



## ***RF-Emission Test Report***

**Report No:** HR/2020/30023  
**Applicant:** Reliance Communications, LLC  
**Manufacturer:** Unimaxcomm  
**Factory:** Yibin Zhengjiyuan Intelligent Tecnology Co.,Ltd.  
**Product Name:** Smart phone  
**Model No.(EUT):** RC545L  
**Trade Mark:** Orbic  
**FCC ID:** 2ABGH-RC545L  
**Standards:** ANSI C63.19-2011  
CFR 47 FCC Part 20  
**Date of Receipt:** 2020-04-17  
**Date of Test:** 2020-04-20 to 2020-04-20  
**Date of Issue:** 2020-05-07  
**Test conclusion:** **PASS \***

\* In the configuration tested, the EUT detailed in this report complied with the standards specified above.

Authorized Signature:

Derek Yang

Wireless Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.



## **REVISION HISTORY**

| Revision Record |         |            |          |          |
|-----------------|---------|------------|----------|----------|
| Version         | Chapter | Date       | Modifier | Remark   |
| 01              |         | 2020-05-07 |          | Original |
|                 |         |            |          |          |
|                 |         |            |          |          |



## TEST SUMMARY

| Frequency Band        | HAC RF Emission Test result* |       | M-rating |
|-----------------------|------------------------------|-------|----------|
| GSM850                | E-Field dB(V/m)              | 34.03 | M4       |
| GSM1900               | E-Field dB(V/m)              | 25.92 | M4       |
| WCDMA Band II         | E-Field dB(V/m)              | /     | M4       |
| WCDMA Band V          | E-Field dB(V/m)              | /     | M4       |
| LTE Band 2            | E-Field dB(V/m)              | /     | M4       |
| LTE Band 4            | E-Field dB(V/m)              | /     | M4       |
| LTE Band 5            | E-Field dB(V/m)              | /     | M4       |
| LTE Band 13           | E-Field dB(V/m)              | /     | M4       |
| WiFi 2.4G             | E-Field dB(V/m)              | /     | M4       |
| HAC Rate Category: M4 |                              |       |          |

**Note:**

1) This portable wireless equipment has been shown to be hearing-aid compatible under the above rated category, specified in ANSI/IEEE Std.C63.19-2011 and had been tested in accordance with the specified measurement procedures, Hear-Aid Compatibility is based on the assumption that all production units will be designed electrically identical to the device tested in this report. Test results reported herein relate only to the item(s) tested and are for North American Bands only.

2) \*- HAC RF Emission Test for low power exemption according to ANSI C63.19-2011 and HAC RF Emission rating is M4 (Refer to Section 9.3 for details).

**Approved & Released by**

Simon Ling

HAC Manager

**Tested by**

Gavin Gao

HAC Engineer



## CONTENTS

|           |                                                           |           |
|-----------|-----------------------------------------------------------|-----------|
| <b>1</b>  | <b>GENERAL INFORMATION .....</b>                          | <b>5</b>  |
| 1.1       | Introduction .....                                        | 5         |
| 1.2       | Details of Client .....                                   | 5         |
| 1.3       | Test Location .....                                       | 6         |
| 1.4       | Test Facility .....                                       | 6         |
| 1.5       | General Description of EUT .....                          | 7         |
| 1.5.1     | DUT Antenna Locations(Front view) .....                   | 8         |
| 1.5.2     | List of air interfaces/frequency bands .....              | 9         |
| 1.6       | Test Specification .....                                  | 10        |
| 1.7       | ANSI C63.19-2011 limits .....                             | 10        |
| <b>2</b>  | <b>CALIBRATION CERTIFICATE .....</b>                      | <b>10</b> |
| <b>3</b>  | <b>HAC (T COIL) MEASUREMENT SYSTEM .....</b>              | <b>11</b> |
| 3.1       | Measurement System Diagram for SPEAG Robotic .....        | 11        |
| 3.2       | E-Field Probe .....                                       | 12        |
| 3.3       | Test Arch .....                                           | 12        |
| 3.4       | Phone Holder .....                                        | 12        |
| <b>4</b>  | <b>MEASUREMENT UNCERTAINTY EVALUATION .....</b>           | <b>13</b> |
| <b>5</b>  | <b>RF EMISSION MEASUREMENTS REFERENCE AND PLANE .....</b> | <b>14</b> |
| <b>6</b>  | <b>SYSTEM VERIFICATION PROCEDURE .....</b>                | <b>15</b> |
| 6.1       | System Check .....                                        | 15        |
| 6.2       | System Check Result .....                                 | 15        |
| <b>7</b>  | <b>MODULATION INTERFERENCE FACTOR .....</b>               | <b>16</b> |
| <b>8</b>  | <b>HAC MEASUREMENT PROCEDURE .....</b>                    | <b>17</b> |
| <b>9</b>  | <b>HAC RF MEASUREMENT RESULTS .....</b>                   | <b>18</b> |
| 9.1       | Max Tune-up .....                                         | 18        |
| 9.2       | Conducted RF Output Power .....                           | 19        |
| 9.3       | Low-power Exemption .....                                 | 20        |
| 9.4       | HAC RF Emission Test Results .....                        | 21        |
| <b>10</b> | <b>EQUIPMENT LIST .....</b>                               | <b>22</b> |
| <b>11</b> | <b>CALIBRATION CERTIFICATE .....</b>                      | <b>23</b> |
| <b>12</b> | <b>PHOTOGRAPHS .....</b>                                  | <b>23</b> |
|           | <b>APPENDIX A: DETAILED SYSTEM CHECK RESULTS .....</b>    | <b>23</b> |
|           | <b>APPENDIX B: DETAILED TEST RESULTS .....</b>            | <b>23</b> |
|           | <b>APPENDIX C: CALIBRATION CERTIFICATE .....</b>          | <b>23</b> |
|           | <b>APPENDIX D: PHOTOGRAPHS .....</b>                      | <b>23</b> |



## **1 General Information**

### **1.1 Introduction**

The purpose of the Hearing Aid Compatibility is to enable measurements of the near electric fields generated by wireless communication devices in the region controlled for use by a hearing aid in accordance with ANSI-C63.19-2011

The purpose of this standard is to establish categories for hearing aids and for WD (wireless communications devices) that can indicate to health care practitioners and hearing aid users which hearing aids are compatible with which WD, and to provide tests that can be used to assess the electromagnetic characteristics of hearing aids and WD and assign them to these categories. The various parameters required, in order to demonstrate compatibility and accessibility are measured. The design of the standard is such that when a hearing aid and WD achieve one of the categories specified, as measured by the methodology of this standard, the indicated performance is realized.

In order to provide for the usability of a hearing aid with a WD, several factors must be coordinated:

a) Radio frequency (RF) measurements of the near-field electric fields emitted by a WD to categorize these emissions for correlation with the RF immunity of a hearing aid.

Hence, the following are measurements made for the WD:

RF E-Field emissions

The measurement plane is parallel to, and 1.5cm in front of, the reference plane.

Applications for certification of equipment operation under part 20, that a manufacturer is seeking to certify as hearing aid compatible, as set forth in §20.19 of that part, shall include a statement indication compliance with the test requirements of §20.19 and indicating the appropriate U-rating for the equipment. The manufacturer of the equipment shall be responsible for maintaining the test results.

### **1.2 Details of Client**

|               |                                                                                                                     |
|---------------|---------------------------------------------------------------------------------------------------------------------|
| Applicant:    | Reliance Communications, LLC                                                                                        |
| Address:      | 91 Colin Drive, Unit 1 Holbrook, NY 11741                                                                           |
| Manufacturer: | Unimaxcomm                                                                                                          |
| Address:      | Room 602, Floor 6th, Building B, Software Park T3,Hi-Tech Park South, Nanshan District, Shenzhen, P.R. China 518057 |
| Factory:      | Yibin Zhengjiyuan Intelligent Tecnology Co.,Ltd.                                                                    |
| Address:      | No.71 West Gangyuan Road,Lingang Economic Development Zone,Yibin ,Sichuan Province 644000 P.R.China                 |



### 1.3 Test Location

|            |                                                                                                                                                       |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| Company:   | SGS-CSTC Standards Technical Services Co., Ltd. Xi'an Branch                                                                                          |
| Address:   | Single floor D, building 1, Kanghong orange square science and technology park, No.137 keyuan 3rd road, fengdong new town, Xi 'an city, shaanxi China |
| Post code: | 710086                                                                                                                                                |
| Telephone: | +86 (0) 29 6282 7885                                                                                                                                  |
| Fax:       | +86 (0) 29 6282 7885                                                                                                                                  |
| E-mail:    | <a href="mailto:ee.xian@sgs.com">ee.xian@sgs.com</a>                                                                                                  |

### 1.4 Test Facility

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

- **A2LA (Certificate No. 4854.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Xi'an Branch is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 4854.01.

- **FCC –Designation Number: CN1271**

SGS-CSTC Standards Technical Services Co., Ltd., Xi'an Branch has been recognized as an accredited testing laboratory.

Designation Number: CN1271. Test Firm Registration Number: 637380.

- **Innovation, Science and Economic Development Canada**

SGS-CSTC Standards Technical Services Co., Ltd., Xi'an Branch has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0095

ISED#: 25613.



## 1.5 General Description of EUT

|                                   |                                                                                                                                                  |                                        |           |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|-----------|
| Product Name:                     | Smart phone                                                                                                                                      |                                        |           |
| Model No.(EUT):                   | RC545L                                                                                                                                           |                                        |           |
| Trade Mark:                       | Orbic                                                                                                                                            |                                        |           |
| Device Type :                     | portable device                                                                                                                                  |                                        |           |
| Exposure Category:                | uncontrolled environment / general population                                                                                                    |                                        |           |
| Product Phase:                    | production unit                                                                                                                                  |                                        |           |
| FCC ID:                           | 2ABGH-RC545L                                                                                                                                     |                                        |           |
| SN:                               | 5a67ceb9                                                                                                                                         |                                        |           |
| Hardware Version:                 | V1.1                                                                                                                                             |                                        |           |
| Software Version:                 | ORB545L_V.1.0.7_BVZPP                                                                                                                            |                                        |           |
| Antenna Type:                     | Inner Antenna                                                                                                                                    |                                        |           |
| Device Operating Configurations : |                                                                                                                                                  |                                        |           |
| Modulation Mode:                  | <b>GSM:</b> GMSK, 8PSK; <b>WCDMA:</b> QPSK, 16QAM(HSPA+); <b>LTE:</b> QPSK,16QAM<br><b>WIFI:</b> DSSS, OFDM <b>BT:</b> GFSK, $\pi/4$ DQPSK,8DPSK |                                        |           |
| Device Class:                     | B                                                                                                                                                |                                        |           |
| GPRS Multi-slots Class:           | 12                                                                                                                                               | EGPRS Multi-slots Class:               | 12        |
| HSDPA UE Category:                | 14                                                                                                                                               | HSUPA UE Category                      | 7         |
| DC-HSDPA UE Category:             | 24                                                                                                                                               |                                        |           |
| Power Class                       | 4,tested with power level 5(GSM850)                                                                                                              |                                        |           |
|                                   | 1,tested with power level 0(GSM1900)                                                                                                             |                                        |           |
|                                   | 3, tested with power control “all 1”(WCDMA Band II/V)                                                                                            |                                        |           |
|                                   | 3, tested with power control Max Power(LTE Band 2/4/5/13)                                                                                        |                                        |           |
| Frequency Bands:                  | Band                                                                                                                                             | Tx (MHz)                               | Rx (MHz)  |
|                                   | GSM850                                                                                                                                           | 824~849                                | 869~894   |
|                                   | GSM1900                                                                                                                                          | 1850~1910                              | 1930~1990 |
|                                   | WCDMA Band II                                                                                                                                    | 1850~1910                              | 1930~1990 |
|                                   | WCDMA Band V                                                                                                                                     | 824~849                                | 869~894   |
|                                   | LTE Band 2                                                                                                                                       | 1850~1910                              | 1930~1990 |
|                                   | LTE Band 4                                                                                                                                       | 1710~1755                              | 2110~2155 |
|                                   | LTE Band 5                                                                                                                                       | 824~849                                | 869~894   |
|                                   | LTE Band 13                                                                                                                                      | 777~787                                | 746~756   |
|                                   | WIFI 2.4G                                                                                                                                        | 2412~2462                              | 2412~2462 |
|                                   | Bluetooth                                                                                                                                        | 2402~2480                              | 2402~2480 |
| Battery Information:              | Model:                                                                                                                                           | BTE-3002                               |           |
|                                   | Normal Voltage:                                                                                                                                  | +3.85V                                 |           |
|                                   | Rated capacity:                                                                                                                                  | 3000mAh                                |           |
|                                   | Manufacturer:                                                                                                                                    | Phenix New Energy (Hui Zhou) Co., Ltd. |           |

### 1.5.1 DUT Antenna Locations(Front view)





### 1.5.2 List of air interfaces/frequency bands

| Air- Interface | Band (MHZ) | Type | ANSI C63.19 Tested | Simultaneous Transmitter | Name of Voice Service  | Power Reduction |
|----------------|------------|------|--------------------|--------------------------|------------------------|-----------------|
| GSM            | 850        | VO   | Yes                | BT or Wi-Fi              | CMRS Voice             | NA              |
|                | 1900       |      |                    |                          |                        |                 |
|                | GPRS/EGPRS | VD   | Yes                | BT or Wi-Fi              | Google Duo*            |                 |
| WCDMA          | Band II    | VO   | No <sup>(1)</sup>  | BT or Wi-Fi              | CMRS Voice             | NA              |
|                | Band V     |      |                    |                          |                        |                 |
|                | HSPA       | VD   | No <sup>(1)</sup>  | BT or Wi-Fi              | Google Duo*            |                 |
| LTE FDD        | Band 2     | VD   | No <sup>(1)</sup>  | BT or Wi-Fi              | VoLTE<br>Google Duo*   | NA              |
|                | Band 4     |      |                    |                          |                        |                 |
|                | Band 5     |      |                    |                          |                        |                 |
|                | Band 13    |      |                    |                          |                        |                 |
| Wi-Fi          | 2450       | VD   | No <sup>(1)</sup>  | WWAN                     | VoWiFi*<br>Google Duo* | NA              |
| BT             | 2450       | DT   | No                 | WWAN                     | NA                     | NA              |

VO: Legacy Cellular Voice Service from Table 7.1 in 7.4.2.1 of ANSI C63.19-2011

DT: Digital Transport (no voice)

VD: IP Voice Service over Digital Transport

**Remark:**

1. The air interface is exempted from testing by low power exemption that its average antenna input power plus its MIF is  $\leq 17$  dBm, and is rated as M4.



## 1.6 Test Specification

| Identity           | Document Title                                                                                                |
|--------------------|---------------------------------------------------------------------------------------------------------------|
| CFR 47 FCC Part 20 | §20.19 Hearing aid-compatible mobile handsets.                                                                |
| ANSI C63.19-2011   | American National Standard for Methods of Measurement of Compatibility between Wireless Communication Devices |
| KDB 285076 D01     | HAC Guidance v05r01                                                                                           |
| KDB 285076 D03     | HAC FAQ v01r01                                                                                                |

## 1.7 ANSI C63.19-2011 limits

| Emission Categories | E-field emissions dB(V/m) |           |
|---------------------|---------------------------|-----------|
|                     | < 960 MHz                 | > 960 MHz |
| Category M1         | 50-55                     | 40-45     |
| Category M2         | 45-50                     | 35-40     |
| Category M3         | 40-45                     | 30-45     |
| Category M4         | <40                       | <30       |

Table 1: Telephone near-field categories in linear units

## 2 Calibration certificate

|                   |                           |
|-------------------|---------------------------|
| Temperature       | Min. = 18°C, Max. = 25 °C |
| Relative humidity | Min. = 30%, Max. = 70%    |

Table 2: The Ambient Conditions

### 3 HAC (T Coil) Measurement System

#### 3.1 Measurement System Diagram for SPEAG Robotic

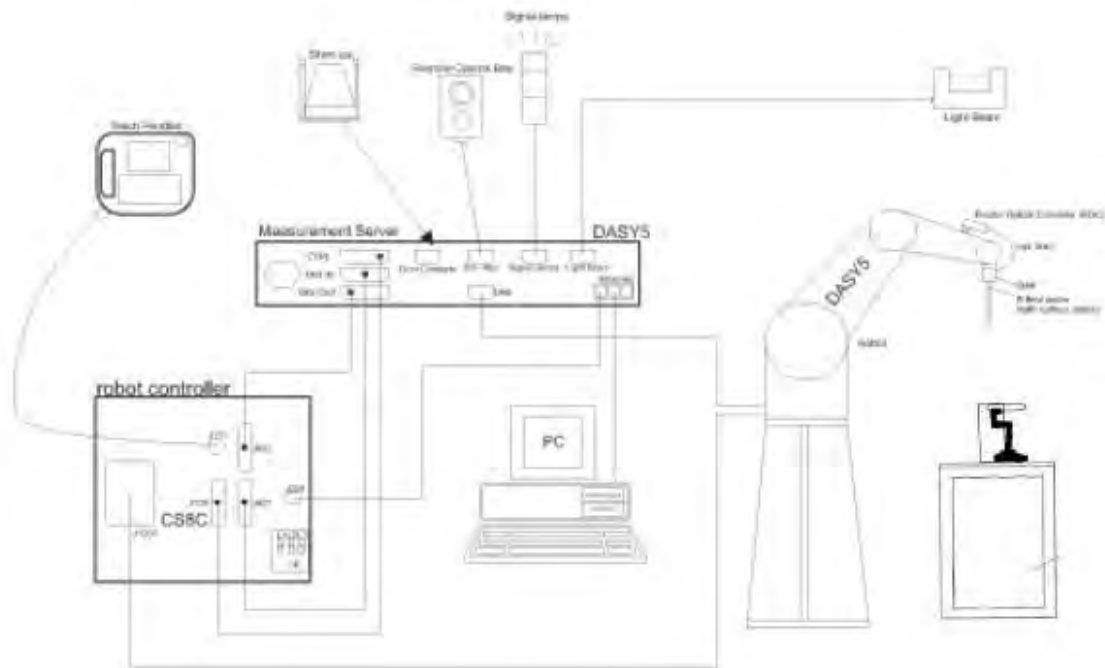


Fig. 1. The SPEAG Robotic Diagram

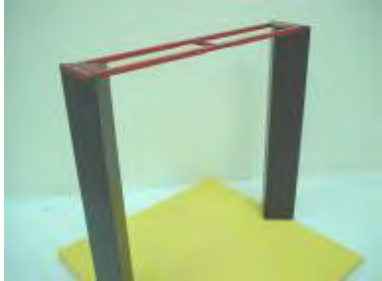
The DASY5 system for performing compliance tests consists of the following items:

- A standard high precision 6-axis robot (Stabile RX family) with controller, teach pendant and software. An arm extension is for accommodating the data acquisition electronics (DAE).
- An Audio Magnetic probe.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion between optical and electrical of the signals for the digital communication to the DAE and for the analog signal from the optical surface detection. The EOC is connected to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- A computer operating Windows 7.
- DASY5 software.
- Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The Test Arch SAM phantom
- The device holder for handheld mobile phones.
- Validation dipole kits allowing to validate the proper functioning of the system.

### 3.2 E-Field Probe

|               |                                                                                                                            |                                                                                                                        |
|---------------|----------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| Construction  | One dipole parallel, two dipoles normal to probe axis<br>Built-in shielding against static charges PEEK enclosure material |  <p><u>EF3DV3 E-Field Probe</u></p> |
| Calibration   | In air from 100 MHz to 6.0 GHz<br>(absolute accuracy $\pm 6.0\%$ , $k=2$ )                                                 |                                                                                                                        |
| Frequency     | (extended to 20 MHz for MRI),<br>Linearity: $\pm 0.2$ dB (100 MHz to 6 GHz)                                                |                                                                                                                        |
| Directivity   | $\pm 0.2$ dB in air (rotation around probe axis)<br>$\pm 0.4$ dB in air (rotation normal to probe axis)                    |                                                                                                                        |
| Dynamic Range | 2 V/m to > 1000 V/m; Linearity: $\pm 0.2$ dB                                                                               |                                                                                                                        |
| Dimensions    | Tip diameter: 8 mm<br>Distance from probe tip to dipole centers: 2.5 mm                                                    |                                                                                                                        |

### 3.3 Test Arch

|             |                                                                                                                        |                                                                                                        |
|-------------|------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| Description | Enables easy and well defined positioning of the phone and validation dipoles as well as simple teaching of the robot. |  <p>Test Arch</p> |
| Dimensions  | length: 370 mm<br>width: 370 mm<br>height: 370 mm                                                                      |                                                                                                        |

### 3.4 Phone Holder

|             |                                                                                                   |                                                                                                           |
|-------------|---------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| Description | Supports accurate and reliable positioning of any phone<br>Effect on near field $\leq \pm 0.5$ dB |  <p>Phone Holder</p> |
|-------------|---------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|



#### 4 Measurement uncertainty evaluation

| Uncertainty Component                    | Uncertainty Value (%)                       | Probability Distribution | Divisor    | ci (E) | Standard Uncertainty (E) (%) |
|------------------------------------------|---------------------------------------------|--------------------------|------------|--------|------------------------------|
| <b>Measurement system</b>                |                                             |                          |            |        |                              |
| Probe calibration                        | ±5.1                                        | N                        | 1          | 1      | ±5.1                         |
| Axial isotropy                           | ±4.7                                        | R                        | $\sqrt{3}$ | 1      | ±2.7                         |
| Sensor position                          | ±16.5                                       | R                        | $\sqrt{3}$ | 1      | ±9.5                         |
| Boundary effect                          | ±2.4                                        | R                        | $\sqrt{3}$ | 1      | ±1.4                         |
| Phantom Boundary Effect                  | ±7.2                                        | R                        | $\sqrt{3}$ | 1      | ±4.1                         |
| Linearity                                | ±4.7                                        | R                        | $\sqrt{3}$ | 1      | ±2.7                         |
| Scaling with PMR calibration             | ±10.0                                       | R                        | $\sqrt{3}$ | 1      | ±5.8                         |
| System Detection limit                   | ±1.0                                        | R                        | $\sqrt{3}$ | 1      | ±0.6                         |
| Readout Electronics                      | ±0.3                                        | N                        | 1          | 1      | ±0.3                         |
| Response time                            | ±0.8                                        | R                        | $\sqrt{3}$ | 1      | ±0.5                         |
| Integration time                         | ±2.6                                        | R                        | $\sqrt{3}$ | 1      | ±1.5                         |
| RF ambient conditions                    | ±3.0                                        | R                        | $\sqrt{3}$ | 1      | ±1.7                         |
| RF reflection                            | ±12.0                                       | R                        | $\sqrt{3}$ | 1      | ±6.9                         |
| Probe positioner                         | ±1.2                                        | R                        | $\sqrt{3}$ | 1      | ±0.7                         |
| Probe positioning                        | ±4.7                                        | R                        | $\sqrt{3}$ | 1      | ±2.7                         |
| Extrapolation and interpolation          | ±1.0                                        | R                        | $\sqrt{3}$ | 1      | ±0.6                         |
| <b>Related to test samples</b>           |                                             |                          |            |        |                              |
| Device Positioning Vertical              | ±4.7                                        | R                        | $\sqrt{3}$ | 1      | ±2.7                         |
| Device Positioning Lateral               | ±1.0                                        | R                        | $\sqrt{3}$ | 1      | ±0.6                         |
| Device Holder and Phantom                | ±2.4                                        | R                        | $\sqrt{3}$ | 1      | ±1.4                         |
| Power drift                              | ±5.0                                        | R                        | $\sqrt{3}$ | 1      | ±2.9                         |
| <b>Phantom and Setup Related</b>         |                                             |                          |            |        |                              |
| Phantom Thickness                        | ±2.4                                        | R                        | $\sqrt{3}$ | 1      | ±1.4                         |
| Combined Std. Uncertainty                | $u'_c = \sqrt{\sum_{i=1}^{21} c_i^2 u_i^2}$ |                          |            |        | ±16.3                        |
| Expanded Std. Uncertainty on Power (K=2) |                                             |                          |            |        | ±32.6                        |
| Expanded Std. Uncertainty on Field (K=2) |                                             |                          |            |        | ±16.3                        |

Table 3: Measurement uncertainties for RF

## 5 RF Emission Measurements Reference and Plane

Fig.3 illustrate the references and reference plane that shall be used in a typical EUT emissions measurement. The principle of this section is applied to EUT with similar geometry. Please refer to Appendix C for the setup photographs.

- ◆ The area is 5 cm by 5 cm.
- ◆ The area is centered on the audio frequency output transducer of the EUT.
- ◆ The area is in a reference plane, which is defined as the planar area that contains the highest point in the area of the phone that normally rests against the user's ear. It is parallel to the centerline of the receiver area of the phone and is defined by the points of the receiver-end of the EUT handset, which, in normal handset use, rest against the ear.
- ◆ The measurement plane is parallel to, and 10 mm in front of, the reference plane.



**Fig.3 WD reference and plane for RF emission measurements**

## 6 System Verification Procedure

### 6.1 System Check

Place a dipole antenna meeting the requirements given in ANSI C63.19-2011 in the position normally occupied by the WD. The dipole antenna serves as a known source for an electrical and magnetic output. Position the E-field probe so that the following occurs:

- The probes and their cables are parallel to the coaxial feed of the dipole antenna
- The probe cables and the coaxial feed of the dipole antenna approach the measurement area from opposite directions

- The center point of the probe element(s) are 15 mm from the closest surface of the dipole elements.

Scan the length of the dipole with the E-field probe and record the two maximum values found near the dipole ends. Average the two readings and compare the reading to the expected value in the calibration certificate or the expected value in this standard.

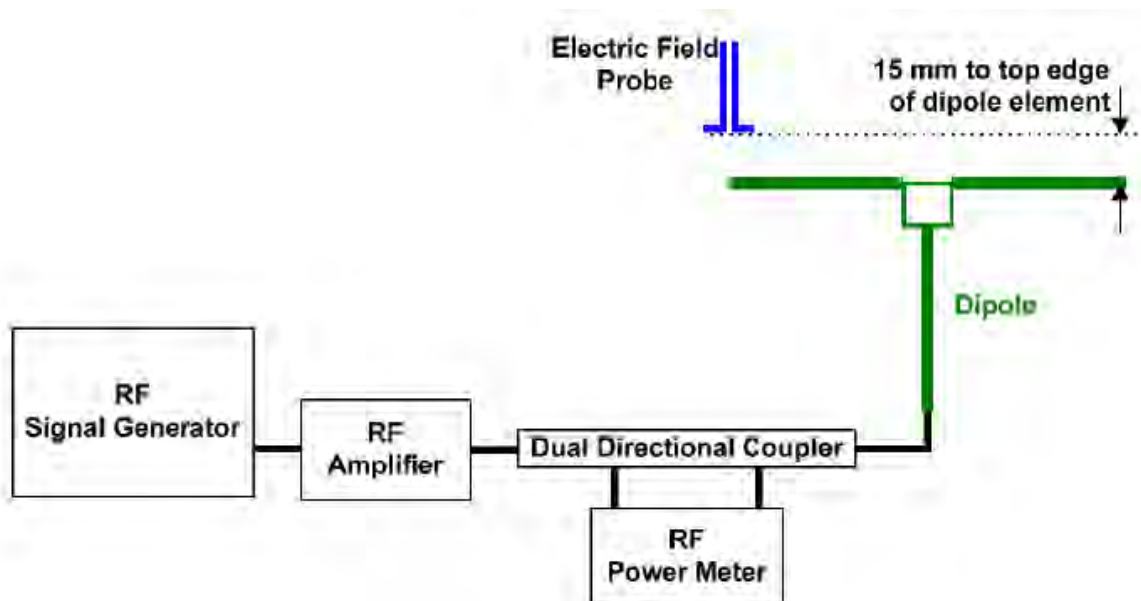


Fig.4 System verification

### 6.2 System Check Result

| Frequency (MHz) | Input Power (mW) | E-Field Value 1 (V/m) | E-Field Value 2 (V/m) | Averaged Measured* Value(V/m) | Target** Value (V/m) | Deviation*** (%) | Limit**** (%) | Test Date  |
|-----------------|------------------|-----------------------|-----------------------|-------------------------------|----------------------|------------------|---------------|------------|
| 835             | 20               | 107.50                | 117.00                | 112.25                        | 115.80               | 6.40             | ±18           | 2020/04/20 |
| 1880            | 20               | 86.48                 | 94.44                 | 90.46                         | 93.17                | 3.74             | ±18           | 2020/04/20 |

**Note:**

\* Please refer to the appendix A for detailed measurement data and plot.

\*\* Target value is provided by SPEAD in the calibration certificate of specific dipoles.

\*\*\* Deviation (%) = 100 \* (Measured value minus Target value) divided by Target value.

\*\*\*\* ANSI C63.19 requires values within ± 18% are acceptable.



## 7 Modulation Interference Factor

The HAC Standard ANSI C63.19-2011 defines a new scaling using the Modulation Interference Factor (MIF). For any specific fixed and repeatable modulated signal, a modulation interference factor (MIF, expressed in dB) may be developed that relates its interference potential to its steady-state rms signal level or average power level. This factor is a function only of the audio-frequency amplitude modulation characteristics of the signal and is the same for field-strength and conducted power measurements. It is important to emphasize that the MIF is valid only for a specific repeatable audio-frequency amplitude modulation characteristic. Any change in modulation characteristic requires determination and application of a new MIF.

The Modulation Interference factor (MIF, in dB) is added to the measured average E-field (in dBV/m) and converts it to the RF Audio Interference level (in dBV/m). This level considers the audible amplitude modulation components in the RF E-field. CW fields without amplitude modulation are assumed to not interfere with the hearing aid electronics.

Modulations without time slots and low fluctuations at low frequencies have low MIF values, TDMA modulations with narrow transmission and repetition rates of few 100 Hz have high MIF values and give similar classifications as ANSI C63.19-2011.

ER3D, EF3D and EU2D E-field probes have a bandwidth <10 kHz and can therefore not evaluate the RF envelope in the full audio band. DASY52 is therefore using the indirect measurement method according to ANSI C63.19-2011 which is the primary method. These near field probes read the averaged E-field measurement. Especially for the new high peak-to-average (PAR) signal types, the probes shall be linearized by PMR calibration in order to not overestimate the field reading. Probe Modulation Response (PMR) calibration linearizes the probe response over its dynamic range for specific modulations which are characterized by their UID and result in an uncertainty specified in the probe calibration certificate. The MIF is characteristic for a given waveform envelope and can be used as a constant conversion factor if the probe has been PMR calibrated.

The evaluation method for the MIF is defined in ANSI C63.19-2011 section D.7. An RMS demodulated RF signal is fed to a spectral filter (similar to an A weighting filter) and forwarded to a temporal filter acting as a quasi-peak detector. The averaged output of these filtering is scaled to a 1 kHz 80% AM signal as reference. MIF measurement requires additional instrumentation and is not well suited for evaluation by the end user with reasonable uncertainty.

It may alternatively be determined through analysis and simulation, because it is constant and characteristic for a communication signal. DASY52 uses well-defined signals for PMR calibration. The MIF of these signals has been determined by simulation and it is automatically applied.

The MIF measurement uncertainty is estimated as follows, declared by HAC equipment provider SPEAG, for modulation frequencies from slotted waveforms with fundamental frequency and at least 2 harmonics within 10 kHz:

1. 0.2 dB for MIF: -7 to +5 dB
2. 0.5 dB for MIF: -13 to +11 dB
3. 1 dB for MIF: > -20 dB

MIF values applied in this test report were provided by the HAC equipment provider of SPEAG, and the worst values for all air interface are listed below to determine the Low-power Exemption.

| SPEAG UID | UID version | Communication system                           | MIF(dB) |
|-----------|-------------|------------------------------------------------|---------|
| 10021     | DAC         | GSM-FDD (TDMA,GMSK)                            | 3.63    |
| 10025     | DAC         | EDGE-FDD (TDMA, 8PSK, TN 0)                    | 3.75    |
| 10460     | AAA         | UMTS-FDD (WCDMA, AMR)                          | -25.43  |
| 10225     | AAA         | UMTS-FDD (HSPA+)                               | -20.39  |
| 10169     | CAE         | LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)          | -15.63  |
| 10170     | CAE         | LTE-FDD (SC-FDMA,1RB, 20 MHz,16-QAM)           | -9.76   |
| 10061     | CAB         | IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps)      | -2.02   |
| 10077     | CAB         | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 54 Mbps) | 0.12    |
| 10427     | AAB         | IEEE 802.11n (HT Green eld, 150 Mbps, 64-QAM)  | -13.44  |



## **8 HAC Measurement Procedure**

**The evaluation was performed with the following procedure:**

- a) Confirm the proper operation of the field probe, probe measurement system, and other instrumentation and the positioning system.
  - b) Position the WD in its intended test position.
  - c) Set the WD to transmit a fixed and repeatable combination of signal power and modulation characteristic that is representative of the worst case (highest interference potential) encountered in normal use. Transiently occurring start-up, changeover, or termination conditions, or other operations likely to occur less than 1% of the time during normal operation, may be excluded from consideration.
  - d) The center subgrid shall be centered on the T-Coil mode perpendicular measurement point or the acoustic output, as appropriate. Locate the field probe at the initial test position in the 50 mm by 50 mm grid, which is contained in the measurement plane, refer to illustrated in Figure 3. If the field alignment method is used, align the probe for maximum field reception.
  - e) Record the reading at the output of the measurement system.
  - f) Scan the entire 50 mm by 50 mm region in equally spaced increments and record the reading at each measurement point. The distance between measurement points shall be sufficient to assure the identification of the maximum reading.
  - g) Identify the five contiguous subgrids around the center subgrid whose maximum reading is the lowest of all available choices. This eliminates the three subgrids with the maximum readings. Thus, the six areas to be used to determine the WD's highest emissions are identified.
  - h) Identify the maximum reading within the nonexcluded subgrids identified in step g).
  - i) Convert the maximum reading identified in step h) to RF audio interference level, in, V/m, by taking the square root of the reading and then dividing it by the measurement system transfer function, established in 5.5.1.1. Convert the result to dB(V/m) by taking the base-10 logarithm and multiplying it by 20.
- Indirect measurement method
- Replacing step i) of 5.5.1.2, the RF audio interference level in dB(V/m) is obtained by adding the MIF (in dB) to the maximum steady-state rms field-strength reading, in dB(V/m), from step h). Use this result to determine the category rating.
- j) Compare this RF audio interference level with the categories in Clause 8 and record the resulting WD category rating.
  - k) For the T-Coil mode M-rating assessment, determine whether the chosen perpendicular measurement point is contained in an included subgrid of the first scan. If so, then a second scan is not necessary. The first scan and resultant category rating may be used for the T-Coil mode M rating. Otherwise, repeat step a) through step i), with the grid shifted so that it is centered on the perpendicular measurement point. Record the WD category rating.



## 9 HAC RF Measurement Results

### 9.1 Max Tune-up

| Frequency Band |              | Average Power (dBm) |
|----------------|--------------|---------------------|
| GSM            | GSM850       | 34.50               |
|                | EDGE850      | 29.00               |
|                | GSM1900      | 31.00               |
|                | EDGE1900     | 28.00               |
| WCDMA          | Band V       | 24.00               |
|                | Band II      | 23.00               |
|                | HSPA         | 23.50               |
| FDD LTE        | Band 2       | 24.00               |
|                | Band 4       | 24.00               |
|                | Band 5       | 24.00               |
|                | Band 13      | 24.00               |
| 2.4GHz WLAN    | 802.11b      | 16.00               |
|                | 802.11g      | 16.00               |
|                | 802.11n-HT20 | 13.00               |



## 9.2 Conducted RF Output Power

| <b>GSM 850</b>          |       |       |       |         |
|-------------------------|-------|-------|-------|---------|
| Burst Output Power(dBm) |       |       |       | Tune up |
| Channel                 | 128   | 190   | 251   |         |
| GSM (GMSK, 1 Tx slot)   | 33.45 | 33.50 | 33.25 | 34.50   |
| <b>GSM 1900</b>         |       |       |       |         |
| Burst Output Power(dBm) |       |       |       | Tune up |
| Channel                 | 512   | 661   | 810   |         |
| GSM (GMSK, 1 Tx slot)   | 29.99 | 30.02 | 29.89 | 31.00   |



### 9.3 Low-power Exemption

According to ANSI C63.19-2011, a RF air interface technology of a device is exempt from testing when its average antenna input power plus its MIF is  $\leq 17$  dBm for any of its operation modes.

| Air Interface | Max Average Antenna Input Power (dBm) | Worst Case MIF (dB) | Power + MIF(dB) | C63.19 test required |
|---------------|---------------------------------------|---------------------|-----------------|----------------------|
| GSM850        | 34.50                                 | 3.63                | 38.13           | Yes                  |
| EDGE850       | 29.00                                 | 3.75                | 32.75           | No                   |
| GSM1900       | 31.00                                 | 3.63                | 34.63           | Yes                  |
| EDGE1900      | 28.00                                 | 3.75                | 31.75           | No                   |
| WCDMA         | 24.00                                 | -25.43              | -1.43           | No                   |
| WCDMA - HSPA  | 23.50                                 | -20.39              | 3.11            | No                   |
| LTE - FDD     | 24.00                                 | -9.76               | 14.24           | No                   |
| 802.11b       | 16.00                                 | -2.02               | 13.98           | No                   |
| 802.11g       | 16.00                                 | 0.12                | 16.12           | No                   |
| 802.11n-HT20  | 13.00                                 | -13.44              | -0.44           | No                   |

**General Note:**

1. EDGE data modes and 16QAM is not necessary due the GSM Voice mode and QPSK is the worst case.
2. According to ANSI C63.19 2011-version, for the air interface technology of a device is exempt from testing when its average antenna input power plus its MIF is  $\leq 17$  dBm for any of its operating modes.
3. HAC RF rating is M4 for the air interface which meets the low power exemption.



#### **9.4 HAC RF Emission Test Results**

| Band    | Test Mode | Channel | Frequency (MHz) | MIF (dB) | Audio Interference Level (dBV/m) | Margin to FCC M3 limit (dB) | Category |
|---------|-----------|---------|-----------------|----------|----------------------------------|-----------------------------|----------|
| GSM850  | GSM Voice | 128     | 824.2           | 3.63     | 34.03                            | 10.97                       | M4       |
| GSM850  | GSM Voice | 190     | 836.6           | 3.63     | 33.52                            | 11.48                       | M4       |
| GSM850  | GSM Voice | 251     | 848.8           | 3.63     | 33.36                            | 11.64                       | M4       |
| GSM1900 | GSM Voice | 512     | 1850.2          | 3.63     | 24.68                            | 10.32                       | M4       |
| GSM1900 | GSM Voice | 661     | 1880            | 3.63     | 23.34                            | 11.66                       | M4       |
| GSM1900 | GSM Voice | 810     | 1909.8          | 3.63     | 25.92                            | 9.08                        | M4       |

**Remark:**

1. The detail RF Emission results please refer to appendix B.



## 10 Equipment list

| Equipment                                                                | Manufacturer  | Model         | Serial Number | Calibration Date | Due date of calibration |
|--------------------------------------------------------------------------|---------------|---------------|---------------|------------------|-------------------------|
| <input checked="" type="checkbox"/> Software                             | SPEAG         | DASY52 52.8.8 | NA            | NCR              | NCR                     |
| <input checked="" type="checkbox"/> DAE                                  | SPEAG         | DAE4          | 896           | 2019-09-18       | 2020-09-17              |
| <input checked="" type="checkbox"/> E-Field Probe                        | SPEAG         | EF3DV3        | 4051          | 2019-06-18       | 2020-06-17              |
| <input checked="" type="checkbox"/> Validation Kits                      | SPEAG         | CD835V3       | 1052          | 2019-06-21       | 2020-06-20              |
| <input checked="" type="checkbox"/> Validation Kits                      | SPEAG         | CD1880V3      | 1044          | 2019-06-21       | 2020-06-20              |
| <input checked="" type="checkbox"/> Test Arch SD HAC                     | SPEAG         | NA            | NA            | NCR              | NCR                     |
| <input checked="" type="checkbox"/> Universal Radio Communication Tester | R&S           | CMU200        | 123090        | 2019-06-25       | 2020-06-24              |
| <input checked="" type="checkbox"/> Universal Radio Communication Tester | R&S           | CMW500        | 111637        | 2020-04-16       | 2021-04-15              |
| <input checked="" type="checkbox"/> Signal Generator                     | Agilent       | N5171B        | MY53050736    | 2020-04-15       | 2021-04-14              |
| <input checked="" type="checkbox"/> Preamplifier                         | Mini-Circuits | ZHL-42W       | 15542         | NCR              | NCR                     |
| <input checked="" type="checkbox"/> Power Meter                          | Agilent       | E4416A        | GB41292095    | 2020-04-15       | 2021-04-14              |
| <input checked="" type="checkbox"/> Power Sensor                         | Agilent       | 8481H         | MY41091234    | 2020-04-15       | 2021-04-14              |
| <input checked="" type="checkbox"/> Power Sensor                         | R&S           | NRP-Z92       | 100025        | 2020-04-16       | 2021-04-15              |
| <input checked="" type="checkbox"/> Attenuator                           | SHX           | TS2-3dB       | 30704         | NCR              | NCR                     |
| <input checked="" type="checkbox"/> Coaxial low pass filter              | Mini-Circuits | VLf-2500(+)   | NA            | NCR              | NCR                     |
| <input checked="" type="checkbox"/> Coaxial low pass filter              | Microlab Fxr  | LA-F13        | NA            | NCR              | NCR                     |
| <input checked="" type="checkbox"/> DC POWER SUPPLY                      | SAKO          | SK1730SL5A    | NA            | NCR              | NCR                     |
| <input checked="" type="checkbox"/> Humidity and Temperature Indicator   | KIMTOKA       | KIMTOKA       | NA            | 2020-04-15       | 2021-04-14              |

Note:

1. All the equipments are within the valid period when the tests are performed.
2. NCR: "No-Calibration Required".



**11 Calibration certificate**

Please see the Appendix B

**12 Photographs**

Please see the Appendix C

**Appendix A: Detailed System Check Results**

**Appendix B: Detailed Test Results**

**Appendix C: Calibration certificate**

**Appendix D: Photographs**

**---END---**

---



**SGS-CSTC Standards Technical Services Co., Ltd.**  
**Xi'An Branch**

Report No.: HR/2020/3002301

# **Appendix A**

## **Detailed System Check Results**

|                                   |
|-----------------------------------|
| 1. System Check Results           |
| System Performance Check 835 MHz  |
| System Performance Check 1880 MHz |

Test Laboratory: SGS-SAR Lab

## HAC-E-Dipole CD835V3

**DUT: CD835V3; Type: CD835V3; Serial: 1052**

Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: Air; Medium parameters used:  $\sigma = 0$  S/m,  $\epsilon_r = 1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: RF Section

DASY 5 Configuration:

- Probe: EF3DV3 - SN4051; ConvF(1, 1, 1); Calibrated: 2019-06-18;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn896; Calibrated: 2019-09-18
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

### **Dipole E-Field measurement/E Scan - measurement distance from the probe sensor center to CD835 = 15mm/Hearing Aid Compatibility Test at 15mm distance**

**(41x361x1):** Interpolated grid: dx=0.5000 mm, dy=0.5000 mm

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 181.6 V/m; Power Drift = -0.04 dB

PMR not calibrated. PMF = 1.000 is applied.

E-field emissions = 107.0 V/m

**Near-field category: M4 (AWF 0 dB)**

PMF scaled E-field

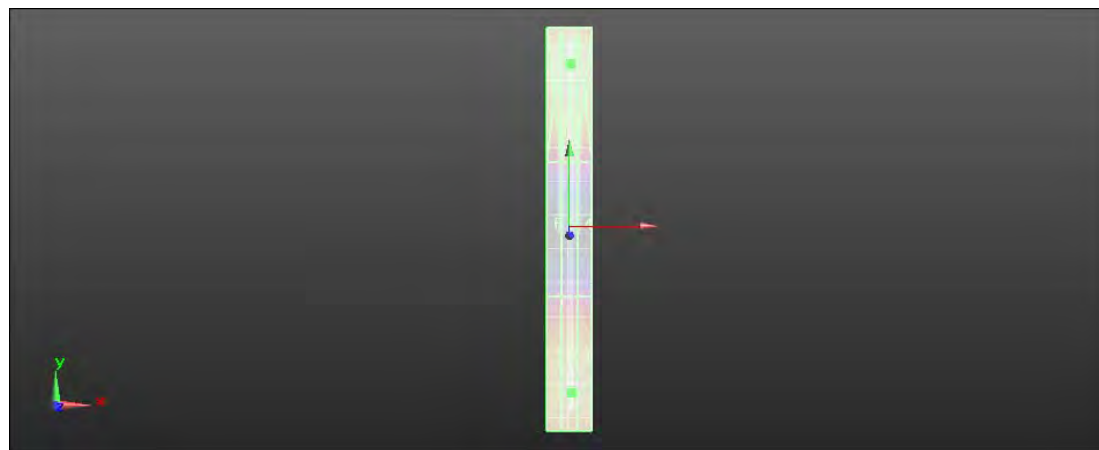
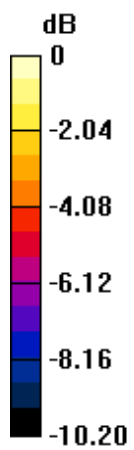
|                                      |                                      |                                      |
|--------------------------------------|--------------------------------------|--------------------------------------|
| Grid 1 <b>M4</b><br><b>106.2 V/m</b> | Grid 2 <b>M4</b><br><b>107.0 V/m</b> | Grid 3 <b>M4</b><br><b>103.9 V/m</b> |
| Grid 4 <b>M4</b><br><b>63.46 V/m</b> | Grid 5 <b>M4</b><br><b>63.56 V/m</b> | Grid 6 <b>M4</b><br><b>61.27 V/m</b> |
| Grid 7 <b>M4</b><br><b>115.3 V/m</b> | Grid 8 <b>M4</b><br><b>117.0 V/m</b> | Grid 9 <b>M4</b><br><b>113.0 V/m</b> |

### **Cursor:**

Total = 117.0 V/m

E Category: M4

Location: 0.5, 73.5, 8.7 mm



0 dB = 117.0 V/m = 41.36 dBV/m

Test Laboratory: SGS-SAR Lab

## HAC-E-Dipole CD1880V3

**DUT: CD1880V3; Type: CD1880V3; Serial: 1044**

Communication System: UID 0, CW; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: Air; Medium parameters used:  $\sigma = 0$  S/m,  $\epsilon_r = 1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: RF Section

DASY 5 Configuration:

- Probe: EF3DV3 - SN4051; ConvF(1, 1, 1); Calibrated: 2019-06-18;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn896; Calibrated: 2019-09-18
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Dipole E-Field measurement/E Scan - measurement distance from the probe sensor center to CD1880 = 10mm & 15mm/Hearing Aid Compatibility Test at 15mm distance (41x181x1):** Interpolated grid: dx=0.5000 mm, dy=0.5000 mm

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 156.6 V/m; Power Drift = 0.01 dB

PMR not calibrated. PMF = 1.000 is applied.

E-field emissions = 86.48 V/m

**Near-field category: M3 (AWF 0 dB)**

PMF scaled E-field

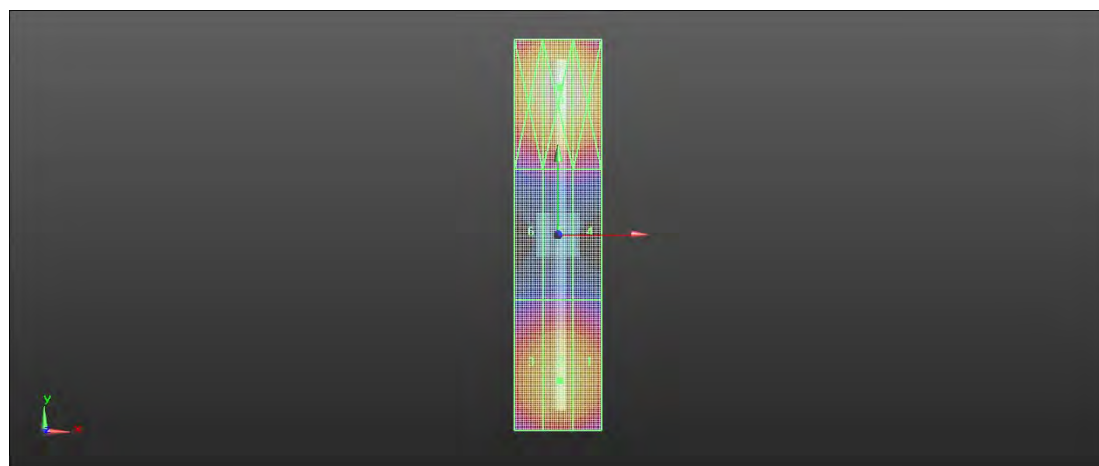
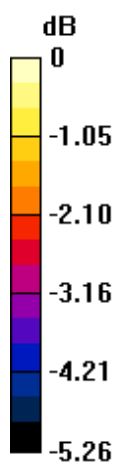
|                                      |                                      |                                      |
|--------------------------------------|--------------------------------------|--------------------------------------|
| Grid 1 <b>M3</b><br><b>85.65 V/m</b> | Grid 2 <b>M3</b><br><b>86.48 V/m</b> | Grid 3 <b>M3</b><br><b>83.99 V/m</b> |
| Grid 4 <b>M3</b><br><b>65.66 V/m</b> | Grid 5 <b>M3</b><br><b>65.68 V/m</b> | Grid 6 <b>M3</b><br><b>64.22 V/m</b> |
| Grid 7 <b>M3</b><br><b>93.18 V/m</b> | Grid 8 <b>M3</b><br><b>94.44 V/m</b> | Grid 9 <b>M3</b><br><b>91.30 V/m</b> |

**Cursor:**

Total = 94.44 V/m

E Category: M3

Location: 0.5, 34, 8.7 mm



0 dB = 94.44 V/m = 39.50 dBV/m



**SGS-CSTC Standards Technical Services Co., Ltd.**  
**Xi'An Branch**

Report No.: HR/2020/3002301

# **Appendix B**

## **Detailed Test Results**

|                              |
|------------------------------|
| 1. GSM                       |
| GSM850 for E-Field Emission  |
| GSM1900 for E-Field Emission |

Test Laboratory: SGS-SAR Lab

## RC545L HAC-RF-GSM850 GSM Voice 128CH

**DUT: RC545L; Type: Smart phone; Serial: 5a67ceb9**

Communication System: UID 10021 - DAC, GSM-FDD (TDMA, GMSK); Frequency: 824.2 MHz; Duty Cycle: 1:8.6896

Medium: Air; Medium parameters used:  $\sigma = 0$  S/m,  $\epsilon_r = 1$ ;  $\rho = 0$  kg/m<sup>3</sup>

Phantom section: RF Section

DASY 5 Configuration:

- Probe: EF3DV3 - SN4051; ConvF(1, 1, 1); Calibrated: 2019-06-18;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn896; Calibrated: 2019-09-18
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Device E-Field measurement/E Scan - ER3D: 15 mm from Probe Center to the Device/Hearing Aid Compatibility Test (101x101x1):** Interpolated grid: dx=0.5000 mm, dy=0.5000 mm

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 42.46 V/m; Power Drift = 0.02 dB

Applied MIF = 3.63 dB

RF audio interference level = 34.03 dBV/m

**Emission category: M4**

MIF scaled E-field

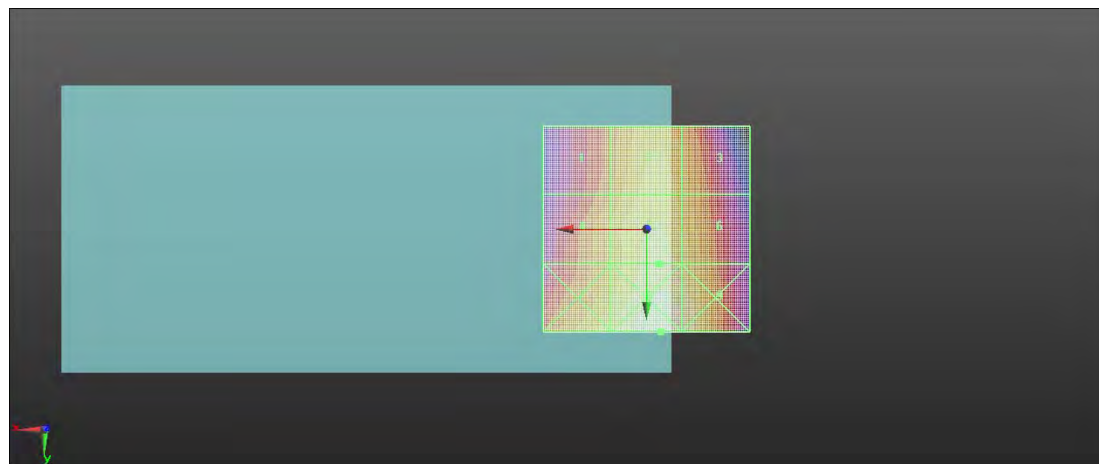
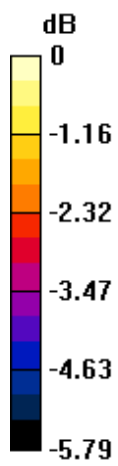
|                                        |                                        |                                        |
|----------------------------------------|----------------------------------------|----------------------------------------|
| Grid 1 <b>M4</b><br><b>32.79 dBV/m</b> | Grid 2 <b>M4</b><br><b>33.69 dBV/m</b> | Grid 3 <b>M4</b><br><b>33.39 dBV/m</b> |
| Grid 4 <b>M4</b><br><b>33.28 dBV/m</b> | Grid 5 <b>M4</b><br><b>34.03 dBV/m</b> | Grid 6 <b>M4</b><br><b>33.79 dBV/m</b> |
| Grid 7 <b>M4</b><br><b>33.81 dBV/m</b> | Grid 8 <b>M4</b><br><b>34.64 dBV/m</b> | Grid 9 <b>M4</b><br><b>34.39 dBV/m</b> |

**Cursor:**

Total = 34.64 dBV/m

E Category: M4

Location: -3.5, 25, 7.7 mm



0 dB = 53.97 V/m = 34.64 dBV/m

Test Laboratory: SGS-SAR Lab

## RC545L HAC-RF-GSM850 GSM Voice 190CH

**DUT: RC545L; Type: Smart phone; Serial: 5a67ceb9**

Communication System: UID 10021 - DAC, GSM-FDD (TDMA, GMSK); Frequency: 836.6 MHz; Duty Cycle: 1:8.6896

Medium: Air; Medium parameters used:  $\sigma = 0$  S/m,  $\epsilon_r = 1$ ;  $\rho = 0$  kg/m<sup>3</sup>

Phantom section: RF Section

DASY 5 Configuration:

- Probe: EF3DV3 - SN4051; ConvF(1, 1, 1); Calibrated: 2019-06-18;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn896; Calibrated: 2019-09-18
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Device E-Field measurement/E Scan - ER3D: 15 mm from Probe Center to the Device/Hearing Aid Compatibility Test (101x101x1):** Interpolated grid: dx=0.5000 mm, dy=0.5000 mm

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 40.02 V/m; Power Drift = 0.02 dB

Applied MIF = 3.63 dB

RF audio interference level = 33.52 dBV/m

**Emission category: M4**

MIF scaled E-field

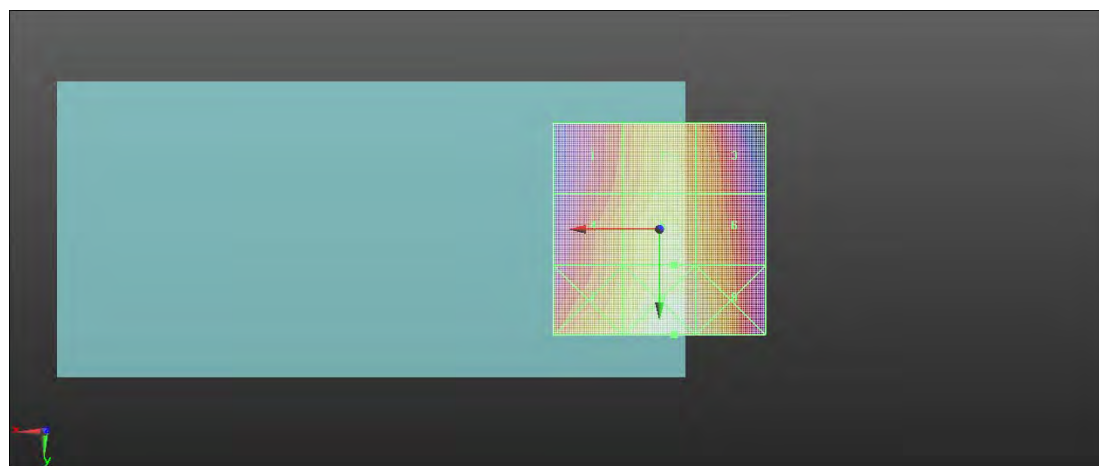
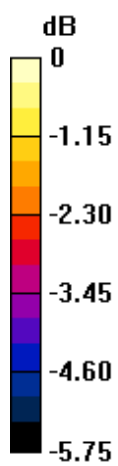
|                                        |                                        |                                        |
|----------------------------------------|----------------------------------------|----------------------------------------|
| Grid 1 <b>M4</b><br><b>32.21 dBV/m</b> | Grid 2 <b>M4</b><br><b>33.17 dBV/m</b> | Grid 3 <b>M4</b><br><b>32.92 dBV/m</b> |
| Grid 4 <b>M4</b><br><b>32.7 dBV/m</b>  | Grid 5 <b>M4</b><br><b>33.52 dBV/m</b> | Grid 6 <b>M4</b><br><b>33.3 dBV/m</b>  |
| Grid 7 <b>M4</b><br><b>33.34 dBV/m</b> | Grid 8 <b>M4</b><br><b>34.13 dBV/m</b> | Grid 9 <b>M4</b><br><b>33.89 dBV/m</b> |

**Cursor:**

Total = 34.13 dBV/m

E Category: M4

Location: -3.5, 25, 7.7 mm



0 dB = 50.89 V/m = 34.13 dBV/m

Test Laboratory: SGS-SAR Lab

## **RC545L HAC-RF-GSM850 GSM Voice 251CH**

**DUT: RC545L; Type: Smart phone; Serial: 5a67ceb9**

Communication System: UID 10021 - DAC, GSM-FDD (TDMA, GMSK); Frequency: 848.8 MHz; Duty Cycle: 1:8.6896

Medium: Air; Medium parameters used:  $\sigma = 0$  S/m,  $\epsilon_r = 1$ ;  $\rho = 0$  kg/m<sup>3</sup>

Phantom section: RF Section

DASY 5 Configuration:

- Probe: EF3DV3 - SN4051; ConvF(1, 1, 1); Calibrated: 2019-06-18;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn896; Calibrated: 2019-09-18
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Device E-Field measurement/E Scan - ER3D: 15 mm from Probe Center to the Device/Hearing Aid Compatibility Test (101x101x1):** Interpolated grid: dx=0.5000 mm, dy=0.5000 mm

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 39.62 V/m; Power Drift = -0.03 dB

Applied MIF = 3.63 dB

RF audio interference level = 33.36 dBV/m

**Emission category: M4**

MIF scaled E-field

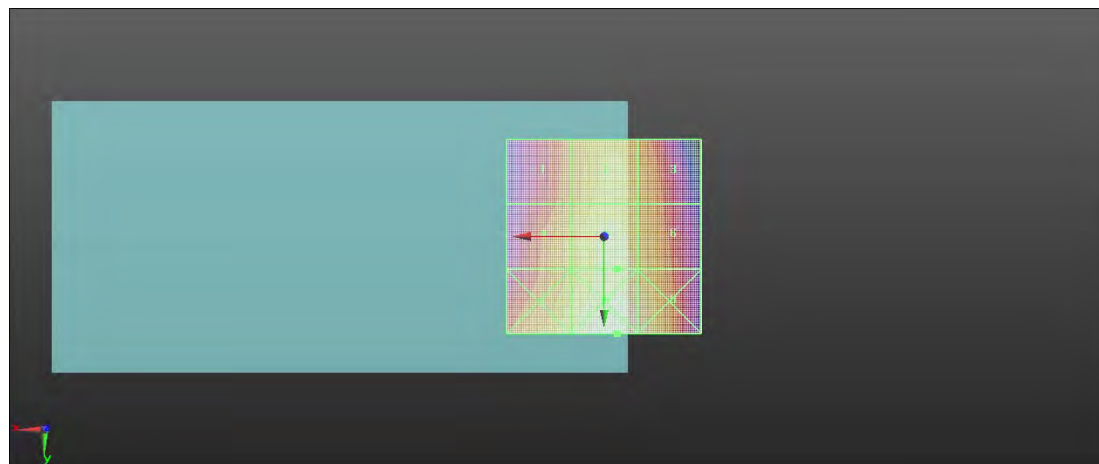
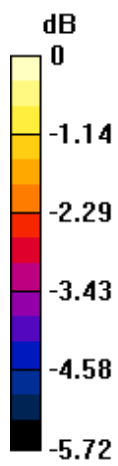
|                                        |                                        |                                        |
|----------------------------------------|----------------------------------------|----------------------------------------|
| Grid 1 <b>M4</b><br><b>32.14 dBV/m</b> | Grid 2 <b>M4</b><br><b>33.05 dBV/m</b> | Grid 3 <b>M4</b><br><b>32.78 dBV/m</b> |
| Grid 4 <b>M4</b><br><b>32.62 dBV/m</b> | Grid 5 <b>M4</b><br><b>33.36 dBV/m</b> | Grid 6 <b>M4</b><br><b>33.12 dBV/m</b> |
| Grid 7 <b>M4</b><br><b>33.16 dBV/m</b> | Grid 8 <b>M4</b><br><b>33.93 dBV/m</b> | Grid 9 <b>M4</b><br><b>33.66 dBV/m</b> |

**Cursor:**

Total = 33.93 dBV/m

E Category: M4

Location: -3.5, 25, 7.7 mm



0 dB = 49.70 V/m = 33.93 dBV/m

Test Laboratory: SGS-SAR Lab

## **RC545L HAC-RF-GSM1900 GSM Voice 512CH**

**DUT: RC545L; Type: Smart phone; Serial: 5a67ceb9**

Communication System: UID 10021 - DAC, GSM-FDD (TDMA, GMSK); Frequency: 1850.2 MHz; Duty Cycle: 1:8.6896

Medium: Air; Medium parameters used:  $\sigma = 0$  S/m,  $\epsilon_r = 1$ ;  $\rho = 0$  kg/m<sup>3</sup>

Phantom section: RF Section

DASY 5 Configuration:

- Probe: EF3DV3 - SN4051; ConvF(1, 1, 1); Calibrated: 2019-06-18;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn896; Calibrated: 2019-09-18
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Device E-Field measurement/E Scan - ER3D: 15 mm from Probe Center to the Device/Hearing Aid Compatibility Test (101x101x1):** Interpolated grid: dx=0.5000 mm, dy=0.5000 mm

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 9.479 V/m; Power Drift = -0.05 dB

Applied MIF = 3.63 dB

RF audio interference level = 24.68 dBV/m

**Emission category: M4**

MIF scaled E-field

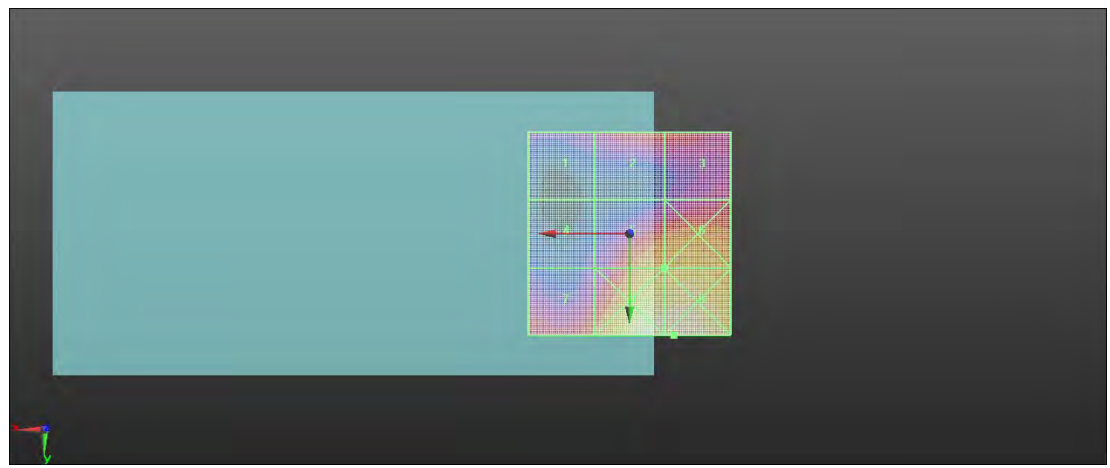
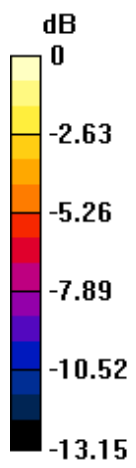
|                                        |                                        |                                        |
|----------------------------------------|----------------------------------------|----------------------------------------|
| Grid 1 <b>M4</b><br><b>20.15 dBV/m</b> | Grid 2 <b>M4</b><br><b>22.34 dBV/m</b> | Grid 3 <b>M4</b><br><b>22.34 dBV/m</b> |
| Grid 4 <b>M4</b><br><b>18.98 dBV/m</b> | Grid 5 <b>M4</b><br><b>24.68 dBV/m</b> | Grid 6 <b>M4</b><br><b>25.16 dBV/m</b> |
| Grid 7 <b>M4</b><br><b>22.6 dBV/m</b>  | Grid 8 <b>M4</b><br><b>27.49 dBV/m</b> | Grid 9 <b>M4</b><br><b>27.6 dBV/m</b>  |

**Cursor:**

Total = 27.60 dBV/m

E Category: M4

Location: -11, 25, 7.7 mm



0 dB = 23.99 V/m = 27.60 dBV/m

Test Laboratory: SGS-SAR Lab

## **RC545L HAC-RF-GSM1900 GSM Voice 661CH**

**DUT: RC545L; Type: Smart phone; Serial: 5a67ceb9**

Communication System: UID 10021 - DAC, GSM-FDD (TDMA, GMSK); Frequency: 1880 MHz; Duty Cycle: 1:8.6896

Medium: Air; Medium parameters used:  $\sigma = 0$  S/m,  $\epsilon_r = 1$ ;  $\rho = 0$  kg/m<sup>3</sup>

Phantom section: RF Section

DASY 5 Configuration:

- Probe: EF3DV3 - SN4051; ConvF(1, 1, 1); Calibrated: 2019-06-18;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn896; Calibrated: 2019-09-18
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Device E-Field measurement/E Scan - ER3D: 15 mm from Probe Center to the Device/Hearing Aid Compatibility Test (101x101x1):** Interpolated grid: dx=0.5000 mm, dy=0.5000 mm

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 8.195 V/m; Power Drift = -0.13 dB

Applied MIF = 3.63 dB

RF audio interference level = 23.34 dBV/m

**Emission category: M4**

MIF scaled E-field

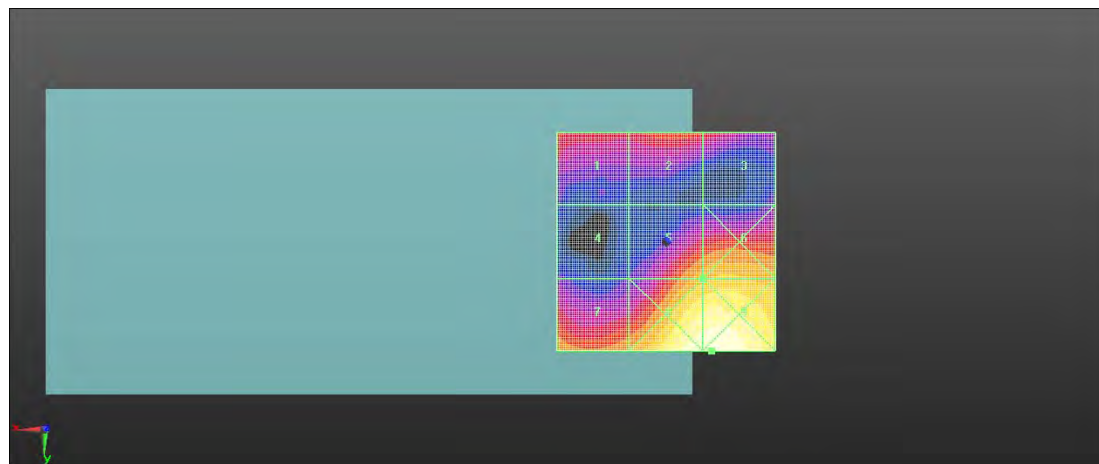
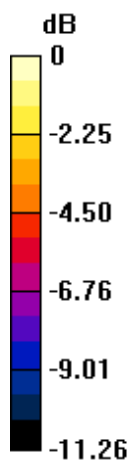
|                                        |                                        |                                        |
|----------------------------------------|----------------------------------------|----------------------------------------|
| Grid 1 <b>M4</b><br><b>21.55 dBV/m</b> | Grid 2 <b>M4</b><br><b>22.03 dBV/m</b> | Grid 3 <b>M4</b><br><b>21.49 dBV/m</b> |
| Grid 4 <b>M4</b><br><b>18.83 dBV/m</b> | Grid 5 <b>M4</b><br><b>23.34 dBV/m</b> | Grid 6 <b>M4</b><br><b>23.76 dBV/m</b> |
| Grid 7 <b>M4</b><br><b>23.06 dBV/m</b> | Grid 8 <b>M4</b><br><b>26.46 dBV/m</b> | Grid 9 <b>M4</b><br><b>26.52 dBV/m</b> |

**Cursor:**

Total = 26.52 dBV/m

E Category: M4

Location: -10.5, 25, 7.7 mm



0 dB = 21.19 V/m = 26.52 dBV/m

Test Laboratory: SGS-SAR Lab

## RC545L HAC-RF-GSM1900 GSM Voice 810CH

**DUT: RC545L; Type: Smart phone; Serial: 5a67ceb9**

Communication System: UID 10021 - DAC, GSM-FDD (TDMA, GMSK); Frequency: 1909.8 MHz; Duty Cycle: 1:8.6896

Medium: Air; Medium parameters used:  $\sigma = 0$  S/m,  $\epsilon_r = 1$ ;  $\rho = 0$  kg/m<sup>3</sup>

Phantom section: RF Section

DASY 5 Configuration:

- Probe: EF3DV3 - SN4051; ConvF(1, 1, 1); Calibrated: 2019-06-18;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn896; Calibrated: 2019-09-18
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Device E-Field measurement/E Scan - ER3D: 15 mm from Probe Center to the Device/Hearing Aid Compatibility Test (101x101x1):** Interpolated grid: dx=0.5000 mm, dy=0.5000 mm

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 8.045 V/m; Power Drift = -0.01 dB

Applied MIF = 3.63 dB

RF audio interference level = 25.92 dBV/m

**Emission category: M4**

MIF scaled E-field

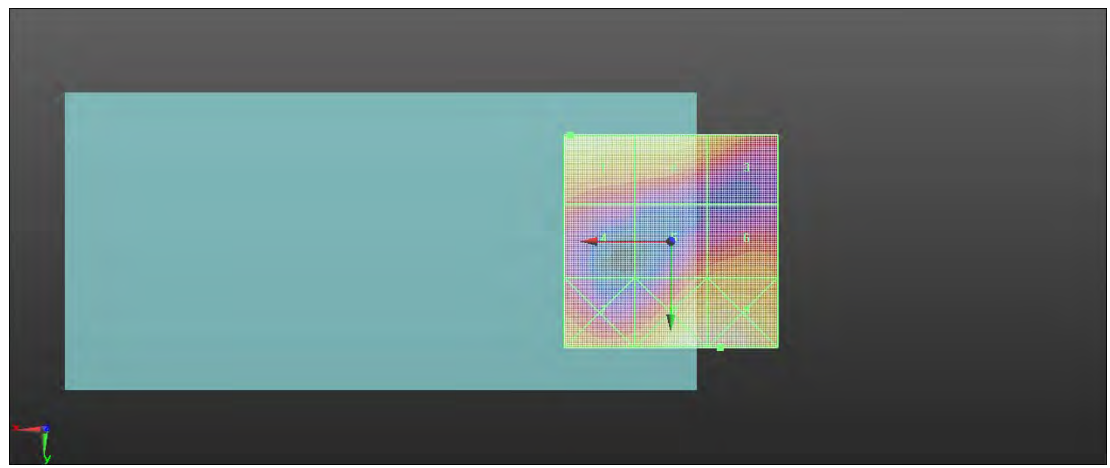
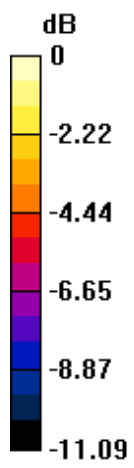
|                                        |                                        |                                        |
|----------------------------------------|----------------------------------------|----------------------------------------|
| Grid 1 <b>M4</b><br><b>25.92 dBV/m</b> | Grid 2 <b>M4</b><br><b>25.65 dBV/m</b> | Grid 3 <b>M4</b><br><b>24.66 dBV/m</b> |
| Grid 4 <b>M4</b><br><b>22.21 dBV/m</b> | Grid 5 <b>M4</b><br><b>23.02 dBV/m</b> | Grid 6 <b>M4</b><br><b>23.76 dBV/m</b> |
| Grid 7 <b>M4</b><br><b>24.12 dBV/m</b> | Grid 8 <b>M4</b><br><b>26.66 dBV/m</b> | Grid 9 <b>M4</b><br><b>26.71 dBV/m</b> |

**Cursor:**

Total = 26.71 dBV/m

E Category: M4

Location: -11.5, 25, 7.7 mm



0 dB = 21.66 V/m = 26.71 dBV/m



**SGS-CSTC Standards Technical Services Co., Ltd.**  
**Xi'An Branch**

Report No.: HR/2020/3002301

# **Appendix C**

## **Calibration certificate**

|                              |
|------------------------------|
| 1. Dipole                    |
| CD835V3-SN 1052(2019-06-21)  |
| CD1880V3-SN 1044(2019-06-21) |
| 2. DAE                       |
| DAE4-SN 896(2019-09-18)      |
| 3. Probe                     |
| EF3DV3-SN 4051(2019-06-18)   |



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 0108**

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

Client **SGS-TW (Auden)**

Certificate No: **CD835V3-1052\_Jun19**

## CALIBRATION CERTIFICATE

Object **CD835V3 - SN: 1052**

Calibration procedure(s) **QA CAL-20.v7  
Calibration Procedure for Validation Sources in air**

Calibration date: **June 21, 2019**

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         | 03-Apr-19 (No. 217-02892/02893) | Apr-20                |
| Power sensor NRP-Z91        | SN: 103244         | 03-Apr-19 (No. 217-02892)       | Apr-20                |
| Power sensor NRP-Z91        | SN: 103245         | 03-Apr-19 (No. 217-02893)       | Apr-20                |
| Reference 20 dB Attenuator  | SN: 5058 (20k)     | 04-Apr-19 (No. 217-02894)       | Apr-20                |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 04-Apr-19 (No. 217-02895)       | Apr-20                |
| Probe EF3DV3                | SN: 4013           | 03-Jan-19 (No. EF3-4013_Jan19)  | Jan-20                |
| DAE4                        | SN: 781            | 09-Jan-19 (No. DAE4-781_Jan19)  | Jan-20                |

| Secondary Standards             | ID #           | Check Date (in house)             | Scheduled Check        |
|---------------------------------|----------------|-----------------------------------|------------------------|
| Power meter Agilent 4419B       | SN: GB42420191 | 09-Oct-09 (in house check Oct-17) | In house check: Oct-20 |
| Power sensor HP E4412A          | SN: US38485102 | 05-Jan-10 (in house check Oct-17) | In house check: Oct-20 |
| Power sensor HP 8482A           | SN: US37295597 | 09-Oct-09 (in house check Oct-17) | In house check: Oct-20 |
| RF generator R&S SMT-06         | SN: 837633/005 | 10-Jan-19 (in house check Jan-19) | In house check: Oct-22 |
| Network Analyzer Agilent E8358A | SN: US41080477 | 31-Mar-14 (in house check Oct-18) | In house check: Oct-19 |

Calibrated by: **Claudio Leubler**      Name: **Claudio Leubler**      Function: **Laboratory Technician**

Approved by: **Katja Pokovic**      Name: **Katja Pokovic**      Function: **Technical Manager**

Signature

Issued: June 24, 2019

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 0108**

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

## References

- [1] ANSI-C63.19-2011  
American National Standard, Methods of Measurement of Compatibility between Wireless Communications  
Devices and Hearing Aids.

## Methods Applied and Interpretation of Parameters:

- *Coordinate System:* y-axis is in the direction of the dipole arms. z-axis is from the basis of the antenna (mounted on the table) towards its feed point between the two dipole arms. x-axis is normal to the other axes. In coincidence with the standards [1], the measurement planes (probe sensor center) are selected to be at a distance of 15 mm above the top metal edge of the dipole arms.
- *Measurement Conditions:* Further details are available from the hardcopies at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated. The forward power to the dipole connector is set with a calibrated power meter connected and monitored with an auxiliary power meter connected to a directional coupler. While the dipole under test is connected, the forward power is adjusted to the same level.
- *Antenna Positioning:* The dipole is mounted on a HAC Test Arch phantom using the matching dipole positioner with the arms horizontal and the feeding cable coming from the floor. The measurements are performed in a shielded room with absorbers around the setup to reduce the reflections. It is verified before the mounting of the dipole under the Test Arch phantom, that its arms are perfectly in a line. It is installed on the HAC dipole positioner with its arms parallel below the dielectric reference wire and able to move elastically in vertical direction without changing its relative position to the top center of the Test Arch phantom. The vertical distance to the probe is adjusted after dipole mounting with a DASY5 Surface Check job. Before the measurement, the distance between phantom surface and probe tip is verified. The proper measurement distance is selected by choosing the matching section of the HAC Test Arch phantom with the proper device reference point (upper surface of the dipole) and the matching grid reference point (tip of the probe) considering the probe sensor offset. The vertical distance to the probe is essential for the accuracy.
- *Feed Point Impedance and Return Loss:* These parameters are measured using a Vector Network Analyzer. The impedance is specified at the SMA connector of the dipole. The influence of reflections was eliminating by applying the averaging function while moving the dipole in the air, at least 70cm away from any obstacles.
- *E-field distribution:* E field is measured in the x-y-plane with an isotropic E-field probe with 100 mW forward power to the antenna feed point. In accordance with [1], the scan area is 20mm wide, its length exceeds the dipole arm length (180 or 90mm). The sensor center is 15 mm (in z) above the metal top of the dipole arms. Two 3D maxima are available near the end of the dipole arms. Assuming the dipole arms are perfectly in one line, the average of these two maxima (in subgrid 2 and subgrid 8) is determined to compensate for any non-parallelity to the measurement plane as well as the sensor displacement. The E-field value stated as calibration value represents the maximum of the interpolated 3D-E-field, in the plane above the dipole surface.

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%.

## Measurement Conditions

DASY system configuration, as far as not given on page 1.

|                                    |                     |          |
|------------------------------------|---------------------|----------|
| DASY Version                       | DASY5               | V52.10.2 |
| Phantom                            | HAC Test Arch       |          |
| Distance Dipole Top - Probe Center | 15 mm               |          |
| Scan resolution                    | dx, dy = 5 mm       |          |
| Frequency                          | 835 MHz $\pm$ 1 MHz |          |
| Input power drift                  | < 0.05 dB           |          |

## Maximum Field values at 835 MHz

| E-field 15 mm above dipole surface | condition          | Interpolated maximum                           |
|------------------------------------|--------------------|------------------------------------------------|
| Maximum measured above high end    | 100 mW input power | 106.3 V/m = 40.53 dBV/m                        |
| Maximum measured above low end     | 100 mW input power | 104.7 V/m = 40.40 dBV/m                        |
| Averaged maximum above arm         | 100 mW input power | <b>105.5 V/m <math>\pm</math> 12.8 % (k=2)</b> |

## Appendix (Additional assessments outside the scope of SCS 0108)

### Antenna Parameters

| Frequency | Return Loss | Impedance                       |
|-----------|-------------|---------------------------------|
| 800 MHz   | 15.7 dB     | 40.4 $\Omega$ - 11.4 j $\Omega$ |
| 835 MHz   | 29.0 dB     | 51.4 $\Omega$ + 3.3 j $\Omega$  |
| 880 MHz   | 18.1 dB     | 58.7 $\Omega$ - 10.4 j $\Omega$ |
| 900 MHz   | 16.4 dB     | 50.1 $\Omega$ - 15.3 j $\Omega$ |
| 945 MHz   | 25.8 dB     | 48.4 $\Omega$ + 4.8 j $\Omega$  |

### 3.2 Antenna Design and Handling

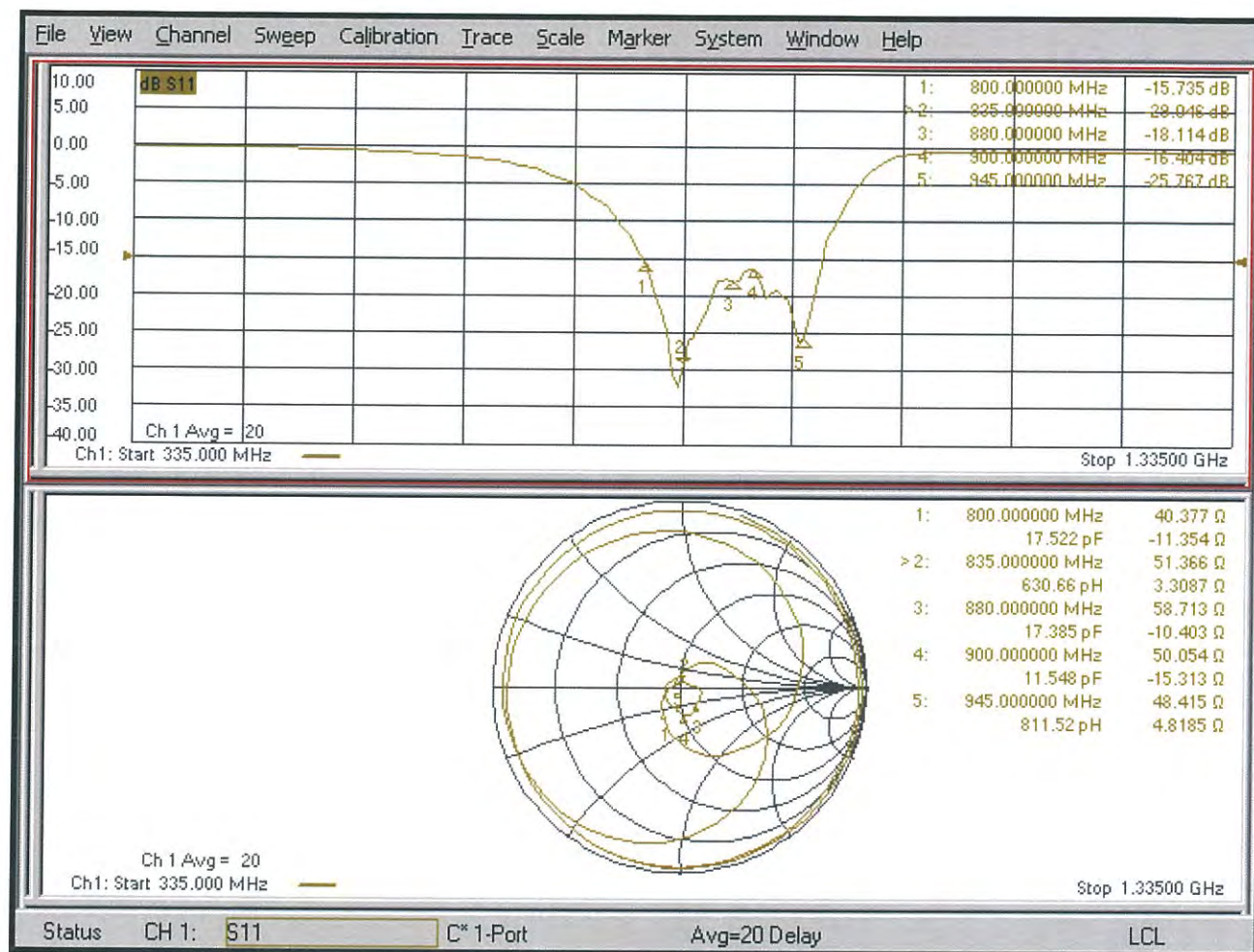
The calibration dipole has a symmetric geometry with a built-in two stub matching network, which leads to the enhanced bandwidth.

The dipole is built of standard semirigid coaxial cable. The internal matching line is open ended. The antenna is therefore open for DC signals.

Do not apply force to dipole arms, as they are liable to bend. The soldered connections near the feedpoint may be damaged. After excessive mechanical stress or overheating, check the impedance characteristics to ensure that the internal matching network is not affected.

After long term use with 40W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

## Impedance Measurement Plot



## DASY5 E-field Result

Date: 21.06.2019

Test Laboratory: SPEAG Lab2

**DUT: HAC-Dipole 835 MHz; Type: CD835V3; Serial: CD835V3 - SN: 1052**

Communication System: UID 0 - CW ; Frequency: 835 MHz

Medium parameters used:  $\sigma = 0$  S/m,  $\epsilon_r = 1$ ;  $\rho = 0$  kg/m<sup>3</sup>

Phantom section: RF Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EF3DV3 - SN4013; ConvF(1, 1, 1) @ 835 MHz; Calibrated: 03.01.2019
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 09.01.2019
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- DASY52 52.10.2(1504); SEMCAD X 14.6.12(7470)

**Dipole E-Field measurement @ 835MHz/E-Scan - 835MHz d=15mm/Hearing Aid Compatibility Test (41x361x1):**

Interpolated grid: dx=0.5000 mm, dy=0.5000 mm

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 123.8 V/m; Power Drift = 0.03 dB

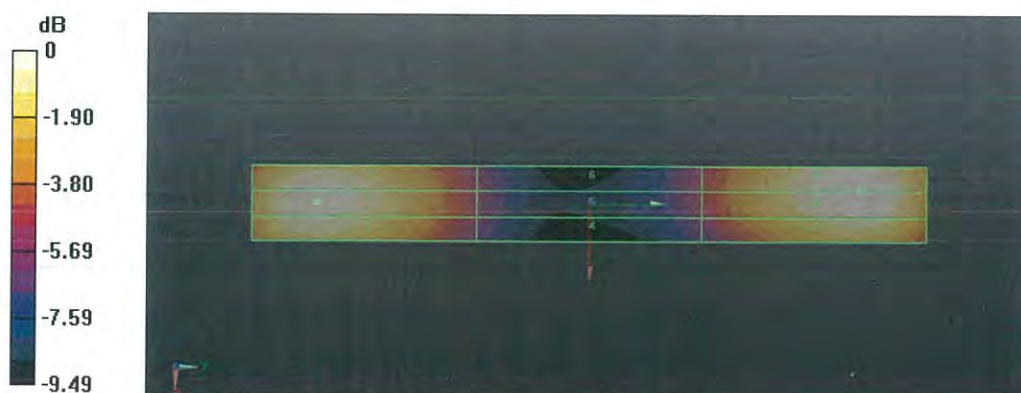
Applied MIF = 0.00 dB

RF audio interference level = 40.53 dBV/m

**Emission category: M3**

MIF scaled E-field

|                          |                          |                          |
|--------------------------|--------------------------|--------------------------|
| Grid 1 M3<br>40.13 dBV/m | Grid 2 M3<br>40.4 dBV/m  | Grid 3 M3<br>40.26 dBV/m |
| Grid 4 M4<br>35.16 dBV/m | Grid 5 M4<br>35.7 dBV/m  | Grid 6 M4<br>35.71 dBV/m |
| Grid 7 M4<br>39.81 dBV/m | Grid 8 M3<br>40.53 dBV/m | Grid 9 M3<br>40.53 dBV/m |



0 dB = 106.3 V/m = 40.53 dBV/m



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 **SGS-TW (Auden)**

Certificate No: **CD1880V3-1044\_Jun19**

## CALIBRATION CERTIFICATE

Object **CD1880V3 - SN: 1044**

Calibration procedure(s) **QA CAL-20.v7  
Calibration Procedure for Validation Sources in air**

Calibration date: **June 21, 2019**

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         | 03-Apr-19 (No. 217-02892/02893) | Apr-20                |
| Power sensor NRP-Z91        | SN: 103244         | 03-Apr-19 (No. 217-02892)       | Apr-20                |
| Power sensor NRP-Z91        | SN: 103245         | 03-Apr-19 (No. 217-02893)       | Apr-20                |
| Reference 20 dB Attenuator  | SN: 5058 (20k)     | 04-Apr-19 (No. 217-02894)       | Apr-20                |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 04-Apr-19 (No. 217-02895)       | Apr-20                |
| Probe EF3DV3                | SN: 4013           | 03-Jan-19 (No. EF3-4013_Jan19)  | Jan-20                |
| DAE4                        | SN: 781            | 09-Jan-19 (No. DAE4-781_Jan19)  | Jan-20                |

| Secondary Standards             | ID #           | Check Date (in house)             | Scheduled Check        |
|---------------------------------|----------------|-----------------------------------|------------------------|
| Power meter Agilent 4419B       | SN: GB42420191 | 09-Oct-09 (in house check Oct-17) | In house check: Oct-20 |
| Power sensor HP E4412A          | SN: US38485102 | 05-Jan-10 (in house check Oct-17) | In house check: Oct-20 |
| Power sensor HP 8482A           | SN: US37295597 | 09-Oct-09 (in house check Oct-17) | In house check: Oct-20 |
| RF generator R&S SMT-06         | SN: 837633/005 | 10-Jan-19 (in house check Jan-19) | In house check: Oct-22 |
| Network Analyzer Agilent E8358A | SN: US41080477 | 31-Mar-14 (in house check Oct-18) | In house check: Oct-19 |

Calibrated by: **Claudio Leubler** **Laboratory Technician**

Approved by: **Katja Poković** **Technical Manager**

Signature

Issued: June 24, 2019

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.



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**

## References

- [1] ANSI-C63.19-2011  
American National Standard, Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids.

## Methods Applied and Interpretation of Parameters:

- *Coordinate System:* y-axis is in the direction of the dipole arms. z-axis is from the basis of the antenna (mounted on the table) towards its feed point between the two dipole arms. x-axis is normal to the other axes. In coincidence with the standards [1], the measurement planes (probe sensor center) are selected to be at a distance of 15 mm above the top metal edge of the dipole arms.
- *Measurement Conditions:* Further details are available from the hardcopies at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated. The forward power to the dipole connector is set with a calibrated power meter connected and monitored with an auxiliary power meter connected to a directional coupler. While the dipole under test is connected, the forward power is adjusted to the same level.
- *Antenna Positioning:* The dipole is mounted on a HAC Test Arch phantom using the matching dipole positioner with the arms horizontal and the feeding cable coming from the floor. The measurements are performed in a shielded room with absorbers around the setup to reduce the reflections. It is verified before the mounting of the dipole under the Test Arch phantom, that its arms are perfectly in a line. It is installed on the HAC dipole positioner with its arms parallel below the dielectric reference wire and able to move elastically in vertical direction without changing its relative position to the top center of the Test Arch phantom. The vertical distance to the probe is adjusted after dipole mounting with a DASY5 Surface Check job. Before the measurement, the distance between phantom surface and probe tip is verified. The proper measurement distance is selected by choosing the matching section of the HAC Test Arch phantom with the proper device reference point (upper surface of the dipole) and the matching grid reference point (tip of the probe) considering the probe sensor offset. The vertical distance to the probe is essential for the accuracy.
- *Feed Point Impedance and Return Loss:* These parameters are measured using a Vector Network Analyzer. The impedance is specified at the SMA connector of the dipole. The influence of reflections was eliminated by applying the averaging function while moving the dipole in the air, at least 70cm away from any obstacles.
- *E-field distribution:* E field is measured in the x-y-plane with an isotropic E-field probe with 100 mW forward power to the antenna feed point. In accordance with [1], the scan area is 20mm wide, its length exceeds the dipole arm length (180 or 90mm). The sensor center is 15 mm (in z) above the metal top of the dipole arms. Two 3D maxima are available near the end of the dipole arms. Assuming the dipole arms are perfectly in one line, the average of these two maxima (in subgrid 2 and subgrid 8) is determined to compensate for any non-parallelity to the measurement plane as well as the sensor displacement. The E-field value stated as calibration value represents the maximum of the interpolated 3D-E-field, in the plane above the dipole surface.

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%.

## Measurement Conditions

DASY system configuration, as far as not given on page 1.

|                                    |                      |          |
|------------------------------------|----------------------|----------|
| DASY Version                       | DASY5                | V52.10.2 |
| Phantom                            | HAC Test Arch        |          |
| Distance Dipole Top - Probe Center | 15 mm                |          |
| Scan resolution                    | dx, dy = 5 mm        |          |
| Frequency                          | 1880 MHz $\pm$ 1 MHz |          |
| Input power drift                  | < 0.05 dB            |          |

## Maximum Field values at 1880 MHz

| E-field 15 mm above dipole surface | condition          | Interpolated maximum        |
|------------------------------------|--------------------|-----------------------------|
| Maximum measured above high end    | 100 mW input power | 88.7 V/m = 38.96 dBV/m      |
| Maximum measured above low end     | 100 mW input power | 85.7 V/m = 38.66 dBV/m      |
| Averaged maximum above arm         | 100 mW input power | 87.2 V/m $\pm$ 12.8 % (k=2) |

## Appendix (Additional assessments outside the scope of SCS 0108)

### Antenna Parameters

| Frequency | Return Loss | Impedance                      |
|-----------|-------------|--------------------------------|
| 1730 MHz  | 24.3 dB     | 54.0 $\Omega$ + 5.0 j $\Omega$ |
| 1880 MHz  | 19.6 dB     | 59.1 $\Omega$ + 6.8 j $\Omega$ |
| 1900 MHz  | 20.0 dB     | 60.7 $\Omega$ + 2.6 j $\Omega$ |
| 1950 MHz  | 26.7 dB     | 53.4 $\Omega$ - 3.3 j $\Omega$ |
| 2000 MHz  | 21.1 dB     | 45.2 $\Omega$ + 7.0 j $\Omega$ |

### 3.2 Antenna Design and Handling

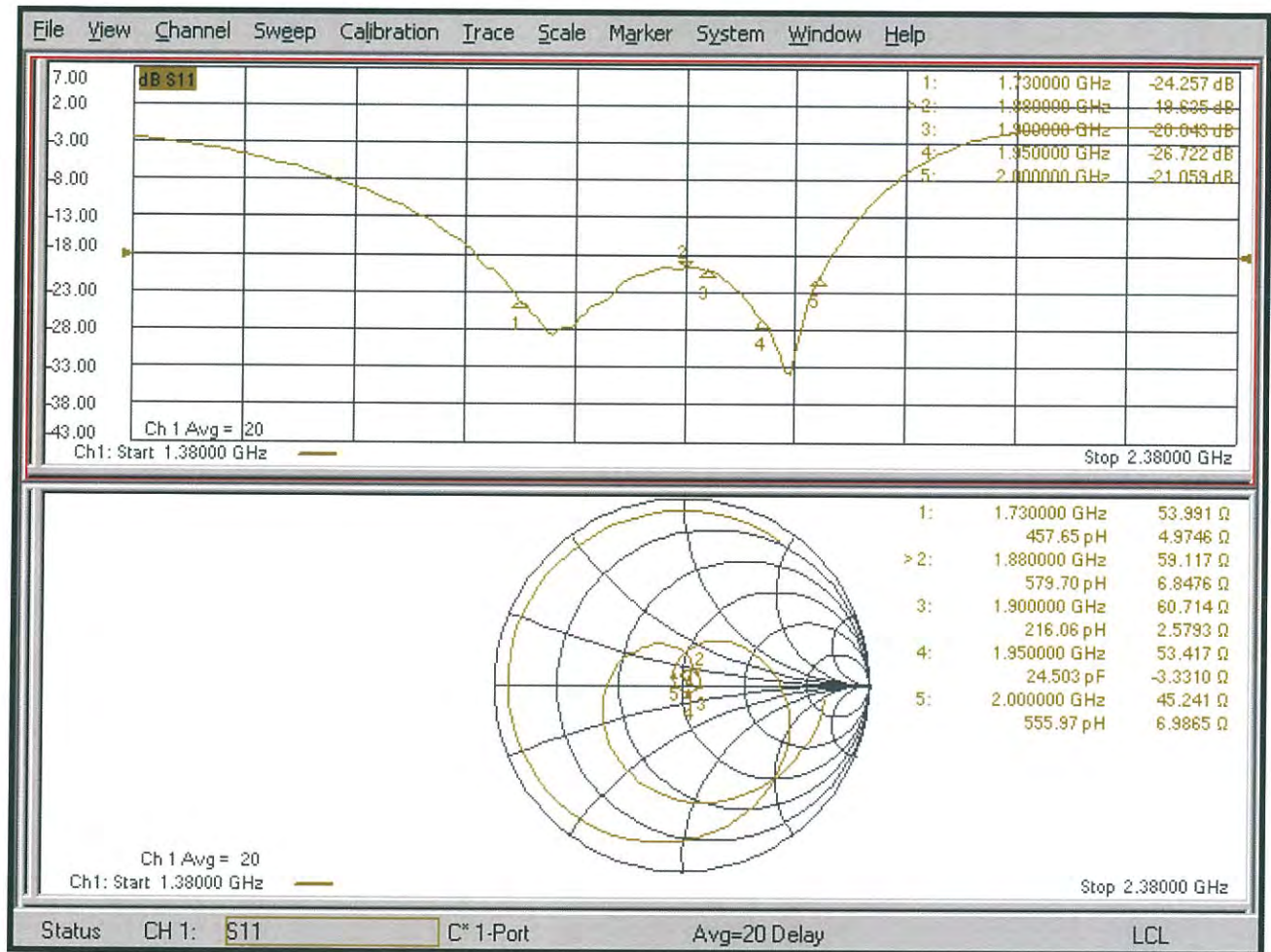
The calibration dipole has a symmetric geometry with a built-in two stub matching network, which leads to the enhanced bandwidth.

The dipole is built of standard semirigid coaxial cable. The internal matching line is open ended. The antenna is therefore open for DC signals.

Do not apply force to dipole arms, as they are liable to bend. The soldered connections near the feedpoint may be damaged. After excessive mechanical stress or overheating, check the impedance characteristics to ensure that the internal matching network is not affected.

After long term use with 40W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

## Impedance Measurement Plot



## DASY5 E-field Result

Date: 21.06.2019

Test Laboratory: SPEAG Lab2

**DUT: HAC Dipole 1880 MHz; Type: CD1880V3; Serial: CD1880V3 - SN: 1044**

Communication System: UID 0 - CW ; Frequency: 1880 MHz

Medium parameters used:  $\sigma = 0$  S/m,  $\epsilon_r = 1$ ;  $\rho = 0$  kg/m<sup>3</sup>

Phantom section: RF Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EF3DV3 - SN4013; ConvF(1, 1, 1) @ 1880 MHz; Calibrated: 03.01.2019
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 09.01.2019
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- DASY52 52.10.2(1504); SEMCAD X 14.6.12(7470)

**Dipole E-Field measurement @ 1880MHz/E-Scan - 1880MHz d=15mm/Hearing Aid Compatibility Test (41x181x1):**

Interpolated grid: dx=0.5000 mm, dy=0.5000 mm

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 150.2 V/m; Power Drift = -0.03 dB

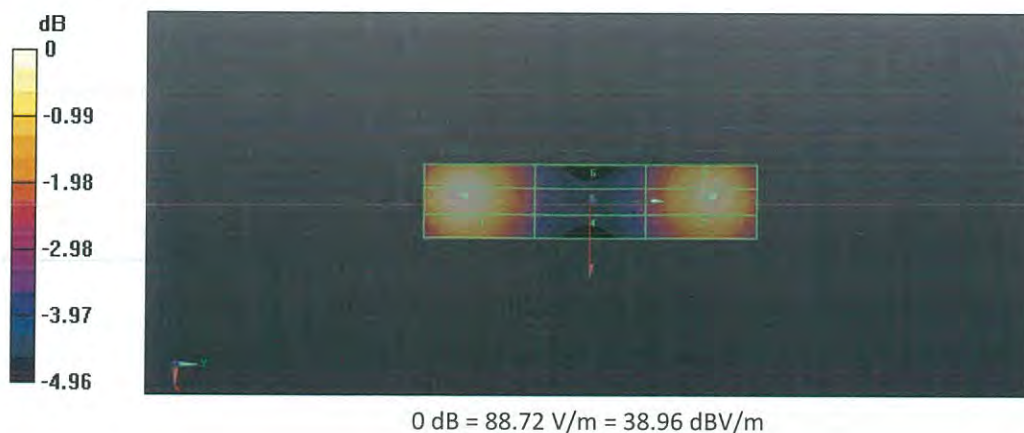
Applied MIF = 0.00 dB

RF audio interference level = 38.96 dBV/m

**Emission category: M2**

MIF scaled E-field

|             |             |             |
|-------------|-------------|-------------|
| Grid 1 M2   | Grid 2 M2   | Grid 3 M2   |
| 38.61 dBV/m | 38.96 dBV/m | 38.91 dBV/m |
| Grid 4 M2   | Grid 5 M2   | Grid 6 M2   |
| 35.75 dBV/m | 35.93 dBV/m | 35.91 dBV/m |
| Grid 7 M2   | Grid 8 M2   | Grid 9 M2   |
| 38.34 dBV/m | 38.66 dBV/m | 38.61 dBV/m |





Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 0108**

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

Client **SGS - CN (Auden)**

Certificate No: **DAE4-896\_Sep19**

## CALIBRATION CERTIFICATE

Object **DAE4 - SD 000 D04 BJ - SN: 896**

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

Calibration date: **September 18, 2019**

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        | 03-Sep-19 (No:25949)       | Sep-20                 |
| Secondary Standards           | ID #               | Check Date (in house)      | Scheduled Check        |
| Auto DAE Calibration Unit     | SE UWS 053 AA 1001 | 07-Jan-19 (in house check) | In house check: Jan-20 |
| Calibrator Box V2.1           | SE UMS 006 AA 1002 | 07-Jan-19 (in house check) | In house check: Jan-20 |

Calibrated by: 

| Name              | Function              | Signature |
|-------------------|-----------------------|-----------|
| Dominique Steffen | Laboratory Technician |           |

Approved by: 

|           |                |  |
|-----------|----------------|--|
| Sven Kühn | Deputy Manager |  |
|-----------|----------------|--|

Issued: September 18, 2019

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.



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**

## 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 = 61 nV , full range = -1.....+3mV

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

| Calibration Factors | X                         | Y                         | Z                         |
|---------------------|---------------------------|---------------------------|---------------------------|
| High Range          | 404.022 $\pm$ 0.02% (k=2) | 404.257 $\pm$ 0.02% (k=2) | 404.191 $\pm$ 0.02% (k=2) |
| Low Range           | 3.98013 $\pm$ 1.50% (k=2) | 3.99657 $\pm$ 1.50% (k=2) | 3.97235 $\pm$ 1.50% (k=2) |

## Connector Angle

|                                           |                  |
|-------------------------------------------|------------------|
| Connector Angle to be used in DASY system | 37.5 ° $\pm$ 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 | 200040.89                 | 5.76                         | 0.00      |
| Channel X + Input | 20006.10                  | 0.48                         | 0.00      |
| Channel X - Input | -20002.92                 | 2.55                         | -0.01     |
| Channel Y + Input | 200032.08                 | -3.21                        | -0.00     |
| Channel Y + Input | 20004.20                  | -1.29                        | -0.01     |
| Channel Y - Input | -20004.09                 | 1.52                         | -0.01     |
| Channel Z + Input | 200033.60                 | -1.56                        | -0.00     |
| Channel Z + Input | 20003.49                  | -2.00                        | -0.01     |
| Channel Z - Input | -20004.81                 | 0.85                         | -0.00     |

| Low Range         | Reading ( $\mu\text{V}$ ) | Difference ( $\mu\text{V}$ ) | Error (%) |
|-------------------|---------------------------|------------------------------|-----------|
| Channel X + Input | 2000.63                   | -0.76                        | -0.04     |
| Channel X + Input | 201.08                    | -0.29                        | -0.15     |
| Channel X - Input | -199.07                   | -0.39                        | 0.20      |
| Channel Y + Input | 2001.55                   | 0.25                         | 0.01      |
| Channel Y + Input | 199.66                    | -1.59                        | -0.79     |
| Channel Y - Input | -199.65                   | -0.88                        | 0.45      |
| Channel Z + Input | 2001.32                   | 0.14                         | 0.01      |
| Channel Z + Input | 200.72                    | -0.51                        | -0.25     |
| Channel Z - Input | -200.26                   | -1.43                        | 0.72      |

### 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                            | 11.76                                        | 10.55                                       |
|           | - 200                          | -10.27                                       | -11.69                                      |
| Channel Y | 200                            | 15.87                                        | 16.13                                       |
|           | - 200                          | -17.91                                       | -18.33                                      |
| Channel Z | 200                            | 5.47                                         | 5.16                                        |
|           | - 200                          | -7.23                                        | -6.76                                       |

### 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                | -                           | -0.54                       | -4.17                       |
| Channel Y | 200                | 7.56                        | -                           | 0.46                        |
| Channel Z | 200                | 9.61                        | 5.52                        | -                           |

#### 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 | 15562            | 17474           |
| Channel Y | 15992            | 17482           |
| Channel Z | 15642            | 14726           |

#### 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 | 0.71               | -0.23                  | 2.09                   | 0.45                      |
| Channel Y | -0.40              | -1.78                  | 0.63                   | 0.55                      |
| Channel Z | -0.76              | -1.83                  | 0.29                   | 0.47                      |

#### 6. Input Offset Current

Nominal Input circuitry offset current on all channels: <25fA

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

|           | Zeroing (kOhm) | Measuring (MOhm) |
|-----------|----------------|------------------|
| 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                |

## IMPORTANT NOTICE

### USAGE OF THE DAE4

The DAE unit is a delicate, high precision instrument and requires careful treatment by the user. There are no serviceable parts inside the DAE. Special attention shall be given to the following points:

**Battery Exchange:** The battery cover of the DAE4 unit is fixed using a screw, over tightening the screw may cause the threads inside the DAE to wear out.

**Shipping of the DAE:** Before shipping the DAE to SPEAG for calibration, remove the batteries and pack the DAE in an antistatic bag. This antistatic bag shall then be packed into a larger box or container which protects the DAE from impacts during transportation. The package shall be marked to indicate that a fragile instrument is inside.

**E-Stop Failures:** Touch detection may be malfunctioning due to broken magnets in the E-stop. Rough handling of the E-stop may lead to damage of these magnets. Touch and collision errors are often caused by dust and dirt accumulated in the E-stop. To prevent E-stop failure, the customer shall always mount the probe to the DAE carefully and keep the DAE unit in a non-dusty environment if not used for measurements.

**Repair:** Minor repairs are performed at no extra cost during the annual calibration. However, SPEAG reserves the right to charge for any repair especially if rough unprofessional handling caused the defect.

**DASY Configuration Files:** Since the exact values of the DAE input resistances, as measured during the calibration procedure of a DAE unit, are not used by the DASY software, a nominal value of 200 MOhm is given in the corresponding configuration file.

#### Important Note:

**Warranty and calibration is void if the DAE unit is disassembled partly or fully by the Customer.**

#### Important Note:

**Never attempt to grease or oil the E-stop assembly. Cleaning and readjusting of the E-stop assembly is allowed by certified SPEAG personnel only and is part of the annual calibration procedure.**

#### Important Note:

**To prevent damage of the DAE probe connector pins, use great care when installing the probe to the DAE. Carefully connect the probe with the connector notch oriented in the mating position. Avoid any rotational movement of the probe body versus the DAE while turning the locking nut of the connector. The same care shall be used when disconnecting the probe from the DAE.**



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 **SGS-TW (Auden)**

Certificate No: **EF3-4051\_Jun19**

## CALIBRATION CERTIFICATE

Object **EF3DV3- SN:4051**

Calibration procedure(s) **QA CAL-02.v9, QA CAL-25.v7**  
 Calibration procedure for E-field probes optimized for close near field  
 evaluations in air

Calibration date: **June 18, 2019**

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  |
|----------------------------|------------------|-----------------------------------|------------------------|
| Power meter NRP            | SN: 104778       | 03-Apr-19 (No. 217-02892/02893)   | Apr-20                 |
| Power sensor NRP-Z91       | SN: 103244       | 03-Apr-19 (No. 217-02892)         | Apr-20                 |
| Power sensor NRP-Z91       | SN: 103245       | 03-Apr-19 (No. 217-02893)         | Apr-20                 |
| Reference 20 dB Attenuator | SN: S5277 (20x)  | 04-Apr-19 (No. 217-02894)         | Apr-20                 |
| DAE4                       | SN: 789          | 14-Jan-19 (No. DAE4-789_Jan19)    | Jan-20                 |
| Reference Probe ER3DV6     | SN: 2328         | 09-Oct-18 (No. ER3-2328_Oct18)    | Oct-19                 |
| Secondary Standards        | ID               | Check Date (in house)             | Scheduled Check        |
| Power meter E4419B         | SN: GB41293874   | 06-Apr-16 (in house check Jun-18) | In house check: Jun-20 |
| Power sensor E4412A        | SN: MY41498087   | 06-Apr-16 (in house check Jun-18) | In house check: Jun-20 |
| Power sensor E4412A        | SN: 000110210    | 06-Apr-16 (in house check Jun-18) | In house check: Jun-20 |
| RF generator HP 8648C      | SN: US3642U01700 | 04-Aug-99 (in house check Jun-18) | In house check: Jun-20 |
| Network Analyzer E8358A    | SN: US41080477   | 31-Mar-14 (in house check Oct-18) | In house check: Oct-19 |

|                                                                                                                 | Name           | Function              | Signature             |
|-----------------------------------------------------------------------------------------------------------------|----------------|-----------------------|-----------------------|
| Calibrated by:                                                                                                  | Jeton Kastrati | Laboratory Technician |                       |
| Approved by:                                                                                                    | Katja Pokovic  | Technical Manager     |                       |
|                                                                                                                 |                |                       | Issued: June 18, 2019 |
| This calibration certificate shall not be reproduced except in full without written approval of the laboratory. |                |                       |                       |



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 0108**

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

### Glossary:

|                          |                                                                                                                                                         |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| NORM <sub>x,y,z</sub>    | sensitivity in free space                                                                                                                               |
| DCP                      | diode compression point                                                                                                                                 |
| CF                       | crest factor (1/duty_cycle) of the RF signal                                                                                                            |
| A, B, C, D               | modulation dependent linearization parameters                                                                                                           |
| E <sub>n</sub>           | incident E-field orientation normal to probe axis                                                                                                       |
| E <sub>p</sub>           | incident E-field orientation parallel to probe axis                                                                                                     |
| Polarization $\phi$      | $\phi$ 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 1309-2005, "IEEE Standard for calibration of electromagnetic field sensors and probes, excluding antennas, from 9 kHz to 40 GHz", December 2005
- CTIA Test Plan for Hearing Aid Compatibility, Rev 3.1.1, May 2017

### Methods Applied and Interpretation of Parameters:

- NORM<sub>x,y,z</sub>**: Assessed for E-field polarization  $\vartheta = 0$  for XY sensors and  $\vartheta = 90$  for Z sensor ( $f \leq 900$  MHz in TEM-cell;  $f > 1800$  MHz: R22 waveguide).
- NORM(f)<sub>x,y,z</sub>** = NORM<sub>x,y,z</sub> \* frequency\_response (see Frequency Response Chart).
- 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.
- Spherical isotropy (3D deviation from isotropy)**: in a locally homogeneous field realized using an open waveguide setup.
- 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).

## DASY/EASY - Parameters of Probe: EF3DV3 - SN:4051

### Basic Calibration Parameters

|                                              | Sensor X | Sensor Y | Sensor Z | Unc (k=2)     |
|----------------------------------------------|----------|----------|----------|---------------|
| Norm ( $\mu\text{V}/(\text{V}/\text{m})^2$ ) | 0.63     | 0.49     | 1.31     | $\pm 10.1 \%$ |
| DCP (mV) <sup>B</sup>                        | 100.8    | 100.7    | 95.9     |               |

### Calibration results for Frequency Response (30 MHz – 6 GHz)

| Frequency MHz | Target E-Field V/m | Measured E-field (En) V/m | Deviation E-normal in % | Measured E-field (Ep) V/m | Deviation E-normal in % | Unc (k=2) %  |
|---------------|--------------------|---------------------------|-------------------------|---------------------------|-------------------------|--------------|
| 30            | 77.3               | 77.4                      | 0.1%                    | 77.4                      | 0.2%                    | $\pm 5.1 \%$ |
| 100           | 77.3               | 78.1                      | 1.0%                    | 77.8                      | 0.6%                    | $\pm 5.1 \%$ |
| 450           | 77.1               | 77.9                      | 0.9%                    | 77.7                      | 0.8%                    | $\pm 5.1 \%$ |
| 600           | 77.1               | 77.5                      | 0.5%                    | 77.3                      | 0.2%                    | $\pm 5.1 \%$ |
| 750           | 77.2               | 77.3                      | 0.2%                    | 77.1                      | 0.0%                    | $\pm 5.1 \%$ |
| 1800          | 143.1              | 139.0                     | -2.9%                   | 139.1                     | -2.8%                   | $\pm 5.1 \%$ |
| 2000          | 135.2              | 131.5                     | -2.8%                   | 131.4                     | -2.8%                   | $\pm 5.1 \%$ |
| 2200          | 127.7              | 123.4                     | -3.3%                   | 124.5                     | -2.4%                   | $\pm 5.1 \%$ |
| 2500          | 125.5              | 122.4                     | -2.5%                   | 123.5                     | -1.6%                   | $\pm 5.1 \%$ |
| 3000          | 79.4               | 75.6                      | -4.7%                   | 76.6                      | -3.5%                   | $\pm 5.1 \%$ |
| 3500          | 256.1              | 247.7                     | -3.3%                   | 245.6                     | -4.1%                   | $\pm 5.1 \%$ |
| 3700          | 249.3              | 239.0                     | -4.2%                   | 238.0                     | -4.5%                   | $\pm 5.1 \%$ |
| 5200          | 50.7               | 51.0                      | 0.6%                    | 51.4                      | 1.5%                    | $\pm 5.1 \%$ |
| 5500          | 49.6               | 49.3                      | -0.6%                   | 48.3                      | -2.6%                   | $\pm 5.1 \%$ |
| 5800          | 48.9               | 48.7                      | -0.4%                   | 49.7                      | 1.7%                    | $\pm 5.1 \%$ |

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>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.

# DASY/EASY - Parameters of Probe: EF3DV3 - SN:4051

## Calibration Results for Modulation Response

| UID           | Communication System Name   |   | A<br>dB | B<br>dB $\sqrt{\mu V}$ | C     | D<br>dB | VR<br>mV | Max<br>dev.  | Max<br>Unc <sup>E</sup><br>(k=2) |
|---------------|-----------------------------|---|---------|------------------------|-------|---------|----------|--------------|----------------------------------|
| 0             | CW                          | X | 0.00    | 0.00                   | 1.00  | 0.00    | 152.5    | $\pm 3.5 \%$ | $\pm 4.7 \%$                     |
|               |                             | Y | 0.00    | 0.00                   | 1.00  |         | 173.4    |              |                                  |
|               |                             | Z | 0.00    | 0.00                   | 1.00  |         | 134.5    |              |                                  |
| 10352-<br>AAA | Pulse Waveform (200Hz, 10%) | X | 3.26    | 66.69                  | 10.85 | 10.00   | 60.0     | $\pm 1.9 \%$ | $\pm 9.6 \%$                     |
|               |                             | Y | 3.37    | 67.83                  | 11.18 |         | 60.0     |              |                                  |
|               |                             | Z | 10.03   | 81.53                  | 17.60 |         | 60.0     |              |                                  |
| 10353-<br>AAA | Pulse Waveform (200Hz, 20%) | X | 1.81    | 64.21                  | 8.66  | 6.99    | 80.0     | $\pm 0.9 \%$ | $\pm 9.6 \%$                     |
|               |                             | Y | 2.45    | 67.27                  | 9.93  |         | 80.0     |              |                                  |
|               |                             | Z | 15.00   | 86.84                  | 18.02 |         | 80.0     |              |                                  |
| 10354-<br>AAA | Pulse Waveform (200Hz, 40%) | X | 0.94    | 62.96                  | 7.03  | 3.98    | 95.0     | $\pm 0.9 \%$ | $\pm 9.6 \%$                     |
|               |                             | Y | 1.59    | 66.82                  | 8.73  |         | 95.0     |              |                                  |
|               |                             | Z | 15.00   | 87.95                  | 17.03 |         | 95.0     |              |                                  |
| 10355-<br>AAA | Pulse Waveform (200Hz, 60%) | X | 0.55    | 62.61                  | 6.16  | 2.22    | 120.0    | $\pm 0.9 \%$ | $\pm 9.6 \%$                     |
|               |                             | Y | 15.00   | 81.10                  | 11.81 |         | 120.0    |              |                                  |
|               |                             | Z | 15.00   | 88.54                  | 15.99 |         | 120.0    |              |                                  |
| 10387-<br>AAA | QPSK Waveform, 1 MHz        | X | 0.62    | 62.15                  | 8.08  | 0.00    | 150.0    | $\pm 3.0 \%$ | $\pm 9.6 \%$                     |
|               |                             | Y | 0.36    | 60.00                  | 4.46  |         | 150.0    |              |                                  |
|               |                             | Z | 1.29    | 68.97                  | 13.78 |         | 150.0    |              |                                  |
| 10388-<br>AAA | QPSK Waveform, 10 MHz       | X | 2.58    | 71.82                  | 17.88 | 0.00    | 150.0    | $\pm 1.0 \%$ | $\pm 9.6 \%$                     |
|               |                             | Y | 2.62    | 73.53                  | 18.91 |         | 150.0    |              |                                  |
|               |                             | Z | 2.83    | 72.19                  | 18.01 |         | 150.0    |              |                                  |
| 10396-<br>AAA | 64-QAM Waveform, 100 kHz    | X | 3.68    | 76.96                  | 21.71 | 3.01    | 150.0    | $\pm 0.7 \%$ | $\pm 9.6 \%$                     |
|               |                             | Y | 2.97    | 74.32                  | 21.04 |         | 150.0    |              |                                  |
|               |                             | Z | 3.20    | 72.03                  | 19.68 |         | 150.0    |              |                                  |
| 10399-<br>AAA | 64-QAM Waveform, 40 MHz     | X | 3.61    | 68.31                  | 16.58 | 0.00    | 150.0    | $\pm 1.5 \%$ | $\pm 9.6 \%$                     |
|               |                             | Y | 3.56    | 68.63                  | 16.94 |         | 150.0    |              |                                  |
|               |                             | Z | 3.70    | 68.17                  | 16.61 |         | 150.0    |              |                                  |
| 10414-<br>AAA | WLAN CCDF, 64-QAM, 40MHz    | X | 4.69    | 65.82                  | 15.78 | 0.00    | 150.0    | $\pm 3.2 \%$ | $\pm 9.6 \%$                     |
|               |                             | Y | 4.67    | 66.55                  | 16.29 |         | 150.0    |              |                                  |
|               |                             | Z | 4.99    | 65.89                  | 15.93 |         | 150.0    |              |                                  |

Note: For details on UID parameters see Appendix

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>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.

## DASY/EASY - Parameters of Probe: EF3DV3 - SN:4051

### Sensor Frequency Model Parameters

|                      | Sensor X | Sensor Y | Sensor Z |
|----------------------|----------|----------|----------|
| Frequency Corr. (LF) | 0.04     | -0.05    | 5.65     |
| Frequency Corr. (HF) | 2.82     | 2.82     | 2.82     |

### Sensor Model Parameters

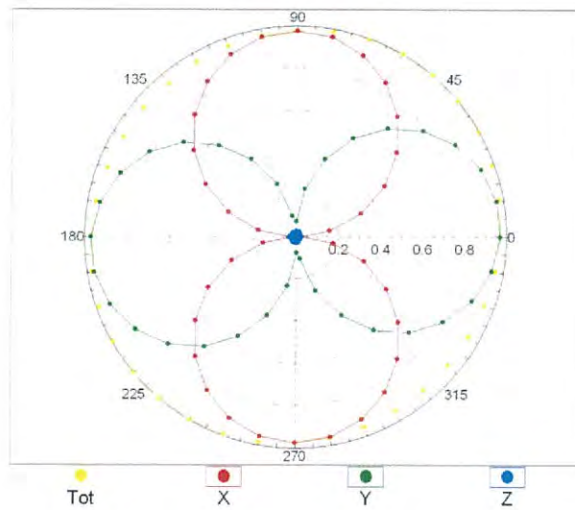
|   | C1<br>fF | C2<br>fF | $\alpha$<br>$V^{-1}$ | T1<br>$ms.V^{-2}$ | T2<br>$ms.V^{-1}$ | T3<br>ms | T4<br>$V^{-2}$ | T5<br>$V^{-1}$ | T6   |
|---|----------|----------|----------------------|-------------------|-------------------|----------|----------------|----------------|------|
| X | 39.6     | 252.87   | 34.89                | 7.78              | 0.63              | 4.93     | 1.91           | 0.00           | 1.00 |
| Y | 29.3     | 191.02   | 36.24                | 10.15             | 0.34              | 4.98     | 1.39           | 0.03           | 1.00 |
| Z | 61.3     | 408.15   | 37.47                | 12.72             | 0.51              | 5.05     | 0.00           | 0.50           | 1.00 |

### Other Probe Parameters

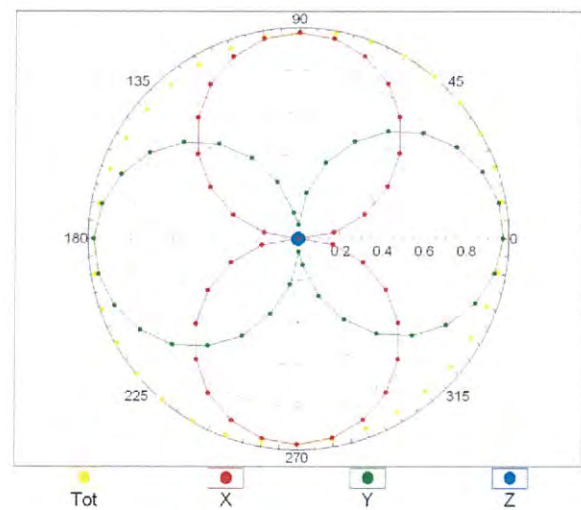
|                                         |             |
|-----------------------------------------|-------------|
| Sensor Arrangement                      | Rectangular |
| Connector Angle (°)                     | 127.2       |
| Mechanical Surface Detection Mode       | enabled     |
| Optical Surface Detection Mode          | disabled    |
| Probe Overall Length                    | 337 mm      |
| Probe Body Diameter                     | 12 mm       |
| Tip Length                              | 25 mm       |
| Tip Diameter                            | 4 mm        |
| Probe Tip to Sensor X Calibration Point | 1.5 mm      |
| Probe Tip to Sensor Y Calibration Point | 1.5 mm      |
| Probe Tip to Sensor Z Calibration Point | 1.5 mm      |

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

$f=600\text{ MHz, TEM, }0^\circ$

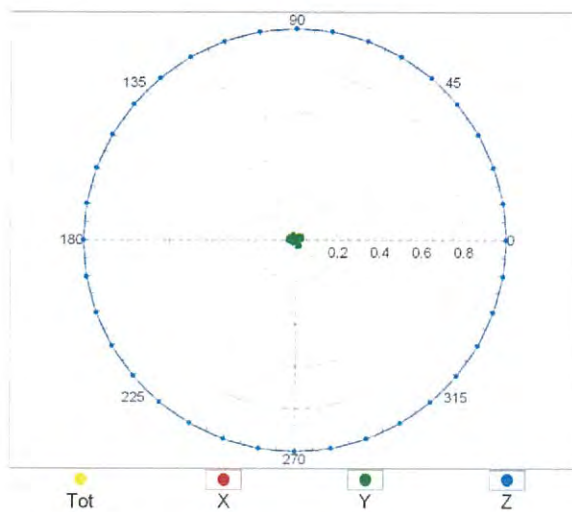


$f=1800\text{ MHz, R22, }0^\circ$

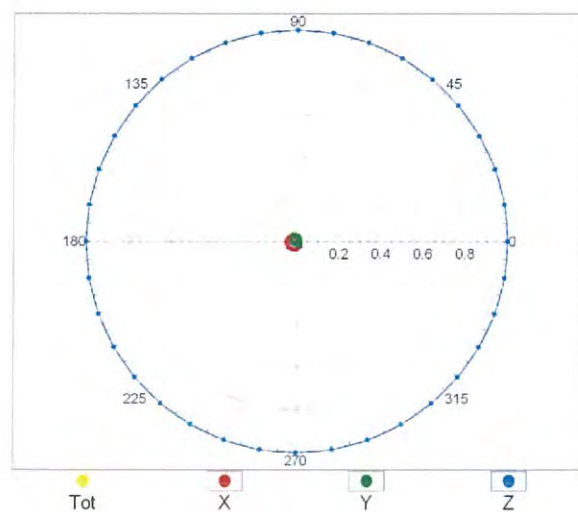


## Receiving Pattern ( $\phi$ ), $\vartheta = 90^\circ$

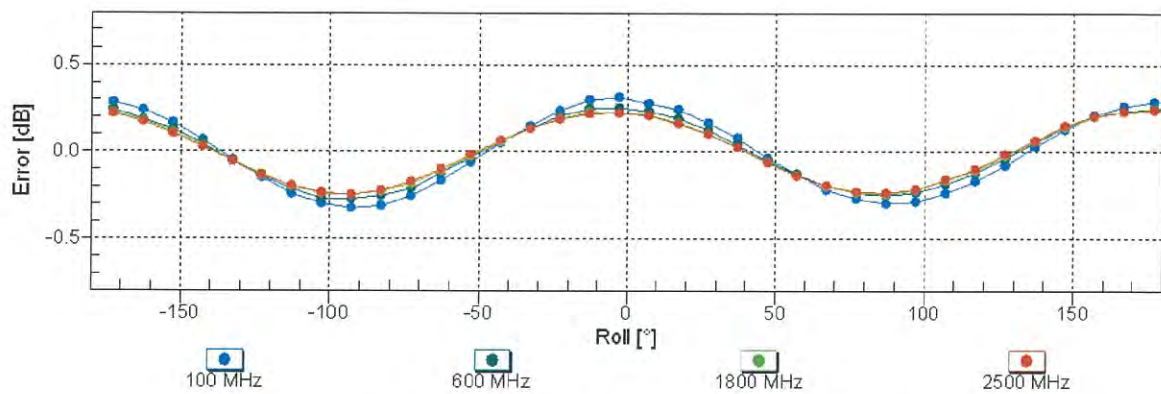
$f=600\text{ MHz, TEM, }90^\circ$



$f=1800\text{ MHz, R22, }90^\circ$

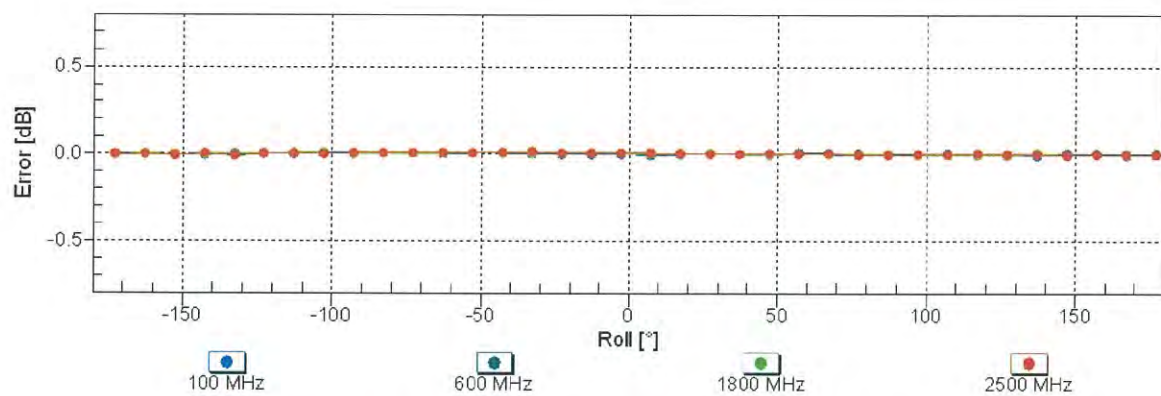


## Receiving Pattern ( $\phi$ ), $\vartheta = 0^\circ$



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

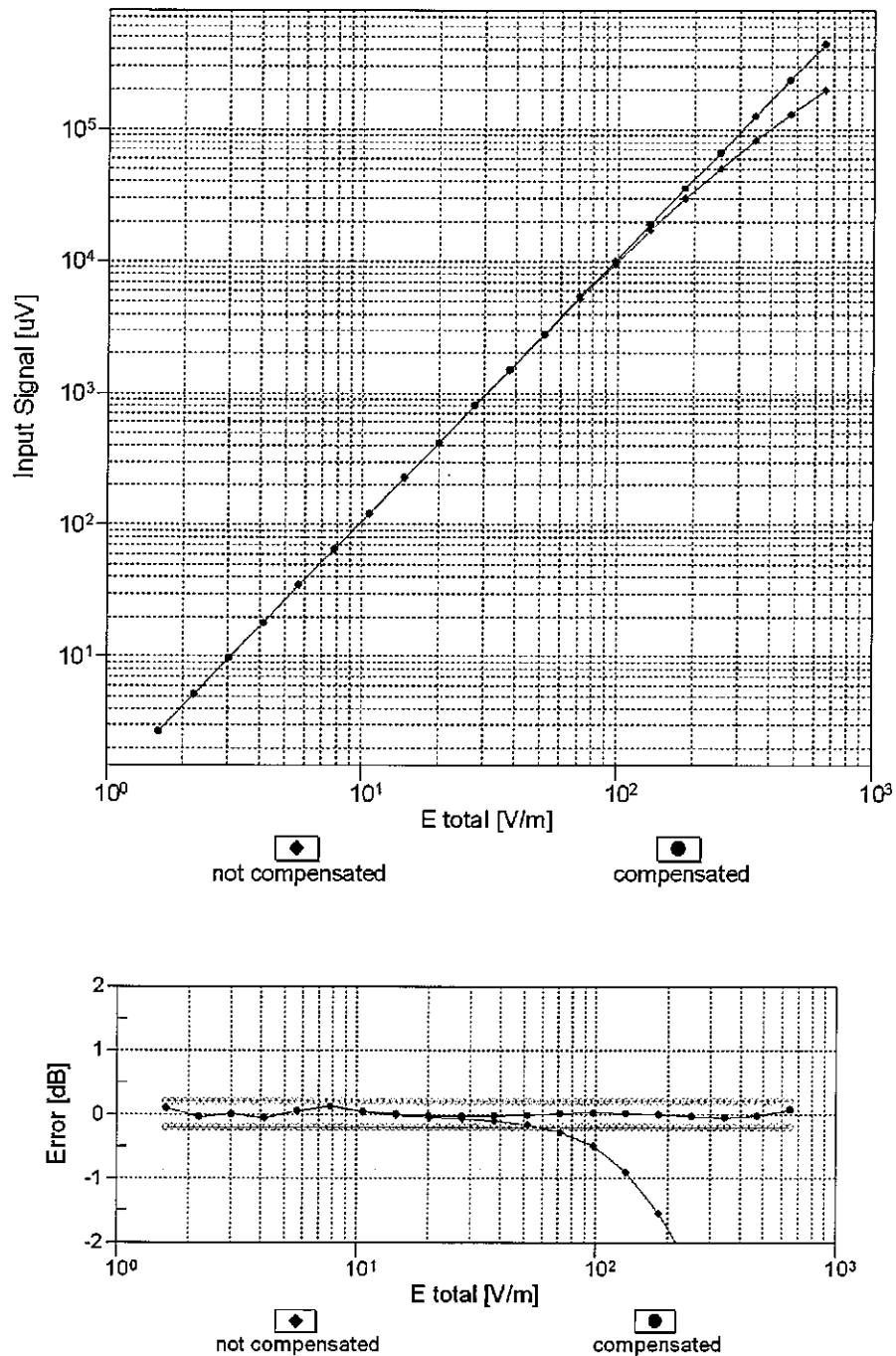
## Receiving Pattern ( $\phi$ ), $\vartheta = 90^\circ$



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

## Dynamic Range f(E-field)

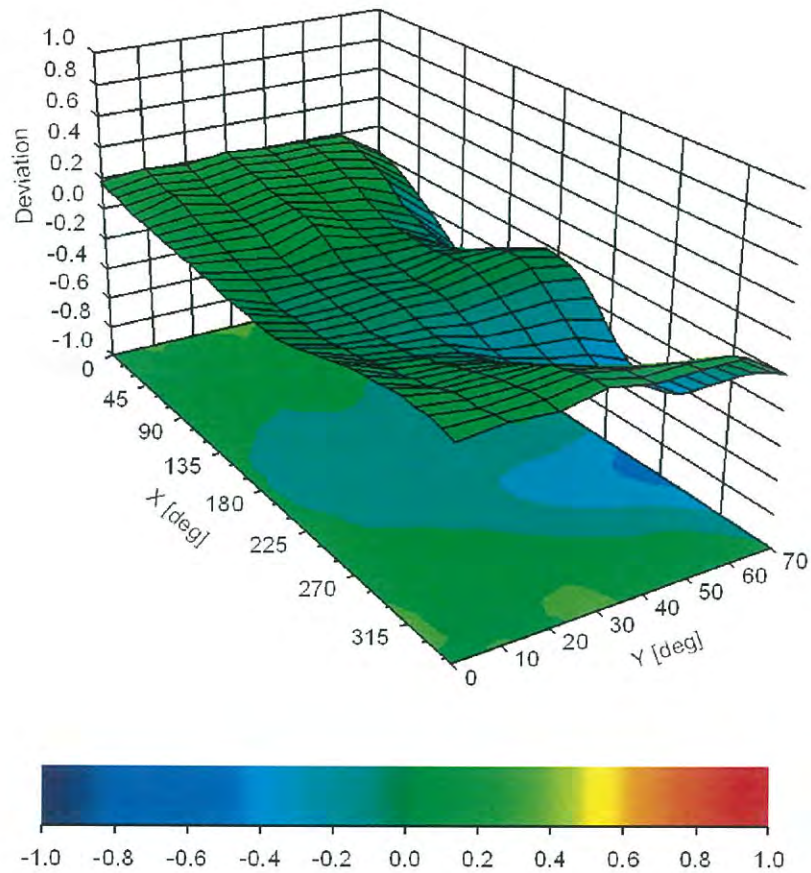
(TEM cell,  $f = 900$  MHz)



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

## Deviation from Isotropy in Air

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



Uncertainty of Spherical Isotropy Assessment:  $\pm 2.6\%$  ( $k=2$ )

**Appendix: Modulation Calibration Parameters**

| UID   | Rev | Communication System Name                           | Group     | PAR (dB) | Unc <sup>E</sup> (k=2) |
|-------|-----|-----------------------------------------------------|-----------|----------|------------------------|
| 0     |     | CW                                                  | CW        | 0.00     | ± 4.7 %                |
| 10010 | CAA | SAR Validation (Square, 100ms, 10ms)                | Test      | 10.00    | ± 9.6 %                |
| 10011 | CAB | UMTS-FDD (WCDMA)                                    | WCDMA     | 2.91     | ± 9.6 %                |
| 10012 | CAB | IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps)            | WLAN      | 1.87     | ± 9.6 %                |
| 10013 | CAB | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps)       | WLAN      | 9.46     | ± 9.6 %                |
| 10021 | DAC | GSM-FDD (TDMA, GMSK)                                | GSM       | 9.39     | ± 9.6 %                |
| 10023 | DAC | GPRS-FDD (TDMA, GMSK, TN 0)                         | GSM       | 9.57     | ± 9.6 %                |
| 10024 | DAC | GPRS-FDD (TDMA, GMSK, TN 0-1)                       | GSM       | 6.56     | ± 9.6 %                |
| 10025 | DAC | EDGE-FDD (TDMA, 8PSK, TN 0)                         | GSM       | 12.62    | ± 9.6 %                |
| 10026 | DAC | EDGE-FDD (TDMA, 8PSK, TN 0-1)                       | GSM       | 9.55     | ± 9.6 %                |
| 10027 | DAC | GPRS-FDD (TDMA, GMSK, TN 0-1-2)                     | GSM       | 4.80     | ± 9.6 %                |
| 10028 | DAC | GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)                   | GSM       | 3.55     | ± 9.6 %                |
| 10029 | DAC | EDGE-FDD (TDMA, 8PSK, TN 0-1-2)                     | GSM       | 7.78     | ± 9.6 %                |
| 10030 | CAA | IEEE 802.15.1 Bluetooth (GFSK, DH1)                 | Bluetooth | 5.30     | ± 9.6 %                |
| 10031 | CAA | IEEE 802.15.1 Bluetooth (GFSK, DH3)                 | Bluetooth | 1.87     | ± 9.6 %                |
| 10032 | CAA | IEEE 802.15.1 Bluetooth (GFSK, DH5)                 | Bluetooth | 1.16     | ± 9.6 %                |
| 10033 | CAA | IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH1)           | Bluetooth | 7.74     | ± 9.6 %                |
| 10034 | CAA | IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH3)           | Bluetooth | 4.53     | ± 9.6 %                |
| 10035 | CAA | IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH5)           | Bluetooth | 3.83     | ± 9.6 %                |
| 10036 | CAA | IEEE 802.15.1 Bluetooth (8-DPSK, DH1)               | Bluetooth | 8.01     | ± 9.6 %                |
| 10037 | CAA | IEEE 802.15.1 Bluetooth (8-DPSK, DH3)               | Bluetooth | 4.77     | ± 9.6 %                |
| 10038 | CAA | IEEE 802.15.1 Bluetooth (8-DPSK, DH5)               | Bluetooth | 4.10     | ± 9.6 %                |
| 10039 | CAB | CDMA2000 (1xRTT, RC1)                               | CDMA2000  | 4.57     | ± 9.6 %                |
| 10042 | CAB | IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Halfrate) | AMPS      | 7.78     | ± 9.6 %                |
| 10044 | CAA | IS-91/EIA/TIA-553 FDD (FDMA, FM)                    | AMPS      | 0.00     | ± 9.6 %                |
| 10048 | CAA | DECT (TDD, TDMA/FDM, GFSK, Full Slot, 24)           | DECT      | 13.80    | ± 9.6 %                |
| 10049 | CAA | DECT (TDD, TDMA/FDM, GFSK, Double Slot, 12)         | DECT      | 10.79    | ± 9.6 %                |
| 10056 | CAA | UMTS-TDD (TD-SCDMA, 1.28 Mcps)                      | TD-SCDMA  | 11.01    | ± 9.6 %                |
| 10058 | DAC | EDGE-FDD (TDMA, 8PSK, TN 0-1-2-3)                   | GSM       | 6.52     | ± 9.6 %                |
| 10059 | CAB | IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps)            | WLAN      | 2.12     | ± 9.6 %                |
| 10060 | CAB | IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps)          | WLAN      | 2.83     | ± 9.6 %                |
| 10061 | CAB | IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps)           | WLAN      | 3.60     | ± 9.6 %                |
| 10062 | CAC | IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)            | WLAN      | 8.68     | ± 9.6 %                |
| 10063 | CAC | IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps)            | WLAN      | 8.63     | ± 9.6 %                |
| 10064 | CAC | IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps)           | WLAN      | 9.09     | ± 9.6 %                |
| 10065 | CAC | IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps)           | WLAN      | 9.00     | ± 9.6 %                |
| 10066 | CAC | IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps)           | WLAN      | 9.38     | ± 9.6 %                |
| 10067 | CAC | IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps)           | WLAN      | 10.12    | ± 9.6 %                |
| 10068 | CAC | IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps)           | WLAN      | 10.24    | ± 9.6 %                |
| 10069 | CAC | IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps)           | WLAN      | 10.56    | ± 9.6 %                |
| 10071 | CAB | IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 9 Mbps)       | WLAN      | 9.83     | ± 9.6 %                |
| 10072 | CAB | IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 12 Mbps)      | WLAN      | 9.62     | ± 9.6 %                |
| 10073 | CAB | IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 18 Mbps)      | WLAN      | 9.94     | ± 9.6 %                |
| 10074 | CAB | IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 24 Mbps)      | WLAN      | 10.30    | ± 9.6 %                |
| 10075 | CAB | IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 36 Mbps)      | WLAN      | 10.77    | ± 9.6 %                |
| 10076 | CAB | IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 48 Mbps)      | WLAN      | 10.94    | ± 9.6 %                |
| 10077 | CAB | IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 54 Mbps)      | WLAN      | 11.00    | ± 9.6 %                |
| 10081 | CAB | CDMA2000 (1xRTT, RC3)                               | CDMA2000  | 3.97     | ± 9.6 %                |
| 10082 | CAB | IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Fullrate) | AMPS      | 4.77     | ± 9.6 %                |
| 10090 | DAC | GPRS-FDD (TDMA, GMSK, TN 0-4)                       | GSM       | 6.56     | ± 9.6 %                |
| 10097 | CAB | UMTS-FDD (HSDPA)                                    | WCDMA     | 3.98     | ± 9.6 %                |
| 10098 | CAB | UMTS-FDD (HSUPA, Subtest 2)                         | WCDMA     | 3.98     | ± 9.6 %                |
| 10099 | DAC | EDGE-FDD (TDMA, 8PSK, TN 0-4)                       | GSM       | 9.55     | ± 9.6 %                |
| 10100 | CAE | LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)            | LTE-FDD   | 5.67     | ± 9.6 %                |
| 10101 | CAE | LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)          | LTE-FDD   | 6.42     | ± 9.6 %                |
| 10102 | CAE | LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)          | LTE-FDD   | 6.60     | ± 9.6 %                |
| 10103 | CAG | LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK)            | LTE-TDD   | 9.29     | ± 9.6 %                |
| 10104 | CAG | LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)          | LTE-TDD   | 9.97     | ± 9.6 %                |
| 10105 | CAG | LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)          | LTE-TDD   | 10.01    | ± 9.6 %                |
| 10108 | CAG | LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK)            | LTE-FDD   | 5.80     | ± 9.6 %                |

|       |     |                                                |         |       |         |
|-------|-----|------------------------------------------------|---------|-------|---------|
| 10109 | CAG | LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)     | LTE-FDD | 6.43  | ± 9.6 % |
| 10110 | CAG | LTE-FDD (SC-FDMA, 100% RB, 5 MHz, QPSK)        | LTE-FDD | 5.75  | ± 9.6 % |
| 10111 | CAG | LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)      | LTE-FDD | 6.44  | ± 9.6 % |
| 10112 | CAG | LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)     | LTE-FDD | 6.59  | ± 9.6 % |
| 10113 | CAG | LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)      | LTE-FDD | 6.62  | ± 9.6 % |
| 10114 | CAC | IEEE 802.11n (HT Greenfield, 13.5 Mbps, BPSK)  | WLAN    | 8.10  | ± 9.6 % |
| 10115 | CAC | IEEE 802.11n (HT Greenfield, 81 Mbps, 16-QAM)  | WLAN    | 8.46  | ± 9.6 % |
| 10116 | CAC | IEEE 802.11n (HT Greenfield, 135 Mbps, 64-QAM) | WLAN    | 8.15  | ± 9.6 % |
| 10117 | CAC | IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK)       | WLAN    | 8.07  | ± 9.6 % |
| 10118 | CAC | IEEE 802.11n (HT Mixed, 81 Mbps, 16-QAM)       | WLAN    | 8.59  | ± 9.6 % |
| 10119 | CAC | IEEE 802.11n (HT Mixed, 135 Mbps, 64-QAM)      | WLAN    | 8.13  | ± 9.6 % |
| 10140 | CAE | LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)     | LTE-FDD | 6.49  | ± 9.6 % |
| 10141 | CAE | LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)     | LTE-FDD | 6.53  | ± 9.6 % |
| 10142 | CAE | LTE-FDD (SC-FDMA, 100% RB, 3 MHz, QPSK)        | LTE-FDD | 5.73  | ± 9.6 % |
| 10143 | CAE | LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)      | LTE-FDD | 6.35  | ± 9.6 % |
| 10144 | CAE | LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)      | LTE-FDD | 6.65  | ± 9.6 % |
| 10145 | CAF | LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)      | LTE-FDD | 5.76  | ± 9.6 % |
| 10146 | CAF | LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)    | LTE-FDD | 6.41  | ± 9.6 % |
| 10147 | CAF | LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)    | LTE-FDD | 6.72  | ± 9.6 % |
| 10149 | CAE | LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)      | LTE-FDD | 6.42  | ± 9.6 % |
| 10150 | CAE | LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)      | LTE-FDD | 6.60  | ± 9.6 % |
| 10151 | CAG | LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)        | LTE-TDD | 9.28  | ± 9.6 % |
| 10152 | CAG | LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)      | LTE-TDD | 9.92  | ± 9.6 % |
| 10153 | CAG | LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)      | LTE-TDD | 10.05 | ± 9.6 % |
| 10154 | CAG | LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)        | LTE-FDD | 5.75  | ± 9.6 % |
| 10155 | CAG | LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)      | LTE-FDD | 6.43  | ± 9.6 % |
| 10156 | CAG | LTE-FDD (SC-FDMA, 50% RB, 5 MHz, QPSK)         | LTE-FDD | 5.79  | ± 9.6 % |
| 10157 | CAG | LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)       | LTE-FDD | 6.49  | ± 9.6 % |
| 10158 | CAG | LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)      | LTE-FDD | 6.62  | ± 9.6 % |
| 10159 | CAG | LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)       | LTE-FDD | 6.56  | ± 9.6 % |
| 10160 | CAE | LTE-FDD (SC-FDMA, 50% RB, 15 MHz, QPSK)        | LTE-FDD | 5.82  | ± 9.6 % |
| 10161 | CAE | LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)      | LTE-FDD | 6.43  | ± 9.6 % |
| 10162 | CAE | LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)      | LTE-FDD | 6.58  | ± 9.6 % |
| 10166 | CAF | LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)       | LTE-FDD | 5.46  | ± 9.6 % |
| 10167 | CAF | LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)     | LTE-FDD | 6.21  | ± 9.6 % |
| 10168 | CAF | LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)     | LTE-FDD | 6.79  | ± 9.6 % |
| 10169 | CAE | LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)          | LTE-FDD | 5.73  | ± 9.6 % |
| 10170 | CAE | LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)        | LTE-FDD | 6.52  | ± 9.6 % |
| 10171 | AAE | LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)        | LTE-FDD | 6.49  | ± 9.6 % |
| 10172 | CAG | LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)          | LTE-TDD | 9.21  | ± 9.6 % |
| 10173 | CAG | LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)        | LTE-TDD | 9.48  | ± 9.6 % |
| 10174 | CAG | LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)        | LTE-TDD | 10.25 | ± 9.6 % |
| 10175 | CAG | LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)          | LTE-FDD | 5.72  | ± 9.6 % |
| 10176 | CAG | LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)        | LTE-FDD | 6.52  | ± 9.6 % |
| 10177 | CAI | LTE-FDD (SC-FDMA, 1 RB, 5 MHz, QPSK)           | LTE-FDD | 5.73  | ± 9.6 % |
| 10178 | CAG | LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)         | LTE-FDD | 6.52  | ± 9.6 % |
| 10179 | CAG | LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)        | LTE-FDD | 6.50  | ± 9.6 % |
| 10180 | CAG | LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)         | LTE-FDD | 6.50  | ± 9.6 % |
| 10181 | CAE | LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)          | LTE-FDD | 5.72  | ± 9.6 % |
| 10182 | CAE | LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)        | LTE-FDD | 6.52  | ± 9.6 % |
| 10183 | AAD | LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)        | LTE-FDD | 6.50  | ± 9.6 % |
| 10184 | CAE | LTE-FDD (SC-FDMA, 1 RB, 3 MHz, QPSK)           | LTE-FDD | 5.73  | ± 9.6 % |
| 10185 | CAE | LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)         | LTE-FDD | 6.51  | ± 9.6 % |
| 10186 | AAE | LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)         | LTE-FDD | 6.50  | ± 9.6 % |
| 10187 | CAF | LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)         | LTE-FDD | 5.73  | ± 9.6 % |
| 10188 | CAF | LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)       | LTE-FDD | 6.52  | ± 9.6 % |
| 10189 | AAF | LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)       | LTE-FDD | 6.50  | ± 9.6 % |
| 10193 | CAC | IEEE 802.11n (HT Greenfield, 6.5 Mbps, BPSK)   | WLAN    | 8.09  | ± 9.6 % |
| 10194 | CAC | IEEE 802.11n (HT Greenfield, 39 Mbps, 16-QAM)  | WLAN    | 8.12  | ± 9.6 % |
| 10195 | CAC | IEEE 802.11n (HT Greenfield, 65 Mbps, 64-QAM)  | WLAN    | 8.21  | ± 9.6 % |
| 10196 | CAC | IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)        | WLAN    | 8.10  | ± 9.6 % |
| 10197 | CAC | IEEE 802.11n (HT Mixed, 39 Mbps, 16-QAM)       | WLAN    | 8.13  | ± 9.6 % |
| 10198 | CAC | IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)       | WLAN    | 8.27  | ± 9.6 % |
| 10219 | CAC | IEEE 802.11n (HT Mixed, 7.2 Mbps, BPSK)        | WLAN    | 8.03  | ± 9.6 % |

|       |     |                                             |          |       |         |
|-------|-----|---------------------------------------------|----------|-------|---------|
| 10220 | CAC | IEEE 802.11n (HT Mixed, 43.3 Mbps, 16-QAM)  | WLAN     | 8.13  | ± 9.6 % |
| 10221 | CAC | IEEE 802.11n (HT Mixed, 72.2 Mbps, 64-QAM)  | WLAN     | 8.27  | ± 9.6 % |
| 10222 | CAC | IEEE 802.11n (HT Mixed, 15 Mbps, BPSK)      | WLAN     | 8.06  | ± 9.6 % |
| 10223 | CAC | IEEE 802.11n (HT Mixed, 90 Mbps, 16-QAM)    | WLAN     | 8.48  | ± 9.6 % |
| 10224 | CAC | IEEE 802.11n (HT Mixed, 150 Mbps, 64-QAM)   | WLAN     | 8.08  | ± 9.6 % |
| 10225 | CAB | UMTS-FDD (HSPA+)                            | WCDMA    | 5.97  | ± 9.6 % |
| 10226 | CAA | LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)    | LTE-TDD  | 9.49  | ± 9.6 % |
| 10227 | CAA | LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)    | LTE-TDD  | 10.26 | ± 9.6 % |
| 10228 | CAA | LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)      | LTE-TDD  | 9.22  | ± 9.6 % |
| 10229 | CAC | LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)      | LTE-TDD  | 9.48  | ± 9.6 % |
| 10230 | CAC | LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)      | LTE-TDD  | 10.25 | ± 9.6 % |
| 10231 | CAC | LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK)        | LTE-TDD  | 9.19  | ± 9.6 % |
| 10232 | CAF | LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)      | LTE-TDD  | 9.48  | ± 9.6 % |
| 10233 | CAF | LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)      | LTE-TDD  | 10.25 | ± 9.6 % |
| 10234 | CAF | LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK)        | LTE-TDD  | 9.21  | ± 9.6 % |
| 10235 | CAF | LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)     | LTE-TDD  | 9.48  | ± 9.6 % |
| 10236 | CAF | LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)     | LTE-TDD  | 10.25 | ± 9.6 % |
| 10237 | CAF | LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)       | LTE-TDD  | 9.21  | ± 9.6 % |
| 10238 | CAF | LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)     | LTE-TDD  | 9.48  | ± 9.6 % |
| 10239 | CAF | LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)     | LTE-TDD  | 10.25 | ± 9.6 % |
| 10240 | CAF | LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK)       | LTE-TDD  | 9.21  | ± 9.6 % |
| 10241 | CAA | LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)  | LTE-TDD  | 9.82  | ± 9.6 % |
| 10242 | CAA | LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)  | LTE-TDD  | 9.86  | ± 9.6 % |
| 10243 | CAA | LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)    | LTE-TDD  | 9.46  | ± 9.6 % |
| 10244 | CAC | LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)    | LTE-TDD  | 10.06 | ± 9.6 % |
| 10245 | CAC | LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)    | LTE-TDD  | 10.06 | ± 9.6 % |
| 10246 | CAC | LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK)      | LTE-TDD  | 9.30  | ± 9.6 % |
| 10247 | CAF | LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)    | LTE-TDD  | 9.91  | ± 9.6 % |
| 10248 | CAF | LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)    | LTE-TDD  | 10.09 | ± 9.6 % |
| 10249 | CAF | LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK)      | LTE-TDD  | 9.29  | ± 9.6 % |
| 10250 | CAF | LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)   | LTE-TDD  | 9.81  | ± 9.6 % |
| 10251 | CAF | LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)   | LTE-TDD  | 10.17 | ± 9.6 % |
| 10252 | CAF | LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK)     | LTE-TDD  | 9.24  | ± 9.6 % |
| 10253 | CAF | LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)   | LTE-TDD  | 9.90  | ± 9.6 % |
| 10254 | CAF | LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)   | LTE-TDD  | 10.14 | ± 9.6 % |
| 10255 | CAF | LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK)     | LTE-TDD  | 9.20  | ± 9.6 % |
| 10256 | CAA | LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM) | LTE-TDD  | 9.96  | ± 9.6 % |
| 10257 | CAA | LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM) | LTE-TDD  | 10.08 | ± 9.6 % |
| 10258 | CAA | LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)   | LTE-TDD  | 9.34  | ± 9.6 % |
| 10259 | CAC | LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)   | LTE-TDD  | 9.98  | ± 9.6 % |
| 10260 | CAC | LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)   | LTE-TDD  | 9.97  | ± 9.6 % |
| 10261 | CAC | LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK)     | LTE-TDD  | 9.24  | ± 9.6 % |
| 10262 | CAF | LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)   | LTE-TDD  | 9.83  | ± 9.6 % |
| 10263 | CAF | LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)   | LTE-TDD  | 10.16 | ± 9.6 % |
| 10264 | CAF | LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK)     | LTE-TDD  | 9.23  | ± 9.6 % |
| 10265 | CAF | LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)  | LTE-TDD  | 9.92  | ± 9.6 % |
| 10266 | CAF | LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)  | LTE-TDD  | 10.07 | ± 9.6 % |
| 10267 | CAF | LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK)    | LTE-TDD  | 9.30  | ± 9.6 % |
| 10268 | CAF | LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)  | LTE-TDD  | 10.06 | ± 9.6 % |
| 10269 | CAF | LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)  | LTE-TDD  | 10.13 | ± 9.6 % |
| 10270 | CAF | LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK)    | LTE-TDD  | 9.58  | ± 9.6 % |
| 10274 | CAB | UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.10)   | WCDMA    | 4.87  | ± 9.6 % |
| 10275 | CAB | UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.4)    | WCDMA    | 3.96  | ± 9.6 % |
| 10277 | CAA | PHS (QPSK)                                  | PHS      | 11.81 | ± 9.6 % |
| 10278 | CAA | PHS (QPSK, BW 884MHz, Rolloff 0.5)          | PHS      | 11.81 | ± 9.6 % |
| 10279 | CAA | PHS (QPSK, BW 884MHz, Rolloff 0.38)         | PHS      | 12.18 | ± 9.6 % |
| 10290 | AAB | CDMA2000, RC1, SO55, Full Rate              | CDMA2000 | 3.91  | ± 9.6 % |
| 10291 | AAB | CDMA2000, RC3, SO55, Full Rate              | CDMA2000 | 3.46  | ± 9.6 % |
| 10292 | AAB | CDMA2000, RC3, SO32, Full Rate              | CDMA2000 | 3.39  | ± 9.6 % |
| 10293 | AAB | CDMA2000, RC3, SO3, Full Rate               | CDMA2000 | 3.50  | ± 9.6 % |
| 10295 | AAB | CDMA2000, RC1, SO3, 1/8th Rate 25 fr.       | CDMA2000 | 12.49 | ± 9.6 % |
| 10297 | AAD | LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK)     | LTE-FDD  | 5.81  | ± 9.6 % |
| 10298 | AAD | LTE-FDD (SC-FDMA, 50% RB, 3 MHz, QPSK)      | LTE-FDD  | 5.72  | ± 9.6 % |
| 10299 | AAD | LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)    | LTE-FDD  | 6.39  | ± 9.6 % |

|       |     |                                                                                 |          |       |         |
|-------|-----|---------------------------------------------------------------------------------|----------|-------|---------|
| 10300 | AAD | LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)                                        | LTE-FDD  | 6.60  | ± 9.6 % |
| 10301 | AAA | IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, QPSK, PUSC)                              | WiMAX    | 12.03 | ± 9.6 % |
| 10302 | AAA | IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, QPSK, PUSC, 3 CTRL symbols)              | WiMAX    | 12.57 | ± 9.6 % |
| 10303 | AAA | IEEE 802.16e WiMAX (31:15, 5ms, 10MHz, 64QAM, PUSC)                             | WiMAX    | 12.52 | ± 9.6 % |
| 10304 | AAA | IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, 64QAM, PUSC)                             | WiMAX    | 11.86 | ± 9.6 % |
| 10305 | AAA | IEEE 802.16e WiMAX (31:15, 10ms, 10MHz, 64QAM, PUSC, 15 symbols)                | WiMAX    | 15.24 | ± 9.6 % |
| 10306 | AAA | IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 64QAM, PUSC, 18 symbols)                | WiMAX    | 14.67 | ± 9.6 % |
| 10307 | AAA | IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, QPSK, PUSC, 18 symbols)                 | WiMAX    | 14.49 | ± 9.6 % |
| 10308 | AAA | IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 16QAM, PUSC)                            | WiMAX    | 14.46 | ± 9.6 % |
| 10309 | AAA | IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 16QAM, AMC 2x3, 18 symbols)             | WiMAX    | 14.58 | ± 9.6 % |
| 10310 | AAA | IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, QPSK, AMC 2x3, 18 symbols)              | WiMAX    | 14.57 | ± 9.6 % |
| 10311 | AAD | LTE-FDD (SC-FDMA, 100% RB, 15 MHz, QPSK)                                        | LTE-FDD  | 6.06  | ± 9.6 % |
| 10313 | AAA | iDEN 1:3                                                                        | iDEN     | 10.51 | ± 9.6 % |
| 10314 | AAA | iDEN 1:6                                                                        | iDEN     | 13.48 | ± 9.6 % |
| 10315 | AAB | IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 96pc duty cycle)                       | WLAN     | 1.71  | ± 9.6 % |
| 10316 | AAB | IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 96pc duty cycle)                   | WLAN     | 8.36  | ± 9.6 % |
| 10317 | AAC | IEEE 802.11a WiFi 5 GHz (OFDM, 6 Mbps, 96pc duty cycle)                         | WLAN     | 8.36  | ± 9.6 % |
| 10352 | AAA | Pulse Waveform (200Hz, 10%)                                                     | Generic  | 10.00 | ± 9.6 % |
| 10353 | AAA | Pulse Waveform (200Hz, 20%)                                                     | Generic  | 6.99  | ± 9.6 % |
| 10354 | AAA | Pulse Waveform (200Hz, 40%)                                                     | Generic  | 3.98  | ± 9.6 % |
| 10355 | AAA | Pulse Waveform (200Hz, 60%)                                                     | Generic  | 2.22  | ± 9.6 % |
| 10356 | AAA | Pulse Waveform (200Hz, 80%)                                                     | Generic  | 0.97  | ± 9.6 % |
| 10387 | AAA | QPSK Waveform, 1 MHz                                                            | Generic  | 5.10  | ± 9.6 % |
| 10388 | AAA | QPSK Waveform, 10 MHz                                                           | Generic  | 5.22  | ± 9.6 % |
| 10396 | AAA | 64-QAM Waveform, 100 kHz                                                        | Generic  | 6.27  | ± 9.6 % |
| 10399 | AAA | 64-QAM Waveform, 40 MHz                                                         | Generic  | 6.27  | ± 9.6 % |
| 10400 | AAD | IEEE 802.11ac WiFi (20MHz, 64-QAM, 99pc duty cycle)                             | WLAN     | 8.37  | ± 9.6 % |
| 10401 | AAD | IEEE 802.11ac WiFi (40MHz, 64-QAM, 99pc duty cycle)                             | WLAN     | 8.60  | ± 9.6 % |
| 10402 | AAD | IEEE 802.11ac WiFi (80MHz, 64-QAM, 99pc duty cycle)                             | WLAN     | 8.53  | ± 9.6 % |
| 10403 | AAB | CDMA2000 (1xEV-DO, Rev. 0)                                                      | CDMA2000 | 3.76  | ± 9.6 % |
| 10404 | AAB | CDMA2000 (1xEV-DO, Rev. A)                                                      | CDMA2000 | 3.77  | ± 9.6 % |
| 10406 | AAB | CDMA2000, RC3, SO32, SCH0, Full Rate                                            | CDMA2000 | 5.22  | ± 9.6 % |
| 10410 | AAF | LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9, Subframe Conf=4) | LTE-TDD  | 7.82  | ± 9.6 % |
| 10414 | AAA | WLAN CCDF, 64-QAM, 40MHz                                                        | Generic  | 8.54  | ± 9.6 % |
| 10415 | AAA | IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 99pc duty cycle)                       | WLAN     | 1.54  | ± 9.6 % |
| 10416 | AAA | IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 99pc duty cycle)                   | WLAN     | 8.23  | ± 9.6 % |
| 10417 | AAB | IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps, 99pc duty cycle)                       | WLAN     | 8.23  | ± 9.6 % |
| 10418 | AAA | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc duty cycle, Long preamble)   | WLAN     | 8.14  | ± 9.6 % |
| 10419 | AAA | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc duty cycle, Short preamble)  | WLAN     | 8.19  | ± 9.6 % |
| 10422 | AAB | IEEE 802.11n (HT Greenfield, 7.2 Mbps, BPSK)                                    | WLAN     | 8.32  | ± 9.6 % |
| 10423 | AAB | IEEE 802.11n (HT Greenfield, 43.3 Mbps, 16-QAM)                                 | WLAN     | 8.47  | ± 9.6 % |
| 10424 | AAB | IEEE 802.11n (HT Greenfield, 72.2 Mbps, 64-QAM)                                 | WLAN     | 8.40  | ± 9.6 % |
| 10425 | AAB | IEEE 802.11n (HT Greenfield, 15 Mbps, BPSK)                                     | WLAN     | 8.41  | ± 9.6 % |
| 10426 | AAB | IEEE 802.11n (HT Greenfield, 90 Mbps, 16-QAM)                                   | WLAN     | 8.45  | ± 9.6 % |
| 10427 | AAB | IEEE 802.11n (HT Greenfield, 150 Mbps, 64-QAM)                                  | WLAN     | 8.41  | ± 9.6 % |
| 10430 | AAD | LTE-FDD (OFDMA, 5 MHz, E-TM 3.1)                                                | LTE-FDD  | 8.28  | ± 9.6 % |
| 10431 | AAD | LTE-FDD (OFDMA, 10 MHz, E-TM 3.1)                                               | LTE-FDD  | 8.38  | ± 9.6 % |
| 10432 | AAC | LTE-FDD (OFDMA, 15 MHz, E-TM 3.1)                                               | LTE-FDD  | 8.34  | ± 9.6 % |
| 10433 | AAC | LTE-FDD (OFDMA, 20 MHz, E-TM 3.1)                                               | LTE-FDD  | 8.34  | ± 9.6 % |
| 10434 | AAA | W-CDMA (BS Test Model 1, 64 DPCH)                                               | WCDMA    | 8.60  | ± 9.6 % |
| 10435 | AAF | LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)                  | LTE-TDD  | 7.82  | ± 9.6 % |
| 10447 | AAD | LTE-FDD (OFDMA, 5 MHz, E-TM 3.1, Clipping 44%)                                  | LTE-FDD  | 7.56  | ± 9.6 % |
| 10448 | AAD | LTE-FDD (OFDMA, 10 MHz, E-TM 3.1, Clipping 44%)                                 | LTE-FDD  | 7.53  | ± 9.6 % |
| 10449 | AAC | LTE-FDD (OFDMA, 15 MHz, E-TM 3.1, Clipping 44%)                                 | LTE-FDD  | 7.51  | ± 9.6 % |
| 10450 | AAC | LTE-FDD (OFDMA, 20 MHz, E-TM 3.1, Clipping 44%)                                 | LTE-FDD  | 7.48  | ± 9.6 % |

|       |     |                                                                        |          |      |         |
|-------|-----|------------------------------------------------------------------------|----------|------|---------|
| 10451 | AAA | W-CDMA (BS Test Model 1, 64 DPCH, Clipping 44%)                        | WCDMA    | 7.59 | ± 9.6 % |
| 10456 | AAB | IEEE 802.11ac WiFi (160MHz, 64-QAM, 99pc duty cycle)                   | WLAN     | 8.63 | ± 9.6 % |
| 10457 | AAA | UMTS-FDD (DC-HSDPA)                                                    | WCDMA    | 6.62 | ± 9.6 % |
| 10458 | AAA | CDMA2000 (1xEV-DO, Rev. B, 2 carriers)                                 | CDMA2000 | 6.55 | ± 9.6 % |
| 10459 | AAA | CDMA2000 (1xEV-DO, Rev. B, 3 carriers)                                 | CDMA2000 | 8.25 | ± 9.6 % |
| 10460 | AAA | UMTS-FDD (WCDMA, AMR)                                                  | WCDMA    | 2.39 | ± 9.6 % |
| 10461 | AAA | LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK, UL<br>Subframe=2,3,4,7,8,9)     | LTE-TDD  | 7.82 | ± 9.6 % |
| 10462 | AAA | LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM, UL<br>Subframe=2,3,4,7,8,9)   | LTE-TDD  | 8.30 | ± 9.6 % |
| 10463 | AAA | LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM, UL<br>Subframe=2,3,4,7,8,9)   | LTE-TDD  | 8.56 | ± 9.6 % |
| 10464 | AAB | LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK, UL<br>Subframe=2,3,4,7,8,9)       | LTE-TDD  | 7.82 | ± 9.6 % |
| 10465 | AAB | LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM, UL<br>Subframe=2,3,4,7,8,9)     | LTE-TDD  | 8.32 | ± 9.6 % |
| 10466 | AAB | LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM, UL<br>Subframe=2,3,4,7,8,9)     | LTE-TDD  | 8.57 | ± 9.6 % |
| 10467 | AAE | LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL<br>Subframe=2,3,4,7,8,9)       | LTE-TDD  | 7.82 | ± 9.6 % |
| 10468 | AAE | LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM, UL<br>Subframe=2,3,4,7,8,9)     | LTE-TDD  | 8.32 | ± 9.6 % |
| 10469 | AAE | LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM, UL<br>Subframe=2,3,4,7,8,9)     | LTE-TDD  | 8.56 | ± 9.6 % |
| 10470 | AAE | LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL<br>Subframe=2,3,4,7,8,9)      | LTE-TDD  | 7.82 | ± 9.6 % |
| 10471 | AAE | LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM, UL<br>Subframe=2,3,4,7,8,9)    | LTE-TDD  | 8.32 | ± 9.6 % |
| 10472 | AAE | LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM, UL<br>Subframe=2,3,4,7,8,9)    | LTE-TDD  | 8.57 | ± 9.6 % |
| 10473 | AAE | LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK, UL<br>Subframe=2,3,4,7,8,9)      | LTE-TDD  | 7.82 | ± 9.6 % |
| 10474 | AAE | LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM, UL<br>Subframe=2,3,4,7,8,9)    | LTE-TDD  | 8.32 | ± 9.6 % |
| 10475 | AAE | LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM, UL<br>Subframe=2,3,4,7,8,9)    | LTE-TDD  | 8.57 | ± 9.6 % |
| 10477 | AAF | LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM, UL<br>Subframe=2,3,4,7,8,9)    | LTE-TDD  | 8.32 | ± 9.6 % |
| 10478 | AAF | LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM, UL<br>Subframe=2,3,4,7,8,9)    | LTE-TDD  | 8.57 | ± 9.6 % |
| 10479 | AAA | LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK, UL<br>Subframe=2,3,4,7,8,9)   | LTE-TDD  | 7.74 | ± 9.6 % |
| 10480 | AAA | LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM, UL<br>Subframe=2,3,4,7,8,9) | LTE-TDD  | 8.18 | ± 9.6 % |
| 10481 | AAA | LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM, UL<br>Subframe=2,3,4,7,8,9) | LTE-TDD  | 8.45 | ± 9.6 % |
| 10482 | AAB | LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK, UL<br>Subframe=2,3,4,7,8,9)     | LTE-TDD  | 7.71 | ± 9.6 % |
| 10483 | AAB | LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM, UL<br>Subframe=2,3,4,7,8,9)   | LTE-TDD  | 8.39 | ± 9.6 % |
| 10484 | AAB | LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM, UL<br>Subframe=2,3,4,7,8,9)   | LTE-TDD  | 8.47 | ± 9.6 % |
| 10485 | AAE | LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK, UL<br>Subframe=2,3,4,7,8,9)     | LTE-TDD  | 7.59 | ± 9.6 % |
| 10486 | AAE | LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM, UL<br>Subframe=2,3,4,7,8,9)   | LTE-TDD  | 8.38 | ± 9.6 % |
| 10487 | AAE | LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM, UL<br>Subframe=2,3,4,7,8,9)   | LTE-TDD  | 8.60 | ± 9.6 % |
| 10488 | AAE | LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK, UL<br>Subframe=2,3,4,7,8,9)    | LTE-TDD  | 7.70 | ± 9.6 % |
| 10489 | AAE | LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM, UL<br>Subframe=2,3,4,7,8,9)  | LTE-TDD  | 8.31 | ± 9.6 % |
| 10490 | AAE | LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM, UL<br>Subframe=2,3,4,7,8,9)  | LTE-TDD  | 8.54 | ± 9.6 % |
| 10491 | AAE | LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK, UL<br>Subframe=2,3,4,7,8,9)    | LTE-TDD  | 7.74 | ± 9.6 % |

|       |     |                                                                      |         |      |         |
|-------|-----|----------------------------------------------------------------------|---------|------|---------|
| 10492 | AAE | LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)   | LTE-TDD | 8.41 | ± 9.6 % |
| 10493 | AAE | LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)   | LTE-TDD | 8.55 | ± 9.6 % |
| 10494 | AAF | LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)     | LTE-TDD | 7.74 | ± 9.6 % |
| 10495 | AAF | LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)   | LTE-TDD | 8.37 | ± 9.6 % |
| 10496 | AAF | LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)   | LTE-TDD | 8.54 | ± 9.6 % |
| 10497 | AAA | LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9)   | LTE-TDD | 7.67 | ± 9.6 % |
| 10498 | AAA | LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 8.40 | ± 9.6 % |
| 10499 | AAA | LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9) | LTE-TDD | 8.68 | ± 9.6 % |
| 10500 | AAB | LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9)     | LTE-TDD | 7.67 | ± 9.6 % |
| 10501 | AAB | LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)   | LTE-TDD | 8.44 | ± 9.6 % |
| 10502 | AAB | LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)   | LTE-TDD | 8.52 | ± 9.6 % |
| 10503 | AAE | LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9)     | LTE-TDD | 7.72 | ± 9.6 % |
| 10504 | AAE | LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)   | LTE-TDD | 8.31 | ± 9.6 % |
| 10505 | AAE | LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)   | LTE-TDD | 8.54 | ± 9.6 % |
| 10506 | AAE | LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)    | LTE-TDD | 7.74 | ± 9.6 % |
| 10507 | AAE | LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)  | LTE-TDD | 8.36 | ± 9.6 % |
| 10508 | AAE | LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)  | LTE-TDD | 8.55 | ± 9.6 % |
| 10509 | AAE | LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9)    | LTE-TDD | 7.99 | ± 9.6 % |
| 10510 | AAE | LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)  | LTE-TDD | 8.49 | ± 9.6 % |
| 10511 | AAE | LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)  | LTE-TDD | 8.51 | ± 9.6 % |
| 10512 | AAF | LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)    | LTE-TDD | 7.74 | ± 9.6 % |
| 10513 | AAF | LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)  | LTE-TDD | 8.42 | ± 9.6 % |
| 10514 | AAF | LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)  | LTE-TDD | 8.45 | ± 9.6 % |
| 10515 | AAA | IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps, 99pc duty cycle)            | WLAN    | 1.58 | ± 9.6 % |
| 10516 | AAA | IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps, 99pc duty cycle)          | WLAN    | 1.57 | ± 9.6 % |
| 10517 | AAA | IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 99pc duty cycle)           | WLAN    | 1.58 | ± 9.6 % |
| 10518 | AAB | IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps, 99pc duty cycle)            | WLAN    | 8.23 | ± 9.6 % |
| 10519 | AAB | IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps, 99pc duty cycle)           | WLAN    | 8.39 | ± 9.6 % |
| 10520 | AAB | IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps, 99pc duty cycle)           | WLAN    | 8.12 | ± 9.6 % |
| 10521 | AAB | IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps, 99pc duty cycle)           | WLAN    | 7.97 | ± 9.6 % |
| 10522 | AAB | IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps, 99pc duty cycle)           | WLAN    | 8.45 | ± 9.6 % |
| 10523 | AAB | IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps, 99pc duty cycle)           | WLAN    | 8.08 | ± 9.6 % |
| 10524 | AAB | IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps, 99pc duty cycle)           | WLAN    | 8.27 | ± 9.6 % |
| 10525 | AAB | IEEE 802.11ac WiFi (20MHz, MCS0, 99pc duty cycle)                    | WLAN    | 8.36 | ± 9.6 % |
| 10526 | AAB | IEEE 802.11ac WiFi (20MHz, MCS1, 99pc duty cycle)                    | WLAN    | 8.42 | ± 9.6 % |
| 10527 | AAB | IEEE 802.11ac WiFi (20MHz, MCS2, 99pc duty cycle)                    | WLAN    | 8.21 | ± 9.6 % |
| 10528 | AAB | IEEE 802.11ac WiFi (20MHz, MCS3, 99pc duty cycle)                    | WLAN    | 8.36 | ± 9.6 % |
| 10529 | AAB | IEEE 802.11ac WiFi (20MHz, MCS4, 99pc duty cycle)                    | WLAN    | 8.36 | ± 9.6 % |
| 10531 | AAB | IEEE 802.11ac WiFi (20MHz, MCS6, 99pc duty cycle)                    | WLAN    | 8.43 | ± 9.6 % |
| 10532 | AAB | IEEE 802.11ac WiFi (20MHz, MCS7, 99pc duty cycle)                    | WLAN    | 8.29 | ± 9.6 % |
| 10533 | AAB | IEEE 802.11ac WiFi (20MHz, MCS8, 99pc duty cycle)                    | WLAN    | 8.38 | ± 9.6 % |
| 10534 | AAB | IEEE 802.11ac WiFi (40MHz, MCS0, 99pc duty cycle)                    | WLAN    | 8.45 | ± 9.6 % |

|       |     |                                                                 |      |      |         |
|-------|-----|-----------------------------------------------------------------|------|------|---------|
| 10535 | AAB | IEEE 802.11ac WiFi (40MHz, MCS1, 99pc duty cycle)               | WLAN | 8.45 | ± 9.6 % |
| 10536 | AAB | IEEE 802.11ac WiFi (40MHz, MCS2, 99pc duty cycle)               | WLAN | 8.32 | ± 9.6 % |
| 10537 | AAB | IEEE 802.11ac WiFi (40MHz, MCS3, 99pc duty cycle)               | WLAN | 8.44 | ± 9.6 % |
| 10538 | AAB | IEEE 802.11ac WiFi (40MHz, MCS4, 99pc duty cycle)               | WLAN | 8.54 | ± 9.6 % |
| 10540 | AAB | IEEE 802.11ac WiFi (40MHz, MCS6, 99pc duty cycle)               | WLAN | 8.39 | ± 9.6 % |
| 10541 | AAB | IEEE 802.11ac WiFi (40MHz, MCS7, 99pc duty cycle)               | WLAN | 8.46 | ± 9.6 % |
| 10542 | AAB | IEEE 802.11ac WiFi (40MHz, MCS8, 99pc duty cycle)               | WLAN | 8.65 | ± 9.6 % |
| 10543 | AAB | IEEE 802.11ac WiFi (40MHz, MCS9, 99pc duty cycle)               | WLAN | 8.65 | ± 9.6 % |
| 10544 | AAB | IEEE 802.11ac WiFi (80MHz, MCS0, 99pc duty cycle)               | WLAN | 8.47 | ± 9.6 % |
| 10545 | AAB | IEEE 802.11ac WiFi (80MHz, MCS1, 99pc duty cycle)               | WLAN | 8.55 | ± 9.6 % |
| 10546 | AAB | IEEE 802.11ac WiFi (80MHz, MCS2, 99pc duty cycle)               | WLAN | 8.35 | ± 9.6 % |
| 10547 | AAB | IEEE 802.11ac WiFi (80MHz, MCS3, 99pc duty cycle)               | WLAN | 8.49 | ± 9.6 % |
| 10548 | AAB | IEEE 802.11ac WiFi (80MHz, MCS4, 99pc duty cycle)               | WLAN | 8.37 | ± 9.6 % |
| 10550 | AAB | IEEE 802.11ac WiFi (80MHz, MCS6, 99pc duty cycle)               | WLAN | 8.38 | ± 9.6 % |
| 10551 | AAB | IEEE 802.11ac WiFi (80MHz, MCS7, 99pc duty cycle)               | WLAN | 8.50 | ± 9.6 % |
| 10552 | AAB | IEEE 802.11ac WiFi (80MHz, MCS8, 99pc duty cycle)               | WLAN | 8.42 | ± 9.6 % |
| 10553 | AAB | IEEE 802.11ac WiFi (80MHz, MCS9, 99pc duty cycle)               | WLAN | 8.45 | ± 9.6 % |
| 10554 | AAC | IEEE 802.11ac WiFi (160MHz, MCS0, 99pc duty cycle)              | WLAN | 8.48 | ± 9.6 % |
| 10555 | AAC | IEEE 802.11ac WiFi (160MHz, MCS1, 99pc duty cycle)              | WLAN | 8.47 | ± 9.6 % |
| 10556 | AAC | IEEE 802.11ac WiFi (160MHz, MCS2, 99pc duty cycle)              | WLAN | 8.50 | ± 9.6 % |
| 10557 | AAC | IEEE 802.11ac WiFi (160MHz, MCS3, 99pc duty cycle)              | WLAN | 8.52 | ± 9.6 % |
| 10558 | AAC | IEEE 802.11ac WiFi (160MHz, MCS4, 99pc duty cycle)              | WLAN | 8.61 | ± 9.6 % |
| 10560 | AAC | IEEE 802.11ac WiFi (160MHz, MCS6, 99pc duty cycle)              | WLAN | 8.73 | ± 9.6 % |
| 10561 | AAC | IEEE 802.11ac WiFi (160MHz, MCS7, 99pc duty cycle)              | WLAN | 8.56 | ± 9.6 % |
| 10562 | AAC | IEEE 802.11ac WiFi (160MHz, MCS8, 99pc duty cycle)              | WLAN | 8.69 | ± 9.6 % |
| 10563 | AAC | IEEE 802.11ac WiFi (160MHz, MCS9, 99pc duty cycle)              | WLAN | 8.77 | ± 9.6 % |
| 10564 | AAA | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 9 Mbps, 99pc duty cycle)  | WLAN | 8.25 | ± 9.6 % |
| 10565 | AAA | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 12 Mbps, 99pc duty cycle) | WLAN | 8.45 | ± 9.6 % |
| 10566 | AAA | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 18 Mbps, 99pc duty cycle) | WLAN | 8.13 | ± 9.6 % |
| 10567 | AAA | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 24 Mbps, 99pc duty cycle) | WLAN | 8.00 | ± 9.6 % |
| 10568 | AAA | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 36 Mbps, 99pc duty cycle) | WLAN | 8.37 | ± 9.6 % |
| 10569 | AAA | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 48 Mbps, 99pc duty cycle) | WLAN | 8.10 | ± 9.6 % |
| 10570 | AAA | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 54 Mbps, 99pc duty cycle) | WLAN | 8.30 | ± 9.6 % |
| 10571 | AAA | IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 90pc duty cycle)       | WLAN | 1.99 | ± 9.6 % |
| 10572 | AAA | IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps, 90pc duty cycle)       | WLAN | 1.99 | ± 9.6 % |
| 10573 | AAA | IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps, 90pc duty cycle)     | WLAN | 1.98 | ± 9.6 % |
| 10574 | AAA | IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 90pc duty cycle)      | WLAN | 1.98 | ± 9.6 % |
| 10575 | AAA | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 90pc duty cycle)  | WLAN | 8.59 | ± 9.6 % |
| 10576 | AAA | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 9 Mbps, 90pc duty cycle)  | WLAN | 8.60 | ± 9.6 % |
| 10577 | AAA | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 12 Mbps, 90pc duty cycle) | WLAN | 8.70 | ± 9.6 % |
| 10578 | AAA | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 18 Mbps, 90pc duty cycle) | WLAN | 8.49 | ± 9.6 % |
| 10579 | AAA | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 24 Mbps, 90pc duty cycle) | WLAN | 8.36 | ± 9.6 % |
| 10580 | AAA | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 36 Mbps, 90pc duty cycle) | WLAN | 8.76 | ± 9.6 % |
| 10581 | AAA | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 48 Mbps, 90pc duty cycle) | WLAN | 8.35 | ± 9.6 % |
| 10582 | AAA | IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 54 Mbps, 90pc duty cycle) | WLAN | 8.67 | ± 9.6 % |
| 10583 | AAB | IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps, 90pc duty cycle)       | WLAN | 8.59 | ± 9.6 % |
| 10584 | AAB | IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps, 90pc duty cycle)       | WLAN | 8.60 | ± 9.6 % |
| 10585 | AAB | IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps, 90pc duty cycle)      | WLAN | 8.70 | ± 9.6 % |
| 10586 | AAB | IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps, 90pc duty cycle)      | WLAN | 8.49 | ± 9.6 % |
| 10587 | AAB | IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps, 90pc duty cycle)      | WLAN | 8.36 | ± 9.6 % |

|       |     |                                                            |          |       |         |
|-------|-----|------------------------------------------------------------|----------|-------|---------|
| 10588 | AAB | IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps, 90pc duty cycle) | WLAN     | 8.76  | ± 9.6 % |
| 10589 | AAB | IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps, 90pc duty cycle) | WLAN     | 8.35  | ± 9.6 % |
| 10590 | AAB | IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps, 90pc duty cycle) | WLAN     | 8.67  | ± 9.6 % |
| 10591 | AAB | IEEE 802.11n (HT Mixed, 20MHz, MCS0, 90pc duty cycle)      | WLAN     | 8.63  | ± 9.6 % |
| 10592 | AAB | IEEE 802.11n (HT Mixed, 20MHz, MCS1, 90pc duty cycle)      | WLAN     | 8.79  | ± 9.6 % |
| 10593 | AAB | IEEE 802.11n (HT Mixed, 20MHz, MCS2, 90pc duty cycle)      | WLAN     | 8.64  | ± 9.6 % |
| 10594 | AAB | IEEE 802.11n (HT Mixed, 20MHz, MCS3, 90pc duty cycle)      | WLAN     | 8.74  | ± 9.6 % |
| 10595 | AAB | IEEE 802.11n (HT Mixed, 20MHz, MCS4, 90pc duty cycle)      | WLAN     | 8.74  | ± 9.6 % |
| 10596 | AAB | IEEE 802.11n (HT Mixed, 20MHz, MCS5, 90pc duty cycle)      | WLAN     | 8.71  | ± 9.6 % |
| 10597 | AAB | IEEE 802.11n (HT Mixed, 20MHz, MCS6, 90pc duty cycle)      | WLAN     | 8.72  | ± 9.6 % |
| 10598 | AAB | IEEE 802.11n (HT Mixed, 20MHz, MCS7, 90pc duty cycle)      | WLAN     | 8.50  | ± 9.6 % |
| 10599 | AAB | IEEE 802.11n (HT Mixed, 40MHz, MCS0, 90pc duty cycle)      | WLAN     | 8.79  | ± 9.6 % |
| 10600 | AAB | IEEE 802.11n (HT Mixed, 40MHz, MCS1, 90pc duty cycle)      | WLAN     | 8.88  | ± 9.6 % |
| 10601 | AAB | IEEE 802.11n (HT Mixed, 40MHz, MCS2, 90pc duty cycle)      | WLAN     | 8.82  | ± 9.6 % |
| 10602 | AAB | IEEE 802.11n (HT Mixed, 40MHz, MCS3, 90pc duty cycle)      | WLAN     | 8.94  | ± 9.6 % |
| 10603 | AAB | IEEE 802.11n (HT Mixed, 40MHz, MCS4, 90pc duty cycle)      | WLAN     | 9.03  | ± 9.6 % |
| 10604 | AAB | IEEE 802.11n (HT Mixed, 40MHz, MCS5, 90pc duty cycle)      | WLAN     | 8.76  | ± 9.6 % |
| 10605 | AAB | IEEE 802.11n (HT Mixed, 40MHz, MCS6, 90pc duty cycle)      | WLAN     | 8.97  | ± 9.6 % |
| 10606 | AAB | IEEE 802.11n (HT Mixed, 40MHz, MCS7, 90pc duty cycle)      | WLAN     | 8.82  | ± 9.6 % |
| 10607 | AAB | IEEE 802.11ac WiFi (20MHz, MCS0, 90pc duty cycle)          | WLAN     | 8.64  | ± 9.6 % |
| 10608 | AAB | IEEE 802.11ac WiFi (20MHz, MCS1, 90pc duty cycle)          | WLAN     | 8.77  | ± 9.6 % |
| 10609 | AAB | IEEE 802.11ac WiFi (20MHz, MCS2, 90pc duty cycle)          | WLAN     | 8.57  | ± 9.6 % |
| 10610 | AAB | IEEE 802.11ac WiFi (20MHz, MCS3, 90pc duty cycle)          | WLAN     | 8.78  | ± 9.6 % |
| 10611 | AAB | IEEE 802.11ac WiFi (20MHz, MCS4, 90pc duty cycle)          | WLAN     | 8.70  | ± 9.6 % |
| 10612 | AAB | IEEE 802.11ac WiFi (20MHz, MCS5, 90pc duty cycle)          | WLAN     | 8.77  | ± 9.6 % |
| 10613 | AAB | IEEE 802.11ac WiFi (20MHz, MCS6, 90pc duty cycle)          | WLAN     | 8.94  | ± 9.6 % |
| 10614 | AAB | IEEE 802.11ac WiFi (20MHz, MCS7, 90pc duty cycle)          | WLAN     | 8.59  | ± 9.6 % |
| 10615 | AAB | IEEE 802.11ac WiFi (20MHz, MCS8, 90pc duty cycle)          | WLAN     | 8.82  | ± 9.6 % |
| 10616 | AAB | IEEE 802.11ac WiFi (40MHz, MCS0, 90pc duty cycle)          | WLAN     | 8.82  | ± 9.6 % |
| 10617 | AAB | IEEE 802.11ac WiFi (40MHz, MCS1, 90pc duty cycle)          | WLAN     | 8.81  | ± 9.6 % |
| 10618 | AAB | IEEE 802.11ac WiFi (40MHz, MCS2, 90pc duty cycle)          | WLAN     | 8.58  | ± 9.6 % |
| 10619 | AAB | IEEE 802.11ac WiFi (40MHz, MCS3, 90pc duty cycle)          | WLAN     | 8.86  | ± 9.6 % |
| 10620 | AAB | IEEE 802.11ac WiFi (40MHz, MCS4, 90pc duty cycle)          | WLAN     | 8.87  | ± 9.6 % |
| 10621 | AAB | IEEE 802.11ac WiFi (40MHz, MCS5, 90pc duty cycle)          | WLAN     | 8.77  | ± 9.6 % |
| 10622 | AAB | IEEE 802.11ac WiFi (40MHz, MCS6, 90pc duty cycle)          | WLAN     | 8.68  | ± 9.6 % |
| 10623 | AAB | IEEE 802.11ac WiFi (40MHz, MCS7, 90pc duty cycle)          | WLAN     | 8.82  | ± 9.6 % |
| 10624 | AAB | IEEE 802.11ac WiFi (40MHz, MCS8, 90pc duty cycle)          | WLAN     | 8.96  | ± 9.6 % |
| 10625 | AAB | IEEE 802.11ac WiFi (40MHz, MCS9, 90pc duty cycle)          | WLAN     | 8.96  | ± 9.6 % |
| 10626 | AAB | IEEE 802.11ac WiFi (80MHz, MCS0, 90pc duty cycle)          | WLAN     | 8.83  | ± 9.6 % |
| 10627 | AAB | IEEE 802.11ac WiFi (80MHz, MCS1, 90pc duty cycle)          | WLAN     | 8.88  | ± 9.6 % |
| 10628 | AAB | IEEE 802.11ac WiFi (80MHz, MCS2, 90pc duty cycle)          | WLAN     | 8.71  | ± 9.6 % |
| 10629 | AAB | IEEE 802.11ac WiFi (80MHz, MCS3, 90pc duty cycle)          | WLAN     | 8.85  | ± 9.6 % |
| 10630 | AAB | IEEE 802.11ac WiFi (80MHz, MCS4, 90pc duty cycle)          | WLAN     | 8.72  | ± 9.6 % |
| 10631 | AAB | IEEE 802.11ac WiFi (80MHz, MCS5, 90pc duty cycle)          | WLAN     | 8.81  | ± 9.6 % |
| 10632 | AAB | IEEE 802.11ac WiFi (80MHz, MCS6, 90pc duty cycle)          | WLAN     | 8.74  | ± 9.6 % |
| 10633 | AAB | IEEE 802.11ac WiFi (80MHz, MCS7, 90pc duty cycle)          | WLAN     | 8.83  | ± 9.6 % |
| 10634 | AAB | IEEE 802.11ac WiFi (80MHz, MCS8, 90pc duty cycle)          | WLAN     | 8.80  | ± 9.6 % |
| 10635 | AAB | IEEE 802.11ac WiFi (80MHz, MCS9, 90pc duty cycle)          | WLAN     | 8.81  | ± 9.6 % |
| 10636 | AAC | IEEE 802.11ac WiFi (160MHz, MCS0, 90pc duty cycle)         | WLAN     | 8.83  | ± 9.6 % |
| 10637 | AAC | IEEE 802.11ac WiFi (160MHz, MCS1, 90pc duty cycle)         | WLAN     | 8.79  | ± 9.6 % |
| 10638 | AAC | IEEE 802.11ac WiFi (160MHz, MCS2, 90pc duty cycle)         | WLAN     | 8.86  | ± 9.6 % |
| 10639 | AAC | IEEE 802.11ac WiFi (160MHz, MCS3, 90pc duty cycle)         | WLAN     | 8.85  | ± 9.6 % |
| 10640 | AAC | IEEE 802.11ac WiFi (160MHz, MCS4, 90pc duty cycle)         | WLAN     | 8.98  | ± 9.6 % |
| 10641 | AAC | IEEE 802.11ac WiFi (160MHz, MCS5, 90pc duty cycle)         | WLAN     | 9.06  | ± 9.6 % |
| 10642 | AAC | IEEE 802.11ac WiFi (160MHz, MCS6, 90pc duty cycle)         | WLAN     | 9.06  | ± 9.6 % |
| 10643 | AAC | IEEE 802.11ac WiFi (160MHz, MCS7, 90pc duty cycle)         | WLAN     | 8.89  | ± 9.6 % |
| 10644 | AAC | IEEE 802.11ac WiFi (160MHz, MCS8, 90pc duty cycle)         | WLAN     | 9.05  | ± 9.6 % |
| 10645 | AAC | IEEE 802.11ac WiFi (160MHz, MCS9, 90pc duty cycle)         | WLAN     | 9.11  | ± 9.6 % |
| 10646 | AAF | LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Subframe=2,7)      | LTE-TDD  | 11.96 | ± 9.6 % |
| 10647 | AAF | LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Subframe=2,7)     | LTE-TDD  | 11.96 | ± 9.6 % |
| 10648 | AAA | CDMA2000 (1x Advanced)                                     | CDMA2000 | 3.45  | ± 9.6 % |
| 10652 | AAD | LTE-TDD (OFDMA, 5 MHz, E-TM 3.1, Clipping 44%)             | LTE-TDD  | 6.91  | ± 9.6 % |
| 10653 | AAD | LTE-TDD (OFDMA, 10 MHz, E-TM 3.1, Clipping 44%)            | LTE-TDD  | 7.42  | ± 9.6 % |
| 10654 | AAD | LTE-TDD (OFDMA, 15 MHz, E-TM 3.1, Clipping 44%)            | LTE-TDD  | 6.96  | ± 9.6 % |

|       |     |                                                 |           |       |         |
|-------|-----|-------------------------------------------------|-----------|-------|---------|
| 10655 | AAE | LTE-TDD (OFDMA, 20 MHz, E-TM 3.1, Clipping 44%) | LTE-TDD   | 7.21  | ± 9.6 % |
| 10658 | AAA | Pulse Waveform (200Hz, 10%)                     | Test      | 10.00 | ± 9.6 % |
| 10659 | AAA | Pulse Waveform (200Hz, 20%)                     | Test      | 6.99  | ± 9.6 % |
| 10660 | AAA | Pulse Waveform (200Hz, 40%)                     | Test      | 3.98  | ± 9.6 % |
| 10661 | AAA | Pulse Waveform (200Hz, 60%)                     | Test      | 2.22  | ± 9.6 % |
| 10662 | AAA | Pulse Waveform (200Hz, 80%)                     | Test      | 0.97  | ± 9.6 % |
| 10670 | AAA | Bluetooth Low Energy                            | Bluetooth | 2.19  | ± 9.6 % |
| 10671 | AAA | IEEE 802.11ax (20MHz, MCS0, 90pc duty cycle)    | WLAN      | 9.09  | ± 9.6 % |
| 10672 | AAA | IEEE 802.11ax (20MHz, MCS1, 90pc duty cycle)    | WLAN      | 8.57  | ± 9.6 % |
| 10673 | AAA | IEEE 802.11ax (20MHz, MCS2, 90pc duty cycle)    | WLAN      | 8.78  | ± 9.6 % |
| 10674 | AAA | IEEE 802.11ax (20MHz, MCS3, 90pc duty cycle)    | WLAN      | 8.74  | ± 9.6 % |
| 10675 | AAA | IEEE 802.11ax (20MHz, MCS4, 90pc duty cycle)    | WLAN      | 8.90  | ± 9.6 % |
| 10676 | AAA | IEEE 802.11ax (20MHz, MCS5, 90pc duty cycle)    | WLAN      | 8.77  | ± 9.6 % |
| 10677 | AAA | IEEE 802.11ax (20MHz, MCS6, 90pc duty cycle)    | WLAN      | 8.73  | ± 9.6 % |
| 10678 | AAA | IEEE 802.11ax (20MHz, MCS7, 90pc duty cycle)    | WLAN      | 8.78  | ± 9.6 % |
| 10679 | AAA | IEEE 802.11ax (20MHz, MCS8, 90pc duty cycle)    | WLAN      | 8.89  | ± 9.6 % |
| 10680 | AAA | IEEE 802.11ax (20MHz, MCS9, 90pc duty cycle)    | WLAN      | 8.80  | ± 9.6 % |
| 10681 | AAA | IEEE 802.11ax (20MHz, MCS10, 90pc duty cycle)   | WLAN      | 8.62  | ± 9.6 % |
| 10682 | AAA | IEEE 802.11ax (20MHz, MCS11, 90pc duty cycle)   | WLAN      | 8.83  | ± 9.6 % |
| 10683 | AAA | IEEE 802.11ax (20MHz, MCS0, 99pc duty cycle)    | WLAN      | 8.42  | ± 9.6 % |
| 10684 | AAA | IEEE 802.11ax (20MHz, MCS1, 99pc duty cycle)    | WLAN      | 8.26  | ± 9.6 % |
| 10685 | AAA | IEEE 802.11ax (20MHz, MCS2, 99pc duty cycle)    | WLAN      | 8.33  | ± 9.6 % |
| 10686 | AAA | IEEE 802.11ax (20MHz, MCS3, 99pc duty cycle)    | WLAN      | 8.28  | ± 9.6 % |
| 10687 | AAA | IEEE 802.11ax (20MHz, MCS4, 99pc duty cycle)    | WLAN      | 8.45  | ± 9.6 % |
| 10688 | AAA | IEEE 802.11ax (20MHz, MCS5, 99pc duty cycle)    | WLAN      | 8.29  | ± 9.6 % |
| 10689 | AAA | IEEE 802.11ax (20MHz, MCS6, 99pc duty cycle)    | WLAN      | 8.55  | ± 9.6 % |
| 10690 | AAA | IEEE 802.11ax (20MHz, MCS7, 99pc duty cycle)    | WLAN      | 8.29  | ± 9.6 % |
| 10691 | AAA | IEEE 802.11ax (20MHz, MCS8, 99pc duty cycle)    | WLAN      | 8.25  | ± 9.6 % |
| 10692 | AAA | IEEE 802.11ax (20MHz, MCS9, 99pc duty cycle)    | WLAN      | 8.29  | ± 9.6 % |
| 10693 | AAA | IEEE 802.11ax (20MHz, MCS10, 99pc duty cycle)   | WLAN      | 8.25  | ± 9.6 % |
| 10694 | AAA | IEEE 802.11ax (20MHz, MCS11, 99pc duty cycle)   | WLAN      | 8.57  | ± 9.6 % |
| 10695 | AAA | IEEE 802.11ax (40MHz, MCS0, 90pc duty cycle)    | WLAN      | 8.78  | ± 9.6 % |
| 10696 | AAA | IEEE 802.11ax (40MHz, MCS1, 90pc duty cycle)    | WLAN      | 8.91  | ± 9.6 % |
| 10697 | AAA | IEEE 802.11ax (40MHz, MCS2, 90pc duty cycle)    | WLAN      | 8.61  | ± 9.6 % |
| 10698 | AAA | IEEE 802.11ax (40MHz, MCS3, 90pc duty cycle)    | WLAN      | 8.89  | ± 9.6 % |
| 10699 | AAA | IEEE 802.11ax (40MHz, MCS4, 90pc duty cycle)    | WLAN      | 8.82  | ± 9.6 % |
| 10700 | AAA | IEEE 802.11ax (40MHz, MCS5, 90pc duty cycle)    | WLAN      | 8.73  | ± 9.6 % |
| 10701 | AAA | IEEE 802.11ax (40MHz, MCS6, 90pc duty cycle)    | WLAN      | 8.86  | ± 9.6 % |
| 10702 | AAA | IEEE 802.11ax (40MHz, MCS7, 90pc duty cycle)    | WLAN      | 8.70  | ± 9.6 % |
| 10703 | AAA | IEEE 802.11ax (40MHz, MCS8, 90pc duty cycle)    | WLAN      | 8.82  | ± 9.6 % |
| 10704 | AAA | IEEE 802.11ax (40MHz, MCS9, 90pc duty cycle)    | WLAN      | 8.56  | ± 9.6 % |
| 10705 | AAA | IEEE 802.11ax (40MHz, MCS10, 90pc duty cycle)   | WLAN      | 8.69  | ± 9.6 % |
| 10706 | AAA | IEEE 802.11ax (40MHz, MCS11, 90pc duty cycle)   | WLAN      | 8.66  | ± 9.6 % |
| 10707 | AAA | IEEE 802.11ax (40MHz, MCS0, 99pc duty cycle)    | WLAN      | 8.32  | ± 9.6 % |
| 10708 | AAA | IEEE 802.11ax (40MHz, MCS1, 99pc duty cycle)    | WLAN      | 8.55  | ± 9.6 % |
| 10709 | AAA | IEEE 802.11ax (40MHz, MCS2, 99pc duty cycle)    | WLAN      | 8.33  | ± 9.6 % |
| 10710 | AAA | IEEE 802.11ax (40MHz, MCS3, 99pc duty cycle)    | WLAN      | 8.29  | ± 9.6 % |
| 10711 | AAA | IEEE 802.11ax (40MHz, MCS4, 99pc duty cycle)    | WLAN      | 8.39  | ± 9.6 % |
| 10712 | AAA | IEEE 802.11ax (40MHz, MCS5, 99pc duty cycle)    | WLAN      | 8.67  | ± 9.6 % |
| 10713 | AAA | IEEE 802.11ax (40MHz, MCS6, 99pc duty cycle)    | WLAN      | 8.33  | ± 9.6 % |
| 10714 | AAA | IEEE 802.11ax (40MHz, MCS7, 99pc duty cycle)    | WLAN      | 8.26  | ± 9.6 % |
| 10715 | AAA | IEEE 802.11ax (40MHz, MCS8, 99pc duty cycle)    | WLAN      | 8.45  | ± 9.6 % |
| 10716 | AAA | IEEE 802.11ax (40MHz, MCS9, 99pc duty cycle)    | WLAN      | 8.30  | ± 9.6 % |
| 10717 | AAA | IEEE 802.11ax (40MHz, MCS10, 99pc duty cycle)   | WLAN      | 8.48  | ± 9.6 % |
| 10718 | AAA | IEEE 802.11ax (40MHz, MCS11, 99pc duty cycle)   | WLAN      | 8.24  | ± 9.6 % |
| 10719 | AAA | IEEE 802.11ax (80MHz, MCS0, 90pc duty cycle)    | WLAN      | 8.81  | ± 9.6 % |
| 10720 | AAA | IEEE 802.11ax (80MHz, MCS1, 90pc duty cycle)    | WLAN      | 8.87  | ± 9.6 % |
| 10721 | AAA | IEEE 802.11ax (80MHz, MCS2, 90pc duty cycle)    | WLAN      | 8.76  | ± 9.6 % |
| 10722 | AAA | IEEE 802.11ax (80MHz, MCS3, 90pc duty cycle)    | WLAN      | 8.55  | ± 9.6 % |
| 10723 | AAA | IEEE 802.11ax (80MHz, MCS4, 90pc duty cycle)    | WLAN      | 8.70  | ± 9.6 % |
| 10724 | AAA | IEEE 802.11ax (80MHz, MCS5, 90pc duty cycle)    | WLAN      | 8.90  | ± 9.6 % |
| 10725 | AAA | IEEE 802.11ax (80MHz, MCS6, 90pc duty cycle)    | WLAN      | 8.74  | ± 9.6 % |
| 10726 | AAA | IEEE 802.11ax (80MHz, MCS7, 90pc duty cycle)    | WLAN      | 8.72  | ± 9.6 % |
| 10727 | AAA | IEEE 802.11ax (80MHz, MCS8, 90pc duty cycle)    | WLAN      | 8.66  | ± 9.6 % |

|       |     |                                                |      |      |         |
|-------|-----|------------------------------------------------|------|------|---------|
| 10728 | AAA | IEEE 802.11ax (80MHz, MCS9, 90pc duty cycle)   | WLAN | 8.65 | ± 9.6 % |
| 10729 | AAA | IEEE 802.11ax (80MHz, MCS10, 90pc duty cycle)  | WLAN | 8.64 | ± 9.6 % |
| 10730 | AAA | IEEE 802.11ax (80MHz, MCS11, 90pc duty cycle)  | WLAN | 8.67 | ± 9.6 % |
| 10731 | AAA | IEEE 802.11ax (80MHz, MCS0, 99pc duty cycle)   | WLAN | 8.42 | ± 9.6 % |
| 10732 | AAA | IEEE 802.11ax (80MHz, MCS1, 99pc duty cycle)   | WLAN | 8.46 | ± 9.6 % |
| 10733 | AAA | IEEE 802.11ax (80MHz, MCS2, 99pc duty cycle)   | WLAN | 8.40 | ± 9.6 % |
| 10734 | AAA | IEEE 802.11ax (80MHz, MCS3, 99pc duty cycle)   | WLAN | 8.25 | ± 9.6 % |
| 10735 | AAA | IEEE 802.11ax (80MHz, MCS4, 99pc duty cycle)   | WLAN | 8.33 | ± 9.6 % |
| 10736 | AAA | IEEE 802.11ax (80MHz, MCS5, 99pc duty cycle)   | WLAN | 8.27 | ± 9.6 % |
| 10737 | AAA | IEEE 802.11ax (80MHz, MCS6, 99pc duty cycle)   | WLAN | 8.36 | ± 9.6 % |
| 10738 | AAA | IEEE 802.11ax (80MHz, MCS7, 99pc duty cycle)   | WLAN | 8.42 | ± 9.6 % |
| 10739 | AAA | IEEE 802.11ax (80MHz, MCS8, 99pc duty cycle)   | WLAN | 8.29 | ± 9.6 % |
| 10740 | AAA | IEEE 802.11ax (80MHz, MCS9, 99pc duty cycle)   | WLAN | 8.48 | ± 9.6 % |
| 10741 | AAA | IEEE 802.11ax (80MHz, MCS10, 99pc duty cycle)  | WLAN | 8.40 | ± 9.6 % |
| 10742 | AAA | IEEE 802.11ax (80MHz, MCS11, 99pc duty cycle)  | WLAN | 8.43 | ± 9.6 % |
| 10743 | AAA | IEEE 802.11ax (160MHz, MCS0, 90pc duty cycle)  | WLAN | 8.94 | ± 9.6 % |
| 10744 | AAA | IEEE 802.11ax (160MHz, MCS1, 90pc duty cycle)  | WLAN | 9.16 | ± 9.6 % |
| 10745 | AAA | IEEE 802.11ax (160MHz, MCS2, 90pc duty cycle)  | WLAN | 8.93 | ± 9.6 % |
| 10746 | AAA | IEEE 802.11ax (160MHz, MCS3, 90pc duty cycle)  | WLAN | 9.11 | ± 9.6 % |
| 10747 | AAA | IEEE 802.11ax (160MHz, MCS4, 90pc duty cycle)  | WLAN | 9.04 | ± 9.6 % |
| 10748 | AAA | IEEE 802.11ax (160MHz, MCS5, 90pc duty cycle)  | WLAN | 8.93 | ± 9.6 % |
| 10749 | AAA | IEEE 802.11ax (160MHz, MCS6, 90pc duty cycle)  | WLAN | 8.90 | ± 9.6 % |
| 10750 | AAA | IEEE 802.11ax (160MHz, MCS7, 90pc duty cycle)  | WLAN | 8.79 | ± 9.6 % |
| 10751 | AAA | IEEE 802.11ax (160MHz, MCS8, 90pc duty cycle)  | WLAN | 8.82 | ± 9.6 % |
| 10752 | AAA | IEEE 802.11ax (160MHz, MCS9, 90pc duty cycle)  | WLAN | 8.81 | ± 9.6 % |
| 10753 | AAA | IEEE 802.11ax (160MHz, MCS10, 90pc duty cycle) | WLAN | 9.00 | ± 9.6 % |
| 10754 | AAA | IEEE 802.11ax (160MHz, MCS11, 90pc duty cycle) | WLAN | 8.94 | ± 9.6 % |
| 10755 | AAA | IEEE 802.11ax (160MHz, MCS0, 99pc duty cycle)  | WLAN | 8.64 | ± 9.6 % |
| 10756 | AAA | IEEE 802.11ax (160MHz, MCS1, 99pc duty cycle)  | WLAN | 8.77 | ± 9.6 % |
| 10757 | AAA | IEEE 802.11ax (160MHz, MCS2, 99pc duty cycle)  | WLAN | 8.77 | ± 9.6 % |
| 10758 | AAA | IEEE 802.11ax (160MHz, MCS3, 99pc duty cycle)  | WLAN | 8.69 | ± 9.6 % |
| 10759 | AAA | IEEE 802.11ax (160MHz, MCS4, 99pc duty cycle)  | WLAN | 8.58 | ± 9.6 % |
| 10760 | AAA | IEEE 802.11ax (160MHz, MCS5, 99pc duty cycle)  | WLAN | 8.49 | ± 9.6 % |
| 10761 | AAA | IEEE 802.11ax (160MHz, MCS6, 99pc duty cycle)  | WLAN | 8.58 | ± 9.6 % |
| 10762 | AAA | IEEE 802.11ax (160MHz, MCS7, 99pc duty cycle)  | WLAN | 8.49 | ± 9.6 % |
| 10763 | AAA | IEEE 802.11ax (160MHz, MCS8, 99pc duty cycle)  | WLAN | 8.53 | ± 9.6 % |
| 10764 | AAA | IEEE 802.11ax (160MHz, MCS9, 99pc duty cycle)  | WLAN | 8.54 | ± 9.6 % |
| 10765 | AAA | IEEE 802.11ax (160MHz, MCS10, 99pc duty cycle) | WLAN | 8.54 | ± 9.6 % |
| 10766 | AAA | IEEE 802.11ax (160MHz, MCS11, 99pc duty cycle) | WLAN | 8.51 | ± 9.6 % |

<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.



# **Appendix D**

## **Photographs**

|                                     |
|-------------------------------------|
| 1. SAR measurement System           |
| 2. Photographs of EUT test position |
| 3. EUT Constructional Details       |



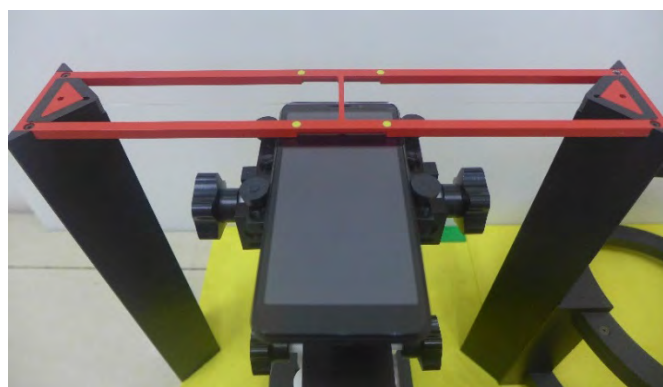
## **1 SAR measurement System**





## 2 Photographs of Test Setup

**Photo 1: Receiver of mobile contact center of Arch**



## 3 Photographs of the EUT

**Photo 2: Front View**



**Photo 3: Back View**

