15 |
| | | | 15 | 0 | 16-QAM | 21.30 |
| | 19175 | 5 | 1 | 0 | QPSK | 23.36 |
| | | | 1 | 24 | QPSK | 23.30 |
| | | | 12 | 6 | QPSK | 22.31 |
| | | | 25 | 0 | QPSK | 22.35 |
| | | | 1 | 0 | 16-QAM | 22.40 |
| | | | 1 | 24 | 16-QAM | 22.30 |
| | | | 12 | 6 | 16-QAM | 21.21 |
| | | | 25 | 0 | 16-QAM | 21.60 |
| | 19150 | 10 | 1 | 0 | QPSK | 23.15 |
| | | | 1 | 49 | QPSK | 23.09 |
| | | | 25 | 13 | QPSK | 22.05 |
| | | | 50 | 0 | QPSK | 22.11 |
| | | | 1 | 0 | 16-QAM | 21.80 |
| | | | 1 | 49 | 16-QAM | 21.90 |
| | | | 25 | 13 | 16-QAM | 21.16 |
| | | | 50 | 0 | 16-QAM | 21.30 |

Table 16: Test results conducted power measurement LTE Band II High Channel

7.1.5 Conducted power measurements LTE Band IV

| LTE Band IV | Uplink Channel Number | BW [MHz] | RB Size | RB Offset | Mod | Conducted Power (dBm) |
|-------------|-----------------------|----------|---------|-----------|--------|-----------------------|
| Low Channel | 19975 | 5 | 1 | 0 | QPSK | 23.01 |
| | | | 1 | 24 | QPSK | 22.90 |
| | | | 12 | 6 | QPSK | 21.90 |
| | | | 25 | 0 | QPSK | 22.01 |
| | | | 1 | 0 | 16-QAM | 22.15 |
| | | | 1 | 24 | 16-QAM | 22.06 |
| | | | 12 | 6 | 16-QAM | 20.80 |
| | | | 25 | 0 | 16-QAM | 21.37 |
| | 20000 | 10 | 1 | 0 | QPSK | 22.80 |
| | | | 1 | 49 | QPSK | 22.99 |
| | | | 25 | 13 | QPSK | 21.82 |
| | | | 50 | 0 | QPSK | 21.80 |
| | | | 1 | 0 | 16-QAM | 22.01 |
| | | | 1 | 49 | 16-QAM | 22.06 |
| | | | 25 | 13 | 16-QAM | 20.97 |
| | | | 50 | 0 | 16-QAM | 21.00 |

Table 17: Test results conducted power measurement LTE Band IV Low Channel

| LTE Band IV | Uplink Channel Number | BW [MHz] | RB Size | RB Offset | Mod | Conducted Power (dBm) |
|-------------|-----------------------|----------|---------|-----------|--------|-----------------------|
| Mid Channel | 20175 | 5 | 1 | 0 | QPSK | 23.24 |
| | | | 1 | 24 | QPSK | 23.20 |
| | | | 12 | 6 | QPSK | 22.27 |
| | | | 25 | 0 | QPSK | 22.21 |
| | | | 1 | 0 | 16-QAM | 21.84 |
| | | | 1 | 24 | 16-QAM | 21.83 |
| | | | 12 | 6 | 16-QAM | 20.99 |
| | | | 25 | 0 | 16-QAM | 21.60 |
| | | 10 | 1 | 0 | QPSK | 22.96 |
| | | | 1 | 49 | QPSK | 23.15 |
| | | | 25 | 13 | QPSK | 22.14 |
| | | | 50 | 0 | QPSK | 22.20 |
| | | | 1 | 0 | 16-QAM | 21.80 |
| | | | 1 | 49 | 16-QAM | 21.90 |
| | | | 25 | 13 | 16-QAM | 21.30 |
| | | | 50 | 0 | 16-QAM | 21.35 |

Table 18: Test results conducted power measurement LTE Band IV Mid Channel

| LTE Band IV | Uplink Channel Number | BW [MHz] | RB Size | RB Offset | Mod | Conducted Power (dBm) |
|--------------|-----------------------|----------|---------|-----------|--------|-----------------------|
| High Channel | 20375 | 5 | 1 | 0 | QPSK | 23.10 |
| | | | 1 | 24 | QPSK | 23.06 |
| | | | 12 | 6 | QPSK | 21.92 |
| | | | 25 | 0 | QPSK | 22.00 |
| | | | 1 | 0 | 16-QAM | 22.33 |
| | | | 1 | 24 | 16-QAM | 22.36 |
| | | | 12 | 6 | 16-QAM | 20.80 |
| | | | 25 | 0 | 16-QAM | 21.40 |
| | 20350 | 10 | 1 | 0 | QPSK | 23.05 |
| | | | 1 | 49 | QPSK | 23.07 |
| | | | 25 | 13 | QPSK | 22.05 |
| | | | 50 | 0 | QPSK | 22.20 |
| | | | 1 | 0 | 16-QAM | 22.10 |
| | | | 1 | 49 | 16-QAM | 22.18 |
| | 25 | 13 | 16-QAM | 21.50 | | |
| | 50 | 0 | 16-QAM | 21.39 | | |

Table 19: Test results conducted power measurement LTE Band IV High Channel

7.1.6 Conducted power measurements LTE Band V

| LTE Band V | Uplink Channel Number | BW [MHz] | RB Size | RB Offset | Mod | Conducted Power (dBm) |
|-------------|-----------------------|----------|---------|-----------|--------|-----------------------|
| Low Channel | 20407 | 1.4 | 1 | 0 | QPSK | 23.20 |
| | | | 1 | 5 | QPSK | 23.25 |
| | | | 3 | 2 | QPSK | 23.06 |
| | | | 6 | 0 | QPSK | 22.11 |
| | | | 1 | 0 | 16-QAM | 22.40 |
| | | | 1 | 5 | 16-QAM | 22.37 |
| | | | 3 | 2 | 16-QAM | 21.91 |
| | | | 6 | 0 | 16-QAM | 21.30 |
| | 20415 | 3 | 1 | 0 | QPSK | 23.10 |
| | | | 1 | 14 | QPSK | 23.20 |
| | | | 8 | 4 | QPSK | 22.10 |
| | | | 15 | 0 | QPSK | 22.21 |
| | | | 1 | 0 | 16-QAM | 22.15 |
| | | | 1 | 14 | 16-QAM | 22.22 |
| | | | 8 | 4 | 16-QAM | 21.50 |
| | | | 15 | 0 | 16-QAM | 21.30 |
| | 20425 | 5 | 1 | 0 | QPSK | 23.27 |
| | | | 1 | 24 | QPSK | 23.40 |
| | | | 12 | 6 | QPSK | 22.15 |
| | | | 25 | 0 | QPSK | 22.20 |
| | | | 1 | 0 | 16-QAM | 22.15 |
| | | | 1 | 24 | 16-QAM | 22.16 |
| | | | 12 | 6 | 16-QAM | 21.30 |
| | | | 25 | 0 | 16-QAM | 20.86 |
| | 20450 | 10 | 1 | 0 | QPSK | 23.10 |
| | | | 1 | 49 | QPSK | 22.95 |
| | | | 25 | 13 | QPSK | 22.30 |
| | | | 50 | 0 | QPSK | 21.90 |
| | | | 1 | 0 | 16-QAM | 22.20 |
| | | | 1 | 49 | 16-QAM | 22.10 |
| | | | 25 | 13 | 16-QAM | 21.50 |
| | | | 50 | 0 | 16-QAM | 21.12 |

Table 20: Test results conducted power measurement LTE Band V Low Channel

| LTE Band V | Uplink Channel Number | BW [MHz] | RB Size | RB Offset | Mod | Conducted Power (dBm) |
|-------------|-----------------------|----------|---------|-----------|--------|-----------------------|
| Mid Channel | 20525 | 1.4 | 1 | 0 | QPSK | 23.22 |
| | | | 1 | 5 | QPSK | 23.20 |
| | | | 3 | 2 | QPSK | 23.10 |
| | | | 6 | 0 | QPSK | 22.20 |
| | | | 1 | 0 | 16-QAM | 21.95 |
| | | | 1 | 5 | 16-QAM | 21.80 |
| | | | 3 | 2 | 16-QAM | 22.43 |
| | | | 6 | 0 | 16-QAM | 21.46 |
| | | 3 | 1 | 0 | QPSK | 23.11 |
| | | | 1 | 14 | QPSK | 22.96 |
| | | | 8 | 4 | QPSK | 22.13 |
| | | | 15 | 0 | QPSK | 22.07 |
| | | | 1 | 0 | 16-QAM | 22.41 |
| | | | 1 | 14 | 16-QAM | 22.30 |
| | | | 8 | 4 | 16-QAM | 21.14 |
| | | | 15 | 0 | 16-QAM | 21.00 |
| | | 5 | 1 | 0 | QPSK | 23.41 |
| | | | 1 | 24 | QPSK | 23.12 |
| | | | 12 | 6 | QPSK | 22.10 |
| | | | 25 | 0 | QPSK | 22.25 |
| | | | 1 | 0 | 16-QAM | 22.00 |
| | | | 1 | 24 | 16-QAM | 22.16 |
| | | | 12 | 6 | 16-QAM | 21.05 |
| | | | 25 | 0 | 16-QAM | 20.75 |
| | | 10 | 1 | 0 | QPSK | 23.20 |
| | | | 1 | 49 | QPSK | 23.05 |
| | | | 25 | 13 | QPSK | 22.19 |
| | | | 50 | 0 | QPSK | 22.02 |
| | | | 1 | 0 | 16-QAM | 22.17 |
| | | | 1 | 49 | 16-QAM | 21.93 |
| | | | 25 | 13 | 16-QAM | 21.20 |
| | | | 50 | 0 | 16-QAM | 21.31 |

Table 21: Test results conducted power measurement LTE Band V Mid Channel

| LTE Band V | Uplink Channel Number | BW [MHz] | RB Size | RB Offset | Mod | Conducted Power (dBm) | |
|--------------|-----------------------|----------|---------|-----------|--------|-----------------------|-------|
| High Channel | 20643 | 1.4 | 1 | 0 | QPSK | 23.11 | |
| | | | 1 | 5 | QPSK | 23.20 | |
| | | | 3 | 2 | QPSK | 22.91 | |
| | | | 6 | 0 | QPSK | 22.05 | |
| | | | 1 | 0 | 16-QAM | 21.88 | |
| | | | 1 | 5 | 16-QAM | 21.80 | |
| | | | 3 | 2 | 16-QAM | 22.50 | |
| | | | 6 | 0 | 16-QAM | 21.48 | |
| | 20635 | 3 | 3 | 1 | 0 | QPSK | 23.08 |
| | | | | 1 | 14 | QPSK | 23.11 |
| | | | | 8 | 4 | QPSK | 22.15 |
| | | | | 15 | 0 | QPSK | 21.98 |
| | | | | 1 | 0 | 16-QAM | 21.99 |
| | | | | 1 | 14 | 16-QAM | 22.17 |
| | | | | 8 | 4 | 16-QAM | 21.20 |
| | | | | 15 | 0 | 16-QAM | 20.99 |
| | 20625 | 5 | 5 | 1 | 0 | QPSK | 23.11 |
| | | | | 1 | 24 | QPSK | 23.16 |
| | | | | 12 | 6 | QPSK | 22.90 |
| | | | | 25 | 0 | QPSK | 22.11 |
| | | | | 1 | 0 | 16-QAM | 21.85 |
| | | | | 1 | 24 | 16-QAM | 21.88 |
| | | | | 12 | 6 | 16-QAM | 21.10 |
| | | | | 25 | 0 | 16-QAM | 20.83 |
| | 20600 | 10 | 10 | 1 | 0 | QPSK | 22.99 |
| | | | | 1 | 49 | QPSK | 22.85 |
| | | | | 25 | 13 | QPSK | 22.01 |
| | | | | 50 | 0 | QPSK | 22.03 |
| | | | | 1 | 0 | 16-QAM | 21.98 |
| | | | | 1 | 49 | 16-QAM | 21.89 |
| | | | | 25 | 13 | 16-QAM | 21.22 |
| | | | | 50 | 0 | 16-QAM | 21.30 |

Table 22: Test results conducted power measurement LTE Band V High Channel

7.1.7 Conducted power measurements LTE FDD Band XII

| LTE Band XII | Uplink Channel Number | BW [MHz] | RB Size | RB Offset | Mod | Conducted Power (dBm) |
|--------------|-----------------------|----------|---------|-----------|--------|-----------------------|
| Low Channel | 23017 | 1.4 | 1 | 0 | QPSK | 23.20 |
| | | | 1 | 5 | QPSK | 23.06 |
| | | | 3 | 2 | QPSK | 23.08 |
| | | | 6 | 0 | QPSK | 22.12 |
| | | | 1 | 0 | 16-QAM | 22.60 |
| | | | 1 | 5 | 16-QAM | 22.20 |
| | | | 3 | 2 | 16-QAM | 22.32 |
| | | | 6 | 0 | 16-QAM | 21.51 |
| | 23025 | 3 | 1 | 0 | QPSK | 23.11 |
| | | | 1 | 14 | QPSK | 23.14 |
| | | | 8 | 4 | QPSK | 22.15 |
| | | | 15 | 0 | QPSK | 22.09 |
| | | | 1 | 0 | 16-QAM | 22.55 |
| | | | 1 | 14 | 16-QAM | 22.63 |
| | | | 8 | 4 | 16-QAM | 21.32 |
| | | | 15 | 0 | 16-QAM | 20.99 |
| | 23035 | 5 | 1 | 0 | QPSK | 23.11 |
| | | | 1 | 24 | QPSK | 23.15 |
| | | | 12 | 6 | QPSK | 22.31 |
| | | | 25 | 0 | QPSK | 22.15 |
| | | | 1 | 0 | 16-QAM | 22.42 |
| | | | 1 | 24 | 16-QAM | 22.53 |
| | | | 12 | 6 | 16-QAM | 21.32 |
| | | | 25 | 0 | 16-QAM | 21.55 |
| | 20360 | 10 | 1 | 0 | QPSK | 22.87 |
| | | | 1 | 49 | QPSK | 22.81 |
| | | | 25 | 13 | QPSK | 22.31 |
| | | | 50 | 0 | QPSK | 22.11 |
| | | | 1 | 0 | 16-QAM | 22.29 |
| | | | 1 | 49 | 16-QAM | 22.25 |
| | | | 25 | 13 | 16-QAM | 21.61 |
| | | | 50 | 0 | 16-QAM | 21.66 |

Table 23: Test results conducted power measurement LTE Band XVII Low Channel

I

| LTE Band XII | Uplink Channel Number | BW [MHz] | RB Size | RB Offset | Mod | Conducted Power (dBm) |
|--------------|-----------------------|----------|---------|-----------|--------|-----------------------|
| Mid Channel | 23095 | 1.4 | 1 | 0 | QPSK | 23.08 |
| | | | 1 | 5 | QPSK | 23.07 |
| | | | 3 | 2 | QPSK | 22.98 |
| | | | 6 | 0 | QPSK | 22.05 |
| | | | 1 | 0 | 16-QAM | 22.31 |
| | | | 1 | 5 | 16-QAM | 22.11 |
| | | | 3 | 2 | 16-QAM | 22.19 |
| | | | 6 | 0 | 16-QAM | 21.20 |
| | | 3 | 1 | 0 | QPSK | 23.31 |
| | | | 1 | 14 | QPSK | 23.18 |
| | | | 8 | 4 | QPSK | 22.04 |
| | | | 15 | 0 | QPSK | 21.97 |
| | | | 1 | 0 | 16-QAM | 22.41 |
| | | | 1 | 14 | 16-QAM | 22.36 |
| | | | 8 | 4 | 16-QAM | 21.25 |
| | | | 15 | 0 | 16-QAM | 20.99 |
| | | 5 | 1 | 0 | QPSK | 22.98 |
| | | | 1 | 24 | QPSK | 23.01 |
| | | | 12 | 6 | QPSK | 22.05 |
| | | | 25 | 0 | QPSK | 22.07 |
| | | | 1 | 0 | 16-QAM | 22.46 |
| | | | 1 | 24 | 16-QAM | 22.35 |
| | | | 12 | 6 | 16-QAM | 21.09 |
| | | | 25 | 0 | 16-QAM | 21.55 |
| | | 10 | 1 | 0 | QPSK | 22.99 |
| | | | 1 | 49 | QPSK | 23.24 |
| | | | 25 | 13 | QPSK | 22.30 |
| | | | 50 | 0 | QPSK | 22.11 |
| | | | 1 | 0 | 16-QAM | 22.32 |
| | | | 1 | 49 | 16-QAM | 22.36 |
| | | | 25 | 13 | 16-QAM | 21.48 |
| | | | 50 | 0 | 16-QAM | 21.11 |

Table 24: Test results conducted power measurement LTE Band XII Middle Channel

| LTE Band XII | Uplink Channel Number | BW [MHz] | RB Size | RB Offset | Mod | Conducted Power (dBm) |
|--------------|-----------------------|----------|---------|-----------|--------|-----------------------|
| High Channel | 23173 | 1.4 | 1 | 0 | QPSK | 22.98 |
| | | | 1 | 5 | QPSK | 22.88 |
| | | | 3 | 2 | QPSK | 22.79 |
| | | | 6 | 0 | QPSK | 21.97 |
| | | | 1 | 0 | 16-QAM | 22.17 |
| | | | 1 | 5 | 16-QAM | 22.11 |
| | | | 3 | 2 | 16-QAM | 21.91 |
| | | | 6 | 0 | 16-QAM | 21.98 |
| | 23165 | 3 | 1 | 0 | QPSK | 23.41 |
| | | | 1 | 14 | QPSK | 22.85 |
| | | | 8 | 4 | QPSK | 22.18 |
| | | | 15 | 0 | QPSK | 21.97 |
| | | | 1 | 0 | 16-QAM | 22.40 |
| | | | 1 | 14 | 16-QAM | 22.11 |
| | | | 8 | 4 | 16-QAM | 21.31 |
| | | | 15 | 0 | 16-QAM | 22.11 |
| | 23155 | 5 | 1 | 0 | QPSK | 23.64 |
| | | | 1 | 24 | QPSK | 22.78 |
| | | | 12 | 6 | QPSK | 22.35 |
| | | | 25 | 0 | QPSK | 22.16 |
| | | | 1 | 0 | 16-QAM | 22.31 |
| | | | 1 | 24 | 16-QAM | 21.68 |
| | | | 12 | 6 | 16-QAM | 21.01 |
| | | | 25 | 0 | 16-QAM | 21.66 |
| | 23130 | 10 | 1 | 0 | QPSK | 23.34 |
| | | | 1 | 49 | QPSK | 22.70 |
| | | | 25 | 13 | QPSK | 22.51 |
| | | | 50 | 0 | QPSK | 22.37 |
| | | | 1 | 0 | 16-QAM | 22.51 |
| | | | 1 | 49 | 16-QAM | 22.11 |
| | | | 25 | 13 | 16-QAM | 21.60 |
| | | | 50 | 0 | 16-QAM | 21.53 |

Table 25: Test results conducted power measurement LTE Band XII High Channel

7.2 SAR measurement Result

7.2.1 SAR measurement Result of CDMA 800

| Test Position with 5mm | Test channel /Frequency | Test Mode | SAR Value (W/kg) | | Power Drift (dB) | Limit (W/kg) | Liquid Temp. |
|------------------------|-------------------------|------------|------------------|-------|------------------|--------------|--------------|
| | | | 1-g | 10-g | | | |
| Front Side | 1013/824.7 | EVDO Rev.0 | 1.030 | 0.601 | 0.100 | 1.6 | 21.5°C |
| | 384/836.52 | EVDO Rev.0 | 0.977 | 0.565 | 0.160 | 1.6 | 21.5°C |
| | 777/848.31 | EVDO Rev.0 | 0.900 | 0.522 | 0.100 | 1.6 | 21.5°C |
| Rear Side | 1013/824.7 | EVDO Rev.0 | 1.180 | 0.735 | 0.050 | 1.6 | 21.5°C |
| | 384/836.52 | EVDO Rev.0 | 1.090 | 0.684 | 0.100 | 1.6 | 21.5°C |
| | 777/848.31 | EVDO Rev.0 | 1.020 | 0.639 | 0.170 | 1.6 | 21.5°C |
| Left Side | 384/836.52 | EVDO Rev.0 | 0.588 | 0.375 | 0.150 | 1.6 | 21.5°C |
| Right Side | 384/836.52 | EVDO Rev.0 | 0.206 | 0.140 | -0.010 | 1.6 | 21.5°C |
| Rear Side | 1013/824.7 | EVDO Rev.A | 1.170 | 0.747 | 0.070 | 1.6 | 21.5°C |
| Rear Side | 1013/824.7 | CDMA 1xRTT | 1.170 | 0.741 | -0.040 | 1.6 | 21.5°C |

Table 26: Test results body SAR CDMA 800

7.2.2 SAR measurement Result of CDMA 1700

| Test Position with 5mm | Test channel /Frequency | Test Mode | SAR Value (W/kg) | | Power Drift (dB) | Limit (W/kg) | Liquid Temp. |
|------------------------|-------------------------|------------|------------------|-------|------------------|--------------|--------------|
| | | | 1-g | 10-g | | | |
| Front Side | 25/1711.25 | EVDO Rev.0 | 0.691 | 0.402 | 0.160 | 1.6 | 21.8°C |
| | 450/1732.5 | | 0.911 | 0.518 | 0.150 | 1.6 | 21.8°C |
| | 850/1752.5 | | 0.848 | 0.495 | -0.080 | 1.6 | 21.8°C |
| Rear Side | 450/1732.5 | EVDO Rev.0 | 0.750 | 0.398 | 0.030 | 1.6 | 21.8°C |
| Left Side | 25/1711.25 | EVDO Rev.0 | 0.632 | 0.374 | 0.020 | 1.6 | 21.8°C |
| | 450/1732.5 | | 0.806 | 0.491 | 0.160 | 1.6 | 21.8°C |
| | 850/1752.5 | | 0.790 | 0.463 | 0.060 | 1.6 | 21.8°C |
| Right Side | 450/1732.5 | EVDO Rev.0 | 0.174 | 0.082 | -0.040 | 1.6 | 21.8°C |
| Front Side | 450/1732.5 | EVDO Rev.A | 0.895 | 0.527 | 0.140 | 1.6 | 21.8°C |
| Front Side | 450/1732.5 | CDMA 1xRTT | 0.880 | 0.519 | 0.130 | 1.6 | 21.8°C |

Table 27: Test results body SAR CDMA 1700

7.2.3 SAR measurement Result of CDMA 1900

| Test Position with 5mm | Test channel /Frequency | Test Mode | SAR Value (W/kg) | | Power Drift (dB) | Limit (W/kg) | Liquid Temp. |
|------------------------|-------------------------|------------|------------------|-------|------------------|--------------|--------------|
| | | | 1-g | 10-g | | | |
| Front Side | 25/1851.25 | EVDO Rev.0 | 0.932 | 0.533 | -0.060 | 1.6 | 21.5°C |
| | 600/1880 | | 0.945 | 0.572 | -0.090 | 1.6 | 21.5°C |
| | 1175/1908.75 | | 1.020 | 0.592 | -0.160 | 1.6 | 21.5°C |
| Rear Side | 25/1851.25 | EVDO Rev.0 | 0.639 | 0.375 | 0.040 | 1.6 | 21.5°C |
| | 600/1880 | | 0.855 | 0.503 | -0.030 | 1.6 | 21.5°C |
| | 1175/1908.75 | | 0.869 | 0.510 | 0.010 | 1.6 | 21.5°C |
| Left Side | 600/1880 | EVDO Rev.0 | 0.648 | 0.306 | -0.140 | 1.6 | 21.5°C |
| Right Side | 600/1880 | EVDO Rev.0 | 0.355 | 0.189 | -0.130 | 1.6 | 21.5°C |
| Front Side | 1175/1908.75 | EVDO Rev.A | 1.120 | 0.682 | -0.100 | 1.6 | 21.5°C |
| Front Side | 1175/1908.75 | CDMA 1xRTT | 0.950 | 0.581 | -0.010 | 1.6 | 21.5°C |

Table 28: Test results body SAR WCDMA 1900

7.2.4 SAR measurement Result of LTE Band II

| Test Position with 5mm | Test channel /Frequency | LTE Configuration | SAR Value (W/kg) | | Power Drift (dB) | Limit (W/kg) | Liquid Temp. |
|------------------------|-------------------------|-------------------|------------------|-------|------------------|--------------|--------------|
| | | | 1-g | 10-g | | | |
| 10M/QPSK | | | | | | | |
| Front Side | 18650/1855 | 50%RB/#13 | 0.884 | 0.529 | -0.070 | 1.6 | 21.5°C |
| | 18900/1880 | | 0.946 | 0.573 | -0.010 | 1.6 | 21.5°C |
| | 19150/1905 | | 1.070 | 0.656 | 0.170 | 1.6 | 21.5°C |
| Rear Side | 18650/1855 | | 0.704 | 0.411 | -0.050 | 1.6 | 21.5°C |
| | 18900/1880 | | 0.835 | 0.486 | 0.060 | 1.6 | 21.5°C |
| | 19150/1905 | | 0.938 | 0.547 | 0.130 | 1.6 | 21.5°C |
| Left Side | 18900/1880 | | 0.643 | 0.361 | 0.030 | 1.6 | 21.5°C |
| Right Side | 18900/1880 | | 0.388 | 0.217 | -0.010 | 1.6 | 21.5°C |
| 10M/QPSK | | | | | | | |
| Front Side | 18650/1855 | 1RB/#0 | 0.906 | 0.540 | -0.070 | 1.6 | 21.5°C |
| Rear Side | 18650/1855 | | 0.674 | 0.392 | 0.020 | 1.6 | 21.5°C |
| Left Side | 18650/1855 | | 0.538 | 0.310 | 0.010 | 1.6 | 21.5°C |
| Right Side | 18650/1855 | | 0.354 | 0.200 | -0.030 | 1.6 | 21.5°C |
| 10M/QPSK | | | | | | | |
| Front Side | 18650/1855 | 1RB/#49 | 0.989 | 0.592 | -0.030 | 1.6 | 21.5°C |
| Rear Side | 18650/1855 | | 0.732 | 0.427 | -0.120 | 1.6 | 21.5°C |
| Left Side | 18650/1855 | | 0.580 | 0.323 | 0.020 | 1.6 | 21.5°C |
| Right Side | 18650/1855 | | 0.376 | 0.213 | 0.020 | 1.6 | 21.5°C |

Table 29: Test results body SAR LTE Band II QPSK

| Test Position with 5mm | Test channel /Frequency | LTE Configuration | SAR Value (W/kg) | | Power Drift (dB) | Limit (W/kg) | Liquid Temp. |
|------------------------|-------------------------|-------------------|------------------|-------|------------------|--------------|--------------|
| | | | 1-g | 10-g | | | |
| 10M/16QAM | | | | | | | |
| Front Side | 19150/1905 | 50%RB/#13 | 1.160 | 0.715 | -0.090 | 1.6 | 21.5°C |
| Rear Side | 19150/1905 | | 0.914 | 0.529 | 0.080 | 1.6 | 21.5°C |
| Left Side | 19150/1905 | | 0.913 | 0.515 | -0.080 | 1.6 | 21.5°C |
| Right Side | 19150/1905 | | 0.440 | 0.247 | -0.040 | 1.6 | 21.5°C |
| 10M/16QAM | | | | | | | |
| Front Side | 18650/1855 | 1RB/#0 | 0.978 | 0.584 | -0.090 | 1.6 | 21.5°C |
| Rear Side | 18650/1855 | | 0.628 | 0.367 | 0.150 | 1.6 | 21.5°C |
| Left Side | 18650/1855 | | 0.561 | 0.322 | -0.110 | 1.6 | 21.5°C |
| Right Side | 18650/1855 | | 0.380 | 0.214 | 0.030 | 1.6 | 21.5°C |
| 10M/16QAM | | | | | | | |
| Front Side | 18650/1855 | 1RB/#49 | 1.070 | 0.638 | -0.070 | 1.6 | 21.5°C |
| Rear Side | 18650/1855 | | 0.700 | 0.406 | 0.120 | 1.6 | 21.5°C |
| Left Side | 18650/1855 | | 0.596 | 0.335 | -0.080 | 1.6 | 21.5°C |
| Right Side | 18650/1855 | | 0.411 | 0.231 | -0.020 | 1.6 | 21.5°C |

Table 30: Test results body SAR LTE Band II 16QAM

7.2.5 SAR measurement Result of LTE Band IV

| Test Position with 5mm | Test channel /Frequency | LTE Configuration | SAR Value (W/kg) | | Power Drift (dB) | Limit (W/kg) | Liquid Temp. | |
|------------------------|-------------------------|-------------------|------------------|-------|------------------|--------------|--------------|--------|
| | | | 1-g | 10-g | | | | |
| 10M/QPSK | | | | | | | | |
| Front Side | 20000/1715 | 50%RB/#13 | 0.814 | 0.475 | -0.120 | 1.6 | 21.5°C | |
| | 20175/1732.5 | | 0.916 | 0.538 | 0.050 | 1.6 | 21.5°C | |
| | 20350/1750 | | 0.864 | 0.511 | -0.060 | 1.6 | 21.5°C | |
| Rear Side | 20175/1732.5 | | 0.796 | 0.443 | -0.180 | 1.6 | 21.5°C | |
| Left Side | 20000/1715 | | 0.695 | 0.414 | 0.050 | 1.6 | 21.5°C | |
| | 20175/1732.5 | | 0.861 | 0.506 | -0.150 | 1.6 | 21.5°C | |
| | 20350/1750 | | 0.799 | 0.475 | 0.090 | 1.6 | 21.5°C | |
| Right Side | 20175/1732.5 | | 0.184 | 0.092 | 0.190 | 1.6 | 21.5°C | |
| 10M/QPSK | | | | | | | | |
| Front Side | 20350/1750 | | 1RB/#0 | 0.786 | 0.469 | -0.180 | 1.6 | 21.5°C |
| Rear Side | 20350/1750 | 0.624 | | 0.337 | -0.030 | 1.6 | 21.5°C | |
| Left Side | 20350/1750 | 0.704 | | 0.419 | 0.130 | 1.6 | 21.5°C | |
| Right Side | 20350/1750 | 0.184 | | 0.096 | 0.170 | 1.6 | 21.5°C | |
| 10M/QPSK | | | | | | | | |
| Front Side | 20175/1732.5 | 1RB/#49 | 0.848 | 0.503 | -0.060 | 1.6 | 21.5°C | |
| Rear Side | 20175/1732.5 | | 0.712 | 0.378 | 0.180 | 1.6 | 21.5°C | |
| Left Side | 20175/1732.5 | | 0.759 | 0.450 | -0.190 | 1.6 | 21.5°C | |
| Right Side | 20175/1732.5 | | 0.186 | 0.095 | 0.020 | 1.6 | 21.5°C | |

Table 31: Test results body SAR LTE Band IV QPSK

| Test Position with 5mm | Test channel /Frequency | LTE Configuration | SAR Value (W/kg) | | Power Drift (dB) | Limit (W/kg) | Liquid Temp. |
|------------------------|-------------------------|-------------------|------------------|-------|------------------|--------------|--------------|
| | | | 1-g | 10-g | | | |
| 10M/16QAM | | | | | | | |
| Front Side | 20175/1732.5 | 50%RB/#13 | 0.870 | 0.506 | -0.090 | 1.6 | 21.5°C |
| Rear Side | 20175/1732.5 | | 0.810 | 0.424 | 0.110 | 1.6 | 21.5°C |
| Left Side | 20175/1732.5 | | 0.698 | 0.412 | -0.050 | 1.6 | 21.5°C |
| Right Side | 20175/1732.5 | | 0.175 | 0.090 | 0.070 | 1.6 | 21.5°C |
| 10M/16QAM | | | | | | | |
| Front Side | 20350/1750 | 1RB/#0 | 0.786 | 0.462 | -0.030 | 1.6 | 21.5°C |
| Rear Side | 20350/1750 | | 0.642 | 0.337 | 0.140 | 1.6 | 21.5°C |
| Left Side | 20350/1750 | | 0.782 | 0.459 | -0.110 | 1.6 | 21.5°C |
| Right Side | 20350/1750 | | 0.185 | 0.094 | 0.140 | 1.6 | 21.5°C |
| 10M/16QAM | | | | | | | |
| Front Side | 20350/1750 | 1RB/#49 | 0.880 | 0.520 | 0.040 | 1.6 | 21.5°C |
| Rear Side | 20350/1750 | | 0.698 | 0.381 | 0.070 | 1.6 | 21.5°C |
| Left Side | 20350/1750 | | 0.879 | 0.516 | 0.004 | 1.6 | 21.5°C |
| Right Side | 20350/1750 | | 0.246 | 0.126 | 0.170 | 1.6 | 21.5°C |

Table 32: Test results body SAR LTE Band IV 16QAM

7.2.6 SAR measurement Result of LTE Band V

| Test Position with 5mm | Test channel /Frequency | LTE Configuration | SAR Value (W/kg) | | Power Drift (dB) | Limit (W/kg) | Liquid Temp. |
|------------------------|-------------------------|-------------------|------------------|-------|------------------|--------------|--------------|
| | | | 1-g | 10-g | | | |
| 10M/QPSK | | | | | | | |
| Front Side | 20525/836.5 | 50%RB/#13 | 0.762 | 0.440 | 0.170 | 1.6 | 21.5°C |
| Rear Side | 20450/829 | | 0.871 | 0.547 | 0.110 | 1.6 | 21.5°C |
| | 20525/836.5 | | 0.833 | 0.522 | 0.110 | 1.6 | 21.5°C |
| | 20600/844 | | 0.915 | 0.572 | 0.003 | 1.6 | 21.5°C |
| Left Side | 20525/836.5 | | 0.434 | 0.276 | 0.030 | 1.6 | 21.5°C |
| Right Side | 20525/836.5 | | 0.156 | 0.109 | 0.020 | 1.6 | 21.5°C |
| 10M/QPSK | | | | | | | |
| Front Side | 20525/836.5 | 1RB/#0 | 0.776 | 0.454 | 0.020 | 1.6 | 21.5°C |
| Rear Side | 20525/836.5 | | 0.805 | 0.508 | 0.120 | 1.6 | 21.5°C |
| Left Side | 20525/836.5 | | 0.414 | 0.263 | 0.130 | 1.6 | 21.5°C |
| Right Side | 20525/836.5 | | 0.133 | 0.092 | -0.120 | 1.6 | 21.5°C |
| 10M/QPSK | | | | | | | |
| Front Side | 20525/836.5 | 1RB/#49 | 0.808 | 0.467 | -0.050 | 1.6 | 21.5°C |
| Rear Side | 20525/836.5 | | 0.883 | 0.556 | 0.160 | 1.6 | 21.5°C |
| Left Side | 20525/836.5 | | 0.475 | 0.303 | 0.040 | 1.6 | 21.5°C |
| Right Side | 20525/836.5 | | 0.158 | 0.111 | -0.007 | 1.6 | 21.5°C |

Table 33: Test results body SAR LTE Band V QPSK

| Test Position with 5mm | Test channel /Frequency | LTE Configuration | SAR Value (W/kg) | | Power Drift (dB) | Limit (W/kg) | Liquid Temp. |
|------------------------|-------------------------|-------------------|------------------|-------|------------------|--------------|--------------|
| | | | 1-g | 10-g | | | |
| 10M/16QAM | | | | | | | |
| Front Side | 20600/844 | 50%RB/#13 | 0.721 | 0.414 | 0.070 | 1.6 | 21.5°C |
| Rear Side | 20600/844 | | 0.802 | 0.502 | 0.030 | 1.6 | 21.5°C |
| Left Side | 20600/844 | | 0.376 | 0.237 | 0.090 | 1.6 | 21.5°C |
| Right Side | 20600/844 | | 0.116 | 0.081 | -0.190 | 1.6 | 21.5°C |
| 10M/16QAM | | | | | | | |
| Front Side | 20450/829 | 1RB/#0 | 0.853 | 0.495 | 0.150 | 1.6 | 21.5°C |
| Rear Side | 20450/829 | | 0.854 | 0.542 | -0.110 | 1.6 | 21.5°C |
| Left Side | 20450/829 | | 0.414 | 0.262 | 0.190 | 1.6 | 21.5°C |
| Right Side | 20450/829 | | 0.171 | 0.120 | -0.050 | 1.6 | 21.5°C |
| 10M/16QAM | | | | | | | |
| Front Side | 20450/829 | 1RB/#49 | 0.727 | 0.424 | 0.040 | 1.6 | 21.5°C |
| Rear Side | 20450/829 | | 0.778 | 0.494 | 0.100 | 1.6 | 21.5°C |
| Left Side | 20450/829 | | 0.350 | 0.221 | 0.040 | 1.6 | 21.5°C |
| Right Side | 20450/829 | | 0.114 | 0.080 | 0.110 | 1.6 | 21.5°C |

Table 34: Test results body SAR LTE Band V 16QAM

7.2.7 SAR measurement Result of LTE Band XII

| Test Position with 5mm | Test channel /Frequency | LTE Configuration | SAR Value (W/kg) | | Power Drift (dB) | Limit (W/kg) | Liquid Temp. |
|------------------------|-------------------------|-------------------|------------------|-------|------------------|--------------|--------------|
| | | | 1-g | 10-g | | | |
| 10M/QPSK | | | | | | | |
| Front Side | 23095/707.5 | 50%RB/#13 | 0.516 | 0.307 | -0.120 | 1.6 | 21.5°C |
| Rear Side | 23095/707.5 | | 0.657 | 0.431 | 0.160 | 1.6 | 21.5°C |
| Left Side | 23095/707.5 | | 0.542 | 0.358 | 0.050 | 1.6 | 21.5°C |
| Right Side | 23095/707.5 | | 0.157 | 0.106 | 0.100 | 1.6 | 21.5°C |
| 10M/QPSK | | | | | | | |
| Front Side | 23130/711 | 1RB/#0 | 0.677 | 0.404 | 0.020 | 1.6 | 21.5°C |
| Rear Side | 23130/711 | | 0.882 | 0.582 | 0.170 | 1.6 | 21.5°C |
| Left Side | 23130/711 | | 0.738 | 0.490 | 0.070 | 1.6 | 21.5°C |
| Right Side | 23130/711 | | 0.211 | 0.143 | -0.030 | 1.6 | 21.5°C |
| 10M/QPSK | | | | | | | |
| Front Side | 23095/707.5 | 1RB/#49 | 0.644 | 0.374 | 0.090 | 1.6 | 21.5°C |
| Rear Side | 23095/707.5 | | 0.715 | 0.473 | -0.140 | 1.6 | 21.5°C |
| Left Side | 23095/707.5 | | 0.593 | 0.392 | 0.180 | 1.6 | 21.5°C |
| Right Side | 23095/707.5 | | 0.208 | 0.137 | -0.070 | 1.6 | 21.5°C |

Table 35: Test results body SAR LTE Band XII QPSK

| Test Position with 5mm | Test channel /Frequency | LTE Configuration | SAR Value (W/kg) | | Power Drift (dB) | Limit (W/kg) | Liquid Temp. |
|------------------------|-------------------------|-------------------|------------------|-------|------------------|--------------|--------------|
| | | | 1-g | 10-g | | | |
| 10M/16QAM | | | | | | | |
| Front Side | 23095/707.5 | 50%RB/#13 | 0.430 | 0.266 | -0.002 | 1.6 | 21.5°C |
| Rear Side | 23095/707.5 | | 0.472 | 0.309 | -0.070 | 1.6 | 21.5°C |
| Left Side | 23095/707.5 | | 0.429 | 0.284 | 0.050 | 1.6 | 21.5°C |
| Right Side | 23095/707.5 | | 0.124 | 0.085 | 0.070 | 1.6 | 21.5°C |
| 10M/16QAM | | | | | | | |
| Front Side | 23130/711 | 1RB/#0 | 0.482 | 0.300 | 0.130 | 1.6 | 21.5°C |
| Rear Side | 23130/711 | | 0.697 | 0.454 | 0.030 | 1.6 | 21.5°C |
| Left Side | 23130/711 | | 0.654 | 0.430 | 0.110 | 1.6 | 21.5°C |
| Right Side | 23130/711 | | 0.205 | 0.141 | 0.080 | 1.6 | 21.5°C |
| 10M/16QAM | | | | | | | |
| Front Side | 23095/707.5 | 1RB/#49 | 0.527 | 0.307 | -0.150 | 1.6 | 21.5°C |
| Rear Side | 23095/707.5 | | 0.522 | 0.345 | 0.190 | 1.6 | 21.5°C |
| Left Side | 23095/707.5 | | 0.473 | 0.312 | 0.070 | 1.6 | 21.5°C |
| Right Side | 23095/707.5 | | 0.163 | 0.107 | 0.030 | 1.6 | 21.5°C |

Table 36: Test results body SAR LTE Band XII 16QAM

Note:

- 1) The maximum SAR value is marked in **bold** letters.
- 1) A-MPR was disabled by Radio Communication Tester;
- 2) Per Lab PBA Tracking Number 230023:
If the SAR level for the horizontal position is < 1.2 W/Kg, testing at the additional position is optional.
- 3) Tests in body position were performed with 5 mm air gap between DUT and SAM.
- 4) Per KDB447498 D02, for the antenna is over 1 cm from the tip of the dongle, so no test for tip side.
- 5) Per KDB941225 D05, LTE band test reduce is as below the following:

First step:

Refer to Item 3A): Begin by measuring SAR on the high, middle and low (H, M, L) channels² using the largest channel bandwidth, in QPSK with 50% RB allocation⁴ centered within the channel bandwidth.

And Foot note 2: When the maximum output power variation across H, M and L channels is $\leq \frac{1}{2}$ dB, start with the middle channel; otherwise, start with the highest output power channel. When the measured 1-g SAR for the middle or highest output power channel is ≤ 0.8 W/kg, testing of the remaining two channels in that device and exposure configuration is not necessary. Also see footnote 1.

| LTE Band II | Uplink Channel Number | BW [MHz] | RB Size | RB Offset | Mod | Max Conducted Power (dBm) | Max Difference |
|--------------|-----------------------|----------|---------|-----------|------|---------------------------|----------------|
| Low Channel | 18650 | 10 | 1 | 0 | QPSK | 23.32 | 0.17 |
| Mid Channel | 18900 | 10 | 1 | 0 | QPSK | 23.27 | |
| High Channel | 19150 | 10 | 1 | 0 | QPSK | 23.15 | |

→ Band II Middle channel, 10MHz BW, 50%/#13, QPSK has been selected.

| LTE Band IV | Uplink Channel Number | BW [MHz] | RB Size | RB Offset | Mod | Max Conducted Power (dBm) | Max Difference |
|--------------|-----------------------|----------|---------|-----------|------|---------------------------|----------------|
| Low Channel | 20000 | 10 | 1 | 49 | QPSK | 22.99 | 0.16 |
| Mid Channel | 20175 | 10 | 1 | 49 | QPSK | 23.15 | |
| High Channel | 20350 | 10 | 1 | 49 | QPSK | 23.07 | |

→ Band IV Middle channel, 10MHz BW, 50%/#13, QPSK has been selected.

| LTE Band V | Uplink Channel Number | BW [MHz] | RB Size | RB Offset | Mod | Max Conducted Power (dBm) | Max Difference |
|--------------|-----------------------|----------|---------|-----------|------|---------------------------|----------------|
| Low Channel | 20450 | 10 | 1 | 0 | QPSK | 23.10 | 0.21 |
| Mid Channel | 20525 | 10 | 1 | 0 | QPSK | 23.20 | |
| High Channel | 20600 | 10 | 1 | 0 | QPSK | 22.99 | |

→ Band V Middle channel, 10MHz BW, 50%/#13, QPSK has been selected.

| LTE Band XII | Uplink Channel Number | BW [MHz] | RB Size | RB Offset | Mod | Max Conducted Power (dBm) | Max Difference |
|--------------|-----------------------|----------|---------|-----------|------|---------------------------|----------------|
| Low Channel | 23060 | 10 | 1 | 0 | QPSK | 22.87 | 0.47 |
| Mid Channel | 23095 | 10 | 1 | 49 | QPSK | 23.24 | |
| High Channel | 23130 | 10 | 1 | 0 | QPSK | 23.34 | |

→ Band XII Middle channel, 10MHz BW, 50%/#13, QPSK has been selected.

Second step:

Refer to Item 3B) : Measure SAR in QPSK with 1 RB allocated at the high end of the channel edge using the highest SAR channel measured in A); and then repeat the measurement at the low end of the channel edge.⁶

And Foot note 6: If the maximum average conducted output power for a 1 RB allocation is > ½ dB higher than the 50% RB allocation, instead of using the highest SAR channel measured for QPSK and 50% RB allocation, measure SAR on the highest output power channel for the 1 RB allocation

the maximum average conducted output power should be compared with 1RB/50% RB allocation of the same channel as below the following,

| LTE Band II | Uplink Channel Number | BW [MHz] | RB Size | RB Offset | Mod | Max Conducted Power (dBm) | Difference |
|--------------|-----------------------|----------|---------|-----------|------|---------------------------|-------------|
| Low Channel | 18650 | 10 | 1 | 49 | QPSK | 23.26 | 1.01 |
| | | 10 | 25 | 13 | QPSK | 22.25 | |
| Mid Channel | 18900 | 10 | 1 | 49 | QPSK | 23.16 | 0.97 |
| | | 10 | 25 | 13 | QPSK | 22.19 | |
| High Channel | 19150 | 10 | 1 | 49 | QPSK | 23.09 | 1.04 |
| | | 10 | 25 | 13 | QPSK | 22.05 | |

➔ Band II Low channel, 10 MHz BW, 1RB/#49, QPSK has been selected.

| LTE Band IV | Uplink Channel Number | BW [MHz] | RB Size | RB Offset | Mod | Max Conducted Power (dBm) | Difference |
|--------------|-----------------------|----------|---------|-----------|------|---------------------------|-------------|
| Low Channel | 20000 | 10 | 1 | 49 | QPSK | 22.99 | 1.17 |
| | | 10 | 25 | 13 | QPSK | 21.82 | |
| Mid Channel | 20175 | 10 | 1 | 49 | QPSK | 23.15 | 1.01 |
| | | 10 | 25 | 13 | QPSK | 22.14 | |
| High Channel | 20350 | 10 | 1 | 49 | QPSK | 23.07 | 1.02 |
| | | 10 | 25 | 13 | QPSK | 22.05 | |

➔ Band IV Mid channel, 10 MHz BW, 1RB/#49, QPSK has been selected.

| LTE Band V | Uplink Channel Number | BW [MHz] | RB Size | RB Offset | Mod | Max Conducted Power (dBm) | Difference |
|--------------|-----------------------|----------|---------|-----------|------|---------------------------|-------------|
| Low Channel | 20450 | 10 | 1 | 49 | QPSK | 22.95 | 0.65 |
| | | 10 | 25 | 13 | QPSK | 22.30 | |
| Mid Channel | 20525 | 10 | 1 | 49 | QPSK | 23.05 | 0.84 |
| | | 10 | 25 | 13 | QPSK | 22.19 | |
| High Channel | 20600 | 10 | 1 | 49 | QPSK | 22.85 | 0.84 |
| | | 10 | 25 | 13 | QPSK | 22.01 | |

➔ Band V Mid channel, 10 MHz BW, 1RB/#49, QPSK has been selected.

| LTE Band XII | Uplink Channel Number | BW [MHz] | RB Size | RB Offset | Mod | Max Conducted Power (dBm) | Difference |
|--------------|-----------------------|----------|---------|-----------|------|---------------------------|-------------|
| Low Channel | 23060 | 10 | 1 | 49 | QPSK | 22.81 | 0.50 |
| | | 10 | 25 | 13 | QPSK | 22.31 | |
| Mid Channel | 23095 | 10 | 1 | 49 | QPSK | 23.24 | 0.94 |
| | | 10 | 25 | 13 | QPSK | 22.30 | |
| High Channel | 23130 | 10 | 1 | 49 | QPSK | 22.70 | 0.19 |
| | | 10 | 25 | 13 | QPSK | 22.51 | |

→ Band XII Mid channel, 10 MHz BW, 1RB/#49, QPSK has been selected.

| LTE Band II | Uplink Channel Number | BW [MHz] | RB Size | RB Offset | Mod | Max Conducted Power (dBm) | Difference |
|--------------|-----------------------|----------|---------|-----------|------|---------------------------|-------------|
| Low Channel | 18650 | 10 | 1 | 0 | QPSK | 23.32 | 1.07 |
| | | 10 | 25 | 13 | QPSK | 22.25 | |
| Mid Channel | 18900 | 10 | 1 | 0 | QPSK | 23.27 | 1.08 |
| | | 10 | 25 | 13 | QPSK | 22.19 | |
| High Channel | 19150 | 10 | 1 | 0 | QPSK | 23.15 | 1.10 |
| | | 10 | 25 | 13 | QPSK | 22.05 | |

→ Band II Low channel, 10 MHz BW, 1RB/#0, QPSK has been selected.

| LTE Band IV | Uplink Channel Number | BW [MHz] | RB Size | RB Offset | Mod | Max Conducted Power (dBm) | Difference |
|--------------|-----------------------|----------|---------|-----------|------|---------------------------|-------------|
| Low Channel | 20000 | 10 | 1 | 0 | QPSK | 22.80 | 0.98 |
| | | 10 | 25 | 13 | QPSK | 21.82 | |
| Mid Channel | 20175 | 10 | 1 | 0 | QPSK | 22.96 | 0.82 |
| | | 10 | 25 | 13 | QPSK | 22.14 | |
| High Channel | 20350 | 10 | 1 | 0 | QPSK | 23.05 | 1.00 |
| | | 10 | 25 | 13 | QPSK | 22.05 | |

→ Band IV High channel, 10 MHz BW, 1RB/#0, QPSK has been selected.

| LTE Band V | Uplink Channel Number | BW [MHz] | RB Size | RB Offset | Mod | Max Conducted Power (dBm) | Difference |
|-------------|-----------------------|----------|---------|-----------|------|---------------------------|-------------|
| Low Channel | 20450 | 10 | 1 | 0 | QPSK | 23.10 | 0.80 |
| | | 10 | 25 | 13 | QPSK | 22.30 | |
| Mid Channel | 20525 | 10 | 1 | 0 | QPSK | 23.20 | 1.01 |
| | | 10 | 25 | 13 | QPSK | 22.19 | |
| High hannel | 20600 | 10 | 1 | 0 | QPSK | 22.99 | 0.98 |
| | | 10 | 25 | 13 | QPSK | 22.01 | |

→ Band V Mid channel, 10 MHz BW, 1RB/#0, QPSK has been selected.

| LTE Band XII | Uplink Channel Number | BW [MHz] | RB Size | RB Offset | Mod | Max Conducted Power (dBm) | Difference |
|--------------|-----------------------|----------|---------|-----------|------|---------------------------|-------------|
| Low Channel | 23060 | 10 | 1 | 0 | QPSK | 22.87 | 0.56 |
| | | 10 | 25 | 13 | QPSK | 22.31 | |
| Mid Channel | 23095 | 10 | 1 | 0 | QPSK | 22.99 | 0.69 |
| | | 10 | 25 | 13 | QPSK | 22.30 | |
| High Channel | 23130 | 10 | 1 | 0 | QPSK | 23.34 | 0.83 |
| | | 10 | 25 | 13 | QPSK | 22.51 | |

➔ **Band XII High channel, 10 MHz BW, 1RB/#0, QPSK has been selected.**

For measured SAR in QPSK with 1 RB is < 1.45 W/kg-> Test 1RB configuration on other channels is not required. (Refer to LTE SAR test result)

Third step:

Refer to Item 4A): For the largest channel bandwidth in each LTE frequency band⁷: Measure SAR in 16QAM with 50% RB allocation using the highest SAR channel measured in 3) A).⁸

And Foot note 7: If the maximum average conducted output power for 16QAM is more than ¼ dB higher than QPSK, apply the procedures for QPSK in 3) to test 16QAM.

And Foot note 8: If the maximum average conducted output power for 16QAM with 50% RB allocation is > ½ dB higher than QPSK with 50% RB allocation, instead of using the highest SAR channel measured in QPSK measure SAR on the highest output power channel for 16QAM with 50% RB allocation.

| LTE Band II | Uplink Channel Number | BW [MHz] | RB Size | RB Offset | Mod | Max Conducted Power (dBm) | Difference |
|--------------|-----------------------|----------|---------|-----------|-------|---------------------------|--------------|
| Low Channel | 18650 | 10 | 1 | 0 | 16QAM | 22.05 | -1.27 |
| | | 10 | 1 | 0 | QPSK | 23.32 | |
| Mid Channel | 18900 | 10 | 1 | 0 | 16QAM | 21.88 | -1.39 |
| | | 10 | 1 | 0 | QPSK | 23.27 | |
| High Channel | 19150 | 10 | 1 | 49 | 16QAM | 21.90 | -1.25 |
| | | 10 | 1 | 0 | QPSK | 23.15 | |

➔ **Band II, using the highest SAR channel measured in 3) A).**

| LTE Band IV | Uplink Channel Number | BW [MHz] | RB Size | RB Offset | Mod | Max Conducted Power (dBm) | Difference |
|--------------|-----------------------|----------|---------|-----------|-------|---------------------------|------------|
| Low Channel | 20000 | 10 | 1 | 49 | 16QAM | 22.06 | -0.93 |
| | | 10 | 1 | 49 | QPSK | 22.99 | |
| Mid Channel | 20175 | 10 | 1 | 49 | 16QAM | 21.90 | -1.25 |
| | | 10 | 1 | 49 | QPSK | 23.15 | |
| High Channel | 20350 | 10 | 1 | 49 | 16QAM | 22.18 | -0.89 |
| | | 10 | 1 | 49 | QPSK | 23.07 | |

➔ **Band IV, using the highest SAR channel measured in 3) A).**

| LTE Band V | Uplink Channel Number | BW [MHz] | RB Size | RB Offset | Mod | Max Conducted Power (dBm) | Difference |
|--------------|-----------------------|----------|---------|-----------|-------|---------------------------|--------------|
| Low Channel | 20450 | 10 | 1 | 0 | 16QAM | 22.20 | -1.10 |
| | | 10 | 1 | 0 | QPSK | 23.10 | |
| Mid Channel | 20525 | 10 | 1 | 0 | 16QAM | 22.17 | -1.03 |
| | | 10 | 1 | 0 | QPSK | 23.20 | |
| High Channel | 20600 | 10 | 1 | 0 | 16QAM | 21.98 | -1.01 |
| | | 10 | 1 | 0 | QPSK | 22.99 | |

➔ **Band V using the highest SAR channel measured in 3) A).**

| LTE Band XII | Uplink Channel Number | BW [MHz] | RB Size | RB Offset | Mod | Max Conducted Power (dBm) | Difference |
|--------------|-----------------------|----------|---------|-----------|-------|---------------------------|--------------|
| Low Channel | 23060 | 10 | 1 | 0 | 16QAM | 22.29 | -0.58 |
| | | 10 | 1 | 0 | QPSK | 22.87 | |
| Mid Channel | 23095 | 10 | 1 | 49 | 16QAM | 22.36 | -0.88 |
| | | 10 | 1 | 49 | QPSK | 23.24 | |
| High Channel | 23130 | 10 | 1 | 0 | 16QAM | 22.51 | -0.83 |
| | | 10 | 1 | 0 | QPSK | 23.34 | |

➔ **Band XII using the highest SAR channel measured in 3) A).**

Refer to Item 4B): Measure SAR in 16QAM with 1 RB allocated at the high end of the channel edge using the SAR channel measured in A); and then repeat the measurement at the low end of the channel edge.⁹

And Foot note 9: If the maximum average conducted output power for a 1 RB allocation is > ½ dB higher than the 50% RB allocation, instead of using the highest SAR channel measured for 16QAM and 50% RB measure SAR on the highest output power channel for the 1 RB allocation.

the maximum average conducted output power should be compared with 1RB/50% RB allocation of the same channel as below the following:

| LTE Band II | Uplink Channel Number | BW [MHz] | RB Size | RB Offset | Mod | Max Conducted Power (dBm) | Difference |
|--------------|-----------------------|----------|---------|-----------|-------|---------------------------|-------------|
| Low Channel | 18650 | 10 | 1 | 49 | 16QAM | 22.01 | 0.81 |
| | | 10 | 25 | 13 | 16QAM | 21.20 | |
| Mid Channel | 18900 | 10 | 1 | 49 | 16QAM | 21.80 | 0.55 |
| | | 10 | 25 | 13 | 16QAM | 21.25 | |
| High Channel | 19150 | 10 | 1 | 49 | 16QAM | 21.90 | 0.74 |
| | | 10 | 25 | 13 | 16QAM | 21.16 | |

➔ **Band II Low channel, 10 MHz BW, 1RB/#49, 16QAM has been selected**

| LTE Band IV | Uplink Channel Number | BW [MHz] | RB Size | RB Offset | Mod | Max Conducted Power (dBm) | Difference |
|--------------|-----------------------|----------|---------|-----------|-------|---------------------------|-------------|
| Low Channel | 20000 | 10 | 1 | 49 | 16QAM | 22.06 | 1.09 |
| | | 10 | 25 | 13 | 16QAM | 20.97 | |
| Mid Channel | 20175 | 10 | 1 | 49 | 16QAM | 21.90 | 0.60 |
| | | 10 | 25 | 13 | 16QAM | 21.30 | |
| High Channel | 20350 | 10 | 1 | 49 | 16QAM | 22.18 | 0.68 |
| | | 10 | 25 | 13 | 16QAM | 21.50 | |

➔ **Band IV High channel, 10 MHz BW, 1RB/#49, 16QAM has been selected**

| LTE Band V | Uplink Channel Number | BW [MHz] | RB Size | RB Offset | Mod | Max Conducted Power (dBm) | Difference |
|--------------|-----------------------|----------|---------|-----------|-------|---------------------------|-------------|
| Low Channel | 20450 | 10 | 1 | 49 | 16QAM | 22.10 | 0.60 |
| | | 10 | 25 | 13 | 16QAM | 21.50 | |
| Mid Channel | 20525 | 10 | 1 | 49 | 16QAM | 21.93 | 0.73 |
| | | 10 | 25 | 13 | 16QAM | 21.20 | |
| High Channel | 20600 | 10 | 1 | 49 | 16QAM | 21.89 | 0.67 |
| | | 10 | 25 | 13 | 16QAM | 21.22 | |

➔ **Band V Low channel, 10 MHz BW, 1RB/#49, 16QAM has been selected.**

| LTE Band XII | Uplink Channel Number | BW [MHz] | RB Size | RB Offset | Mod | Max Conducted Power (dBm) | Difference |
|--------------|-----------------------|----------|---------|-----------|-------|---------------------------|-------------|
| Low Channel | 23060 | 10 | 1 | 49 | 16QAM | 22.25 | 0.64 |
| | | 10 | 25 | 13 | 16QAM | 21.61 | |
| Mid Channel | 23095 | 10 | 1 | 49 | 16QAM | 22.36 | 0.88 |
| | | 10 | 25 | 13 | 16QAM | 21.48 | |
| High Channel | 23130 | 10 | 1 | 0 | 16QAM | 22.11 | 0.51 |
| | | 10 | 25 | 13 | 16QAM | 21.60 | |

➔ **Band XII Midd channel, 10 MHz BW, 1RB/#49, 16QAM has been selected**

| LTE Band II | Uplink Channel Number | BW [MHz] | RB Size | RB Offset | Mod | Max Conducted Power (dBm) | Difference |
|--------------|-----------------------|----------|---------|-----------|-------|---------------------------|-------------|
| Low Channel | 18650 | 10 | 1 | 0 | 16QAM | 22.05 | 0.85 |
| | | 10 | 25 | 13 | 16QAM | 21.20 | |
| Mid Channel | 18900 | 10 | 1 | 0 | 16QAM | 21.88 | 0.63 |
| | | 10 | 25 | 13 | 16QAM | 21.25 | |
| High Channel | 19150 | 10 | 1 | 0 | 16QAM | 21.80 | 0.64 |
| | | 10 | 25 | 13 | 16QAM | 21.16 | |

➔ **Band II Low channel, 10 MHz BW, 1RB/#0, 16QAM has been selected**

| LTE Band IV | Uplink Channel Number | BW [MHz] | RB Size | RB Offset | Mod | Max Conducted Power (dBm) | Difference |
|--------------|-----------------------|----------|---------|-----------|-------|---------------------------|-------------|
| Low Channel | 20000 | 10 | 1 | 0 | 16QAM | 22.01 | 1.04 |
| | | 10 | 25 | 13 | 16QAM | 20.97 | |
| Mid Channel | 20175 | 10 | 1 | 0 | 16QAM | 21.80 | 0.50 |
| | | 10 | 25 | 13 | 16QAM | 21.30 | |
| High Channel | 20350 | 10 | 1 | 0 | 16QAM | 22.10 | 0.60 |
| | | 10 | 25 | 13 | 16QAM | 21.50 | |

➔ **Band IV High channel, 10 MHz BW, 1RB/#0, 16QAM has been selected**

| LTE Band V | Uplink Channel Number | BW [MHz] | RB Size | RB Offset | Mod | Max Conducted Power (dBm) | Difference |
|--------------|-----------------------|----------|---------|-----------|-------|---------------------------|-------------|
| Low Channel | 20450 | 10 | 1 | 0 | 16QAM | 22.20 | 0.70 |
| | | 10 | 25 | 13 | 16QAM | 21.50 | |
| Mid Channel | 20525 | 10 | 1 | 0 | 16QAM | 22.17 | 0.97 |
| | | 10 | 25 | 13 | 16QAM | 21.20 | |
| High Channel | 20600 | 10 | 1 | 0 | 16QAM | 21.98 | 0.76 |
| | | 10 | 25 | 13 | 16QAM | 21.22 | |

➔ **Band V Low channel, 10 MHz BW, 1RB/#0, 16QAM has been selected.**

| LTE Band XII | Uplink Channel Number | BW [MHz] | RB Size | RB Offset | Mod | Max Conducted Power (dBm) | Difference |
|--------------|-----------------------|----------|---------|-----------|-------|---------------------------|-------------|
| Low Channel | 23060 | 10 | 1 | 0 | 16QAM | 22.29 | 0.68 |
| | | 10 | 25 | 13 | 16QAM | 21.61 | |
| Mid Channel | 23095 | 10 | 1 | 0 | 16QAM | 22.32 | 0.84 |
| | | 10 | 25 | 13 | 16QAM | 21.48 | |
| High Channel | 23130 | 10 | 1 | 0 | 16QAM | 22.51 | 0.91 |
| | | 10 | 25 | 13 | 16QAM | 21.60 | |

➔ **Band XII High channel, 10 MHz BW, 1RB/#0, 16QAM has been selected**

Measured SAR in 16QAM with 1 RB is < 1.45 W/kg-> Test 16QAM on other channels is not required. (Refer to LTE SAR test result)

Fourth step:

Refer to Item 5B): For the other channel bandwidths used by the device within a LTE frequency band:

- a) Max average conducted power of 5MHz/3MHz/1.4MHz BW is lower than ½ dB for 10MHz BW: and SAR of QPSK with 50% RB (10MHz) is < 1.45 W/kg.

| LTE Band II | 10 MHz | 5 MHz | 3 MHz | 1.4 MHz |
|--------------|--------|-------|-------|---------|
| Max Power | 23.32 | 23.36 | 23.39 | 23.42 |
| Difference | -- | -0.04 | 0.07 | 0.10 |
| LTE Band V | 10 MHz | 5 MHz | 3 MHz | 1.4 MHz |
| Max Power | 23.20 | 23.41 | 23.20 | 23.25 |
| Difference | -- | 0.21 | 0 | 0.05 |
| LTE Band XII | 10 MHz | 5 MHz | 3 MHz | 1.4 MHz |
| Max Power | 23.34 | 23.64 | 23.41 | 23.20 |
| Difference | -- | 0.30 | 0.07 | -0.14 |

➔ **Band II/V/XII, lower BW is not required to be tested.**

- b) Max average conducted power of 5MHz BW is lower than ½ dB for 10MHzBW and SAR of QPSK with 50% RB (10MHz) is < 1.45 W/kg.

| LTE Band IV | 10 MHz | 5 MHz |
|-------------|--------|-------|
| Max Power | 23.15 | 23.24 |
| Difference | -- | 0.09 |

➔ **Band IV, lower BW is not required to be tested.**

7.3 simultaneous transmission SAR

CDMA<E mode can not work at the same time. Only one mode can work at a time.No Simultaneous transmission mode is provided for the device. Therefore, simultaneous transmission SAR is not required.

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