



# HAC TEST REPORT

**Applicant** ZTE Corporation  
**FCC ID** SRQ-ZTEN9131  
**Product** LTE/WCDMA/GSM/CDMA  
Multi-Mode Digital Mobile Phone  
**Model** N9131  
**Report No.** RXA1603-0039HAC01R1  
**Issue Date** April 28, 2016

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **ANSI C63.19-2011**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

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# 1 Test Laboratory

## 1.1 Notes of the Test Report

This report shall not be reproduced in full or partial, without the written approval of **TA technology (shanghai) co., Ltd**. The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. Measurement Uncertainties were not taken into account and are published for informational purposes only. This report is written to support regulatory compliance of the applicable standards stated above. This report must not be used by the client to claim product certification, approval, or endorsement by CNAS or any government agencies.

## 1.2 Test facility

### **CNAS (accreditation number: L2264)**

TA Technology (Shanghai) Co., Ltd. has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS).

### **FCC (recognition number is 428261)**

TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

### **IC (recognition number is 8510A)**

TA Technology (Shanghai) Co., Ltd. has been listed by industry Canada to perform electromagnetic emission measurement.

### **VCCI (recognition number is C-4595, T-2154, R-4113, G-766)**

TA Technology (Shanghai) Co., Ltd. has been listed by industry Japan to perform electromagnetic emission measurement.

### **A2LA (Certificate Number: 3857.01)**

TA Technology (Shanghai) Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.



### 1.3 Testing Location

Company: TA Technology (Shanghai) Co., Ltd.  
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### 1.4 Laboratory Environment

|                                                                                                                                                                                                 |                           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| Temperature                                                                                                                                                                                     | Min. = 18°C, Max. = 28 °C |
| Relative humidity                                                                                                                                                                               | Min. = 0%, Max. = 80%     |
| Ground system resistance                                                                                                                                                                        | < 0.5 $\Omega$            |
| Ambient noise is checked and found very low and in compliance with requirement of standards.<br>Reflection of surrounding objects is minimized and in compliance with requirement of standards. |                           |

## 2 Statement of Compliance

Table 2.1: The Total M-rating of each tested band

| Mode                            | Rating    |
|---------------------------------|-----------|
| GSM 850                         | <b>M4</b> |
| GSM 1900                        | <b>M3</b> |
| CDMA BC0                        | <b>M4</b> |
| CDMA BC1                        | <b>M4</b> |
| CDMA BC10                       | <b>M4</b> |
| Date of Testing: March 30, 2016 |           |



### 3 Description of Equipment under Test

#### Client Information

|                             |                                                                               |
|-----------------------------|-------------------------------------------------------------------------------|
| <b>Applicant</b>            | ZTE Corporation                                                               |
| <b>Applicant address</b>    | ZTE Plaza, #55 Keji Road South, Hi-Tech, Industrial Park,<br>Nanshan District |
| <b>Manufacturer</b>         | ZTE Corporation                                                               |
| <b>Manufacturer address</b> | ZTE Plaza, #55 Keji Road South, Hi-Tech, Industrial Park,<br>Nanshan District |



## General Technologies

|                                                           |                                                                                                                                                                   |                   |
|-----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| Device Type:                                              | Portable Device                                                                                                                                                   |                   |
| State of Sample:                                          | Prototype Unit                                                                                                                                                    |                   |
| Model:                                                    | N9131                                                                                                                                                             |                   |
| MEID:                                                     | 99000680000346                                                                                                                                                    |                   |
| Hardware Version:                                         | cuzA                                                                                                                                                              |                   |
| Software Version:                                         | N9131V1.0.0B01                                                                                                                                                    |                   |
| Antenna Type:                                             | Internal Antenna                                                                                                                                                  |                   |
| Device Operating Configurations :                         |                                                                                                                                                                   |                   |
| Tested Mode(s):                                           | GSM 850/GSM 1900;<br>WCDMA Band II/IV/V<br>CDMA BC0/BC1/BC10                                                                                                      |                   |
| Test Modulation:                                          | (GSM)GMSK;(WCDMA) QPSK;(CDMA) QPSK;                                                                                                                               |                   |
| Operating Frequency Range(s):                             | Mode                                                                                                                                                              | Tx (MHz)          |
|                                                           | GSM 850                                                                                                                                                           | 824.2 ~ 848.8     |
|                                                           | GSM 1900                                                                                                                                                          | 1850.2 ~ 1909.8   |
|                                                           | WCDMA Band II                                                                                                                                                     | 1852.4 ~ 1907.6   |
|                                                           | WCDMA Band IV                                                                                                                                                     | 1712.4 ~ 1752.6   |
|                                                           | WCDMA Band V                                                                                                                                                      | 826.4 ~ 846.6     |
|                                                           | CDMA BC0                                                                                                                                                          | 824.7 ~ 848.31    |
|                                                           | CDMA BC1                                                                                                                                                          | 1851.25 ~ 1908.75 |
| Power Class:                                              | CDMA BC10                                                                                                                                                         |                   |
|                                                           | 817.9 ~ 823.1                                                                                                                                                     |                   |
|                                                           |                                                                                                                                                                   |                   |
| Power Level                                               | GSM 850: 4    GSM 1900: 1<br>WCDMA Band II/IV/V: 3<br>CDMA BC0/BC1/BC10: 3                                                                                        |                   |
| Test Channel/<br>Frequency(MHz):<br>(Low - Middle - High) | GSM 850: level 5<br>GSM 1900: level 0<br>WCDMA Band II/IV/VIII: Tested with Power Control All up bits<br>CDMA BC0/BC1/BC10: Tested with Power Control All up bits |                   |
|                                                           | GSM 850: 128/824.2 – 190/836.6 – 251/848.8 (GSM 850)                                                                                                              |                   |
|                                                           | GSM 1900: 512/1850.2 – 661/1880 – 810/1909.8 (GSM 1900)                                                                                                           |                   |
|                                                           | WCDMA Band II: 9262/1852.4 – 9400/1880 – 9538/1907.6 (WCDMA Band II)                                                                                              |                   |
|                                                           | WCDMA Band IV: 1312/1712.4 – 1412/1732.4 – 1513/1752.6 (WCDMA Band IV)                                                                                            |                   |
|                                                           | WCDMA Band V: 4132/826.4 – 4183/836.6 – 4233/846.6 (WCDMA Band V)                                                                                                 |                   |
|                                                           | CDMA BC0: 1013/824.7 – 384/836.52 – 777/848.31 (CDMA BC0)                                                                                                         |                   |
|                                                           | CDMA BC1: 25/1851.25 – 600/1880 – 1175/1908.75 (CDMA BC1)                                                                                                         |                   |
| CDMA BC10: 476/817.9 – 580/820.5 – 684/823.1 (CDMA BC10)  |                                                                                                                                                                   |                   |
| Accessory Equipment                                       |                                                                                                                                                                   |                   |
| Battery                                                   | Manufacturer: SCUD(FUJIAN)ELECTRONICS<br>Model: Li3922T44P6h903546<br>Power Rating: DC 3.8V, 2200mAh, Li-ion                                                      |                   |



| Air-Interface                                                                                   | Band (MHz) | Type | HAC tested      | Simultaneous Transmissions Note: Not to be tested                                        | Reduced power 20.19(c)(1) | Voice Over Digital Transport (Data) |
|-------------------------------------------------------------------------------------------------|------------|------|-----------------|------------------------------------------------------------------------------------------|---------------------------|-------------------------------------|
| GSM                                                                                             | 850        | VO   | Yes             | Yes<br>BT and Wi-Fi                                                                      | NA                        | NA                                  |
|                                                                                                 | 1900       | VO   |                 |                                                                                          | NO                        | NA                                  |
| WCDMA                                                                                           | Band II    | VO   | NO <sup>#</sup> | Yes<br>BT and Wi-Fi                                                                      | NA                        | NA                                  |
|                                                                                                 | Band IV    | VO   | NO <sup>#</sup> |                                                                                          | NA                        | NA                                  |
|                                                                                                 | Band V     | VO   | NO <sup>#</sup> |                                                                                          | NA                        | NA                                  |
| CDMA                                                                                            | BC0        | VO   | Yes             | Yes<br>BT and Wi-Fi                                                                      | NA                        | NA                                  |
|                                                                                                 | BC1        | VO   |                 |                                                                                          | NA                        | NA                                  |
|                                                                                                 | BC10       | VO   |                 |                                                                                          | NA                        | NA                                  |
| Wi-Fi                                                                                           | 2450       | DT   | NA              | Yes<br>GSM, CDMA, BT                                                                     | NA                        | NA                                  |
| Bluetooth (BT)                                                                                  | 2450       | DT   | NA              | Yes<br>GSM, CDMA, Wi-Fi                                                                  | NA                        | NA                                  |
| VO Voice CMRS/PSTN Service only<br>V/D Voice CMRS/PSTN and Data Service<br>DT Digital Transport |            |      |                 | #: Evaluated for MIF and Low power exemption<br>Rating was based on concurrent voice and |                           |                                     |



## 4 Test Specification and Operational Conditions

### 4.1 Test Specification

The tests documented in this report were performed in accordance with the following:

**ANSI C63.19-2011**

**KDB 285076 D01 HAC Guidance v04**

**KDB 285076 D02 T-Coil testing for CMRS IP v01r01**

## 5 Test Information

### 5.1 Operational Conditions during Test

#### 5.1.1 General Description of Test Procedures

The phone was tested in all normal configurations for the ear use. The EUT is mounted in the device holder equivalent as for classic dosimeter measurements. The acoustic output of the EUT shall coincide with the center point of the area formed by the dielectric wire and the middle bar of the arch's top frame. The EUT shall be moved vertically upwards until it touches the frame. The fine adjustment is possible by sliding the complete. The EUT holder is on the yellow base plate of the Test Arch phantom. These test configurations are tested at the high, middle and low frequency channels of each applicable operating mode; for example, GSM, WCDMA (UMTS), CDMA and TDMA.

No associated T-coil measurement has been made in accordance with the guidance issued by OET in KDB publication 285076 D02 T-Coil testing for CMRS IP.

#### 5.1.2 GSM Test Configuration

A communication link is set up with a System Simulator (SS) by air link, and a call is established. The EUT is commanded to operate at maximum transmitting power. Using CMU200 the power lever is set to "5" for GSM 850, set to "0" for GSM 1900. The test in the bands of GSM 850 and GSM 1900 are performed in the mode of speech transfer function.

#### 5.1.3 CDMA Test Configuration

A communication link is set up with a System Simulator (SS) by air link, and a call is established. The EUT is commanded to operate at maximum transmitting power.

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

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

## 5.2 HAC RF Measurements System Configuration

### 5.2.1 HAC Measurement Set-up

These measurements are performed using the DASY5 automated dosimetric assessment system. It is made by Schmid & Partner Engineering AG (SPEAG) in Zurich, Switzerland. It consists of high precision robotics system (Stäubli), robot controller, Intel Core2 computer, near-field probe, probe alignment sensor. The robot is a six-axis industrial robot performing precise movements. Cell controller systems contain the power supply, robot controller, teach pendant (Joystick) and remote control, and are used to drive the robot motors. The Stäubli Robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit performs the signal amplification; signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC plug-in card.

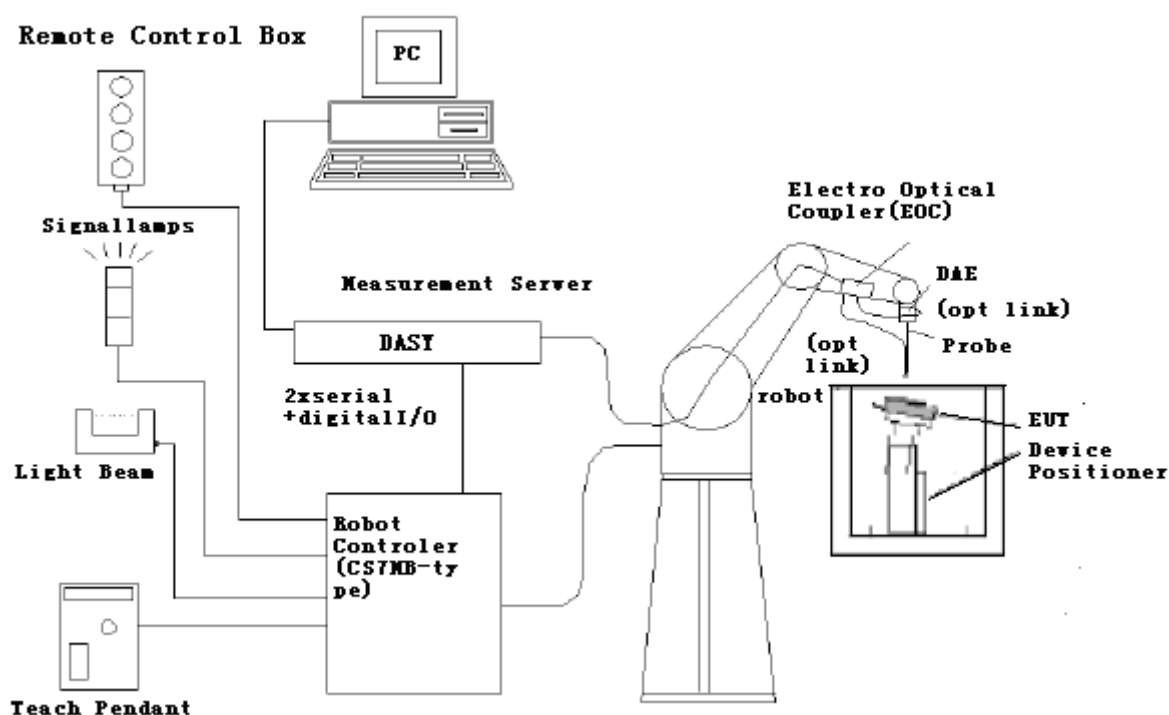


Figure 1 HAC Test Measurement Set-up

The DAE4 consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer.



## 5.2.2 Probe System

The HAC measurements were conducted with the E-Field Probe ER3DV6 and the H-Field Probe H3DV6 (manufactured by SPEAG), designed in the classical triangular configuration and optimized for dosimetric evaluation.

## E-Field Probe Description

|               |                                                                                                                               |
|---------------|-------------------------------------------------------------------------------------------------------------------------------|
| Construction  | One dipole parallel, two dipoles normal to probe axis<br>Built-in shielding against static charges<br>PEEK enclosure material |
| Calibration   | In air from 100 MHz to 3.0 GHz (absolute accuracy $\pm 6.0\%$ , $k=2$ )                                                       |
| Frequency     | 40 MHz to > 6 GHz (can be extended to < 20 MHz)<br>Linearity: $\pm 0.2$ dB (100 MHz to 3 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    | Overall length: 330 mm (Tip: 16 mm)<br>Tip diameter: 8 mm (Body: 12 mm)<br>Distance from probe tip to dipole centers: 2.5 mm  |
| Application   | General near-field measurements up to 6 GHz<br>Field component measurements<br>Fast automatic scanning in phantoms            |



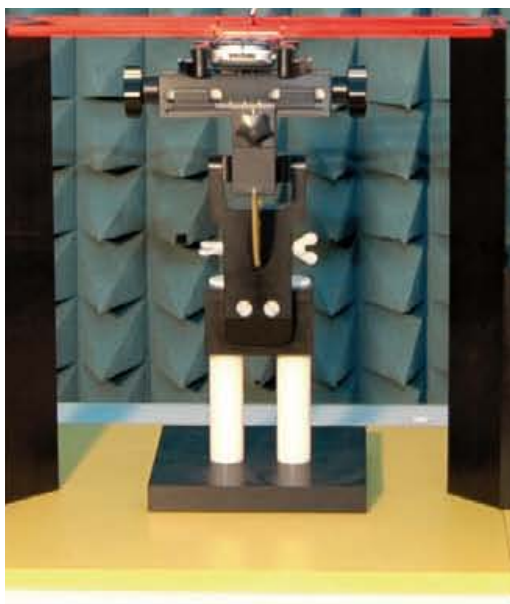
**Figure 2 ER3DV6 E-field Probe**

### 5.2.3 Test Arch Phantom & Phone Positioner

The Test Arch phantom should be positioned horizontally on a stable surface. Reference markings on the Phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot. It enables easy and well defined positioning of the phone and validation dipoles as well as simple teaching of the robot (Dimensions: 370 x 370 x 370 mm).

The Device reference point is set for the EUT at 6.3 mm, the Grid reference point is on the upper surface at the origin of the coordinates, and the "user point \Height Check 0.5 mm" is 0.5mm above the center, allowing verification of the gap of 0.5mm while the probe is positioned there.

The Phone Positioner supports accurate and reliable positioning of any phone with effect on near field  $< \pm 0.5$  dB.



**Figure 3 HAC Phantom & Device Holder**

### 5.3 RF Test Procedures

The evaluation was performed with the following procedure:

1. Confirm proper operation of the field probe, probe measurement system and other instrumentation and the positioning system.
2. Position the WD in its intended test position. The gauge block can simplify this positioning. Note that a separate E-field gauge block will be needed if the center of the probe sensor elements is at different distances from the tip of the probe.
3. Configure the WD normal operation for maximum rated RF output power, at the desired channel and other operating parameters (e.g., test mode), as intended for the test.
4. The center sub-grid shall center on the center of the axial 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. If the field alignment method is used, align the probe for maximum field reception.
5. Record the reading.
6. Scan the entire 50 mm by 50 mm region in equally spaced increments and record the reading at each measurement point. The grid is 5 cm by 5 cm area that is divided into 9 evenly sized blocks or sub-grids. The distance between measurement points shall be sufficient to assure the identification of the maximum reading.
7. Identify the five contiguous sub-grids around the center sub-grid with the lowest maximum field strength readings. Thus the six areas to be used to determine the WD's highest emissions are identified and outlined for the final manual scan. Please note that a maximum of five blocks can be excluded for both E-field measurements for the WD output being measured. Stated another way, the center sub-grid and three others must be common to both the E-field measurements.
8. Identify the maximum field reading within the non-excluded sub-grids identified in Step 7.
9. Convert the maximum field strength reading identified in Step 8 to V/m or A/m, as appropriate. For probes which require a probe modulation factor, this conversion shall be done using the

appropriate probe modulation factor and the calibration.

10. Repeat Step 1 through Step 10 for both the E-field measurements.

11. Compare this reading to the categories in ANSI C63.19 Clause 8 and record the resulting category. The lowest category number listed in 8.2, Table 8.3 obtained in Step 10 for either E-field determines the M category for the audio coupling mode assessment. Record the WD category rating.



Figure 4 WD reference and plane for RF emission measurements

## 5.4 System Check

### Validation Procedure

Place a dipole antenna meeting the requirements given in ANSI C63.19 D.11 in the position normally occupied by the WD. The dipole antenna serves as a known source for an electrical output. Position the E-field probe so that:

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.

Position the E-field probe at a 15 mm distance from the center of the probe element to the top surface. Validation was performed to verify that measured E-field is within +/-18% from the target reference values provided by the manufacturer. "Values within +/-18% are acceptable. Of which 12% is deviation and 13% is measurement uncertainty."

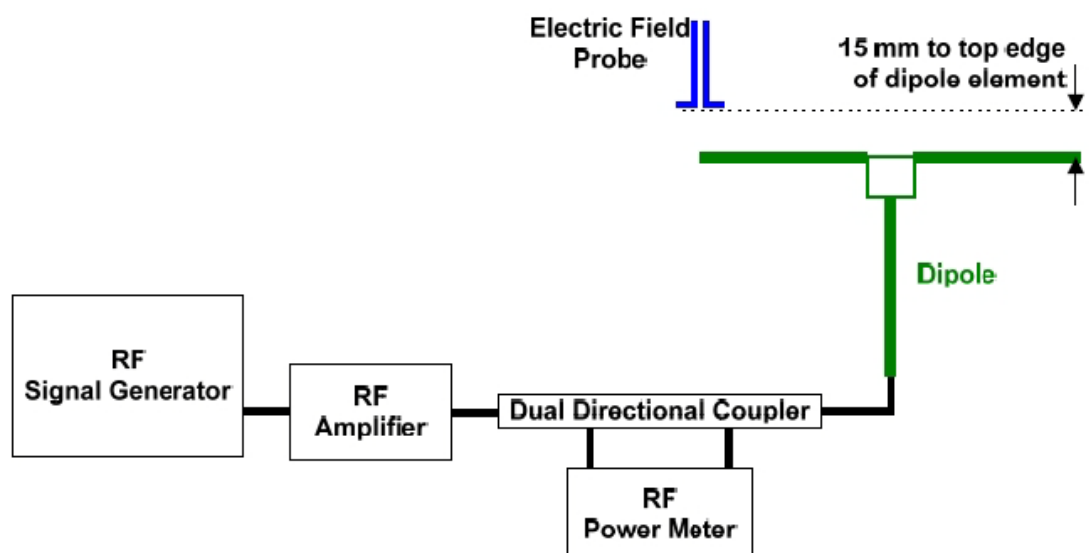


Figure 5 Dipole Validation Setup

### Dipole Measurement Summary

| E-Field Scan |                 |                  |                                  |       |                   |
|--------------|-----------------|------------------|----------------------------------|-------|-------------------|
| Mode         | Frequency (MHz) | Input Power (mW) | Value                            |       | Test Date         |
| CW           | 835             | 100              | Target <sup>1</sup> Value(V/m)   | 104.7 | November 17, 2014 |
|              |                 |                  | Measured <sup>2</sup> Value(V/m) | 107.3 | January 23, 2016  |
|              |                 |                  | Deviation <sup>3</sup> (%)       | 2.48  | /                 |
| CW           | 1880            | 100              | Target <sup>1</sup> Value(V/m)   | 88.8  | November 17, 2014 |
|              |                 |                  | Measured <sup>2</sup> Value(V/m) | 92.1  | January 23, 2016  |
|              |                 |                  | Deviation <sup>3</sup> (%)       | 3.72  | /                 |

## 5.5 Modulation interference factor

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 MIF may be determined using a radiated RF field or a conducted RF signal.

- Using RF illumination or conducted coupling, apply the specific modulated signal in question to the measurement system at a level within its confirmed operating dynamic range.
- Measure the steady-state rms level at the output of the fast probe or sensor.
- Measure the steady-state average level at the weighting output.

- d) Without changing the square-law detector or weighting system, and using RF illumination or conducted coupling, substitute for the specific modulated signal a 1 kHz, 80% amplitudemodulated carrier at the same frequency and adjust its strength until the level at the weighting output equals the step d) measurement.
- e) Without changing the carrier level from step e), remove the 1 kHz modulation and again measure the steady-state rms level indicated at the output of the fast probe or sensor.
- f) The MIF for the specific modulation characteristic is provided by the ratio of the step e) measurement to the step c) measurement, expressed in dB ( $20 \times \log(\text{step e})/\text{step b})$ ).

#### MIF

| Band          | Worst case E-Field Modulation interference factor (dB) |
|---------------|--------------------------------------------------------|
| GSM 850       | 3.63                                                   |
| GSM 1900      | 3.63                                                   |
| WCDMA Band II | -21.25                                                 |
| WCDMA Band IV | -21.11                                                 |
| WCDMA Band V  | -21.19                                                 |
| CDMA BC0      | 3.26                                                   |
| CDMA BC1      | 3.26                                                   |
| CDMA BC10     | 3.26                                                   |

## 5.6 Conducted Output Power Measurement

### Summary

The EUT is tested using an E5515C communications tester as controller unit to set test channels and maximum output power to the DUT, as well as for measuring the conducted power. Conducted output power was measured using an integrated RF connector and attached RF cable. This result contains conducted output power for the EUT.

### Conducted Power Results

| GSM 850      | Conducted Power(dBm) |              |              |
|--------------|----------------------|--------------|--------------|
|              | Channel 128          | Channel 190  | Channel 251  |
| Test Results | 31.57                | 31.60        | 31.56        |
| GSM 1900     | Conducted Power(dBm) |              |              |
|              | Channel 512          | Channel 661  | Channel 810  |
| Test Results | 29.33                | 29.47        | 29.44        |
| UMTS Band II | Conducted Power(dBm) |              |              |
|              | Channel 9262         | Channel 9400 | Channel 9538 |
| 12.2kbps RMC | 24.24                | 24.27        | 24.31        |
| UMTS Band IV | Conducted Power(dBm) |              |              |
|              | Channel 1312         | Channel 1413 | Channel 1513 |
| 12.2kbps RMC | 24.41                | 24.47        | 24.36        |
| UMTS Band V  | Conducted Power(dBm) |              |              |
|              | Channel 4132         | Channel 4183 | Channel 4233 |
| 12.2kbps RMC | 24.13                | 24.20        | 24.02        |
| CDMA BC0     | Conducted Power(dBm) |              |              |
|              | Channel 1013         | Channel 384  | Channel 777  |
| RC3          | 23.79                | 23.81        | 23.65        |
| CDMA BC1     | Conducted Power(dBm) |              |              |
|              | Channel 25           | Channel 600  | Channel 1175 |
| RC3          | 24.25                | 24.29        | 24.27        |
| CDMA BC10    | Conducted Power(dBm) |              |              |
|              | Channel 476          | Channel 580  | Channel 684  |
| RC3          | 23.87                | 23.95        | 23.98        |

## 5.7 Analysis of RF Air Interface Technologies

RF air interface technologies that have low power have been found to produce sufficiently low RF interference potential, so that it is possible to exempt them from the product testing specified in Clause 5. As described in 5.4.4. An 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 operating modes.

## 5.8 Individual Mode Evaluations

| Air Interface | Maximum average power (dBm) | Worst case MIF (dB) | Total (power +MIF,dBm) | C63.19 Testing Required |
|---------------|-----------------------------|---------------------|------------------------|-------------------------|
| GSM 850       | 31.60                       | 3.63                | 35.23                  | Yes                     |
| GSM 1900      | 29.47                       | 3.63                | 33.10                  | Yes                     |
| WCDMA Band II | 24.31                       | -21.25              | 3.06                   | No                      |
| WCDMA Band IV | 24.47                       | -21.11              | 3.36                   | No                      |
| WCDMA Band V  | 24.20                       | -21.19              | 3.01                   | No                      |
| CDMA BC0      | 23.81                       | 3.26                | 27.07                  | Yes                     |
| CDMA BC1      | 24.29                       | 3.26                | 27.55                  | Yes                     |
| CDMA BC10     | 23.98                       | 3.26                | 27.24                  | Yes                     |

Per ANSI C63.19-2011 RF Emissions testing for this device is required only for GSM and CDMA voice modes. All other applicable air interfaces are exempt.

## 6 Test Results

### 6.1 ANSI C63.19-2011 Limits

| Category    | Telephone RF parameters<br>< 960 MHz |          |
|-------------|--------------------------------------|----------|
| Near field  | E-field emissions                    |          |
| Category M1 | 50 to 55                             | dB (V/m) |
| Category M2 | 45 to 50                             | dB (V/m) |
| Category M3 | 40 to 45                             | dB (V/m) |
| Category M4 | < 40                                 | dB (V/m) |
| Category    | Telephone RF parameters<br>> 960 MHz |          |
| Near field  | E-field emissions                    |          |
| Category M1 | 40 to 45                             | dB (V/m) |
| Category M2 | 35 to 40                             | dB (V/m) |
| Category M3 | 30 to 35                             | dB (V/m) |
| Category M4 | < 30                                 | dB (V/m) |

## 6.2 Summary Test Results

### GSM 850 Results

| Channel    | Frequency (MHz) | MIF(dB) | E-Field Emissions dB (V/m) | Power Drift (dB) | Category | Graph Results |
|------------|-----------------|---------|----------------------------|------------------|----------|---------------|
| High/251   | 848.8           | 3.63    | 39.82                      | -0.06            | M4       | Figure 8      |
| Middle/190 | 836.6           | 3.63    | 39.65                      | -0.07            | M4       | Figure 9      |
| Low/128    | 824.2           | 3.63    | 39.57                      | 0.03             | M4       | Figure 10     |

### GSM 1900 Results

| Channel    | Frequency (MHz) | MIF(dB) | E-Field Emissions dB (V/m) | Power Drift (dB) | Category | Graph Results |
|------------|-----------------|---------|----------------------------|------------------|----------|---------------|
| High/810   | 1909.8          | 3.63    | 30.93                      | 0.09             | M3       | Figure 11     |
| Middle/661 | 1880            | 3.63    | 32.00                      | 0.09             | M3       | Figure 12     |
| Low/512    | 1850.2          | 3.63    | 32.74                      | 0.00             | M3       | Figure 13     |

### CDMA BC0 Results

| Channel    | Frequency (MHz) | MIF(dB) | E-Field Emissions dB (V/m) | Power Drift (dB) | Category | Graph Results |
|------------|-----------------|---------|----------------------------|------------------|----------|---------------|
| High/777   | 848.31          | 3.26    | 35.78                      | -0.01            | M4       | Figure 14     |
| Middle/384 | 836.52          | 3.26    | 36.26                      | 0.06             | M4       | Figure 15     |
| Low/1013   | 824.70          | 3.26    | 39.44                      | -0.02            | M4       | Figure 16     |

### CDMA BC1 Results

| Channel    | Frequency (MHz) | MIF(dB) | E-Field Emissions dB (V/m) | Power Drift (dB) | Category | Graph Results |
|------------|-----------------|---------|----------------------------|------------------|----------|---------------|
| High/1175  | 1908.75         | 3.26    | 24.84                      | -0.04            | M4       | Figure 17     |
| Middle/600 | 1880.00         | 3.26    | 26.13                      | -0.08            | M4       | Figure 18     |
| Low/25     | 1851.25         | 3.26    | 27.24                      | -0.15            | M4       | Figure 19     |

**CDMA BC10 Results**

| Channel    | Frequency (MHz) | MIF(dB) | E-Field Emissions dB (V/m) | Power Drift (dB) | Category | Graph Results |
|------------|-----------------|---------|----------------------------|------------------|----------|---------------|
| High/684   | 823.1           | 3.26    | 33.28                      | -0.03            | M4       | Figure 20     |
| Middle/580 | 820.5           | 3.26    | 33.22                      | -0.11            | M4       | Figure 21     |
| Low/476    | 817.9           | 3.26    | 33.60                      | -0.10            | M4       | Figure 22     |

## 7 Measurement Uncertainty

| No. | Error source                   | Type | Uncertainty Value (%) | Prob. Dist. | k          | $c_{iE}$ | $c_{iH}$ | Standard Uncertainty (%) $u_i$ (%)<br>E | Degree of freedom $V_{eff}$ or $v_i$ |
|-----|--------------------------------|------|-----------------------|-------------|------------|----------|----------|-----------------------------------------|--------------------------------------|
| 1   | Probe Calibration              | B    | 5.1                   | N           | 1          | 1        | 1        | 5.1                                     | $\infty$                             |
| 2   | Axial Isotropy                 | B    | 4.7                   | R           | $\sqrt{3}$ | 1        | 1        | 2.7                                     | $\infty$                             |
| 3   | Sensor Displacement            | B    | 16.5                  | R           | $\sqrt{3}$ | 1        | 0.145    | 9.5                                     | $\infty$                             |
| 4   | Boundary Effects               | B    | 2.4                   | R           | $\sqrt{3}$ | 1        | 1        | 1.4                                     | $\infty$                             |
| 5   | Test Arch                      | B    | 7.2                   | R           | $\sqrt{3}$ | 1        | 0        | 4.1                                     | $\infty$                             |
| 6   | Linearity                      | B    | 4.7                   | R           | $\sqrt{3}$ | 1        | 1        | 2.7                                     | $\infty$                             |
| 7   | Scaling to Peak Envelope Power | B    | 2.0                   | R           | $\sqrt{3}$ | 1        | 1        | 1.2                                     | $\infty$                             |
| 8   | System Detection Limit         | B    | 1.0                   | R           | $\sqrt{3}$ | 1        | 1        | 0.6                                     | $\infty$                             |
| 9   | Readout Electronics            | B    | 0.3                   | N           | 1          | 1        | 1        | 0.3                                     | $\infty$                             |
| 10  | Response Time                  | B    | 0.8                   | R           | $\sqrt{3}$ | 1        | 1        | 0.5                                     | $\infty$                             |
| 11  | Integration Time               | B    | 2.6                   | R           | $\sqrt{3}$ | 1        | 1        | 1.5                                     | $\infty$                             |
| 12  | RF Ambient Conditions          | B    | 3.0                   | R           | $\sqrt{3}$ | 1        | 1        | 1.7                                     | $\infty$                             |
| 13  | RF Reflections                 | B    | 12.0                  | R           | $\sqrt{3}$ | 1        | 1        | 6.9                                     | $\infty$                             |
| 14  | Probe Positioner               | B    | 1.2                   | R           | $\sqrt{3}$ | 1        | 0.67     | 0.7                                     | $\infty$                             |
| 15  | Probe Positioning              | A    | 4.7                   | R           | $\sqrt{3}$ | 1        | 0.67     | 2.7                                     | $\infty$                             |
| 16  | Extra. And Interpolation       | B    | 1.0                   | R           | $\sqrt{3}$ | 1        | 1        | 0.6                                     | $\infty$                             |
| 17  | Device Positioning Vertical    | B    | 4.7                   | R           | $\sqrt{3}$ | 1        | 0.67     | 2.7                                     | $\infty$                             |
| 18  | Device Positioning Lateral     | B    | 1.0                   | R           | $\sqrt{3}$ | 1        | 1        | 0.6                                     | $\infty$                             |
| 19  | Device Holder and Phantom      | B    | 2.4                   | R           | $\sqrt{3}$ | 1        | 1        | 1.4                                     | $\infty$                             |



|                                          |                   |   |     |   |            |   |      |       |          |
|------------------------------------------|-------------------|---|-----|---|------------|---|------|-------|----------|
| 20                                       | Power Drift       | B | 5.0 | R | $\sqrt{3}$ | 1 | 1    | 2.9   | $\infty$ |
| 21                                       | Phantom Thickness | B | 2.4 | R | $\sqrt{3}$ | 1 | 0.67 | 1.4   | $\infty$ |
| Combined standard uncertainty (%)        |                   |   |     |   |            |   |      | 15.19 |          |
| Expanded Std. uncertainty on power (K=2) |                   |   |     |   |            |   |      | 30.38 |          |
| Expanded Std. uncertainty on field (K=2) |                   |   |     |   |            |   |      | 15.19 |          |



## 8 Main Test Instruments

| Name                                 | Type           | Serial Number | Calibration Date         | Expiration Time |
|--------------------------------------|----------------|---------------|--------------------------|-----------------|
| Power meter                          | Agilent E4417A | GB41291714    | 2015-05-22               | 2016-05-21      |
| Power sensor                         | Agilent N8481H | MY50350004    | 2015-05-22               | 2016-05-21      |
| Signal Generator                     | Agilent N5181A | MY50140143    | 2015-05-22               | 2016-05-21      |
| Amplifier                            | IXA-020        | 0401          | No Calibration Requested |                 |
| Universal Radio Communication Tester | CMU 200        | 118133        | 2015-05-22               | 2016-05-21      |
| E-Field Probe                        | ER3DV6         | 2303          | 2014-11-19               | 2016-11-18      |
| DAE                                  | DAE4           | 871           | 2015-11-17               | 2016-11-16      |
| Validation Kit 835MHz                | CD835V3        | 1133          | 2014-11-17               | 2016-11-16      |
| Validation Kit 1880MHz               | CD1880V3       | 1115          | 2014-11-17               | 2016-11-16      |
| Hygrothermograph                     | NT-311         | 20150731      | 2015-07-16               | 2016-07-15      |
| Audio Interference Analyzer          | AIA            | 1012          | No Calibration Requested |                 |

\*\*\*\*\*END OF REPORT \*\*\*\*\*

## ANNEX A: System Check Results

### HAC\_System Performance Check at 835MHz\_E

DUT: Dipole 835 MHz; Type: CD835V3; SN:1023

Date: 2016-3-30

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1

Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature:22.3 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: ER3DV6 - SN2303; ConvF(1, 1, 1); Calibrated: 2014-11-19

Electronics: DAE4 Sn871; Calibrated: 2015-11-17

Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**E Scan - measurement distance from the probe sensor center to CD835 Dipole = 15mm**

**2/Hearing Aid Compatibility Test (41x361x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 107.3 V/m

Applied MIF = 0.00 dB

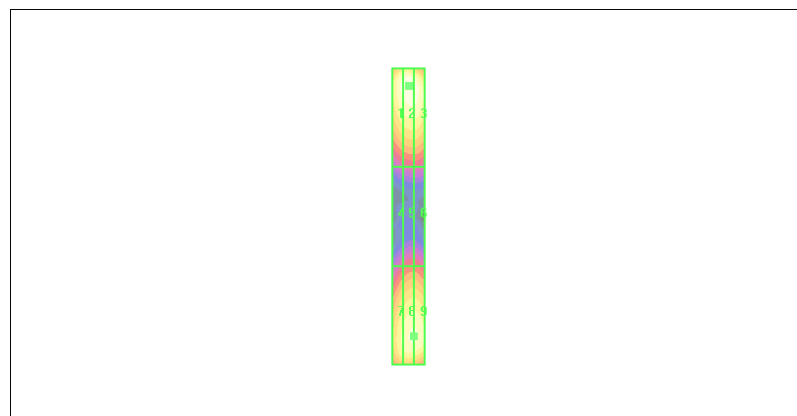
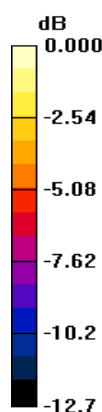
Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 91 V/m; Power Drift = 0.003 dB

**Hearing Aid Near-Field Category: M4 (AWF 0 dB)**

Peak E-field in V/m

|                           |                            |                           |
|---------------------------|----------------------------|---------------------------|
| Grid 1<br><b>101.2 M4</b> | Grid 2<br><b>104.3 M4</b>  | Grid 3<br><b>101.5 M4</b> |
| Grid 4<br><b>61.2 M4</b>  | <b>Grid 5<br/>64.23 M4</b> | Grid 6<br><b>62.39 M4</b> |
| Grid 7<br><b>104.5 M4</b> | Grid 8<br><b>107.3 M4</b>  | Grid 9<br><b>104.3 M4</b> |



0 dB = 107.3V/m

**Figure 6 System Performance Check 835MHz\_E**

## HAC\_System Performance Check at 1880MHz\_E

DUT: Dipole 1880 MHz; Type: CD1880V3; SN: 1018

Date: 2016-3-30

Communication System: CW; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: ER3DV6 - SN2303; ConvF(1, 1, 1); Calibrated: 2014-11-19

Electronics: DAE4 Sn871; Calibrated: 2015-11-17

Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**E Scan - measurement distance from the probe sensor center to CD1880 Dipole =**

**15mm/Hearing Aid Compatibility Test (41x181x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 92.1 V/m

Applied MIF = 0.00 dB

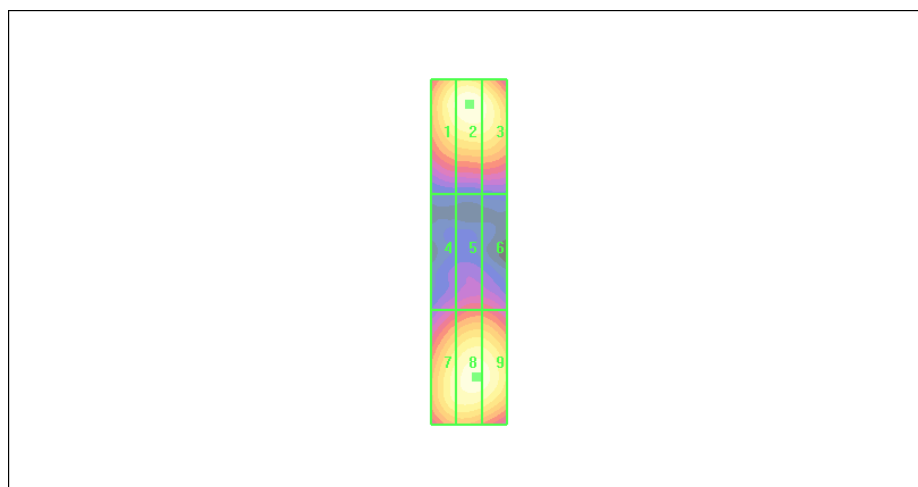
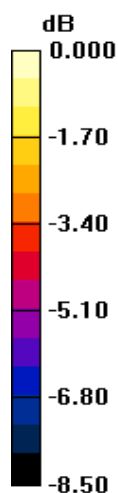
Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 86V/m; Power Drift = 0.002 dB

**Hearing Aid Near-Field Category: M2 (AWF 0 dB)**

Peak E-field in V/m

|                           |                            |                           |
|---------------------------|----------------------------|---------------------------|
| Grid 1<br><b>91.78 M2</b> | Grid 2<br><b>98.10 M2</b>  | Grid 3<br><b>93.42M2</b>  |
| Grid 4<br><b>71.76 M3</b> | <b>Grid 5<br/>73.56 M3</b> | Grid 6<br><b>71.17 M3</b> |
| Grid 7<br><b>87.15 M2</b> | Grid 8<br><b>89.46 M2</b>  | Grid 9<br><b>89.01 M2</b> |



0 dB = 98.10V/m

**Figure 7 System Performance Check 1880MHz\_E**



## ANNEX B: Graph Results

### HAC RF E-Field GSM 850 High

Date: 2016-3-30

Communication System: UID 10021 - DAA, GSM-FDD (TDMA, GMSK); Frequency: 848.6 MHz; Duty Cycle: 1:8.30042

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

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: ER3DV6 - SN2303; ConvF(1, 1, 1); Calibrated: 2014-11-19;

Electronics: DAE4 Sn871; Calibrated: 2015-11-17

Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**N9131 GSM 850 HAC RF E-Field 2011 Device E-Field measurement (E-field scan for ANSI C63.19-2007 & -2011 compliance)/E Scan - ER3D: 15 mm from Probe Center to the Device High/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 = 62.50 V/m; Power Drift = -0.06 dB

Applied MIF = 3.63 dB

RF audio interference level = 37.97 dBV/m

**Emission category: M4**

MIF scaled E-field

|                          |                          |                          |
|--------------------------|--------------------------|--------------------------|
| Grid 1 M4<br>37.72 dBV/m | Grid 2 M4<br>39.82 dBV/m | Grid 3 M4<br>39.74 dBV/m |
| Grid 4 M4<br>36.58 dBV/m | Grid 5 M4<br>37.97 dBV/m | Grid 6 M4<br>37.92 dBV/m |
| Grid 7 M4<br>36.36 dBV/m | Grid 8 M4<br>37.42 dBV/m | Grid 9 M4<br>37.31 dBV/m |

| Category | Limits for E-Field Emissions < 960MHz | Limits for E-Field Emissions > 960MHz |
|----------|---------------------------------------|---------------------------------------|
| M1       | 50 dBV/m - 55 dB V/m                  | 40 dBV/m - 45 dB V/m                  |
| M2       | 45 dBV/m - 50 dB V/m                  | 35 dBV/m - 40 dB V/m                  |
| M3       | 40 dBV/m - 45 dB V/m                  | 30 dBV/m - 35 dB V/m                  |
| M4       | <40 dBV/m                             | <30 dBV/m                             |

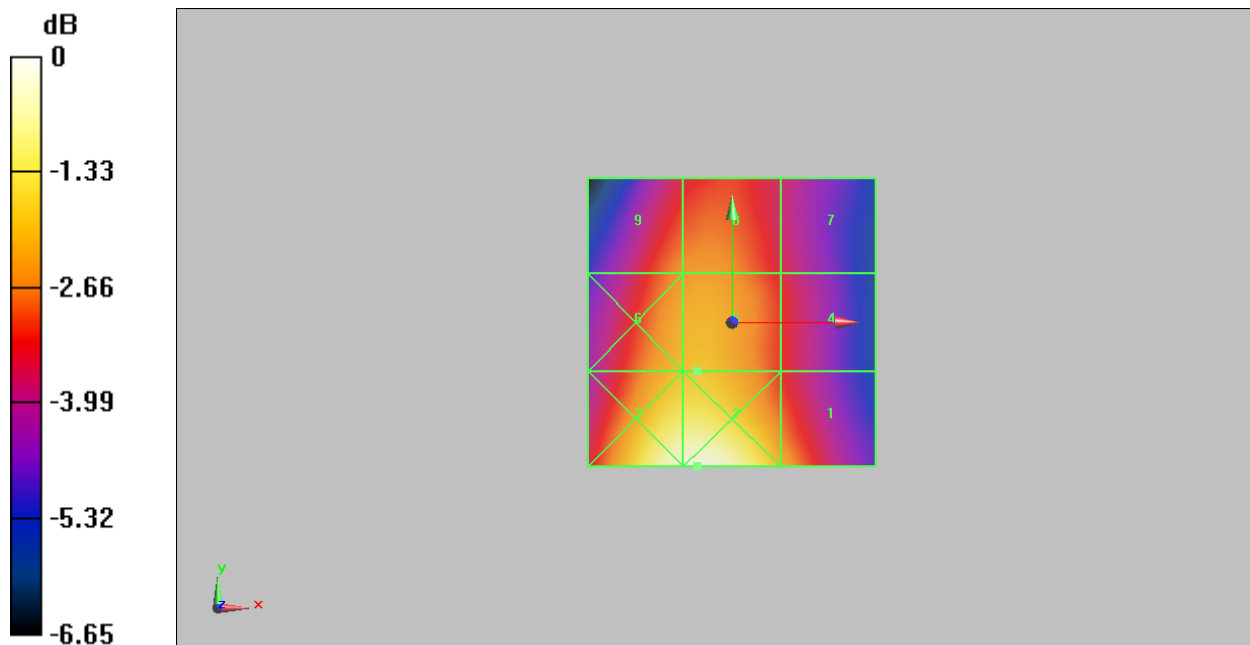
**Cursor:**

Total = 39.82 dBV/m

E Category: M4

Location: -6, -25, 8.7 mm

Maximum value of Total (interpolated) = 97.94 V/m



0 dB = 97.94 V/m = 39.82 dBV/m

**Figure 8 HAC RF E-Field GSM 850 Channel 251**

**HAC RF E-Field GSM 850 Middle**

Date: 2016-3-30

Communication System: UID 10021 - DAA, GSM-FDD (TDMA, GMSK); Frequency: 836.6 MHz; Duty Cycle: 1:8.30042

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

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: ER3DV6 - SN2303; ConvF(1, 1, 1); Calibrated: 2014-11-19;

Electronics: DAE4 Sn871; Calibrated: 2015-11-17

Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**N9131 GSM 850 HAC RF E-Field 2011 Device E-Field measurement (E-field scan for ANSI C63.19-2007 & -2011 compliance)/E Scan - ER3D: 15 mm from Probe Center to the Device Middle/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 = 69.32 V/m; Power Drift = -0.07 dB

Applied MIF = 3.63 dB

RF audio interference level = 38.66 dBV/m

**Emission category: M4**

MIF scaled E-field

|                          |                          |                          |
|--------------------------|--------------------------|--------------------------|
| Grid 1 M4<br>38.33 dBV/m | Grid 2 M4<br>39.65 dBV/m | Grid 3 M4<br>39.58 dBV/m |
| Grid 4 M4<br>37.56 dBV/m | Grid 5 M4<br>38.66 dBV/m | Grid 6 M4<br>38.64 dBV/m |
| Grid 7 M4<br>37.21 dBV/m | Grid 8 M4<br>38.21 dBV/m | Grid 9 M4<br>38.16 dBV/m |

| Category | Limits for E-Field Emissions < 960MHz | Limits for E-Field Emissions > 960MHz |
|----------|---------------------------------------|---------------------------------------|
| M1       | 50 dBV/m - 55 dB V/m                  | 40 dBV/m - 45 dB V/m                  |
| M2       | 45 dBV/m - 50 dB V/m                  | 35 dBV/m - 40 dB V/m                  |
| M3       | 40 dBV/m - 45 dB V/m                  | 30 dBV/m - 35 dB V/m                  |
| M4       | <40 dBV/m                             | <30 dBV/m                             |

**Cursor:**

Total = 39.65 dBV/m

E Category: M4

Location: -5, -25, 8.7 mm

Maximum value of Total (interpolated) = 96.01 V/m

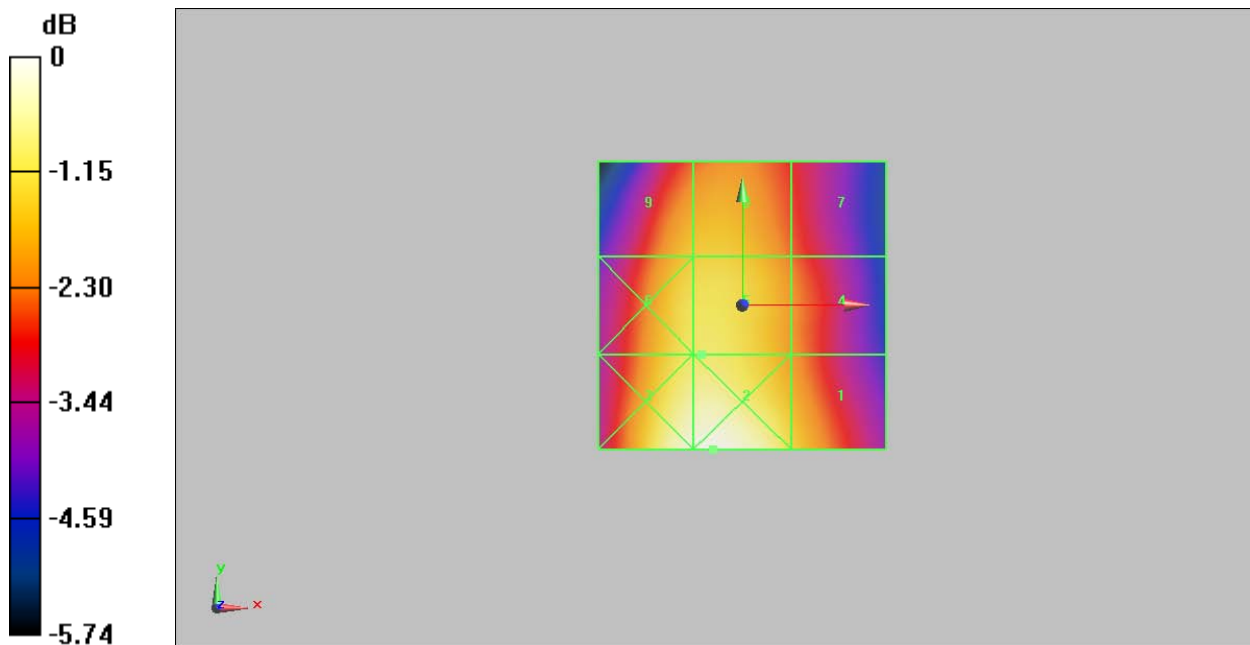


Figure 9 HAC RF E-Field GSM 850 Channel 190

**HAC RF E-Field GSM 850 Low**

Date: 2016-3-30

Communication System: UID 10021 - DAA, GSM-FDD (TDMA, GMSK); Frequency: 824.2 MHz; Duty Cycle: 1:8.30042

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

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: ER3DV6 - SN2303; ConvF(1, 1, 1); Calibrated: 2014-11-19;

Electronics: DAE4 Sn871; Calibrated: 2015-11-17

Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**N9131 GSM 850 HAC RF E-Field 2011 Device E-Field measurement (E-field scan for ANSI C63.19-2007 & -2011 compliance)/E Scan - ER3D: 15 mm from Probe Center to the Device Low/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 = 71.28 V/m; Power Drift = 0.03 dB

Applied MIF = 3.63 dB

RF audio interference level = 38.91 dBV/m

**Emission category: M4**

MIF scaled E-field

|                          |                          |                          |
|--------------------------|--------------------------|--------------------------|
| Grid 1 M4<br>38.39 dBV/m | Grid 2 M4<br>39.57 dBV/m | Grid 3 M4<br>39.42 dBV/m |
| Grid 4 M4<br>37.82 dBV/m | Grid 5 M4<br>38.91 dBV/m | Grid 6 M4<br>38.85 dBV/m |
| Grid 7 M4<br>37.54 dBV/m | Grid 8 M4<br>38.58 dBV/m | Grid 9 M4<br>38.49 dBV/m |

| Category | Limits for E-Field Emissions < 960MHz | Limits for E-Field Emissions > 960MHz |
|----------|---------------------------------------|---------------------------------------|
| M1       | 50 dBV/m - 55 dB V/m                  | 40 dBV/m - 45 dB V/m                  |
| M2       | 45 dBV/m - 50 dB V/m                  | 35 dBV/m - 40 dB V/m                  |
| M3       | 40 dBV/m - 45 dB V/m                  | 30 dBV/m - 35 dB V/m                  |
| M4       | <40 dBV/m                             | <30 dBV/m                             |

**Cursor:**

Total = 39.57 dBV/m

E Category: M4

Location: -4.5, -25, 8.7 mm

Maximum value of Total (interpolated) = 95.21 V/m

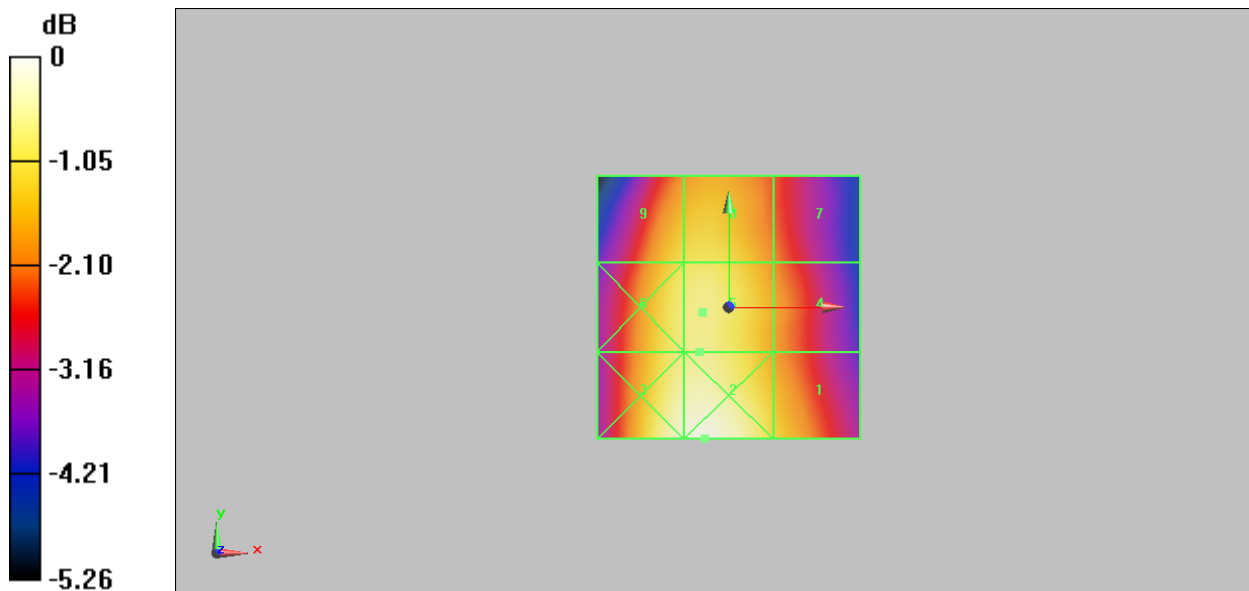


Figure 10 HAC RF E-Field GSM 850 Channel 128

**HAC RF E-Field GSM 1900 High**

Date: 2016-3-30

Communication System: UID 10021 - DAB, GSM-FDD (TDMA, GMSK); Frequency: 1909.8 MHz; Duty Cycle: 1:8.30042

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

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: ER3DV6 - SN2303; ConvF(1, 1, 1); Calibrated: 2014-11-19;

Electronics: DAE4 Sn871; Calibrated: 2015-11-17

Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**N9131 GSM 1900 HAC RF E-Field/E Scan - ER3D: 15 mm from Probe Center to the Device High/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 = 13.65 V/m; Power Drift = 0.09 dB

Applied MIF = 3.63 dB

RF audio interference level = 28.71 dBV/m

**Emission category: M4**

MIF scaled E-field

|             |             |             |
|-------------|-------------|-------------|
| Grid 1 M4   | Grid 2 M3   | Grid 3 M3   |
| 29.04 dBV/m | 30.93 dBV/m | 30.92 dBV/m |
| Grid 4 M4   | Grid 5 M4   | Grid 6 M4   |
| 25.94 dBV/m | 28.7 dBV/m  | 28.71 dBV/m |
| Grid 7 M4   | Grid 8 M4   | Grid 9 M4   |
| 26.11 dBV/m | 25.27 dBV/m | 25.12 dBV/m |

| Category | Limits for E-Field Emissions < 960MHz | Limits for E-Field Emissions > 960MHz |
|----------|---------------------------------------|---------------------------------------|
| M1       | 50 dBV/m - 55 dB V/m                  | 40 dBV/m - 45 dB V/m                  |
| M2       | 45 dBV/m - 50 dB V/m                  | 35 dBV/m - 40 dB V/m                  |
| M3       | 40 dBV/m - 45 dB V/m                  | 30 dBV/m - 35 dB V/m                  |
| M4       | <40 dBV/m                             | <30 dBV/m                             |

**Cursor:**

Total = 30.93 dBV/m

E Category: M3

Location: -8, -25, 8.7 mm

Maximum value of Total (interpolated) = 35.18 V/m

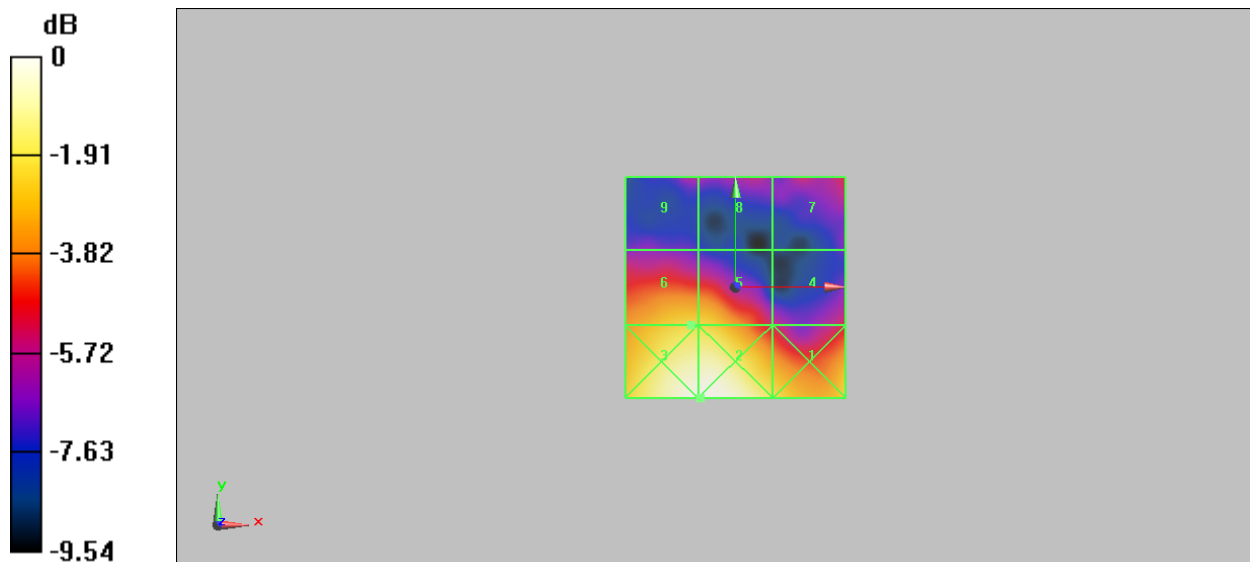


Figure 11 HAC RF E-Field GSM 1900 Channel 810

**HAC RF E-Field GSM 1900 Middle**

Date: 2016-3-30

Communication System: UID 10021 - DAB, GSM-FDD (TDMA, GMSK); Frequency: 1880 MHz; Duty Cycle: 1:8.30042

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

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: ER3DV6 - SN2303; ConvF(1, 1, 1); Calibrated: 2014-11-19;

Electronics: DAE4 Sn871; Calibrated: 2015-11-17

Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**N9131 GSM 1900 HAC RF E-Field/E Scan - ER3D: 15 mm from Probe Center to the Device Middle/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 = 16.60 V/m; Power Drift = 0.09 dB

Applied MIF = 3.63 dB

RF audio interference level = 30.07 dBV/m

**Emission category: M3**

MIF scaled E-field

|                          |                          |                          |
|--------------------------|--------------------------|--------------------------|
| Grid 1 M4<br>29.41 dBV/m | Grid 2 M3<br>32 dBV/m    | Grid 3 M3<br>31.92 dBV/m |
| Grid 4 M4<br>25.68 dBV/m | Grid 5 M3<br>30.07 dBV/m | Grid 6 M3<br>30.14 dBV/m |
| Grid 7 M4<br>26.78 dBV/m | Grid 8 M4<br>25.32 dBV/m | Grid 9 M4<br>25.95 dBV/m |

| Category | Limits for E-Field Emissions < 960MHz | Limits for E-Field Emissions > 960MHz |
|----------|---------------------------------------|---------------------------------------|
| M1       | 50 dBV/m - 55 dB V/m                  | 40 dBV/m - 45 dB V/m                  |
| M2       | 45 dBV/m - 50 dB V/m                  | 35 dBV/m - 40 dB V/m                  |
| M3       | 40 dBV/m - 45 dB V/m                  | 30 dBV/m - 35 dB V/m                  |
| M4       | <40 dBV/m                             | <30 dBV/m                             |

**Cursor:**

Total = 32.00 dBV/m

E Category: M3

Location: -6.5, -25, 8.7 mm

Maximum value of Total (interpolated) = 39.80 V/m

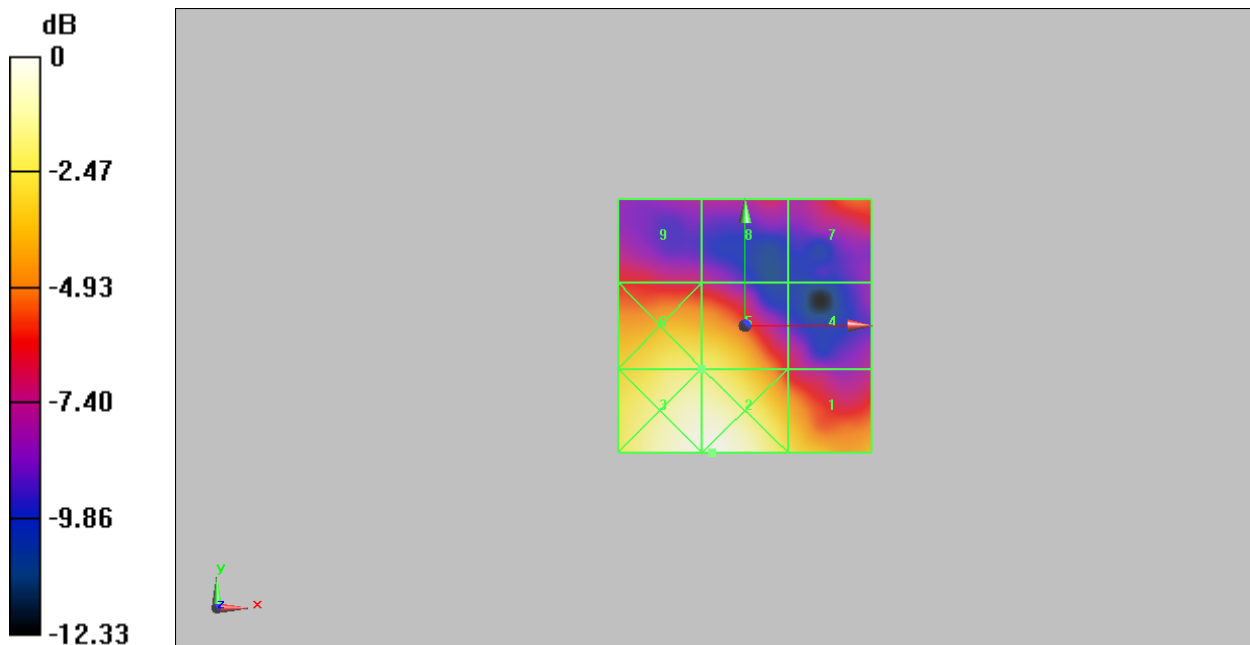


Figure 12 HAC RF E-Field GSM 1900 Channel 661

## HAC RF E-Field GSM 1900 Low

Date: 2016-3-30

Communication System: UID 10021 - DAB, GSM-FDD (TDMA, GMSK); Frequency: 1850.2 MHz; Duty Cycle: 1:8.30042

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

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: ER3DV6 - SN2303; ConvF(1, 1, 1); Calibrated: 2014-11-19;

Electronics: DAE4 Sn871; Calibrated: 2015-11-17

Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**N9131 GSM 1900 HAC RF E-Field/E Scan - ER3D: 15 mm from Probe Center to the Device Low/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 = 18.86 V/m; Power Drift = 0.00 dB

Applied MIF = 3.63 dB

RF audio interference level = 30.90 dBV/m

**Emission category: M3**

MIF scaled E-field

|                                 |                                 |                                 |
|---------------------------------|---------------------------------|---------------------------------|
| Grid 1 <b>M3</b><br>30.27 dBV/m | Grid 2 <b>M3</b><br>32.74 dBV/m | Grid 3 <b>M3</b><br>32.74 dBV/m |
| Grid 4 <b>M4</b><br>26.76 dBV/m | Grid 5 <b>M3</b><br>30.9 dBV/m  | Grid 6 <b>M3</b><br>30.93 dBV/m |
| Grid 7 <b>M4</b><br>27.02 dBV/m | Grid 8 <b>M4</b><br>26.83 dBV/m | Grid 9 <b>M4</b><br>26.02 dBV/m |

| Category | Limits for E-Field Emissions < 960MHz | Limits for E-Field Emissions > 960MHz |
|----------|---------------------------------------|---------------------------------------|
| M1       | 50 dBV/m - 55 dB V/m                  | 40 dBV/m - 45 dB V/m                  |
| M2       | 45 dBV/m - 50 dB V/m                  | 35 dBV/m - 40 dB V/m                  |
| M3       | 40 dBV/m - 45 dB V/m                  | 30 dBV/m - 35 dB V/m                  |
| M4       | <40 dBV/m                             | <30 dBV/m                             |

**Cursor:**

Total = 32.74 dBV/m

E Category: M3

Location: -8.5, -25, 8.7 mm

Maximum value of Total (interpolated) = 43.33 V/m

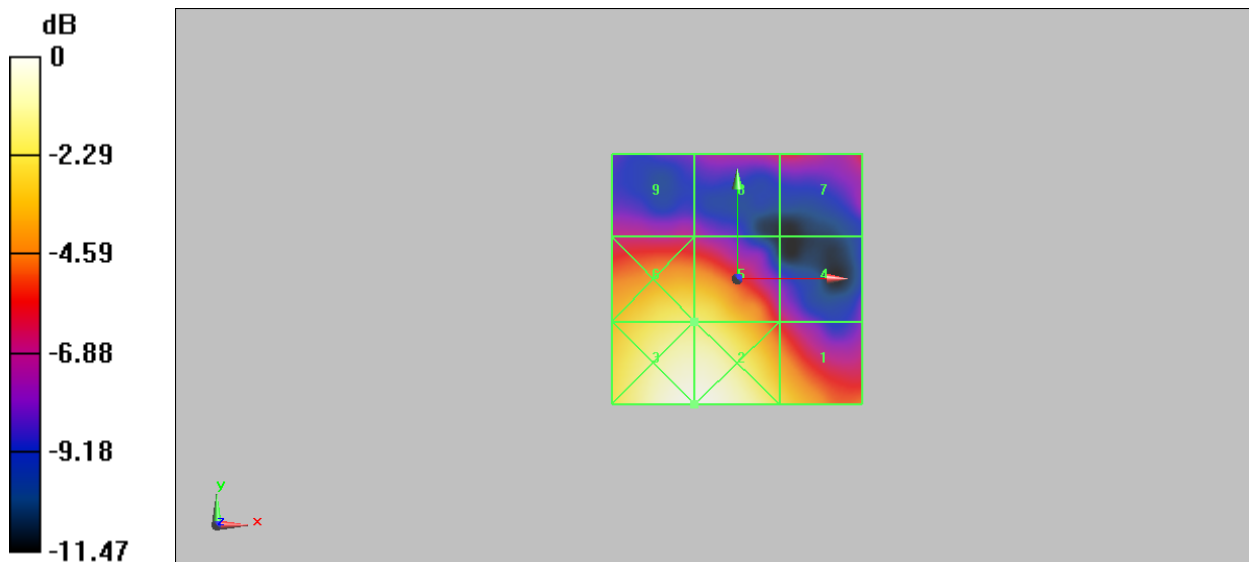


Figure 13 HAC RF E-Field GSM 1900 Channel 512

**HAC RF E-Field CDMA BC0 High**

Date: 2016-3-30

Communication System: UID 0, HAC CDMA (0); Frequency: 848.31 MHz; Duty Cycle: 1:1

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

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: ER3DV6 - SN2303; ConvF(1, 1, 1); Calibrated: 2014-11-19;

Electronics: DAE4 Sn871; Calibrated: 2015-11-17

Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**N9131 CDMA BC0 HAC RF E-Field 2011 Device E-Field measurement (E-field scan for ANSI C63.19-2007 & -2011 compliance)/E Scan - ER3D: 15 mm from Probe Center to the Device High/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 = 29.22 V/m; Power Drift = -0.01 dB

Applied MIF = 3.26 dB

RF audio interference level = 34.30 dBV/m

**Emission category: M4**

MIF scaled E-field

|             |             |             |
|-------------|-------------|-------------|
| Grid 1 M4   | Grid 2 M4   | Grid 3 M4   |
| 30.39 dBV/m | 35.78 dBV/m | 31.77 dBV/m |
| Grid 4 M4   | Grid 5 M4   | Grid 6 M4   |
| 29.67 dBV/m | 34.3 dBV/m  | 30.67 dBV/m |
| Grid 7 M4   | Grid 8 M4   | Grid 9 M4   |
| 30.41 dBV/m | 30.41 dBV/m | 30.22 dBV/m |

| Category | Limits for E-Field Emissions < 960MHz | Limits for E-Field Emissions > 960MHz |
|----------|---------------------------------------|---------------------------------------|
| M1       | 50 dBV/m - 55 dB V/m                  | 40 dBV/m - 45 dB V/m                  |
| M2       | 45 dBV/m - 50 dB V/m                  | 35 dBV/m - 40 dB V/m                  |
| M3       | 40 dBV/m - 45 dB V/m                  | 30 dBV/m - 35 dB V/m                  |
| M4       | <40 dBV/m                             | <30 dBV/m                             |

**Cursor:**

Total = 35.78 dBV/m

E Category: M4

Location: 0, -10, 8.7 mm

Maximum value of Total (interpolated) = 61.55 V/m

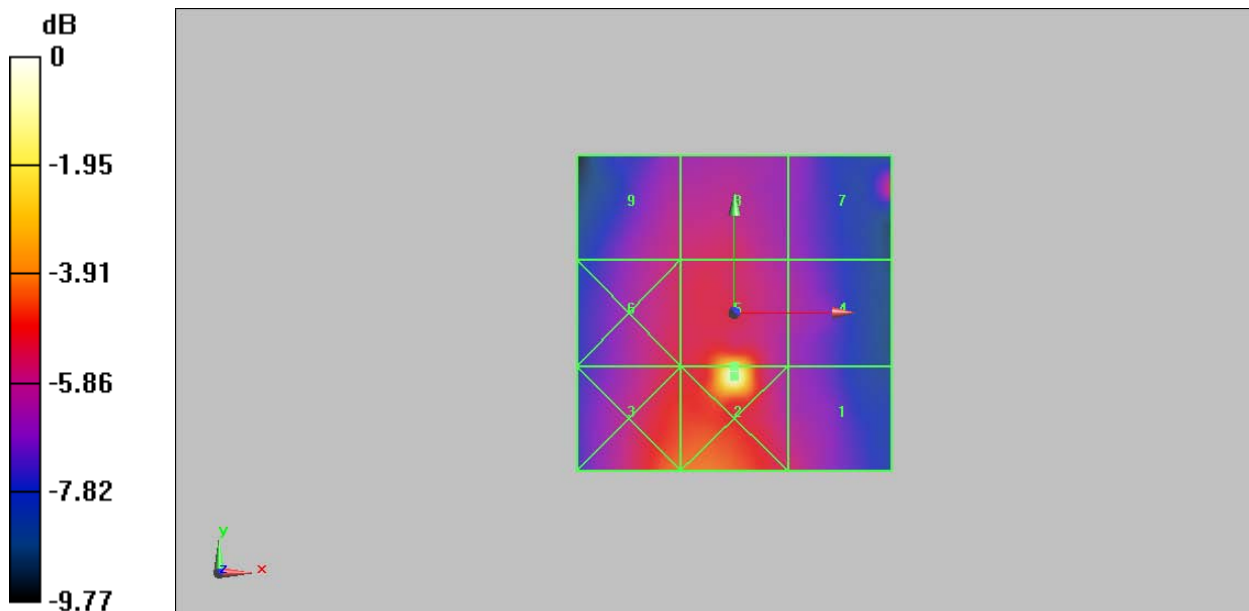


Figure 14 HAC RF E-Field CDMA BC0 Channel 777

## HAC RF E-Field CDMA BC0 Middle

Date: 2016-3-30

Communication System: UID 0, HAC CDMA (0); Frequency: 836.52 MHz; Duty Cycle: 1:1

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

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: ER3DV6 - SN2303; ConvF(1, 1, 1); Calibrated: 2014-11-19;

Electronics: DAE4 Sn871; Calibrated: 2015-11-17

Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**N9131 CDMA BC0 HAC RF E-Field 2011 Device E-Field measurement (E-field scan for ANSI C63.19-2007 & -2011 compliance)/E Scan - ER3D: 15 mm from Probe Center to the Device Middle/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 = 31.53 V/m; Power Drift = 0.05 dB

Applied MIF = 3.26 dB

RF audio interference level = 34.71 dBV/m

**Emission category: M4**

MIF scaled E-field

|             |             |             |
|-------------|-------------|-------------|
| Grid 1 M4   | Grid 2 M4   | Grid 3 M4   |
| 31.55 dBV/m | 36.26 dBV/m | 32.34 dBV/m |
| Grid 4 M4   | Grid 5 M4   | Grid 6 M4   |
| 31.35 dBV/m | 33.71 dBV/m | 32.03 dBV/m |
| Grid 7 M4   | Grid 8 M4   | Grid 9 M4   |
| 34.71 dBV/m | 34.48 dBV/m | 32.21 dBV/m |

| Category | Limits for E-Field Emissions < 960MHz | Limits for E-Field Emissions > 960MHz |
|----------|---------------------------------------|---------------------------------------|
| M1       | 50 dBV/m - 55 dB V/m                  | 40 dBV/m - 45 dB V/m                  |
| M2       | 45 dBV/m - 50 dB V/m                  | 35 dBV/m - 40 dB V/m                  |
| M3       | 40 dBV/m - 45 dB V/m                  | 30 dBV/m - 35 dB V/m                  |
| M4       | <40 dBV/m                             | <30 dBV/m                             |

**Cursor:**

Total = 36.26 dBV/m

E Category: M4

Location: 4.5, -25, 8.7 mm

Maximum value of Total (interpolated) = 64.99 V/m

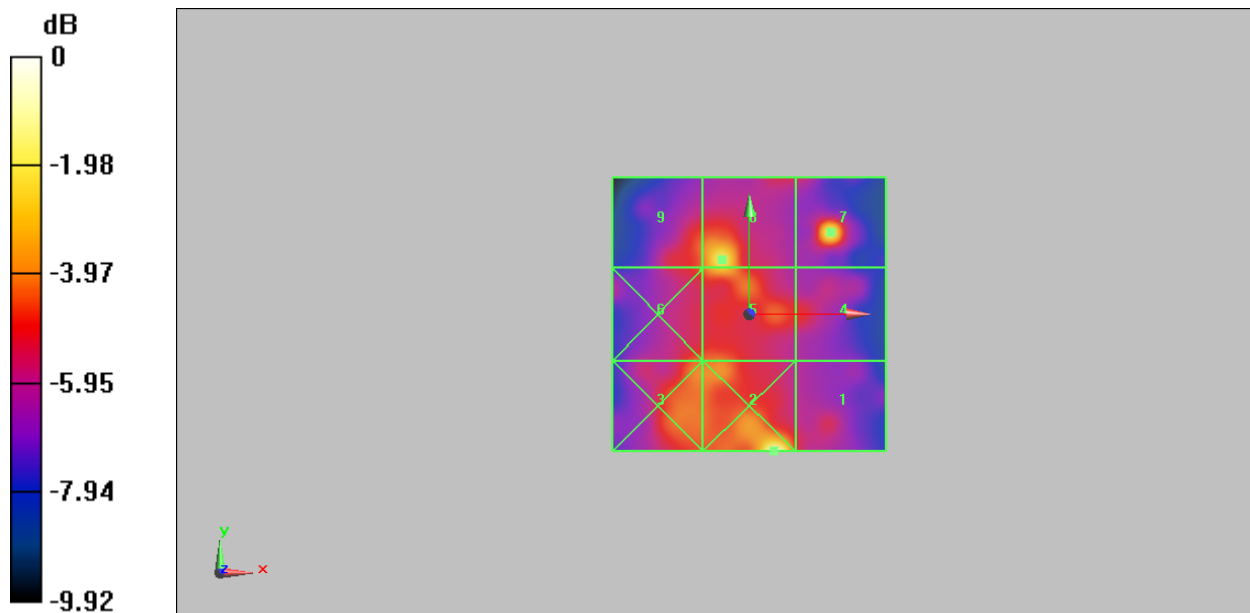


Figure 15 HAC RF E-Field CDMA BC0 Channel 384

**HAC RF E-Field CDMA BC0 Low**

Date: 2016-3-30

Communication System: UID 0, HAC CDMA (0); Frequency: 824.7 MHz; Duty Cycle: 1:1

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

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: ER3DV6 - SN2303; ConvF(1, 1, 1); Calibrated: 2014-11-19;

Electronics: DAE4 Sn871; Calibrated: 2015-11-17

Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**N9131 CDMA BC0 HAC RF E-Field 2011 Device E-Field measurement (E-field scan for ANSI C63.19-2007 & -2011 compliance)/E Scan - ER3D: 15 mm from Probe Center to the Device Low/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 = 32.92 V/m; Power Drift = -0.023 dB

Applied MIF = 3.26 dB

RF audio interference level = 33.04 dBV/m

**Emission category: M4**

MIF scaled E-field

|                          |                          |                          |
|--------------------------|--------------------------|--------------------------|
| Grid 1 M4<br>31.16 dBV/m | Grid 2 M4<br>33.04 dBV/m | Grid 3 M4<br>36.46 dBV/m |
| Grid 4 M4<br>31.69 dBV/m | Grid 5 M4<br>32.58 dBV/m | Grid 6 M4<br>36.74 dBV/m |
| Grid 7 M4<br>30.98 dBV/m | Grid 8 M4<br>31.71 dBV/m | Grid 9 M4<br>39.44 dBV/m |

| Category | Limits for E-Field Emissions < 960MHz | Limits for E-Field Emissions > 960MHz |
|----------|---------------------------------------|---------------------------------------|
| M1       | 50 dBV/m - 55 dB V/m                  | 40 dBV/m - 45 dB V/m                  |
| M2       | 45 dBV/m - 50 dB V/m                  | 35 dBV/m - 40 dB V/m                  |
| M3       | 40 dBV/m - 45 dB V/m                  | 30 dBV/m - 35 dB V/m                  |
| M4       | <40 dBV/m                             | <30 dBV/m                             |

**Cursor:**

Total = 39.44 dBV/m

E Category: M4

Location: -14.5, 10, 8.7 mm

Maximum value of Total (interpolated) = 93.74 V/m

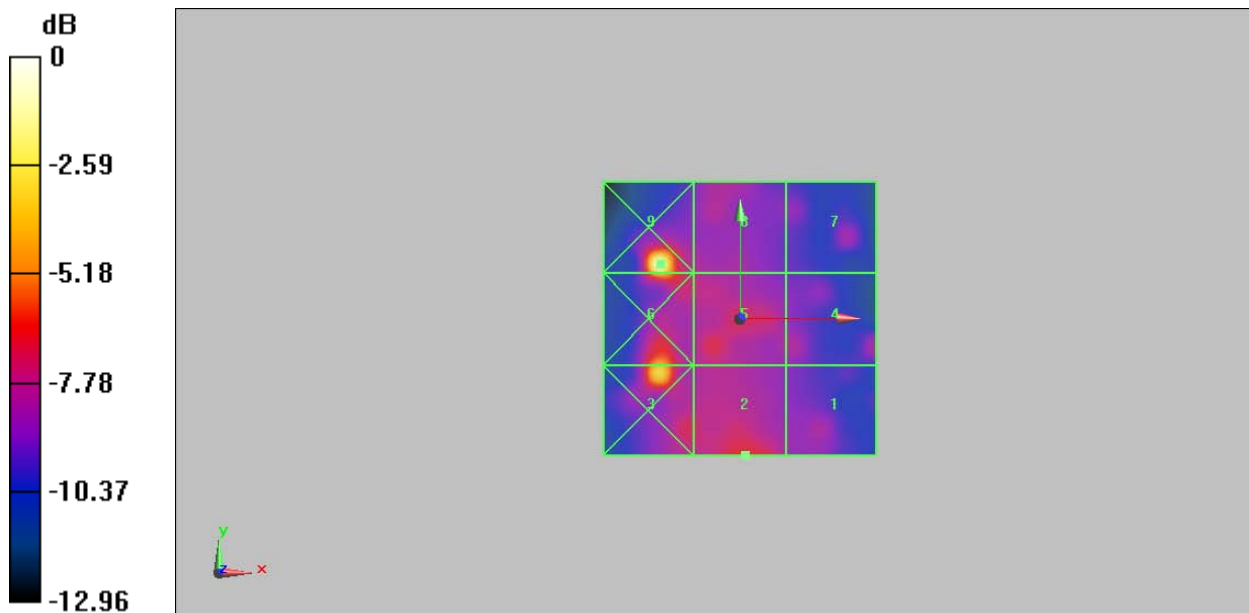


Figure 16 HAC RF E-Field CDMA BC0 Channel 1013

**HAC RF E-Field CDMA BC1 High**

Date: 2016-3-30

Communication System: UID 0, HAC CDMA (0); Frequency: 1908.75 MHz; Duty Cycle: 1:1

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

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: ER3DV6 - SN2303; ConvF(1, 1, 1); Calibrated: 2014-11-19;

Electronics: DAE4 Sn871; Calibrated: 2015-11-17

Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**N9131 CDMA BC1 HAC RF E-Field 2011 Device E-Field measurement (E-field scan for ANSI C63.19-2007 & -2011 compliance)/E Scan - ER3D: 15 mm from Probe Center to the Device High/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 = 15.62 V/m; Power Drift = -0.0394 dB

Applied MIF = 3.26 dB

RF audio interference level = 24.54 dBV/m

**Emission category: M4**

MIF scaled E-field

|                          |                          |                          |
|--------------------------|--------------------------|--------------------------|
| Grid 1 M4<br>22.27 dBV/m | Grid 2 M4<br>24.54 dBV/m | Grid 3 M4<br>24.21 dBV/m |
| Grid 4 M4<br>19.35 dBV/m | Grid 5 M4<br>22.79 dBV/m | Grid 6 M4<br>22.58 dBV/m |
| Grid 7 M4<br>21.19 dBV/m | Grid 8 M4<br>19.16 dBV/m | Grid 9 M4<br>24.84 dBV/m |

| Category | Limits for E-Field Emissions < 960MHz | Limits for E-Field Emissions > 960MHz |
|----------|---------------------------------------|---------------------------------------|
| M1       | 50 dBV/m - 55 dB V/m                  | 40 dBV/m - 45 dB V/m                  |
| M2       | 45 dBV/m - 50 dB V/m                  | 35 dBV/m - 40 dB V/m                  |
| M3       | 40 dBV/m - 45 dB V/m                  | 30 dBV/m - 35 dB V/m                  |
| M4       | <40 dBV/m                             | <30 dBV/m                             |

**Cursor:**

Total = 24.84 dBV/m

E Category: M4

Location: -18.5, 25, 8.7 mm

Maximum value of Total (interpolated) = 17.46 V/m

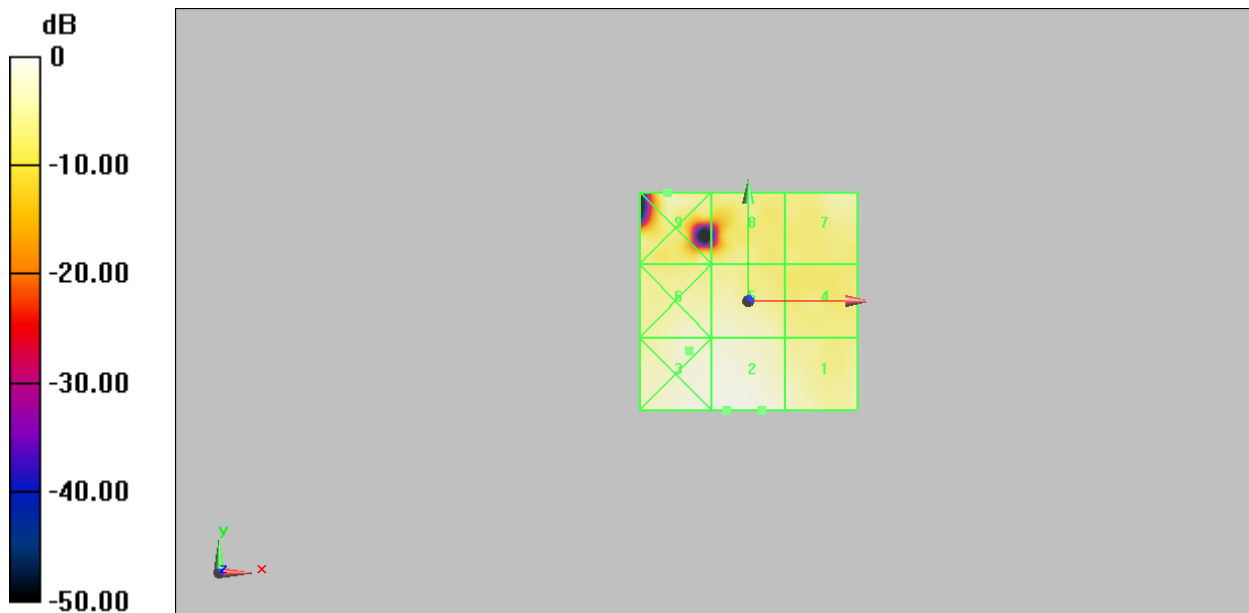


Figure 17 HAC RF E-Field CDMA BC1 Channel 1175

**HAC RF E-Field CDMA BC1 Middle**

Date: 2016-3-30

Communication System: UID 0, HAC CDMA (0); Frequency: 1880 MHz; Duty Cycle: 1:1

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

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: ER3DV6 - SN2303; ConvF(1, 1, 1); Calibrated: 2014-11-19;

Electronics: DAE4 Sn871; Calibrated: 2015-11-17

Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**N9131 CDMA BC1 HAC RF E-Field 2011 Device E-Field measurement (E-field scan for ANSI C63.19-2007 & -2011 compliance)/E Scan - ER3D: 15 mm from Probe Center to the Device Middle/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 = 8.861 V/m; Power Drift = -0.08 dB

Applied MIF = 3.26 dB

RF audio interference level = 23.67 dBV/m

**Emission category: M4**

MIF scaled E-field

|                          |                          |                          |
|--------------------------|--------------------------|--------------------------|
| Grid 1 M4<br>26.13 dBV/m | Grid 2 M4<br>25.6 dBV/m  | Grid 3 M4<br>25.6 dBV/m  |
| Grid 4 M4<br>21.25 dBV/m | Grid 5 M4<br>23.54 dBV/m | Grid 6 M4<br>23.67 dBV/m |
| Grid 7 M4<br>22.6 dBV/m  | Grid 8 M4<br>22.94 dBV/m | Grid 9 M4<br>20.17 dBV/m |

| Category | Limits for E-Field Emissions < 960MHz | Limits for E-Field Emissions > 960MHz |
|----------|---------------------------------------|---------------------------------------|
| M1       | 50 dBV/m - 55 dB V/m                  | 40 dBV/m - 45 dB V/m                  |
| M2       | 45 dBV/m - 50 dB V/m                  | 35 dBV/m - 40 dB V/m                  |
| M3       | 40 dBV/m - 45 dB V/m                  | 30 dBV/m - 35 dB V/m                  |
| M4       | <40 dBV/m                             | <30 dBV/m                             |

**Cursor:**

Total = 26.13 dBV/m

E Category: M4

Location: 25, -16.5, 8.7 mm

Maximum value of Total (interpolated) = 20.25 V/m

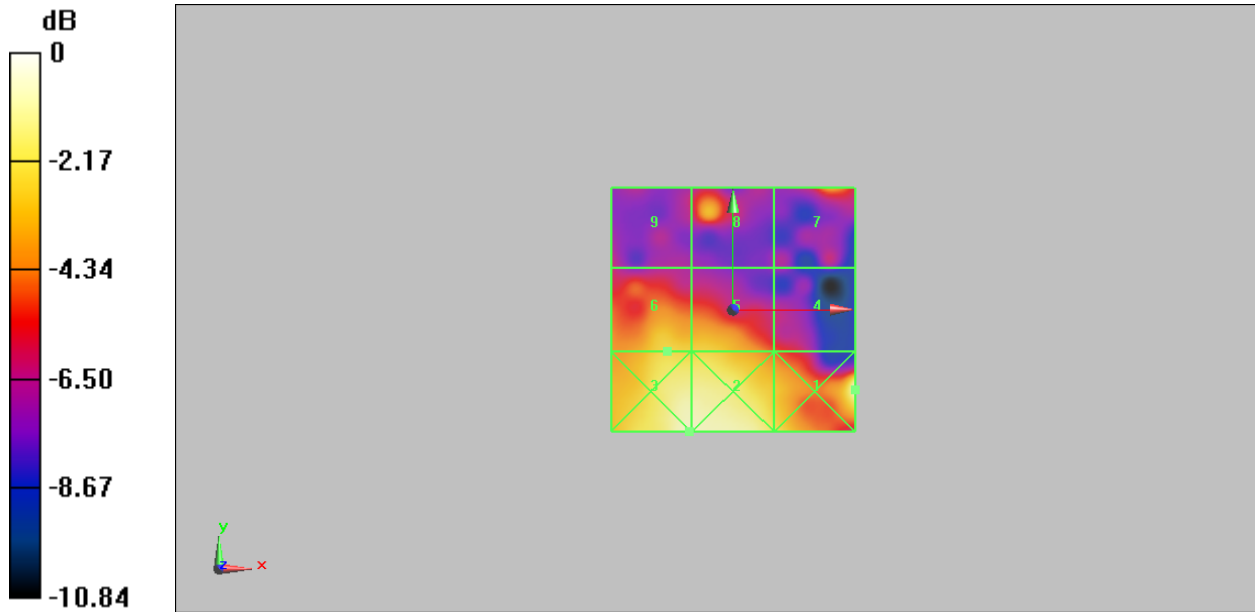


Figure 18 HAC RF E-Field CDMA BC1 Channel 600

**HAC RF E-Field CDMA BC1 Low**

Date: 2016-3-30

Communication System: UID 0, HAC CDMA (0); Frequency: 1851.25 MHz; Duty Cycle: 1:1

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

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: ER3DV6 - SN2303; ConvF(1, 1, 1); Calibrated: 2014-11-19;

Electronics: DAE4 Sn871; Calibrated: 2015-11-17

Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**N9131 CDMA BC1 HAC RF E-Field 2011 Device E-Field measurement (E-field scan for ANSI C63.19-2007 & -2011 compliance)/E Scan - ER3D: 15 mm from Probe Center to the Device Low/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 = 9.340 V/m; Power Drift = -0.15 dB

Applied MIF = 3.26 dB

RF audio interference level = 24.23 dBV/m

**Emission category: M4**

MIF scaled E-field

|             |             |             |
|-------------|-------------|-------------|
| Grid 1 M4   | Grid 2 M4   | Grid 3 M4   |
| 24.59 dBV/m | 27.24 dBV/m | 27.07 dBV/m |
| Grid 4 M4   | Grid 5 M4   | Grid 6 M4   |
| 22.12 dBV/m | 24.23 dBV/m | 23.9 dBV/m  |
| Grid 7 M4   | Grid 8 M4   | Grid 9 M4   |
| 22.4 dBV/m  | 23.37 dBV/m | 20.9 dBV/m  |

| Category | Limits for E-Field Emissions < 960MHz | Limits for E-Field Emissions > 960MHz |
|----------|---------------------------------------|---------------------------------------|
| M1       | 50 dBV/m - 55 dB V/m                  | 40 dBV/m - 45 dB V/m                  |
| M2       | 45 dBV/m - 50 dB V/m                  | 35 dBV/m - 40 dB V/m                  |
| M3       | 40 dBV/m - 45 dB V/m                  | 30 dBV/m - 35 dB V/m                  |
| M4       | <40 dBV/m                             | <30 dBV/m                             |

**Cursor:**

Total = 27.24 dBV/m

E Category: M4

Location: -6, -25, 8.7 mm

Maximum value of Total (interpolated) = 23.02 V/m

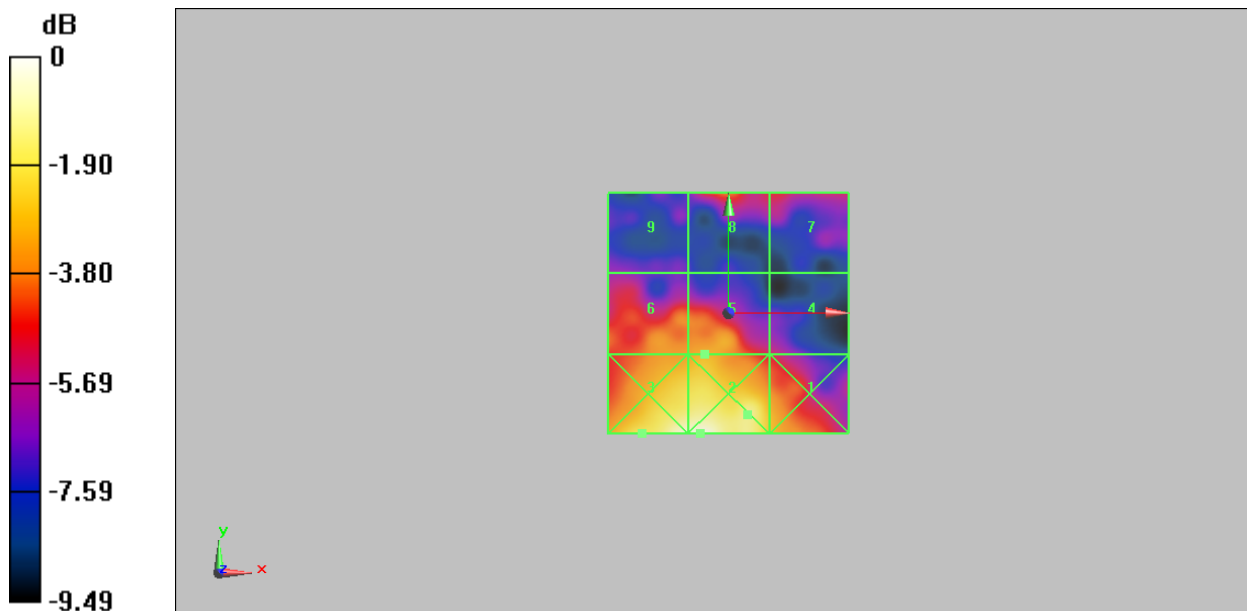


Figure 19 HAC RF E-Field CDMA BC1 Channel 25

**HAC RF E-Field CDMA BC10 High**

Date: 2016-3-30

Communication System: UID 0, HAC CDMA (0); Frequency: 823.1 MHz; Duty Cycle: 1:1

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

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: ER3DV6 - SN2303; ConvF(1, 1, 1); Calibrated: 2014-11-19;

Electronics: DAE4 Sn871; Calibrated: 2015-11-17

Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**N9131 CDMA BC10 HAC RF E-Field 2011 Device E-Field measurement (E-field scan for ANSI C63.19-2007 & -2011 compliance)/E Scan - ER3D: 15 mm from Probe Center to the Device High/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 = 39.03 V/m; Power Drift = -0.03 dB

Applied MIF = 3.26 dB

Maximum value of Total (interpolated) = 46.15 V/m

**N9131 CDMA BC10 HAC RF E-Field 2011 Device E-Field measurement (E-field scan for ANSI C63.19-2007 & -2011 compliance)/E Scan - ER3D: 15 mm from Probe Center to the Device High/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 = 39.03 V/m; Power Drift = -0.03 dB

Applied MIF = 3.26 dB

RF audio interference level = 32.96 dBV/m

**Emission category: M4**

MIF scaled E-field

|                          |                          |                          |
|--------------------------|--------------------------|--------------------------|
| Grid 1 M4<br>31.84 dBV/m | Grid 2 M4<br>33.28 dBV/m | Grid 3 M4<br>32.7 dBV/m  |
| Grid 4 M4<br>31.54 dBV/m | Grid 5 M4<br>32.96 dBV/m | Grid 6 M4<br>32.49 dBV/m |
| Grid 7 M4<br>31.23 dBV/m | Grid 8 M4<br>32.16 dBV/m | Grid 9 M4<br>32.3 dBV/m  |

| Category | Limits for E-Field Emissions < 960MHz | Limits for E-Field Emissions > 960MHz |
|----------|---------------------------------------|---------------------------------------|
| M1       | 50 dBV/m - 55 dB V/m                  | 40 dBV/m - 45 dB V/m                  |
| M2       | 45 dBV/m - 50 dB V/m                  | 35 dBV/m - 40 dB V/m                  |
| M3       | 40 dBV/m - 45 dB V/m                  | 30 dBV/m - 35 dB V/m                  |
| M4       | <40 dBV/m                             | <30 dBV/m                             |

### Cursor:

Total = 33.28 dBV/m

E Category: M4

Location: -0.5, -25, 8.7 mm

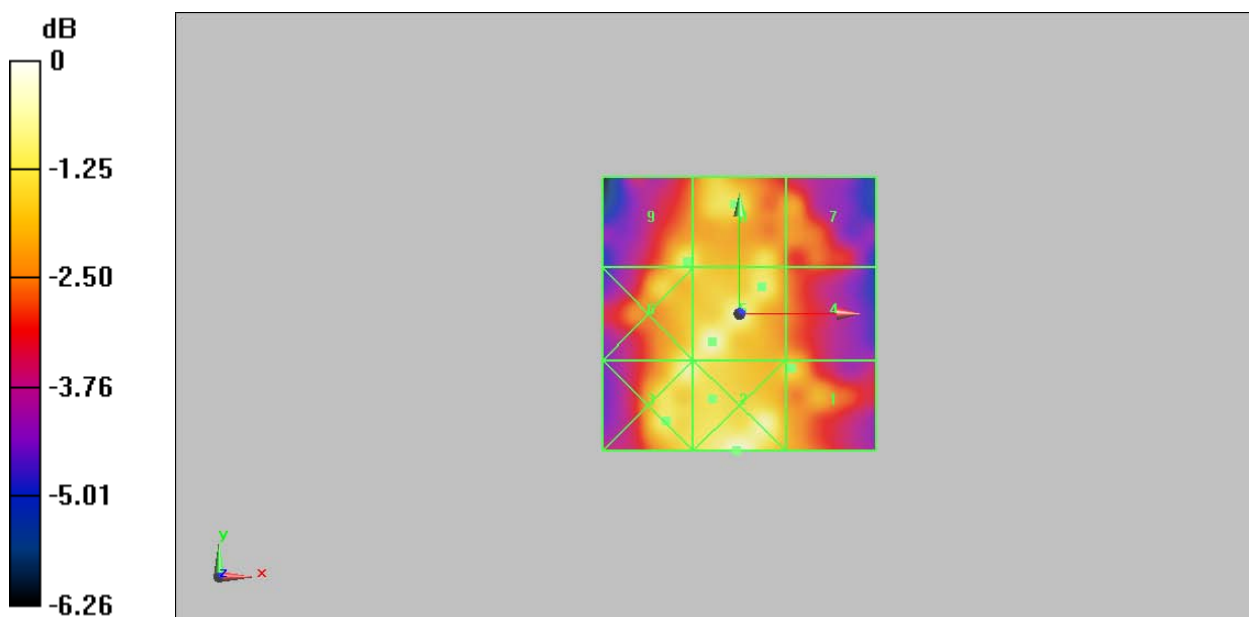


Figure 20 HAC RF E-Field CDMA BC10 Channel 684

**HAC RF E-Field CDMA BC10 Middle**

Date: 2016-3-30

Communication System: UID 0, HAC CDMA (0); Frequency: 820.5 MHz; Duty Cycle: 1:1

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

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: ER3DV6 - SN2303; ConvF(1, 1, 1); Calibrated: 2014-11-19;

Electronics: DAE4 Sn871; Calibrated: 2015-11-17

Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**N9131 CDMA BC10 HAC RF E-Field 2011 Device E-Field measurement (E-field scan for ANSI C63.19-2007 & -2011 compliance)/E Scan - ER3D: 15 mm from Probe Center to the Device Middle/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 = 37.97 V/m; Power Drift = -0.105 dB

Applied MIF = 3.26 dB

RF audio interference level = 33.15 dBV/m

**Emission category: M4**

MIF scaled E-field

|             |             |             |
|-------------|-------------|-------------|
| Grid 1 M4   | Grid 2 M4   | Grid 3 M4   |
| 31.87 dBV/m | 33.22 dBV/m | 32.65 dBV/m |
| Grid 4 M4   | Grid 5 M4   | Grid 6 M4   |
| 31.73 dBV/m | 33.15 dBV/m | 32.36 dBV/m |
| Grid 7 M4   | Grid 8 M4   | Grid 9 M4   |
| 31.15 dBV/m | 32.43 dBV/m | 32.01 dBV/m |

| Category | Limits for E-Field Emissions < 960MHz | Limits for E-Field Emissions > 960MHz |
|----------|---------------------------------------|---------------------------------------|
| M1       | 50 dBV/m - 55 dB V/m                  | 40 dBV/m - 45 dB V/m                  |
| M2       | 45 dBV/m - 50 dB V/m                  | 35 dBV/m - 40 dB V/m                  |
| M3       | 40 dBV/m - 45 dB V/m                  | 30 dBV/m - 35 dB V/m                  |
| M4       | <40 dBV/m                             | <30 dBV/m                             |

**Cursor:**

Total = 33.22 dBV/m

E Category: M4

Location: -4.5, -25, 8.7 mm

Maximum value of Total (interpolated) = 45.79 V/m

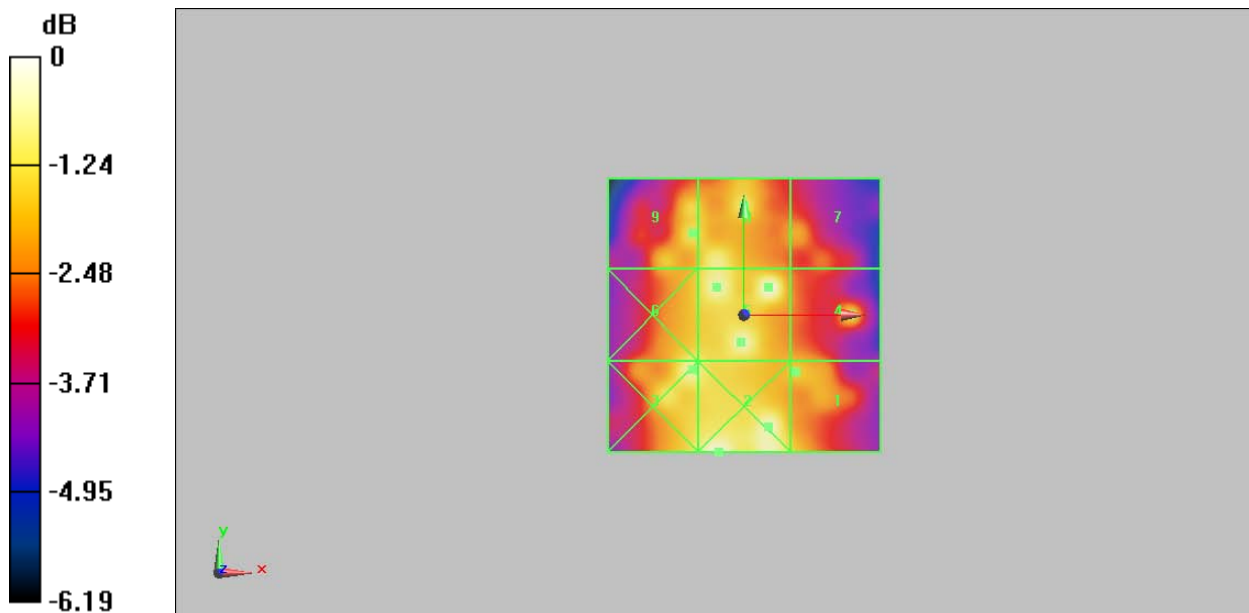


Figure 21 HAC RF E-Field CDMA BC10 Channel 580

**HAC RF E-Field CDMA BC10 Low**

Date: 2016-3-30

Communication System: UID 0, HAC CDMA (0); Frequency: 817.9 MHz; Duty Cycle: 1:1

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

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: ER3DV6 - SN2303; ConvF(1, 1, 1); Calibrated: 2014-11-19;

Electronics: DAE4 Sn871; Calibrated: 2015-11-17

Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**N9131 CDMA BC10 HAC RF E-Field 2011 Device E-Field measurement (E-field scan for ANSI C63.19-2007 & -2011 compliance)/E Scan - ER3D: 15 mm from Probe Center to the Device Low/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 = 38.84 V/m; Power Drift = -0.102 dB

Applied MIF = 3.26 dB

RF audio interference level = 32.65 dBV/m

**Emission category: M4**

MIF scaled E-field

|                          |                          |                          |
|--------------------------|--------------------------|--------------------------|
| Grid 1 M4<br>32.1 dBV/m  | Grid 2 M4<br>33.15 dBV/m | Grid 3 M4<br>33.6 dBV/m  |
| Grid 4 M4<br>31.36 dBV/m | Grid 5 M4<br>32.5 dBV/m  | Grid 6 M4<br>32.52 dBV/m |
| Grid 7 M4<br>31.59 dBV/m | Grid 8 M4<br>32.65 dBV/m | Grid 9 M4<br>32.21 dBV/m |

| Category | Limits for E-Field Emissions < 960MHz | Limits for E-Field Emissions > 960MHz |
|----------|---------------------------------------|---------------------------------------|
| M1       | 50 dBV/m - 55 dB V/m                  | 40 dBV/m - 45 dB V/m                  |
| M2       | 45 dBV/m - 50 dB V/m                  | 35 dBV/m - 40 dB V/m                  |
| M3       | 40 dBV/m - 45 dB V/m                  | 30 dBV/m - 35 dB V/m                  |
| M4       | <40 dBV/m                             | <30 dBV/m                             |

**Cursor:**

Total = 33.60 dBV/m

E Category: M4

Location: -14.5, -20, 8.7 mm

Maximum value of Total (interpolated) = 47.86 V/m

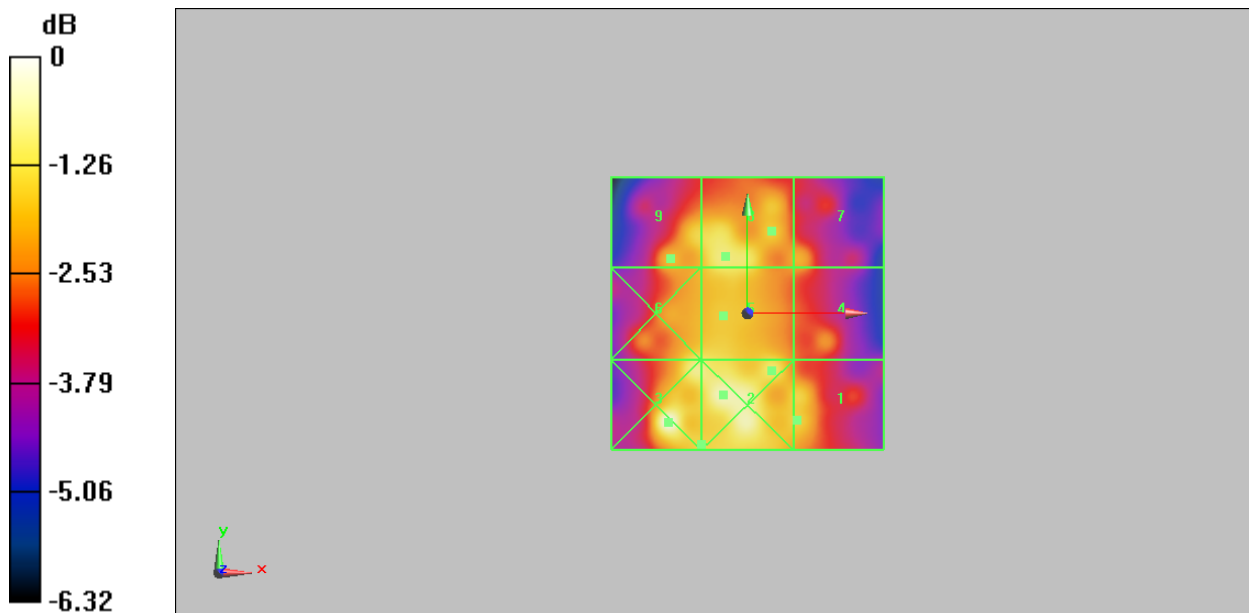


Figure 22 HAC RF E-Field CDMA BC10 Channel 476

# ANNEX C: E-Probe Calibration Certificate

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



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

Accredited by the Swiss Accreditation Service (SAS)  
 The Swiss Accreditation Service is one of the signatories to the EA  
 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **TA-Shanghai (Auden)**

Certificate No: **ER3-2303\_Nov14**

## CALIBRATION CERTIFICATE

Object **ER3DV6 - SN:2303**

Calibration procedure(s) **QA CAL-02.v8, QA CAL-25.v6**  
 Calibration procedure for E-field probes optimized for close near field  
 evaluations in air

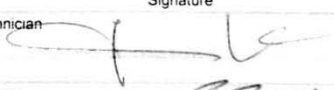
Calibration date **November 19, 2014**

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 E4419B         | GB41293874     | 03-Apr-14 (No. 217-01911)         | Apr-15                |
| Power sensor E4412A        | MY41498087     | 03-Apr-14 (No. 217-01911)         | Apr-15                |
| Reference 3 dB Attenuator  | SN S5054 (3c)  | 03-Apr-14 (No. 217-01915)         | Apr-15                |
| Reference 20 dB Attenuator | SN S5277 (20x) | 03-Apr-14 (No. 217-01919)         | Apr-15                |
| Reference 30 dB Attenuator | SN S5129 (30b) | 03-Apr-14 (No. 217-01920)         | Apr-15                |
| Reference Probe ER3DV6     | SN 2328        | 08-Oct-14 (No. ER3-2328_Oct14)    | Oct-15                |
| DAE4                       | SN 789         | 30-Apr-14 (No. DAE4-789_Apr14)    | Apr-15                |
| Secondary Standards        | ID             | Check Date (in house)             | Scheduled Check       |
| RF generator HP 8648C      | US3642U01700   | 4-Aug-99 (in house check Apr-13)  | In house check Apr-16 |
| Network Analyzer HP 8753E  | US37390585     | 18-Oct-01 (in house check Oct-14) | In house check Oct-15 |

|                                                                                                                | Name           | Function              | Signature                                                                             |
|----------------------------------------------------------------------------------------------------------------|----------------|-----------------------|---------------------------------------------------------------------------------------|
| Calibrated by:                                                                                                 | Jeton Kastrati | Laboratory Technician |   |
| Approved by:                                                                                                   | Katja Pokovic  | Technical Manager     |  |
| This calibration certificate shall not be reproduced except in full without written approval of the laboratory |                |                       |                                                                                       |
| Issued November 21, 2014                                                                                       |                |                       |                                                                                       |

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



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

Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

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                                                                                                           |
| Polarization $\varphi$   | $\varphi$ rotation around probe axis                                                                                                                    |
| Polarization $\vartheta$ | $\vartheta$ rotation around an axis that is in the plane normal to probe axis (at measurement center),<br>i.e., $\vartheta = 0$ is normal to probe axis |
| Connector Angle          | information used in DASY system to align probe sensor X to the robot coordinate system                                                                  |

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

- IEEE Std 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, April 2010.

### 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).



ER3DV6 – SN:2303

November 19, 2014

# Probe ER3DV6

## SN:2303

Manufactured: November 6, 2002  
Calibrated: November 19, 2014

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

ER3DV6- SN:2303

November 19, 2014

## DASY/EASY - Parameters of Probe: ER3DV6 - SN:2303

### Basic Calibration Parameters

|                                              | Sensor X | Sensor Y | Sensor Z | Unc (k=2)    |
|----------------------------------------------|----------|----------|----------|--------------|
| Norm ( $\mu\text{V}/(\text{V}/\text{m})^2$ ) | 1.39     | 1.42     | 1.44     | $\pm 10.1\%$ |
| DCP (mV) <sup>B</sup>                        | 100.8    | 99.6     | 102.6    |              |

### Modulation Calibration Parameters

| UID       | Communication System Name |   | A<br>dB | B<br>dB $\sqrt{\mu\text{V}}$ | C    | D<br>dB | VR<br>mV | Unc <sup>E</sup><br>(k=2) |
|-----------|---------------------------|---|---------|------------------------------|------|---------|----------|---------------------------|
| 0         | CW                        | X | 0.0     | 0.0                          | 1.0  | 0.00    | 182.5    | $\pm 3.0\%$               |
|           |                           | Y | 0.0     | 0.0                          | 1.0  |         | 183.8    |                           |
|           |                           | Z | 0.0     | 0.0                          | 1.0  |         | 225.1    |                           |
| 10021-DAB | GSM-FDD (TDMA, GMSK)      | X | 7.38    | 87.0                         | 24.1 | 9.39    | 130.0    | $\pm 1.7\%$               |
|           |                           | Y | 8.61    | 89.7                         | 25.2 |         | 132.9    |                           |
|           |                           | Z | 4.01    | 75.5                         | 19.0 |         | 148.0    |                           |

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

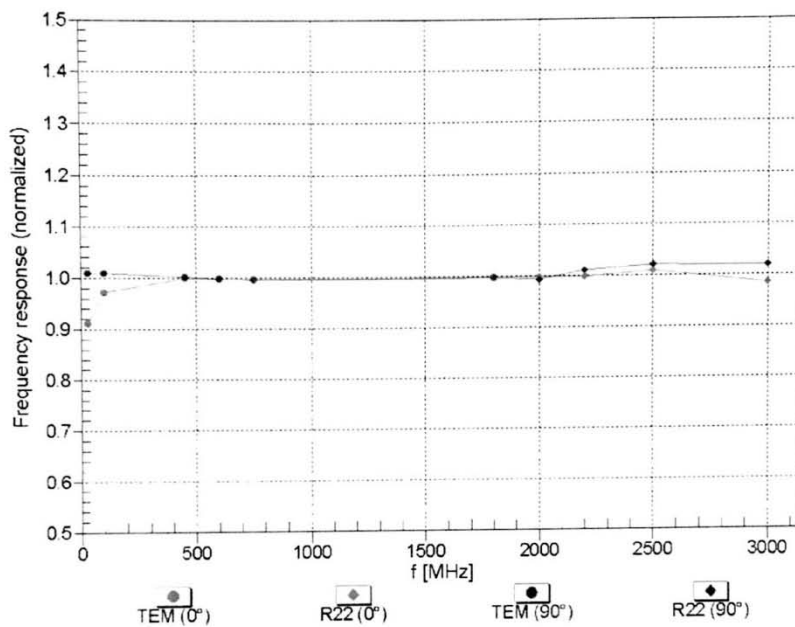
<sup>E</sup> Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value

ER3DV6- SN:2303

November 19, 2014

## Frequency Response of E-Field

(TEM-Cell:ifi110 EXX, Waveguide: R22)

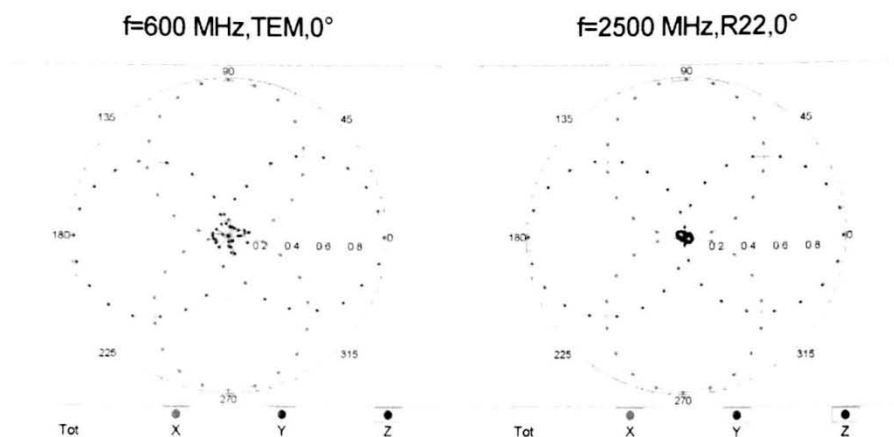


Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  (k=2)

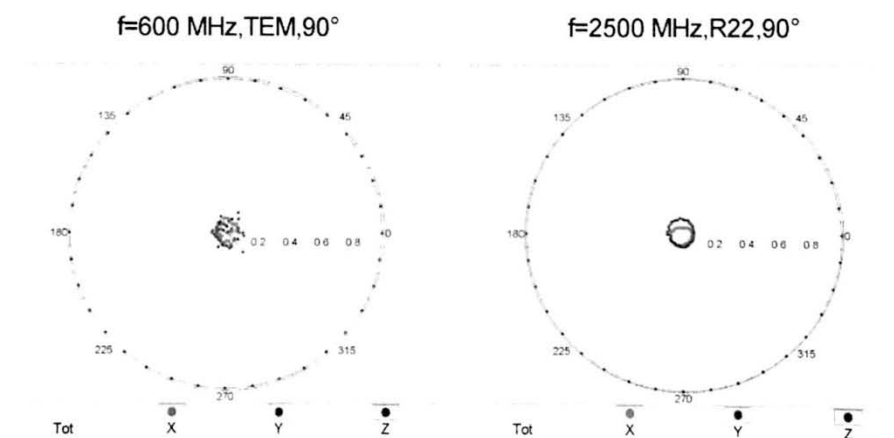
ER3DV6- SN:2303

November 19, 2014

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



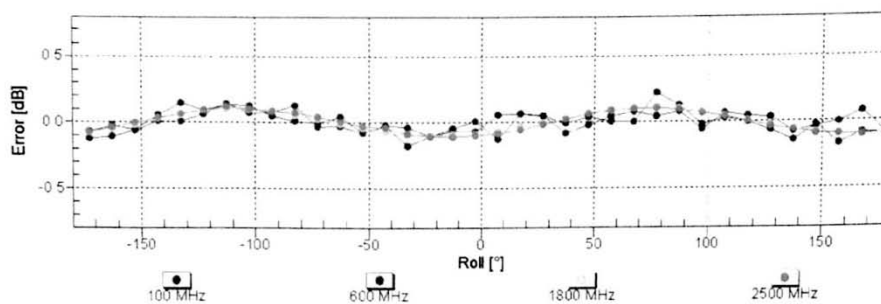
### Receiving Pattern ( $\phi$ ), $\theta = 90^\circ$



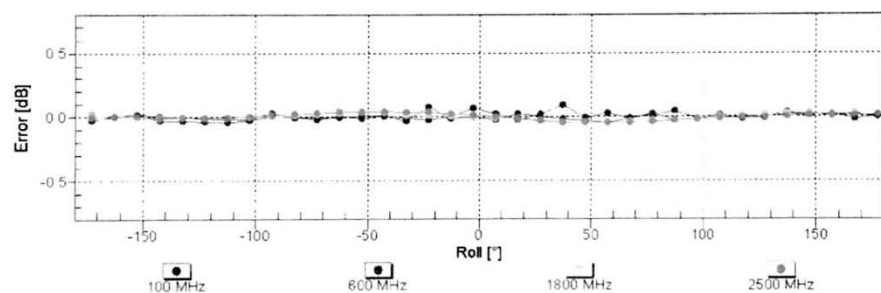
ER3DV6—SN:2303

November 19, 2014

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


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

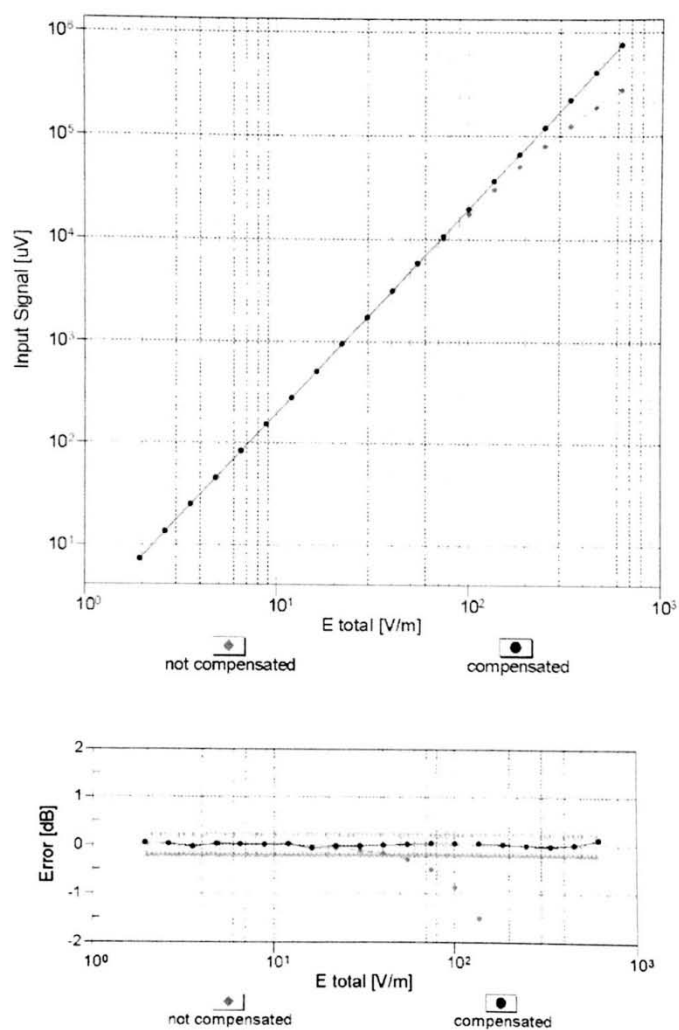
### Receiving Pattern ( $\phi$ ), $\vartheta = 90^\circ$


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

ER3DV6- SN:2303

November 19, 2014

# Dynamic Range f(E-field) (TEM cell , f = 900 MHz)

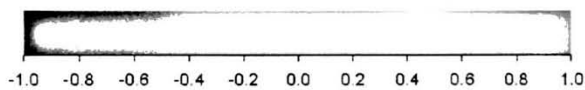
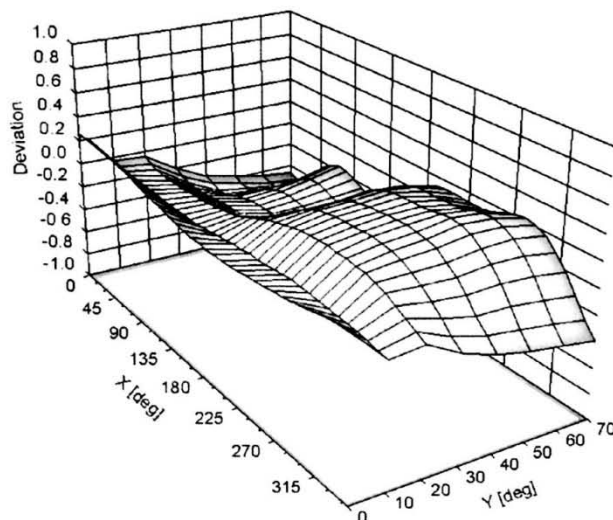


Uncertainty of Linearity Assessment:  $\pm 0.6\%$  ( $k=2$ )

ER3DV6- SN:2303

November 19, 2014

## Deviation from Isotropy in Air

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

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



ER3DV6- SN:2303

November 19, 2014

**DASY/EASY - Parameters of Probe: ER3DV6 - SN:2303****Other Probe Parameters**

|                                         |             |
|-----------------------------------------|-------------|
| Sensor Arrangement                      | Rectangular |
| Connector Angle (°)                     | 27.3        |
| Mechanical Surface Detection Mode       | enabled     |
| Optical Surface Detection Mode          | disabled    |
| Probe Overall Length                    | 337 mm      |
| Probe Body Diameter                     | 10 mm       |
| Tip Length                              | 10 mm       |
| Tip Diameter                            | 8 mm        |
| Probe Tip to Sensor X Calibration Point | 2.5 mm      |
| Probe Tip to Sensor Y Calibration Point | 2.5 mm      |
| Probe Tip to Sensor Z Calibration Point | 2.5 mm      |

# ANNEX D: CD835V3 Dipole Calibration Certificate

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



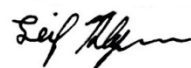
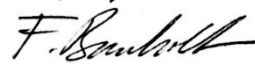
**S** Schweizerischer Kalibrierdienst  
**C** Service suisse d'étalonnage  
**S** Servizio svizzero di taratura  
**S** Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)  
The Swiss Accreditation Service is one of the signatories to the EA  
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **TA-Shanghai (Auden)**

Certificate No: **CD835V3-1133\_Nov14**

| CALIBRATION CERTIFICATE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                          |                                   |                                                                                                    |                   |      |                            |                       |                      |            |                           |        |                       |            |                           |        |                       |            |                           |        |                            |                    |                           |        |              |          |                                |        |             |          |                               |        |      |         |                                |        |                     |      |                       |                 |                           |                |                                   |                        |                        |                |                                   |                        |                       |                |                                   |                        |                           |            |                                   |                        |                         |                |                                   |                        |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|-----------------------------------|----------------------------------------------------------------------------------------------------|-------------------|------|----------------------------|-----------------------|----------------------|------------|---------------------------|--------|-----------------------|------------|---------------------------|--------|-----------------------|------------|---------------------------|--------|----------------------------|--------------------|---------------------------|--------|--------------|----------|--------------------------------|--------|-------------|----------|-------------------------------|--------|------|---------|--------------------------------|--------|---------------------|------|-----------------------|-----------------|---------------------------|----------------|-----------------------------------|------------------------|------------------------|----------------|-----------------------------------|------------------------|-----------------------|----------------|-----------------------------------|------------------------|---------------------------|------------|-----------------------------------|------------------------|-------------------------|----------------|-----------------------------------|------------------------|
| Object                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | CD835V3 - SN: 1133                                       |                                   |                                                                                                    |                   |      |                            |                       |                      |            |                           |        |                       |            |                           |        |                       |            |                           |        |                            |                    |                           |        |              |          |                                |        |             |          |                               |        |      |         |                                |        |                     |      |                       |                 |                           |                |                                   |                        |                        |                |                                   |                        |                       |                |                                   |                        |                           |            |                                   |                        |                         |                |                                   |                        |
| Calibration procedure(s)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | QA CAL-20.v6<br>Calibration procedure for dipoles in air |                                   |                                                                                                    |                   |      |                            |                       |                      |            |                           |        |                       |            |                           |        |                       |            |                           |        |                            |                    |                           |        |              |          |                                |        |             |          |                               |        |      |         |                                |        |                     |      |                       |                 |                           |                |                                   |                        |                        |                |                                   |                        |                       |                |                                   |                        |                           |            |                                   |                        |                         |                |                                   |                        |
| Calibration date:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | November 17, 2014                                        |                                   |                                                                                                    |                   |      |                            |                       |                      |            |                           |        |                       |            |                           |        |                       |            |                           |        |                            |                    |                           |        |              |          |                                |        |             |          |                               |        |      |         |                                |        |                     |      |                       |                 |                           |                |                                   |                        |                        |                |                                   |                        |                       |                |                                   |                        |                           |            |                                   |                        |                         |                |                                   |                        |
| <p>This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).<br/>The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.</p> <p>All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity &lt; 70%.</p> <p>Calibration Equipment used (M&amp;TE critical for calibration)</p> <table border="1"> <thead> <tr> <th>Primary Standards</th> <th>ID #</th> <th>Cal Date (Certificate No.)</th> <th>Scheduled Calibration</th> </tr> </thead> <tbody> <tr> <td>Power meter EPM-442A</td> <td>GB37480704</td> <td>07-Oct-14 (No. 217-02020)</td> <td>Oct-15</td> </tr> <tr> <td>Power sensor HP 8481A</td> <td>US37292783</td> <td>07-Oct-14 (No. 217-02020)</td> <td>Oct-15</td> </tr> <tr> <td>Power sensor HP 8481A</td> <td>MY41092317</td> <td>07-Oct-14 (No. 217-02021)</td> <td>Oct-15</td> </tr> <tr> <td>Reference 10 dB Attenuator</td> <td>SN: 5047.2 / 06327</td> <td>03-Apr-14 (No. 217-01921)</td> <td>Apr-15</td> </tr> <tr> <td>Probe ER3DV6</td> <td>SN: 2336</td> <td>30-Dec-13 (No. ER3-2336_Dec13)</td> <td>Dec-14</td> </tr> <tr> <td>Probe H3DV6</td> <td>SN: 6065</td> <td>30-Dec-13 (No. H3-6065_Dec13)</td> <td>Dec-14</td> </tr> <tr> <td>DAE4</td> <td>SN: 601</td> <td>18-Aug-14 (No. DAE4-601_Aug14)</td> <td>Aug-15</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>Secondary Standards</th> <th>ID #</th> <th>Check Date (in house)</th> <th>Scheduled Check</th> </tr> </thead> <tbody> <tr> <td>Power meter Agilent 4419B</td> <td>SN: GB42420191</td> <td>09-Oct-09 (in house check Sep-14)</td> <td>In house check: Sep-16</td> </tr> <tr> <td>Power sensor HP E4412A</td> <td>SN: US38485102</td> <td>05-Jan-10 (in house check Sep-14)</td> <td>In house check: Sep-16</td> </tr> <tr> <td>Power sensor HP 8482A</td> <td>SN: US37295597</td> <td>09-Oct-09 (in house check Sep-14)</td> <td>In house check: Sep-16</td> </tr> <tr> <td>Network Analyzer HP 8753E</td> <td>US37390585</td> <td>18-Oct-01 (in house check Oct-14)</td> <td>In house check: Oct-15</td> </tr> <tr> <td>RF generator R&amp;S SMT-06</td> <td>SN: 832283/011</td> <td>27-Aug-12 (in house check Oct-13)</td> <td>In house check: Oct-16</td> </tr> </tbody> </table> |                                                          |                                   |                                                                                                    | Primary Standards | ID # | Cal Date (Certificate No.) | Scheduled Calibration | Power meter EPM-442A | GB37480704 | 07-Oct-14 (No. 217-02020) | Oct-15 | Power sensor HP 8481A | US37292783 | 07-Oct-14 (No. 217-02020) | Oct-15 | Power sensor HP 8481A | MY41092317 | 07-Oct-14 (No. 217-02021) | Oct-15 | Reference 10 dB Attenuator | SN: 5047.2 / 06327 | 03-Apr-14 (No. 217-01921) | Apr-15 | Probe ER3DV6 | SN: 2336 | 30-Dec-13 (No. ER3-2336_Dec13) | Dec-14 | Probe H3DV6 | SN: 6065 | 30-Dec-13 (No. H3-6065_Dec13) | Dec-14 | DAE4 | SN: 601 | 18-Aug-14 (No. DAE4-601_Aug14) | Aug-15 | Secondary Standards | ID # | Check Date (in house) | Scheduled Check | Power meter Agilent 4419B | SN: GB42420191 | 09-Oct-09 (in house check Sep-14) | In house check: Sep-16 | Power sensor HP E4412A | SN: US38485102 | 05-Jan-10 (in house check Sep-14) | In house check: Sep-16 | Power sensor HP 8482A | SN: US37295597 | 09-Oct-09 (in house check Sep-14) | In house check: Sep-16 | Network Analyzer HP 8753E | US37390585 | 18-Oct-01 (in house check Oct-14) | In house check: Oct-15 | RF generator R&S SMT-06 | SN: 832283/011 | 27-Aug-12 (in house check Oct-13) | In house check: Oct-16 |
| Primary Standards                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | ID #                                                     | Cal Date (Certificate No.)        | Scheduled Calibration                                                                              |                   |      |                            |                       |                      |            |                           |        |                       |            |                           |        |                       |            |                           |        |                            |                    |                           |        |              |          |                                |        |             |          |                               |        |      |         |                                |        |                     |      |                       |                 |                           |                |                                   |                        |                        |                |                                   |                        |                       |                |                                   |                        |                           |            |                                   |                        |                         |                |                                   |                        |
| Power meter EPM-442A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | GB37480704                                               | 07-Oct-14 (No. 217-02020)         | Oct-15                                                                                             |                   |      |                            |                       |                      |            |                           |        |                       |            |                           |        |                       |            |                           |        |                            |                    |                           |        |              |          |                                |        |             |          |                               |        |      |         |                                |        |                     |      |                       |                 |                           |                |                                   |                        |                        |                |                                   |                        |                       |                |                                   |                        |                           |            |                                   |                        |                         |                |                                   |                        |
| Power sensor HP 8481A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | US37292783                                               | 07-Oct-14 (No. 217-02020)         | Oct-15                                                                                             |                   |      |                            |                       |                      |            |                           |        |                       |            |                           |        |                       |            |                           |        |                            |                    |                           |        |              |          |                                |        |             |          |                               |        |      |         |                                |        |                     |      |                       |                 |                           |                |                                   |                        |                        |                |                                   |                        |                       |                |                                   |                        |                           |            |                                   |                        |                         |                |                                   |                        |
| Power sensor HP 8481A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | MY41092317                                               | 07-Oct-14 (No. 217-02021)         | Oct-15                                                                                             |                   |      |                            |                       |                      |            |                           |        |                       |            |                           |        |                       |            |                           |        |                            |                    |                           |        |              |          |                                |        |             |          |                               |        |      |         |                                |        |                     |      |                       |                 |                           |                |                                   |                        |                        |                |                                   |                        |                       |                |                                   |                        |                           |            |                                   |                        |                         |                |                                   |                        |
| Reference 10 dB Attenuator                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | SN: 5047.2 / 06327                                       | 03-Apr-14 (No. 217-01921)         | Apr-15                                                                                             |                   |      |                            |                       |                      |            |                           |        |                       |            |                           |        |                       |            |                           |        |                            |                    |                           |        |              |          |                                |        |             |          |                               |        |      |         |                                |        |                     |      |                       |                 |                           |                |                                   |                        |                        |                |                                   |                        |                       |                |                                   |                        |                           |            |                                   |                        |                         |                |                                   |                        |
| Probe ER3DV6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | SN: 2336                                                 | 30-Dec-13 (No. ER3-2336_Dec13)    | Dec-14                                                                                             |                   |      |                            |                       |                      |            |                           |        |                       |            |                           |        |                       |            |                           |        |                            |                    |                           |        |              |          |                                |        |             |          |                               |        |      |         |                                |        |                     |      |                       |                 |                           |                |                                   |                        |                        |                |                                   |                        |                       |                |                                   |                        |                           |            |                                   |                        |                         |                |                                   |                        |
| Probe H3DV6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | SN: 6065                                                 | 30-Dec-13 (No. H3-6065_Dec13)     | Dec-14                                                                                             |                   |      |                            |                       |                      |            |                           |        |                       |            |                           |        |                       |            |                           |        |                            |                    |                           |        |              |          |                                |        |             |          |                               |        |      |         |                                |        |                     |      |                       |                 |                           |                |                                   |                        |                        |                |                                   |                        |                       |                |                                   |                        |                           |            |                                   |                        |                         |                |                                   |                        |
| DAE4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | SN: 601                                                  | 18-Aug-14 (No. DAE4-601_Aug14)    | Aug-15                                                                                             |                   |      |                            |                       |                      |            |                           |        |                       |            |                           |        |                       |            |                           |        |                            |                    |                           |        |              |          |                                |        |             |          |                               |        |      |         |                                |        |                     |      |                       |                 |                           |                |                                   |                        |                        |                |                                   |                        |                       |                |                                   |                        |                           |            |                                   |                        |                         |                |                                   |                        |
| Secondary Standards                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | ID #                                                     | Check Date (in house)             | Scheduled Check                                                                                    |                   |      |                            |                       |                      |            |                           |        |                       |            |                           |        |                       |            |                           |        |                            |                    |                           |        |              |          |                                |        |             |          |                               |        |      |         |                                |        |                     |      |                       |                 |                           |                |                                   |                        |                        |                |                                   |                        |                       |                |                                   |                        |                           |            |                                   |                        |                         |                |                                   |                        |
| Power meter Agilent 4419B                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | SN: GB42420191                                           | 09-Oct-09 (in house check Sep-14) | In house check: Sep-16                                                                             |                   |      |                            |                       |                      |            |                           |        |                       |            |                           |        |                       |            |                           |        |                            |                    |                           |        |              |          |                                |        |             |          |                               |        |      |         |                                |        |                     |      |                       |                 |                           |                |                                   |                        |                        |                |                                   |                        |                       |                |                                   |                        |                           |            |                                   |                        |                         |                |                                   |                        |
| Power sensor HP E4412A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | SN: US38485102                                           | 05-Jan-10 (in house check Sep-14) | In house check: Sep-16                                                                             |                   |      |                            |                       |                      |            |                           |        |                       |            |                           |        |                       |            |                           |        |                            |                    |                           |        |              |          |                                |        |             |          |                               |        |      |         |                                |        |                     |      |                       |                 |                           |                |                                   |                        |                        |                |                                   |                        |                       |                |                                   |                        |                           |            |                                   |                        |                         |                |                                   |                        |
| Power sensor HP 8482A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | SN: US37295597                                           | 09-Oct-09 (in house check Sep-14) | In house check: Sep-16                                                                             |                   |      |                            |                       |                      |            |                           |        |                       |            |                           |        |                       |            |                           |        |                            |                    |                           |        |              |          |                                |        |             |          |                               |        |      |         |                                |        |                     |      |                       |                 |                           |                |                                   |                        |                        |                |                                   |                        |                       |                |                                   |                        |                           |            |                                   |                        |                         |                |                                   |                        |
| Network Analyzer HP 8753E                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | US37390585                                               | 18-Oct-01 (in house check Oct-14) | In house check: Oct-15                                                                             |                   |      |                            |                       |                      |            |                           |        |                       |            |                           |        |                       |            |                           |        |                            |                    |                           |        |              |          |                                |        |             |          |                               |        |      |         |                                |        |                     |      |                       |                 |                           |                |                                   |                        |                        |                |                                   |                        |                       |                |                                   |                        |                           |            |                                   |                        |                         |                |                                   |                        |
| RF generator R&S SMT-06                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | SN: 832283/011                                           | 27-Aug-12 (in house check Oct-13) | In house check: Oct-16                                                                             |                   |      |                            |                       |                      |            |                           |        |                       |            |                           |        |                       |            |                           |        |                            |                    |                           |        |              |          |                                |        |             |          |                               |        |      |         |                                |        |                     |      |                       |                 |                           |                |                                   |                        |                        |                |                                   |                        |                       |                |                                   |                        |                           |            |                                   |                        |                         |                |                                   |                        |
| Calibrated by:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Name<br>Leif Klynsner                                    | Function<br>Laboratory Technician | Signature<br> |                   |      |                            |                       |                      |            |                           |        |                       |            |                           |        |                       |            |                           |        |                            |                    |                           |        |              |          |                                |        |             |          |                               |        |      |         |                                |        |                     |      |                       |                 |                           |                |                                   |                        |                        |                |                                   |                        |                       |                |                                   |                        |                           |            |                                   |                        |                         |                |                                   |                        |
| Approved by:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Fin Bomholt                                              | Deputy Technical Manager          |               |                   |      |                            |                       |                      |            |                           |        |                       |            |                           |        |                       |            |                           |        |                            |                    |                           |        |              |          |                                |        |             |          |                               |        |      |         |                                |        |                     |      |                       |                 |                           |                |                                   |                        |                        |                |                                   |                        |                       |                |                                   |                        |                           |            |                                   |                        |                         |                |                                   |                        |
| <p>Issued: November 19, 2014</p> <p>This calibration certificate shall not be reproduced except in full without written approval of the laboratory.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                          |                                   |                                                                                                    |                   |      |                            |                       |                      |            |                           |        |                       |            |                           |        |                       |            |                           |        |                            |                    |                           |        |              |          |                                |        |             |          |                               |        |      |         |                                |        |                     |      |                       |                 |                           |                |                                   |                        |                        |                |                                   |                        |                       |                |                                   |                        |                           |            |                                   |                        |                         |                |                                   |                        |

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