

# Hearing Aid Compatibility(HAC)

## TEST REPORT

### <RF-Emission>

Applicant Name	Nokia Inc.
Address of Applicant	12278 Scripps Summit Dr., San Diego, CA92131, USA
EUT Type	CDMA2000 1xRTT Mobile Phone
Model Number	RH-120
Date of receive	2008.09.19
Date of Test(s)	2008.09.24;2008.10.06
Date of Issue	2008.10.06

Standards:

**ANSI C63.19-2007**

**FCC RULE PART(S): 47 CFR PART 20.19(B)**

**HAC RATE CATEGORY: M3 (M Category)**

In the configuration tested, the EUT complied with the standards specified above.

#### Remarks:

This report details the results of the testing carried out on one sample, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

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Tested by :

Ricky Huang

Asst. Supervisor

Approved by:

Robert Chang

Tech. Manager

Date: 2008/10/06

Date: 2008/10/06

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## 1. Introduction

The purpose of the Hearing Aid Compatibility extension is to enable measurements of the near electric and magnetic fields generated by wireless communication devices in the region controlled for use by a hearing aid in accordance with ANSI-C63.19-2007

FCC has granted a request for waiver of the HAC rules in section 20.19 for dual band GSM handsets. The waiver has specific conditions, as stated in the order (FCC 05-166) and expires 1 August 2006.

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

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

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

Hence, the following are measurements made for the WD:

- a) RF E-Field emissions
- b) RF H-Field emissions

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The measurement plane is parallel to, and 1.0cm in front of, the reference plane.



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

## 2. Testing Laboratory

Company Name	SGS Taiwan Ltd. Electronics & Communication Laboratory
Company address	134, Wu Kung Road, Wuku Industrial Zone Taipei, Taiwan, R.O.C.
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Fax	+886-2-2298-0488
Website	<a href="http://www.tw.sgs.com/">http://www.tw.sgs.com/</a>

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## Revision history of Report

Version Number	Description	Date
1.0	Original copy	2008.09.30
1.1	Retest AWS band channel 425	2008.10.06

### 3. Details of Applicant/Manufacturer

#### 3.1 Details of Applicant

Applicant Name	Nokia Inc.
Applicant Address	12278 Scripps Summit Dr. San Diego, CA92131, USA

#### 3.2 Details of Manufacturer

Manufacturer Name	Compal Communications(Nanjing)Co., Ltd
Manufacturer Address	Nanjing Jiangning Export Processing Zone (South Area) No.68-2 Suyuan Street

### 4. Description of EUT

EUT Type	CDMA2000 1xRTT Mobile Phone
Mode(s) of Operation	cdma2000 Tri band
FCC ID	QMNRH-120
Hardware Version	3000
Software Version	GB_1700T_GEN
TX Frequency range	CDMA2000 Cellular :824~849 MHz CDMA2000 AWS :1710~1755 MHz CDMA2000 US PCS :1850~1910 MHz

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RX Frequency range	CDMA2000 Cellular :869~894 MHz CDMA2000 AWS :2110~2155 MHz CDMA2000 US PCS :1930~1990 MHz		
Channel Number (ARFCN)	1013-777	25-875	25-1175
Maximum Output Power Setting (dBm)	Cellular	AWS	US PCS
	24.18	23.97	24.00
Duty Cycle	1		
Radio configuration	RC3 SO32 ( +F –SCH)		
MEID	A0000001591F903		

## 5. Test Environment

Ambient Temperature	22.2° C
Relative Humidity	<60 %

## 6. System Specifications of DASY4

### 6.1 Measurement system Diagram for SPEAG Robotic

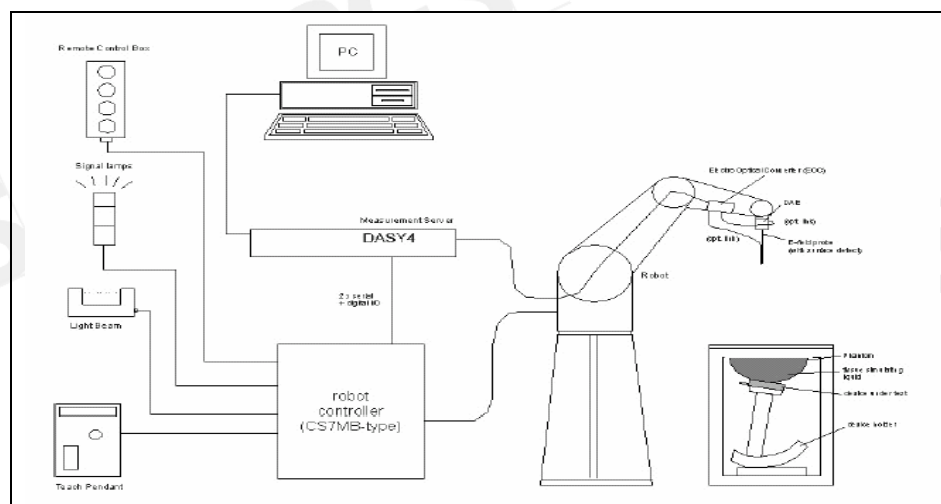


Fig 1. The SPEAG Robotic Diagram

The DASY4 system for performing compliance tests consists of the following items:

- A standard high precision 6-axis robot (Staubli RX family) with controller, teach pendant

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and software. An arm extension is for accommodating the data acquisition electronics (DAE).

- E and H Field probe.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion between optical and electrical of the signals for the digital communication to the DAE and for the analog signal from the optical surface detection. The EOC is connected to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- A computer operating Windows 2000 or Windows XP.
- DASY4 software.
- Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The Test Arch phantom.
- The device holder for handheld mobile phones.
- Validation dipole kits allowing to validate the proper functioning of the system.


## 6.2 E and H Field Probe

Construction	One dipole parallel, two dipoles normal to probe axis Built-in shielding against static charges PEEK enclosure material	
Calibration	In air from 100 MHz to 3.0 GHz (absolute accuracy $\pm 6.0\%$ , $k=2$ )	
Frequency	100 MHz to > 6 GHz (extended to 20 MHz for MRI), Linearity: $\pm 0.2$ dB (100 MHz to 3 GHz)	
Directivity	$\pm 0.2$ dB in air (rotation around probe axis) $\pm 0.4$ 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) Tip diameter: 8 mm (Body: 12 mm) Distance from probe tip to dipole centers: 2.5 mm	


ER3DV6 E-Field Probe

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Application	General near-field measurements up to 6 GHz Field component measurements Fast automatic scanning in phantoms	
Construction	Three concentric loop sensors with 3.8 mm loop diameters Resistively loaded detector diodes for linear response Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., glycolether)	 H3DV6 H-Field Probe
Frequency	200 MHz to 3 GHz (absolute accuracy $\pm 6.0\%$ , $k=2$ ); Output linearized	
Directivity	$\pm 0.2$ dB (spherical isotropy error)	
Dynamic Range	10 mA/m to 2 A/m at 1 GHz	
E-Field Interference	< 10% at 3 GHz (for plane wave)	
Dimensions	Overall length: 330 mm (Tip: 40 mm) Tip diameter: 6 mm (Body: 12 mm) Distance from probe tip to dipole centers: 3 mm	
Application	General magnetic near-field measurements up to 3 GHz (in air or liquids) Field component measurements Surface current measurements Low interaction with the measured field	

## 6.3 Test Arch


Description	Enables easy and well defined positioning of the phone and validation dipoles as well as simple teaching of the robot.	 Test Arch
Dimensions	length: 370 mm width: 370 mm height: 370 mm	

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## 6.4 Phone Holder

Description	Supports accurate and reliable positioning of any phone Effect on near field <+/- 0.5 dB	
		Phone Holder

## 7. Measurement Procedure

The following illustrate a typical RF emissions test scan over a wireless communications device:

1. Proper operation of the field probe, probe measurement system, other instrumentation, and the positioning system was confirmed.
2. WD is positioned in its intended test position, acoustic output point of the device perpendicular to the field probe.
3. the WD operation for maximum rated RF output power was configured and confirmed with the base station simulator, at the test channel and other normal operating parameters as intended for the test. The battery was ensured to be fully charged before each test.
4. the center sub-grid was centered over the center of the acoustic output (also audio band magnetic output, if applicable). The WD audio output was positioned tangent (as physically possible) to the measurement plane.
5. A surface calibration was performed before each setup change to ensure repeatable spacing and proper maintenance of the measurement plane using the HAC Phantom.
6. The measurement system measured the field strength at the reference location.
7. Measurements at 2mm increments in the 5 × 5 cm region were performed and recorded. A 360° rotation about the azimuth axis at the maximum interpolated position was measured. For the worst-case condition, the peak reading from this rotation was used in re-evaluating the HAC category.
8. The system performed a drift evaluation by measuring the field at the reference location.

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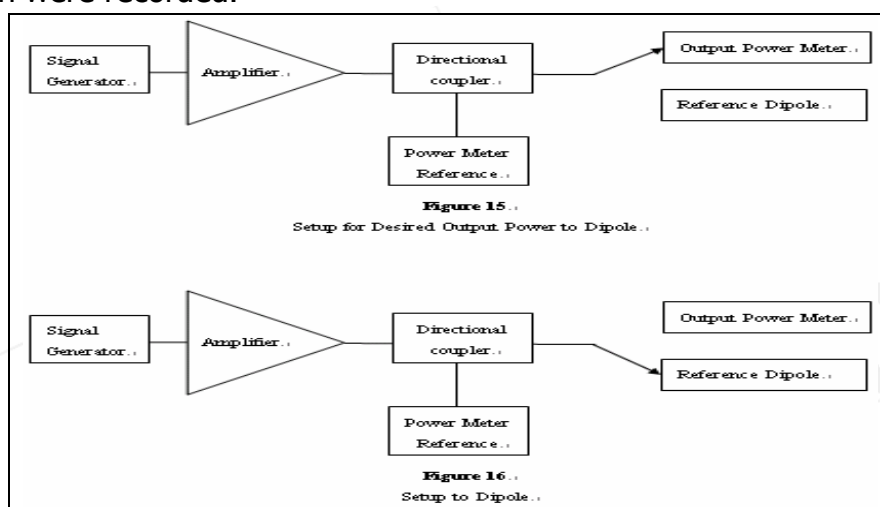
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9. Steps 1-8 were done for both the E and H-Field measurements.

## 8. System Verification

A dipole antenna meeting the requirements given in C63.19 was placed in the position normally occupied by the WD.

The length of the dipole was scanned with both E-field and H-field probes and the maximum values for each were recorded.



For E-Field Scan

Mode	Frequency (MHz)	Input Power(dBm)	Measured Value(V/m)	Target Value(V/m)	Measured Date
CW	835	20	171.9	165.2	2008/09/24
Mode	Frequency (MHz)	Input Power(dBm)	Measured Value(V/m)	Target Value(V/m)	Measured Date
CW	1880	20	135.7	141.4	2008/09/24
Mode	Frequency (MHz)	Input Power(dBm)	Measured Value(V/m)	Target Value(V/m)	Measured Date
CW	1880	20	135.6	141.4	2008/10/6

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### For H-Field Scan

Mode	Frequency	Input Power	Measured Value(V/m)	Target Value(V/m)	Measured Date
CW	835	20	0.472	0.457	2008/09/24
Mode	Frequency	Input Power	Measured Value(V/m)	Target Value(V/m)	Measured Date
CW	1880	20	0.470	0.464	2008/09/24
Mode	Frequency	Input Power	Measured Value(V/m)	Target Value(V/m)	Measured Date
CW	1880	20	0.481	0.464	2008/10/6

## 9. Probe Modulation Factor

The measurement setup for determination of the PMF is given in DASY4 manual section 28.2. The following points describe the installation, the measurement procedure and the evaluation.

1. Install the field probe in the DASY4 window setup.
2. Mount a validation dipole for the appropriate frequency band under the Test Arch. Move the probe manually to a point of high field strength for the specific field type. The probe may be very close to the dipole and might even touch it. During the fine adjustment of the probe with a signal applied to the dipole, read the x, y and z channel amplitudes in a multimeter job. They should all show a similar amplitude.
3. For comparing the peak amplitudes of modulated and CW signal, the same spectrum analyzer settings are required. The signal path (and setup geometry) between spectrum analyzer and probe must not be changed during the evaluation of the PMF! Only signal type and amplitudes as well as DASY4 settings may be varied.

Spectrum analyzer settings:

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- Center Frequency: nominal center frequency of channel
  - Span: zero
  - Resolution bandwidth  $\geq$  emission bandwidth
  - Video bandwidth = 20dB
  - Detection: RMS detection
  - Trigger: Video or IF trigger, adjusted to give a stable display of the transmission
  - Sweep rate: Set to show a complete transmission cycle
  - Line max hold may be used temporarily to ease the peak reading.
4. Define a DASY4 document and set the procedure properties (frequency as above, modulation frequency and crest factor for the modulated signal) according to the measured signal. Define a multimeter job (continuous mode) for the field reading. The probe shall not move. A predefined document is available.
5. Define a DASY4 document with a procedure for the evaluation of the CW signal (frequency, modulation frequency = 0, crest factor = 1) with a multimeter job.
- The HAC measurement procedure is as follows:
6. Prepare the evaluation sheet for the installed field probe, frequency and modulation type.
7. Modulated signal measurement: Connect the modulated signal using the appropriate frequency via the cable to the setup. Do not move the setup between the following measurements.
8. Run the multimeter job in the procedure with the corresponding modulation setting in continuous mode.
9. Adjust the signal amplitude to achieve the the desired field level display in the multimeter. (A number of levels over the full dynamic range of the probe in the desired range shall be set, including the values read during the WD scans.)
10. Read the total field for the modulated signal.
11. Read the peak envelope signal on the spectrum analyzer.
12. Repeat these readings for other amplitude settings.
13. Switch the signal source off and verify that the ambient and instrumentation noise level is at least 10dB lower (a factor of 3 in field).
14. CW measurement: Change the signal to CW at the same center frequency, without touching or moving dipole or probe in the setup.
15. Adjust the CW signal amplitude to a similar range of peak levels on the spectrum analyzer.

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16. Run the multimeter in the CW procedure in continuous mode.
17. Read the multimeter total field display.
18. Read the signal on the spectrum analyzer.
19. Repeat these readings for other amplitude settings.
20. Select the correct type of predefined Excel calculation sheet and insert the readings into the appropriate measurement columns. Conversion from linear DASY readings to logarithmic will be automatically made. The diagrams contain fitting curves for the logarithmic quantities. CW and E-field values will be fitted by linear trendlines, H-field values by quadratic.

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## 10. Test Standards and Limits

The measurements were performed to ensure compliance to the ANSI C63.19-2007 standard,

Category	AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
M1	0	199.5 - 354.8	0.6 - 1.07
M2	0	112.2 - 199.5	0.34 - 0.6
M3	0	63.1 - 112.2	0.19 - 0.34
M4	0	<63.1	<0.19
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
M2	0	354.8 - 631	1.07 - 1.91
M3	0	199.5 - 354.8	0.6 - 1.07
M4	0	<199.5	<0.6

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## 11. Instruments List

Manufacturer	Device	Type	Serial number	Date of last calibration
Schmid & Partner Engineering AG	E-Field and H-Field Probe	ER3DV6 H3DV6	2306 6142	Apr.17.2008 Apr.21.2008
Schmid & Partner Engineering AG	835&1880 MHz System Validation Dipole In Air	CD835V3 CD1880V3	1052 1044	Apr.10.2008 Apr.10.2008
Schmid & Partner Engineering AG	Data acquisition Electronics	DAE4	547	Jan.24.2008
Schmid & Partner Engineering AG	Software	DASY 4 V4.7 Build 71	N/A	Calibration isn't necessary
Agilent	Dielectric Probe Kit	85070D	US01440168	Calibration isn't necessary
Agilent	Dual-directional coupler	778D	50313	Aug.26.2008
Agilent	RF Signal Generator	8648D	3847M00432	May.21.2008
Agilent	Power Sensor	8481H	MY41091361	May.20.2008
R&S	Radio Communication Test	CMU200	113508	Sep.03.2008
Schmid & Partner Engineering AG	Test Arch SD HAC	P01	1047	N/A
Agilent	Spectrum Analyzer	E4405B	MY45113250	Jun.03.2008

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## 12. Summary of Results

### E-Field

E-Field Emission	Band	Channel	Modulation Factor	Conducted Power at BS (dBm)	Measured Drift(%)	Time Avg. Field (V/m)	RESULT	Excl Blocks per 4.3.1.2.2
CDMA	Cellular	1013	0.991	24.13	0.023	112.6	M4	478
		384	0.991	24.17	-0.028	108.6	M4	478
		777	0.991	24.18	0.078	100.8	M4	478
E-Field Emission	Band	Channel	Modulation Factor	Conducted Power at BS (dBm)	Measured Drift(%)	Time Avg. Field (V/m)	RESULT	Excl Blocks per 4.3.1.2.2
CDMA	AWS	25	0.986	23.94	-0.080	70.3	M3	236
		425	0.986	23.97	0.036	73.8	M3	236
		875	0.986	23.91	0.078	76.4	M3	236
E-Field Emission	Band	Channel	Modulation Factor	Conducted Power at BS (dBm)	Measured Drift(%)	Time Avg. Field (V/m)	RESULT	Excl Blocks per 4.3.1.2.2
CDMA	US PCS	25	0.986	23.88	0.077	62.8	M4	689
		600	0.986	23.87	-0.084	64.1	M3	689
		1175	0.986	24.00	-0.146	59.7	M4	689

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## H-Filed

H-Field Emission	Band	Channel	Modulation Factor	Conducted Power at BS (dBm)	Measured Drift(%)	Time Avg. Field (A/m)	RESULT	Excl Blocks per 4.3.1.2.2
CDMA	Cellular	1013	0.987	24.13	0.065	0.132	M4	147
		384	0.987	24.17	0.114	0.121	M4	147
		777	0.987	24.18	0.108	0.117	M4	147
H-Field Emission	Band	Channel	Modulation Factor	Conducted Power at BS (dBm)	Measured Drift(%)	Time Avg. Field (A/m)	RESULT	Excl Blocks per 4.3.1.2.2
CDMA	AWS	25	0.975	23.94	0.000	0.159	M4	147
		425	0.975	23.97	0.052	0.164	M4	147
		875	0.975	23.91	0.066	0.167	M4	147
H-Field Emission	Band	Channel	Modulation Factor	Conducted Power at BS (dBm)	Measured Drift(%)	Time Avg. Field (A/m)	RESULT	Excl Blocks per 4.3.1.2.2
CDMA	US PCS	25	0.975	23.88	0.060	0.157	M4	147
		600	0.975	23.87	0.031	0.163	M4	147
		1175	0.975	24.00	0.040	0.152	M4	147

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### 13. Measurement Data

Date/Time: 2008/9/24 07:20:33

#### HAC\_E\_Cellular\_CH1013

DUT: RH-120;

Communication System: CDMA\_850; Frequency: 824.7 MHz; Duty Cycle: 1:1

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

Phantom section: E Device Section

DASY4 Configuration:

- Probe: ER3DV6 - SN2306; ConvF(1, 1, 1); Calibrated: 2008/4/17
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2008/1/24
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

**E Scan - ER3DV6 - measurement distance from the closest probe sensor part to the Device = 10mm/Hearing Aid Compatibility Test (101x101x1):**

Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 112.6 V/m

Probe Modulation Factor = 0.991

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 130.3 V/m; Power Drift = 0.023 dB

Test Arch Compensation is Applied.

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

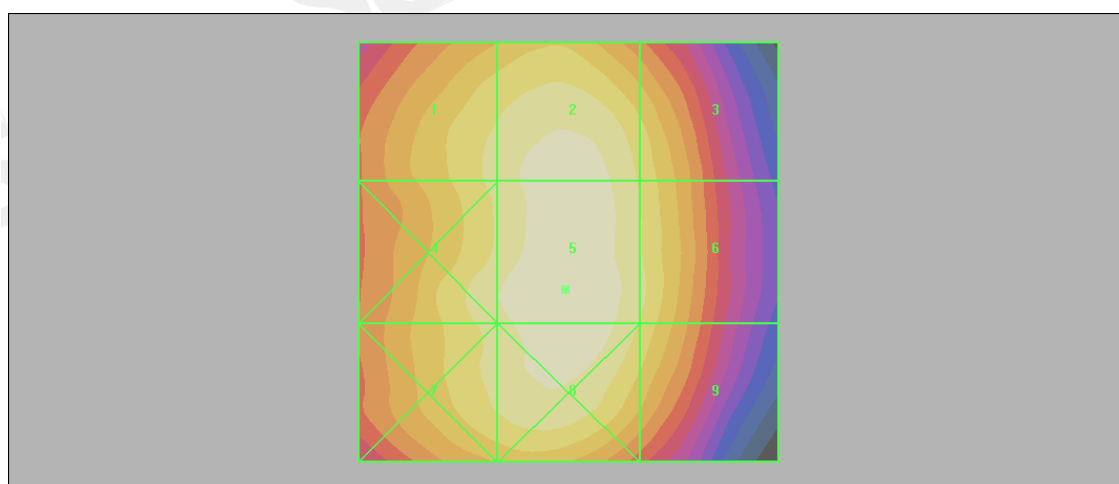
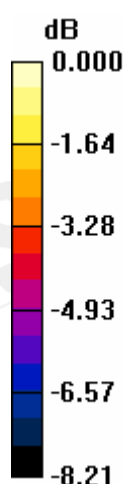
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## Peak E-field in V/m

Grid 1 <b>101.9 M4</b>	Grid 2 <b>109.8 M4</b>	Grid 3 <b>98.5 M4</b>
Grid 4 <b>105.5 M4</b>	Grid 5 <b>112.6 M4</b>	Grid 6 <b>101.1 M4</b>
Grid 7 <b>103.0 M4</b>	Grid 8 <b>111.3 M4</b>	Grid 9 <b>98.6 M4</b>

Category	AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
M1	0	199.5 - 354.8	0.6 - 1.07
M2	0	112.2 - 199.5	0.34 - 0.6
M3	0	63.1 - 112.2	0.19 - 0.34
M4	0	<63.1	<0.19
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
M2	0	354.8 - 631	1.07 - 1.91
M3	0	199.5 - 354.8	0.6 - 1.07
M4	0	<199.5	<0.6



0 dB = 112.6V/m

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Date/Time: 2008/9/24 07:36:20

## HAC\_E\_Cellular\_CH384

DUT: RH-120;

Communication System: CDMA\_850; Frequency: 836.52 MHz; Duty Cycle: 1:1  
Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: E Device Section

DASY4 Configuration:

- Probe: ER3DV6 - SN2306; ConvF(1, 1, 1); Calibrated: 2008/4/17
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2008/1/24
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

### E Scan - ER3DV6 - measurement distance from the closest probe sensor part to the Device = 10mm/Hearing Aid Compatibility Test (101x101x1):

Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 108.6 V/m

Probe Modulation Factor = 0.991

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 125.3 V/m; Power Drift = -0.028 dB

Test Arch Compensation is Applied.

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

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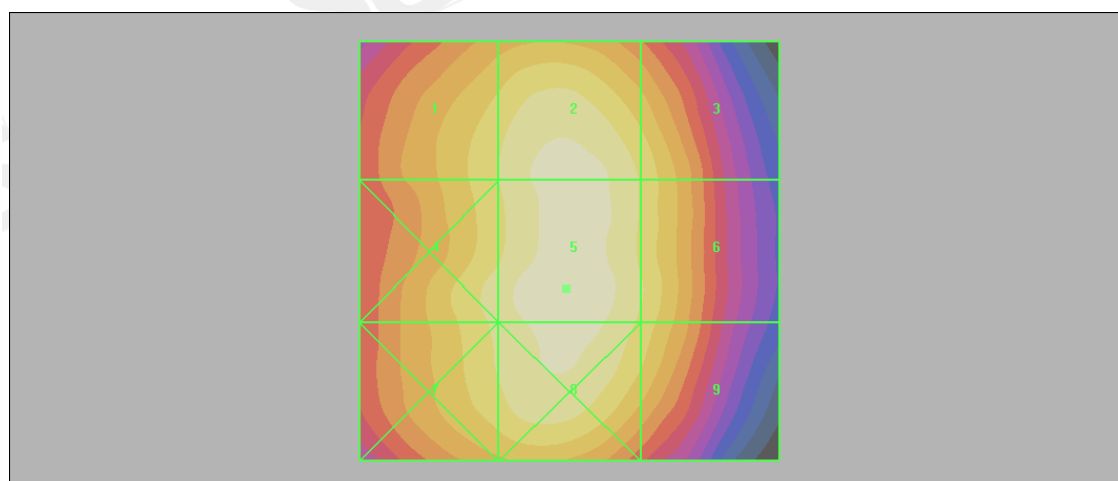
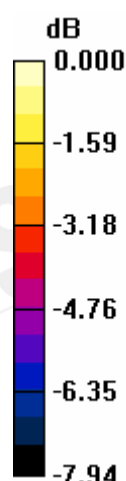
## Peak E-field in V/m

Grid 1 <b>96.2 M4</b>	Grid 2 <b>104.3 M4</b>	Grid 3 <b>95.5 M4</b>
Grid 4 <b>99.5 M4</b>	Grid 5 <b>108.6 M4</b>	Grid 6 <b>96.7 M4</b>
Grid 7 <b>98.1 M4</b>	Grid 8 <b>105.1 M4</b>	Grid 9 <b>94.7 M4</b>

Category	AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
M1	0	199.5 - 354.8	0.6 - 1.07
M2	0	112.2 - 199.5	0.34 - 0.6
M3	0	63.1 - 112.2	0.19 - 0.34
M4	0	<63.1	<0.19

Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
M2	0	354.8 - 631	1.07 - 1.91
M3	0	199.5 - 354.8	0.6 - 1.07
M4	0	<199.5	<0.6



0 dB = 108.6V/m

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Date/Time: 2008/9/24 07:48:08

## HAC\_E\_Cellular\_CH777

DUT: RH-120;

Communication System: CDMA\_850; Frequency: 848.31 MHz; Duty Cycle: 1:1  
Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: E Device Section

DASY4 Configuration:

- Probe: ER3DV6 - SN2306; ConvF(1, 1, 1); Calibrated: 2008/4/17
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2008/1/24
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

### E Scan - ER3DV6 - measurement distance from the closest probe sensor part to the Device = 10mm/Hearing Aid Compatibility Test (101x101x1):

Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 100.8 V/m

Probe Modulation Factor = 0.991

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 115.3 V/m; Power Drift = 0.078 dB

Test Arch Compensation is Applied.

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

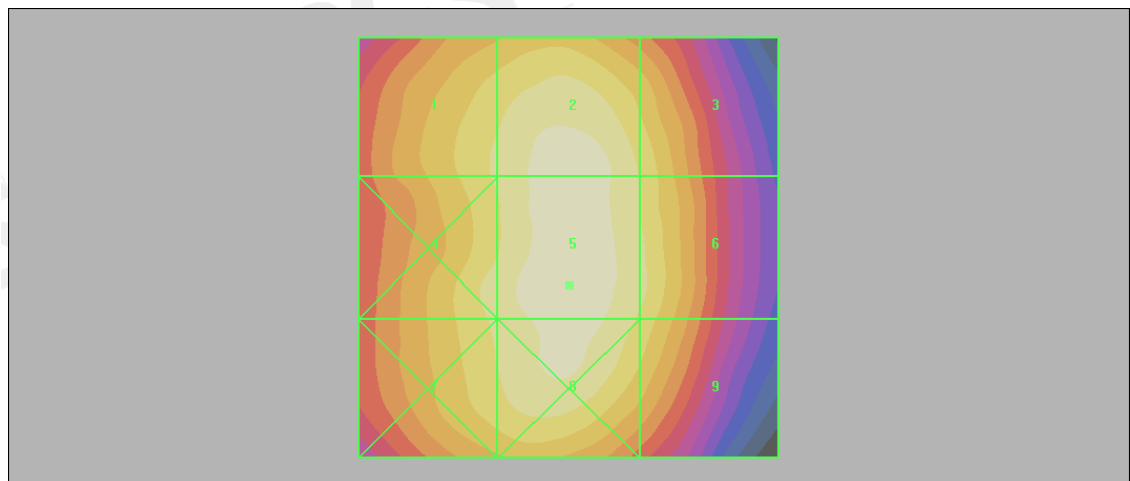
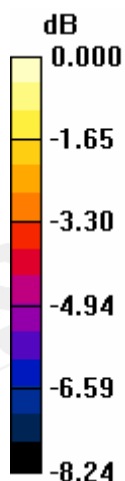
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## Peak E-field in V/m

Grid 1 <b>90.1 M4</b>	Grid 2 <b>97.4 M4</b>	Grid 3 <b>88.4 M4</b>
Grid 4 <b>91.9 M4</b>	Grid 5 <b>100.8 M4</b>	Grid 6 <b>90.6 M4</b>
Grid 7 <b>90.5 M4</b>	Grid 8 <b>97.4 M4</b>	Grid 9 <b>87.7 M4</b>

Category	AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
M1	0	199.5 - 354.8	0.6 - 1.07
M2	0	112.2 - 199.5	0.34 - 0.6
M3	0	63.1 - 112.2	0.19 - 0.34
M4	0	<63.1	<0.19
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
M2	0	354.8 - 631	1.07 - 1.91
M3	0	199.5 - 354.8	0.6 - 1.07
M4	0	<199.5	<0.6



0 dB = 100.8V/m

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Date/Time: 2008/9/24 10:05:55

## HAC\_E\_AWS\_CH25

### DUT: RH-120;

Communication System: AWS; Frequency: 1711.25 MHz; Duty Cycle: 1:1

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

Phantom section: E Device Section

### DASY4 Configuration:

- Probe: ER3DV6 - SN2306; ConvF(1, 1, 1); Calibrated: 2008/4/17
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2008/1/24
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

### E Scan - ER3DV6 - measurement distance from the closest probe sensor part to the Device = 10mm/Hearing Aid Compatibility Test (101x101x1):

Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 70.3 V/m

Probe Modulation Factor = 0.986

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 79.8 V/m; Power Drift = -0.080 dB

Test Arch Compensation is Applied.

### Hearing Aid Near-Field Category: M3 (AWF 0 dB)

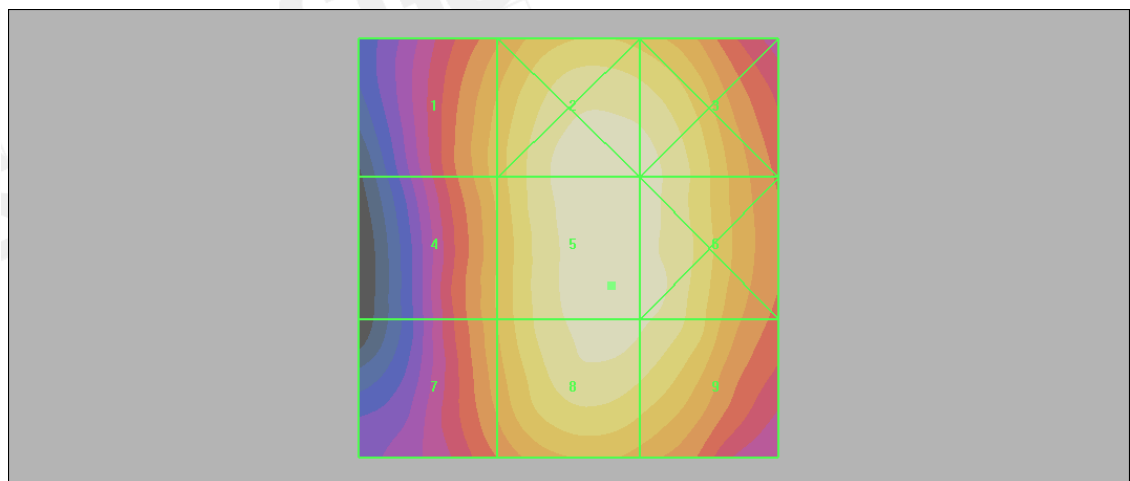
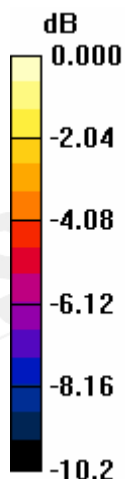
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## Peak E-field in V/m

Grid 1	Grid 2	Grid 3
<b>53.8 M4</b>	<b>69.3 M3</b>	<b>67.8 M3</b>
Grid 4	Grid 5	Grid 6
<b>53.5 M4</b>	<b>70.3 M3</b>	<b>68.8 M3</b>
Grid 7	Grid 8	Grid 9
<b>51.7 M4</b>	<b>68.6 M3</b>	<b>66.4 M3</b>

Category	AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
M1	0	199.5 - 354.8	0.6 - 1.07
M2	0	112.2 - 199.5	0.34 - 0.6
M3	0	63.1 - 112.2	0.19 - 0.34
M4	0	<63.1	<0.19
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
M2	0	354.8 - 631	1.07 - 1.91
M3	0	199.5 - 354.8	0.6 - 1.07
M4	0	<199.5	<0.6



0 dB = 70.3V/m

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Date/Time: 2008/10/6 13:42:49

## HAC\_E\_AWS\_CH425

### DUT: RH-120;

Communication System: AWS; Frequency: 1731.25 MHz; Duty Cycle: 1:1

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

Phantom section: E Device Section

### DASY4 Configuration:

- Probe: ER3DV6 - SN2306; ConvF(1, 1, 1); Calibrated: 2008/4/17
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2008/1/24
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

### E Scan - ER3DV6 - measurement distance from the closest probe sensor part to the Device = 10mm/Hearing Aid Compatibility Test (101x101x1):

Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 73.8 V/m

Probe Modulation Factor = 0.986

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 83.7 V/m; Power Drift = 0.036 dB

Test Arch Compensation is Applied.

### Hearing Aid Near-Field Category: M3 (AWF 0 dB)

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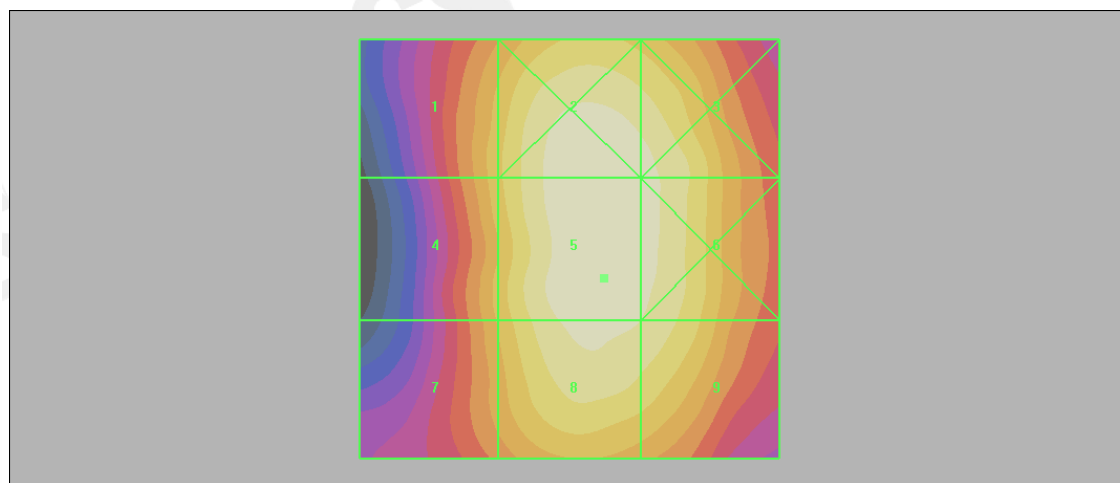
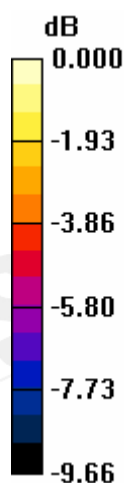
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## Peak E-field in V/m

Grid 1	Grid 2	Grid 3
<b>58.3 M4</b>	<b>73.7 M3</b>	<b>71.0 M3</b>
Grid 4	Grid 5	Grid 6
<b>58.1 M4</b>	<b>73.8 M3</b>	<b>71.1 M3</b>
Grid 7	Grid 8	Grid 9
<b>55.6 M4</b>	<b>70.8 M3</b>	<b>68.4 M3</b>

Category	AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
M1	0	199.5 - 354.8	0.6 - 1.07
M2	0	112.2 - 199.5	0.34 - 0.6
M3	0	63.1 - 112.2	0.19 - 0.34
M4	0	<63.1	<0.19
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
M2	0	354.8 - 631	1.07 - 1.91
M3	0	199.5 - 354.8	0.6 - 1.07
M4	0	<199.5	<0.6



0 dB = 73.8V/m

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Date/Time: 2008/9/24 09:15:46

## HAC\_E\_AWS\_CH875

### DUT: RH-120;

Communication System: AWS; Frequency: 1753.75 MHz; Duty Cycle: 1:1

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

Phantom section: E Device Section

### DASY4 Configuration:

- Probe: ER3DV6 - SN2306; ConvF(1, 1, 1); Calibrated: 2008/4/17
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2008/1/24
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

### E Scan - ER3DV6 - measurement distance from the closest probe sensor part to the Device = 10mm/Hearing Aid Compatibility Test (101x101x1):

Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 76.4 V/m

Probe Modulation Factor = 0.986

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 83.6 V/m; Power Drift = 0.078 dB

Test Arch Compensation is Applied.

### Hearing Aid Near-Field Category: M3 (AWF 0 dB)

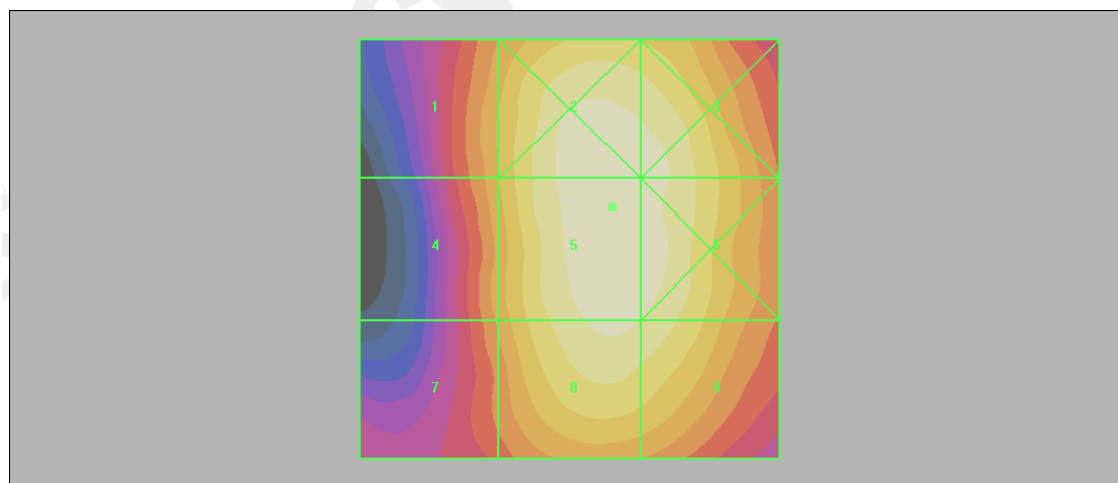
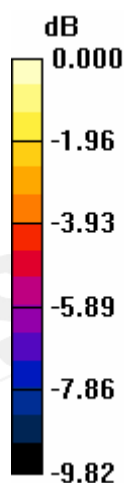
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## Peak E-field in V/m

Grid 1	Grid 2	Grid 3
<b>57.3 M4</b>	<b>75.8 M3</b>	<b>74.6 M3</b>
Grid 4	Grid 5	Grid 6
<b>56.5 M4</b>	<b>76.4 M3</b>	<b>74.6 M3</b>
Grid 7	Grid 8	Grid 9
<b>53.4 M4</b>	<b>72.3 M3</b>	<b>70.6 M3</b>

Category	AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
M1	0	199.5 - 354.8	0.6 - 1.07
M2	0	112.2 - 199.5	0.34 - 0.6
M3	0	63.1 - 112.2	0.19 - 0.34
M4	0	<63.1	<0.19
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
M2	0	354.8 - 631	1.07 - 1.91
M3	0	199.5 - 354.8	0.6 - 1.07
M4	0	<199.5	<0.6



0 dB = 76.4V/m

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Date/Time: 2008/9/24 10:38:07

## HAC\_E\_US PCS\_CH25

### DUT: RH-120;

Communication System: CDMA2000; Frequency: 1851.25 MHz; Duty Cycle: 1:1

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

Phantom section: E Device Section

### DASY4 Configuration:

- Probe: ER3DV6 - SN2306; ConvF(1, 1, 1); Calibrated: 2008/4/17
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2008/1/24
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

### E Scan - ER3DV6 - measurement distance from the closest probe sensor part to the Device = 10mm/Hearing Aid Compatibility Test (101x101x1):

Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 62.8 V/m

Probe Modulation Factor = 0.986

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 70.7 V/m; Power Drift = 0.077 dB

Test Arch Compensation is Applied.

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

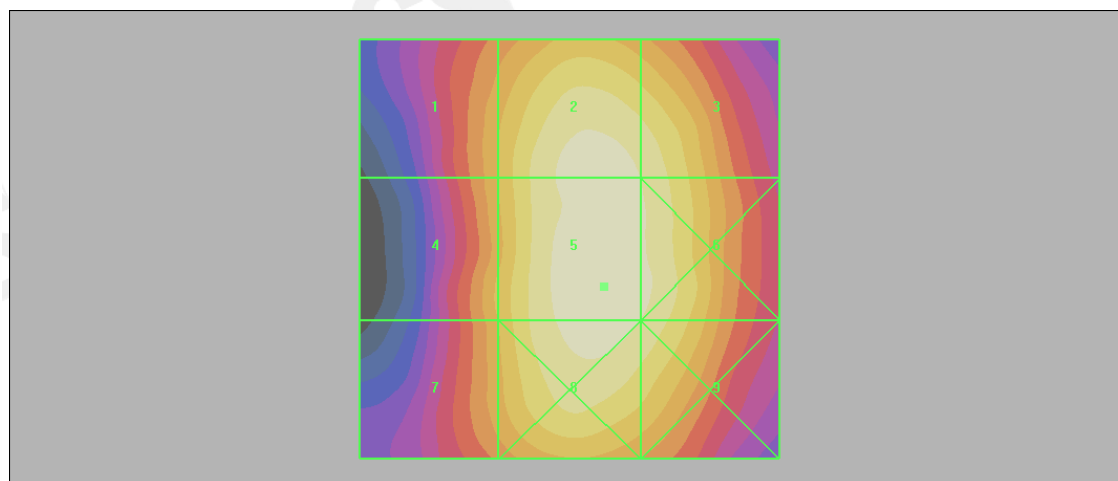
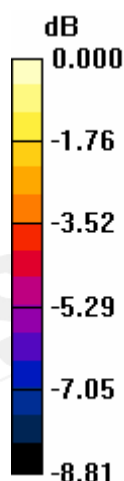
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## Peak E-field in V/m

Grid 1 <b>48.3 M4</b>	Grid 2 <b>61.1 M4</b>	Grid 3 <b>58.6 M4</b>
Grid 4 <b>49.0 M4</b>	Grid 5 <b>62.8 M4</b>	Grid 6 <b>60.1 M4</b>
Grid 7 <b>48.2 M4</b>	Grid 8 <b>61.2 M4</b>	Grid 9 <b>58.5 M4</b>

Category	AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
M1	0	199.5 - 354.8	0.6 - 1.07
M2	0	112.2 - 199.5	0.34 - 0.6
M3	0	63.1 - 112.2	0.19 - 0.34
M4	0	<63.1	<0.19
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
M2	0	354.8 - 631	1.07 - 1.91
M3	0	199.5 - 354.8	0.6 - 1.07
M4	0	<199.5	<0.6



0 dB = 62.8V/m

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Date/Time: 2008/9/24 10:52:36

## HAC\_E\_US PCS\_CH600

### DUT: RH-120;

Communication System: CDMA2000; Frequency: 1880 MHz; Duty Cycle: 1:1

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

Phantom section: E Device Section

### DASY4 Configuration:

- Probe: ER3DV6 - SN2306; ConvF(1, 1, 1); Calibrated: 2008/4/17
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2008/1/24
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

### E Scan - ER3DV6 - measurement distance from the closest probe sensor part to the Device = 10mm/Hearing Aid Compatibility Test (101x101x1):

Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 64.1 V/m

Probe Modulation Factor = 0.986

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 73.4 V/m; Power Drift = -0.084 dB

Test Arch Compensation is Applied.

### Hearing Aid Near-Field Category: M3 (AWF 0 dB)

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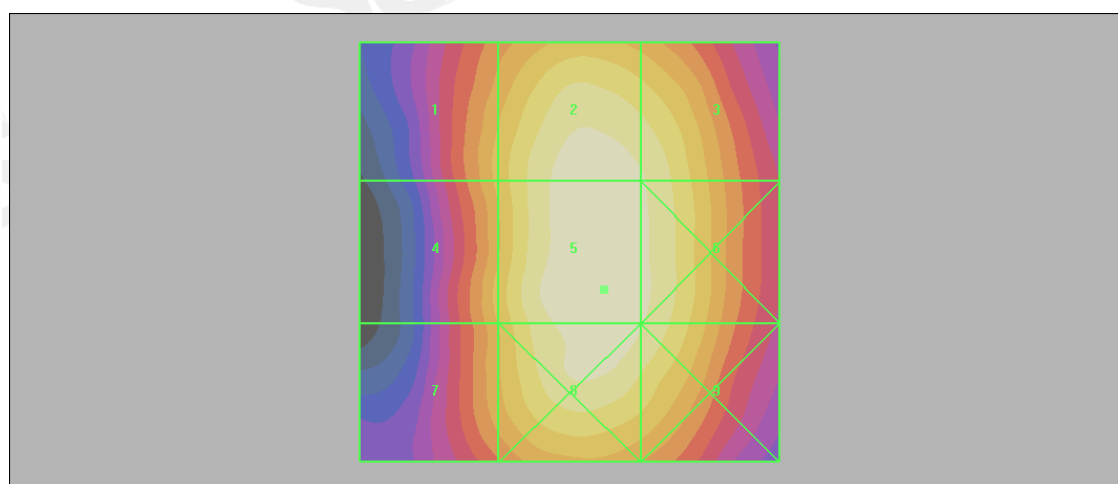
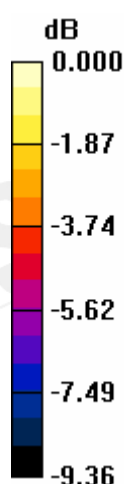
## Peak E-field in V/m

Grid 1 <b>49.7 M4</b>	Grid 2 <b>62.8 M4</b>	Grid 3 <b>60.1 M4</b>
Grid 4 <b>49.7 M4</b>	Grid 5 <b>64.1 M3</b>	Grid 6 <b>61.0 M4</b>
Grid 7 <b>48.4 M4</b>	Grid 8 <b>63.1 M4</b>	Grid 9 <b>60.0 M4</b>

Category	AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
M1	0	199.5 - 354.8	0.6 - 1.07
M2	0	112.2 - 199.5	0.34 - 0.6
M3	0	63.1 - 112.2	0.19 - 0.34
M4	0	<63.1	<0.19

Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
M2	0	354.8 - 631	1.07 - 1.91
M3	0	199.5 - 354.8	0.6 - 1.07
M4	0	<199.5	<0.6



0 dB = 64.1V/m

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Date/Time: 2008/9/24 11:12:36

## HAC\_E\_US PCS\_CH1175

### DUT: RH-120;

Communication System: CDMA2000; Frequency: 1908.75 MHz; Duty Cycle: 1:1

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

Phantom section: E Device Section

### DASY4 Configuration:

- Probe: ER3DV6 - SN2306; ConvF(1, 1, 1); Calibrated: 2008/4/17
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2008/1/24
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

### E Scan - ER3DV6 - measurement distance from the closest probe sensor part to the Device = 10mm/Hearing Aid Compatibility Test (101x101x1):

Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 59.7 V/m

Probe Modulation Factor = 0.986

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 67.7 V/m; Power Drift = -0.146 dB

Test Arch Compensation is Applied.

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

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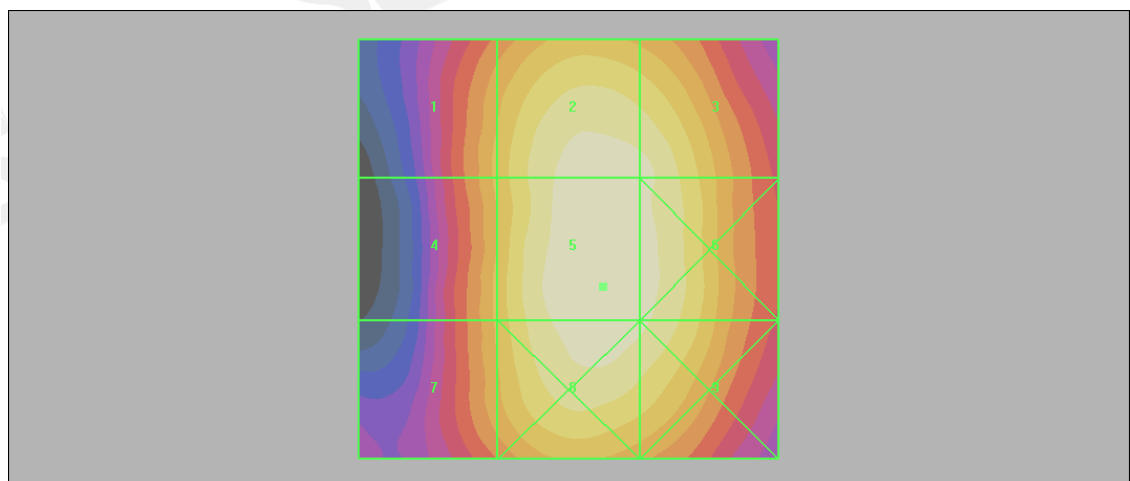
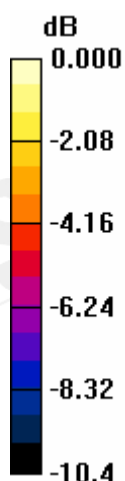
## Peak E-field in V/m

Grid 1 <b>44.8 M4</b>	Grid 2 <b>58.0 M4</b>	Grid 3 <b>56.6 M4</b>
Grid 4 <b>44.8 M4</b>	Grid 5 <b>59.7 M4</b>	Grid 6 <b>57.5 M4</b>
Grid 7 <b>44.5 M4</b>	Grid 8 <b>58.1 M4</b>	Grid 9 <b>56.2 M4</b>

Category	AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
M1	0	199.5 - 354.8	0.6 - 1.07
M2	0	112.2 - 199.5	0.34 - 0.6
M3	0	63.1 - 112.2	0.19 - 0.34
M4	0	<63.1	<0.19

Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
M2	0	354.8 - 631	1.07 - 1.91
M3	0	199.5 - 354.8	0.6 - 1.07
M4	0	<199.5	<0.6



0 dB = 59.7V/m

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Date/Time: 2008/9/24 13:05:49

## HAC\_H\_Cellular\_CH1013

### DUT: RH-120;

Communication System: CDMA\_850; Frequency: 824.7 MHz; Duty Cycle: 1:1

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

Phantom section: H Device Section

### DASY4 Configuration:

- Probe: H3DV6 - SN6142; ; Calibrated: 2008/4/21
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2008/1/24
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

### H Scan - H3DV6 - measurement distance from the closest probe sensor part to the Device = 10mm/Hearing Aid Compatibility Test (101x101x1):

Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.132 A/m

Probe Modulation Factor = 0.987

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 0.083 A/m; Power Drift = 0.065 dB

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

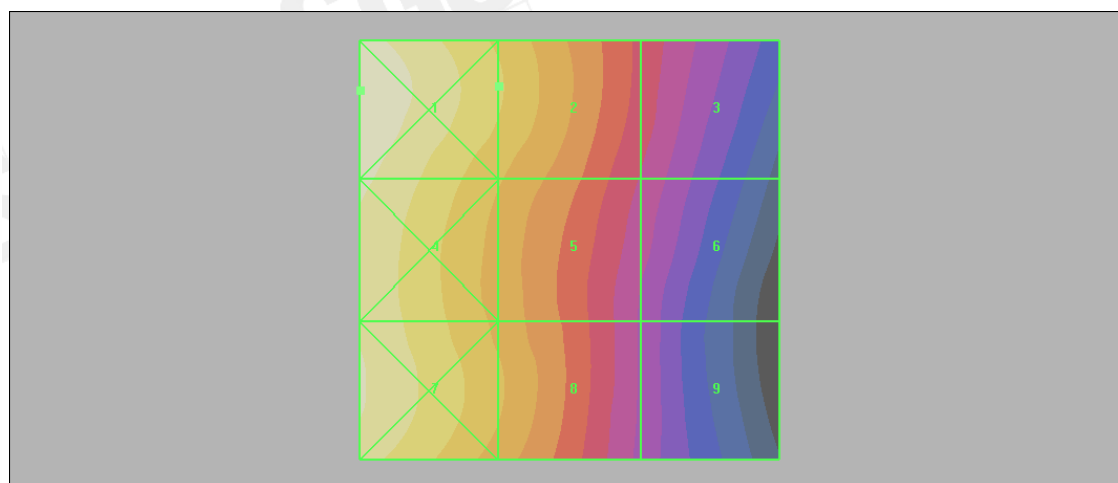
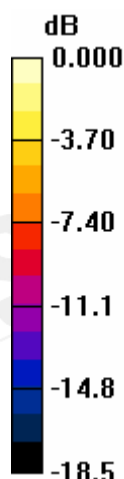
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## Peak H-field in A/m

Grid 1 <b>0.197 M4</b>	Grid 2 <b>0.132 M4</b>	Grid 3 <b>0.070 M4</b>
Grid 4 <b>0.177 M4</b>	Grid 5 <b>0.114 M4</b>	Grid 6 <b>0.063 M4</b>
Grid 7 <b>0.174 M4</b>	Grid 8 <b>0.114 M4</b>	Grid 9 <b>0.054 M4</b>

Category	AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
M1	0	199.5 - 354.8	0.6 - 1.07
M2	0	112.2 - 199.5	0.34 - 0.6
M3	0	63.1 - 112.2	0.19 - 0.34
M4	0	<63.1	<0.19
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
M2	0	354.8 - 631	1.07 - 1.91
M3	0	199.5 - 354.8	0.6 - 1.07
M4	0	<199.5	<0.6



0 dB = 0.197A/m

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Date/Time: 2008/9/24 13:21:02

## HAC\_H\_Cellular\_CH384

### DUT: RH-120;

Communication System: CDMA\_850; Frequency: 836.52 MHz; Duty Cycle: 1:1

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

Phantom section: H Device Section

### DASY4 Configuration:

- Probe: H3DV6 - SN6142; ; Calibrated: 2008/4/21
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2008/1/24
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

### H Scan - H3DV6 - measurement distance from the closest probe sensor part to the Device = 10mm/Hearing Aid Compatibility Test (101x101x1):

Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.121 A/m

Probe Modulation Factor = 0.987

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 0.077 A/m; Power Drift = 0.114 dB

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

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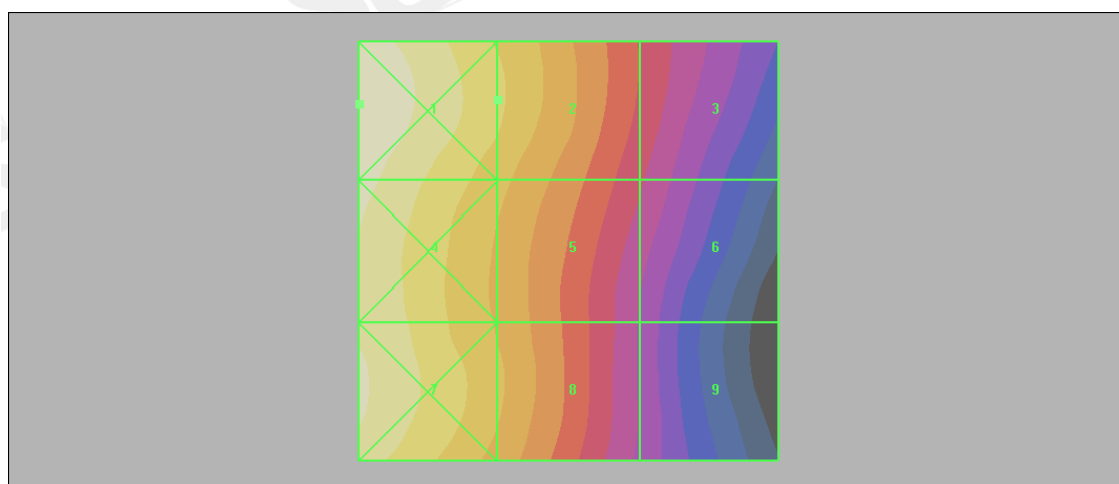
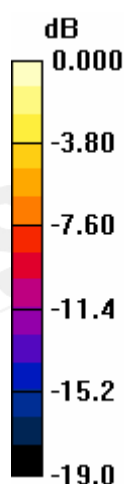
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## Peak H-field in A/m

Grid 1 <b>0.182 M4</b>	Grid 2 <b>0.121 M4</b>	Grid 3 <b>0.065 M4</b>
Grid 4 <b>0.168 M4</b>	Grid 5 <b>0.107 M4</b>	Grid 6 <b>0.058 M4</b>
Grid 7 <b>0.161 M4</b>	Grid 8 <b>0.105 M4</b>	Grid 9 <b>0.049 M4</b>

Category	AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
M1	0	199.5 - 354.8	0.6 - 1.07
M2	0	112.2 - 199.5	0.34 - 0.6
M3	0	63.1 - 112.2	0.19 - 0.34
M4	0	<63.1	<0.19
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
M2	0	354.8 - 631	1.07 - 1.91
M3	0	199.5 - 354.8	0.6 - 1.07
M4	0	<199.5	<0.6



0 dB = 0.182A/m

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Date/Time: 2008/9/24 13:43:07

## HAC\_H\_Cellular\_CH777

### DUT: RH-120;

Communication System: CDMA\_850; Frequency: 836.52 MHz; Duty Cycle: 1:1

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

Phantom section: H Device Section

### DASY4 Configuration:

- Probe: H3DV6 - SN6142; ; Calibrated: 2008/4/21
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2008/1/24
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

### H Scan - H3DV6 - measurement distance from the closest probe sensor part to the Device = 10mm/Hearing Aid Compatibility Test (101x101x1):

Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.117 A/m

Probe Modulation Factor = 0.987

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 0.075 A/m; Power Drift = 0.108 dB

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

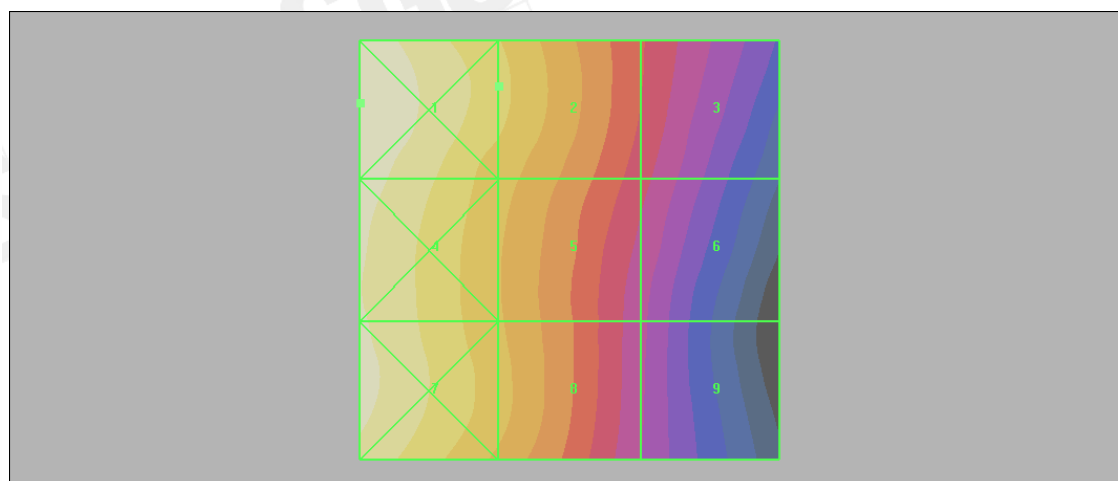
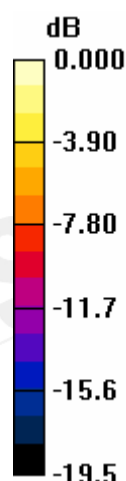
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## Peak H-field in A/m

Grid 1 <b>0.173 M4</b>	Grid 2 <b>0.117 M4</b>	Grid 3 <b>0.062 M4</b>
Grid 4 <b>0.162 M4</b>	Grid 5 <b>0.102 M4</b>	Grid 6 <b>0.055 M4</b>
Grid 7 <b>0.157 M4</b>	Grid 8 <b>0.101 M4</b>	Grid 9 <b>0.047 M4</b>

Category	AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
M1	0	199.5 - 354.8	0.6 - 1.07
M2	0	112.2 - 199.5	0.34 - 0.6
M3	0	63.1 - 112.2	0.19 - 0.34
M4	0	<63.1	<0.19
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
M2	0	354.8 - 631	1.07 - 1.91
M3	0	199.5 - 354.8	0.6 - 1.07
M4	0	<199.5	<0.6



0 dB = 0.173A/m

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Date/Time: 2008/9/24 16:19:20

## HAC\_H\_AWS\_CH25

### DUT: RH-120;

Communication System: AWS; Frequency: 1711.25 MHz; Duty Cycle: 1:1

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

Phantom section: H Device Section

### DASY4 Configuration:

- Probe: H3DV6 - SN6142; ; Calibrated: 2008/4/21
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2008/1/24
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

### H Scan - H3DV6 - measurement distance from the closest probe sensor part to the Device = 10mm/Hearing Aid Compatibility Test (101x101x1):

Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.159 A/m

Probe Modulation Factor = 0.975

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 0.128 A/m; Power Drift = 0.000 dB

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

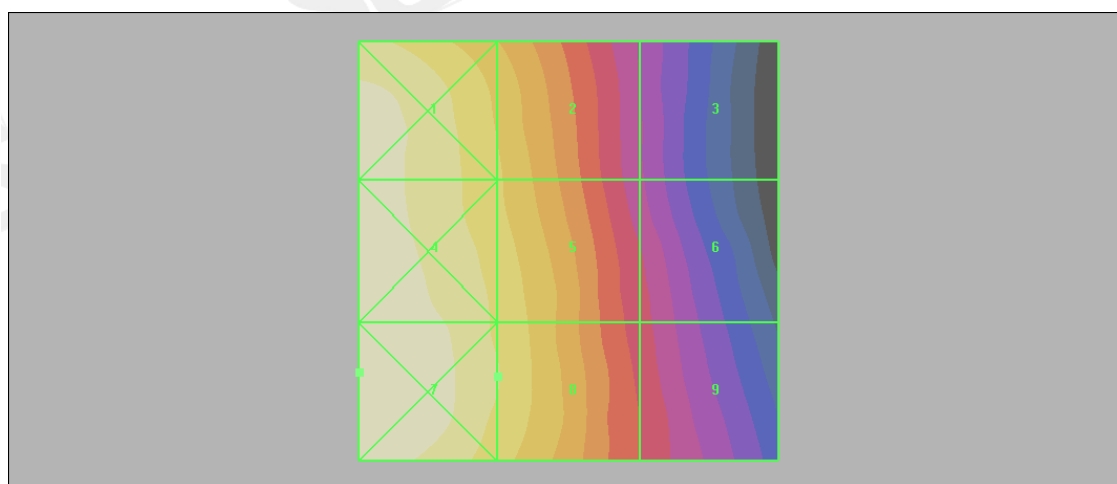
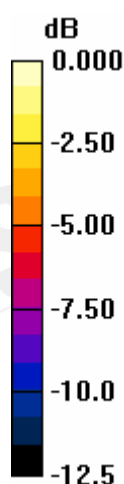
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## Peak H-field in A/m

Grid 1 <b>0.183 M4</b>	Grid 2 <b>0.146 M4</b>	Grid 3 <b>0.082 M4</b>
Grid 4 <b>0.186 M4</b>	Grid 5 <b>0.155 M4</b>	Grid 6 <b>0.093 M4</b>
Grid 7 <b>0.191 M3</b>	Grid 8 <b>0.159 M4</b>	Grid 9 <b>0.098 M4</b>

Category	AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
M1	0	199.5 - 354.8	0.6 - 1.07
M2	0	112.2 - 199.5	0.34 - 0.6
M3	0	63.1 - 112.2	0.19 - 0.34
M4	0	<63.1	<0.19
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
M2	0	354.8 - 631	1.07 - 1.91
M3	0	199.5 - 354.8	0.6 - 1.07
M4	0	<199.5	<0.6



0 dB = 0.191A/m

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Date/Time: 2008/10/6 15:18:03

## HAC\_H\_AWS\_CH425

### DUT: RH-120;

Communication System: AWS; Frequency: 1731.25 MHz; Duty Cycle: 1:1

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

Phantom section: H Device Section

### DASY4 Configuration:

- Probe: H3DV6 - SN6142; ; Calibrated: 2008/4/21
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2008/1/24
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

### H Scan - H3DV6 - measurement distance from the closest probe sensor part to the Device = 10mm/Hearing Aid Compatibility Test (101x101x1):

Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.164 A/m

Probe Modulation Factor = 0.975

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 0.131 A/m; Power Drift = 0.052 dB

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

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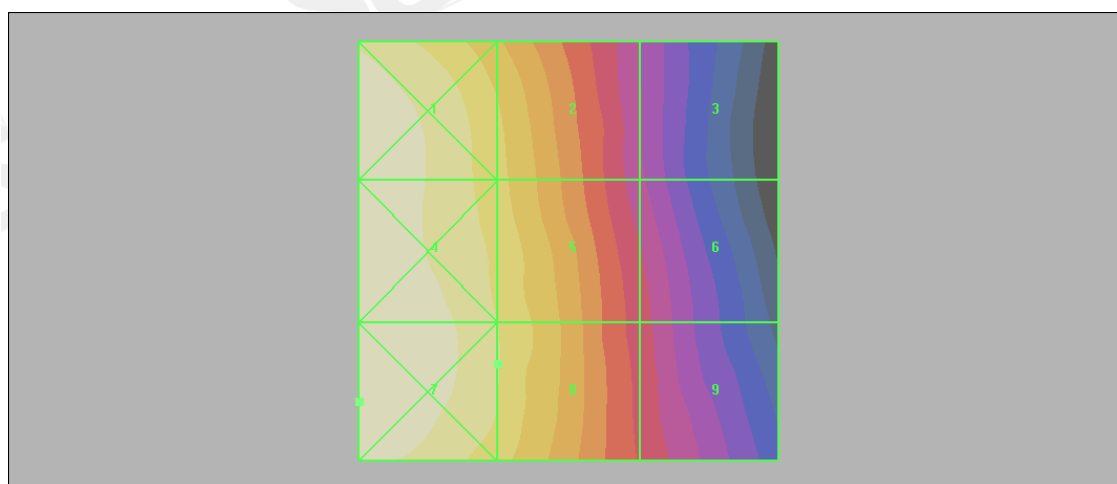
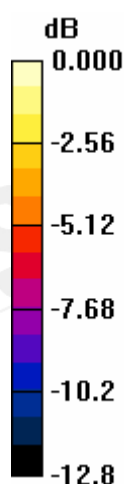
## Peak H-field in A/m

Grid 1 <b>0.191 M3</b>	Grid 2 <b>0.152 M4</b>	Grid 3 <b>0.084 M4</b>
Grid 4 <b>0.195 M3</b>	Grid 5 <b>0.163 M4</b>	Grid 6 <b>0.095 M4</b>
Grid 7 <b>0.198 M3</b>	Grid 8 <b>0.164 M4</b>	Grid 9 <b>0.099 M4</b>

Category	AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
M1	0	199.5 - 354.8	0.6 - 1.07
M2	0	112.2 - 199.5	0.34 - 0.6
M3	0	63.1 - 112.2	0.19 - 0.34
M4	0	<63.1	<0.19

Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
M2	0	354.8 - 631	1.07 - 1.91
M3	0	199.5 - 354.8	0.6 - 1.07
M4	0	<199.5	<0.6



0 dB = 0.198A/m

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Date/Time: 2008/9/24 15:31:50

## HAC\_H\_AWS\_CH875

### DUT: RH-120;

Communication System: AWS; Frequency: 1753.75 MHz; Duty Cycle: 1:1

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

Phantom section: H Device Section

### DASY4 Configuration:

- Probe: H3DV6 - SN6142; ; Calibrated: 2008/4/21
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2008/1/24
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

### H Scan - H3DV6 - measurement distance from the closest probe sensor part to the Device = 10mm/Hearing Aid Compatibility Test (101x101x1):

Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.167 A/m

Probe Modulation Factor = 0.975

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 0.136 A/m; Power Drift = 0.066 dB

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

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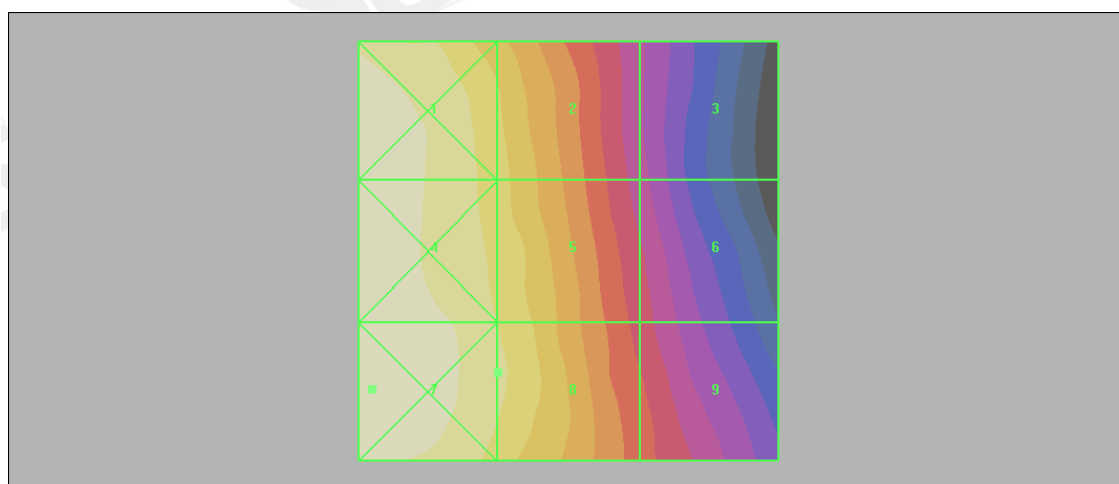
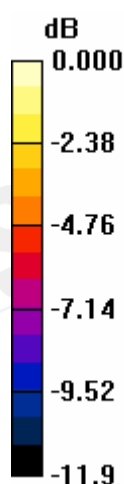
## Peak H-field in A/m

Grid 1 <b>0.192 M3</b>	Grid 2 <b>0.156 M4</b>	Grid 3 <b>0.090 M4</b>
Grid 4 <b>0.192 M3</b>	Grid 5 <b>0.164 M4</b>	Grid 6 <b>0.100 M4</b>
Grid 7 <b>0.197 M3</b>	Grid 8 <b>0.167 M4</b>	Grid 9 <b>0.109 M4</b>

Category	AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
M1	0	199.5 - 354.8	0.6 - 1.07
M2	0	112.2 - 199.5	0.34 - 0.6
M3	0	63.1 - 112.2	0.19 - 0.34
M4	0	<63.1	<0.19

Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
M2	0	354.8 - 631	1.07 - 1.91
M3	0	199.5 - 354.8	0.6 - 1.07
M4	0	<199.5	<0.6



0 dB = 0.197A/m

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Date/Time: 2008/9/24 16:38:39

## HAC\_H\_US PCS\_CH25

### DUT: RH-120;

Communication System: CDMA2000; Frequency: 1851.25 MHz; Duty Cycle: 1:1

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

Phantom section: H Device Section

### DASY4 Configuration:

- Probe: H3DV6 - SN6142; ; Calibrated: 2008/4/21
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2008/1/24
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

### H Scan - H3DV6 - measurement distance from the closest probe sensor part to the Device = 10mm/Hearing Aid Compatibility Test (101x101x1):

Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.157 A/m

Probe Modulation Factor = 0.975

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 0.124 A/m; Power Drift = 0.060 dB

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

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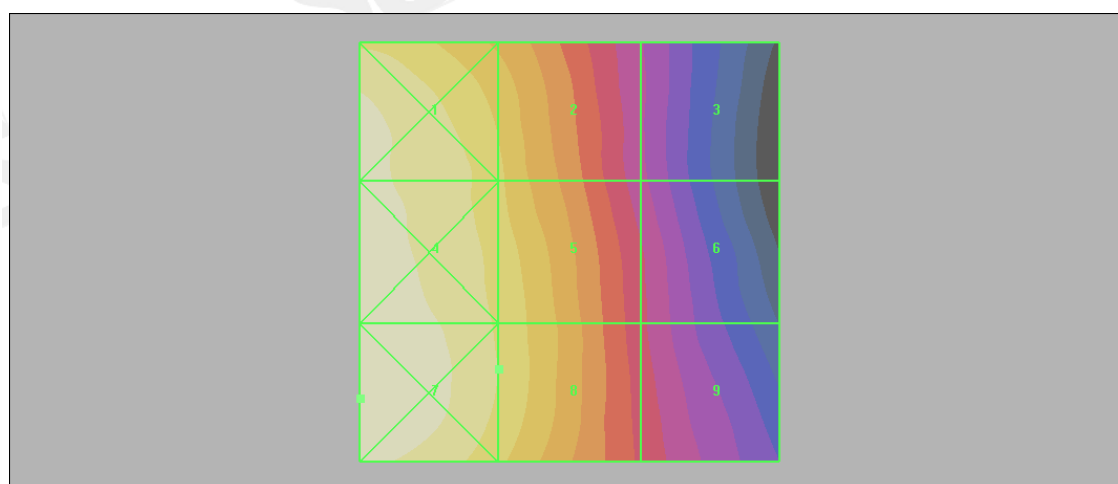
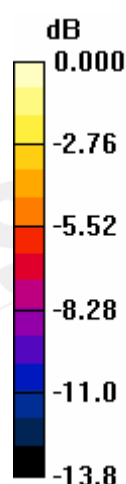
## Peak H-field in A/m

Grid 1 <b>0.184 M4</b>	Grid 2 <b>0.146 M4</b>	Grid 3 <b>0.078 M4</b>
Grid 4 <b>0.188 M4</b>	Grid 5 <b>0.155 M4</b>	Grid 6 <b>0.086 M4</b>
Grid 7 <b>0.195 M3</b>	Grid 8 <b>0.157 M4</b>	Grid 9 <b>0.091 M4</b>

Category	AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
M1	0	199.5 - 354.8	0.6 - 1.07
M2	0	112.2 - 199.5	0.34 - 0.6
M3	0	63.1 - 112.2	0.19 - 0.34
M4	0	<63.1	<0.19

Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
M2	0	354.8 - 631	1.07 - 1.91
M3	0	199.5 - 354.8	0.6 - 1.07
M4	0	<199.5	<0.6



0 dB = 0.195A/m

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Date/Time: 2008/9/24 17:05:24

## HAC\_H\_US PCS\_CH600

### DUT: RH-120;

Communication System: CDMA2000; Frequency: 1880 MHz; Duty Cycle: 1:1

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

Phantom section: H Device Section

### DASY4 Configuration:

- Probe: H3DV6 - SN6142; ; Calibrated: 2008/4/21
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2008/1/24
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

### H Scan - H3DV6 - measurement distance from the closest probe sensor part to the Device = 10mm/Hearing Aid Compatibility Test (101x101x1):

Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.163 A/m

Probe Modulation Factor = 0.975

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 0.128 A/m; Power Drift = 0.031 dB

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

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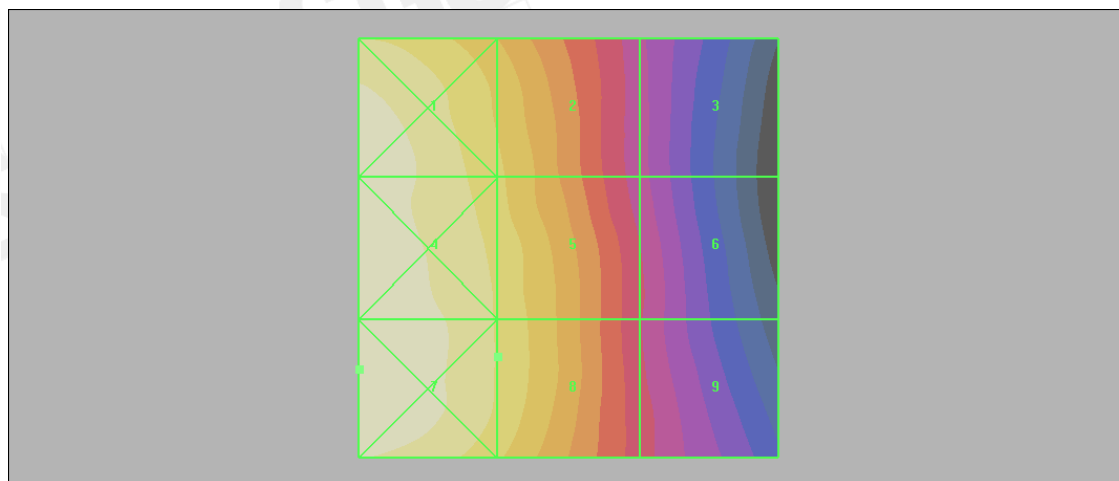
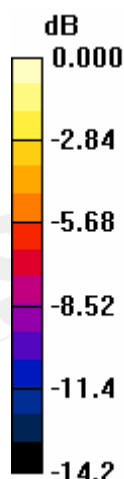
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## Peak H-field in A/m

Grid 1 <b>0.191 M3</b>	Grid 2 <b>0.151 M4</b>	Grid 3 <b>0.080 M4</b>
Grid 4 <b>0.198 M3</b>	Grid 5 <b>0.162 M4</b>	Grid 6 <b>0.087 M4</b>
Grid 7 <b>0.204 M3</b>	Grid 8 <b>0.163 M4</b>	Grid 9 <b>0.090 M4</b>

Category	AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
M1	0	199.5 - 354.8	0.6 - 1.07
M2	0	112.2 - 199.5	0.34 - 0.6
M3	0	63.1 - 112.2	0.19 - 0.34
M4	0	<63.1	<0.19
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
M2	0	354.8 - 631	1.07 - 1.91
M3	0	199.5 - 354.8	0.6 - 1.07
M4	0	<199.5	<0.6



0 dB = 0.204A/m

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Date/Time: 2008/9/24 17:26:14

## HAC\_H\_US PCS\_CH1175

### DUT: RH-120;

Communication System: CDMA2000; Frequency: 1908.75 MHz; Duty Cycle: 1:1

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

Phantom section: H Device Section

### DASY4 Configuration:

- Probe: H3DV6 - SN6142; ; Calibrated: 2008/4/21
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2008/1/24
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

### H Scan - H3DV6 - measurement distance from the closest probe sensor part to the Device = 10mm/Hearing Aid Compatibility Test (101x101x1):

Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.152 A/m

Probe Modulation Factor = 0.975

Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 0.123 A/m; Power Drift = 0.040 dB

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

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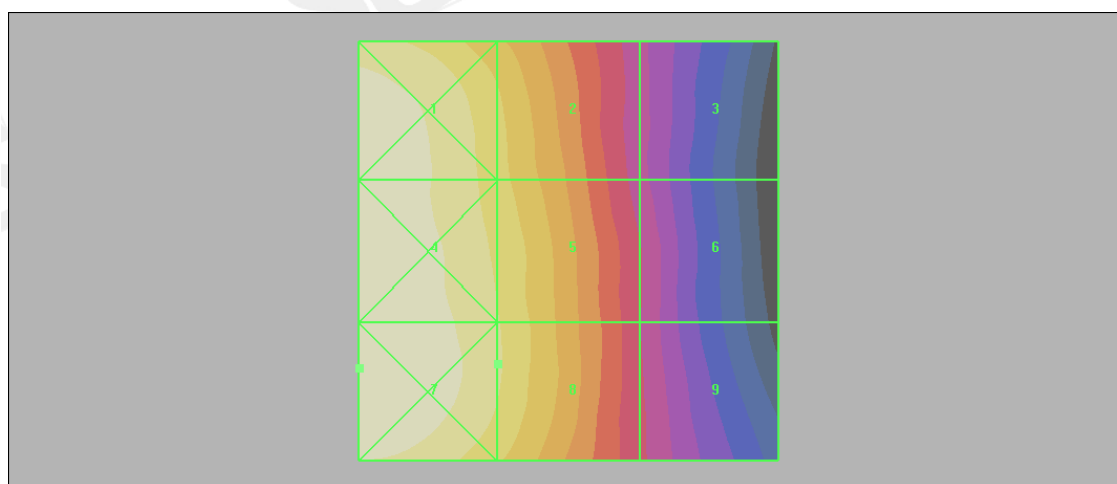
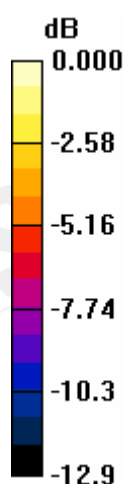
## Peak H-field in A/m

Grid 1 <b>0.178 M4</b>	Grid 2 <b>0.141 M4</b>	Grid 3 <b>0.078 M4</b>
Grid 4 <b>0.178 M4</b>	Grid 5 <b>0.150 M4</b>	Grid 6 <b>0.083 M4</b>
Grid 7 <b>0.182 M4</b>	Grid 8 <b>0.152 M4</b>	Grid 9 <b>0.085 M4</b>

Category	AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
M1	0	199.5 - 354.8	0.6 - 1.07
M2	0	112.2 - 199.5	0.34 - 0.6
M3	0	63.1 - 112.2	0.19 - 0.34
M4	0	<63.1	<0.19

Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
M2	0	354.8 - 631	1.07 - 1.91
M3	0	199.5 - 354.8	0.6 - 1.07
M4	0	<199.5	<0.6



0 dB = 0.182A/m

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## 14. SYSTEM Verification

Date/Time: 2008/9/24 06:21:47

### HAC\_E\_Dipole\_\_835MHz

**DUT: HAC-Dipole 835 MHz; Type: CD835V3;**

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

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

Phantom section: E Dipole Section

DASY4 Configuration:

- Probe: ER3DV6 - SN2306; ConvF(1, 1, 1); Calibrated: 2008/4/17
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2008/1/24
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

**E Scan - ER probe center 10mm above CD835 Dipole/Hearing Aid**

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

Maximum value of peak Total field = 171.9 V/m

Probe Modulation Factor = 1.00

Device Reference Point: 0.000, 0.000, 354.7 mm

Reference Value = 124.9 V/m; Power Drift = -0.041 dB

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

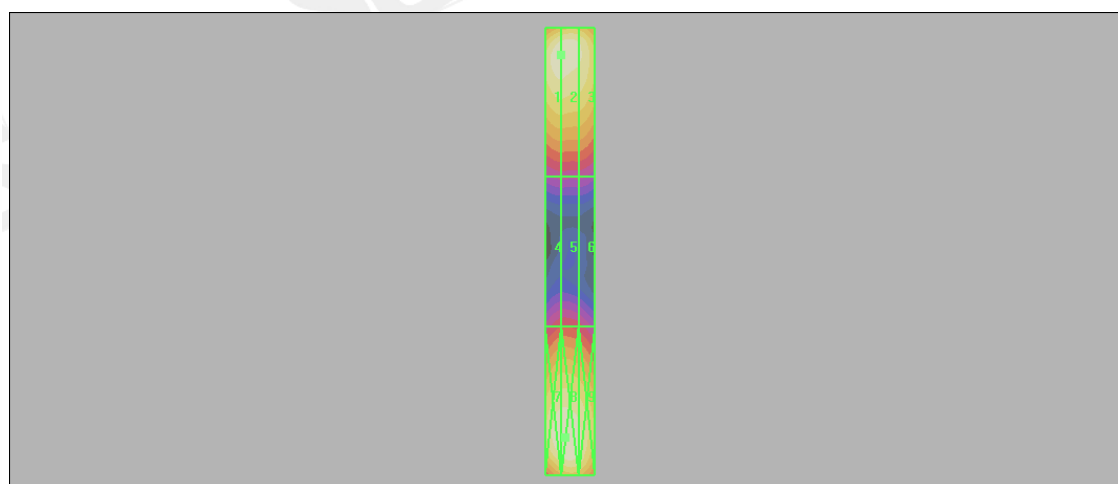
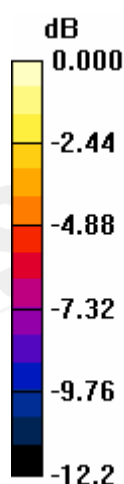
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## Peak E-field in V/m

Grid 1 <b>171.9 M4</b>	Grid 2 <b>171.9 M4</b>	Grid 3 <b>163.3 M4</b>
Grid 4 <b>90.1 M4</b>	Grid 5 <b>90.5 M4</b>	Grid 6 <b>86.2 M4</b>
Grid 7 <b>173.2 M4</b>	Grid 8 <b>174.3 M4</b>	Grid 9 <b>163.3 M4</b>

Category	AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
M1	0	199.5 - 354.8	0.6 - 1.07
M2	0	112.2 - 199.5	0.34 - 0.6
M3	0	63.1 - 112.2	0.19 - 0.34
M4	0	<63.1	<0.19
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
M2	0	354.8 - 631	1.07 - 1.91
M3	0	199.5 - 354.8	0.6 - 1.07
M4	0	<199.5	<0.6



0 dB = 174.3V/m

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Date/Time: 2008/9/24 12:09:33

## HAC\_H\_Dipole\_835MHz

**DUT: HAC-Dipole 835 MHz; Type: CD835V3;**

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

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

Phantom section: H Dipole Section

DASY4 Configuration:

- Probe: H3DV6 - SN6142; ; Calibrated: 2008/4/21
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2008/1/24
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

### H Scan - H3DV6 probe center 10mm above CD835 Dipole/Hearing Aid

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

Maximum value of peak Total field = 0.472 A/m

Probe Modulation Factor = 1.00

Device Reference Point: 0.000, 0.000, 354.7 mm

Reference Value = 0.499 A/m; Power Drift = -0.018 dB

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

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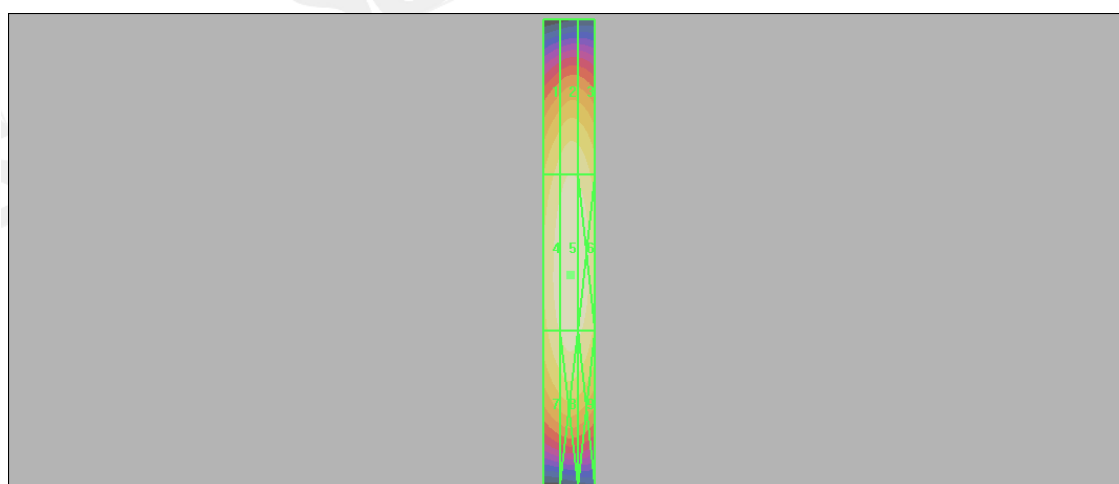
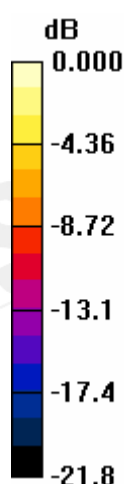
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## Peak H-field in A/m

Grid 1 <b>0.367 M4</b>	Grid 2 <b>0.402 M4</b>	Grid 3 <b>0.390 M4</b>
Grid 4 <b>0.436 M4</b>	Grid 5 <b>0.472 M4</b>	Grid 6 <b>0.456 M4</b>
Grid 7 <b>0.403 M4</b>	Grid 8 <b>0.432 M4</b>	Grid 9 <b>0.415 M4</b>

Category	AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
M1	0	199.5 - 354.8	0.6 - 1.07
M2	0	112.2 - 199.5	0.34 - 0.6
M3	0	63.1 - 112.2	0.19 - 0.34
M4	0	<63.1	<0.19
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
M2	0	354.8 - 631	1.07 - 1.91
M3	0	199.5 - 354.8	0.6 - 1.07
M4	0	<199.5	<0.6



0 dB = 0.472A/m

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Date/Time: 2008/9/24 09:11:11

## HAC\_E\_Dipole\_1880MHz

**DUT: HAC-Dipole 1880MHz; Type: CD1880V3;**

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

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

Phantom section: E Dipole Section

DASY4 Configuration:

- Probe: ER3DV6 - SN2306; ConvF(1, 1, 1); Calibrated: 2008/4/17
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2008/1/24
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

### E Scan - ER probe center 10mm above CD1880 Dipole/Hearing Aid

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

Maximum value of peak Total field = 135.7 V/m

Probe Modulation Factor = 1.00

Device Reference Point: 0.000, 0.000, 354.7 mm

Reference Value = 151.8 V/m; Power Drift = 0.000 dB

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

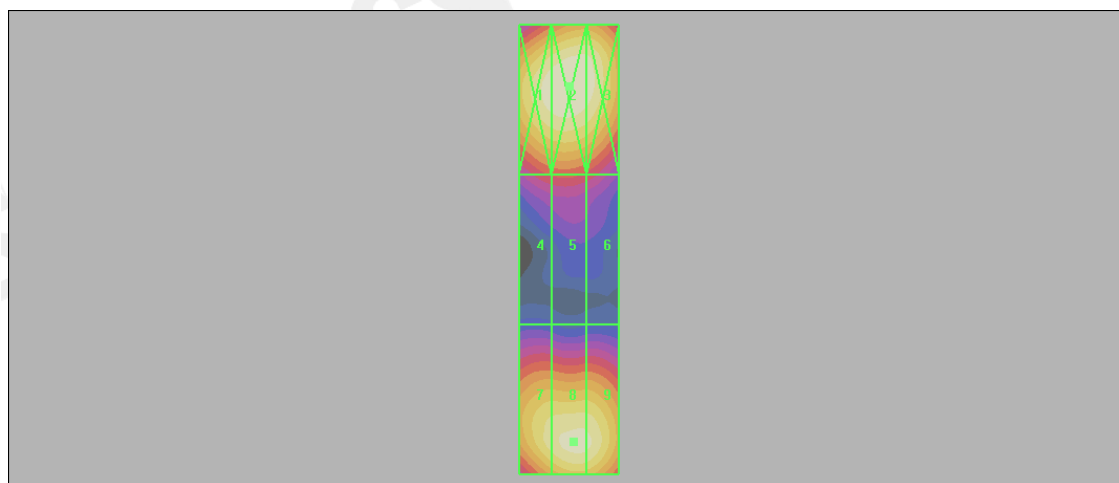
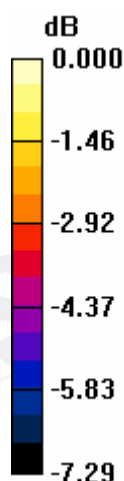
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## Peak E-field in V/m

Grid 1 <b>137.0 M2</b>	Grid 2 <b>139.9 M2</b>	Grid 3 <b>137.3 M2</b>
Grid 4 <b>95.6 M3</b>	Grid 5 <b>96.9 M3</b>	Grid 6 <b>93.4 M3</b>
Grid 7 <b>129.6 M2</b>	Grid 8 <b>135.7 M2</b>	Grid 9 <b>134.6 M2</b>

Category	AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
M1	0	199.5 - 354.8	0.6 - 1.07
M2	0	112.2 - 199.5	0.34 - 0.6
M3	0	63.1 - 112.2	0.19 - 0.34
M4	0	<63.1	<0.19
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
M2	0	354.8 - 631	1.07 - 1.91
M3	0	199.5 - 354.8	0.6 - 1.07
M4	0	<199.5	<0.6



0 dB = 139.9V/m

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Date/Time: 2008/9/24 15:22:06

## HAC\_H\_Dipole\_1880MHz

**DUT: HAC Dipole 1880 MHz; Type: CD1880V3;**

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

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

Phantom section: H Dipole Section

DASY4 Configuration:

- Probe: H3DV6 - SN6142; ; Calibrated: 2008/4/21
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2008/1/24
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

### H Scan - H3DV6 probe center 10mm above CD1880 Dipole/Hearing Aid

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

Maximum value of peak Total field = 0.470 A/m

Probe Modulation Factor = 1.00

Device Reference Point: 0.000, 0.000, 354.7 mm

Reference Value = 0.496 A/m; Power Drift = -0.008 dB

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

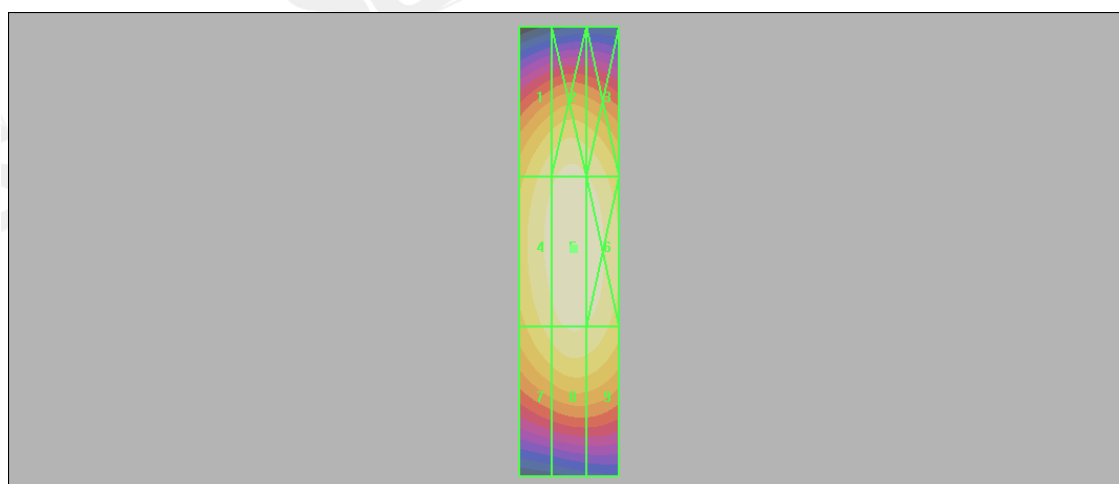
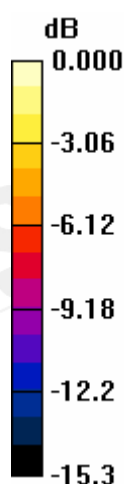
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## Peak H-field in A/m

Grid 1 <b>0.406 M2</b>	Grid 2 <b>0.435 M2</b>	Grid 3 <b>0.420 M2</b>
Grid 4 <b>0.437 M2</b>	Grid 5 <b>0.470 M2</b>	Grid 6 <b>0.458 M2</b>
Grid 7 <b>0.393 M2</b>	Grid 8 <b>0.425 M2</b>	Grid 9 <b>0.415 M2</b>

Category	AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
M1	0	199.5 - 354.8	0.6 - 1.07
M2	0	112.2 - 199.5	0.34 - 0.6
M3	0	63.1 - 112.2	0.19 - 0.34
M4	0	<63.1	<0.19
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
M2	0	354.8 - 631	1.07 - 1.91
M3	0	199.5 - 354.8	0.6 - 1.07
M4	0	<199.5	<0.6



0 dB = 0.470A/m

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Date/Time: 2008/10/6 13:05:02

## HAC\_E\_Dipole\_1880MHz

**DUT: HAC-Dipole 1880MHz; Type: CD1880V3;**

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

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

Phantom section: E Dipole Section

DASY4 Configuration:

- Probe: H3DV6 - SN6142; ; Calibrated: 2008/4/21
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2008/1/24
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

**E Scan - ER probe center 10mm above CD1880 Dipole/Hearing Aid****Compatibility Test (41x181x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 135.6 V/m

Probe Modulation Factor = 1.00

Device Reference Point: 0.000, 0.000, 354.7 mm

Reference Value = 163.9 V/m; Power Drift = -0.046 dB

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

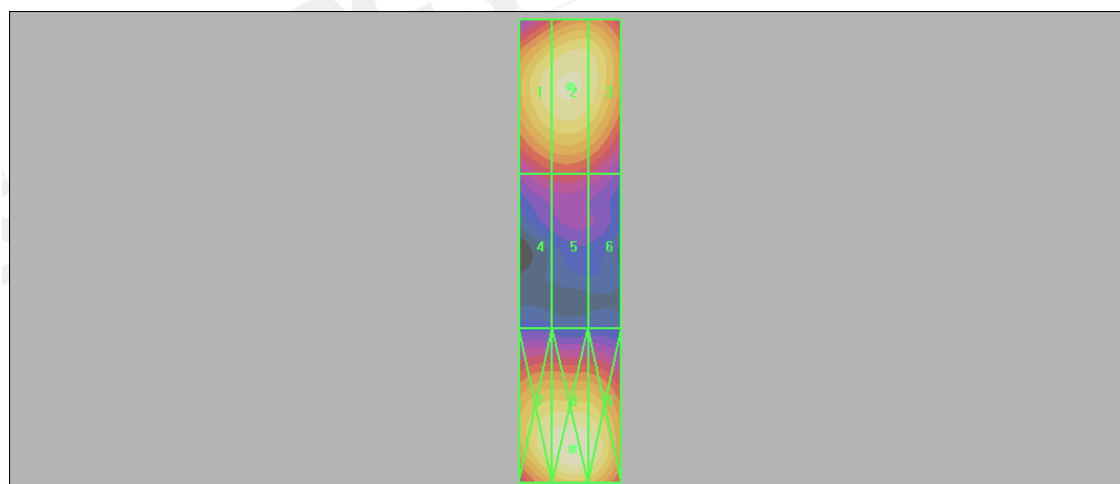
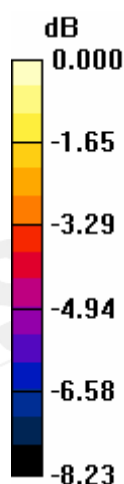
Peak E-field in V/m

Grid 1 <b>132.3 M2</b>	Grid 2 <b>135.6 M2</b>	Grid 3 <b>132.4 M2</b>
Grid 4 <b>89.9 M3</b>	Grid 5 <b>91.6 M3</b>	Grid 6 <b>87.3 M3</b>
Grid 7 <b>136.5 M2</b>	Grid 8 <b>142.7 M2</b>	Grid 9 <b>138.7 M2</b>

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Category	AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
M1	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M2	0	112.2 - 199.5	0.34 - 0.6
	-5	84.1 - 149.6	0.25 - 0.45
M3	0	63.1 - 112.2	0.19 - 0.34
	-5	47.3 - 84.1	0.14 - 0.25
M4	0	<63.1	<0.19
	-5	<47.3	<0.14
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
	-5	473.2 - 841.4	1.43 - 2.54
M2	0	354.8 - 631	1.07 - 1.91
	-5	266.1 - 473.2	0.8 - 1.43
M3	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M4	0	<199.5	<0.6
	-5	<149.6	<0.45



0 dB = 142.7V/m

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Date/Time: 2008/10/6 14:39:58

## HAC\_H\_Dipole\_1880MHz

**DUT: HAC Dipole 1880 MHz; Type: CD1880V3;**

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

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

Phantom section: H Dipole Section

DASY4 Configuration:

- Probe: H3DV6 - SN6142; ; Calibrated: 2008/4/21
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2008/1/24
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

**H Scan - H3DV6 probe center 10mm above CD1880 Dipole/Hearing Aid****Compatibility Test (41x181x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.481 A/m

Probe Modulation Factor = 1.00

Device Reference Point: 0.000, 0.000, 354.7 mm

Reference Value = 0.478 A/m; Power Drift = -0.010 dB

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

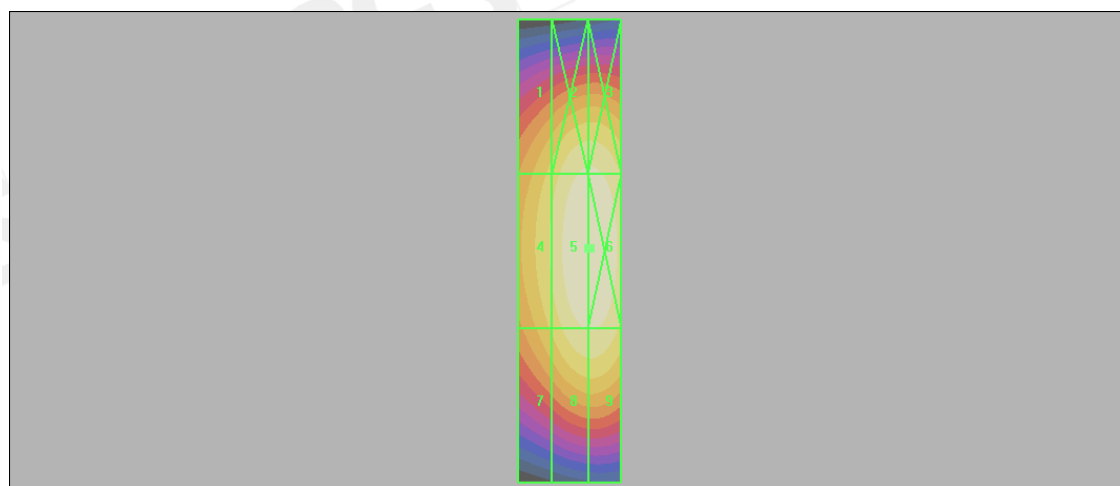
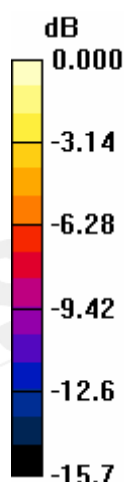
Peak H-field in A/m

Grid 1 <b>0.353 M2</b>	Grid 2 <b>0.438 M2</b>	Grid 3 <b>0.438 M2</b>
Grid 4 <b>0.388 M2</b>	Grid 5 <b>0.481 M2</b>	Grid 6 <b>0.481 M2</b>
Grid 7 <b>0.344 M2</b>	Grid 8 <b>0.430 M2</b>	Grid 9 <b>0.430 M2</b>

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Category	AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
M1	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M2	0	112.2 - 199.5	0.34 - 0.6
	-5	84.1 - 149.6	0.25 - 0.45
M3	0	63.1 - 112.2	0.19 - 0.34
	-5	47.3 - 84.1	0.14 - 0.25
M4	0	<63.1	<0.19
	-5	<47.3	<0.14
Category	AWF (dB)	Limits for E-Field Emissions (V/m) < 960MHz	Limits for H-Field Emissions (A/m) < 960 MHz
M1	0	631 - 1122	1.91 - 3.39
	-5	473.2 - 841.4	1.43 - 2.54
M2	0	354.8 - 631	1.07 - 1.91
	-5	266.1 - 473.2	0.8 - 1.43
M3	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M4	0	<199.5	<0.6
	-5	<149.6	<0.45



0 dB = 0.481A/m

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## 15. DAE & 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: **SGS (Auden)** Certificate No: **DAE4-547\_Jan08**

**CALIBRATION CERTIFICATE**

Object: **DAE4 - SD 000 D04 BA - SN: 547**

Calibration procedure(s): **QA CAL-06.v12  
Calibration procedure for the data acquisition electronics (DAE)**

Calibration date: **January 24, 2008**

Condition of the calibrated item: **In Tolerance**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Fluke Process Calibrator Type 702	SN: 8295803	04-Oct-07 (Eical AG, No: 6467)	Oct-08
Kelthrey Multimeter Type 2001	SN: 0810278	03-Oct-07 (Eical AG, No: 6465)	Oct-08

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Calibrator Box V1.1	SE UMS 006 A8 1004	25-Jun-07 (SPEAG, in house check)	In house check Jun-08

Calibrated by: **Daniel Hess** (Name), **Technician** (Function), **D. Hess** (Signature)

Approved by: **Fin Bornholt** (Name), **R&D Director** (Function), **Fin Bornholt** (Signature)

Issued: January 24, 2008

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

Certificate No: DAE4-547\_Jan08 Page 1 of 5

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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 **SGS (Auden)**

Certificate No: **ER3-2306\_Apr08**

### CALIBRATION CERTIFICATE

Object **ER3DV6 - SN:2306**

Calibration procedure(s) **QA CAL-02.v5  
Calibration procedure for E-field probes optimized for close near field  
evaluations in air**

Calibration date: **April 17, 2008**

Condition of the calibrated item **In Tolerance**

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 ± 3)°C and humidity < 70%.

Calibration Equipment used (MATE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-08 (No. 217-00788)	Apr-08
Power sensor E4412A	MY41495277	1-Apr-08 (No. 217-00788)	Apr-08
Power sensor E4412A	MY41498087	1-Apr-08 (No. 217-00788)	Apr-08
Reference 3 dB Attenuator	SN: SS054 (3c)	8-Aug-07 (No. 217-00719)	Aug-08
Reference 20 dB Attenuator	SN: SS086 (20b)	31-Mar-08 (No. 217-00787)	Apr-08
Reference 30 dB Attenuator	SN: SS129 (30b)	8-Aug-07 (No. 217-00720)	Aug-08
Reference Probe ES3DV2	SN: 3013	2-Jan-08 (No. ES3-3013_Jan08)	Jan-09
DAE4	SN: 654	20-Apr-07 (No. DAE4-654_Apr07)	Apr-08

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP B548C	US3842U01700	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-07)	In house check: Oct-08

Calibrated by:	Name <b>Katja Pokovic</b>	Function <b>Technical Manager</b>	Signature 
Approved by:	Name <b>Noel Kuster</b>	Function <b>Quality Manager</b>	Signature 

Issued: April 17, 2008

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Certificate No: ER3-2306\_Apr08

Page 1 of 9

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Zeughausstrasse 43, 8004 Zurich, Switzerland



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

#### Glossary:

NORM <sub>x,y,z</sub>	sensitivity in free space
DCP	diode compression point
Polarization $\phi$	$\phi$ rotation around probe axis
Polarization $\theta$	$\theta$ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\theta = 0$ 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:

- a) IEEE Std 1309-2005, "IEEE Standard for calibration of electromagnetic field sensors and probes, excluding antennas, from 9 kHz to 40 GHz", December 2005.

#### Methods Applied and Interpretation of Parameters:

- NORM<sub>x,y,z</sub>**: Assessed for E-field polarization  $\theta = 0$  for XY sensors and  $\theta = 90$  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 (no uncertainty required). DCP does not depend on frequency.
- 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).

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ER3DV6 SN:2306

April 17, 2008

## Probe ER3DV6

SN:2306

Manufactured:	December 17, 2002
Last calibrated:	April 20, 2007
Recalibrated:	April 17, 2008

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

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ER3DV6 SN:2306

April 17, 2008

**DASY - Parameters of Probe: ER3DV6 SN:2306****Sensitivity in Free Space [ $\mu\text{V}/(\text{V}/\text{m})^2$ ]**

NormX	<b>1.08 <math>\pm</math> 10.1 % (k=2)</b>
NormY	<b>1.11 <math>\pm</math> 10.1 % (k=2)</b>
NormZ	<b>1.26 <math>\pm</math> 10.1 % (k=2)</b>

**Diode Compression<sup>A</sup>**

DCP X	<b>96 mV</b>
DCP Y	<b>96 mV</b>
DCP Z	<b>100 mV</b>

**Frequency Correction**

X	<b>0.0</b>
Y	<b>0.0</b>
Z	<b>0.0</b>

**Sensor Offset**

(Probe Tip to Sensor Center)

X	<b>2.5 mm</b>
Y	<b>2.5 mm</b>
Z	<b>2.5 mm</b>

**Connector Angle****-224 °**

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

<sup>A</sup> numerical linearization parameter; uncertainty not required

Certificate No: ER3-2306\_Apr08

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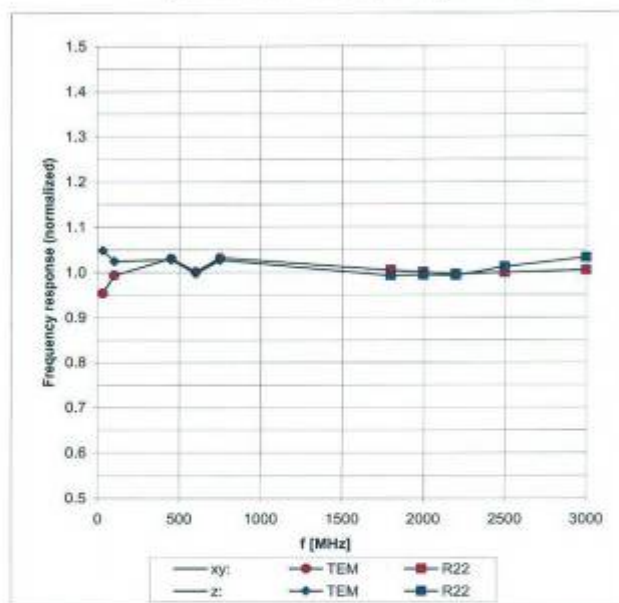


ER3DV6 SN:2306

April 17, 2008

## Frequency Response of E-Field

(TEM-Cell:ifi110 EXX, Waveguide R22)

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

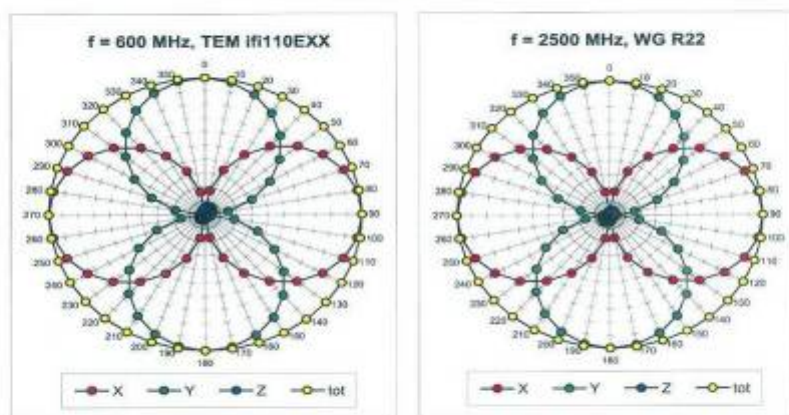
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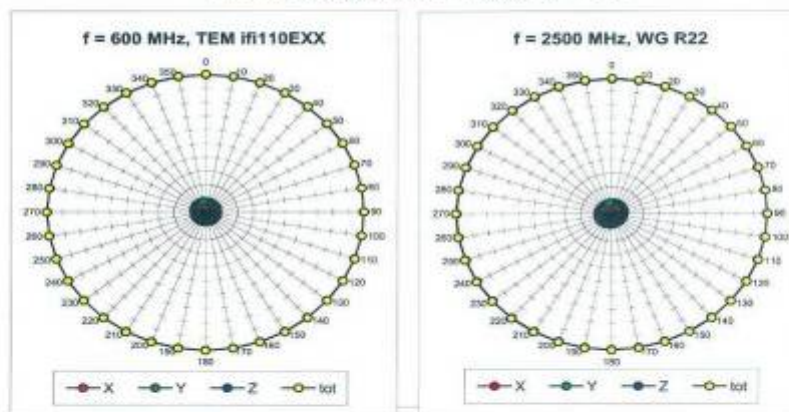
ER3DV6 SN:2306

April 17, 2008

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



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



Certificate No: ER3-2306\_Apr08

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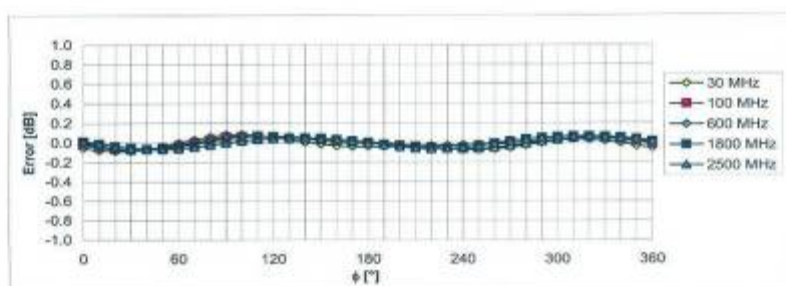
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ER3DV6 SN:2306

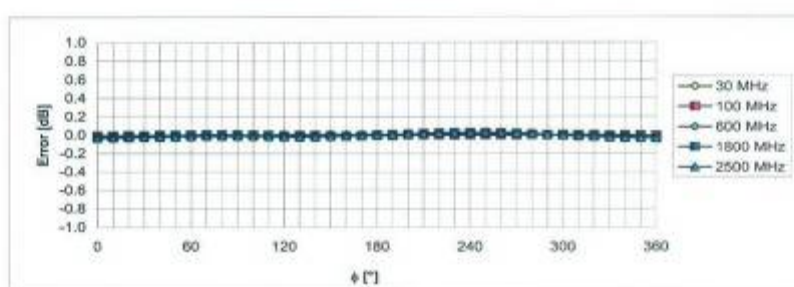
April 17, 2008

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



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

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



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

Certificate No: ER3-2306\_Apr08

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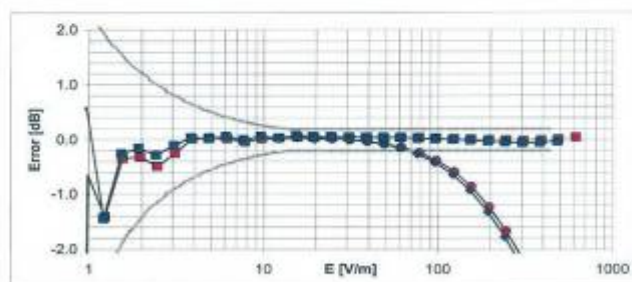
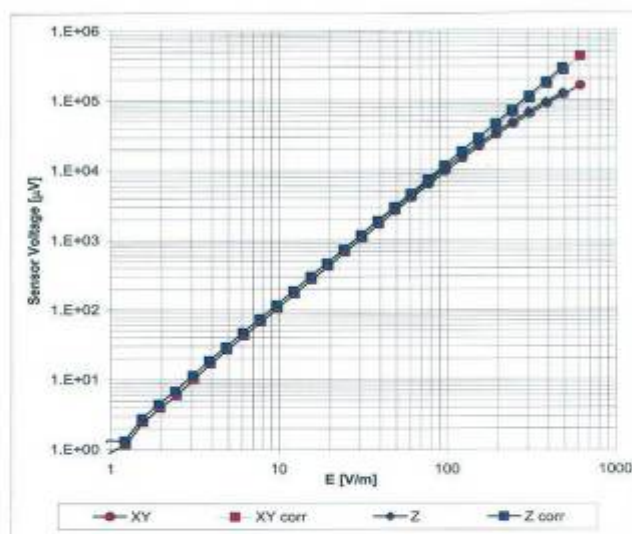
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ER3DV6 SN:2306

April 17, 2008

## Dynamic Range f(E-field) (Waveguide R22, f = 1800 MHz)



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

Certificate No: ER3-2306\_Apr08

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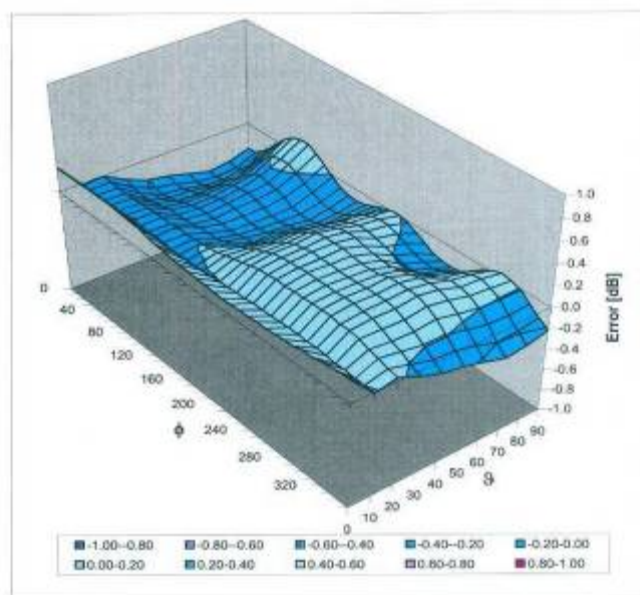
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ER3DV6 SN:2306

April 17, 2008

### Deviation from Isotropy in Air Error ( $\phi$ , $\theta$ ), $f = 900$ MHz

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

Certificate No: ER3-2306\_Apr08

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Accreditation No.: SCS 108

Client: SGS (Auden)

Certificate No: H3-6142\_Apr08

### CALIBRATION CERTIFICATE

Object	H3DV6 - SN:6142		
Calibration procedure(s)	QA CAL-03.v5 Calibration procedure for H-field probes optimized for close near field evaluations in air		
Calibration date:	April 21, 2008		
Condition of the calibrated item	In Tolerance		
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 ± 3)°C and humidity < 70%.			
Calibration Equipment used (M&TE critical for calibration)			
Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
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Power sensor E4412A	MY41498087	1-Apr-08 (No. 217-00788)	Apr-09
Reference 3 dB Attenuator	SN: S5054 (3c)	8-Aug-07 (No. 217-00719)	Aug-08
Reference 20 dB Attenuator	SN: S5086 (20b)	31-Mar-08 (No. 217-00787)	Apr-09
Reference 30 dB Attenuator	SN: S5129 (30b)	8-Aug-07 (No. 217-00720)	Aug-08
Reference Probe H3DV6	SN: 6182	2-Oct-07 (No. H3-6182_Oct07)	Oct-08
DAE4	SN: 660	3-Sep-07 (No. DAE4-660_Sep07)	Sep-08
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642UC1700	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390685	18-Oct-01 (in house check Oct-07)	In house check: Oct-08
Calibrated by:	Name Katja Pokorski	Function Technical Manager	Signature 
Approved by:	Name Nikola Kusler	Function Quality Manager	Signature 
Issued: April 21, 2008			
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Certificate No: H3-6142\_Apr08

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



**S** Schweizerischer Kalibrierdienst  
**C** Service suisse d'étalonnage  
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Accreditation No.: SCS 108

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- $X, Y, Z(f)_{a0a1a2} = X, Y, Z_{a0a1a2} \cdot \text{frequency\_response}$  (see Frequency Response Chart).
- DCP<sub>x,y,z</sub>: DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency.
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- Sensor Offset: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
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H3DV6 SN:6142

April 21, 2008

## Probe H3DV6

SN:6142

Manufactured: July 3, 2002  
Last calibrated: April 20, 2007  
Recalibrated: April 21, 2008

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

Certificate No: H3-6142\_Apr08

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H3DV6 SN:6142

April 21, 2008

## Probe H3DV6

SN:6142

Manufactured:	July 3, 2002
Last calibrated:	April 20, 2007
Recalibrated:	April 21, 2008

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

Certificate No: H3-6142\_Apr08

Page 3 of 8

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H3DV6 SN:6142

April 21, 2008

**DASY - Parameters of Probe: H3DV6 SN:6142**Sensitivity in Free Space [A/m /  $\sqrt{\mu\text{V}}$ ]

	a0	a1	a2
X	2.690E-03	-3.109E-5	-2.870E-5 $\pm$ 5.1 % (k=2)
Y	2.661E-03	-5.442E-5	-6.570E-6 $\pm$ 5.1 % (k=2)
Z	3.031E-03	-2.357E-4	1.583E-5 $\pm$ 5.1 % (k=2)

Diode Compression<sup>1</sup>

DCP X	86 mV
DCP Y	86 mV
DCP Z	85 mV

Sensor Offset

(Probe Tip to Sensor Center)

X	3.0 mm
Y	3.0 mm
Z	3.0 mm

Connector Angle

-248 °

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>1</sup> numerical linearization parameter; uncertainty not required

Certificate No: H3-6142\_Apr08

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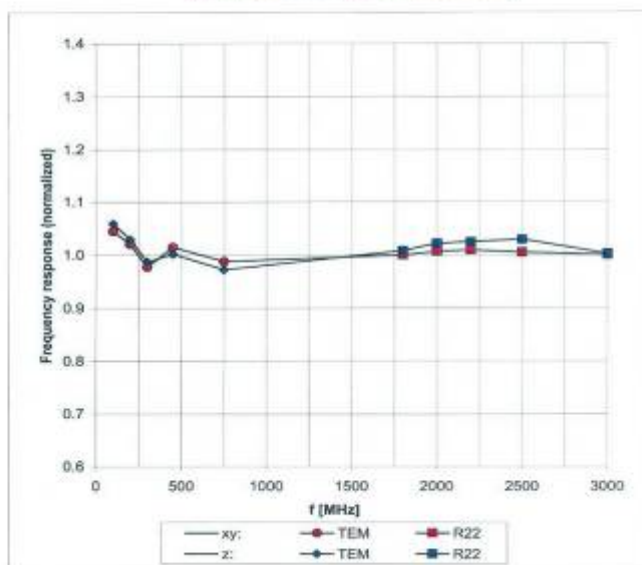
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H3DV6 SN:6142

April 21, 2008

## Frequency Response of H-Field

(TEM-Cell:ifi110, Waveguide R22)

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

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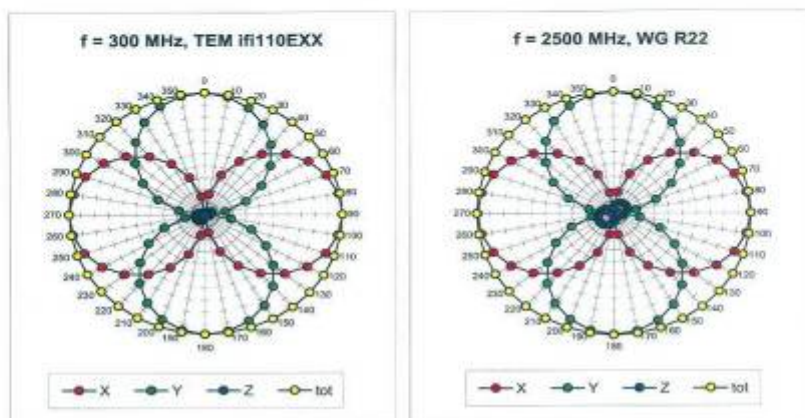
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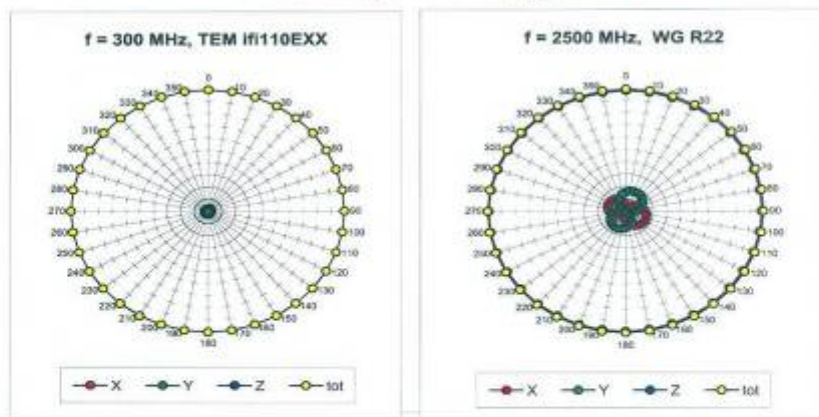
H3DV6 SN:6142

April 21, 2008

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



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



Certificate No: H3-6142\_Apr08

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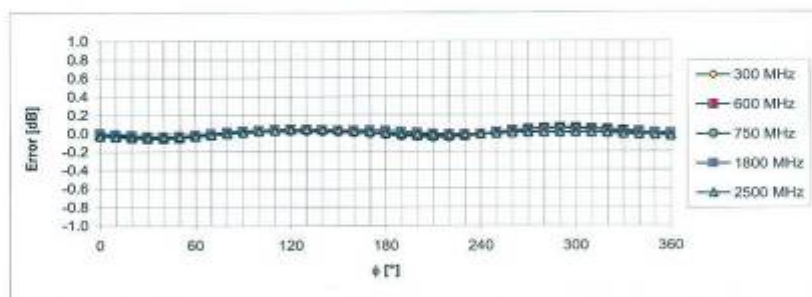
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H3DV6 SN:6142

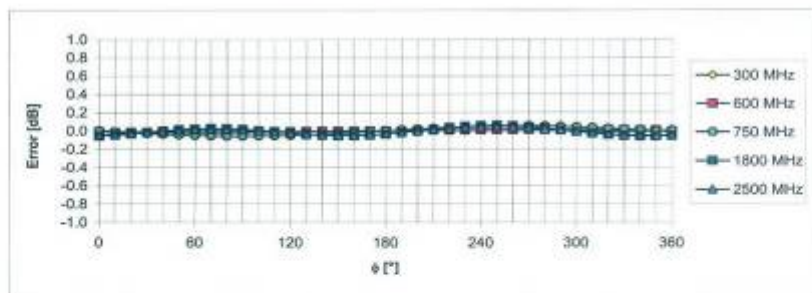
April 21, 2008

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



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

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



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

Certificate No: H3-6142\_Apr08

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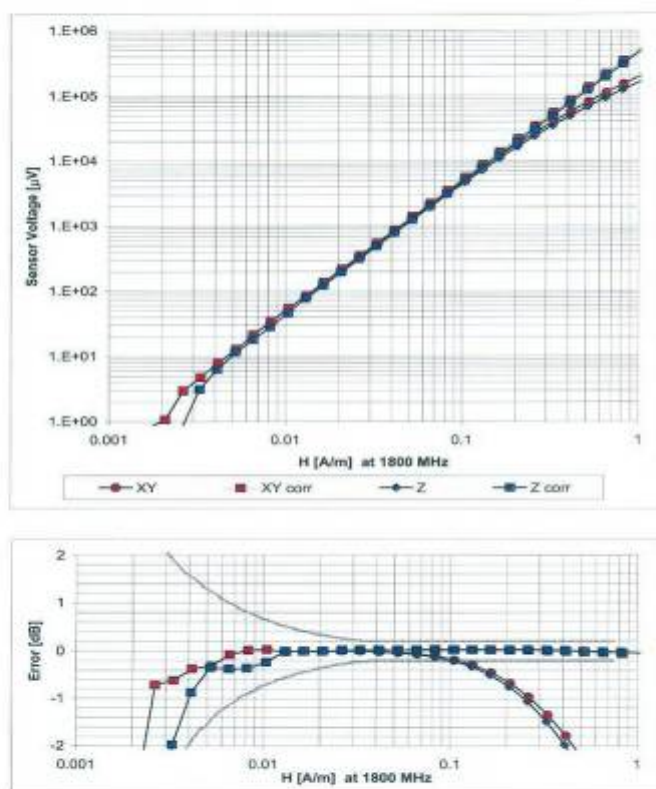
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H3DV6 SN:6142

April 21, 2008

**Dynamic Range f(H-field)**  
(Waveguide R22, f = 1800 MHz)

Certificate No: H3-8142\_Apr08

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## 16. Uncertainty Analysis

HAC-Extension Setup Performance Test Using SPEAG Calibration Dipoles							
Error Description	Uncertainty value	Prob. Dist.	Div.	$(c_1)$ E	$(c_2)$ H	Std. Unc. E	Std. Unc. H
<b>Measurement System</b>							
Probe Calibration	±5.1 %	N	1	1	1	±5.1 %	±5.1 %
Axial Isotropy	±4.7 %	R	$\sqrt{3}$	1	1	±2.7 %	±2.7 %
Sensor Displacement	±16.5 %	R	$\sqrt{3}$	1	0.145	±9.5 %	±1.4 %
Boundary Effects	±2.4 %	R	$\sqrt{3}$	1	1	±1.4 %	±1.4 %
Linearity	±4.7 %	R	$\sqrt{3}$	1	1	±2.7 %	±2.7 %
Scaling to Peak Envelope Power	±0 %	R	$\sqrt{3}$	1	1	±0 %	±0 %
System Detection Limit	±1.0 %	R	$\sqrt{3}$	1	1	±0.6 %	±0.6 %
Readout Electronics	±0.3 %	N	1	1	1	±0.3 %	±0.3 %
Response Time	±0 %	R	$\sqrt{3}$	1	1	±0 %	±0 %
Integration Time	±0 %	R	$\sqrt{3}$	1	1	±0 %	±0 %
RF Ambient Conditions	±3.0 %	R	$\sqrt{3}$	1	1	±1.7 %	±1.7 %
RF Reflections	±6.0 %	R	$\sqrt{3}$	1	1	±3.5 %	±3.5 %
Probe Positioner	±1.2 %	R	$\sqrt{3}$	1	0.67	±0.7 %	±0.5 %
Probe Positioning	±4.7 %	R	$\sqrt{3}$	1	0.67	±2.7 %	±1.8 %
Extrap. and Interpolation	±1.0 %	R	$\sqrt{3}$	1	1	±0.6 %	±0.6 %
<b>Dipole Related</b>							
Distance Dipole - Scanning Plane	±5.2 %	R	$\sqrt{3}$	1	0.3	±3.0 %	±0.9 %
Input power	±4.7 %	N	1	1	1	±4.7 %	±4.7 %
Combined Std. Uncertainty						±13.7 %	±9.3 %
<b>Expanded Std. Uncertainty on Power</b>						±27.4 %	±18.6 %
<b>Expanded Std. Uncertainty on Field</b>						±13.7 %	±9.3 %

Table 28.1: Uncertainty budget for HAC setup performance test. The budget is valid for the frequency range 800 MHz - 3 GHz and represents a worst-case analysis with respect to power uncertainty of the field. Some of the parameters are dependent on the user situations and need adjustment according to the actual laboratory conditions.

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## 17. System Validation from Original equipment supplier

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 **SGS (Auden)**

Certificate No: CD835V3-1052\_Apr08

### CALIBRATION CERTIFICATE

Object **CD835V3 - SN: 1052**

Calibration procedure(s) **QA CAL-20.v4  
Calibration procedure for dipoles in air**

Calibration date: **April 10, 2008**

Condition of the calibrated item **In Tolerance**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).  
All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	04-Oct-07 (No. 217-00736)	Oct-08
Power sensor HP 8481A	US37292783	04-Oct-07 (No. 217-00738)	Oct-08
Probe ER3DV6	SN: 2336	31-Dec-07 (No. ER3-2336_Dec07)	Dec-08
Probe H3DV6	SN: 6065	31-Dec-07 (No. H3-6065_Dec07)	Dec-08
DAE4	SN: 781	2-Oct-07 (No. DAE4-781_Oct07)	Oct-08

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-4419B	GB42420181	11-May-08 (in house check Oct -07)	In house check: Nov-08
Power sensor HP 8482A	US37295597	11-May-08 (in house check Oct -07)	In house check: Nov-08
Power sensor HP 8482H	3318A00460	08-Jan-02 (in house check Oct -07)	In house check: Nov-08
Network Analyzer HP 8753E	US37390685	18-Oct-01 (in house check Oct-07)	In house check: Nov-08
RF generator E4433B	MY 41310381	22-Nov-04 (in house check Oct-07)	In house check: Nov-08

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

Approved by: **Fin Bornholt** **Technical Director**

Issued: April 14, 2008

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Certificate No: CD835V3-1052\_Apr08

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## 3.3.2 DASY4 H-field result

Date/Time: 09.04.2008 14:06:12

Test Laboratory: SPEAG Lab 2

H\_CD835\_1052\_080409

DUT: HAC-Dipole 835 MHz; Type: D835V3; Serial: 1052

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

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

Phantom section: H Dipole Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: H3DV6 - SN6065; ; Calibrated: 31.12.2007
- Sensor-Surface: (Fix Surface)
- Electronics: DALE4 Sn781; Calibrated: 02.10.2007
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 1070
- Measurement SW: DASY4, V4.7 Build 65; Postprocessing SW: SEMCAD, V1.8 Build 176

H Scan - Sensor Center 10mm above CD835 Dipole/Hearing Aid Compatibility Test (41x361x1):

Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.457 A/m

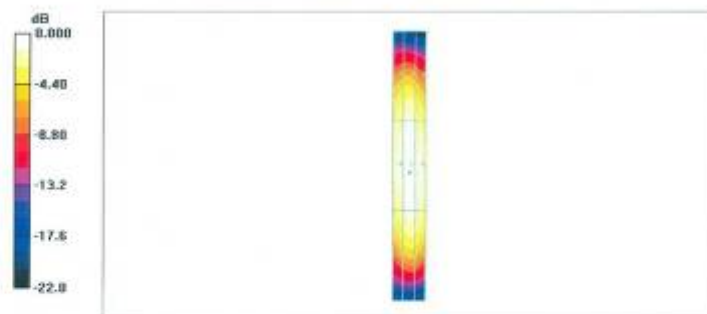
Probe Modulation Factor = 1.00

Reference Value = 0.486 A/m; Power Drift = -0.003 dB

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

Peak H-field in A/m

Grid 1	Grid 2	Grid 3
0.385 M4	0.401 M4	0.373 M4
Grid 4	Grid 5	Grid 6
0.433 M4	0.457 M4	0.433 M4
Grid 7	Grid 8	Grid 9
0.381 M4	0.411 M4	0.393 M4



0 dB = 0.457 A/m



### 3.3.3 DASY4 E-field result

Date/Time: 10.04.2008 14:46:36

Test Laboratory: SPEAG Lab 2

E\_CD835\_1052\_080410

DUT: HAC-Dipole 835 MHz; Type: D835V3; Serial: 1052

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>

Phantom section: E Dipole Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ER3DV6 - SN2336; ConvF(1, 1, 1); Calibrated: 31.12.2007
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 02.10.2007
- Phantom: HAC Test Arch with Coil; Type: SD-HAC P01 BA; Serial: 1070
- Measurement SW: DASY4, V4.7 Build 61; Postprocessing SW: SEMCAD, V1.8 Build 176

E Scan - Sensor Center 10mm above CD835 Dipole 2/Hearing Aid Compatibility Test (41x361x1):

Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 165.2 V/m

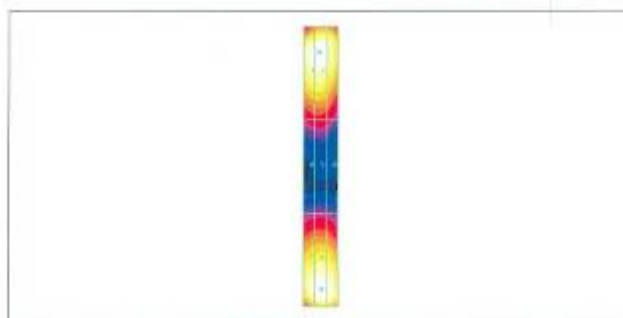
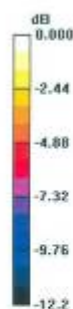
Probe Modulation Factor = 1.00

Reference Value = 104.3 V/m; Power Drift = -0.008 dB

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

Peak E-field in V/m

Grid 1 161.1 M4	Grid 2 163.4 M4	Grid 3 153.7 M4
Grid 4 87.2 M4	Grid 5 88.2 M4	Grid 6 83.4 M4
Grid 7 158.5 M4	Grid 8 165.2 M4	Grid 9 161.7 M4



0 dB = 165.2V/m

**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 **SGS (Auden)**

Certificate No: **CD1880V3-1044\_Apr08**

## CALIBRATION CERTIFICATE

Object **CD1880V3 - SN: 1044**

Calibration procedure(s) **QA CAL-20.v4  
Calibration procedure for dipoles in air**

Calibration date: **April 10, 2008**

Condition of the calibrated item **In Tolerance**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).  
All calibrations have been conducted in the closed laboratory facility: environment temperature ( $22 \pm 3$ )°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	04-Oct-07 (No. 217-00736)	Oct-08
Power sensor HP 8481A	US37292783	04-Oct-07 (No. 217-00736)	Oct-08
Probe ER3DV6	SN: 2336	31-Dec-07 (No. ER3-2336_Dec07)	Dec-08
Probe H3DV6	SN: 6065	31-Dec-07 (No. H3-6065_Dec07)	Dec-08
DAE4	SN: 781	2-Oct-07 (No. DAE4-781_Oct07)	Oct-08

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-4419B	GB42420191	11-May-05 (in house check Oct -07)	In house check: Nov-08
Power sensor HP 8482A	US37295597	11-May-05 (in house check Oct -07)	In house check: Nov-08
Power sensor HP 8482H	3318A09450	08-Jan-02 (in house check Oct -07)	In house check: Nov-08
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-07)	In house check: Nov-08

Calibrated by:	Name <b>Claudio Leubler</b>	Function <b>Laboratory Technician</b>	Signature 
Approved by:	Name <b>Flm Bomholt</b>	Function <b>Technical Director</b>	Signature 

Issued: April 14, 2008

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## 3.3.2 DASY4 E-Field Result

Date/Time: 10.04.2008 12:31:18

Test Laboratory: SPEAG Lab 2

E\_CD1880\_1044\_080410

DUT: HAC Dipole 1880 MHz; Type: CD1880V3; Serial: 1044

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>

Phantom section: E Dipole Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ER3DV6 - SN2336; ConvF(1, 1, 1); Calibrated: 31.12.2007
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 02.10.2007
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 1070
- Measurement SW: DASY4, V4.7 Build 61; Postprocessing SW: SEMCAD, V1.8 Build 176

E Scan - Sensor Center 10mm above CD1880V3 Dipole/Hearing Aid Compatibility Test (41x181x1):

Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 141.4 V/m

Probe Modulation Factor = 1.00

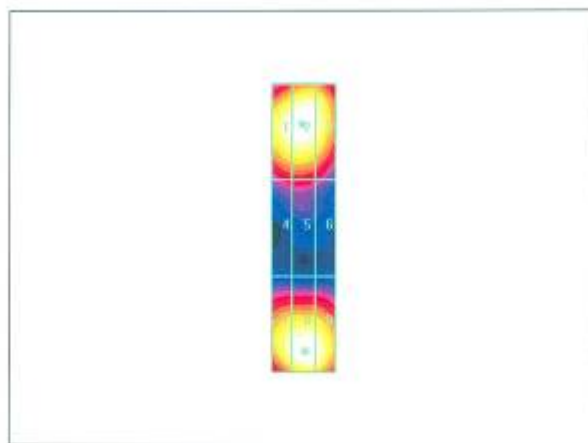
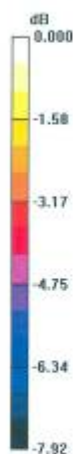
Device Reference Point: 0.000, 0.000, 354.7 mm

Reference Value = 160.0 V/m; Power Drift = 0.013 dB

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

Peak E-field in V/m

Grid 1 136.8 M2	Grid 2 139.9 M2	Grid 3 134.0 M2
Grid 4 91.9 M3	Grid 5 93.3 M3	Grid 6 87.9 M3
Grid 7 134.9 M2	Grid 8 141.4 M2	Grid 9 137.4 M2



0 dB = 141.4V/m

Certificate No: CD1880V3-1044\_Apr08

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### 3.3.2 DASY4 H-Field Result

Date/Time: 09.04.2008 15:00:21

Test Laboratory: SPEAG Lab 2

H\_CD1880\_1044\_080409

DUT: HAC Dipole 1880 MHz; Type: CD1880V3; Serial: 1044

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

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

Phantom section: H Dipole Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: H3DV6 - SN6065; : Calibrated: 31.12.2007
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 02.10.2007
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 1070
- Measurement SW: DASY4, V4.7 Build 65; Postprocessing SW: SEMCAD, V1.8 Build 176

E Scan - Sensor Center 10mm above CD1880V3 Dipole/Hearing Aid Compatibility Test (41x181x1):

Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.464 A/m

Probe Modulation Factor = 1.00

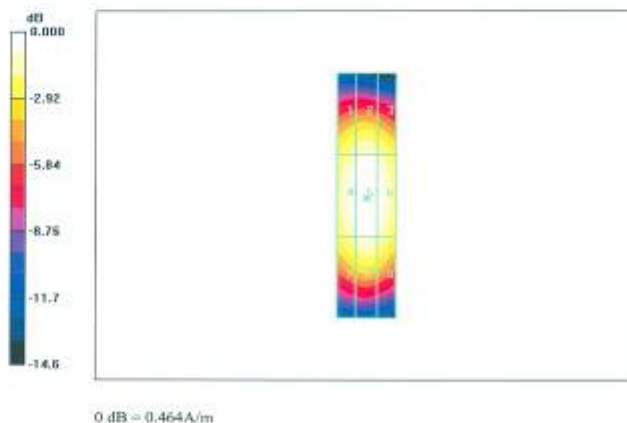
Device Reference Point: 0.000, 0.000, 354.7 mm

Reference Value = 0.492 A/m; Power Drift = -0.003 dB

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

Peak H-field in A/m

Grid 1	Grid 2	Grid 3
0.402 M2	0.420 M2	0.398 M2
Grid 4	Grid 5	Grid 6
0.444 M2	0.464 M2	0.442 M2
Grid 7	Grid 8	Grid 9
0.406 M2	0.430 M2	0.409 M2



0 dB = 0.464 A/m

## End of report

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