



# TEST REPORT

Report Reference No. .... : TRE18050218 R/C.....: 18567

FCC ID..... : WQ8MTPMS508WF

Applicant's name ..... : Autel Intelligent Tech. Corp., Ltd.

Address..... : 6th - 10th Floor, Bldg. B1, Zhiyuan, Xueyuan Rd., Xili, Nanshan, Shenzhen, China.

Manufacturer..... : Autel Intelligent Tech. Corp., Ltd.

Address..... : 6th - 10th Floor, Bldg. B1, Zhiyuan, Xueyuan Rd., Xili, Nanshan, Shenzhen, China.

Test item description ..... : PROFESSIONAL SCAN TOOL

Trade Mark ..... : AUTEL

Model/Type reference..... : TS508WF

Listed Model(s) ..... : -

Standard ..... : FCC 47 CFR Part2.1093  
ANSI/IEEE C95.1: 1999  
IEEE 1528: 2013

Date of receipt of test sample..... : May. 25, 2018

Date of testing..... : May. 28, 2018- Jun. 04, 2018

Date of issue..... : Jun. 05, 2018

Result..... : PASS

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Address..... : 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China

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## 1. Test Standards and Report version

### 1.1. Test Standards

The tests were performed according to following standards:

[FCC 47 Part 2.1093](#): Radiofrequency Radiation Exposure Evaluation:Portable Devices

[IEEE Std C95.1, 1999](#): IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 KHz to 300 GHz.

[IEEE Std 1528™-2013](#): IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques.

[KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04](#): SAR Measurement Requirements for 100 MHz to 6 GHz

[KDB 865664 D02 RF Exposure Reporting v01r02](#): RF Exposure Compliance Reporting and Documentation Considerations

[KDB 447498 D01 General RF Exposure Guidance v06](#): Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies

[KDB 248227 D01 802.11 Wi-Fi SAR v02r02](#): SAR Measurement Proceduresfor802.11 a/b/g Transmitters

### 1.2. Report version

| Revision No. | Date of issue | Description |
|--------------|---------------|-------------|
| N/A          | 2018-06-05    | Original    |
|              |               |             |
|              |               |             |
|              |               |             |
|              |               |             |

## 2. Summary

### 2.1. Client Information

|               |                                                                                   |
|---------------|-----------------------------------------------------------------------------------|
| Applicant:    | Autel Intelligent Tech. Corp., Ltd.                                               |
| Address:      | 6th - 10th Floor, Bldg. B1, Zhiyuan, Xueyuan Rd., Xili, Nanshan, Shenzhen, China. |
| Manufacturer: | Autel Intelligent Tech. Corp., Ltd.                                               |
| Address:      | 6th - 10th Floor, Bldg. B1, Zhiyuan, Xueyuan Rd., Xili, Nanshan, Shenzhen, China. |

### 2.2. Product Description

|                            |                                                                         |            |
|----------------------------|-------------------------------------------------------------------------|------------|
| Name of EUT:               | PROFESSIONAL SCAN TOOL                                                  |            |
| Trade Mark:                | AUTEL                                                                   |            |
| Model No.:                 | TS508WF                                                                 |            |
| Listed Model(s):           | -                                                                       |            |
| Power supply:              | DC 5V                                                                   |            |
| Device Category:           | Portable                                                                |            |
| Product stage:             | Production unit                                                         |            |
| RF Exposure Environment:   | General Population / Uncontrolled                                       |            |
| Hardware version:          | V3                                                                      |            |
| Software version:          | V1.00                                                                   |            |
| Maximum SAR Value          |                                                                         |            |
| Separation Distance:       | Body:                                                                   | 0mm        |
| Max Report SAR Value (1g): | Body:                                                                   | 0.024 W/Kg |
| WIFI 2.4G                  |                                                                         |            |
| Supported type:            | 802.11b/802.11g/802.11n(HT20)                                           |            |
| Modulation Technology:     | 802.11b: DSSS<br>802.11g: DSSS, OFDM<br>802.11n(HT20): OFDM             |            |
| Modulation Type:           | DSSS: DBPSK / DQPSK / CCK<br>OFDM: BPSK / QPSK / 16QAM / 64QAM / 256QAM |            |
| Operation frequency:       | 2412MHz~2462MHz                                                         |            |
| Channel number:            | 11                                                                      |            |
| Channel separation:        | 5MHz                                                                    |            |
| Antenna type:              | PCB Antenna                                                             |            |

*Remark:*

*The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power*

### **3. Test Environment**

#### **3.1. Test laboratory**

Laboratory: Shenzhen Huatongwei International Inspection Co., Ltd.

Address: 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China

#### **3.2. Test Facility**

##### **CNAS-Lab Code: L1225**

Shenzhen Huatongwei International Inspection Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories.

##### **A2LA-Lab Cert. No. 3902.01**

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

##### **FCC-Registration No.: 762235**

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files.

##### **IC-Registration No.:5377B**

Two 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No.: 5377B

##### **ACA**

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our A2LA accreditation.

#### 4. Equipments Used during the Test

| Test Equipment                       | Manufacturer    | Type/Model | Serial Number | Calibration |            |
|--------------------------------------|-----------------|------------|---------------|-------------|------------|
|                                      |                 |            |               | Last Cal.   | Due Date   |
| Data Acquisition Electronics DAEx    | SPEAG           | DAE4       | 1549          | 2018/04/25  | 2019/04/24 |
| E-field Probe                        | SPEAG           | EX3DV4     | 7494          | 2018/02/26  | 2019/02/25 |
| System Validation Dipole             | SPEAG           | D2450V2    | 1009          | 2018/02/05  | 2021/02/04 |
| Dielectric Assessment Kit            | SPEAG           | DAK-3.5    | 1267          | 2018/03/01  | 2019/02/28 |
| Dielectric Assessment Kit            | SPEAG           | DAK-12     | 1130          | 2018/03/01  | 2019/02/28 |
| Network analyzer                     | Agilent         | N9923A     | MY51491493    | 2017/09/05  | 2018/09/04 |
| Universal Radio Communication Tester | ROHDE & SCHWARZ | CMU200     | 112012        | 2017/11/27  | 2018/11/26 |
| Signal Generator                     | ROHDE & SCHWARZ | SMB100A    | 175248        | 2017/09/02  | 2018/09/01 |
| Power meter                          | Agilent         | N1914A     | MY52090010    | 2018/03/22  | 2019/03/21 |
| Power sensor                         | Agilent         | E9304A     | MY52140008    | 2018/03/22  | 2019/03/21 |
| Power sensor                         | Agilent         | E9301H     | MY54470001    | 2018/03/22  | 2019/03/21 |
| Power Amplifier                      | Mini-Circuits   | ZHL-42W    | QA1202003     | 2017/11/27  | 2018/11/26 |
| Dual Directional Coupler             | Agilent         | 778D       | MY48220612    | 2018/03/22  | 2019/03/21 |

Note:

1. The DAE ,Probe and Dipole calibration reference to the Appendix A and Appendix B.

## 5. Measurement Uncertainty

| Measurement Uncertainty                            |                                                 |                                            |                   |                       |            |         |          |                |                 |                   |
|----------------------------------------------------|-------------------------------------------------|--------------------------------------------|-------------------|-----------------------|------------|---------|----------|----------------|-----------------|-------------------|
| No.                                                | Error Description                               | Type                                       | Uncertainty Value | Probably Distribution | Div.       | (Ci) 1g | (Ci) 10g | Std. Unc. (1g) | Std. Unc. (10g) | Degree of freedom |
| Measurement System                                 |                                                 |                                            |                   |                       |            |         |          |                |                 |                   |
| 1                                                  | Probe calibration                               | B                                          | 6.0%              | N                     | 1          | 1       | 1        | 6.0%           | 6.0%            | ∞                 |
| 2                                                  | Axial isotropy                                  | B                                          | 4.70%             | R                     | $\sqrt{3}$ | 0.7     | 0.7      | 1.90%          | 1.90%           | ∞                 |
| 3                                                  | Hemispherical isotropy                          | B                                          | 9.60%             | R                     | $\sqrt{3}$ | 0.7     | 0.7      | 3.90%          | 3.90%           | ∞                 |
| 4                                                  | Boundary Effects                                | B                                          | 1.00%             | R                     | $\sqrt{3}$ | 1       | 1        | 0.60%          | 0.60%           | ∞                 |
| 5                                                  | Probe Linearity                                 | B                                          | 4.70%             | R                     | $\sqrt{3}$ | 1       | 1        | 2.70%          | 2.70%           | ∞                 |
| 6                                                  | Detection limit                                 | B                                          | 1.00%             | R                     | $\sqrt{3}$ | 1       | 1        | 0.60%          | 0.60%           | ∞                 |
| 7                                                  | RF ambient conditions-noise                     | B                                          | 0.00%             | R                     | $\sqrt{3}$ | 1       | 1        | 0.00%          | 0.00%           | ∞                 |
| 8                                                  | RF ambient conditions-reflection                | B                                          | 0.00%             | R                     | $\sqrt{3}$ | 1       | 1        | 0.00%          | 0.00%           | ∞                 |
| 9                                                  | Response time                                   | B                                          | 0.80%             | R                     | $\sqrt{3}$ | 1       | 1        | 0.50%          | 0.50%           | ∞                 |
| 10                                                 | Integration time                                | B                                          | 5.00%             | R                     | $\sqrt{3}$ | 1       | 1        | 2.90%          | 2.90%           | ∞                 |
| 11                                                 | RF ambient                                      | B                                          | 3.00%             | R                     | $\sqrt{3}$ | 1       | 1        | 1.70%          | 1.70%           | ∞                 |
| 12                                                 | Probe positioned mech. restrictions             | B                                          | 0.40%             | R                     | $\sqrt{3}$ | 1       | 1        | 0.20%          | 0.20%           | ∞                 |
| 13                                                 | Probe positioning with respect to phantom shell | B                                          | 2.90%             | R                     | $\sqrt{3}$ | 1       | 1        | 1.70%          | 1.70%           | ∞                 |
| 14                                                 | Max.SAR evaluation                              | B                                          | 3.90%             | R                     | $\sqrt{3}$ | 1       | 1        | 2.30%          | 2.30%           | ∞                 |
| Test Sample Related                                |                                                 |                                            |                   |                       |            |         |          |                |                 |                   |
| 15                                                 | Test sample positioning                         | A                                          | 1.86%             | N                     | 1          | 1       | 1        | 1.86%          | 1.86%           | ∞                 |
| 16                                                 | Device holder uncertainty                       | A                                          | 1.70%             | N                     | 1          | 1       | 1        | 1.70%          | 1.70%           | ∞                 |
| 17                                                 | Drift of output power                           | B                                          | 5.00%             | R                     | $\sqrt{3}$ | 1       | 1        | 2.90%          | 2.90%           | ∞                 |
| Phantom and Set-up                                 |                                                 |                                            |                   |                       |            |         |          |                |                 |                   |
| 18                                                 | Phantom uncertainty                             | B                                          | 4.00%             | R                     | $\sqrt{3}$ | 1       | 1        | 2.30%          | 2.30%           | ∞                 |
| 19                                                 | Liquid conductivity (target)                    | B                                          | 5.00%             | R                     | $\sqrt{3}$ | 0.64    | 0.43     | 1.80%          | 1.20%           | ∞                 |
| 20                                                 | Liquid conductivity (meas.)                     | A                                          | 0.50%             | N                     | 1          | 0.64    | 0.43     | 0.32%          | 0.26%           | ∞                 |
| 21                                                 | Liquid permittivity (target)                    | B                                          | 5.00%             | R                     | $\sqrt{3}$ | 0.64    | 0.43     | 1.80%          | 1.20%           | ∞                 |
| 22                                                 | Liquid permittivity (meas.)                     | A                                          | 0.16%             | N                     | 1          | 0.64    | 0.43     | 0.10%          | 0.07%           | ∞                 |
| Combined standard uncertainty                      |                                                 | $u_c = \sqrt{\sum_{i=1}^{22} c_i^2 u_i^2}$ |                   | /                     | /          | /       | /        | 9.79%          | 9.67%           | ∞                 |
| Expanded uncertainty (confidence interval of 95 %) |                                                 | $u_c = 2u_c$                               |                   | R                     | K=2        | /       | /        | 19.57%         | 19.34%          | ∞                 |

| System Check Uncertainty                           |                                                        |                                            |                   |                       |            |         |          |                |                 |                   |
|----------------------------------------------------|--------------------------------------------------------|--------------------------------------------|-------------------|-----------------------|------------|---------|----------|----------------|-----------------|-------------------|
| No.                                                | Error Description                                      | Type                                       | Uncertainty Value | Probably Distribution | Div.       | (Ci) 1g | (Ci) 10g | Std. Unc. (1g) | Std. Unc. (10g) | Degree of freedom |
| Measurement System                                 |                                                        |                                            |                   |                       |            |         |          |                |                 |                   |
| 1                                                  | Probe calibration                                      | B                                          | 6.0%              | N                     | 1          | 1       | 1        | 6.0%           | 6.0%            | $\infty$          |
| 2                                                  | Axial isotropy                                         | B                                          | 4.70%             | R                     | $\sqrt{3}$ | 0.7     | 0.7      | 1.90%          | 1.90%           | $\infty$          |
| 3                                                  | Hemispherical isotropy                                 | B                                          | 9.60%             | R                     | $\sqrt{3}$ | 0.7     | 0.7      | 3.90%          | 3.90%           | $\infty$          |
| 4                                                  | Boundary Effects                                       | B                                          | 1.00%             | R                     | $\sqrt{3}$ | 1       | 1        | 0.60%          | 0.60%           | $\infty$          |
| 5                                                  | Probe Linearity                                        | B                                          | 4.70%             | R                     | $\sqrt{3}$ | 1       | 1        | 2.70%          | 2.70%           | $\infty$          |
| 6                                                  | Detection limit                                        | B                                          | 1.00%             | R                     | $\sqrt{3}$ | 1       | 1        | 0.60%          | 0.60%           | $\infty$          |
| 7                                                  | RF ambient conditions-noise                            | B                                          | 0.00%             | R                     | $\sqrt{3}$ | 1       | 1        | 0.00%          | 0.00%           | $\infty$          |
| 8                                                  | RF ambient conditions-reflection                       | B                                          | 0.00%             | R                     | $\sqrt{3}$ | 1       | 1        | 0.00%          | 0.00%           | $\infty$          |
| 9                                                  | Response time                                          | B                                          | 0.80%             | R                     | $\sqrt{3}$ | 1       | 1        | 0.50%          | 0.50%           | $\infty$          |
| 10                                                 | Integration time                                       | B                                          | 5.00%             | R                     | $\sqrt{3}$ | 1       | 1        | 2.90%          | 2.90%           | $\infty$          |
| 11                                                 | RF ambient                                             | B                                          | 3.00%             | R                     | $\sqrt{3}$ | 1       | 1        | 1.70%          | 1.70%           | $\infty$          |
| 12                                                 | Probe positioned mech. restrictions                    | B                                          | 0.40%             | R                     | $\sqrt{3}$ | 1       | 1        | 0.20%          | 0.20%           | $\infty$          |
| 13                                                 | Probe positioning with respect to phantom shell        | B                                          | 2.90%             | R                     | $\sqrt{3}$ | 1       | 1        | 1.70%          | 1.70%           | $\infty$          |
| 14                                                 | Max.SAR evaluation                                     | B                                          | 3.90%             | R                     | $\sqrt{3}$ | 1       | 1        | 2.30%          | 2.30%           | $\infty$          |
| System validation source-dipole                    |                                                        |                                            |                   |                       |            |         |          |                |                 |                   |
| 15                                                 | Deviation of experimental dipole from numerical dipole | A                                          | 1.58%             | N                     | 1          | 1       | 1        | 1.58%          | 1.58%           | $\infty$          |
| 16                                                 | Dipole axis to liquid distance                         | A                                          | 1.35%             | N                     | 1          | 1       | 1        | 1.35%          | 1.35%           | $\infty$          |
| 17                                                 | Input power and SAR drift                              | B                                          | 4.00%             | R                     | $\sqrt{3}$ | 1       | 1        | 2.30%          | 2.30%           | $\infty$          |
| Phantom and Set-up                                 |                                                        |                                            |                   |                       |            |         |          |                |                 |                   |
| 18                                                 | Phantom uncertainty                                    | B                                          | 4.00%             | R                     | $\sqrt{3}$ | 1       | 1        | 2.30%          | 2.30%           | $\infty$          |
| 20                                                 | Liquid conductivity (meas.)                            | A                                          | 0.50%             | N                     | 1          | 0.64    | 0.43     | 0.32%          | 0.26%           | $\infty$          |
| 22                                                 | Liquid cpermittivity (meas.)                           | A                                          | 0.16%             | N                     | 1          | 0.64    | 0.43     | 0.10%          | 0.07%           | $\infty$          |
| Combined standard uncertainty                      |                                                        | $u_c = \sqrt{\sum_{i=1}^{22} c_i^2 u_i^2}$ |                   | /                     | /          | /       | /        | 8.80%          | 8.79%           | $\infty$          |
| Expanded uncertainty (confidence interval of 95 %) |                                                        | $u_e = 2u_c$                               |                   | R                     | K=2        | /       | /        | 17.59%         | 17.58%          | $\infty$          |

## 6. SAR Measurements System Configuration

### 6.1. 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 2003.

DASY5 software and SEMCAD data evaluation software.

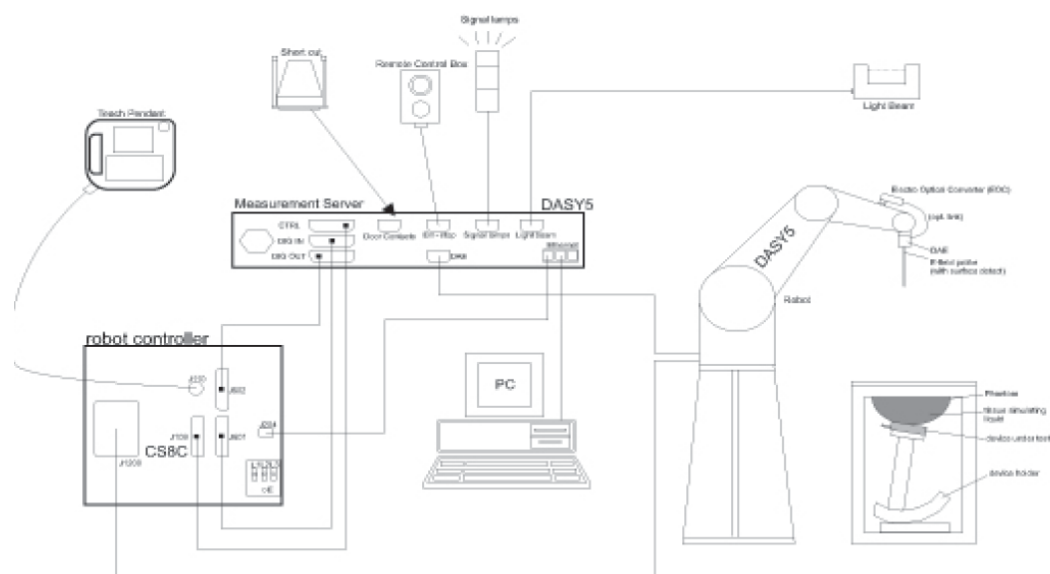
Remote control with teach panel and additional circuitry for robot safety such as warning lamps, etc.

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.



## 6.2. DASY5 E-field Probe System

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

### ● Probe Specification

Construction Symmetrical design with triangular core  
 Interleaved sensors  
 Built-in shielding against static charges  
 PEEK enclosure material (resistant to organic solvents, e.g., DGBE)

Calibration ISO/IEC 17025 calibration service available.

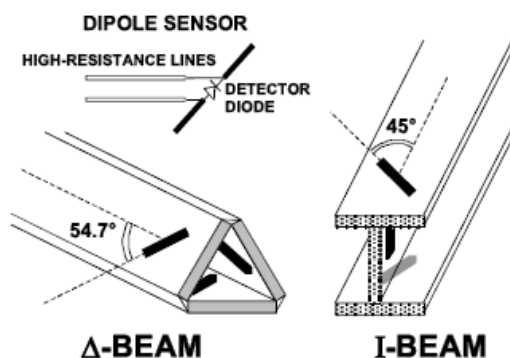
|                      |                                                                                                                                |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------|
| <b>Frequency</b>     | 4 MHz to 10GHz;<br>Linearity: $\pm 0.2$ dB (30 MHz to 10 GHz)                                                                  |
| <b>Directivity</b>   | $\pm 0.1$ dB in HSL (rotation around probe axis)<br>$\pm 0.3$ dB in tissue material (rotation normal to probe axis)            |
| <b>Dynamic Range</b> | 10 $\mu$ W/g to > 100 mW/g;<br>Linearity: $\pm 0.2$ dB                                                                         |
| <b>Dimensions</b>    | Overall length: 337 mm (Tip: 20 mm)<br>Tip diameter: 2.5 mm (Body: 12 mm)<br>Distance from probe tip to dipole centers: 2.0 mm |
| <b>Application</b>   | General dosimetry up to 10 GHz<br>Dosimetry in strong gradient fields<br>Compliance tests of Mobile Phones                     |
| <b>Compatibility</b> | DASY3, DASY4, DASY52 SAR and higher, EASY4/MRI                                                                                 |



### ● Isotropic E-Field Probe

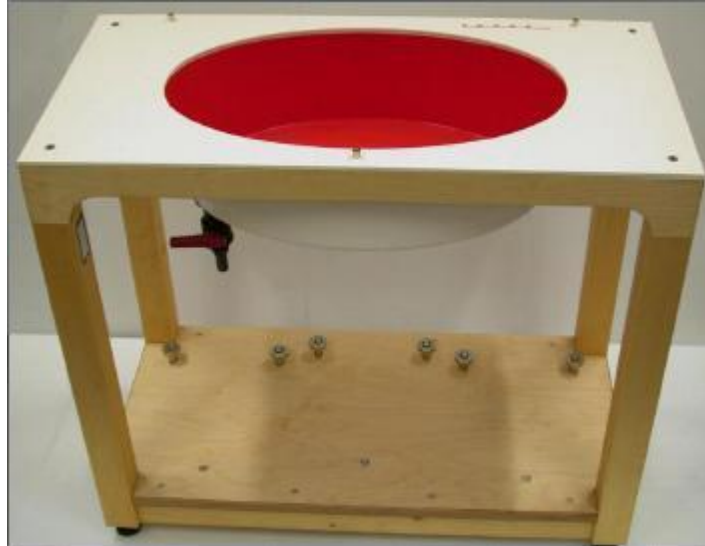
The isotropic E-Field probe has been fully calibrated and assessed for isotropicity, and boundary effect within a controlled environment. Depending on the frequency for which the probe is calibrated the method utilized for calibration will change.

The E-Field probe utilizes a triangular sensor arrangement as detailed in the diagram below:



### 6.3. Phantoms

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



ELI4 Phantom

### 6.4. Device Holder

The device was placed in the device holder (illustrated below) that is supplied by SPEAG as an integral part of the DASY system.

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



Device holder supplied by SPEAG

## 7. **SAR Test Procedure**

### 7.1. **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.  $\pm 5\%$ .

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  $\pm 30^\circ$ .)

#### **Area Scan**

The Area Scan is used as a fast scan in two dimensions to find the area of high field values before running a detailed measurement around the hot spot. Before starting the area scan a grid spacing of 15 mm x 15 mm is set. During the scan the distance of the probe to the phantom remains unchanged. After finishing area scan, the field maxima within a range of 2 dB will be ascertained.

#### **Zoom Scan**

After the maximum interpolated values were calculated between the points in the cube, the SAR was averaged over the spatial volume (1g or 10g) using a 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the “Not a knot” condition (in x, y, and z directions). The volume was then integrated with the trapezoidal algorithm.

#### **Spatial Peak Detection**

The procedure for spatial peak SAR evaluation has been implemented and can determine values of masses of 1g and 10g, as well as for user-specific masses. The DASY5 system allows evaluations that combine measured data and robot positions, such as:

- maximum search
- extrapolation
- boundary correction
- peak search for averaged SAR

During a maximum search, global and local maxima searches are automatically performed in 2-D after each Area Scan measurement with at least 6 measurement points. It is based on the evaluation of the local SAR gradient calculated by the Quadratic Shepard’s method. The algorithm will find the global maximum and all local maxima within -2 dB of the global maxima for all SAR distributions.

Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. Several measurements at different distances are necessary for the extrapolation. Extrapolation routines require at least 10 measurement points in 3-D space.

They are used in the Zoom Scan to obtain SAR values between the lowest measurement points and the inner phantom surface. The routine uses the modified Quadratic Shepard’s method for extrapolation.

A Z-axis scan measures the total SAR value at the x-and y-position of the maximum SAR value found during the cube scan. The probe is moved away in z-direction from the bottom of the SAM phantom in 5mm steps.

**Table 1: Area and Zoom Scan Resolutions per FCC KDB Publication 865664 D01v04**

|                                                                                                                                                                                                                                                                                                                         |                                           |                                                                                             | $\leq 3$ GHz                                                                                                                                                                                                                                                           | $> 3$ GHz                                                                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|---------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|
| Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface                                                                                                                                                                                                                  |                                           |                                                                                             | 5 mm $\pm$ 1 mm                                                                                                                                                                                                                                                        | $\frac{1}{2} \cdot \delta \cdot \ln(2)$ mm $\pm$ 0.5 mm                       |
| Maximum probe angle from probe axis to phantom surface normal at the measurement location                                                                                                                                                                                                                               |                                           |                                                                                             | $30^{\circ} \pm 1^{\circ}$                                                                                                                                                                                                                                             | $20^{\circ} \pm 1^{\circ}$                                                    |
| Maximum area scan spatial resolution: $\Delta x_{\text{Area}}$ , $\Delta y_{\text{Area}}$                                                                                                                                                                                                                               |                                           |                                                                                             | $\leq 2$ GHz: $\leq 15$ mm<br>2 – 3 GHz: $\leq 12$ mm                                                                                                                                                                                                                  | 3 – 4 GHz: $\leq 12$ mm<br>4 – 6 GHz: $\leq 10$ mm                            |
|                                                                                                                                                                                                                                                                                                                         |                                           |                                                                                             | When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be $\leq$ the corresponding x or y dimension of the test device with at least one measurement point on the test device. |                                                                               |
| Maximum zoom scan spatial resolution: $\Delta x_{\text{Zoom}}$ , $\Delta y_{\text{Zoom}}$                                                                                                                                                                                                                               |                                           |                                                                                             | $\leq 2$ GHz: $\leq 8$ mm<br>2 – 3 GHz: $\leq 5$ mm*                                                                                                                                                                                                                   | 3 – 4 GHz: $\leq 5$ mm*<br>4 – 6 GHz: $\leq 4$ mm*                            |
| Maximum zoom scan spatial resolution, normal to phantom surface                                                                                                                                                                                                                                                         | uniform grid: $\Delta z_{\text{Zoom}}(n)$ |                                                                                             | $\leq 5$ mm                                                                                                                                                                                                                                                            | 3 – 4 GHz: $\leq 4$ mm<br>4 – 5 GHz: $\leq 3$ mm<br>5 – 6 GHz: $\leq 2$ mm    |
|                                                                                                                                                                                                                                                                                                                         | graded grid                               | $\Delta z_{\text{Zoom}}(1)$ : between 1 <sup>st</sup> two points closest to phantom surface | $\leq 4$ mm                                                                                                                                                                                                                                                            | 3 – 4 GHz: $\leq 3$ mm<br>4 – 5 GHz: $\leq 2.5$ mm<br>5 – 6 GHz: $\leq 2$ mm  |
|                                                                                                                                                                                                                                                                                                                         |                                           | $\Delta z_{\text{Zoom}}(n>1)$ : between subsequent points                                   | $\leq 1.5 \cdot \Delta z_{\text{Zoom}}(n-1)$ mm                                                                                                                                                                                                                        |                                                                               |
| Minimum zoom scan volume                                                                                                                                                                                                                                                                                                | x, y, z                                   |                                                                                             | $\geq 30$ mm                                                                                                                                                                                                                                                           | 3 – 4 GHz: $\geq 28$ mm<br>4 – 5 GHz: $\geq 25$ mm<br>5 – 6 GHz: $\geq 22$ mm |
| Note: $\delta$ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see IEEE Std 1528-2013 for details.                                                                                                                                                                                   |                                           |                                                                                             |                                                                                                                                                                                                                                                                        |                                                                               |
| * When zoom scan is required and the <i>reported</i> SAR from the <i>area scan based 1-g SAR estimation</i> procedures of KDB Publication 447498 is $\leq 1.4$ W/kg, $\leq 8$ mm, $\leq 7$ mm and $\leq 5$ mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz. |                                           |                                                                                             |                                                                                                                                                                                                                                                                        |                                                                               |

## 7.2. 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),s 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 “.DA4”. 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

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

|                    |                          |                      |
|--------------------|--------------------------|----------------------|
| Probe parameters:  | Sensitivity:             | Normi, ai0, ai1, ai2 |
|                    | Conversion factor:       | ConvFi               |
|                    | Diode compression point: | Dcpi                 |
| Device parameters: | Frequency:               | f                    |
|                    | Crest factor:            | cf                   |
| Media parameters:  | Conductivity:            | 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:

$$V_i = U_i + U_i^2 \cdot \frac{cf}{dcp_i}$$

|                    |                                                 |
|--------------------|-------------------------------------------------|
| Vi:                | compensated signal of channel ( i = x, y, z )   |
| Ui:                | input signal of channel ( i = x, y, z )         |
| cf:                | crest factor of exciting field (DASY parameter) |
| dcp <sub>i</sub> : | diode compression point (DASY parameter)        |

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

$$E - \text{fieldprobes} : \quad E_i = \sqrt{\frac{V_i}{Norm_i \cdot ConvF}}$$

$$H - \text{fieldprobes} : \quad H_i = \sqrt{V_i} \cdot \frac{a_{i0} + a_{i1}f + a_{i2}f^2}{f}$$

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

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

$$E_{tot} = \sqrt{E_x^2 + E_y^2 + E_z^2}$$

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

$$SAR = E_{tot}^2 \cdot \frac{\sigma}{\rho \cdot 1'000}$$

SAR: local specific absorption rate in mW/g  
Etot: total field strength in V/m  
 $\sigma$ : conductivity in [mho/m] or [Siemens/m]  
 $\rho$ : equivalent tissue density in g/cm<sup>3</sup>

Note that the density is normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid.

## 8. Position of the wireless device in relation to the phantom

### 8.1. Generic device

The SAR evaluation shall be performed for all surfaces of the DUT that are accessible during intended use, as indicated in Figure 4. The separation distance in testing shall correspond to the intended use distance as specified in the user instructions provided by the manufacturer.

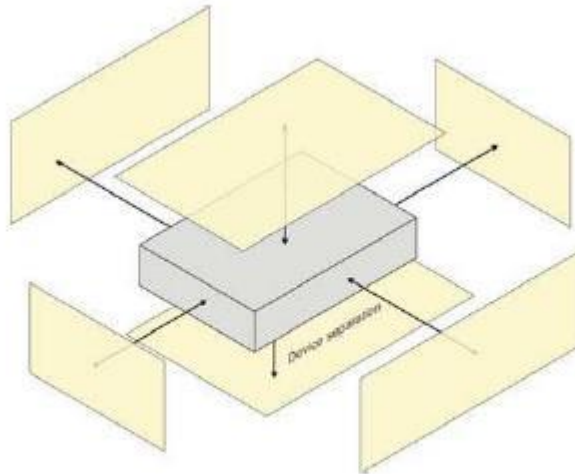


**Figure 4 – Test positions for a generic device**

## 9. System Check

### 9.1. Tissue Dielectric Parameters

It's satisfying the latest tissue dielectric parameters requirements proposed by the KDB865664.

| Tissue dielectric parameters for body phantoms |              |                      |
|------------------------------------------------|--------------|----------------------|
| Target Frequency                               | Body         |                      |
| (MHz)                                          | $\epsilon_r$ | $\sigma(\text{s/m})$ |
| 2450                                           | 52.7         | 1.95                 |

#### Check Result:

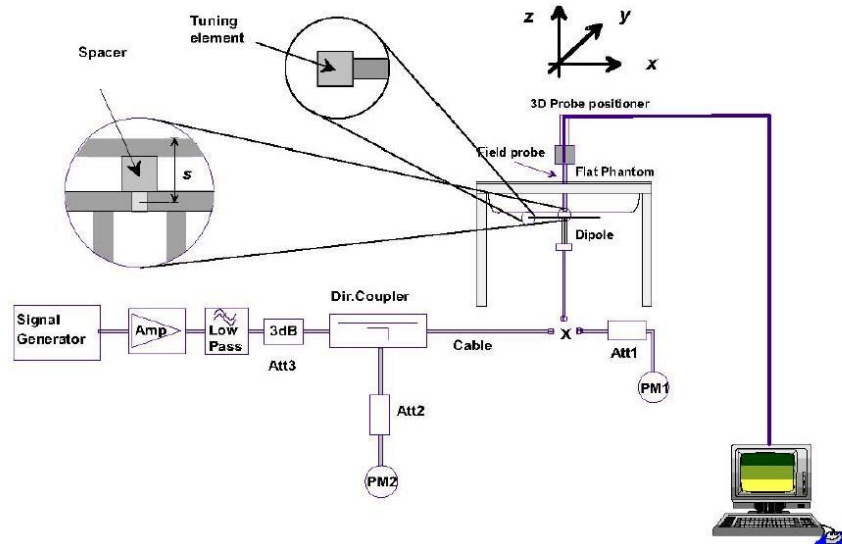
| Dielectric performance of Body tissue simulating liquid |              |          |                      |          |                           |                       |            |                                |            |
|---------------------------------------------------------|--------------|----------|----------------------|----------|---------------------------|-----------------------|------------|--------------------------------|------------|
| Frequency<br>(MHz)                                      | $\epsilon_r$ |          | $\sigma(\text{s/m})$ |          | Delta<br>( $\epsilon_r$ ) | Delta<br>( $\sigma$ ) | Limit      | Temp<br>( $^{\circ}\text{C}$ ) | Date       |
|                                                         | Target       | Measured | Target               | Measured |                           |                       |            |                                |            |
| 2450                                                    | 52.70        | 53.03    | 1.95                 | 2.00     | 0.63%                     | 2.56%                 | $\pm 10\%$ | 22                             | 2018-06-03 |

## 9.2. SAR System Check

The purpose of the system check is to verify that the system operates within its specifications at the device test frequency. The system check is a simple check of repeatability to make sure that the system works correctly at the time of the compliance test;

System check results have to be equal or near the values determined during dipole calibration with the relevant liquids and test system ( $\pm 10\%$ ).

System check is performed regularly on all frequency bands where tests are performed with the DASY5 system.



The output power on dipole port must be calibrated to 24 dBm (250mW) before dipole is connected.

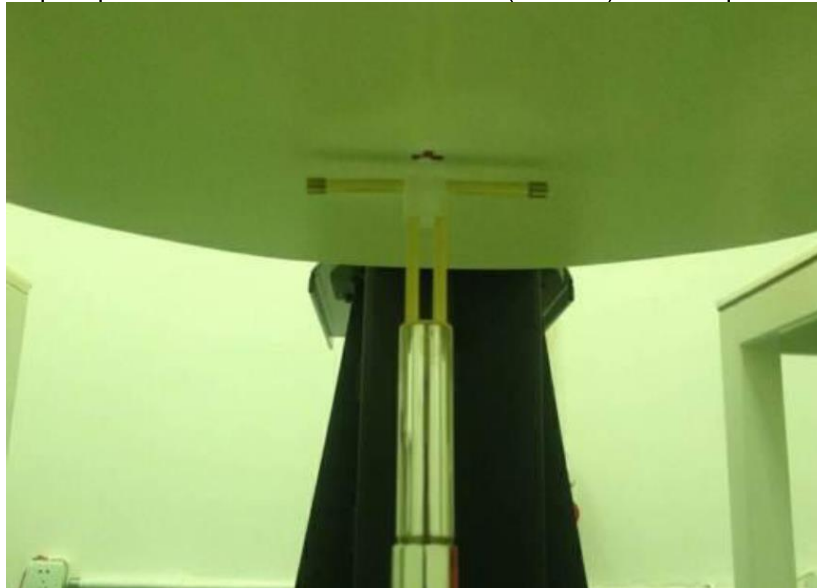


Photo of Dipole Setup

**Check Result:**

| Body               |        |          |         |          |               |                |       |              |            |
|--------------------|--------|----------|---------|----------|---------------|----------------|-------|--------------|------------|
| Frequency<br>(MHz) | 1g SAR |          | 10g SAR |          | Delta<br>(1g) | Delta<br>(10g) | Limit | Temp<br>(°C) | Date       |
|                    | Target | Measured | Target  | Measured |               |                |       |              |            |
| 2450               | 49.40  | 50.00    | 23.30   | 23.32    | 1.21%         | 0.09%          | ±10%  | 22           | 2018-06-03 |

*Note:*

1. the graph results see follow.

**SystemPerformanceCheck-Body 2450MHz****DUT: D2450V2; Type: D2450V2; Serial: 1009**

Date:2018-06-03

Communication System: UID 0, CW (0); Frequency: 2450 MHz

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 2.001$  S/m;  $\epsilon_r = 53.03$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

**DASY5 Configuration:**

- Probe: EX3DV4 - SN7494; ConvF(8.08, 8.08, 8.08); Calibrated: 2/26/2018;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection),  $z = 1.0, 31.0$
- Electronics: DAE4 Sn1549; Calibrated: 4/25/2018
- Phantom: ELI V8.0 ; Type: QD OVA 004 AA ; Serial: 2078
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

**Body/d=10mm,Pin=250mW/Area Scan (41x61x1):** Interpolated grid:  $dx=1.200$  mm,  $dy=1.200$  mm

Maximum value of SAR (interpolated) = 21.1 W/kg

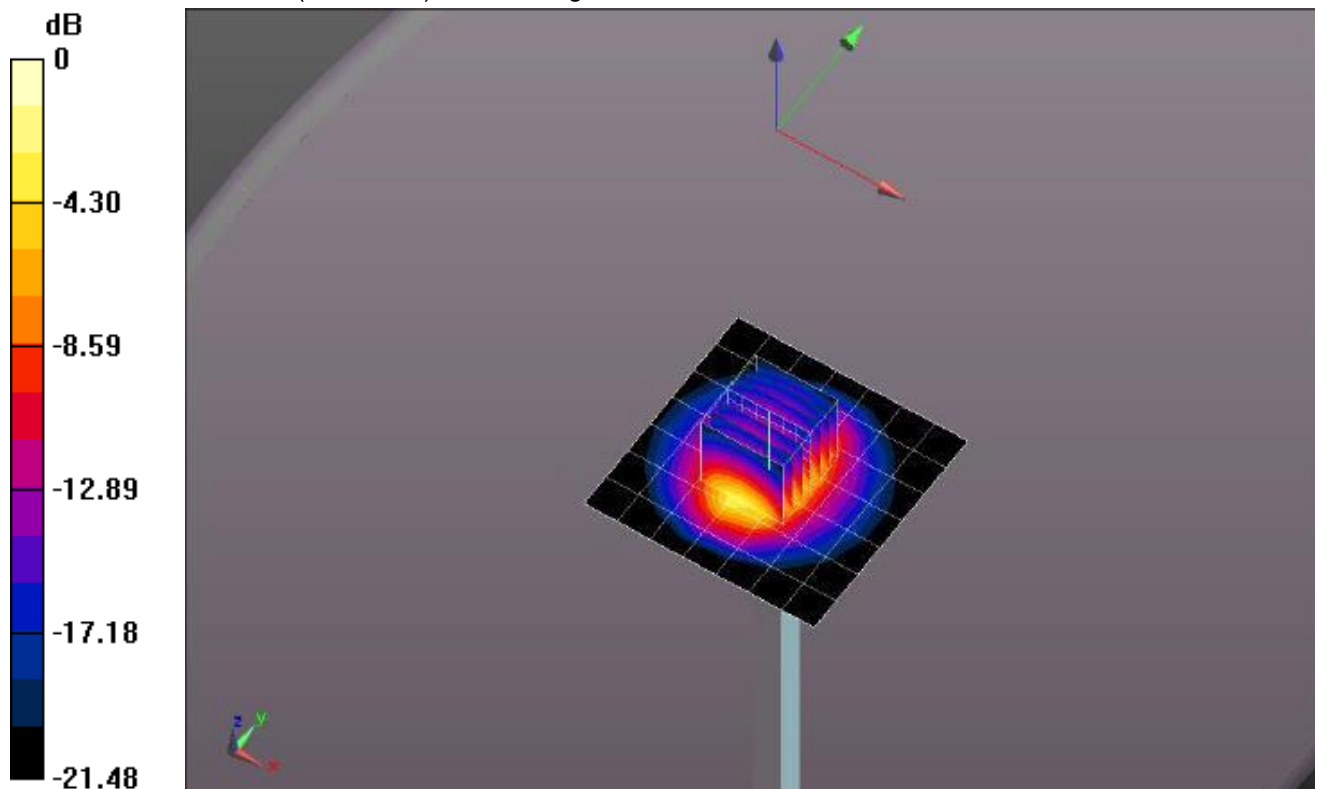
**Body/d=10mm,Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 105.6 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 25.7 W/kg

**SAR(1 g) = 12.5 W/kg; SAR(10 g) = 5.83 W/kg**

Maximum value of SAR (measured) = 20.7 W/kg



0 dB = 20.7 W/kg = 13.16 dBW/kg

## 10. SAR Exposure Limits

SAR assessments have been made in line with the requirements of ANSI/IEEE C95.1-1992

| Type Exposure                                           | Limit (W/kg)                                              |                                                   |
|---------------------------------------------------------|-----------------------------------------------------------|---------------------------------------------------|
|                                                         | General Population /<br>Uncontrolled Exposure Environment | Occupational /<br>Controlled Exposure Environment |
| Spatial Average SAR<br>(whole body)                     | 0.08                                                      | 0.4                                               |
| Spatial Peak SAR<br>(1g cube tissue for head and trunk) | 1.60                                                      | 8.0                                               |
| Spatial Peak SAR<br>(10g for limb)                      | 4.0                                                       | 20.0                                              |

Population/Uncontrolled Environments: are defined as locations where there is the exposure of individual who have no knowledge or control of their exposure.

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

## 11. Conducted Power Measurement Results

### WLAN Conducted Power

For 2.4GHz WLAN SAR testing, highest average RF output power channel for the lowest data rate for 802.11b were for SAR evaluation. 802.11g/n were not investigated since the average putput powers over all channels and data rates were not more than 0.25dB higher than the tested channel in the lowest data rate of 802.11b mode.

| WIFI          |         |                 |                               |           |
|---------------|---------|-----------------|-------------------------------|-----------|
| Mode          | Channel | Frequency (MHz) | Conducted Average Power (dBm) | Data rate |
| 802.11b       | 01      | 2412            | 17.24                         | 1 Mbps    |
|               | 06      | 2437            | 17.02                         | 1 Mbps    |
|               | 11      | 2462            | 16.83                         | 1 Mbps    |
| 802.11g       | 01      | 2412            | 16.21                         | 6 Mbps    |
|               | 06      | 2437            | 16.57                         | 6 Mbps    |
|               | 11      | 2462            | 15.66                         | 6 Mbps    |
| 802.11n(HT20) | 01      | 2412            | 15.48                         | 6.5 Mbps  |
|               | 06      | 2437            | 16.32                         | 6.5 Mbps  |
|               | 11      | 2462            | 15.31                         | 6.5 Mbps  |

**Note:**

The output power was test all data rate and recorded worst case at recorded data rate.

Per KDB 447498 D01, the 1-g and 10-g SAR test exclusion thresholds for 100MHz to 6GHz at test separation distances  $\leq 50\text{mm}$  are determined by:

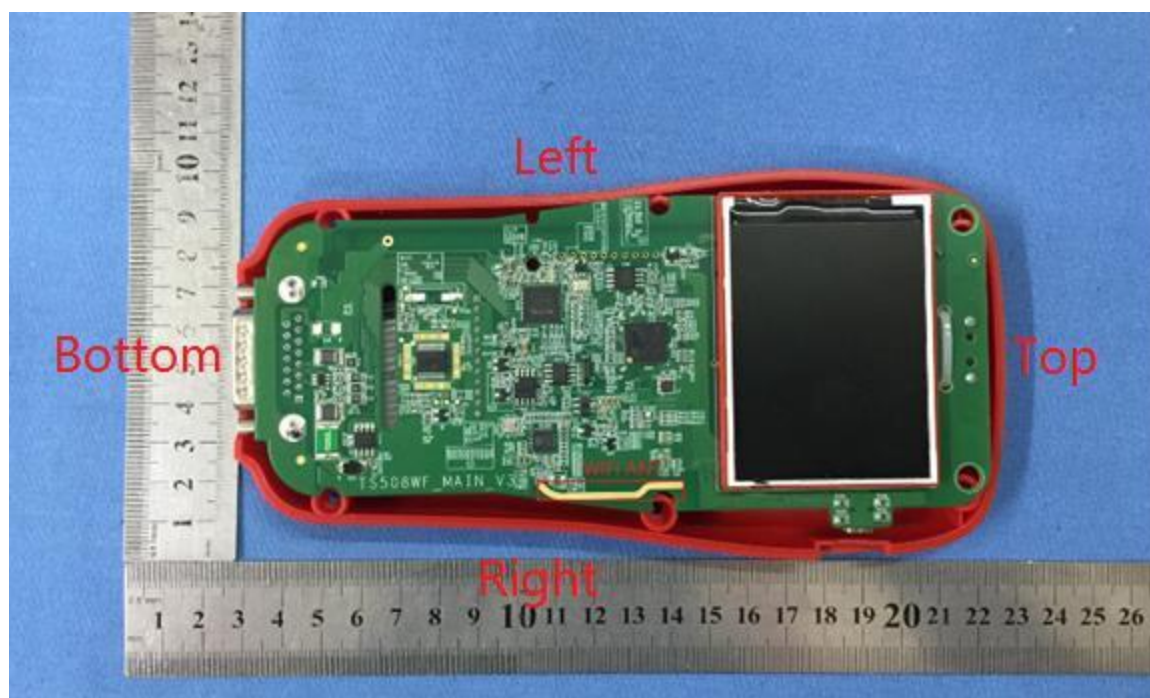
$$[(\text{max. Power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] * [\sqrt{f}(\text{GHz})] \leq 3.0 \text{ for 1-g SAR}$$

Per KDB 447498 D01, when the minimum test separation distance is  $< 5\text{mm}$ , a distance of 5mm is applied to determine SAR test exclusion.

**12. Maximum Tune-up Limit**

| <b>WLAN</b>   |                                              |
|---------------|----------------------------------------------|
| Mode          | Maximum Tune-up (dBm)<br>Burst Average Power |
| 802.11b       | 17.50                                        |
| 802.11g       | 17.00                                        |
| 802.11n(HT20) | 16.50                                        |

### 13. Antenna Location



| Positions for SAR tests |      |       |          |             |            |           |
|-------------------------|------|-------|----------|-------------|------------|-----------|
| Antenna                 | Back | Front | Top side | Bottom side | Right side | Left side |
| WIFI                    | Yes  | Yes   | Yes      | Yes         | Yes        | Yes       |

## 14. SAR Measurement Results

| WLAN             |               |           |      |                       |                     |                        |                 |                         |                       |           |
|------------------|---------------|-----------|------|-----------------------|---------------------|------------------------|-----------------|-------------------------|-----------------------|-----------|
| Mode             | Test Position | Frequency |      | Conducted Power (dBm) | Tune up limit (dBm) | Tune up scaling factor | Power Drift(dB) | Measured SAR(1g) (W/kg) | Report SAR(1g) (W/kg) | Test Plot |
|                  |               | CH        | MHz  |                       |                     |                        |                 |                         |                       |           |
| 802.11b<br>1Mbps | Front         | 1         | 2412 | 17.24                 | 17.50               | 1.06                   | -               | -                       | -                     | -         |
|                  |               | 6         | 2437 | 17.02                 | 17.50               | 1.12                   | 0.13            | 0.0180                  | 0.020                 | -         |
|                  |               | 11        | 2462 | 16.83                 | 17.50               | 1.17                   | -               | -                       | -                     | -         |
|                  | Back          | 1         | 2412 | 17.24                 | 17.50               | 1.06                   | -               | -                       | -                     | -         |
|                  |               | 6         | 2437 | 17.02                 | 17.50               | 1.12                   | 0.20            | 0.0017                  | 0.002                 | -         |
|                  |               | 11        | 2462 | 16.83                 | 17.50               | 1.17                   | -               | -                       | -                     | -         |
|                  | Left          | 1         | 2412 | 17.24                 | 17.50               | 1.06                   | -               | -                       | -                     | -         |
|                  |               | 6         | 2437 | 17.02                 | 17.50               | 1.12                   | 0.15            | 0.0012                  | 0.001                 | -         |
|                  |               | 11        | 2462 | 16.83                 | 17.50               | 1.17                   | -               | -                       | -                     | -         |
|                  | Right         | 1         | 2412 | 17.24                 | 17.50               | 1.06                   | -               | -                       | -                     | -         |
|                  |               | 6         | 2437 | 17.02                 | 17.50               | 1.12                   | -0.19           | 0.0210                  | 0.024                 | B1        |
|                  |               | 11        | 2462 | 16.83                 | 17.50               | 1.17                   | -               | -                       | -                     | -         |
|                  | Top           | 1         | 2412 | 17.24                 | 17.50               | 1.06                   | -               | -                       | -                     | -         |
|                  |               | 6         | 2437 | 17.02                 | 17.50               | 1.12                   | 0               | 0                       | 0                     | -         |
|                  |               | 11        | 2462 | 16.83                 | 17.50               | 1.17                   | -               | -                       | -                     | -         |
|                  | Bottom        | 1         | 2412 | 17.24                 | 17.50               | 1.06                   | -               | -                       | -                     | -         |
|                  |               | 6         | 2437 | 17.02                 | 17.50               | 1.12                   | 0               | 0                       | 0                     | -         |
|                  |               | 11        | 2462 | 16.83                 | 17.50               | 1.17                   | -               | -                       | -                     | -         |

Note:

- According to the above table, the initial test position for body is "Front", and its reported SAR is  $\leq 0.4\text{W/kg}$ . Thus further SAR measurement is not required for the other (remaining) test positions. Because the reported SAR of the highest measured maximum output power channel for the exposure configuration is  $\leq 0.8\text{W/kg}$ , no further SAR testing is required for 802.11b DSSS in that exposure configuration.

| WLAN- Scaled Reported SAR |               |           |      |                    |                     |                         |                                |
|---------------------------|---------------|-----------|------|--------------------|---------------------|-------------------------|--------------------------------|
| Mode                      | Test Position | Frequency |      | Actual duty factor | maximum duty factor | Reported SAR (1g)(W/kg) | Scaled reported SAR (1g)(W/kg) |
|                           |               | CH        | MHz  |                    |                     |                         |                                |
| 802.11b<br>1Mbps          | Front         | 6         | 2437 | 98.23%             | 100%                | 0.020                   | 0.020                          |
|                           | Back          | 6         | 2437 | 98.23%             | 100%                | 0.002                   | 0.002                          |
|                           | Left          | 6         | 2437 | 98.23%             | 100%                | 0.001                   | 0.001                          |
|                           | Right         | 6         | 2437 | 98.23%             | 100%                | 0.024                   | 0.024                          |
|                           | Top           | 6         | 2437 | 98.23%             | 100%                | 0                       | 0                              |
|                           | Bottom        | 6         | 2437 | 98.23%             | 100%                | 0                       | 0                              |

Note:

- According to the KDB248227 D01, The reported SAR must be scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit. A maximum transmission duty factor of 98.23% is achievable for WLAN in this project.

Test mode: WLAN 802.11b

Test Position: Right Side

Test Plot: B1

Date: 2018-06-03

Communication System: UID 0, Generic WIFI (0); Frequency: 2437 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 2437$  MHz;  $\sigma = 1.991$  S/m;  $\epsilon_r = 53.023$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

**DASY5 Configuration:**

- Probe: EX3DV4 - SN7494; ConvF(8.08, 8.08, 8.08) @ 2437 MHz; Calibrated: 2/26/2018
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1549; Calibrated: 4/25/2018
- Phantom: ELI V8.0 ; Type: QD OVA 004 AA ; Serial: 2078
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Right/Procedure/Area Scan (51x101x1):** Interpolated grid:  $dx=1.200$  mm,  $dy=1.200$  mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (interpolated) = 0.0307 W/kg

**Right/Procedure/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

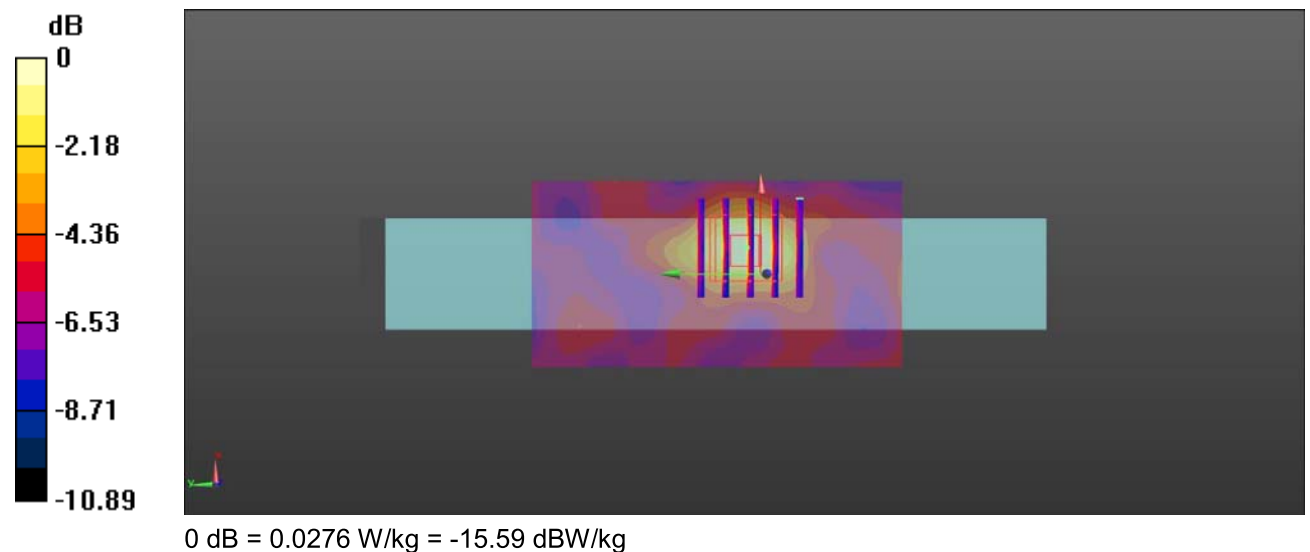
Reference Value = 2.749 V/m; Power Drift = -0.19 dB

Peak SAR (extrapolated) = 0.0340 W/kg

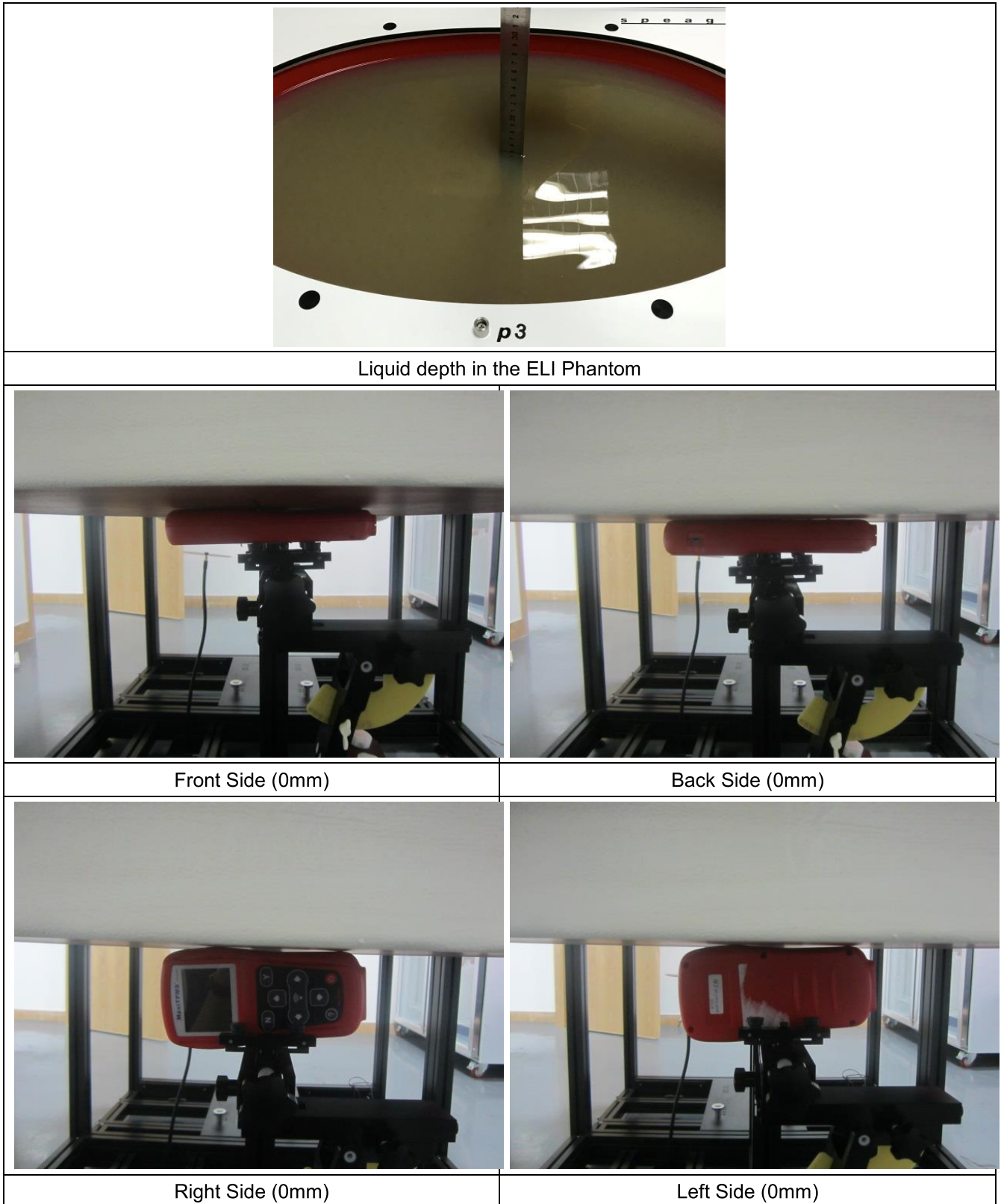
**SAR(1 g) = 0.021 W/kg; SAR(10 g) = 0.010 W/kg**

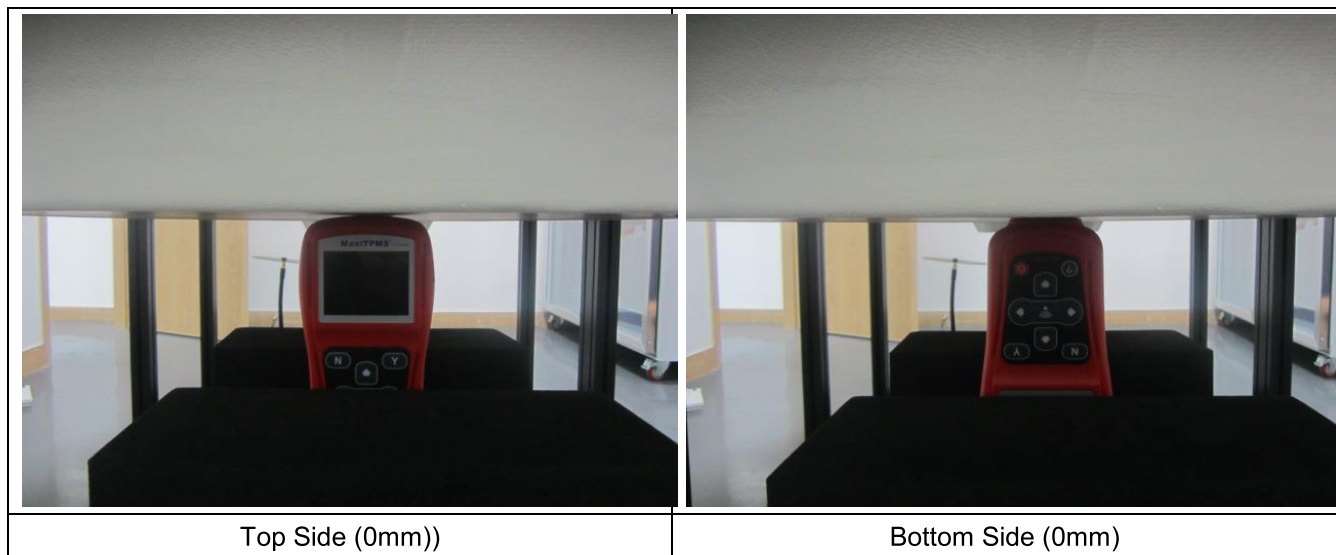
Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.0276 W/kg



## 15. Test Setup Photos





-----End of Report-----

## 1.1. DAE4 Calibration Certificate

**Calibration Laboratory of**  
**Schmid & Partner**  
**Engineering AG**  
Zeughausstrasse 43, 8004 Zurich, Switzerland



**S** Schweizerischer Kalibrierdienst  
**C** Service suisse d'étalonnage  
**S** Servizio svizzero di taratura  
**S** Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signatories to the EA  
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **CCIC - HTW (Auden)**

Certificate No: **DAE4-1549\_Apr18**

**CALIBRATION CERTIFICATE**

Object **DAE4 - SD 000 D04 BN - SN: 1549**

Calibration procedure(s) **QA CAL-06.v29**  
**Calibration procedure for the data acquisition electronics (DAE)**

Calibration date: **April 25, 2018**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).  
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature  $(22 \pm 3)^{\circ}\text{C}$  and humidity  $< 70\%$ .

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards                                | ID #               | Cal Date (Certificate No.) | Scheduled Calibration  |
|--------------------------------------------------|--------------------|----------------------------|------------------------|
| Keithley Multimeter Type 2001                    | SN: 0810278        | 31-Aug-17 (No:21092)       | Aug-18                 |
| Secondary Standards                              | ID #               | Check Date (in house)      | Scheduled Check        |
| Auto DAE Calibration Unit<br>Calibrator Box V2.1 | SE UWS 053 AA 1001 | 04-Jan-18 (in house check) | In house check: Jan-19 |
|                                                  | SE UMS 006 AA 1002 | 04-Jan-18 (in house check) | In house check: Jan-19 |

|                |                       |                                   |               |
|----------------|-----------------------|-----------------------------------|---------------|
| Calibrated by: | Name<br>Eric Hainfeld | Function<br>Laboratory Technician | Signature<br> |
| Approved by:   | Sven Kühn             | Deputy Manager                    |               |

Issued: April 25, 2018

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Zeughausstrasse 43, 8004 Zurich, Switzerland



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

### Glossary

DAE data acquisition electronics  
Connector angle information used in DASY system to align probe sensor X to the robot coordinate system.

### Methods Applied and Interpretation of Parameters

- *DC Voltage Measurement:* Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- *Connector angle:* The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.
  - *DC Voltage Measurement Linearity:* Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
  - *Common mode sensitivity:* Influence of a positive or negative common mode voltage on the differential measurement.
  - *Channel separation:* Influence of a voltage on the neighbor channels not subject to an input voltage.
  - *AD Converter Values with inputs shorted:* Values on the internal AD converter corresponding to zero input voltage
  - *Input Offset Measurement:* Output voltage and statistical results over a large number of zero voltage measurements.
  - *Input Offset Current:* Typical value for information; Maximum channel input offset current, not considering the input resistance.
  - *Input resistance:* Typical value for information: DAE input resistance at the connector, during internal auto-zeroing and during measurement.
  - *Low Battery Alarm Voltage:* Typical value for information. Below this voltage, a battery alarm signal is generated.
  - *Power consumption:* Typical value for information. Supply currents in various operating modes.

**DC Voltage Measurement**

A/D - Converter Resolution nominal

High Range: 1LSB = 6.1 $\mu$ V, full range = -100...+300 mV  
Low Range: 1LSB = 61nV, full range = -1.....+3mV

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

| Calibration Factors | X                         | Y                         | Z                         |
|---------------------|---------------------------|---------------------------|---------------------------|
| High Range          | 406.286 $\pm$ 0.02% (k=2) | 405.992 $\pm$ 0.02% (k=2) | 406.121 $\pm$ 0.02% (k=2) |
| Low Range           | 3.98481 $\pm$ 1.50% (k=2) | 3.99129 $\pm$ 1.50% (k=2) | 3.99380 $\pm$ 1.50% (k=2) |

**Connector Angle**

|                                           |                  |
|-------------------------------------------|------------------|
| Connector Angle to be used in DASY system | 19.5 ° $\pm$ 1 ° |
|-------------------------------------------|------------------|

## Appendix (Additional assessments outside the scope of SCS0108)

### 1. DC Voltage Linearity

| High Range        | Reading ( $\mu\text{V}$ ) | Difference ( $\mu\text{V}$ ) | Error (%) |
|-------------------|---------------------------|------------------------------|-----------|
| Channel X + Input | 200032.88                 | -6.49                        | -0.00     |
| Channel X + Input | 20007.86                  | 2.59                         | 0.01      |
| Channel X - Input | -19999.45                 | 5.51                         | -0.03     |
| Channel Y + Input | 200041.48                 | 8.18                         | 0.00      |
| Channel Y + Input | 20005.02                  | -0.19                        | -0.00     |
| Channel Y - Input | -20006.61                 | -1.53                        | 0.01      |
| Channel Z + Input | 200032.37                 | -0.87                        | -0.00     |
| Channel Z + Input | 20003.95                  | -1.15                        | -0.01     |
| Channel Z - Input | -20006.60                 | -1.44                        | 0.01      |

| Low Range         | Reading ( $\mu\text{V}$ ) | Difference ( $\mu\text{V}$ ) | Error (%) |
|-------------------|---------------------------|------------------------------|-----------|
| Channel X + Input | 2001.67                   | 0.37                         | 0.02      |
| Channel X + Input | 201.82                    | 0.29                         | 0.15      |
| Channel X - Input | -198.25                   | 0.31                         | -0.16     |
| Channel Y + Input | 2001.35                   | 0.05                         | 0.00      |
| Channel Y + Input | 200.82                    | -0.59                        | -0.29     |
| Channel Y - Input | -199.06                   | -0.48                        | 0.24      |
| Channel Z + Input | 2000.94                   | -0.41                        | -0.02     |
| Channel Z + Input | 200.84                    | -0.55                        | -0.27     |
| Channel Z - Input | -199.79                   | -1.17                        | 0.59      |

### 2. Common mode sensitivity

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

|           | Common mode Input Voltage (mV) | High Range Average Reading ( $\mu\text{V}$ ) | Low Range Average Reading ( $\mu\text{V}$ ) |
|-----------|--------------------------------|----------------------------------------------|---------------------------------------------|
| Channel X | 200                            | -15.83                                       | -18.16                                      |
|           | - 200                          | 21.36                                        | 19.06                                       |
| Channel Y | 200                            | 20.98                                        | 20.64                                       |
|           | - 200                          | -22.25                                       | -22.23                                      |
| Channel Z | 200                            | 5.37                                         | 5.05                                        |
|           | - 200                          | -7.46                                        | -7.54                                       |

### 3. Channel separation

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

|           | Input Voltage (mV) | Channel X ( $\mu\text{V}$ ) | Channel Y ( $\mu\text{V}$ ) | Channel Z ( $\mu\text{V}$ ) |
|-----------|--------------------|-----------------------------|-----------------------------|-----------------------------|
| Channel X | 200                | -                           | -1.66                       | -2.66                       |
| Channel Y | 200                | 5.97                        | -                           | -0.75                       |
| Channel Z | 200                | 9.87                        | 3.19                        | -                           |

**4. AD-Converter Values with inputs shorted**

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

|           | High Range (LSB) | Low Range (LSB) |
|-----------|------------------|-----------------|
| Channel X | 16424            | 16943           |
| Channel Y | 15770            | 17113           |
| Channel Z | 15616            | 15207           |

**5. Input Offset Measurement**DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec  
Input 10M $\Omega$ 

|           | Average ( $\mu$ V) | min. Offset ( $\mu$ V) | max. Offset ( $\mu$ V) | Std. Deviation ( $\mu$ V) |
|-----------|--------------------|------------------------|------------------------|---------------------------|
| Channel X | -0.33              | -1.57                  | 0.89                   | 0.48                      |
| Channel Y | 0.13               | -0.93                  | 1.54                   | 0.52                      |
| Channel Z | -0.98              | -2.13                  | 0.50                   | 0.47                      |

**6. Input Offset Current**

Nominal Input circuitry offset current on all channels: &lt;25fA

**7. Input Resistance** (Typical values for information)

|           | Zeroing (k $\Omega$ m) | Measuring (M $\Omega$ m) |
|-----------|------------------------|--------------------------|
| Channel X | 200                    | 200                      |
| Channel Y | 200                    | 200                      |
| Channel Z | 200                    | 200                      |

**8. Low Battery Alarm Voltage** (Typical values for information)

| Typical values | Alarm Level (VDC) |
|----------------|-------------------|
| Supply (+ Vcc) | +7.9              |
| Supply (- Vcc) | -7.6              |

**9. Power Consumption** (Typical values for information)

| Typical values | Switched off (mA) | Stand by (mA) | Transmitting (mA) |
|----------------|-------------------|---------------|-------------------|
| Supply (+ Vcc) | +0.01             | +6            | +14               |
| Supply (- Vcc) | -0.01             | -8            | -9                |

## 1.2. Probe Calibration Certificate

**Calibration Laboratory of**  
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Client **CCIC-HTW (Auden)**

Certificate No: **EX3-7494\_Feb18**

## CALIBRATION CERTIFICATE

Object **EX3DV4 - SN:7494**

Calibration procedure(s) **QA CAL-01.v9, QA CAL-12.v9, QA CAL-14.v4, QA CAL-23.v5,  
 QA CAL-25.v6  
 Calibration procedure for dosimetric E-field probes**

Calibration date: **February 26, 2018**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).  
 The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature ( $22 \pm 3$ )°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards          | ID               | Cal Date (Certificate No.)        | Scheduled Calibration  |
|----------------------------|------------------|-----------------------------------|------------------------|
| Power meter NRP            | SN: 104778       | 04-Apr-17 (No. 217-02521/02522)   | Apr-18                 |
| Power sensor NRP-Z91       | SN: 103244       | 04-Apr-17 (No. 217-02521)         | Apr-18                 |
| Power sensor NRP-Z91       | SN: 103245       | 04-Apr-17 (No. 217-02525)         | Apr-18                 |
| Reference 20 dB Attenuator | SN: S5277 (20x)  | 07-Apr-17 (No. 217-02528)         | Apr-18                 |
| Reference Probe ES3DV2     | SN: 3013         | 30-Dec-17 (No. ES3-3013_Dec17)    | Dec-18                 |
| DAE4                       | SN: 660          | 21-Dec-17 (No. DAE4-660_Dec17)    | Dec-18                 |
| Secondary Standards        | ID               | Check Date (in house)             | Scheduled Check        |
| Power meter E4419B         | SN: GB41293874   | 06-Apr-16 (in house check Jun-16) | In house check: Jun-18 |
| Power sensor E4412A        | SN: MY41498087   | 06-Apr-16 (in house check Jun-16) | In house check: Jun-18 |
| Power sensor E4412A        | SN: 000110210    | 06-Apr-16 (in house check Jun-16) | In house check: Jun-18 |
| RF generator HP 8648C      | SN: US3642U01700 | 04-Aug-99 (in house check Jun-16) | In house check: Jun-18 |
| Network Analyzer HP 8753E  | SN: US37390585   | 18-Oct-01 (in house check Oct-17) | In house check: Oct-18 |

|                | Name           | Function              | Signature                 |
|----------------|----------------|-----------------------|---------------------------|
| Calibrated by: | Jeton Kastrati | Laboratory Technician |                           |
| Approved by:   | Katja Pokovic  | Technical Manager     |                           |
|                |                |                       | Issued: February 27, 2018 |

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Certificate No: EX3-7494\_Feb18

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Accreditation No.: **SCS 0108**

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#### Glossary:

|                          |                                                                                                                                                         |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| TSL                      | tissue simulating liquid                                                                                                                                |
| NORM <sub>x,y,z</sub>    | sensitivity in free space                                                                                                                               |
| ConvF                    | sensitivity in TSL / NORM <sub>x,y,z</sub>                                                                                                              |
| DCP                      | diode compression point                                                                                                                                 |
| CF                       | crest factor (1/duty_cycle) of the RF signal                                                                                                            |
| A, B, C, D               | modulation dependent linearization parameters                                                                                                           |
| Polarization $\varphi$   | $\varphi$ rotation around probe axis                                                                                                                    |
| Polarization $\vartheta$ | $\vartheta$ rotation around an axis that is in the plane normal to probe axis (at measurement center),<br>i.e., $\vartheta = 0$ is normal to probe axis |
| Connector Angle          | information used in DASY system to align probe sensor X to the robot coordinate system                                                                  |

#### Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

#### Methods Applied and Interpretation of Parameters:

- NORM<sub>x,y,z</sub>**: Assessed for E-field polarization  $\vartheta = 0$  ( $f \leq 900$  MHz in TEM-cell;  $f > 1800$  MHz: R22 waveguide). NORM<sub>x,y,z</sub> are only intermediate values, i.e., the uncertainties of NORM<sub>x,y,z</sub> does not affect the  $E^2$ -field uncertainty inside TSL (see below ConvF).
- NORM(f)<sub>x,y,z</sub> = NORM<sub>x,y,z</sub> \* frequency\_response** (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- DCP<sub>x,y,z</sub>**: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR**: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- A<sub>x,y,z</sub>; B<sub>x,y,z</sub>; C<sub>x,y,z</sub>; D<sub>x,y,z</sub>; VR<sub>x,y,z</sub>**: A, B, C, D are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for  $f \leq 800$  MHz) and inside waveguide using analytical field distributions based on power measurements for  $f > 800$  MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM<sub>x,y,z</sub> \* ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from  $\pm 50$  MHz to  $\pm 100$  MHz.
- Spherical isotropy (3D deviation from isotropy)**: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- Connector Angle**: The angle is assessed using the information gained by determining the NORM<sub>x</sub> (no uncertainty required).

EX3DV4 – SN:7494

February 26, 2018

# Probe EX3DV4

## SN:7494

Manufactured: March 20, 2017  
Calibrated: February 26, 2018

Calibrated for DASY/EASY Systems  
(Note: non-compatible with DASY2 system!)

EX3DV4- SN:7494

February 26, 2018

**DASY/EASY - Parameters of Probe: EX3DV4 - SN:7494****Basic Calibration Parameters**

|                                                           | Sensor X | Sensor Y | Sensor Z | Unc (k=2)     |
|-----------------------------------------------------------|----------|----------|----------|---------------|
| Norm ( $\mu\text{V}/(\text{V}/\text{m})^2$ ) <sup>A</sup> | 0.40     | 0.46     | 0.38     | $\pm 10.1 \%$ |
| DCP (mV) <sup>B</sup>                                     | 96.1     | 100.9    | 97.7     |               |

**Modulation Calibration Parameters**

| UID | Communication System Name |   | A<br>dB | B<br>dB $\sqrt{\mu\text{V}}$ | C   | D<br>dB | VR<br>mV | Unc <sup>E</sup><br>(k=2) |
|-----|---------------------------|---|---------|------------------------------|-----|---------|----------|---------------------------|
| 0   | CW                        | X | 0.0     | 0.0                          | 1.0 | 0.00    | 139.9    | $\pm 3.0 \%$              |
|     |                           | Y | 0.0     | 0.0                          | 1.0 |         | 130.5    |                           |
|     |                           | Z | 0.0     | 0.0                          | 1.0 |         | 141.2    |                           |

Note: For details on UID parameters see Appendix.

**Sensor Model Parameters**

|   | C1<br>fF | C2<br>fF | $\alpha$<br>$\text{V}^{-1}$ | T1<br>$\text{ms}\cdot\text{V}^{-2}$ | T2<br>$\text{ms}\cdot\text{V}^{-1}$ | T3<br>ms | T4<br>$\text{V}^{-2}$ | T5<br>$\text{V}^{-1}$ | T6    |
|---|----------|----------|-----------------------------|-------------------------------------|-------------------------------------|----------|-----------------------|-----------------------|-------|
| X | 35.16    | 262.6    | 35.64                       | 5.712                               | 0.042                               | 5.019    | 0.180                 | 0.312                 | 1.002 |
| Y | 33.86    | 260.4    | 37.41                       | 4.029                               | 0.204                               | 5.030    | 0.324                 | 0.359                 | 1.006 |
| Z | 29.60    | 221.1    | 35.61                       | 5.101                               | 0.000                               | 5.027    | 0.562                 | 0.186                 | 1.003 |

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k=2$ , which for a normal distribution corresponds to a coverage probability of approximately 95%.

<sup>A</sup> The uncertainties of Norm X,Y,Z do not affect the  $E^2$ -field uncertainty inside TSL (see Pages 5 and 6).<sup>B</sup> Numerical linearization parameter; uncertainty not required.<sup>E</sup> Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

EX3DV4- SN:7494

February 26, 2018

**DASY/EASY - Parameters of Probe: EX3DV4 - SN:7494****Calibration Parameter Determined in Head Tissue Simulating Media**

| f (MHz) <sup>C</sup> | Relative Permittivity <sup>F</sup> | Conductivity (S/m) <sup>F</sup> | ConvF X | ConvF Y | ConvF Z | Alpha <sup>G</sup> | Depth <sup>D</sup> (mm) | Unc (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|--------------------|-------------------------|-----------|
| 150                  | 52.3                               | 0.76                            | 13.63   | 13.63   | 13.63   | 0.00               | 1.00                    | ± 13.3 %  |
| 450                  | 43.5                               | 0.87                            | 11.70   | 11.70   | 11.70   | 0.14               | 1.25                    | ± 13.3 %  |
| 750                  | 41.9                               | 0.89                            | 11.02   | 11.02   | 11.02   | 0.43               | 0.86                    | ± 12.0 %  |
| 835                  | 41.5                               | 0.90                            | 10.73   | 10.73   | 10.73   | 0.44               | 0.82                    | ± 12.0 %  |
| 1750                 | 40.1                               | 1.37                            | 9.23    | 9.23    | 9.23    | 0.30               | 0.96                    | ± 12.0 %  |
| 1900                 | 40.0                               | 1.40                            | 8.83    | 8.83    | 8.83    | 0.36               | 0.84                    | ± 12.0 %  |
| 2450                 | 39.2                               | 1.80                            | 8.27    | 8.27    | 8.27    | 0.32               | 0.85                    | ± 12.0 %  |
| 2600                 | 39.0                               | 1.96                            | 7.92    | 7.92    | 7.92    | 0.35               | 0.84                    | ± 12.0 %  |
| 5200                 | 36.0                               | 4.66                            | 5.63    | 5.63    | 5.63    | 0.35               | 1.80                    | ± 13.1 %  |
| 5300                 | 35.9                               | 4.76                            | 5.40    | 5.40    | 5.40    | 0.35               | 1.80                    | ± 13.1 %  |
| 5500                 | 35.6                               | 4.96                            | 5.06    | 5.06    | 5.06    | 0.40               | 1.80                    | ± 13.1 %  |
| 5600                 | 35.5                               | 5.07                            | 4.93    | 4.93    | 4.93    | 0.40               | 1.80                    | ± 13.1 %  |
| 5800                 | 35.3                               | 5.27                            | 4.90    | 4.90    | 4.90    | 0.40               | 1.80                    | ± 13.1 %  |

<sup>C</sup> Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

<sup>F</sup> At frequencies below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

<sup>G</sup> Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

EX3DV4- SN:7494

February 26, 2018

**DASY/EASY - Parameters of Probe: EX3DV4 - SN:7494****Calibration Parameter Determined in Body Tissue Simulating Media**

| f (MHz) <sup>C</sup> | Relative Permittivity <sup>F</sup> | Conductivity (S/m) <sup>F</sup> | ConvF X | ConvF Y | ConvF Z | Alpha <sup>G</sup> | Depth <sup>d</sup> (mm) | Unc (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|--------------------|-------------------------|-----------|
| 150                  | 61.9                               | 0.80                            | 12.81   | 12.81   | 12.81   | 0.00               | 1.00                    | ± 13.3 %  |
| 450                  | 56.7                               | 0.94                            | 11.87   | 11.87   | 11.87   | 0.08               | 1.25                    | ± 13.3 %  |
| 750                  | 55.5                               | 0.96                            | 10.87   | 10.87   | 10.87   | 0.41               | 0.85                    | ± 12.0 %  |
| 835                  | 55.2                               | 0.97                            | 10.50   | 10.50   | 10.50   | 0.38               | 0.85                    | ± 12.0 %  |
| 1750                 | 53.4                               | 1.49                            | 8.77    | 8.77    | 8.77    | 0.31               | 0.90                    | ± 12.0 %  |
| 1900                 | 53.3                               | 1.52                            | 8.42    | 8.42    | 8.42    | 0.36               | 0.84                    | ± 12.0 %  |
| 2450                 | 52.7                               | 1.95                            | 8.08    | 8.08    | 8.08    | 0.24               | 1.07                    | ± 12.0 %  |
| 2600                 | 52.5                               | 2.16                            | 7.51    | 7.51    | 7.51    | 0.19               | 1.10                    | ± 12.0 %  |
| 5200                 | 49.0                               | 5.30                            | 5.30    | 5.30    | 5.30    | 0.35               | 1.90                    | ± 13.1 %  |
| 5300                 | 48.9                               | 5.42                            | 4.97    | 4.97    | 4.97    | 0.40               | 1.90                    | ± 13.1 %  |
| 5500                 | 48.6                               | 5.65                            | 4.62    | 4.62    | 4.62    | 0.40               | 1.90                    | ± 13.1 %  |
| 5600                 | 48.5                               | 5.77                            | 4.51    | 4.51    | 4.51    | 0.40               | 1.90                    | ± 13.1 %  |
| 5800                 | 48.2                               | 6.00                            | 4.61    | 4.61    | 4.61    | 0.40               | 1.90                    | ± 13.1 %  |

<sup>C</sup> Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

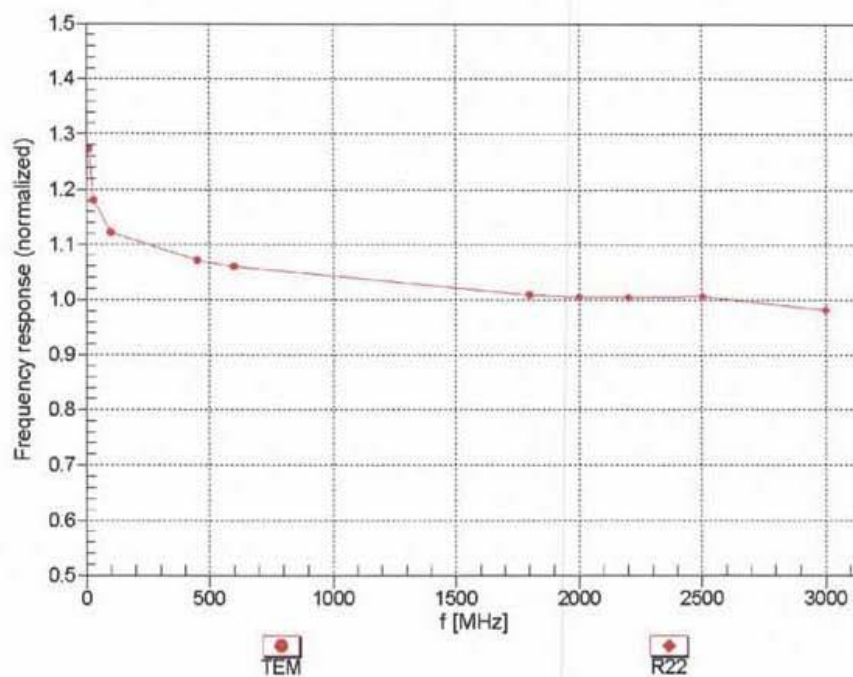
<sup>F</sup> At frequencies below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

<sup>G</sup> Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

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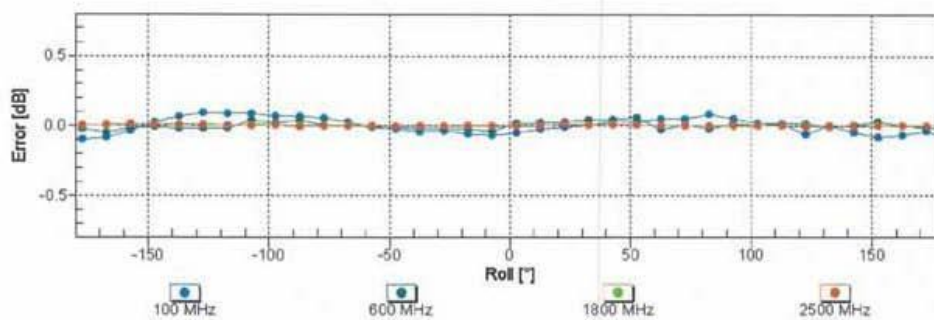
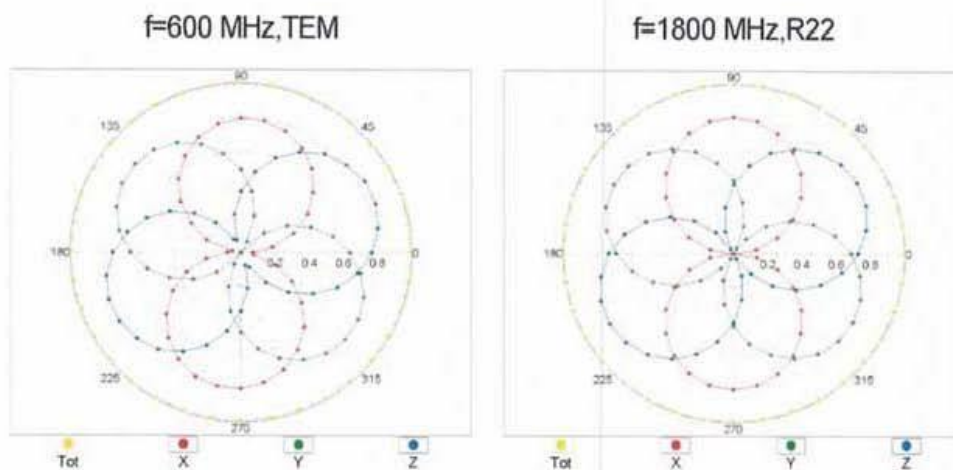
### Frequency Response of E-Field (TEM-Cell:ifi110 EXX, Waveguide: R22)

Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  ( $k=2$ )

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## Receiving Pattern ( $\phi$ ), $\theta = 0^\circ$

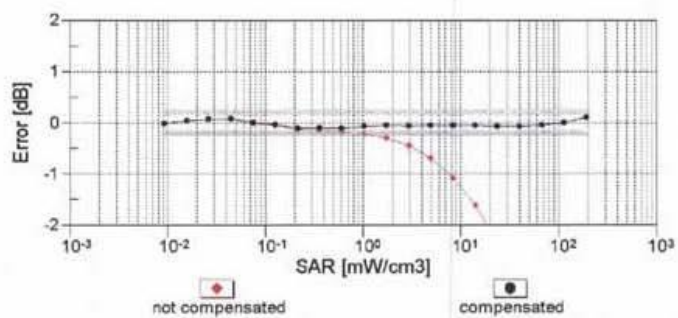
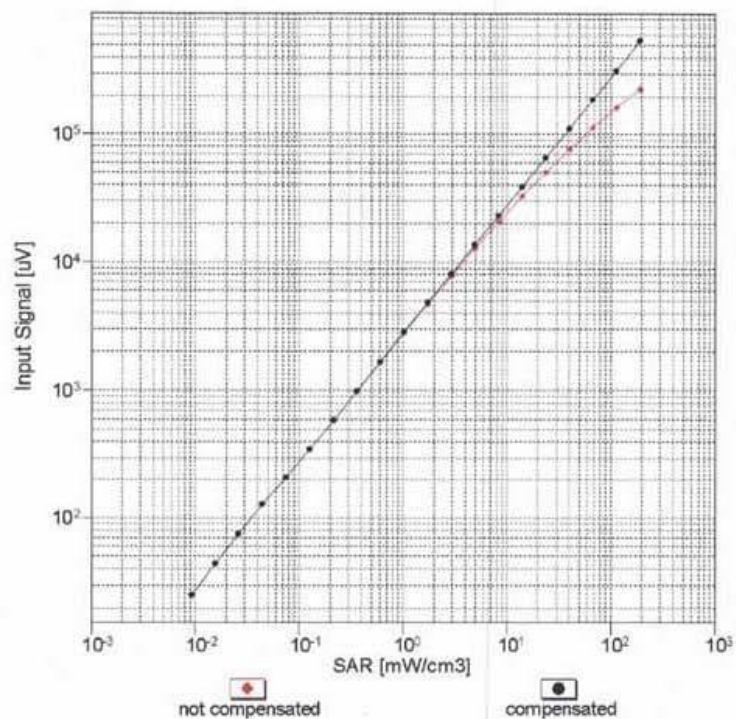


Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

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### Dynamic Range $f(\text{SAR}_{\text{head}})$ (TEM cell, $f_{\text{eval}} = 1900 \text{ MHz}$ )

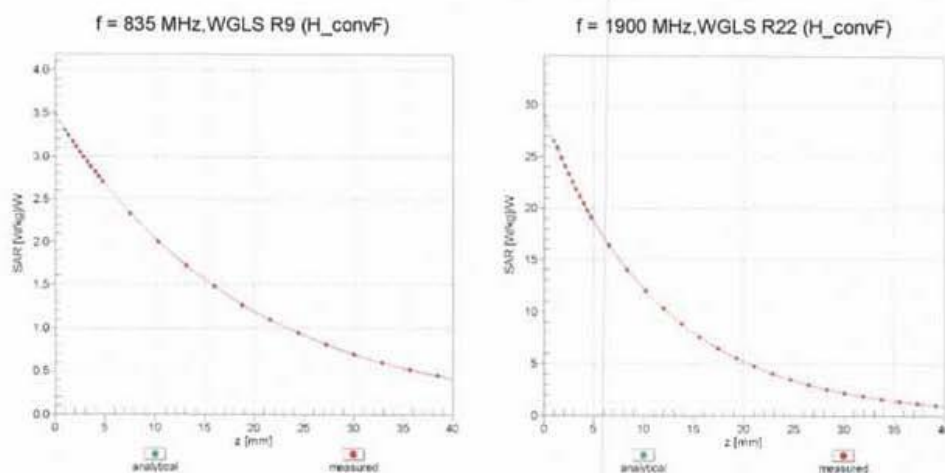


Uncertainty of Linearity Assessment:  $\pm 0.6\%$  ( $k=2$ )

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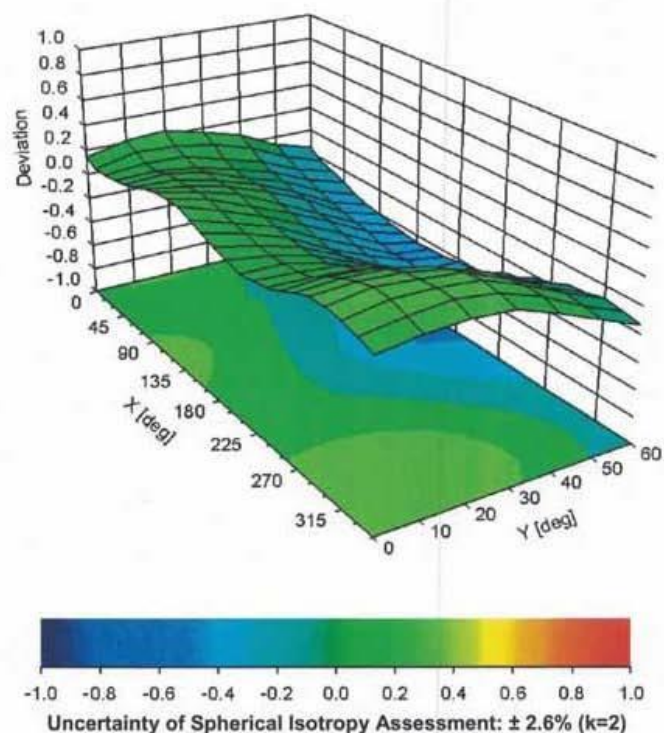
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## Conversion Factor Assessment



## Deviation from Isotropy in Liquid

Error ( $\phi$ ,  $\theta$ ),  $f = 900 \text{ MHz}$



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**DASY/EASY - Parameters of Probe: EX3DV4 - SN:7494****Other Probe Parameters**

|                                               |            |
|-----------------------------------------------|------------|
| Sensor Arrangement                            | Triangular |
| Connector Angle (°)                           | 22.8       |
| Mechanical Surface Detection Mode             | enabled    |
| Optical Surface Detection Mode                | disabled   |
| Probe Overall Length                          | 337 mm     |
| Probe Body Diameter                           | 10 mm      |
| Tip Length                                    | 9 mm       |
| Tip Diameter                                  | 2.5 mm     |
| Probe Tip to Sensor X Calibration Point       | 1 mm       |
| Probe Tip to Sensor Y Calibration Point       | 1 mm       |
| Probe Tip to Sensor Z Calibration Point       | 1 mm       |
| Recommended Measurement Distance from Surface | 1.4 mm     |

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**Appendix: Modulation Calibration Parameters**

| UID           | Communication System Name                     |   | A<br>dB | B<br>dB $\mu$ V | C     | D<br>dB | VR<br>mV | Max<br>Unc <sup>E</sup><br>(k=2) |
|---------------|-----------------------------------------------|---|---------|-----------------|-------|---------|----------|----------------------------------|
| 0             | CW                                            | X | 0.00    | 0.00            | 1.00  | 0.00    | 139.9    | $\pm 3.0\%$                      |
|               |                                               | Y | 0.00    | 0.00            | 1.00  |         | 130.5    |                                  |
|               |                                               | Z | 0.00    | 0.00            | 1.00  |         | 141.2    |                                  |
| 10010-<br>CAA | SAR Validation (Square, 100ms, 10ms)          | X | 1.49    | 62.54           | 7.67  | 10.00   | 20.0     | $\pm 9.6\%$                      |
|               |                                               | Y | 1.40    | 61.40           | 6.89  |         | 20.0     |                                  |
|               |                                               | Z | 1.51    | 62.75           | 7.79  |         | 20.0     |                                  |
| 10011-<br>CAB | UMTS-FDD (WCDMA)                              | X | 0.98    | 67.35           | 15.11 | 0.00    | 150.0    | $\pm 9.6\%$                      |
|               |                                               | Y | 0.81    | 65.02           | 13.17 |         | 150.0    |                                  |
|               |                                               | Z | 0.93    | 66.90           | 14.65 |         | 150.0    |                                  |
| 10012-<br>CAB | IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps)      | X | 1.11    | 63.45           | 14.96 | 0.41    | 150.0    | $\pm 9.6\%$                      |
|               |                                               | Y | 1.01    | 62.50           | 14.08 |         | 150.0    |                                  |
|               |                                               | Z | 1.10    | 63.40           | 14.81 |         | 150.0    |                                  |
| 10013-<br>CAB | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps) | X | 4.64    | 66.63           | 16.93 | 1.46    | 150.0    | $\pm 9.6\%$                      |
|               |                                               | Y | 4.55    | 66.39           | 16.76 |         | 150.0    |                                  |
|               |                                               | Z | 4.54    | 66.74           | 16.91 |         | 150.0    |                                  |
| 10021-<br>DAC | GSM-FDD (TDMA, GMSK)                          | X | 100.00  | 105.24          | 22.43 | 9.39    | 50.0     | $\pm 9.6\%$                      |
|               |                                               | Y | 7.56    | 78.16           | 14.98 |         | 50.0     |                                  |
|               |                                               | Z | 100.00  | 105.86          | 22.69 |         | 50.0     |                                  |
| 10023-<br>DAC | GPRS-FDD (TDMA, GMSK, TN 0)                   | X | 100.00  | 104.66          | 22.23 | 9.57    | 50.0     | $\pm 9.6\%$                      |
|               |                                               | Y | 5.00    | 73.77           | 13.48 |         | 50.0     |                                  |
|               |                                               | Z | 100.00  | 105.06          | 22.39 |         | 50.0     |                                  |
| 10024-<br>DAC | GPRS-FDD (TDMA, GMSK, TN 0-1)                 | X | 100.00  | 105.71          | 21.52 | 6.56    | 60.0     | $\pm 9.6\%$                      |
|               |                                               | Y | 6.98    | 78.84           | 13.84 |         | 60.0     |                                  |
|               |                                               | Z | 100.00  | 107.13          | 22.08 |         | 60.0     |                                  |
| 10025-<br>DAC | EDGE-FDD (TDMA, 8PSK, TN 0)                   | X | 4.17    | 73.26           | 28.42 | 12.57   | 50.0     | $\pm 9.6\%$                      |
|               |                                               | Y | 3.36    | 65.73           | 23.63 |         | 50.0     |                                  |
|               |                                               | Z | 4.00    | 72.02           | 27.83 |         | 50.0     |                                  |
| 10026-<br>DAC | EDGE-FDD (TDMA, 8PSK, TN 0-1)                 | X | 5.43    | 82.70           | 29.77 | 9.56    | 60.0     | $\pm 9.6\%$                      |
|               |                                               | Y | 5.01    | 80.20           | 28.37 |         | 60.0     |                                  |
|               |                                               | Z | 4.92    | 80.62           | 29.06 |         | 60.0     |                                  |
| 10027-<br>DAC | GPRS-FDD (TDMA, GMSK, TN 0-1-2)               | X | 100.00  | 108.47          | 21.93 | 4.80    | 80.0     | $\pm 9.6\%$                      |
|               |                                               | Y | 100.00  | 97.70           | 17.18 |         | 80.0     |                                  |
|               |                                               | Z | 100.00  | 111.35          | 23.07 |         | 80.0     |                                  |
| 10028-<br>DAC | GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)             | X | 100.00  | 113.56          | 23.37 | 3.55    | 100.0    | $\pm 9.6\%$                      |
|               |                                               | Y | 0.84    | 65.84           | 7.87  |         | 100.0    |                                  |
|               |                                               | Z | 100.00  | 118.99          | 25.50 |         | 100.0    |                                  |
| 10029-<br>DAC | EDGE-FDD (TDMA, 8PSK, TN 0-1-2)               | X | 3.69    | 73.69           | 24.54 | 7.80    | 80.0     | $\pm 9.6\%$                      |
|               |                                               | Y | 3.47    | 72.25           | 23.68 |         | 80.0     |                                  |
|               |                                               | Z | 3.48    | 72.59           | 24.16 |         | 80.0     |                                  |
| 10030-<br>CAA | IEEE 802.15.1 Bluetooth (GFSK, DH1)           | X | 100.00  | 103.93          | 20.28 | 5.30    | 70.0     | $\pm 9.6\%$                      |
|               |                                               | Y | 1.23    | 65.73           | 8.63  |         | 70.0     |                                  |
|               |                                               | Z | 100.00  | 104.97          | 20.64 |         | 70.0     |                                  |
| 10031-<br>CAA | IEEE 802.15.1 Bluetooth (GFSK, DH3)           | X | 100.00  | 106.93          | 19.48 | 1.88    | 100.0    | $\pm 9.6\%$                      |
|               |                                               | Y | 0.22    | 60.00           | 2.94  |         | 100.0    |                                  |
|               |                                               | Z | 100.00  | 109.18          | 20.25 |         | 100.0    |                                  |

# Appendix A: DAE and Probe Calibration Certificate

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|           |                                                     |   |        |        |       |       |       |         |
|-----------|-----------------------------------------------------|---|--------|--------|-------|-------|-------|---------|
| 10032-CAA | IEEE 802.15.1 Bluetooth (GFSK, DH5)                 | X | 100.00 | 122.55 | 24.60 | 1.17  | 100.0 | ± 9.6 % |
|           |                                                     | Y | 7.61   | 60.44  | 1.42  |       | 100.0 |         |
|           |                                                     | Z | 100.00 | 126.07 | 25.78 |       | 100.0 |         |
| 10033-CAA | IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH1)           | X | 6.59   | 87.18  | 22.06 | 5.30  | 70.0  | ± 9.6 % |
|           |                                                     | Y | 3.47   | 76.95  | 17.71 |       | 70.0  |         |
|           |                                                     | Z | 6.68   | 86.39  | 21.09 |       | 70.0  |         |
| 10034-CAA | IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH3)           | X | 1.88   | 72.27  | 15.10 | 1.88  | 100.0 | ± 9.6 % |
|           |                                                     | Y | 1.10   | 65.57  | 11.17 |       | 100.0 |         |
|           |                                                     | Z | 1.53   | 69.51  | 13.02 |       | 100.0 |         |
| 10035-CAA | IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH5)           | X | 1.40   | 69.50  | 13.68 | 1.17  | 100.0 | ± 9.6 % |
|           |                                                     | Y | 0.87   | 63.95  | 10.05 |       | 100.0 |         |
|           |                                                     | Z | 1.12   | 66.96  | 11.59 |       | 100.0 |         |
| 10036-CAA | IEEE 802.15.1 Bluetooth (8-DPSK, DH1)               | X | 9.62   | 92.97  | 23.95 | 5.30  | 70.0  | ± 9.6 % |
|           |                                                     | Y | 4.28   | 80.05  | 18.91 |       | 70.0  |         |
|           |                                                     | Z | 10.09  | 92.34  | 23.01 |       | 70.0  |         |
| 10037-CAA | IEEE 802.15.1 Bluetooth (8-DPSK, DH3)               | X | 1.68   | 71.06  | 14.59 | 1.88  | 100.0 | ± 9.6 % |
|           |                                                     | Y | 1.03   | 65.05  | 10.91 |       | 100.0 |         |
|           |                                                     | Z | 1.36   | 68.33  | 12.52 |       | 100.0 |         |
| 10038-CAA | IEEE 802.15.1 Bluetooth (8-DPSK, DH5)               | X | 1.40   | 69.76  | 13.93 | 1.17  | 100.0 | ± 9.6 % |
|           |                                                     | Y | 0.87   | 64.12  | 10.26 |       | 100.0 |         |
|           |                                                     | Z | 1.13   | 67.19  | 11.84 |       | 100.0 |         |
| 10039-CAB | CDMA2000 (1xRTT, RC1)                               | X | 1.34   | 69.22  | 13.14 | 0.00  | 150.0 | ± 9.6 % |
|           |                                                     | Y | 0.77   | 63.08  | 9.10  |       | 150.0 |         |
|           |                                                     | Z | 0.85   | 64.80  | 10.09 |       | 150.0 |         |
| 10042-CAB | IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Halfrate) | X | 100.00 | 102.28 | 20.38 | 7.78  | 50.0  | ± 9.6 % |
|           |                                                     | Y | 1.72   | 65.50  | 9.21  |       | 50.0  |         |
|           |                                                     | Z | 100.00 | 102.90 | 20.62 |       | 50.0  |         |
| 10044-CAA | IS-91/EIA/TIA-553 FDD (FDMA, FM)                    | X | 0.00   | 99.20  | 3.16  | 0.00  | 150.0 | ± 9.6 % |
|           |                                                     | Y | 0.09   | 120.69 | 13.78 |       | 150.0 |         |
|           |                                                     | Z | 0.00   | 99.13  | 4.03  |       | 150.0 |         |
| 10048-CAA | DECT (TDD, TDMA/FDM, GFSK, Full Slot, 24)           | X | 6.20   | 72.28  | 14.23 | 13.80 | 25.0  | ± 9.6 % |
|           |                                                     | Y | 4.17   | 67.17  | 12.27 |       | 25.0  |         |
|           |                                                     | Z | 7.20   | 73.81  | 14.76 |       | 25.0  |         |
| 10049-CAA | DECT (TDD, TDMA/FDM, GFSK, Double Slot, 12)         | X | 7.52   | 77.18  | 14.97 | 10.79 | 40.0  | ± 9.6 % |
|           |                                                     | Y | 3.87   | 69.54  | 12.04 |       | 40.0  |         |
|           |                                                     | Z | 10.31  | 80.47  | 16.03 |       | 40.0  |         |
| 10056-CAA | UMTS-TDD (TD-SCDMA, 1.28 Mcps)                      | X | 44.37  | 107.84 | 27.61 | 9.03  | 50.0  | ± 9.6 % |
|           |                                                     | Y | 11.98  | 87.68  | 21.33 |       | 50.0  |         |
|           |                                                     | Z | 50.57  | 108.48 | 27.27 |       | 50.0  |         |
| 10058-DAC | EDGE-FDD (TDMA, 8PSK, TN 0-1-2-3)                   | X | 3.09   | 70.29  | 22.11 | 6.55  | 100.0 | ± 9.6 % |
|           |                                                     | Y | 2.91   | 69.17  | 21.43 |       | 100.0 |         |
|           |                                                     | Z | 2.96   | 69.57  | 21.87 |       | 100.0 |         |
| 10059-CAB | IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps)            | X | 1.11   | 64.07  | 15.34 | 0.61  | 110.0 | ± 9.6 % |
|           |                                                     | Y | 1.00   | 63.03  | 14.40 |       | 110.0 |         |
|           |                                                     | Z | 1.09   | 64.00  | 15.19 |       | 110.0 |         |
| 10060-CAB | IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps)          | X | 3.00   | 89.75  | 24.24 | 1.30  | 110.0 | ± 9.6 % |
|           |                                                     | Y | 1.55   | 78.88  | 19.29 |       | 110.0 |         |
|           |                                                     | Z | 2.52   | 87.33  | 23.49 |       | 110.0 |         |

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# Appendix A: DAE and Probe Calibration Certificate

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|           |                                                |   |      |       |       |      |       |         |
|-----------|------------------------------------------------|---|------|-------|-------|------|-------|---------|
| 10061-CAB | IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps)      | X | 1.60 | 73.10 | 19.62 | 2.04 | 110.0 | ± 9.6 % |
|           |                                                | Y | 1.35 | 70.56 | 17.98 |      | 110.0 |         |
|           |                                                | Z | 1.53 | 72.62 | 19.39 |      | 110.0 |         |
| 10062-CAC | IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)       | X | 4.47 | 66.68 | 16.41 | 0.49 | 100.0 | ± 9.6 % |
|           |                                                | Y | 4.36 | 66.37 | 16.19 |      | 100.0 |         |
|           |                                                | Z | 4.36 | 66.73 | 16.35 |      | 100.0 |         |
| 10063-CAC | IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps)       | X | 4.47 | 66.74 | 16.49 | 0.72 | 100.0 | ± 9.6 % |
|           |                                                | Y | 4.37 | 66.45 | 16.27 |      | 100.0 |         |
|           |                                                | Z | 4.37 | 66.82 | 16.44 |      | 100.0 |         |
| 10064-CAC | IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps)      | X | 4.71 | 66.94 | 16.68 | 0.86 | 100.0 | ± 9.6 % |
|           |                                                | Y | 4.60 | 66.65 | 16.48 |      | 100.0 |         |
|           |                                                | Z | 4.58 | 66.99 | 16.62 |      | 100.0 |         |
| 10065-CAC | IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps)      | X | 4.57 | 66.74 | 16.73 | 1.21 | 100.0 | ± 9.6 % |
|           |                                                | Y | 4.47 | 66.46 | 16.54 |      | 100.0 |         |
|           |                                                | Z | 4.45 | 66.78 | 16.67 |      | 100.0 |         |
| 10066-CAC | IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps)      | X | 4.57 | 66.71 | 16.86 | 1.46 | 100.0 | ± 9.6 % |
|           |                                                | Y | 4.47 | 66.44 | 16.68 |      | 100.0 |         |
|           |                                                | Z | 4.45 | 66.73 | 16.80 |      | 100.0 |         |
| 10067-CAC | IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps)      | X | 4.85 | 66.96 | 17.32 | 2.04 | 100.0 | ± 9.6 % |
|           |                                                | Y | 4.75 | 66.72 | 17.16 |      | 100.0 |         |
|           |                                                | Z | 4.71 | 66.99 | 17.26 |      | 100.0 |         |
| 10068-CAC | IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps)      | X | 4.86 | 66.83 | 17.46 | 2.55 | 100.0 | ± 9.6 % |
|           |                                                | Y | 4.77 | 66.61 | 17.31 |      | 100.0 |         |
|           |                                                | Z | 4.75 | 66.91 | 17.45 |      | 100.0 |         |
| 10069-CAC | IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps)      | X | 4.93 | 66.84 | 17.64 | 2.67 | 100.0 | ± 9.6 % |
|           |                                                | Y | 4.84 | 66.64 | 17.50 |      | 100.0 |         |
|           |                                                | Z | 4.79 | 66.90 | 17.60 |      | 100.0 |         |
| 10071-CAB | IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 9 Mbps)  | X | 4.72 | 66.65 | 17.20 | 1.99 | 100.0 | ± 9.6 % |
|           |                                                | Y | 4.63 | 66.43 | 17.04 |      | 100.0 |         |
|           |                                                | Z | 4.63 | 66.78 | 17.20 |      | 100.0 |         |
| 10072-CAB | IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 12 Mbps) | X | 4.66 | 66.84 | 17.36 | 2.30 | 100.0 | ± 9.6 % |
|           |                                                | Y | 4.57 | 66.61 | 17.20 |      | 100.0 |         |
|           |                                                | Z | 4.56 | 66.93 | 17.35 |      | 100.0 |         |
| 10073-CAB | IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 18 Mbps) | X | 4.70 | 66.96 | 17.65 | 2.83 | 100.0 | ± 9.6 % |
|           |                                                | Y | 4.62 | 66.75 | 17.51 |      | 100.0 |         |
|           |                                                | Z | 4.61 | 67.10 | 17.68 |      | 100.0 |         |
| 10074-CAB | IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 24 Mbps) | X | 4.69 | 66.86 | 17.79 | 3.30 | 100.0 | ± 9.6 % |
|           |                                                | Y | 4.62 | 66.67 | 17.65 |      | 100.0 |         |
|           |                                                | Z | 4.62 | 67.06 | 17.85 |      | 100.0 |         |
| 10075-CAB | IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 36 Mbps) | X | 4.70 | 66.81 | 18.01 | 3.82 | 90.0  | ± 9.6 % |
|           |                                                | Y | 4.63 | 66.64 | 17.88 |      | 90.0  |         |
|           |                                                | Z | 4.63 | 67.02 | 18.07 |      | 90.0  |         |
| 10076-CAB | IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 48 Mbps) | X | 4.73 | 66.67 | 18.17 | 4.15 | 90.0  | ± 9.6 % |
|           |                                                | Y | 4.66 | 66.51 | 18.05 |      | 90.0  |         |
|           |                                                | Z | 4.67 | 66.88 | 18.24 |      | 90.0  |         |
| 10077-CAB | IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 54 Mbps) | X | 4.75 | 66.74 | 18.27 | 4.30 | 90.0  | ± 9.6 % |
|           |                                                | Y | 4.69 | 66.59 | 18.15 |      | 90.0  |         |
|           |                                                | Z | 4.70 | 66.98 | 18.36 |      | 90.0  |         |

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|           |                                                     |   |        |        |       |      |       |         |
|-----------|-----------------------------------------------------|---|--------|--------|-------|------|-------|---------|
| 10081-CAB | CDMA2000 (1xRTT, RC3)                               | X | 0.65   | 64.28  | 10.38 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                     | Y | 0.42   | 60.39  | 6.92  |      | 150.0 |         |
|           |                                                     | Z | 0.48   | 61.97  | 8.16  |      | 150.0 |         |
| 10082-CAB | IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Fullrate) | X | 0.61   | 60.00  | 2.85  | 4.77 | 80.0  | ± 9.6 % |
|           |                                                     | Y | 0.27   | 125.15 | 3.93  |      | 80.0  |         |
|           |                                                     | Z | 0.68   | 60.01  | 2.64  |      | 80.0  |         |
| 10090-DAC | GPRS-FDD (TDMA, GMSK, TN 0-4)                       | X | 100.00 | 105.71 | 21.53 | 6.56 | 60.0  | ± 9.6 % |
|           |                                                     | Y | 7.96   | 79.91  | 14.17 |      | 60.0  |         |
|           |                                                     | Z | 100.00 | 107.12 | 22.09 |      | 60.0  |         |
| 10097-CAB | UMTS-FDD (HSDPA)                                    | X | 1.81   | 68.35  | 15.62 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                     | Y | 1.59   | 66.62  | 14.28 |      | 150.0 |         |
|           |                                                     | Z | 1.75   | 68.38  | 15.28 |      | 150.0 |         |
| 10098-CAB | UMTS-FDD (HSUPA, Subtest 2)                         | X | 1.77   | 68.30  | 15.60 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                     | Y | 1.55   | 66.55  | 14.25 |      | 150.0 |         |
|           |                                                     | Z | 1.71   | 68.32  | 15.26 |      | 150.0 |         |
| 10099-DAC | EDGE-FDD (TDMA, 8PSK, TN 0-4)                       | X | 5.47   | 82.85  | 29.83 | 9.56 | 60.0  | ± 9.6 % |
|           |                                                     | Y | 5.04   | 80.32  | 28.42 |      | 60.0  |         |
|           |                                                     | Z | 4.96   | 80.77  | 29.11 |      | 60.0  |         |
| 10100-CAD | LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)            | X | 2.96   | 70.04  | 16.68 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                     | Y | 2.71   | 68.69  | 15.83 |      | 150.0 |         |
|           |                                                     | Z | 2.82   | 69.64  | 16.51 |      | 150.0 |         |
| 10101-CAD | LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)          | X | 3.10   | 67.35  | 15.86 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                     | Y | 2.94   | 66.61  | 15.35 |      | 150.0 |         |
|           |                                                     | Z | 3.00   | 67.17  | 15.74 |      | 150.0 |         |
| 10102-CAD | LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)          | X | 3.20   | 67.37  | 15.97 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                     | Y | 3.05   | 66.67  | 15.48 |      | 150.0 |         |
|           |                                                     | Z | 3.10   | 67.22  | 15.85 |      | 150.0 |         |
| 10103-CAD | LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK)            | X | 5.04   | 73.87  | 19.92 | 3.98 | 65.0  | ± 9.6 % |
|           |                                                     | Y | 4.45   | 71.80  | 18.94 |      | 65.0  |         |
|           |                                                     | Z | 4.83   | 73.72  | 19.95 |      | 65.0  |         |
| 10104-CAD | LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)          | X | 4.93   | 71.04  | 19.34 | 3.98 | 65.0  | ± 9.6 % |
|           |                                                     | Y | 4.66   | 70.09  | 18.84 |      | 65.0  |         |
|           |                                                     | Z | 4.74   | 70.79  | 19.24 |      | 65.0  |         |
| 10105-CAD | LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)          | X | 4.89   | 70.60  | 19.44 | 3.98 | 65.0  | ± 9.6 % |
|           |                                                     | Y | 4.42   | 68.79  | 18.52 |      | 65.0  |         |
|           |                                                     | Z | 4.68   | 70.25  | 19.28 |      | 65.0  |         |
| 10108-CAE | LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK)            | X | 2.55   | 69.38  | 16.50 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                     | Y | 2.32   | 68.05  | 15.61 |      | 150.0 |         |
|           |                                                     | Z | 2.42   | 69.06  | 16.32 |      | 150.0 |         |
| 10109-CAE | LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)          | X | 2.74   | 67.33  | 15.73 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                     | Y | 2.57   | 66.48  | 15.09 |      | 150.0 |         |
|           |                                                     | Z | 2.63   | 67.20  | 15.54 |      | 150.0 |         |
| 10110-CAE | LTE-FDD (SC-FDMA, 100% RB, 5 MHz, QPSK)             | X | 2.04   | 68.62  | 15.99 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                     | Y | 1.82   | 67.09  | 14.87 |      | 150.0 |         |
|           |                                                     | Z | 1.91   | 68.30  | 15.65 |      | 150.0 |         |
| 10111-CAE | LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)           | X | 2.48   | 68.58  | 15.98 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                     | Y | 2.26   | 67.29  | 15.00 |      | 150.0 |         |
|           |                                                     | Z | 2.37   | 68.51  | 15.63 |      | 150.0 |         |

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# Appendix A: DAE and Probe Calibration Certificate

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|           |                                                |   |      |       |       |      |       |         |
|-----------|------------------------------------------------|---|------|-------|-------|------|-------|---------|
| 10112-CAE | LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)     | X | 2.87 | 67.40 | 15.81 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                | Y | 2.70 | 66.60 | 15.21 |      | 150.0 |         |
|           |                                                | Z | 2.76 | 67.33 | 15.64 |      | 150.0 |         |
| 10113-CAE | LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)      | X | 2.63 | 68.77 | 16.12 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                | Y | 2.40 | 67.53 | 15.19 |      | 150.0 |         |
|           |                                                | Z | 2.51 | 68.70 | 15.76 |      | 150.0 |         |
| 10114-CAC | IEEE 802.11n (HT Greenfield, 13.5 Mbps, BPSK)  | X | 4.95 | 67.13 | 16.42 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                | Y | 4.85 | 66.84 | 16.24 |      | 150.0 |         |
|           |                                                | Z | 4.85 | 67.12 | 16.40 |      | 150.0 |         |
| 10115-CAC | IEEE 802.11n (HT Greenfield, 81 Mbps, 16-QAM)  | X | 5.19 | 67.19 | 16.45 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                | Y | 5.10 | 66.92 | 16.29 |      | 150.0 |         |
|           |                                                | Z | 5.08 | 67.17 | 16.41 |      | 150.0 |         |
| 10116-CAC | IEEE 802.11n (HT Greenfield, 135 Mbps, 64-QAM) | X | 5.03 | 67.31 | 16.44 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                | Y | 4.93 | 67.00 | 16.25 |      | 150.0 |         |
|           |                                                | Z | 4.91 | 67.26 | 16.39 |      | 150.0 |         |
| 10117-CAC | IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK)       | X | 4.94 | 67.08 | 16.41 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                | Y | 4.84 | 66.75 | 16.22 |      | 150.0 |         |
|           |                                                | Z | 4.83 | 67.00 | 16.35 |      | 150.0 |         |
| 10118-CAC | IEEE 802.11n (HT Mixed, 81 Mbps, 16-QAM)       | X | 5.26 | 67.38 | 16.55 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                | Y | 5.18 | 67.15 | 16.41 |      | 150.0 |         |
|           |                                                | Z | 5.14 | 67.33 | 16.50 |      | 150.0 |         |
| 10119-CAC | IEEE 802.11n (HT Mixed, 135 Mbps, 64-QAM)      | X | 5.03 | 67.31 | 16.45 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                | Y | 4.93 | 67.03 | 16.27 |      | 150.0 |         |
|           |                                                | Z | 4.92 | 67.30 | 16.42 |      | 150.0 |         |
| 10140-CAD | LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)     | X | 3.22 | 67.39 | 15.88 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                | Y | 3.07 | 66.69 | 15.39 |      | 150.0 |         |
|           |                                                | Z | 3.11 | 67.25 | 15.76 |      | 150.0 |         |
| 10141-CAD | LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)     | X | 3.35 | 67.56 | 16.08 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                | Y | 3.20 | 66.89 | 15.61 |      | 150.0 |         |
|           |                                                | Z | 3.24 | 67.46 | 15.97 |      | 150.0 |         |
| 10142-CAD | LTE-FDD (SC-FDMA, 100% RB, 3 MHz, QPSK)        | X | 1.80 | 68.59 | 15.33 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                | Y | 1.53 | 66.49 | 13.76 |      | 150.0 |         |
|           |                                                | Z | 1.64 | 67.93 | 14.59 |      | 150.0 |         |
| 10143-CAD | LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)      | X | 2.29 | 69.05 | 15.16 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                | Y | 1.94 | 66.78 | 13.54 |      | 150.0 |         |
|           |                                                | Z | 2.05 | 68.12 | 14.12 |      | 150.0 |         |
| 10144-CAD | LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)      | X | 1.95 | 65.96 | 13.09 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                | Y | 1.71 | 64.37 | 11.76 |      | 150.0 |         |
|           |                                                | Z | 1.71 | 64.91 | 11.94 |      | 150.0 |         |
| 10145-CAE | LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)      | X | 0.80 | 61.66 | 8.31  | 0.00 | 150.0 | ± 9.6 % |
|           |                                                | Y | 0.63 | 60.00 | 6.42  |      | 150.0 |         |
|           |                                                | Z | 0.60 | 60.00 | 6.26  |      | 150.0 |         |
| 10146-CAE | LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)    | X | 0.93 | 60.23 | 6.53  | 0.00 | 150.0 | ± 9.6 % |
|           |                                                | Y | 0.85 | 59.54 | 5.70  |      | 150.0 |         |
|           |                                                | Z | 0.78 | 60.00 | 5.45  |      | 150.0 |         |
| 10147-CAE | LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)    | X | 0.97 | 60.53 | 6.79  | 0.00 | 150.0 | ± 9.6 % |
|           |                                                | Y | 0.90 | 60.00 | 6.07  |      | 150.0 |         |
|           |                                                | Z | 0.79 | 60.00 | 5.50  |      | 150.0 |         |

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|           |                                            |   |      |       |       |      |       |         |
|-----------|--------------------------------------------|---|------|-------|-------|------|-------|---------|
| 10149-CAD | LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)  | X | 2.75 | 67.40 | 15.78 | 0.00 | 150.0 | ± 9.6 % |
|           |                                            | Y | 2.58 | 66.55 | 15.14 |      | 150.0 |         |
|           |                                            | Z | 2.64 | 67.28 | 15.59 |      | 150.0 |         |
| 10150-CAD | LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)  | X | 2.88 | 67.47 | 15.86 | 0.00 | 150.0 | ± 9.6 % |
|           |                                            | Y | 2.71 | 66.66 | 15.25 |      | 150.0 |         |
|           |                                            | Z | 2.77 | 67.39 | 15.69 |      | 150.0 |         |
| 10151-CAD | LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)    | X | 4.99 | 75.67 | 20.72 | 3.98 | 65.0  | ± 9.6 % |
|           |                                            | Y | 4.54 | 74.14 | 19.94 |      | 65.0  |         |
|           |                                            | Z | 4.82 | 75.77 | 20.80 |      | 65.0  |         |
| 10152-CAD | LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)  | X | 4.45 | 70.90 | 18.86 | 3.98 | 65.0  | ± 9.6 % |
|           |                                            | Y | 4.17 | 69.87 | 18.26 |      | 65.0  |         |
|           |                                            | Z | 4.26 | 70.67 | 18.66 |      | 65.0  |         |
| 10153-CAD | LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)  | X | 4.79 | 71.97 | 19.73 | 3.98 | 65.0  | ± 9.6 % |
|           |                                            | Y | 4.50 | 70.99 | 19.17 |      | 65.0  |         |
|           |                                            | Z | 4.61 | 71.85 | 19.59 |      | 65.0  |         |
| 10154-CAE | LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)    | X | 2.08 | 69.01 | 16.23 | 0.00 | 150.0 | ± 9.6 % |
|           |                                            | Y | 1.85 | 67.42 | 15.08 |      | 150.0 |         |
|           |                                            | Z | 1.95 | 68.66 | 15.88 |      | 150.0 |         |
| 10155-CAE | LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)  | X | 2.49 | 68.62 | 16.01 | 0.00 | 150.0 | ± 9.6 % |
|           |                                            | Y | 2.26 | 67.33 | 15.03 |      | 150.0 |         |
|           |                                            | Z | 2.38 | 68.57 | 15.67 |      | 150.0 |         |
| 10156-CAE | LTE-FDD (SC-FDMA, 50% RB, 5 MHz, QPSK)     | X | 1.62 | 68.33 | 14.75 | 0.00 | 150.0 | ± 9.6 % |
|           |                                            | Y | 1.32 | 65.72 | 12.82 |      | 150.0 |         |
|           |                                            | Z | 1.42 | 67.19 | 13.63 |      | 150.0 |         |
| 10157-CAE | LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)   | X | 1.76 | 66.14 | 12.77 | 0.00 | 150.0 | ± 9.6 % |
|           |                                            | Y | 1.47 | 64.00 | 11.06 |      | 150.0 |         |
|           |                                            | Z | 1.47 | 64.54 | 11.21 |      | 150.0 |         |
| 10158-CAE | LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)  | X | 2.64 | 68.86 | 16.18 | 0.00 | 150.0 | ± 9.6 % |
|           |                                            | Y | 2.41 | 67.62 | 15.24 |      | 150.0 |         |
|           |                                            | Z | 2.52 | 68.81 | 15.83 |      | 150.0 |         |
| 10159-CAE | LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)   | X | 1.84 | 66.49 | 12.98 | 0.00 | 150.0 | ± 9.6 % |
|           |                                            | Y | 1.52 | 64.19 | 11.20 |      | 150.0 |         |
|           |                                            | Z | 1.52 | 64.73 | 11.33 |      | 150.0 |         |
| 10160-CAD | LTE-FDD (SC-FDMA, 50% RB, 15 MHz, QPSK)    | X | 2.60 | 68.75 | 16.31 | 0.00 | 150.0 | ± 9.6 % |
|           |                                            | Y | 2.41 | 67.74 | 15.55 |      | 150.0 |         |
|           |                                            | Z | 2.47 | 68.55 | 16.10 |      | 150.0 |         |
| 10161-CAD | LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)  | X | 2.76 | 67.44 | 15.73 | 0.00 | 150.0 | ± 9.6 % |
|           |                                            | Y | 2.59 | 66.58 | 15.07 |      | 150.0 |         |
|           |                                            | Z | 2.65 | 67.35 | 15.50 |      | 150.0 |         |
| 10162-CAD | LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)  | X | 2.88 | 67.68 | 15.88 | 0.00 | 150.0 | ± 9.6 % |
|           |                                            | Y | 2.70 | 66.83 | 15.23 |      | 150.0 |         |
|           |                                            | Z | 2.76 | 67.62 | 15.66 |      | 150.0 |         |
| 10166-CAE | LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)   | X | 3.02 | 67.96 | 18.28 | 3.01 | 150.0 | ± 9.6 % |
|           |                                            | Y | 3.03 | 68.30 | 18.53 |      | 150.0 |         |
|           |                                            | Z | 2.86 | 67.79 | 18.34 |      | 150.0 |         |
| 10167-CAE | LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM) | X | 3.42 | 70.11 | 18.44 | 3.01 | 150.0 | ± 9.6 % |
|           |                                            | Y | 3.50 | 70.73 | 18.75 |      | 150.0 |         |
|           |                                            | Z | 3.20 | 70.16 | 18.62 |      | 150.0 |         |

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|           |                                            |   |      |       |       |      |       |         |
|-----------|--------------------------------------------|---|------|-------|-------|------|-------|---------|
| 10168-CAE | LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM) | X | 3.80 | 72.47 | 19.91 | 3.01 | 150.0 | ± 9.6 % |
|           |                                            | Y | 3.97 | 73.52 | 20.42 |      | 150.0 |         |
|           |                                            | Z | 3.59 | 72.78 | 20.23 |      | 150.0 |         |
| 10169-CAD | LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)      | X | 2.40 | 66.10 | 17.40 | 3.01 | 150.0 | ± 9.6 % |
|           |                                            | Y | 2.46 | 66.60 | 17.71 |      | 150.0 |         |
|           |                                            | Z | 2.33 | 66.05 | 17.51 |      | 150.0 |         |
| 10170-CAD | LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)    | X | 2.86 | 70.22 | 19.21 | 3.01 | 150.0 | ± 9.6 % |
|           |                                            | Y | 3.07 | 71.47 | 19.80 |      | 150.0 |         |
|           |                                            | Z | 2.76 | 70.55 | 19.53 |      | 150.0 |         |
| 10171-AAD | LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)    | X | 2.43 | 67.02 | 16.67 | 3.01 | 150.0 | ± 9.6 % |
|           |                                            | Y | 2.55 | 67.67 | 16.96 |      | 150.0 |         |
|           |                                            | Z | 2.33 | 67.12 | 16.84 |      | 150.0 |         |
| 10172-CAD | LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)      | X | 3.22 | 76.35 | 23.22 | 6.02 | 65.0  | ± 9.6 % |
|           |                                            | Y | 2.88 | 74.18 | 22.38 |      | 65.0  |         |
|           |                                            | Z | 2.74 | 74.43 | 22.80 |      | 65.0  |         |
| 10173-CAD | LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)    | X | 4.36 | 80.46 | 22.94 | 6.02 | 65.0  | ± 9.6 % |
|           |                                            | Y | 4.63 | 81.45 | 23.36 |      | 65.0  |         |
|           |                                            | Z | 3.93 | 80.61 | 23.43 |      | 65.0  |         |
| 10174-CAD | LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)    | X | 3.95 | 78.13 | 21.47 | 6.02 | 65.0  | ± 9.6 % |
|           |                                            | Y | 3.58 | 76.48 | 20.90 |      | 65.0  |         |
|           |                                            | Z | 3.41 | 77.60 | 21.68 |      | 65.0  |         |
| 10175-CAE | LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)      | X | 2.38 | 65.87 | 17.19 | 3.01 | 150.0 | ± 9.6 % |
|           |                                            | Y | 2.43 | 66.33 | 17.47 |      | 150.0 |         |
|           |                                            | Z | 2.30 | 65.82 | 17.28 |      | 150.0 |         |
| 10176-CAE | LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)    | X | 2.86 | 70.24 | 19.22 | 3.01 | 150.0 | ± 9.6 % |
|           |                                            | Y | 3.08 | 71.50 | 19.81 |      | 150.0 |         |
|           |                                            | Z | 2.76 | 70.57 | 19.54 |      | 150.0 |         |
| 10177-CAG | LTE-FDD (SC-FDMA, 1 RB, 5 MHz, QPSK)       | X | 2.39 | 65.97 | 17.26 | 3.01 | 150.0 | ± 9.6 % |
|           |                                            | Y | 2.45 | 66.44 | 17.54 |      | 150.0 |         |
|           |                                            | Z | 2.32 | 65.91 | 17.35 |      | 150.0 |         |
| 10178-CAE | LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)     | X | 2.85 | 70.12 | 19.14 | 3.01 | 150.0 | ± 9.6 % |
|           |                                            | Y | 3.06 | 71.36 | 19.72 |      | 150.0 |         |
|           |                                            | Z | 2.75 | 70.47 | 19.48 |      | 150.0 |         |
| 10179-CAE | LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)    | X | 2.62 | 68.53 | 17.82 | 3.01 | 150.0 | ± 9.6 % |
|           |                                            | Y | 2.78 | 69.42 | 18.23 |      | 150.0 |         |
|           |                                            | Z | 2.52 | 68.74 | 18.07 |      | 150.0 |         |
| 10180-CAE | LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)     | X | 2.43 | 66.99 | 16.64 | 3.01 | 150.0 | ± 9.6 % |
|           |                                            | Y | 2.55 | 67.64 | 16.93 |      | 150.0 |         |
|           |                                            | Z | 2.33 | 67.10 | 16.82 |      | 150.0 |         |
| 10181-CAD | LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)      | X | 2.39 | 65.96 | 17.25 | 3.01 | 150.0 | ± 9.6 % |
|           |                                            | Y | 2.44 | 66.43 | 17.54 |      | 150.0 |         |
|           |                                            | Z | 2.31 | 65.90 | 17.34 |      | 150.0 |         |
| 10182-CAD | LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)    | X | 2.84 | 70.10 | 19.13 | 3.01 | 150.0 | ± 9.6 % |
|           |                                            | Y | 3.05 | 71.33 | 19.71 |      | 150.0 |         |
|           |                                            | Z | 2.75 | 70.45 | 19.47 |      | 150.0 |         |
| 10183-AAC | LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)    | X | 2.43 | 66.97 | 16.63 | 3.01 | 150.0 | ± 9.6 % |
|           |                                            | Y | 2.55 | 67.62 | 16.92 |      | 150.0 |         |
|           |                                            | Z | 2.32 | 67.08 | 16.81 |      | 150.0 |         |

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|           |                                               |   |      |       |       |      |       |         |
|-----------|-----------------------------------------------|---|------|-------|-------|------|-------|---------|
| 10184-CAD | LTE-FDD (SC-FDMA, 1 RB, 3 MHz, QPSK)          | X | 2.39 | 65.99 | 17.27 | 3.01 | 150.0 | ± 9.6 % |
|           |                                               | Y | 2.45 | 66.47 | 17.56 |      | 150.0 |         |
|           |                                               | Z | 2.32 | 65.93 | 17.36 |      | 150.0 |         |
| 10185-CAD | LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)        | X | 2.85 | 70.16 | 19.17 | 3.01 | 150.0 | ± 9.6 % |
|           |                                               | Y | 3.07 | 71.40 | 19.75 |      | 150.0 |         |
|           |                                               | Z | 2.76 | 70.51 | 19.50 |      | 150.0 |         |
| 10186-AAD | LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)        | X | 2.44 | 67.02 | 16.66 | 3.01 | 150.0 | ± 9.6 % |
|           |                                               | Y | 2.56 | 67.67 | 16.95 |      | 150.0 |         |
|           |                                               | Z | 2.33 | 67.13 | 16.84 |      | 150.0 |         |
| 10187-CAE | LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)        | X | 2.40 | 66.06 | 17.35 | 3.01 | 150.0 | ± 9.6 % |
|           |                                               | Y | 2.46 | 66.54 | 17.64 |      | 150.0 |         |
|           |                                               | Z | 2.33 | 66.01 | 17.45 |      | 150.0 |         |
| 10188-CAE | LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)      | X | 2.92 | 70.63 | 19.48 | 3.01 | 150.0 | ± 9.6 % |
|           |                                               | Y | 3.15 | 71.97 | 20.11 |      | 150.0 |         |
|           |                                               | Z | 2.82 | 70.99 | 19.83 |      | 150.0 |         |
| 10189-AAE | LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)      | X | 2.48 | 67.32 | 16.90 | 3.01 | 150.0 | ± 9.6 % |
|           |                                               | Y | 2.60 | 68.01 | 17.21 |      | 150.0 |         |
|           |                                               | Z | 2.37 | 67.44 | 17.08 |      | 150.0 |         |
| 10193-CAC | IEEE 802.11n (HT Greenfield, 6.5 Mbps, BPSK)  | X | 4.36 | 66.79 | 16.12 | 0.00 | 150.0 | ± 9.6 % |
|           |                                               | Y | 4.24 | 66.43 | 15.86 |      | 150.0 |         |
|           |                                               | Z | 4.25 | 66.88 | 16.06 |      | 150.0 |         |
| 10194-CAC | IEEE 802.11n (HT Greenfield, 39 Mbps, 16-QAM) | X | 4.50 | 67.02 | 16.25 | 0.00 | 150.0 | ± 9.6 % |
|           |                                               | Y | 4.38 | 66.66 | 16.00 |      | 150.0 |         |
|           |                                               | Z | 4.38 | 67.06 | 16.19 |      | 150.0 |         |
| 10195-CAC | IEEE 802.11n (HT Greenfield, 65 Mbps, 64-QAM) | X | 4.53 | 67.04 | 16.27 | 0.00 | 150.0 | ± 9.6 % |
|           |                                               | Y | 4.41 | 66.68 | 16.02 |      | 150.0 |         |
|           |                                               | Z | 4.40 | 67.05 | 16.19 |      | 150.0 |         |
| 10196-CAC | IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)       | X | 4.34 | 66.79 | 16.11 | 0.00 | 150.0 | ± 9.6 % |
|           |                                               | Y | 4.22 | 66.42 | 15.84 |      | 150.0 |         |
|           |                                               | Z | 4.23 | 66.84 | 16.03 |      | 150.0 |         |
| 10197-CAC | IEEE 802.11n (HT Mixed, 39 Mbps, 16-QAM)      | X | 4.51 | 67.03 | 16.26 | 0.00 | 150.0 | ± 9.6 % |
|           |                                               | Y | 4.38 | 66.66 | 16.01 |      | 150.0 |         |
|           |                                               | Z | 4.38 | 67.05 | 16.19 |      | 150.0 |         |
| 10198-CAC | IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)      | X | 4.53 | 67.04 | 16.27 | 0.00 | 150.0 | ± 9.6 % |
|           |                                               | Y | 4.40 | 66.67 | 16.02 |      | 150.0 |         |
|           |                                               | Z | 4.39 | 67.04 | 16.19 |      | 150.0 |         |
| 10219-CAC | IEEE 802.11n (HT Mixed, 7.2 Mbps, BPSK)       | X | 4.30 | 66.83 | 16.08 | 0.00 | 150.0 | ± 9.6 % |
|           |                                               | Y | 4.17 | 66.45 | 15.81 |      | 150.0 |         |
|           |                                               | Z | 4.19 | 66.90 | 16.01 |      | 150.0 |         |
| 10220-CAC | IEEE 802.11n (HT Mixed, 43.3 Mbps, 16-QAM)    | X | 4.50 | 66.99 | 16.24 | 0.00 | 150.0 | ± 9.6 % |
|           |                                               | Y | 4.38 | 66.63 | 16.00 |      | 150.0 |         |
|           |                                               | Z | 4.37 | 67.02 | 16.18 |      | 150.0 |         |
| 10221-CAC | IEEE 802.11n (HT Mixed, 72.2 Mbps, 64-QAM)    | X | 4.54 | 66.98 | 16.26 | 0.00 | 150.0 | ± 9.6 % |
|           |                                               | Y | 4.42 | 66.63 | 16.01 |      | 150.0 |         |
|           |                                               | Z | 4.41 | 67.00 | 16.19 |      | 150.0 |         |
| 10222-CAC | IEEE 802.11n (HT Mixed, 15 Mbps, BPSK)        | X | 4.91 | 67.06 | 16.39 | 0.00 | 150.0 | ± 9.6 % |
|           |                                               | Y | 4.81 | 66.75 | 16.20 |      | 150.0 |         |
|           |                                               | Z | 4.81 | 67.01 | 16.35 |      | 150.0 |         |

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# Appendix A: DAE and Probe Calibration Certificate

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|           |                                           |   |      |       |       |      |       |         |
|-----------|-------------------------------------------|---|------|-------|-------|------|-------|---------|
| 10223-CAC | IEEE 802.11n (HT Mixed, 90 Mbps, 16-QAM)  | X | 5.18 | 67.25 | 16.50 | 0.00 | 150.0 | ± 9.6 % |
|           |                                           | Y | 5.07 | 66.94 | 16.31 |      | 150.0 |         |
|           |                                           | Z | 5.03 | 67.10 | 16.40 |      | 150.0 |         |
| 10224-CAC | IEEE 802.11n (HT Mixed, 150 Mbps, 64-QAM) | X | 4.95 | 67.17 | 16.38 | 0.00 | 150.0 | ± 9.6 % |
|           |                                           | Y | 4.85 | 66.86 | 16.19 |      | 150.0 |         |
|           |                                           | Z | 4.85 | 67.15 | 16.34 |      | 150.0 |         |
| 10225-CAB | UMTS-FDD (HSPA+)                          | X | 2.64 | 66.25 | 14.92 | 0.00 | 150.0 | ± 9.6 % |
|           |                                           | Y | 2.47 | 65.44 | 14.20 |      | 150.0 |         |
|           |                                           | Z | 2.51 | 66.11 | 14.44 |      | 150.0 |         |
| 10226-CAA | LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)  | X | 4.57 | 81.37 | 23.38 | 6.02 | 65.0  | ± 9.6 % |
|           |                                           | Y | 4.90 | 82.52 | 23.85 |      | 65.0  |         |
|           |                                           | Z | 4.15 | 81.66 | 23.92 |      | 65.0  |         |
| 10227-CAA | LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)  | X | 4.60 | 80.57 | 22.40 | 6.02 | 65.0  | ± 9.6 % |
|           |                                           | Y | 4.89 | 81.58 | 22.82 |      | 65.0  |         |
|           |                                           | Z | 4.14 | 80.85 | 22.92 |      | 65.0  |         |
| 10228-CAA | LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)    | X | 3.35 | 77.29 | 23.65 | 6.02 | 65.0  | ± 9.6 % |
|           |                                           | Y | 3.36 | 77.54 | 23.87 |      | 65.0  |         |
|           |                                           | Z | 2.92 | 75.79 | 23.43 |      | 65.0  |         |
| 10229-CAB | LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)    | X | 4.39 | 80.55 | 22.98 | 6.02 | 65.0  | ± 9.6 % |
|           |                                           | Y | 4.67 | 81.55 | 23.40 |      | 65.0  |         |
|           |                                           | Z | 3.96 | 80.71 | 23.47 |      | 65.0  |         |
| 10230-CAB | LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)    | X | 4.37 | 79.68 | 21.99 | 6.02 | 65.0  | ± 9.6 % |
|           |                                           | Y | 4.61 | 80.55 | 22.37 |      | 65.0  |         |
|           |                                           | Z | 3.91 | 79.81 | 22.46 |      | 65.0  |         |
| 10231-CAB | LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK)      | X | 3.26 | 76.70 | 23.33 | 6.02 | 65.0  | ± 9.6 % |
|           |                                           | Y | 3.26 | 76.88 | 23.51 |      | 65.0  |         |
|           |                                           | Z | 2.84 | 75.20 | 23.10 |      | 65.0  |         |
| 10232-CAD | LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)    | X | 4.39 | 80.53 | 22.98 | 6.02 | 65.0  | ± 9.6 % |
|           |                                           | Y | 4.66 | 81.53 | 23.40 |      | 65.0  |         |
|           |                                           | Z | 3.96 | 80.69 | 23.47 |      | 65.0  |         |
| 10233-CAD | LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)    | X | 4.36 | 79.65 | 21.99 | 6.02 | 65.0  | ± 9.6 % |
|           |                                           | Y | 4.60 | 80.51 | 22.36 |      | 65.0  |         |
|           |                                           | Z | 3.89 | 79.77 | 22.44 |      | 65.0  |         |
| 10234-CAD | LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK)      | X | 3.19 | 76.23 | 23.02 | 6.02 | 65.0  | ± 9.6 % |
|           |                                           | Y | 3.18 | 76.36 | 23.17 |      | 65.0  |         |
|           |                                           | Z | 2.78 | 74.77 | 22.80 |      | 65.0  |         |
| 10235-CAD | LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)   | X | 4.38 | 80.55 | 22.98 | 6.02 | 65.0  | ± 9.6 % |
|           |                                           | Y | 4.66 | 81.55 | 23.41 |      | 65.0  |         |
|           |                                           | Z | 3.96 | 80.70 | 23.48 |      | 65.0  |         |
| 10236-CAD | LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)   | X | 4.40 | 79.78 | 22.03 | 6.02 | 65.0  | ± 9.6 % |
|           |                                           | Y | 4.64 | 80.65 | 22.40 |      | 65.0  |         |
|           |                                           | Z | 3.94 | 79.92 | 22.49 |      | 65.0  |         |
| 10237-CAD | LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)     | X | 3.25 | 76.71 | 23.34 | 6.02 | 65.0  | ± 9.6 % |
|           |                                           | Y | 3.26 | 76.89 | 23.52 |      | 65.0  |         |
|           |                                           | Z | 2.83 | 75.20 | 23.10 |      | 65.0  |         |
| 10238-CAD | LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)   | X | 4.37 | 80.51 | 22.96 | 6.02 | 65.0  | ± 9.6 % |
|           |                                           | Y | 4.65 | 81.50 | 23.39 |      | 65.0  |         |
|           |                                           | Z | 3.95 | 80.66 | 23.46 |      | 65.0  |         |

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|           |                                            |   |      |       |       |      |      |         |
|-----------|--------------------------------------------|---|------|-------|-------|------|------|---------|
| 10239-CAD | LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)    | X | 4.34 | 79.61 | 21.97 | 6.02 | 65.0 | ± 9.6 % |
|           |                                            | Y | 4.58 | 80.47 | 22.35 |      | 65.0 |         |
|           |                                            | Z | 3.88 | 79.72 | 22.43 |      | 65.0 |         |
| 10240-CAD | LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK)      | X | 3.25 | 76.69 | 23.33 | 6.02 | 65.0 | ± 9.6 % |
|           |                                            | Y | 3.25 | 76.87 | 23.51 |      | 65.0 |         |
|           |                                            | Z | 2.83 | 75.19 | 23.10 |      | 65.0 |         |
| 10241-CAA | LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM) | X | 5.67 | 76.94 | 23.64 | 6.98 | 65.0 | ± 9.6 % |
|           |                                            | Y | 5.73 | 77.33 | 23.85 |      | 65.0 |         |
|           |                                            | Z | 5.41 | 77.63 | 24.19 |      | 65.0 |         |
| 10242-CAA | LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM) | X | 5.51 | 76.48 | 23.38 | 6.98 | 65.0 | ± 9.6 % |
|           |                                            | Y | 5.15 | 75.22 | 22.87 |      | 65.0 |         |
|           |                                            | Z | 5.17 | 76.81 | 23.79 |      | 65.0 |         |
| 10243-CAA | LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)   | X | 4.66 | 73.35 | 22.88 | 6.98 | 65.0 | ± 9.6 % |
|           |                                            | Y | 4.37 | 72.03 | 22.31 |      | 65.0 |         |
|           |                                            | Z | 4.40 | 73.35 | 23.12 |      | 65.0 |         |
| 10244-CAB | LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)   | X | 2.90 | 67.06 | 13.06 | 3.98 | 65.0 | ± 9.6 % |
|           |                                            | Y | 2.71 | 66.26 | 12.47 |      | 65.0 |         |
|           |                                            | Z | 2.39 | 65.15 | 11.38 |      | 65.0 |         |
| 10245-CAB | LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)   | X | 2.85 | 66.61 | 12.78 | 3.98 | 65.0 | ± 9.6 % |
|           |                                            | Y | 2.68 | 65.84 | 12.20 |      | 65.0 |         |
|           |                                            | Z | 2.36 | 64.77 | 11.12 |      | 65.0 |         |
| 10246-CAB | LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK)     | X | 3.01 | 71.40 | 15.89 | 3.98 | 65.0 | ± 9.6 % |
|           |                                            | Y | 2.36 | 67.99 | 13.82 |      | 65.0 |         |
|           |                                            | Z | 2.41 | 68.64 | 13.94 |      | 65.0 |         |
| 10247-CAD | LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)   | X | 3.36 | 69.51 | 15.75 | 3.98 | 65.0 | ± 9.6 % |
|           |                                            | Y | 2.95 | 67.61 | 14.45 |      | 65.0 |         |
|           |                                            | Z | 2.97 | 68.07 | 14.42 |      | 65.0 |         |
| 10248-CAD | LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)   | X | 3.34 | 68.90 | 15.44 | 3.98 | 65.0 | ± 9.6 % |
|           |                                            | Y | 2.95 | 67.15 | 14.22 |      | 65.0 |         |
|           |                                            | Z | 2.92 | 67.38 | 14.07 |      | 65.0 |         |
| 10249-CAD | LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK)     | X | 4.26 | 76.83 | 19.56 | 3.98 | 65.0 | ± 9.6 % |
|           |                                            | Y | 3.47 | 73.55 | 17.79 |      | 65.0 |         |
|           |                                            | Z | 3.81 | 75.50 | 18.55 |      | 65.0 |         |
| 10250-CAD | LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)  | X | 4.36 | 73.05 | 19.62 | 3.98 | 65.0 | ± 9.6 % |
|           |                                            | Y | 4.02 | 71.77 | 18.85 |      | 65.0 |         |
|           |                                            | Z | 4.18 | 72.90 | 19.29 |      | 65.0 |         |
| 10251-CAD | LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)  | X | 4.16 | 70.97 | 18.24 | 3.98 | 65.0 | ± 9.6 % |
|           |                                            | Y | 3.84 | 69.74 | 17.45 |      | 65.0 |         |
|           |                                            | Z | 3.91 | 70.51 | 17.72 |      | 65.0 |         |
| 10252-CAD | LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK)    | X | 4.83 | 77.80 | 21.42 | 3.98 | 65.0 | ± 9.6 % |
|           |                                            | Y | 4.26 | 75.76 | 20.36 |      | 65.0 |         |
|           |                                            | Z | 4.64 | 77.86 | 21.33 |      | 65.0 |         |
| 10253-CAD | LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)  | X | 4.40 | 70.58 | 18.61 | 3.98 | 65.0 | ± 9.6 % |
|           |                                            | Y | 4.13 | 69.58 | 18.00 |      | 65.0 |         |
|           |                                            | Z | 4.22 | 70.40 | 18.37 |      | 65.0 |         |
| 10254-CAD | LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)  | X | 4.70 | 71.50 | 19.34 | 3.98 | 65.0 | ± 9.6 % |
|           |                                            | Y | 4.41 | 70.53 | 18.77 |      | 65.0 |         |
|           |                                            | Z | 4.51 | 71.38 | 19.13 |      | 65.0 |         |

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|           |                                             |   |      |       |       |      |      |         |
|-----------|---------------------------------------------|---|------|-------|-------|------|------|---------|
| 10255-CAD | LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK)     | X | 4.76 | 74.95 | 20.56 | 3.98 | 65.0 | ± 9.6 % |
|           |                                             | Y | 4.35 | 73.52 | 19.81 |      | 65.0 |         |
|           |                                             | Z | 4.59 | 75.06 | 20.58 |      | 65.0 |         |
| 10256-CAA | LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM) | X | 2.08 | 63.27 | 9.80  | 3.98 | 65.0 | ± 9.6 % |
|           |                                             | Y | 1.95 | 62.60 | 9.21  |      | 65.0 |         |
|           |                                             | Z | 1.70 | 61.73 | 8.15  |      | 65.0 |         |
| 10257-CAA | LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM) | X | 2.07 | 62.91 | 9.50  | 3.98 | 65.0 | ± 9.6 % |
|           |                                             | Y | 1.94 | 62.29 | 8.92  |      | 65.0 |         |
|           |                                             | Z | 1.69 | 61.46 | 7.88  |      | 65.0 |         |
| 10258-CAA | LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)   | X | 2.01 | 65.63 | 11.91 | 3.98 | 65.0 | ± 9.6 % |
|           |                                             | Y | 1.65 | 63.35 | 10.17 |      | 65.0 |         |
|           |                                             | Z | 1.59 | 63.25 | 9.83  |      | 65.0 |         |
| 10259-CAB | LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)   | X | 3.78 | 71.05 | 17.26 | 3.98 | 65.0 | ± 9.6 % |
|           |                                             | Y | 3.37 | 69.33 | 16.13 |      | 65.0 |         |
|           |                                             | Z | 3.46 | 70.13 | 16.31 |      | 65.0 |         |
| 10260-CAB | LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)   | X | 3.81 | 70.78 | 17.12 | 3.98 | 65.0 | ± 9.6 % |
|           |                                             | Y | 3.41 | 69.12 | 16.02 |      | 65.0 |         |
|           |                                             | Z | 3.48 | 69.84 | 16.15 |      | 65.0 |         |
| 10261-CAB | LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK)     | X | 4.32 | 76.55 | 20.03 | 3.98 | 65.0 | ± 9.6 % |
|           |                                             | Y | 3.68 | 73.97 | 18.61 |      | 65.0 |         |
|           |                                             | Z | 4.03 | 75.96 | 19.43 |      | 65.0 |         |
| 10262-CAD | LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)   | X | 4.35 | 72.98 | 19.56 | 3.98 | 65.0 | ± 9.6 % |
|           |                                             | Y | 4.00 | 71.69 | 18.79 |      | 65.0 |         |
|           |                                             | Z | 4.16 | 72.81 | 19.23 |      | 65.0 |         |
| 10263-CAD | LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)   | X | 4.15 | 70.95 | 18.23 | 3.98 | 65.0 | ± 9.6 % |
|           |                                             | Y | 3.83 | 69.72 | 17.45 |      | 65.0 |         |
|           |                                             | Z | 3.90 | 70.49 | 17.72 |      | 65.0 |         |
| 10264-CAD | LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK)     | X | 4.78 | 77.59 | 21.30 | 3.98 | 65.0 | ± 9.6 % |
|           |                                             | Y | 4.21 | 75.55 | 20.24 |      | 65.0 |         |
|           |                                             | Z | 4.59 | 77.63 | 21.21 |      | 65.0 |         |
| 10265-CAD | LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)  | X | 4.45 | 70.90 | 18.87 | 3.98 | 65.0 | ± 9.6 % |
|           |                                             | Y | 4.17 | 69.87 | 18.27 |      | 65.0 |         |
|           |                                             | Z | 4.26 | 70.67 | 18.67 |      | 65.0 |         |
| 10266-CAD | LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)  | X | 4.79 | 71.96 | 19.72 | 3.98 | 65.0 | ± 9.6 % |
|           |                                             | Y | 4.50 | 70.98 | 19.16 |      | 65.0 |         |
|           |                                             | Z | 4.60 | 71.84 | 19.58 |      | 65.0 |         |
| 10267-CAD | LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK)    | X | 4.98 | 75.63 | 20.70 | 3.98 | 65.0 | ± 9.6 % |
|           |                                             | Y | 4.53 | 74.10 | 19.92 |      | 65.0 |         |
|           |                                             | Z | 4.81 | 75.72 | 20.78 |      | 65.0 |         |
| 10268-CAD | LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)  | X | 5.11 | 71.08 | 19.43 | 3.98 | 65.0 | ± 9.6 % |
|           |                                             | Y | 4.84 | 70.20 | 18.97 |      | 65.0 |         |
|           |                                             | Z | 4.92 | 70.93 | 19.36 |      | 65.0 |         |
| 10269-CAD | LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)  | X | 5.13 | 70.76 | 19.32 | 3.98 | 65.0 | ± 9.6 % |
|           |                                             | Y | 4.87 | 69.92 | 18.86 |      | 65.0 |         |
|           |                                             | Z | 4.96 | 70.66 | 19.25 |      | 65.0 |         |
| 10270-CAD | LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK)    | X | 5.11 | 73.33 | 19.86 | 3.98 | 65.0 | ± 9.6 % |
|           |                                             | Y | 4.76 | 72.19 | 19.29 |      | 65.0 |         |
|           |                                             | Z | 4.96 | 73.43 | 19.98 |      | 65.0 |         |

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|           |                                                                    |   |       |        |       |      |       |         |
|-----------|--------------------------------------------------------------------|---|-------|--------|-------|------|-------|---------|
| 10274-CAB | UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.10)                          | X | 2.48  | 66.86  | 14.99 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                                    | Y | 2.30  | 65.90  | 14.17 |      | 150.0 |         |
|           |                                                                    | Z | 2.37  | 66.79  | 14.57 |      | 150.0 |         |
| 10275-CAB | UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.4)                           | X | 1.53  | 68.05  | 15.40 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                                    | Y | 1.32  | 66.12  | 13.91 |      | 150.0 |         |
|           |                                                                    | Z | 1.45  | 67.75  | 14.99 |      | 150.0 |         |
| 10277-CAA | PHS (QPSK)                                                         | X | 1.30  | 58.93  | 4.20  | 9.03 | 50.0  | ± 9.6 % |
|           |                                                                    | Y | 1.32  | 58.56  | 3.87  |      | 50.0  |         |
|           |                                                                    | Z | 1.18  | 58.32  | 3.49  |      | 50.0  |         |
| 10278-CAA | PHS (QPSK, BW 884MHz, Rolloff 0.5)                                 | X | 2.49  | 64.91  | 10.26 | 9.03 | 50.0  | ± 9.6 % |
|           |                                                                    | Y | 2.32  | 63.55  | 9.26  |      | 50.0  |         |
|           |                                                                    | Z | 2.17  | 63.27  | 8.86  |      | 50.0  |         |
| 10279-CAA | PHS (QPSK, BW 884MHz, Rolloff 0.38)                                | X | 2.57  | 65.18  | 10.47 | 9.03 | 50.0  | ± 9.6 % |
|           |                                                                    | Y | 2.38  | 63.76  | 9.44  |      | 50.0  |         |
|           |                                                                    | Z | 2.22  | 63.44  | 9.03  |      | 50.0  |         |
| 10290-AAB | CDMA2000, RC1, SO55, Full Rate                                     | X | 1.01  | 65.74  | 11.23 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                                    | Y | 0.67  | 61.70  | 8.06  |      | 150.0 |         |
|           |                                                                    | Z | 0.69  | 62.65  | 8.67  |      | 150.0 |         |
| 10291-AAB | CDMA2000, RC3, SO55, Full Rate                                     | X | 0.64  | 64.08  | 10.26 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                                    | Y | 0.41  | 60.32  | 6.85  |      | 150.0 |         |
|           |                                                                    | Z | 0.48  | 61.84  | 8.06  |      | 150.0 |         |
| 10292-AAB | CDMA2000, RC3, SO32, Full Rate                                     | X | 0.93  | 69.17  | 13.09 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                                    | Y | 0.46  | 61.72  | 7.96  |      | 150.0 |         |
|           |                                                                    | Z | 0.63  | 65.19  | 10.18 |      | 150.0 |         |
| 10293-AAB | CDMA2000, RC3, SO3, Full Rate                                      | X | 2.58  | 81.84  | 18.38 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                                    | Y | 0.61  | 64.42  | 9.84  |      | 150.0 |         |
|           |                                                                    | Z | 1.45  | 74.16  | 14.40 |      | 150.0 |         |
| 10295-AAB | CDMA2000, RC1, SO3, 1/8th Rate 25 fr.                              | X | 16.38 | 93.11  | 24.71 | 9.03 | 50.0  | ± 9.6 % |
|           |                                                                    | Y | 16.06 | 90.60  | 23.14 |      | 50.0  |         |
|           |                                                                    | Z | 41.75 | 104.48 | 26.91 |      | 50.0  |         |
| 10297-AAC | LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK)                            | X | 2.56  | 69.49  | 16.58 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                                    | Y | 2.33  | 68.15  | 15.68 |      | 150.0 |         |
|           |                                                                    | Z | 2.43  | 69.17  | 16.39 |      | 150.0 |         |
| 10298-AAC | LTE-FDD (SC-FDMA, 50% RB, 3 MHz, QPSK)                             | X | 1.18  | 65.35  | 11.77 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                                    | Y | 0.89  | 62.40  | 9.35  |      | 150.0 |         |
|           |                                                                    | Z | 0.90  | 63.00  | 9.64  |      | 150.0 |         |
| 10299-AAC | LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)                           | X | 1.36  | 63.05  | 9.42  | 0.00 | 150.0 | ± 9.6 % |
|           |                                                                    | Y | 1.26  | 62.26  | 8.62  |      | 150.0 |         |
|           |                                                                    | Z | 1.05  | 61.24  | 7.54  |      | 150.0 |         |
| 10300-AAC | LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)                           | X | 1.15  | 60.99  | 7.59  | 0.00 | 150.0 | ± 9.6 % |
|           |                                                                    | Y | 1.07  | 60.46  | 6.94  |      | 150.0 |         |
|           |                                                                    | Z | 0.89  | 59.75  | 5.99  |      | 150.0 |         |
| 10301-AAA | IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, QPSK, PUSC)                 | X | 4.25  | 64.73  | 16.86 | 4.17 | 50.0  | ± 9.6 % |
|           |                                                                    | Y | 4.21  | 64.78  | 16.74 |      | 50.0  |         |
|           |                                                                    | Z | 4.10  | 64.79  | 16.69 |      | 50.0  |         |
| 10302-AAA | IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, QPSK, PUSC, 3 CTRL symbols) | X | 4.74  | 65.43  | 17.63 | 4.96 | 50.0  | ± 9.6 % |
|           |                                                                    | Y | 4.66  | 65.24  | 17.38 |      | 50.0  |         |
|           |                                                                    | Z | 4.60  | 65.49  | 17.44 |      | 50.0  |         |

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|           |                                                                     |   |      |       |       |       |       |         |
|-----------|---------------------------------------------------------------------|---|------|-------|-------|-------|-------|---------|
| 10303-AAA | IEEE 802.16e WiMAX (31:15, 5ms, 10MHz, 64QAM, PUSC)                 | X | 4.49 | 65.00 | 17.39 | 4.96  | 50.0  | ± 9.6 % |
|           |                                                                     | Y | 4.44 | 65.13 | 17.34 |       | 50.0  |         |
|           |                                                                     | Z | 4.36 | 65.13 | 17.21 |       | 50.0  |         |
| 10304-AAA | IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, 64QAM, PUSC)                 | X | 4.34 | 65.04 | 16.98 | 4.17  | 50.0  | ± 9.6 % |
|           |                                                                     | Y | 4.25 | 64.81 | 16.70 |       | 50.0  |         |
|           |                                                                     | Z | 4.21 | 65.16 | 16.81 |       | 50.0  |         |
| 10305-AAA | IEEE 802.16e WiMAX (31:15, 10ms, 10MHz, 64QAM, PUSC, 15 symbols)    | X | 3.71 | 65.40 | 17.85 | 6.02  | 35.0  | ± 9.6 % |
|           |                                                                     | Y | 3.72 | 65.71 | 17.67 |       | 35.0  |         |
|           |                                                                     | Z | 3.59 | 65.50 | 17.36 |       | 35.0  |         |
| 10306-AAA | IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 64QAM, PUSC, 18 symbols)    | X | 4.14 | 65.15 | 17.96 | 6.02  | 35.0  | ± 9.6 % |
|           |                                                                     | Y | 4.12 | 65.33 | 17.82 |       | 35.0  |         |
|           |                                                                     | Z | 4.02 | 65.33 | 17.66 |       | 35.0  |         |
| 10307-AAA | IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, QPSK, PUSC, 18 symbols)     | X | 4.01 | 65.07 | 17.81 | 6.02  | 35.0  | ± 9.6 % |
|           |                                                                     | Y | 3.99 | 65.26 | 17.66 |       | 35.0  |         |
|           |                                                                     | Z | 3.89 | 65.22 | 17.49 |       | 35.0  |         |
| 10308-AAA | IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 16QAM, PUSC)                | X | 3.97 | 65.21 | 17.93 | 6.02  | 35.0  | ± 9.6 % |
|           |                                                                     | Y | 3.96 | 65.42 | 17.79 |       | 35.0  |         |
|           |                                                                     | Z | 3.86 | 65.37 | 17.62 |       | 35.0  |         |
| 10309-AAA | IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 16QAM, AMC 2x3, 18 symbols) | X | 4.16 | 65.22 | 18.05 | 6.02  | 35.0  | ± 9.6 % |
|           |                                                                     | Y | 4.14 | 65.39 | 17.90 |       | 35.0  |         |
|           |                                                                     | Z | 4.03 | 65.36 | 17.74 |       | 35.0  |         |
| 10310-AAA | IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, QPSK, AMC 2x3, 18 symbols)  | X | 4.09 | 65.15 | 17.92 | 6.02  | 35.0  | ± 9.6 % |
|           |                                                                     | Y | 4.07 | 65.35 | 17.79 |       | 35.0  |         |
|           |                                                                     | Z | 3.97 | 65.35 | 17.65 |       | 35.0  |         |
| 10311-AAC | LTE-FDD (SC-FDMA, 100% RB, 15 MHz, QPSK)                            | X | 2.92 | 68.73 | 16.23 | 0.00  | 150.0 | ± 9.6 % |
|           |                                                                     | Y | 2.68 | 67.45 | 15.43 |       | 150.0 |         |
|           |                                                                     | Z | 2.78 | 68.38 | 16.08 |       | 150.0 |         |
| 10313-AAA | iDEN 1:3                                                            | X | 2.23 | 70.71 | 15.35 | 6.99  | 70.0  | ± 9.6 % |
|           |                                                                     | Y | 1.69 | 66.90 | 13.17 |       | 70.0  |         |
|           |                                                                     | Z | 2.30 | 71.64 | 15.93 |       | 70.0  |         |
| 10314-AAA | iDEN 1:6                                                            | X | 4.08 | 80.89 | 22.31 | 10.00 | 30.0  | ± 9.6 % |
|           |                                                                     | Y | 3.04 | 75.07 | 19.42 |       | 30.0  |         |
|           |                                                                     | Z | 4.65 | 83.62 | 23.48 |       | 30.0  |         |
| 10315-AAB | IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 96pc duty cycle)           | X | 1.04 | 63.55 | 14.98 | 0.17  | 150.0 | ± 9.6 % |
|           |                                                                     | Y | 0.94 | 62.52 | 14.02 |       | 150.0 |         |
|           |                                                                     | Z | 1.03 | 63.50 | 14.81 |       | 150.0 |         |
| 10316-AAB | IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 96pc duty cycle)       | X | 4.37 | 66.68 | 16.19 | 0.17  | 150.0 | ± 9.6 % |
|           |                                                                     | Y | 4.26 | 66.34 | 15.95 |       | 150.0 |         |
|           |                                                                     | Z | 4.26 | 66.72 | 16.11 |       | 150.0 |         |
| 10317-AAC | IEEE 802.11a WiFi 5 GHz (OFDM, 6 Mbps, 96pc duty cycle)             | X | 4.37 | 66.68 | 16.19 | 0.17  | 150.0 | ± 9.6 % |
|           |                                                                     | Y | 4.26 | 66.34 | 15.95 |       | 150.0 |         |
|           |                                                                     | Z | 4.26 | 66.72 | 16.11 |       | 150.0 |         |
| 10400-AAD | IEEE 802.11ac WiFi (20MHz, 64-QAM, 99pc duty cycle)                 | X | 4.46 | 67.02 | 16.23 | 0.00  | 150.0 | ± 9.6 % |
|           |                                                                     | Y | 4.33 | 66.64 | 15.97 |       | 150.0 |         |
|           |                                                                     | Z | 4.31 | 66.98 | 16.13 |       | 150.0 |         |
| 10401-AAD | IEEE 802.11ac WiFi (40MHz, 64-QAM, 99pc duty cycle)                 | X | 5.12 | 66.82 | 16.24 | 0.00  | 150.0 | ± 9.6 % |
|           |                                                                     | Y | 5.01 | 66.51 | 16.06 |       | 150.0 |         |
|           |                                                                     | Z | 4.99 | 66.73 | 16.17 |       | 150.0 |         |

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|           |                                                                                 |   |        |        |       |      |       |         |
|-----------|---------------------------------------------------------------------------------|---|--------|--------|-------|------|-------|---------|
| 10402-AAD | IEEE 802.11ac WiFi (80MHz, 64-QAM, 99pc duty cycle)                             | X | 5.47   | 67.39  | 16.42 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                                                 | Y | 5.37   | 67.08  | 16.25 |      | 150.0 |         |
|           |                                                                                 | Z | 5.37   | 67.35  | 16.39 |      | 150.0 |         |
| 10403-AAB | CDMA2000 (1xEV-DO, Rev. 0)                                                      | X | 1.01   | 65.74  | 11.23 | 0.00 | 115.0 | ± 9.6 % |
|           |                                                                                 | Y | 0.67   | 61.70  | 8.06  |      | 115.0 |         |
|           |                                                                                 | Z | 0.69   | 62.65  | 8.67  |      | 115.0 |         |
| 10404-AAB | CDMA2000 (1xEV-DO, Rev. A)                                                      | X | 1.01   | 65.74  | 11.23 | 0.00 | 115.0 | ± 9.6 % |
|           |                                                                                 | Y | 0.67   | 61.70  | 8.06  |      | 115.0 |         |
|           |                                                                                 | Z | 0.69   | 62.65  | 8.67  |      | 115.0 |         |
| 10406-AAB | CDMA2000, RC3, SO32, SCH0, Full Rate                                            | X | 13.40  | 94.87  | 22.42 | 0.00 | 100.0 | ± 9.6 % |
|           |                                                                                 | Y | 37.24  | 104.89 | 24.38 |      | 100.0 |         |
|           |                                                                                 | Z | 100.00 | 114.79 | 25.79 |      | 100.0 |         |
| 10410-AAD | LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9, Subframe Conf=4) | X | 2.95   | 79.35  | 18.40 | 3.23 | 80.0  | ± 9.6 % |
|           |                                                                                 | Y | 3.69   | 82.30  | 19.32 |      | 80.0  |         |
|           |                                                                                 | Z | 3.87   | 84.90  | 20.56 |      | 80.0  |         |
| 10415-AAA | IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 99pc duty cycle)                       | X | 1.00   | 63.14  | 14.62 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                                                 | Y | 0.91   | 62.12  | 13.65 |      | 150.0 |         |
|           |                                                                                 | Z | 0.99   | 63.08  | 14.44 |      | 150.0 |         |
| 10416-AAA | IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 99pc duty cycle)                   | X | 4.35   | 66.77  | 16.19 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                                                 | Y | 4.23   | 66.41  | 15.93 |      | 150.0 |         |
|           |                                                                                 | Z | 4.24   | 66.81  | 16.11 |      | 150.0 |         |
| 10417-AAB | IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps, 99pc duty cycle)                       | X | 4.35   | 66.77  | 16.19 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                                                 | Y | 4.23   | 66.41  | 15.93 |      | 150.0 |         |
|           |                                                                                 | Z | 4.24   | 66.81  | 16.11 |      | 150.0 |         |
| 10418-AAA | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc duty cycle, Long preamble)   | X | 4.35   | 66.98  | 16.25 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                                                 | Y | 4.23   | 66.61  | 15.99 |      | 150.0 |         |
|           |                                                                                 | Z | 4.23   | 67.03  | 16.19 |      | 150.0 |         |
| 10419-AAA | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc duty cycle, Short preamble)  | X | 4.36   | 66.91  | 16.23 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                                                 | Y | 4.24   | 66.55  | 15.97 |      | 150.0 |         |
|           |                                                                                 | Z | 4.25   | 66.96  | 16.17 |      | 150.0 |         |
| 10422-AAB | IEEE 802.11n (HT Greenfield, 7.2 Mbps, BPSK)                                    | X | 4.47   | 66.89  | 16.24 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                                                 | Y | 4.35   | 66.53  | 15.99 |      | 150.0 |         |
|           |                                                                                 | Z | 4.35   | 66.92  | 16.18 |      | 150.0 |         |
| 10423-AAB | IEEE 802.11n (HT Greenfield, 43.3 Mbps, 16-QAM)                                 | X | 4.59   | 67.14  | 16.33 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                                                 | Y | 4.47   | 66.78  | 16.08 |      | 150.0 |         |
|           |                                                                                 | Z | 4.46   | 67.16  | 16.25 |      | 150.0 |         |
| 10424-AAB | IEEE 802.11n (HT Greenfield, 72.2 Mbps, 64-QAM)                                 | X | 4.52   | 67.09  | 16.31 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                                                 | Y | 4.40   | 66.73  | 16.05 |      | 150.0 |         |
|           |                                                                                 | Z | 4.39   | 67.09  | 16.23 |      | 150.0 |         |
| 10425-AAB | IEEE 802.11n (HT Greenfield, 15 Mbps, BPSK)                                     | X | 5.15   | 67.27  | 16.49 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                                                 | Y | 5.05   | 66.98  | 16.31 |      | 150.0 |         |
|           |                                                                                 | Z | 5.01   | 67.17  | 16.41 |      | 150.0 |         |
| 10426-AAB | IEEE 802.11n (HT Greenfield, 90 Mbps, 16-QAM)                                   | X | 5.17   | 67.36  | 16.53 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                                                 | Y | 5.08   | 67.12  | 16.38 |      | 150.0 |         |
|           |                                                                                 | Z | 5.05   | 67.33  | 16.49 |      | 150.0 |         |

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|           |                                                                |   |      |       |       |      |       |         |
|-----------|----------------------------------------------------------------|---|------|-------|-------|------|-------|---------|
| 10427-AAB | IEEE 802.11n (HT Greenfield, 150 Mbps, 64-QAM)                 | X | 5.13 | 67.15 | 16.42 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                                | Y | 5.03 | 66.85 | 16.24 |      | 150.0 |         |
|           |                                                                | Z | 5.01 | 67.11 | 16.38 |      | 150.0 |         |
| 10430-AAB | LTE-FDD (OFDMA, 5 MHz, E-TM 3.1)                               | X | 4.23 | 72.27 | 18.34 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                                | Y | 3.99 | 71.49 | 17.71 |      | 150.0 |         |
|           |                                                                | Z | 4.17 | 72.80 | 18.15 |      | 150.0 |         |
| 10431-AAB | LTE-FDD (OFDMA, 10 MHz, E-TM 3.1)                              | X | 3.96 | 67.36 | 16.06 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                                | Y | 3.81 | 66.88 | 15.67 |      | 150.0 |         |
|           |                                                                | Z | 3.81 | 67.37 | 15.87 |      | 150.0 |         |
| 10432-AAB | LTE-FDD (OFDMA, 15 MHz, E-TM 3.1)                              | X | 4.29 | 67.19 | 16.23 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                                | Y | 4.15 | 66.79 | 15.93 |      | 150.0 |         |
|           |                                                                | Z | 4.15 | 67.22 | 16.13 |      | 150.0 |         |
| 10433-AAB | LTE-FDD (OFDMA, 20 MHz, E-TM 3.1)                              | X | 4.54 | 67.13 | 16.33 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                                | Y | 4.42 | 66.76 | 16.08 |      | 150.0 |         |
|           |                                                                | Z | 4.41 | 67.14 | 16.25 |      | 150.0 |         |
| 10434-AAA | W-CDMA (BS Test Model 1, 64 DPCH)                              | X | 4.34 | 73.15 | 18.13 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                                | Y | 3.97 | 71.83 | 17.20 |      | 150.0 |         |
|           |                                                                | Z | 4.17 | 73.19 | 17.60 |      | 150.0 |         |
| 10435-AAC | LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9) | X | 2.84 | 78.74 | 18.13 | 3.23 | 80.0  | ± 9.6 % |
|           |                                                                | Y | 3.48 | 81.45 | 18.98 |      | 80.0  |         |
|           |                                                                | Z | 3.64 | 83.98 | 20.20 |      | 80.0  |         |
| 10447-AAB | LTE-FDD (OFDMA, 5 MHz, E-TM 3.1, Clipping 44%)                 | X | 3.20 | 67.15 | 14.91 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                                | Y | 2.99 | 66.28 | 14.17 |      | 150.0 |         |
|           |                                                                | Z | 2.97 | 66.77 | 14.26 |      | 150.0 |         |
| 10448-AAB | LTE-FDD (OFDMA, 10 MHz, E-TM 3.1, Clipping 44%)                | X | 3.83 | 67.16 | 15.94 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                                | Y | 3.68 | 66.67 | 15.55 |      | 150.0 |         |
|           |                                                                | Z | 3.69 | 67.18 | 15.75 |      | 150.0 |         |
| 10449-AAB | LTE-FDD (OFDMA, 15 MHz, E-TM 3.1, Clipping 44%)                | X | 4.13 | 67.03 | 16.13 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                                | Y | 4.00 | 66.61 | 15.83 |      | 150.0 |         |
|           |                                                                | Z | 4.00 | 67.05 | 16.03 |      | 150.0 |         |
| 10450-AAB | LTE-FDD (OFDMA, 20 MHz, E-TM 3.1, Clipping 44%)                | X | 4.34 | 66.91 | 16.19 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                                | Y | 4.22 | 66.53 | 15.92 |      | 150.0 |         |
|           |                                                                | Z | 4.23 | 66.92 | 16.11 |      | 150.0 |         |
| 10451-AAA | W-CDMA (BS Test Model 1, 64 DPCH, Clipping 44%)                | X | 2.99 | 66.88 | 14.14 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                                | Y | 2.74 | 65.78 | 13.23 |      | 150.0 |         |
|           |                                                                | Z | 2.69 | 66.07 | 13.18 |      | 150.0 |         |
| 10456-AAB | IEEE 802.11ac WiFi (160MHz, 64-QAM, 99pc duty cycle)           | X | 6.06 | 67.78 | 16.63 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                                | Y | 6.00 | 67.55 | 16.51 |      | 150.0 |         |
|           |                                                                | Z | 6.07 | 68.05 | 16.78 |      | 150.0 |         |
| 10457-AAA | UMTS-FDD (DC-HSDPA)                                            | X | 3.71 | 65.53 | 15.92 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                                | Y | 3.61 | 65.20 | 15.66 |      | 150.0 |         |
|           |                                                                | Z | 3.65 | 65.68 | 15.87 |      | 150.0 |         |
| 10458-AAA | CDMA2000 (1xEV-DO, Rev. B, 2 carriers)                         | X | 3.70 | 71.13 | 16.64 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                                | Y | 3.25 | 69.16 | 15.28 |      | 150.0 |         |
|           |                                                                | Z | 3.15 | 69.17 | 14.95 |      | 150.0 |         |
| 10459-AAA | CDMA2000 (1xEV-DO, Rev. B, 3 carriers)                         | X | 4.84 | 69.11 | 17.84 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                                | Y | 4.69 | 68.77 | 17.48 |      | 150.0 |         |
|           |                                                                | Z | 4.58 | 68.84 | 17.14 |      | 150.0 |         |

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|-----------|-------------------------------------------------------------------|---|------|-------|-------|------|-------|---------|
| 10460-AAA | UMTS-FDD (WCDMA, AMR)                                             | X | 0.88 | 68.39 | 16.07 | 0.00 | 150.0 | ± 9.6 % |
|           |                                                                   | Y | 0.70 | 65.56 | 13.77 |      | 150.0 |         |
|           |                                                                   | Z | 0.84 | 67.99 | 15.62 |      | 150.0 |         |
| 10461-AAA | LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9)   | X | 1.57 | 72.49 | 16.91 | 3.29 | 80.0  | ± 9.6 % |
|           |                                                                   | Y | 2.31 | 77.86 | 18.85 |      | 80.0  |         |
|           |                                                                   | Z | 1.89 | 76.90 | 18.97 |      | 80.0  |         |
| 10462-AAA | LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9) | X | 0.65 | 60.00 | 7.36  | 3.23 | 80.0  | ± 9.6 % |
|           |                                                                   | Y | 0.67 | 60.00 | 7.26  |      | 80.0  |         |
|           |                                                                   | Z | 0.57 | 60.00 | 7.02  |      | 80.0  |         |
| 10463-AAA | LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9) | X | 0.67 | 60.00 | 6.67  | 3.23 | 80.0  | ± 9.6 % |
|           |                                                                   | Y | 0.68 | 60.00 | 6.58  |      | 80.0  |         |
|           |                                                                   | Z | 0.60 | 60.00 | 6.22  |      | 80.0  |         |
| 10464-AAA | LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9)     | X | 1.23 | 69.24 | 14.93 | 3.23 | 80.0  | ± 9.6 % |
|           |                                                                   | Y | 1.59 | 72.66 | 16.19 |      | 80.0  |         |
|           |                                                                   | Z | 1.42 | 72.83 | 16.69 |      | 80.0  |         |
| 10465-AAA | LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)   | X | 0.65 | 60.00 | 7.28  | 3.23 | 80.0  | ± 9.6 % |
|           |                                                                   | Y | 0.67 | 60.00 | 7.19  |      | 80.0  |         |
|           |                                                                   | Z | 0.57 | 60.00 | 6.95  |      | 80.0  |         |
| 10466-AAA | LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)   | X | 0.67 | 60.00 | 6.62  | 3.23 | 80.0  | ± 9.6 % |
|           |                                                                   | Y | 0.69 | 60.00 | 6.54  |      | 80.0  |         |
|           |                                                                   | Z | 0.60 | 60.00 | 6.18  |      | 80.0  |         |
| 10467-AAC | LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9)     | X | 1.28 | 69.83 | 15.22 | 3.23 | 80.0  | ± 9.6 % |
|           |                                                                   | Y | 1.71 | 73.64 | 16.62 |      | 80.0  |         |
|           |                                                                   | Z | 1.51 | 73.74 | 17.10 |      | 80.0  |         |
| 10468-AAC | LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)   | X | 0.65 | 60.00 | 7.31  | 3.23 | 80.0  | ± 9.6 % |
|           |                                                                   | Y | 0.66 | 60.00 | 7.22  |      | 80.0  |         |
|           |                                                                   | Z | 0.57 | 60.00 | 6.98  |      | 80.0  |         |
| 10469-AAC | LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)   | X | 0.67 | 60.00 | 6.62  | 3.23 | 80.0  | ± 9.6 % |
|           |                                                                   | Y | 0.68 | 60.00 | 6.54  |      | 80.0  |         |
|           |                                                                   | Z | 0.60 | 60.00 | 6.18  |      | 80.0  |         |
| 10470-AAC | LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)    | X | 1.27 | 69.83 | 15.21 | 3.23 | 80.0  | ± 9.6 % |
|           |                                                                   | Y | 1.71 | 73.66 | 16.62 |      | 80.0  |         |
|           |                                                                   | Z | 1.50 | 73.77 | 17.11 |      | 80.0  |         |
| 10471-AAC | LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)  | X | 0.65 | 60.00 | 7.29  | 3.23 | 80.0  | ± 9.6 % |
|           |                                                                   | Y | 0.66 | 60.00 | 7.20  |      | 80.0  |         |
|           |                                                                   | Z | 0.57 | 60.00 | 6.96  |      | 80.0  |         |
| 10472-AAC | LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)  | X | 0.67 | 60.00 | 6.60  | 3.23 | 80.0  | ± 9.6 % |
|           |                                                                   | Y | 0.68 | 60.00 | 6.52  |      | 80.0  |         |
|           |                                                                   | Z | 0.31 | 55.91 | 4.03  |      | 80.0  |         |
| 10473-AAC | LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9)    | X | 1.27 | 69.80 | 15.19 | 3.23 | 80.0  | ± 9.6 % |
|           |                                                                   | Y | 1.70 | 73.59 | 16.59 |      | 80.0  |         |
|           |                                                                   | Z | 1.50 | 73.71 | 17.08 |      | 80.0  |         |
| 10474-AAC | LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)  | X | 0.65 | 60.00 | 7.29  | 3.23 | 80.0  | ± 9.6 % |
|           |                                                                   | Y | 0.66 | 60.00 | 7.20  |      | 80.0  |         |
|           |                                                                   | Z | 0.57 | 60.00 | 6.96  |      | 80.0  |         |
| 10475-AAC | LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)  | X | 0.67 | 60.00 | 6.60  | 3.23 | 80.0  | ± 9.6 % |
|           |                                                                   | Y | 0.68 | 60.00 | 6.52  |      | 80.0  |         |
|           |                                                                   | Z | 0.31 | 55.90 | 4.03  |      | 80.0  |         |

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