



# HAC (RF Emission) TEST REPORT

**Summary Result: M-Rating Category = M3**

**REPORT NO.:** SA111130C18-1

**MODEL NO.:** PJ83100

**FCC ID:** NM8PJ83100

**RECEIVED:** Nov. 30, 2011

**TESTED:** Jan. 06, 2012 ~ Jan. 18, 2012

**ISSUED:** Jan. 30, 2012

**APPLICANT:** HTC Corporation

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**ISSUED BY:** Bureau Veritas Consumer Products Services  
(H.K.) Ltd., Taoyuan Branch

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**TEST LOCATION:** No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei  
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R.O.C.

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## TABLE OF CONTENTS

RELEASE CONTROL RECORD .....	3
1. CERTIFICATION .....	4
2. GENERAL INFORMATION .....	5
2.1 GENERAL DESCRIPTION OF EUT .....	5
2.2 DESCRIPTION OF SUPPORT UNITS .....	7
2.3 GENERAL DESCRIPTION OF APPLIED STANDARDS .....	7
3. GENERAL INFORMATION OF THE DASY5 SYSTEM .....	8
3.1. GENERAL INFORMATION OF TEST EQUIPMENT .....	8
3.2. TEST EQUIPMENT LIST .....	11
3.3. MEASUREMENT UNCERTAINTY .....	12
3.4. GENERAL DESCRIPTION OF THE HAC EVALUATION .....	13
4. PERFORMANCE CATEGORIES .....	15
5. SYSTEM CHECK .....	17
5.1. VALIDATION STRUCTURE .....	17
5.2. SYSTEM CHECK PROCEDURE .....	18
5.3. VALIDATION RESULTS .....	19
6. MODULATION FACTOR .....	20
6.1 MODULATION FACTOR TEST RESULTS .....	21
7. RF EMISSION TEST PROCEDURES .....	23
7.1. TEST INSTRUCTION .....	23
7.2. TEST PROCEDURES .....	24
7.3. DESCRIPTION OF TEST POSITION AND CONFIGURATIONS .....	25
7.4. SUMMARY OF MEASURED HAC RESULTS .....	26
8. INFORMATION ON THE TESTING LABORATORIES .....	28
APPENDIX A: TEST CONFIGURATIONS AND TEST DATA	
APPENDIX B: SYSTEM CERTIFICATE & CALIBRATION	



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## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
Original release	N/A	Jan. 30, 2012



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## 1. CERTIFICATION

**PRODUCT** : Smart Phone

**MODEL NO.** : PJ83100

**BRAND** : HTC

**APPLICANT** : HTC Corporation

**TESTED** : Jan. 06, 2012 ~ Jan. 18, 2012

**STANDARDS** : FCC 47 CFR Part 20.19  
ANSI C63.19-2007

**TEST ITEM:** RF emissions

The above equipment have been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's characteristics under the conditions specified in this report.

PREPARED BY : Ivonne Wu , DATE: Jan. 30, 2012  
Ivonne Wu / Senior Specialist

APPROVED BY : Roy Wu , DATE: Jan. 30, 2012  
Roy Wu / Manager



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## 2. GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

<b>EUT</b>	Smart Phone
<b>MODEL NO.</b>	PJ83100
<b>CLASSIFICATION</b>	Production Unit
<b>MODULATION TYPE</b>	GSM: GMSK WCDMA: QPSK
<b>TX FREQUENCY RANGE</b>	GSM850: 824 MHz ~ 849 MHz GSM1900: 1850 MHz ~ 1910 MHz WCDMA Band V: 824 MHz ~ 849 MHz WCDMA Band II: 1850 MHz ~ 1910 MHz
<b>ANTENNA TYPE</b>	Fixed internal antenna
<b>ACCESSORY DEVICES</b>	Refer to Note as below

Air Interfaces/Bands List						
Air Interface	Band	Type	C63.19 Tested	Simultaneous Transmissions	Reduced Power	VOIP
GSM	850	Voice	Yes	WLAN+BT	N/A	N/A
	1900	Voice	Yes	WLAN+BT	N/A	N/A
WCDMA	II	Voice	Yes	WLAN+BT	N/A	N/A
	V	Voice	Yes	WLAN+BT	N/A	N/A
GSM	850	Data	N/A	WLAN+BT	N/A	Yes
	1900	Data	N/A	WLAN+BT	N/A	Yes
WCDMA	II	Data	N/A	WLAN+BT	N/A	Yes
	V	Data	N/A	WLAN+BT	N/A	Yes
LTE	4	Data	N/A	WLAN+BT	N/A	Yes
	17	Data	N/A	WLAN+BT	N/A	Yes
WLAN	2.4G	Data	N/A	WLAN+BT	N/A	Yes
	5G	Data	N/A	WLAN+BT	N/A	Yes
BT	2.4G	Data	N/A	WCDMA	N/A	N/A

**Note: The HAC rating was evaluated for voice mode only.**



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**NOTE:**

1. The EUT's accessories list refers to Ext Pho\_NM8PJ83100.pdf.
2. Conducted power list as below:

<b>Band</b>	<b>GSM850</b>			<b>GSM1900</b>		
<b>Channel</b>	<b>128</b>	<b>190</b>	<b>251</b>	<b>512</b>	<b>661</b>	<b>810</b>
<b>Frequency (MHz)</b>	<b>824.2</b>	<b>836.6</b>	<b>848.8</b>	<b>1850.2</b>	<b>1880.0</b>	<b>1909.8</b>
GSM (GMSK, 1 slot)	33.36	33.01	33.11	30.55	30.27	30.61
GPRS 8 (GMSK, 1 slot)	33.35	32.98	33.18	30.51	30.16	30.52
GPRS 10 (GMSK, 2 slot)	30.39	30.17	30.07	29.59	29.54	29.50
EDGE 8 (GMSK, 1 slot)	33.21	33.13	33.15	30.28	30.14	30.22
EDGE 10 (GMSK, 2 slot)	30.11	30.06	30.09	29.46	29.39	29.41
EDGE 8 (8PSK, 1 slot)	26.59	26.51	26.47	26.28	26.23	26.15
EDGE 10 (8PSK, 2 slot)	26.74	26.68	26.60	26.40	26.30	26.21

<b>Band</b>	<b>WCDMA Band II</b>			<b>WCDMA Band V</b>		
<b>Channel</b>	<b>9262</b>	<b>9400</b>	<b>9538</b>	<b>4132</b>	<b>4182</b>	<b>4233</b>
<b>Frequency (MHz)</b>	<b>1852.4</b>	<b>1880.0</b>	<b>1907.6</b>	<b>826.4</b>	<b>836.4</b>	<b>846.6</b>
<b>RMC 12.2K</b>	23.12	23.26	23.13	23.55	23.51	23.49
<b>HSDPA Subtest-1</b>	22.37	22.62	22.56	22.77	22.75	22.76
<b>HSDPA Subtest-2</b>	22.35	22.62	22.57	22.76	22.81	22.75
<b>HSDPA Subtest-3</b>	21.53	21.72	21.69	22.09	21.95	22.03
<b>HSDPA Subtest-4</b>	21.55	21.75	21.65	22.09	22.05	22.02
<b>HSUPA Subtest-1</b>	21.72	22.28	22.07	22.68	22.65	22.56
<b>HSUPA Subtest-2</b>	19.14	18.90	19.15	19.57	19.52	19.57
<b>HSUPA Subtest-3</b>	20.22	20.27	20.25	20.66	20.67	20.68
<b>HSUPA Subtest-4</b>	19.12	19.06	19.17	19.66	19.65	19.64
<b>HSUPA Subtest-5</b>	22.31	22.47	22.42	22.76	22.72	22.76

3. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.



## 2.2 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.
1	Universal Radio Communication Tester	R&S	101372	Oct. 10, 2012

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA

**NOTE:** All power cords of the above support units are non shielded (1.8m).

## 2.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

According to the specifications of the manufacturer, this product must comply with the requirements of the following standards:

**FCC 47 CFR Part 20.19**

**ANSI C63.19 – 2007**

All test items have been performed and recorded as per the above standards.



### 3. GENERAL INFORMATION OF THE DASY5SYSTEM

#### 3.1. GENERAL INFORMATION OF TEST EQUIPMENT

DASY5 consists of high precision robot, probe alignment sensor, phantom, robot controller, controlled measurement server and near-field probe. The robot includes six axes that can move to the precision position of the DASY5 software defined. The DASY5 software can define the area that is detected by the probe. The robot is connected to controlled box. Controlled measurement server is connected to the controlled robot box. The DAE includes amplifier, signal multiplexing, AD converter, offset measurement and surface detection. It is connected to the Electro-optical coupler (ECO). The ECO performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC.

#### ER3DV6 E-FIELD PROBE

<b>CONSTRUCTION</b>	One dipole parallel, two dipoles normal to probe axis Built-in shielding against static charges
<b>CALIBRATION</b>	In air from 100MHz to 3.0GHz (absolute accuracy $\pm 6.0\%$ , $k = 2$ )
<b>FREQUENCY</b>	100MHz to > 6GHz; Linearity: $\pm 0.2\text{dB}$ (100MHz to 3GHz)
<b>DIRECTIVITY</b>	$\pm 0.2\text{dB}$ in air (rotation around probe axis) $\pm 0.4\text{dB}$ in air (rotation normal to probe axis)
<b>DYNAMIC RANGE</b>	2V/m to > 1000V/m (M3 or better device readings fall well below diode compression point) Linearity: $\pm 0.2\text{dB}$
<b>DIMENSIONS</b>	Overall length: 330mm (Tip: 16mm) Tip diameter: 8mm (Body: 12mm) Distance from probe tip to dipole centers: 2.5mm

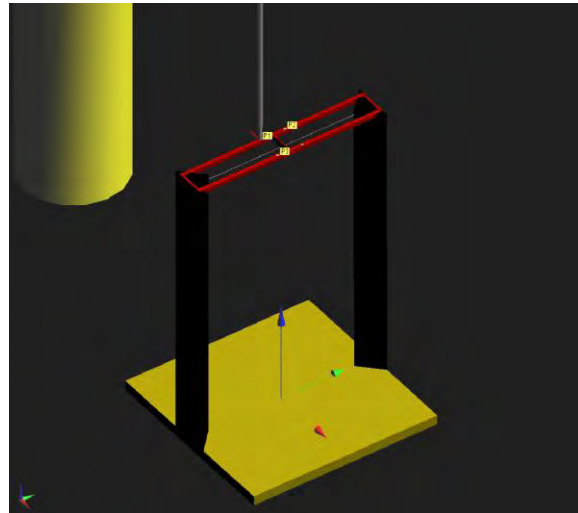
#### H3DV6 H-FIELD PROBE

<b>CONSTRUCTION</b>	Three concentric loop sensors with 3.8mm loop diameters Resistively loaded detector diodes for linear response Built-in shielding against static charges
<b>FREQUENCY</b>	200MHz to 3GHz (absolute accuracy $\pm 6.0\%$ , $k = 2$ ); Output linearized
<b>DIRECTIVITY</b>	$\pm 0.25\text{dB}$ (spherical isotropy error)
<b>DYNAMIC RANGE</b>	10mA/m to 2A/m at 1GHz (M3 or better device readings fall well below diode compression point)
<b>DIMENSIONS</b>	Overall length: 330mm (Tip: 40mm) Tip diameter: 6mm (Body: 12mm) Distance from probe tip to dipole centers: 3mm
<b>E-FIELD INTERFERENCE</b>	< 10% at 3GHz (for plane wave)

**NOTE:** The Probe parameters have been calibrated by the SPEAG. Please reference "APPENDIX D" for the Calibration Certification Report.



## HAC ARCH



**DIMENSIONS**      370 x 370 x 370mm

### SYSTEM VALIDATION KITS:

**CD835V3**    **Frequency Band:** 800 ~ 960MHz (free space)

**Return Loss:** > 15dB

**Calibrated at:** 835MHz

**Power Capability:** 50W continuous

**Length & Height:** 166 x 330mm

**CD1880V3**    **Frequency Band:** 1710 ~ 2000MHz (free space)

**Return Loss:** > 18dB

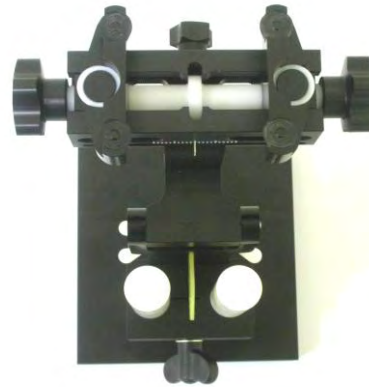
**Calibrated at:** 1880MHz

**Power Capability:** 50W continuous

**Length & Height:** 80.8 x 330mm



## DEVICE HOLDER



**CONSTRUCTION** Supports accurate and reliable positioning of any phone effect on near field  $\pm 0.5\text{dB}$

## DATA ACQUISITION ELECTRONICS ( DAE )



**CONSTRUCTION** The data acquisition electronics (DAE3) consists of a highly sensitive electrometer grade preamplifier with auto-zeroing, a channel and gain-switching multiplex, a fast 16 bit AD converter and a command decoder and control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information as well as an optical uplink for commands and the clock. The mechanical probe is mounting device includes two different sensor systems for frontal and sideways probe contacts. They are used for mechanical surface detection and probe collision detection. The input impedance of the DAE3 box is  $200\text{M}\Omega$ ; the inputs are symmetrical and floating. Common mode rejection is above 80dB.



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### 3.2. TEST EQUIPMENT LIST

NAME	BRAND	TYPE	SERIES NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
E-Field Probe	SPEAG	ER3DV6	2293	Jan. 24, 2011	Jan. 23, 2012
E-Field Probe	SPEAG	ER3DV6	2302	Jun. 15, 2011	Jun. 14, 2012
H-Field Probe	SPEAG	H3DV6	6124	Jan. 14, 2011	Jan. 13, 2012
H-Field Probe	SPEAG	H3DV6	6187	Jun. 17, 2011	Jun. 16, 2012
DAE	SPEAG	DAE4	861	Aug. 29, 2011	Aug. 28, 2012
Validation Dipole	SPEAG	CD835V3	1041	Mar. 15, 2011	Mar. 14, 2012
Validation Dipole	SPEAG	CD1880V3	1032	Apr. 12, 2011	Apr. 11, 2012

**NOTE:** Before starting the measurement, all test equipment shall be warmed up for 30min.



### 3.3. MEASUREMENT UNCERTAINTY

HAC UNCERTAINTY BUDGET ACCORDING TO ANSI C63.19[1]							
ERROR DESCRIPTION	UNCERTAINTY VALUE	PROBABILITY DISTRIBUTION	DIVISOR	( Ci ) E	( Ci ) H	STD. UNC. E (%)	STD. UNC. H (%)
<b>MEASUREMENT SYSTEM</b>							
Probe calibration	5.1	Normal	1	1	1	5.1	5.1
Axial isotropy	0.5	Rectangular	$\sqrt{3}$	1	1	0.3	0.3
Sensor Displacement	16.5	Rectangular	$\sqrt{3}$	1	0.145	9.5	1.4
Boundary Effects	2.4	Rectangular	$\sqrt{3}$	1	1	1.4	1.4
Linearity	0.6	Rectangular	$\sqrt{3}$	1	1	0.3	0.3
Scaling to Peak Envelope Power	2.0	Rectangular	$\sqrt{3}$	1	1	1.2	1.2
System Detection Limit	1.0	Rectangular	$\sqrt{3}$	1	1	0.6	0.6
Readout Electronics	0.3	Rectangular	$\sqrt{3}$	1	1	0.2	0.2
Response Time	0.8	Rectangular	$\sqrt{3}$	1	1	0.5	0.5
Integration Time	2.6	Rectangular	$\sqrt{3}$	1	1	1.5	1.5
RF Ambient Condition	3.0	Rectangular	$\sqrt{3}$	1	1	1.7	1.7
RF Reflections	12.0	Rectangular	$\sqrt{3}$	1	1	6.9	6.9
Probe Positioner	1.2	Rectangular	$\sqrt{3}$	1	0.67	0.7	0.5
Probe Positioning	4.7	Rectangular	$\sqrt{3}$	1	0.67	2.7	1.8
Extrap. And Interpolation	1.0	Rectangular	$\sqrt{3}$	1	1	0.6	0.6
<b>TEST SAMPLE RELATED</b>							
Device Positioning Vertical	2.6	Normal	1	1	1	2.6	2.6
Device Positioning Lateral	2.6	Normal	1	1	1	2.6	2.6
Device Holder and Phantom	2.4	Rectangular	$\sqrt{3}$	1	1	1.4	1.4
Power Drift	5.0	Rectangular	$\sqrt{3}$	1	1	2.9	2.9
<b>PHANTOM AND SETUP RELATED</b>							
Phantom Thickness	2.4	Rectangular	$\sqrt{3}$	1	0.67	1.4	0.9
<b>COMBINED STD. UNCERTAINTY</b>						14.4	10.7
<b>EXPANDED STD. UNCERTAINTY ON POWER</b>						28.8	21.3
<b>EXPANDED STD. UNCERTAINTY ON FIELD</b>						14.4	10.7

**NOTE:** Worst-case uncertainty budget for HAC free field assessment according to ANSI C63.19 [1]. The budget is valid for the frequency range 800MHz ~ 3GHz and represents a worst-case analysis. For specific tests and configurations, the uncertainty could be considerably smaller.

### 3.4. GENERAL DESCRIPTION OF THE HAC EVALUATION

The DASY5 post-processing software (SEMCAD) automatically executes the following procedures to calculate the field units from the micro-volt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software:

Probe parameters: - Sensitivity	Norm <sub>i</sub> , a <sub>i0</sub> , a <sub>i1</sub> , a <sub>i2</sub>
- Conversion factor	ConvF <sub>i</sub>
- Diode compression point	dcp <sub>i</sub>
Device parameters: - Frequency	F
- Crest factor	Cf

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics. If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given as:

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

V <sub>i</sub> = compensated signal of channel i	(i = x, y, z)
U <sub>i</sub> = input signal of channel i	(i = x, y, z)
Cf = crest factor of exciting field	(DASY parameter)
dcp <sub>i</sub> = diode compression point	(DASY parameter)

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

$$\mathbf{E\text{-field probes: } E_i = \sqrt{\frac{V_i}{\text{Norm}_i \cdot \text{Conv}F}}$$

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

$V_i$  = compensated signal of channel  $i$  ( $i = x, y, z$ )

$\text{Norm}_i$  = sensor sensitivity of channel  $i$   $\mu\text{V}/(\text{V/m})^2$  for E-field Probes ( $i = x, y, z$ )

$\text{Conv}F$  = sensitivity enhancement in solution

$a_{ij}$  = sensor sensitivity factors for H-field probes

$F$  = carrier frequency [GHz]

$E_i$  = electric field strength of channel  $i$  in V/m

$H_i$  = magnetic field strength of channel  $i$  in A/m

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

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

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

$E$  = field strength in V/m

$E_{tot}$  = total field strength in V/m

**NOTE:** The signal response time is evaluated as the time required by the system to reach 90% of the expected final value after an on/off switch of the power source with an integration time of 500ms and a probe response time of < 5ms. In the current implementation, DASY5 waits longer than 100ms after having reached the grid point before starting a measurement, i.e., the response time uncertainty is negligible.



## 4. PERFORMANCE CATEGORIES

The ANSI Standard presents performance requirements for acceptable interoperability of hearing aids with wireless communications devices. When these parameters are met, a hearing aid operates acceptably in close proximity to a wireless communications device.

CATEGORY NEAR FIELD	TELEPHONE RF PARAMETERS < 960MHz				
	AWF	E-FIELD EMISSION CW (dBV/m)	E-FIELD EMISSION CW (V/m)	H-FIELD EMISSION CW (dBA/m)	H-FIELD EMISSION CW (A/m)
M1	0	56.0 to 61.0	631.0 to 1122.0	5.6 to 10.6	1.91 to 3.39
	-5	53.5 to 58.5	473.2 to 841.4	3.1 to 8.1	1.43 to 2.54
M2	0	51.0 to 56.0	354.8 to 631.0	0.6 to 5.6	1.07 to 1.91
	-5	48.5 to 53.5	266.1 to 473.2	-1.9 to 3.1	0.80 to 1.43
M3	0	46.0 to 51.0	199.5 to 354.8	-4.4 to 0.6	0.60 to 1.07
	-5	43.5 to 48.5	149.6 to 266.1	-6.9 to -1.9	0.45 to 0.80
M4	0	< 46.0	< 199.5	< -4.4	< 0.60
	-5	< 43.5	< 149.6	< -6.9	< 0.45

CATEGORY NEAR FIELD	TELEPHONE RF PARAMETERS > 960MHz				
	AWF	E-FIELD EMISSION CW (dBV/m)	E-FIELD EMISSION CW (V/m)	H-FIELD EMISSION CW (dBA/m)	H-FIELD EMISSION CW (A/m)
M1	0	46.0 to 51.0	199.5 to 354.8	-4.4 to 0.6	0.60 to 1.07
	-5	43.5 to 48.5	149.6 to 266.1	-6.9 to -1.9	0.45 to 0.80
M2	0	41.0 to 46.0	112.2 to 199.5	-9.4 to -4.4	0.34 to 0.60
	-5	48.5 to 53.5	84.1 to 149.6	-11.9 to -6.9	0.25 to 0.45
M3	0	36.0 to 41.0	63.1 to 112.2	-14.4 to -9.4	0.19 to 0.34
	-5	33.5 to 38.5	47.3 to 84.1	-16.9 to -11.9	0.14 to 0.25
M4	0	< 36.0	< 63.1	< -14.4	< 0.19
	-5	< 33.5	< 47.3	< -16.9	< 0.14



## ARTICULATION WEIGHING FACTOR (AWF)

The following AWF factors shall be used for the standard transmission protocols:

STANDARD	TECHNOLOGY	AWF (dB)
TIA/EIA/IS-2000	CDMA	0
TIA/EIA-136	TDMA (50Hz)	0
iDENTM	TDMA (22 and 11Hz)	0
J-STD-007	GSM (217)	-5
T1/T1P1/3GPP	UMTS (WCDMA)	0



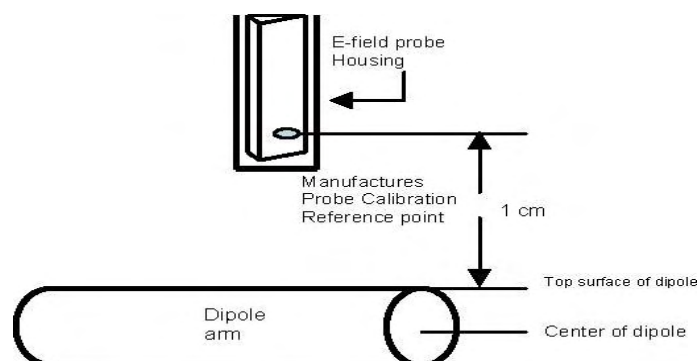
## 5. SYSTEM CHECK

The measured values (E-field and H-field) were compared with the values provided by the probe manufacturer and must within the allowed tolerance of **25%**.

### 5.1. VALIDATION STRUCTURE

The input signal was an un-modulated continuous wave. The following points were taken into consideration in performing this check:

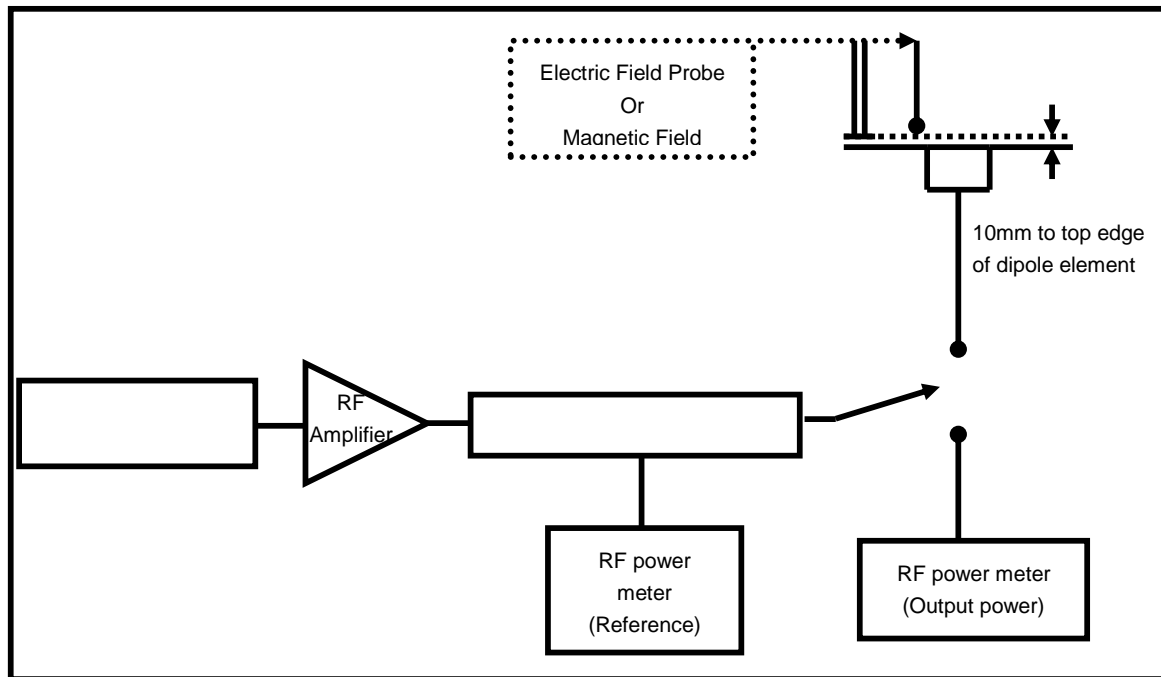
- Average Input Power  $P = 100\text{mW RMS}$  ( $20\text{dBm RMS}$ ) after adjustment for return loss
- The test fixture must meet the 2 wavelength separation criterion
- The proper measurement of the 1cm probe to dipole separation, which is measured from top surface of the dipole to the calibration reference point of the sensor, defined by the probe manufacturer is shown in the following diagram:



## 5.2. SYSTEM CHECK PROCEDURE

1. Before you start the system performance check, need only to tell the system with which components (probe type, validation dipole and HAC arch) are performing the system performance check; the system will take care of all parameters.

The system check configuration is shown in the following figure:



2. The dipole was energized with a 20dBm un-modulated continuous-wave signal.
3. The length of the dipole was scanned with both E-field and H-field probes and the maximum values for each were recorded.



### 5.3. VALIDATION RESULTS

Frequency (MHz)	Input Power (dBm)	Target Value (V/m)	E-Field 1 (V/m)	E-Field 2 (V/m)	Average Value (V/m)	Deviation (%)	Date
835	20	168.0	160.2	156.6	158.4	-5.71	Jan. 06, 2012
835	20	168.0	153.4	149.6	151.5	-9.82	Jan. 12, 2012
835	20	168.0	150.9	143.3	147.1	-12.44	Jan. 18, 2012
1880	20	142.1	140.2	142.3	141.25	-0.60	Jan. 06, 2012
1880	20	142.1	144.7	147.5	146.1	2.81	Jan. 12, 2012
1880	20	142.1	138.2	138.8	138.5	-2.53	Jan. 18, 2012
Frequency (MHz)	Input Power (dBm)	Target Value (A/m)	H-Field (A/m)		Deviation (%)	Date	
835	20	0.471	0.465		-1.27	Jan. 07, 2012	
835	20	0.471	0.476		1.06	Jan. 12, 2012	
835	20	0.471	0.546		15.92	Jan. 18, 2012	
1880	20	0.471	0.46		-2.34	Jan. 07, 2012	
1880	20	0.471	0.487		3.40	Jan. 12, 2012	
1880	20	0.471	0.541		14.86	Jan. 18, 2012	

**NOTE:** Please see Appendix for the system validation test data.



## 6. MODULATION FACTOR

A calibration was made of the modulation response of the probe and its instrumentation chain. This calibration was performed with the field probe, attached to its instrumentation. The response of the probe system to a CW field at the frequency of interest is compared to its response to a modulated signal with equal peak amplitude to that of a CW signal. The field level of the test signals are ensured to be more than 10dB above the ambient level and the noise floor of the instrumentation being used. The ratio of the CW reading to that taken with a modulated reading was applied to the DUT measurements.

### **This was done using the following procedure:**

1. Fixing the probe in a set location relative to a field generating device, such as a reference dipole antenna, as illustrated in the system check procedure.
2. Illuminate the probe using the wireless device connected to the reference dipole with a test signal at the intended measurement frequency, Ensure there is sufficient field coupling between the probe and the antenna so the resulting reading is greater than 10dB above the probe system noise floor but within the systems operating range.
3. Record the amplitude applied to the antenna during transmission and the field strength measured by the E-field probe located near the tip of the dipole antenna.
4. Replace the wireless device with an RF signal generator producing an unmodulated CW signal and set to the wireless device operating frequency.
5. Set the amplitude of the unmodulated signal to equal that recorded from the wireless device.
6. Record the reading of the probe measurement system of the unmodulated signal.
7. The RF signal generator producing an 80%AM signal and set to the wireless device operating frequency. Set the amplitude of the signal to equal that recorded from the wireless device.
8. Record the reading of the probe measurement system of the 80%AM signal.
9. The ratio, in linear units, of the probe reading in Step 3) or 8) to the reading in Step 6) is the E-field modulation factor.
10. Steps 1-9 were repeated at all frequency bands and for both E and H field probes.

**NOTE:** The ratio of the CW to modulated signal reading is the modulation factor. The modulation factors obtained were applied to readings taken of the actual wireless device, in order to obtain an accurate peak field reading using the formula:

$$\text{Peak} = 20 \cdot \log(\text{Raw} \cdot \text{ProbeModulationFactor})$$



## 6.1 MODULATION FACTOR TEST RESULTS

TEST FREQUENCY (MHz)	PROTOCOL	REFERENCE LEVEL (dBm)	MEASURED E-FILED (V/m)	E-FILED MODULATION FACTOR
835	CW	33.5	755.0	NA
	80% AM		468.0	1.61
	GSM		286.0	2.64
TEST FREQUENCY (MHz)	PROTOCOL	REFERENCE LEVEL (dBm)	MEASURED H-FILED (A/m)	H-FILED MODULATION FACTOR
835	CW	33.5	2.050	NA
	80% AM		1.650	1.24
	GSM		1.444	1.42

TEST FREQUENCY (MHz)	PROTOCOL	REFERENCE LEVEL (dBm)	MEASURED E-FILED (V/m)	E-FILED MODULATION FACTOR
1880	CW	30.5	496.7	NA
	80% AM		312.1	1.59
	GSM		185.9	2.67
TEST FREQUENCY (MHz)	PROTOCOL	REFERENCE LEVEL (dBm)	MEASURED H-FILED (A/m)	H-FILED MODULATION FACTOR
1880	CW	30.5	1.635	NA
	80% AM		1.374	1.19
	GSM		1.316	1.24

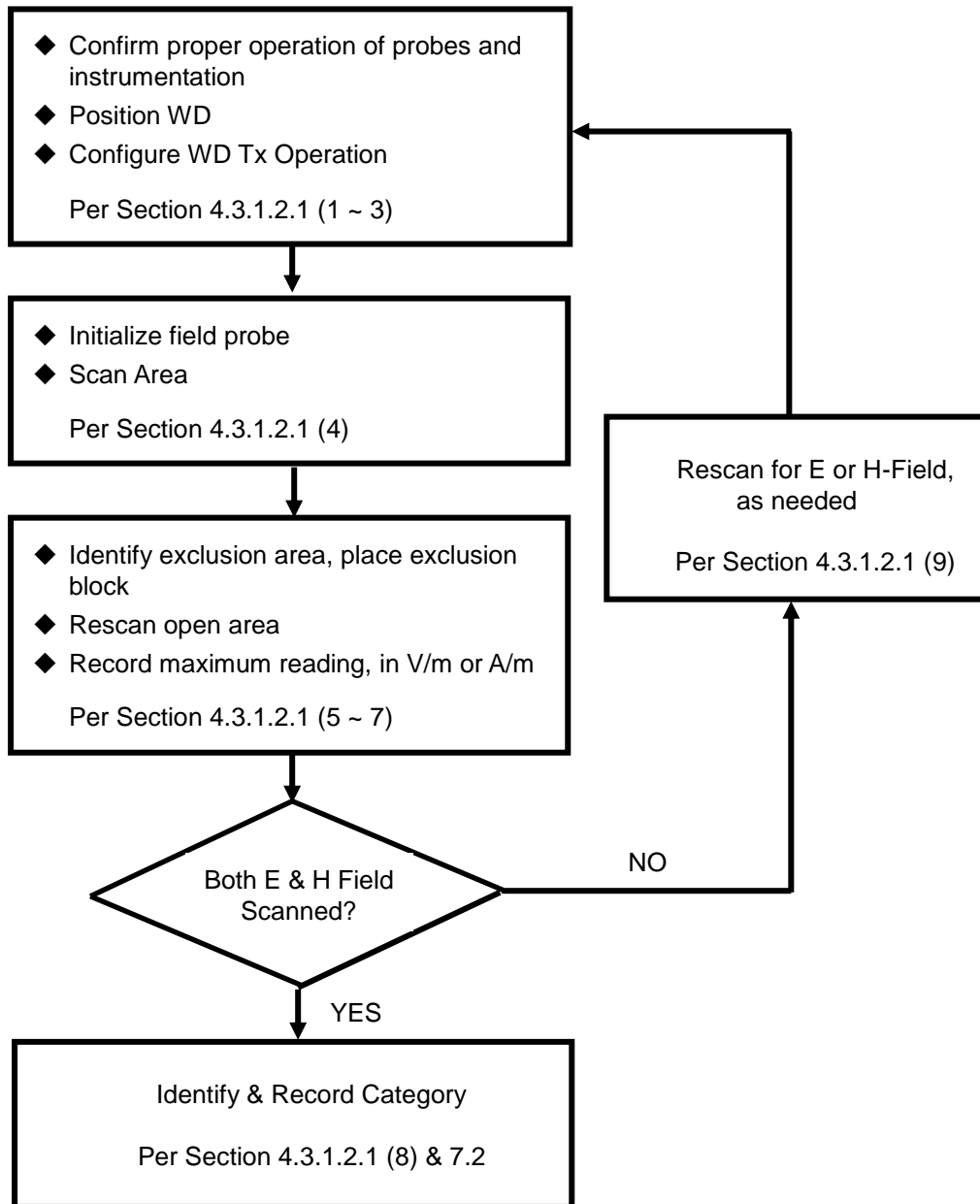


TEST FREQUENCY (MHz)	PROTOCOL	REFERENCE LEVEL (dBm)	MEASURED E-FILED (V/m)	E-FILED MODULATION FACTOR
835	CW	23.5	337.1	NA
	80% AM		219.9	1.53
	WCDMA		351.3	0.96
TEST FREQUENCY (MHz)	PROTOCOL	REFERENCE LEVEL (dBm)	MEASURED H-FILED (A/m)	H-FILED MODULATION FACTOR
835	CW	23.5	0.697	NA
	80% AM		0.495	1.41
	WCDMA		0.907	0.77

TEST FREQUENCY (MHz)	PROTOCOL	REFERENCE LEVEL (dBm)	MEASURED E-FILED (V/m)	E-FILED MODULATION FACTOR
1880	CW	23.5	228.5	-
	80% AM		155.7	1.47
	WCDMA		233.9	0.98
TEST FREQUENCY (MHz)	PROTOCOL	REFERENCE LEVEL (dBm)	MEASURED H-FILED (A/m)	H-FILED MODULATION FACTOR
1880	CW	23.5	0.751	-
	80% AM		0.628	1.20
	WCDMA		1.459	0.51

## 7. RF EMISSION TEST PROCEDURES

### 7.1. TEST INSTRUCTION





## 7.2. TEST PROCEDURES

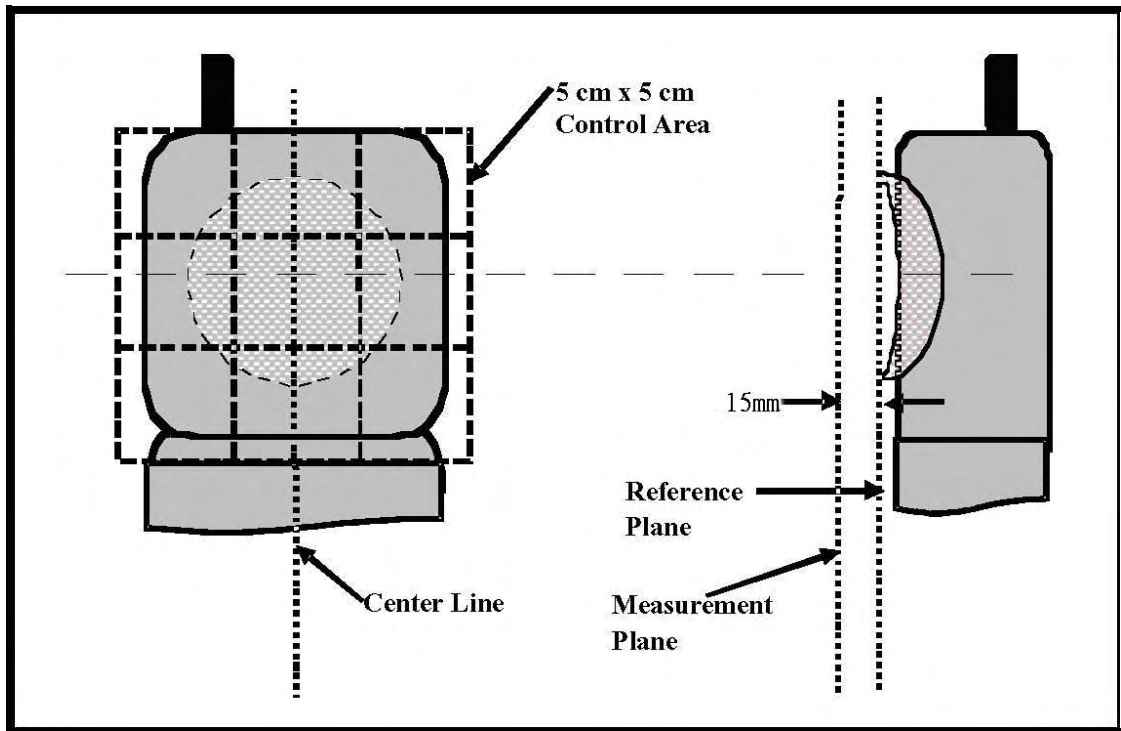
The EUT makes a phone call to the GSM base station. Establish the simulation communication configuration rather the actual communication. Then the EUT could continuous the transmission mode. Adjust the PCL of the base station could controlled the EUT to transmitted the maximum output power. The base station also could control the transmission channel.

The recommended procedure for assessing the RF emission value consists of the following steps:

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 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.
4. A surface calibration was performed before each setup change to ensure repeatable spacing and proper maintenance of the measurement plane using the HAC arch.
5. The measurement system measured the field strength at the reference location.
6. Measurements at 2mm increments in the 5 x 5cm 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.
7. Steps 1-6 were done for both the E and H-Field measurements.



### 7.3. DESCRIPTION OF TEST POSITION AND CONFIGURATIONS





## 7.4. SUMMARY OF MEASURED HAC RESULTS

### E-FIELD EMISSION

Plot No.	Band	Mode	Channel	Battery	Peak E-Field (V/m)	E-Field M Rating
1	GSM850	GSM	128	1	148.8	M4
<b>2</b>	<b>GSM850</b>	<b>GSM</b>	<b>189</b>	<b>1</b>	<b>182.2</b>	<b>M3</b>
3	GSM850	GSM	251	1	168.7	M3
4	GSM850	GSM	189	2	179.7	M3
<b>5</b>	<b>GSM1900</b>	<b>GSM</b>	<b>512</b>	<b>1</b>	<b>56.134</b>	<b>M3</b>
6	GSM1900	GSM	661	1	55.591	M3
7	GSM1900	GSM	810	1	50.044	M3
8	GSM1900	GSM	512	2	49.7	M3
13	WCDMA V	RMC12.2K	4132	1	62.868	M4
<b>14</b>	<b>WCDMA V</b>	<b>RMC12.2K</b>	<b>4182</b>	<b>1</b>	<b>64.047</b>	<b>M4</b>
15	WCDMA V	RMC12.2K	4233	1	59.122	M4
16	WCDMA V	RMC12.2K	4182	2	54.9	M4
9	WCDMA II	RMC12.2K	9262	1	22.767	M4
<b>10</b>	<b>WCDMA II</b>	<b>RMC12.2K</b>	<b>9400</b>	<b>1</b>	<b>25.896</b>	<b>M4</b>
11	WCDMA II	RMC12.2K	9538	1	22.501	M4
12	WCDMA II	RMC12.2K	9400	2	19.6	M4

**NOTE:** Please see the Appendix A for the measured data and test plots.



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### H-FIELD EMISSION

Plot No.	Band	Mode	Channel	Battery	Peak H-Field (A/m)	H-Field M Rating
17	GSM850	GSM	128	1	0.172	M4
<b>18</b>	<b>GSM850</b>	<b>GSM</b>	<b>189</b>	<b>1</b>	<b>0.177</b>	<b>M4</b>
19	GSM850	GSM	251	1	0.172	M4
20	GSM850	GSM	189	2	0.146	M4
<b>21</b>	<b>GSM1900</b>	<b>GSM</b>	<b>512</b>	<b>1</b>	<b>0.076</b>	<b>M4</b>
22	GSM1900	GSM	661	1	0.074	M4
23	GSM1900	GSM	810	1	0.075	M4
24	GSM1900	GSM	512	2	0.071	M4
<b>25</b>	<b>WCDMA II</b>	<b>RMC12.2K</b>	<b>9262</b>	<b>1</b>	<b>0.046</b>	<b>M4</b>
26	WCDMA II	RMC12.2K	9400	1	0.044	M4
27	WCDMA II	RMC12.2K	9538	1	0.038	M4
28	WCDMA II	RMC12.2K	9262	2	0.034	M4
29	WCDMA V	RMC12.2K	4132	1	0.08	M4
<b>30</b>	<b>WCDMA V</b>	<b>RMC12.2K</b>	<b>4182</b>	<b>1</b>	<b>0.101</b>	<b>M4</b>
31	WCDMA V	RMC12.2K	4233	1	0.095	M4
32	WCDMA V	RMC12.2K	4182	2	0.086	M4

**NOTE:**

Please see the Appendix A for the measured data and test plots.



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## 8. INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

Copies of accreditation and authorization certificates of our laboratories obtained from approval agencies can be downloaded from our web site: [www.adt.com.tw/index.5.phtml](http://www.adt.com.tw/index.5.phtml). If you have any comments, please feel free to contact us at the following:

**Linko EMC/RF Lab:**

Tel: 886-2-26052180

Fax: 886-2-26051924

**Hsin Chu EMC/RF Lab:**

Tel: 886-3-5935343

Fax: 886-3-5935342

**Hwa Ya EMC/RF/Safety/Telecom Lab:**

Tel: 886-3-3183232

Fax: 886-3-3185050

**Email:** [service.adt@tw.bureauveritas.com](mailto:service.adt@tw.bureauveritas.com)

**Web Site:** [www.adt.com.tw](http://www.adt.com.tw)

The address and road map of all our labs can be found in our web site also.

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### System Check\_E-Field\_835\_120106

**DUT: HAC Dipole 835 MHz; Type: CD835V3; SN: 1041**

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>

Ambient Temperature : 22.0 °C ;

DASY5 Configuration:

- Probe: ER3DV6 - SN2293; ConvF(1, 1, 1); Calibrated: 2011/01/24
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1202
- Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.4.5 (3634)

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

Maximum value of peak Total field = 160.2 V/m

Probe Modulation Factor = 1.000

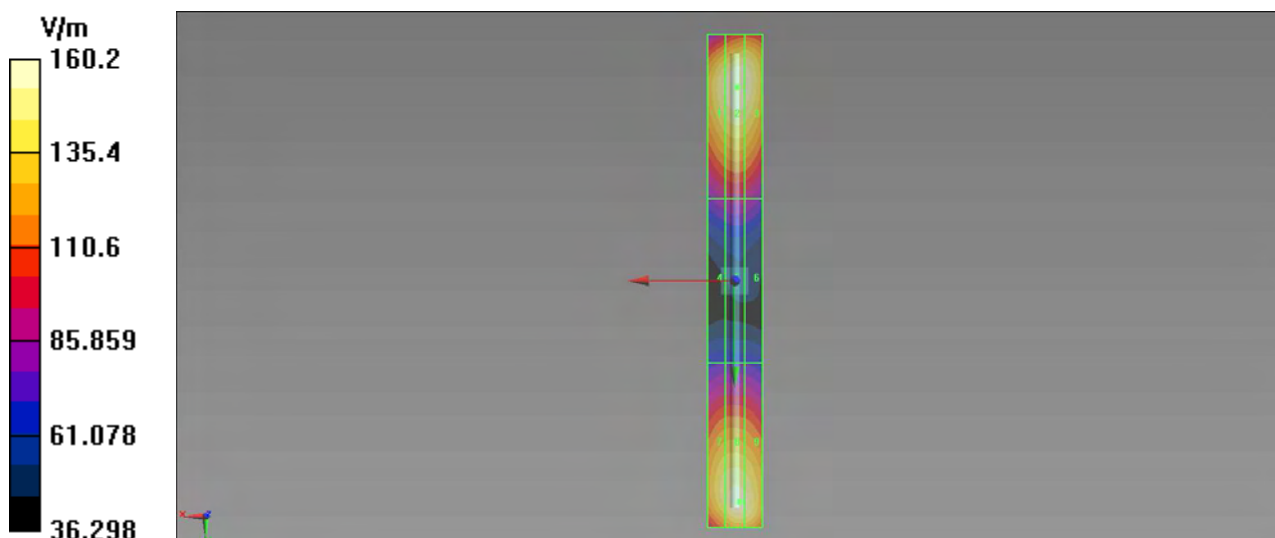
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 100.1 V/m; Power Drift = -0.0093 dB

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

Peak E-field in V/m

Grid 1 <b>154.4 M4</b>	Grid 2 <b>160.2 M4</b>	Grid 3 <b>158.8 M4</b>
Grid 4 <b>87.319 M4</b>	Grid 5 <b>90.705 M4</b>	Grid 6 <b>89.402 M4</b>
Grid 7 <b>149.5 M4</b>	Grid 8 <b>156.6 M4</b>	Grid 9 <b>154.9 M4</b>



### System Check\_E-Field\_835\_120112

**DUT: HAC Dipole 835 MHz; Type: CD835V3; SN: 1041**

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>

Ambient Temperature : 20.7 °C;

DASY4 Configuration:

- Probe: ER3DV6 - SN2293; ConvF(1, 1, 1); Calibrated: 2011/01/24
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: HAC Test Arch; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

Maximum value of peak Total field = 153.4 V/m

Probe Modulation Factor = 1.00

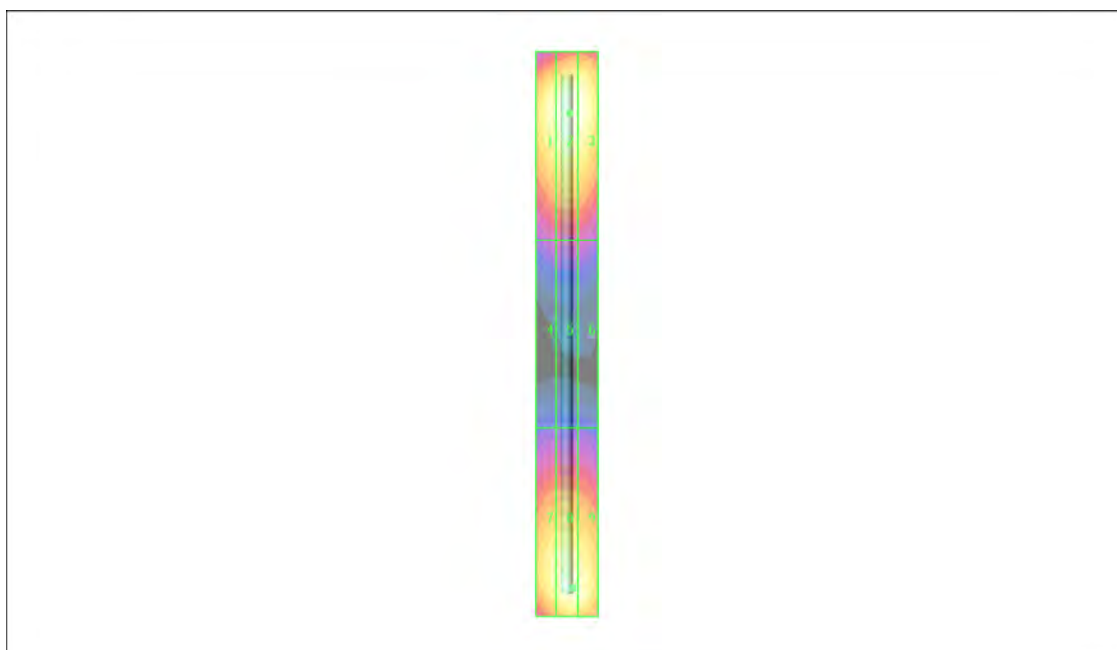
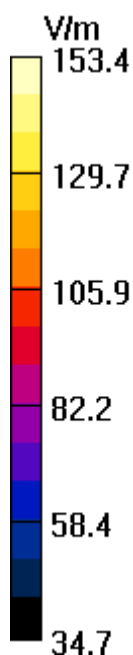
Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 95.8 V/m; Power Drift = -0.035 dB

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

Peak E-field in V/m

Grid 1 <b>147.9 M4</b>	Grid 2 <b>153.4 M4</b>	Grid 3 <b>152.0 M4</b>
Grid 4 <b>83.7 M4</b>	Grid 5 <b>86.9 M4</b>	Grid 6 <b>85.5 M4</b>
Grid 7 <b>143.2 M4</b>	Grid 8 <b>149.6 M4</b>	Grid 9 <b>147.9 M4</b>



### System Check\_E-Field\_835\_120118

**DUT: HAC Dipole 835 MHz; Type: CD835V3; SN: 1041**

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>

Ambient Temperature : 21.7 °C;

DASY4 Configuration:

- Probe: ER3DV6 - SN2302; ConvF(1, 1, 1); Calibrated: 2011/06/15
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: HAC Test Arch; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

Maximum value of peak Total field = 150.9 V/m

Probe Modulation Factor = 1.00

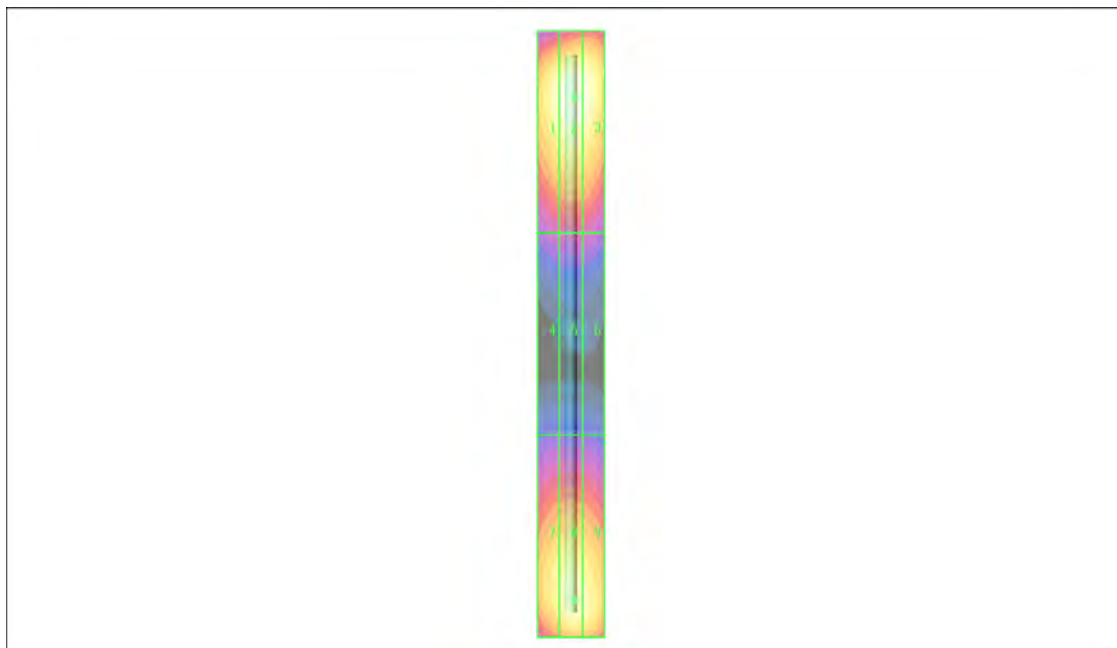
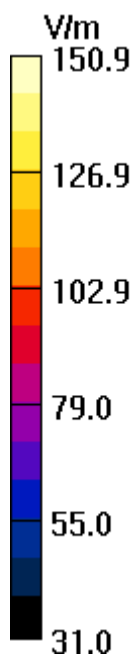
Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 93.0 V/m; Power Drift = -0.002 dB

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

Peak E-field in V/m

Grid 1 <b>144.4 M4</b>	Grid 2 <b>150.9 M4</b>	Grid 3 <b>148.7 M4</b>
Grid 4 <b>81.4 M4</b>	Grid 5 <b>85.2 M4</b>	Grid 6 <b>83.6 M4</b>
Grid 7 <b>136.3 M4</b>	Grid 8 <b>143.3 M4</b>	Grid 9 <b>141.0 M4</b>



### System Check\_E-Field\_1880\_120106

**DUT: HAC Dipole 1880 MHz; Type: CD1880V3; SN: 1032**

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>

Ambient Temperature : 22.0 °C ;

DASY5 Configuration:

- Probe: ER3DV6 - SN2293; ConvF(1, 1, 1); Calibrated: 2011/01/24
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1202
- Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.4.5 (3634)

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

Maximum value of peak Total field = 142.3 V/m

Probe Modulation Factor = 1.000

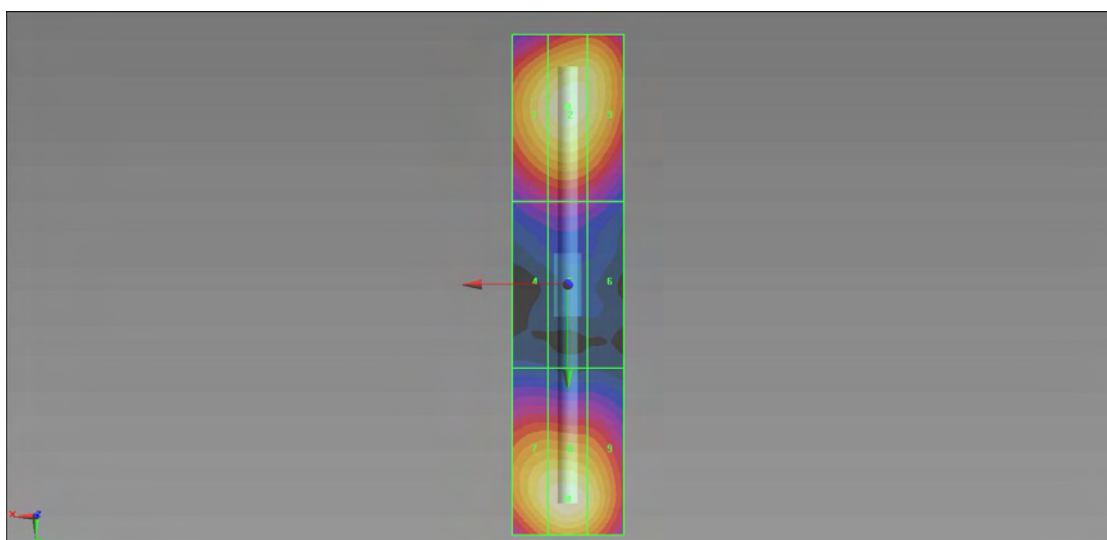
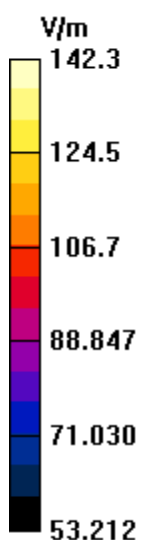
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 162.9 V/m; Power Drift = -0.01 dB

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

Peak E-field in V/m

Grid 1 <b>135.9 M2</b>	Grid 2 <b>140.2 M2</b>	Grid 3 <b>137.1 M2</b>
Grid 4 <b>90.226 M3</b>	Grid 5 <b>92.791 M3</b>	Grid 6 <b>88.460 M3</b>
Grid 7 <b>136.8 M2</b>	Grid 8 <b>142.3 M2</b>	Grid 9 <b>135.6 M2</b>





### System Check\_E-Field\_1880\_120112

**DUT: HAC Dipole 1880 MHz; Type: CD1880V3; SN: 1032**

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>

Ambient Temperature : 20.7 °C

DASY4 Configuration:

- Probe: ER3DV6 - SN2293; ConvF(1, 1, 1); Calibrated: 2011/01/24
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: HAC Test Arch; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

Maximum value of peak Total field = 147.5 V/m

Probe Modulation Factor = 1.00

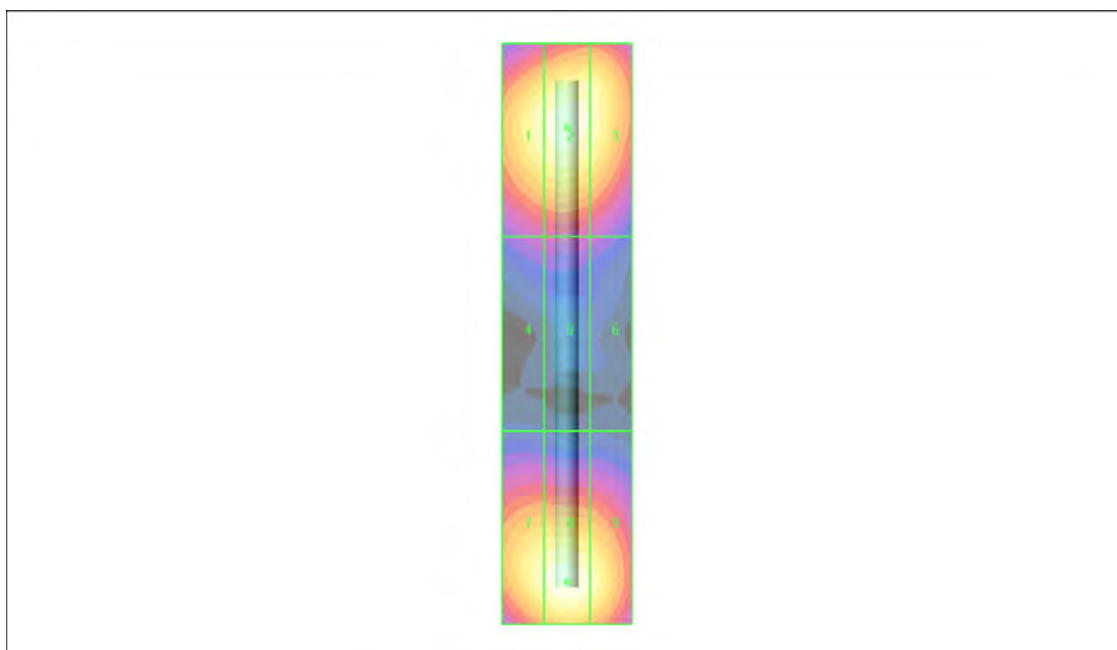
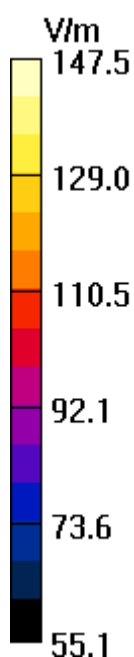
Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 169.0 V/m; Power Drift = 0.004 dB

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

Peak E-field in V/m

Grid 1 <b>141.1 M2</b>	Grid 2 <b>144.7 M2</b>	Grid 3 <b>141.4 M2</b>
Grid 4 <b>93.7 M3</b>	Grid 5 <b>96.0 M3</b>	Grid 6 <b>91.1 M3</b>
Grid 7 <b>141.1 M2</b>	Grid 8 <b>147.5 M2</b>	Grid 9 <b>141.4 M2</b>



### System Check\_E-Field\_1880\_120118

**DUT: HAC Dipole 1880 MHz; Type: CD1880V3; SN: 1032**

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>

Ambient Temperature : 21.7 °C;

DASY4 Configuration:

- Probe: ER3DV6 - SN2302; ConvF(1, 1, 1); Calibrated: 2011/06/15
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: HAC Test Arch; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

Maximum value of peak Total field = 138.8 V/m

Probe Modulation Factor = 1.00

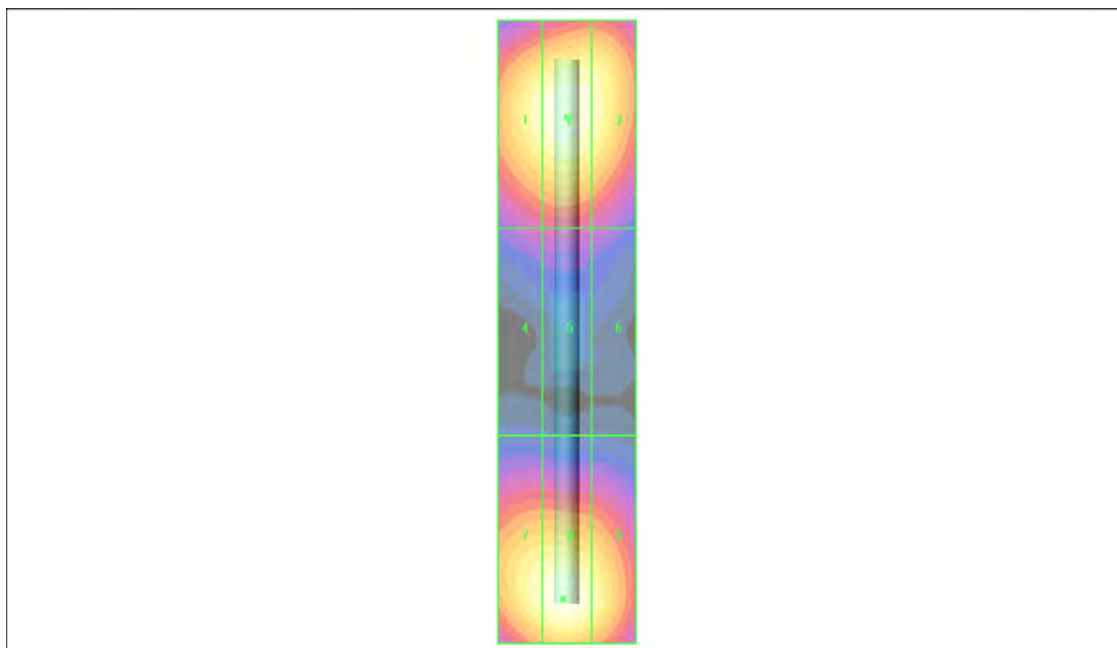
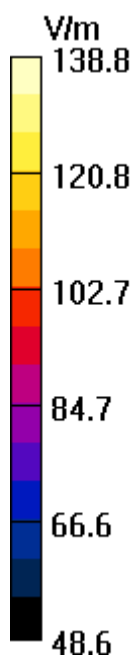
Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 158.1 V/m; Power Drift = 0.007 dB

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

Peak E-field in V/m

Grid 1 <b>133.3 M2</b>	Grid 2 <b>138.2 M2</b>	Grid 3 <b>133.7 M2</b>
Grid 4 <b>88.4 M3</b>	Grid 5 <b>91.4 M3</b>	Grid 6 <b>86.5 M3</b>
Grid 7 <b>133.8 M2</b>	Grid 8 <b>138.8 M2</b>	Grid 9 <b>131.0 M2</b>



### System Check\_H-Field\_835\_120107

**DUT: HAC Dipole 835 MHz; Type: CD835V3; SN: 1041**

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>  
 Ambient Temperature : 22.0 °C ;

DASY5 Configuration:

- Probe: H3DV6 - SN6124; ; Calibrated: 2011/01/14
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1202
- Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.4.5 (3634)

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

Maximum value of peak Total field = 0.465 A/m

Probe Modulation Factor = 1.000

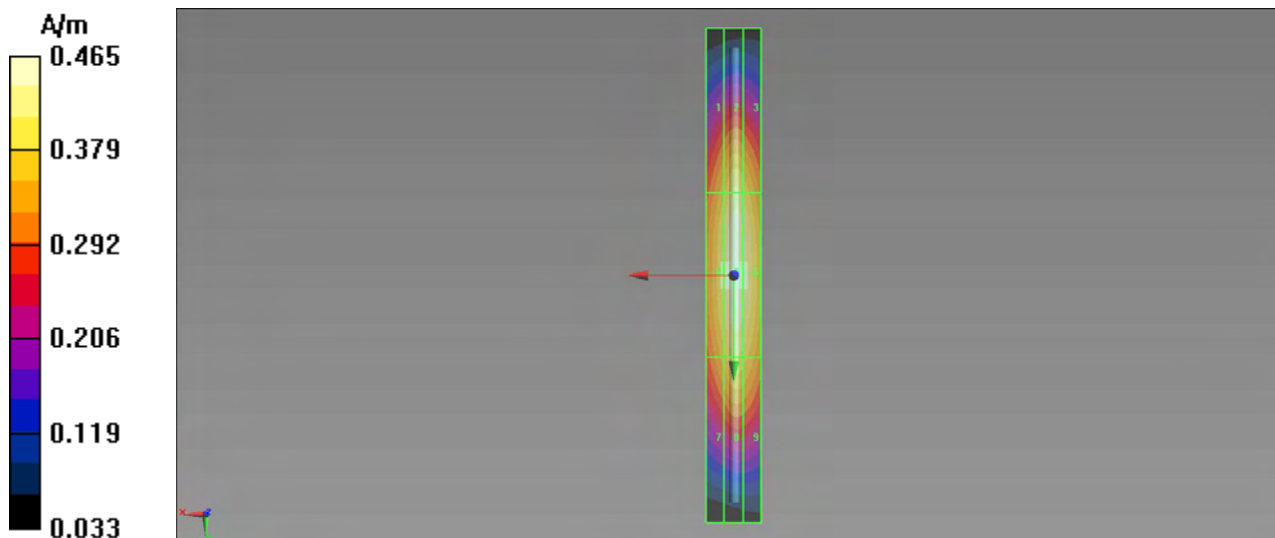
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.496 A/m; Power Drift = -0.04 dB

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

Peak H-field in A/m

Grid 1 <b>0.376 M4</b>	Grid 2 <b>0.418 M4</b>	Grid 3 <b>0.402 M4</b>
Grid 4 <b>0.423 M4</b>	Grid 5 <b>0.465 M4</b>	Grid 6 <b>0.448 M4</b>
Grid 7 <b>0.368 M4</b>	Grid 8 <b>0.405 M4</b>	Grid 9 <b>0.392 M4</b>



### System Check\_H-Field\_835\_120112

**DUT: HAC Dipole 835 MHz; Type: CD835V3; SN: 1041**

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>

Ambient Temperature : 20.7 °C ;

DASY4 Configuration:

- Probe: H3DV6 - SN6124; ; Calibrated: 2011/01/14
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: HAC Test Arch; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

Maximum value of peak Total field = 0.476 A/m

Probe Modulation Factor = 1.00

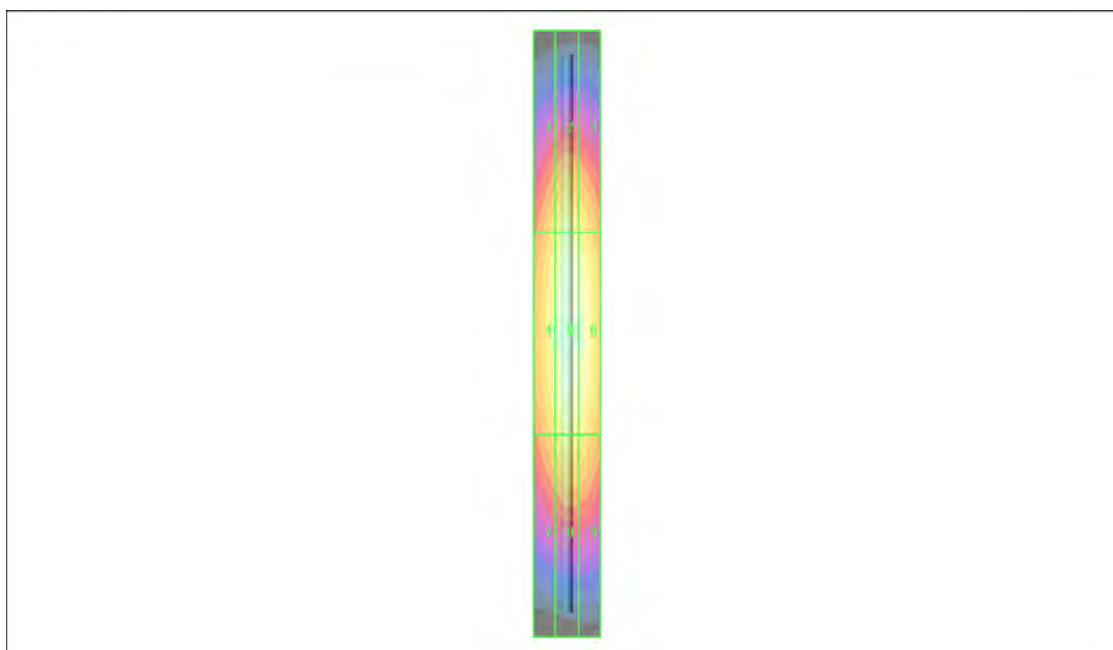
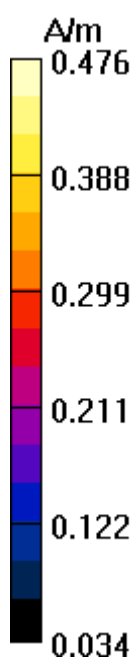
Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 0.513 A/m; Power Drift = -0.126 dB

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

Peak H-field in A/m

Grid 1 <b>0.385 M4</b>	Grid 2 <b>0.428 M4</b>	Grid 3 <b>0.411 M4</b>
Grid 4 <b>0.433 M4</b>	Grid 5 <b>0.476 M4</b>	Grid 6 <b>0.458 M4</b>
Grid 7 <b>0.377 M4</b>	Grid 8 <b>0.415 M4</b>	Grid 9 <b>0.401 M4</b>



### System Check\_H-Field\_835\_120118

**DUT: HAC Dipole 835 MHz; Type: CD835V3; SN: 1041**

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>

Ambient Temperature : 21.7 °C;

DASY4 Configuration:

- Probe: H3DV6 - SN6187; ; Calibrated: 2011/06/17
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: HAC Test Arch; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

Maximum value of peak Total field = 0.546 A/m

Probe Modulation Factor = 1.00

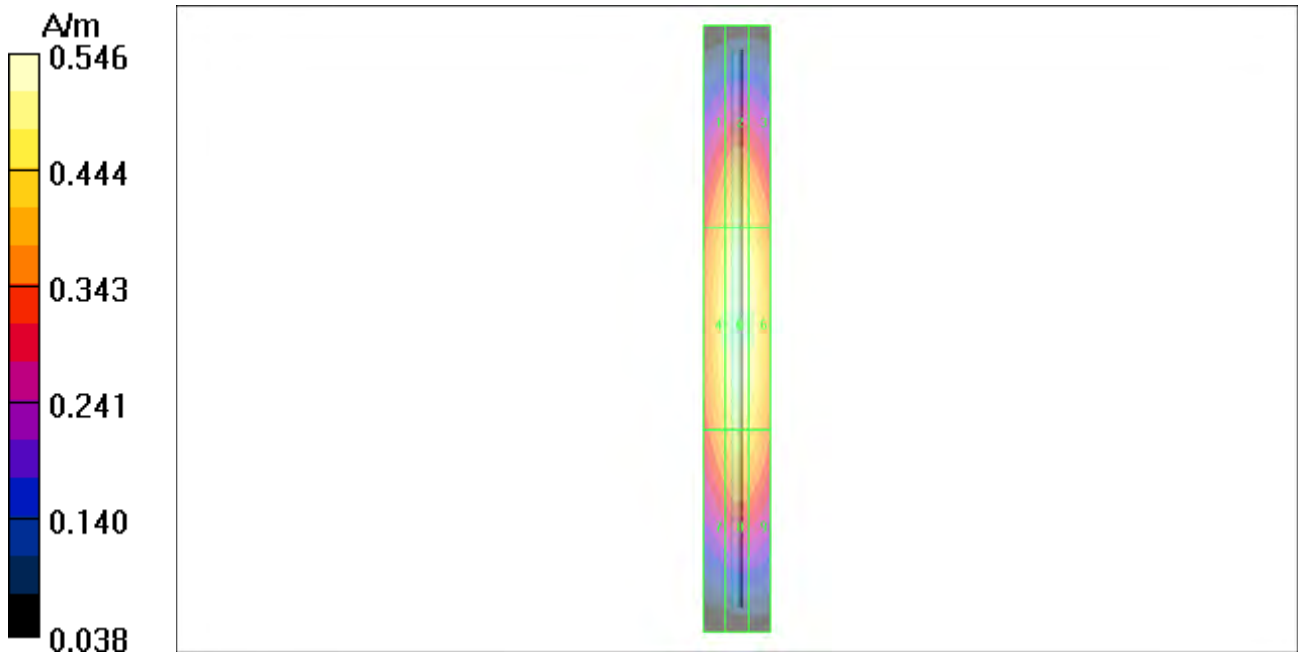
Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 0.581 A/m; Power Drift = -0.027 dB

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

Peak H-field in A/m

Grid 1 <b>0.440 M4</b>	Grid 2 <b>0.492 M4</b>	Grid 3 <b>0.468 M4</b>
Grid 4 <b>0.495 M4</b>	Grid 5 <b>0.546 M4</b>	Grid 6 <b>0.519 M4</b>
Grid 7 <b>0.430 M4</b>	Grid 8 <b>0.476 M4</b>	Grid 9 <b>0.455 M4</b>



### System Check\_H-Field\_1880\_120107

**DUT: HAC Dipole 1880 MHz; Type: CD1880V3; SN: 1032**

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>

Ambient Temperature : 22.0 °C ;

DASY5 Configuration:

- Probe: H3DV6 - SN6124; ; Calibrated: 2011/01/14
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1202
- Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.4.5 (3634)

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

Maximum value of peak Total field = 0.460 A/m

Probe Modulation Factor = 1.000

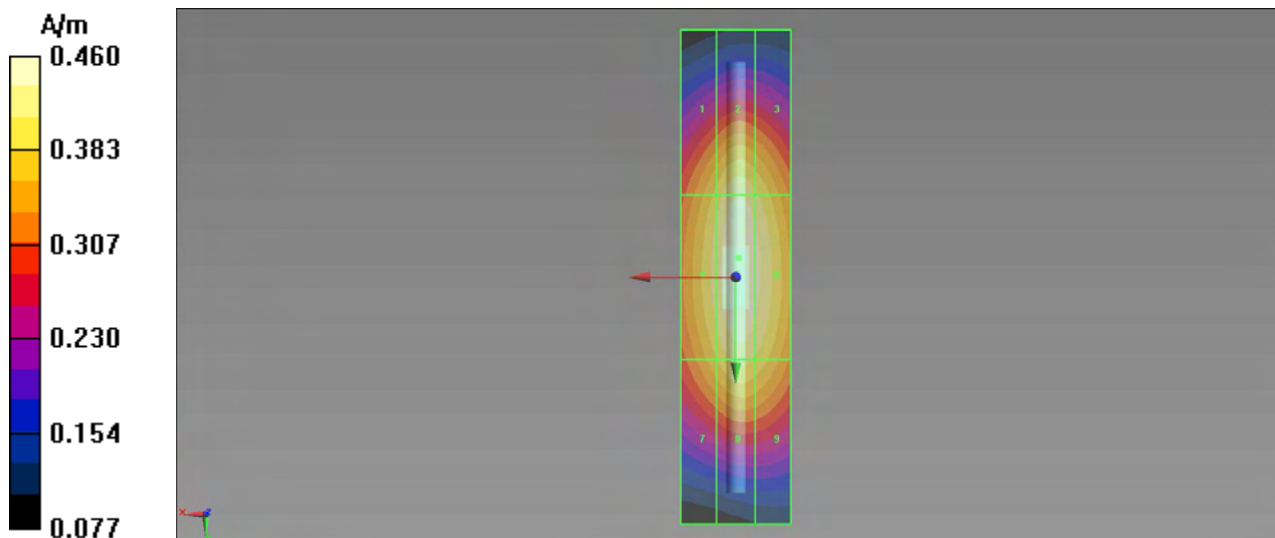
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.489 A/m; Power Drift = -0.03 dB

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

Peak H-field in A/m

Grid 1 <b>0.393 M2</b>	Grid 2 <b>0.432 M2</b>	Grid 3 <b>0.415 M2</b>
Grid 4 <b>0.423 M2</b>	Grid 5 <b>0.460 M2</b>	Grid 6 <b>0.444 M2</b>
Grid 7 <b>0.382 M2</b>	Grid 8 <b>0.417 M2</b>	Grid 9 <b>0.405 M2</b>



### System Check\_H-Field\_1880\_120112

**DUT: HAC Dipole 1880 MHz; Type: CD1880V3; SN: 1032**

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>

Ambient Temperature : 20.7 °C;

DASY4 Configuration:

- Probe: H3DV6 - SN6124; ; Calibrated: 2011/01/14
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: HAC Test Arch; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

Maximum value of peak Total field = 0.487 A/m

Probe Modulation Factor = 1.00

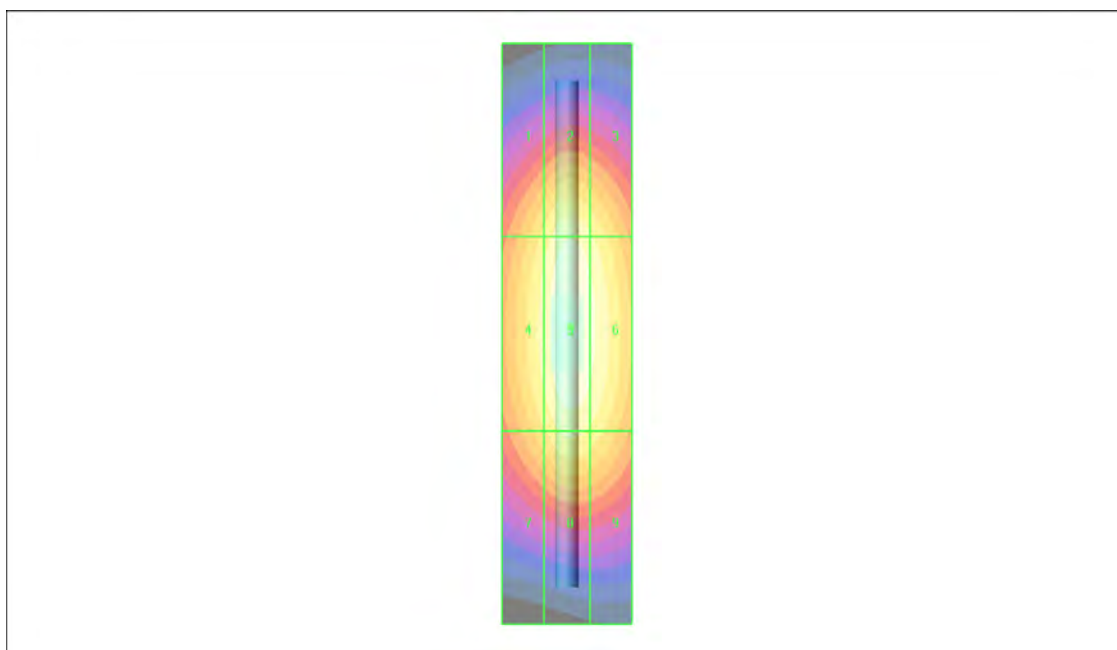
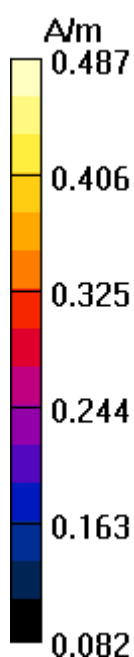
Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 0.518 A/m; Power Drift = -0.036 dB

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

Peak H-field in A/m

Grid 1 <b>0.417 M2</b>	Grid 2 <b>0.458 M2</b>	Grid 3 <b>0.439 M2</b>
Grid 4 <b>0.448 M2</b>	Grid 5 <b>0.487 M2</b>	Grid 6 <b>0.470 M2</b>
Grid 7 <b>0.405 M2</b>	Grid 8 <b>0.442 M2</b>	Grid 9 <b>0.429 M2</b>



### System Check\_H-Field\_1880\_120118

**DUT: HAC Dipole 1880 MHz; Type: CD1880V3; SN: 1032**

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>

Ambient Temperature : 21.7 °C;

DASY4 Configuration:

- Probe: H3DV6 - SN6187; ; Calibrated: 2011/06/17
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: HAC Test Arch; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

Maximum value of peak Total field = 0.541 A/m

Probe Modulation Factor = 1.00

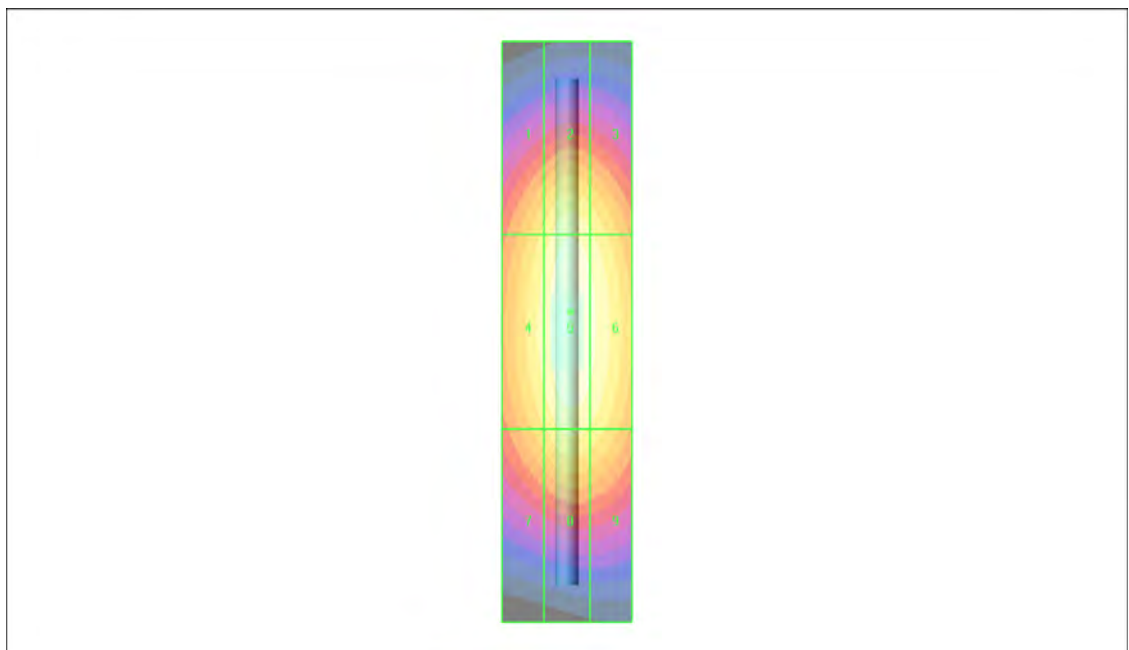
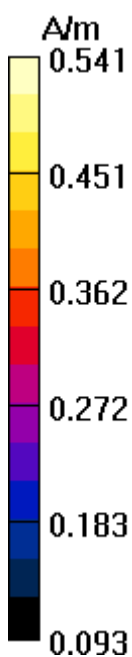
Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 0.573 A/m; Power Drift = -0.028 dB

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

Peak H-field in A/m

Grid 1 <b>0.463 M2</b>	Grid 2 <b>0.509 M2</b>	Grid 3 <b>0.489 M2</b>
Grid 4 <b>0.499 M2</b>	Grid 5 <b>0.541 M2</b>	Grid 6 <b>0.523 M2</b>
Grid 7 <b>0.451 M2</b>	Grid 8 <b>0.492 M2</b>	Grid 9 <b>0.478 M2</b>





### P01 E-Field GSM850\_Ch128\_Battery1

**DUT: 111130C18**

Communication System: Generic GSM; Frequency: 824.2 MHz; Duty Cycle: 1:8.30042

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

Ambient Temperature : 22.0 °C ;

DASY5 Configuration:

- Probe: ER3DV6 - SN2293; ConvF(1, 1, 1); Calibrated: 2011/01/24
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

**Ch128/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 148.8 V/m

Probe Modulation Factor = 2.640

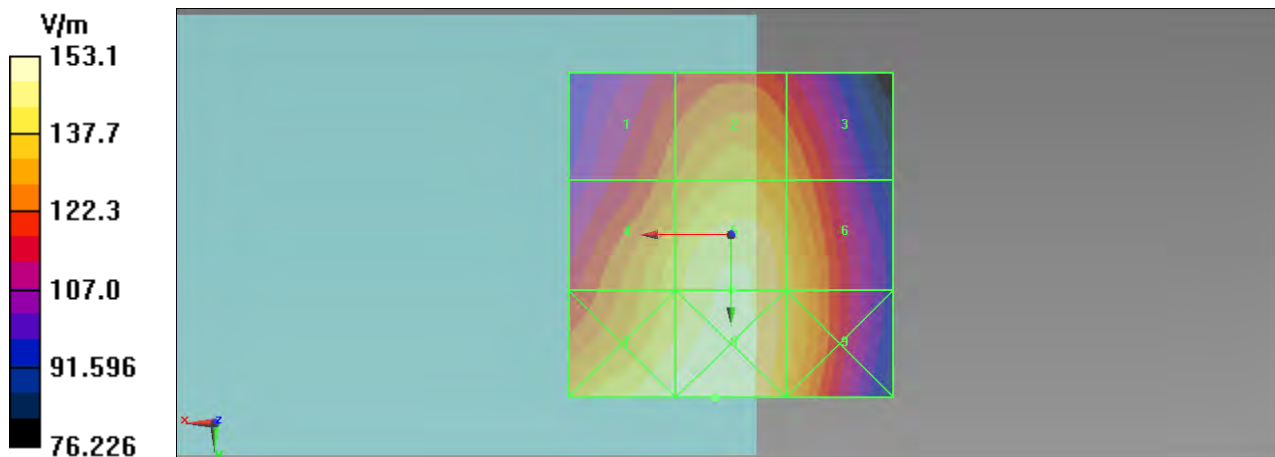
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 73.572 V/m; Power Drift = -0.40 dB

**Hearing Aid Near-Field Category: M4 (AWF -5 dB)**

Peak E-field in V/m

Grid 1 <b>127.6 M4</b>	Grid 2 <b>137.5 M4</b>	Grid 3 <b>131.6 M4</b>
Grid 4 <b>140.9 M4</b>	Grid 5 <b>148.8 M4</b>	Grid 6 <b>141.0 M4</b>
Grid 7 <b>150.5 M3</b>	Grid 8 <b>153.1 M3</b>	Grid 9 <b>141.3 M4</b>



### P02 E-Field GSM850\_Ch189\_Battery1

**DUT: 111130C18**

Communication System: Generic GSM; Frequency: 836.6 MHz; Duty Cycle: 1:8.30042

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

Ambient Temperature : 22.0 °C ;

DASY5 Configuration:

- Probe: ER3DV6 - SN2293; ConvF(1, 1, 1); Calibrated: 2011/01/24
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

**Ch189/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 182.2 V/m

Probe Modulation Factor = 2.640

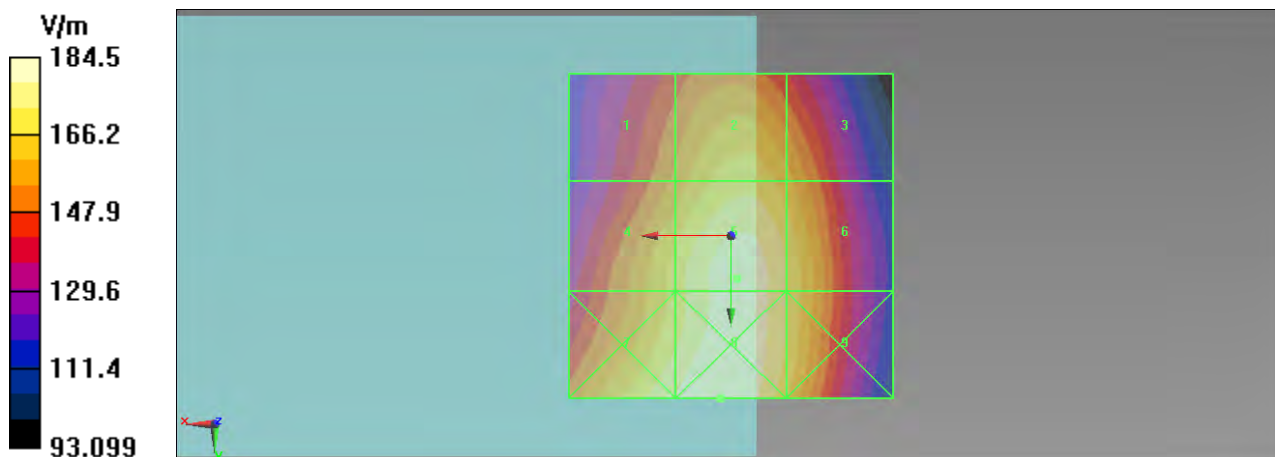
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 89.093 V/m; Power Drift = -0.11 dB

**Hearing Aid Near-Field Category: M3 (AWF -5 dB)**

Peak E-field in V/m

Grid 1 <b>156.3 M3</b>	Grid 2 <b>170.3 M3</b>	Grid 3 <b>163.1 M3</b>
Grid 4 <b>169.4 M3</b>	Grid 5 <b>182.2 M3</b>	Grid 6 <b>172.9 M3</b>
Grid 7 <b>178.6 M3</b>	Grid 8 <b>184.5 M3</b>	Grid 9 <b>172.8 M3</b>



### P03 E-Field GSM850\_Ch251\_Battery1

**DUT: 111130C18**

Communication System: Generic GSM; Frequency: 848.6 MHz; Duty Cycle: 1:8.30042

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

Ambient Temperature : 22.0 °C ;

DASY5 Configuration:

- Probe: ER3DV6 - SN2293; ConvF(1, 1, 1); Calibrated: 2011/01/24
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

**Ch251/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 168.7 V/m

Probe Modulation Factor = 2.640

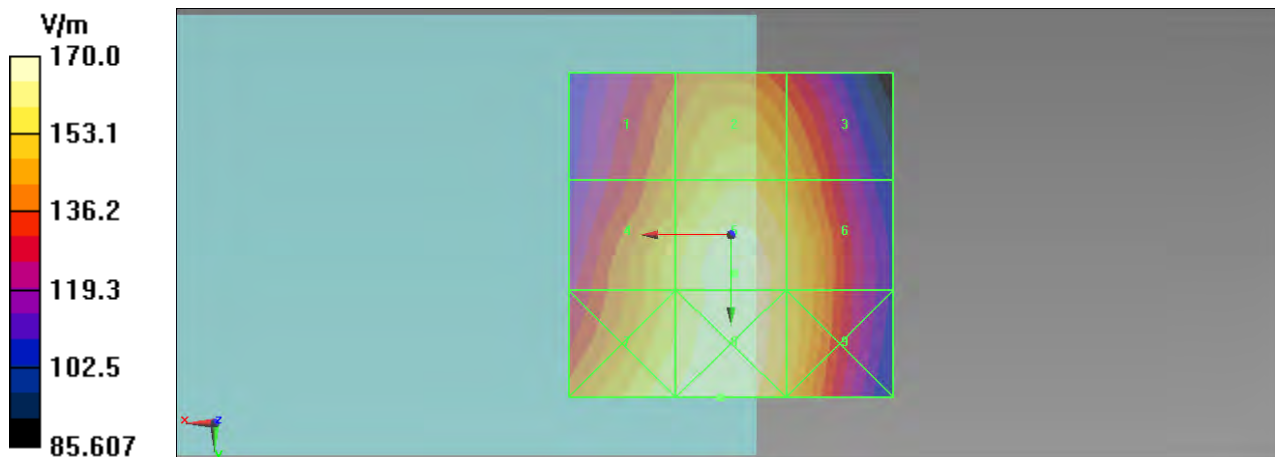
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 82.740 V/m; Power Drift = -0.14 dB

**Hearing Aid Near-Field Category: M3 (AWF -5 dB)**

Peak E-field in V/m

Grid 1 <b>145.6 M4</b>	Grid 2 <b>158.2 M3</b>	Grid 3 <b>150.7 M3</b>
Grid 4 <b>157.8 M3</b>	Grid 5 <b>168.7 M3</b>	Grid 6 <b>159.6 M3</b>
Grid 7 <b>164.6 M3</b>	Grid 8 <b>170.0 M3</b>	Grid 9 <b>159.7 M3</b>



## P04 E-Field GSM850\_Ch189\_Battery2

**DUT: 111130C18**

Communication System: GSM850; Frequency: 836.4 MHz; Duty Cycle: 1:8.3

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

Ambient Temperature : 20.7 °C;

DASY4 Configuration:

- Probe: ER3DV6 - SN2293; ConvF(1, 1, 1); Calibrated: 2011/01/24
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: HAC Test Arch; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Ch189/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 179.7 V/m

Probe Modulation Factor = 2.64

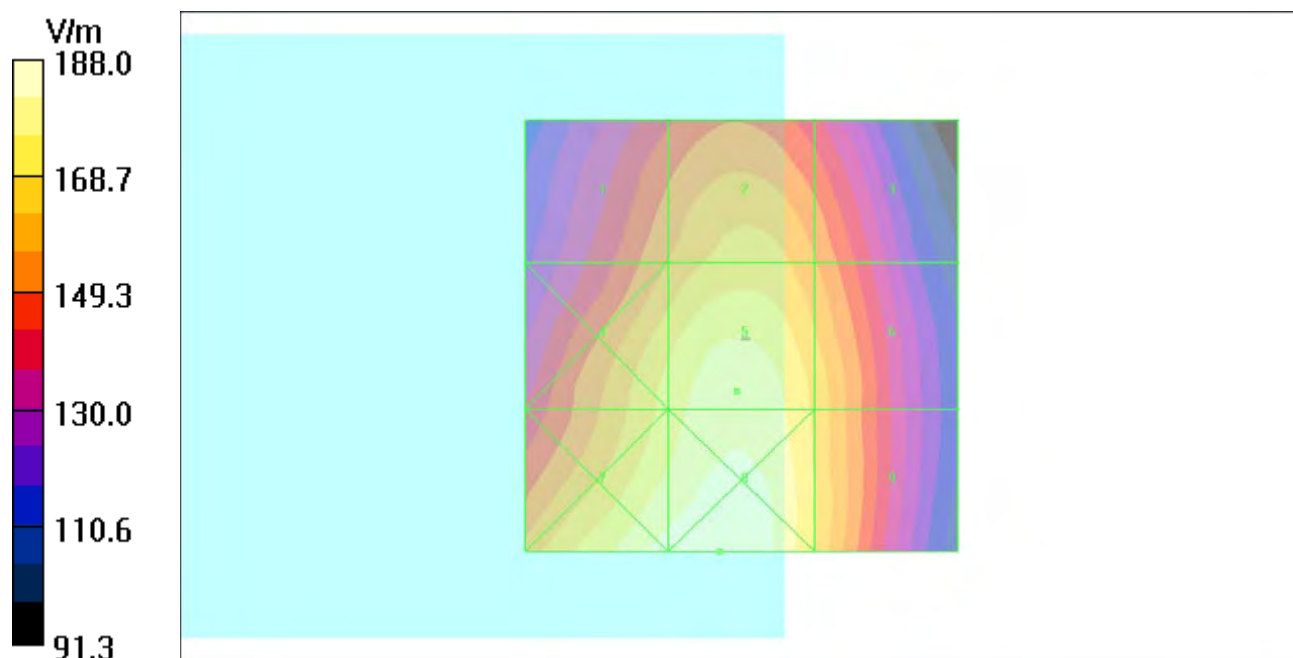
Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 84.9 V/m; Power Drift = -0.065 dB

**Hearing Aid Near-Field Category: M3 (AWF -5 dB)**

Peak E-field in V/m

Grid 1 <b>156.2 M3</b>	Grid 2 <b>166.0 M3</b>	Grid 3 <b>156.5 M3</b>
Grid 4 <b>171.3 M3</b>	Grid 5 <b>179.7 M3</b>	Grid 6 <b>167.3 M3</b>
Grid 7 <b>184.6 M3</b>	Grid 8 <b>188.0 M3</b>	Grid 9 <b>169.4 M3</b>



### P05 E-Field GSM1900\_Ch512\_Battery1

**DUT: 111130C18**

Communication System: Generic GSM; Frequency: 1850.2 MHz; Duty Cycle: 1:8.30042

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

Ambient Temperature : 22.0 °C

DASY5 Configuration:

- Probe: ER3DV6 - SN2293; ConvF(1, 1, 1); Calibrated: 2011/01/24
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

**Ch512/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 56.134 V/m

Probe Modulation Factor = 2.670

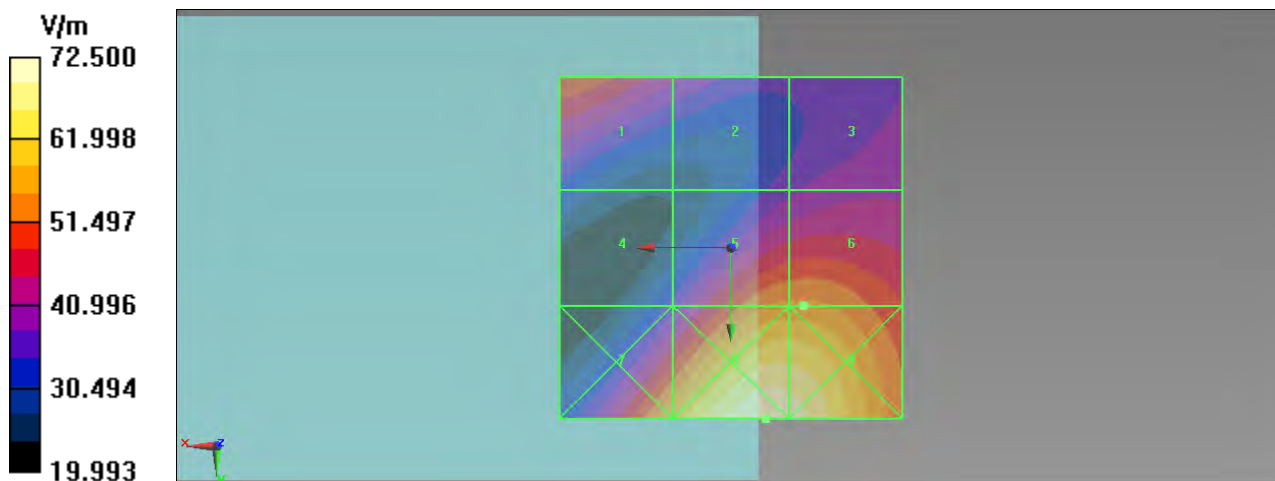
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 17.361 V/m; Power Drift = -0.19 dB

**Hearing Aid Near-Field Category: M3 (AWF -5 dB)**

Peak E-field in V/m

Grid 1 <b>51.307 M3</b>	Grid 2 <b>42.146 M4</b>	Grid 3 <b>40.536 M4</b>
Grid 4 <b>36.156 M4</b>	Grid 5 <b>56.110 M3</b>	Grid 6 <b>56.134 M3</b>
Grid 7 <b>59.170 M3</b>	Grid 8 <b>72.500 M3</b>	Grid 9 <b>71.156 M3</b>



### P06 E-Field GSM1900\_Ch661\_Battery1

**DUT: 111130C18**

Communication System: Generic GSM; Frequency: 1880 MHz; Duty Cycle: 1:8.30042

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

Ambient Temperature : 22.0 °C

DASY5 Configuration:

- Probe: ER3DV6 - SN2293; ConvF(1, 1, 1); Calibrated: 2011/01/24
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

**Ch661/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 55.591 V/m

Probe Modulation Factor = 2.670

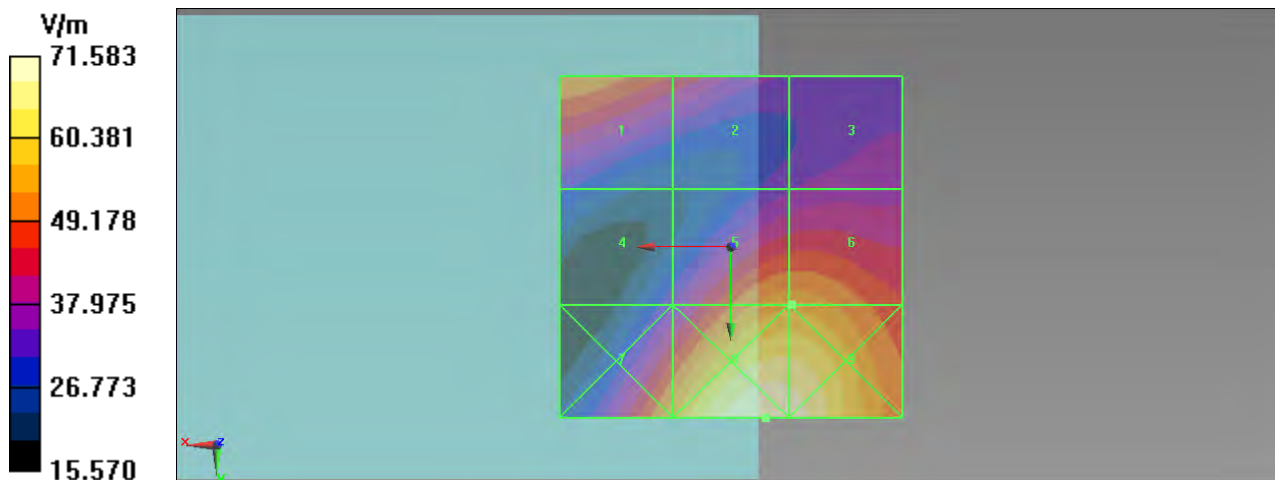
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 17.499 V/m; Power Drift = -0.06 dB

**Hearing Aid Near-Field Category: M3 (AWF -5 dB)**

Peak E-field in V/m

Grid 1 <b>52.986 M3</b>	Grid 2 <b>45.420 M4</b>	Grid 3 <b>37.097 M4</b>
Grid 4 <b>34.612 M4</b>	Grid 5 <b>55.581 M3</b>	Grid 6 <b>55.591 M3</b>
Grid 7 <b>56.751 M3</b>	Grid 8 <b>71.583 M3</b>	Grid 9 <b>70.242 M3</b>



### P07 E-Field GSM1900\_Ch810\_Battery1

**DUT: 111130C18**

Communication System: Generic GSM; Frequency: 1909.8 MHz; Duty Cycle: 1:8.30042

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

Ambient Temperature : 22.0 °C

DASY5 Configuration:

- Probe: ER3DV6 - SN2293; ConvF(1, 1, 1); Calibrated: 2011/01/24
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

**Ch810/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 50.044 V/m

Probe Modulation Factor = 2.670

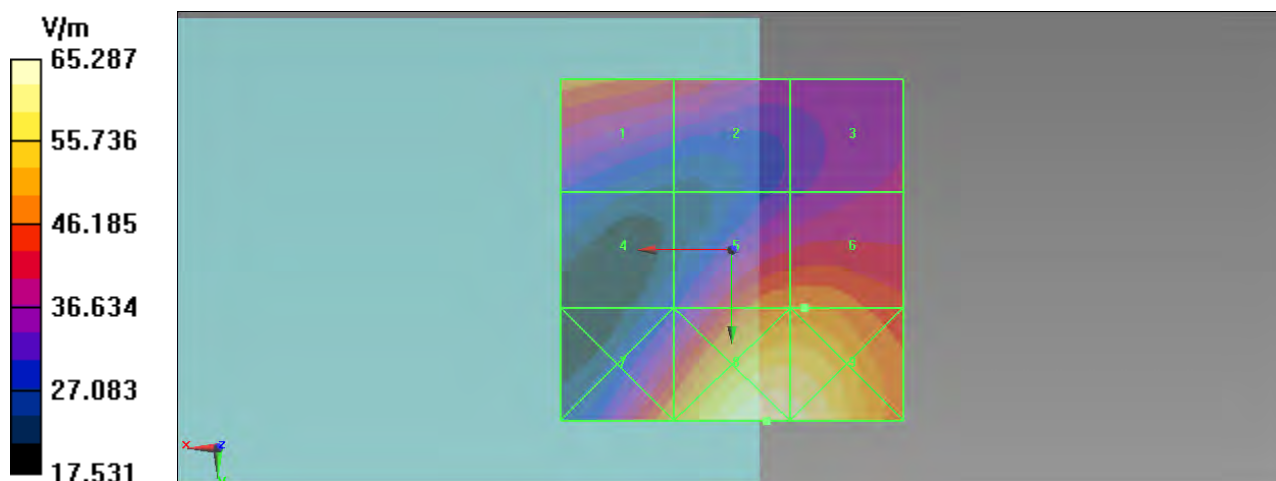
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 14.817 V/m; Power Drift = -0.03 dB

**Hearing Aid Near-Field Category: M3 (AWF -5 dB)**

Peak E-field in V/m

Grid 1 <b>48.327 M3</b>	Grid 2 <b>43.062 M4</b>	Grid 3 <b>37.528 M4</b>
Grid 4 <b>30.237 M4</b>	Grid 5 <b>49.896 M3</b>	Grid 6 <b>50.044 M3</b>
Grid 7 <b>51.556 M3</b>	Grid 8 <b>65.287 M3</b>	Grid 9 <b>63.955 M3</b>



## P08 E-Field GSM1900\_Ch512\_Battery2

**DUT: 111130C18**

Communication System: GSM1900; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3

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

Ambient Temperature : 20.7 °C;

DASY4 Configuration:

- Probe: ER3DV6 - SN2293; ConvF(1, 1, 1); Calibrated: 2011/01/24
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: HAC Test Arch; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Ch512/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 49.7 V/m

Probe Modulation Factor = 2.67

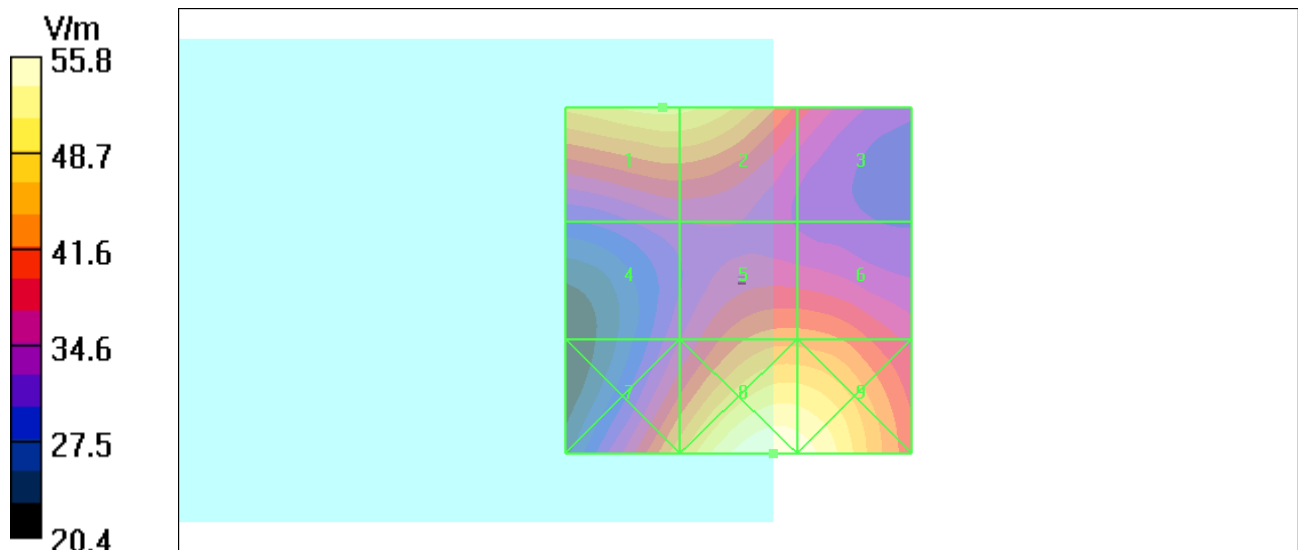
Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 16.8 V/m; Power Drift = -0.016 dB

**Hearing Aid Near-Field Category: M3 (AWF -5 dB)**

Peak E-field in V/m

Grid 1 <b>49.7 M3</b>	Grid 2 <b>49.5 M3</b>	Grid 3 <b>38.8 M4</b>
Grid 4 <b>34.6 M4</b>	Grid 5 <b>43.2 M4</b>	Grid 6 <b>43.1 M4</b>
Grid 7 <b>46.0 M4</b>	Grid 8 <b>55.8 M3</b>	Grid 9 <b>55.0 M3</b>





### P13 E-Field WCDMA V\_RMC12.2K\_Ch4132\_Battery1

**DUT: 111130C18**

Communication System: WCDMA; Frequency: 826.4 MHz; Duty Cycle: 1:1

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

Ambient Temperature : 22.0 °C

DASY5 Configuration:

- Probe: ER3DV6 - SN2293; ConvF(1, 1, 1); Calibrated: 2011/01/24
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.4.5 (3634)

**Ch4132/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 62.868 V/m

Probe Modulation Factor = 0.960

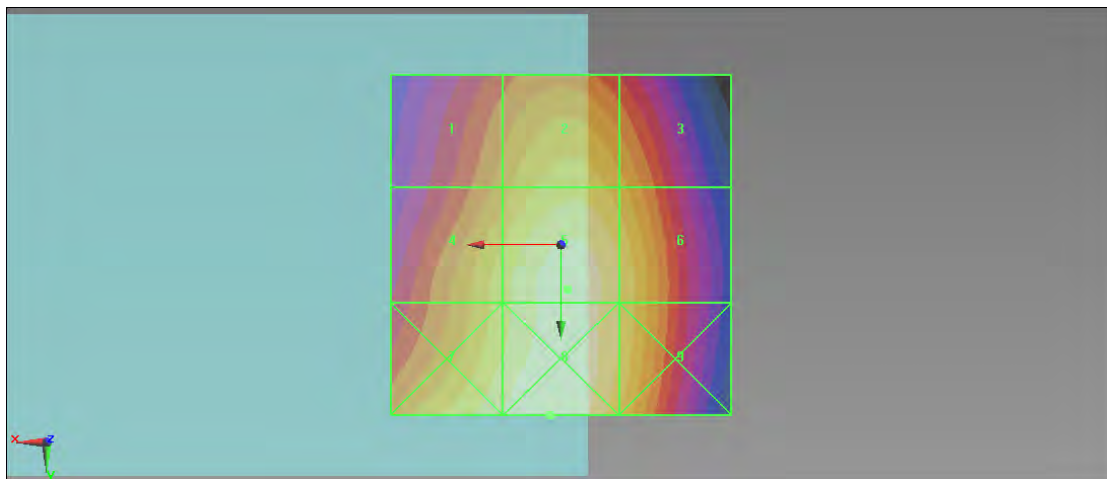
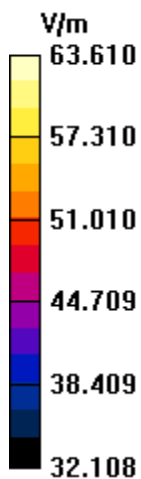
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 83.948 V/m; Power Drift = -0.13 dB

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

Peak E-field in V/m

Grid 1 <b>54.392 M4</b>	Grid 2 <b>58.726 M4</b>	Grid 3 <b>56.251 M4</b>
Grid 4 <b>58.715 M4</b>	Grid 5 <b>62.868 M4</b>	Grid 6 <b>59.783 M4</b>
Grid 7 <b>61.673 M4</b>	Grid 8 <b>63.610 M4</b>	Grid 9 <b>59.596 M4</b>



### P14 E-Field WCDMA V\_RMC12.2K\_Ch4182\_Battery1

**DUT: 111130C18**

Communication System: WCDMA; Frequency: 836.4 MHz; Duty Cycle: 1:1

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

Ambient Temperature : 22.0 °C

DASY5 Configuration:

- Probe: ER3DV6 - SN2293; ConvF(1, 1, 1); Calibrated: 2011/01/24
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.4.5 (3634)

**Ch4182/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 64.047 V/m

Probe Modulation Factor = 0.960

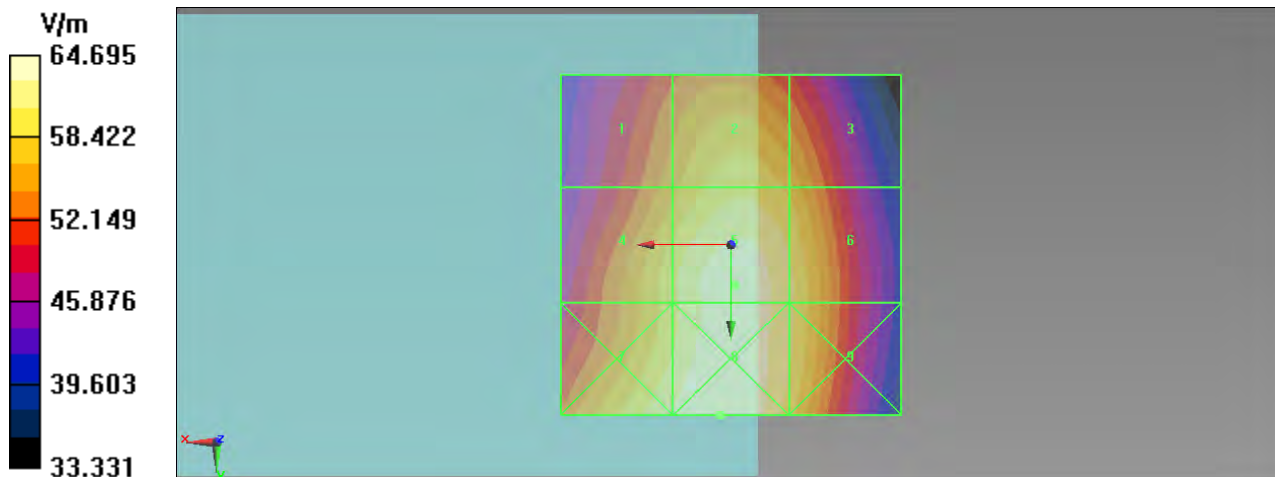
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 83.211 V/m; Power Drift = 0.04 dB

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

Peak E-field in V/m

Grid 1 <b>55.801 M4</b>	Grid 2 <b>60.087 M4</b>	Grid 3 <b>57.947 M4</b>
Grid 4 <b>60.223 M4</b>	Grid 5 <b>64.047 M4</b>	Grid 6 <b>61.169 M4</b>
Grid 7 <b>62.919 M4</b>	Grid 8 <b>64.695 M4</b>	Grid 9 <b>61.142 M4</b>



### P15 E-Field WCDMA V\_RMC12.2K\_Ch4233\_Battery1

**DUT: 111130C18**

Communication System: WCDMA ; Frequency: 846.6 MHz;Duty Cycle: 1:1

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

Ambient Temperature : 22.0 °C

DASY5 Configuration:

- Probe: ER3DV6 - SN2293; ConvF(1, 1, 1); Calibrated: 2011/01/24
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

**Ch4233/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 59.122 V/m

Probe Modulation Factor = 0.960

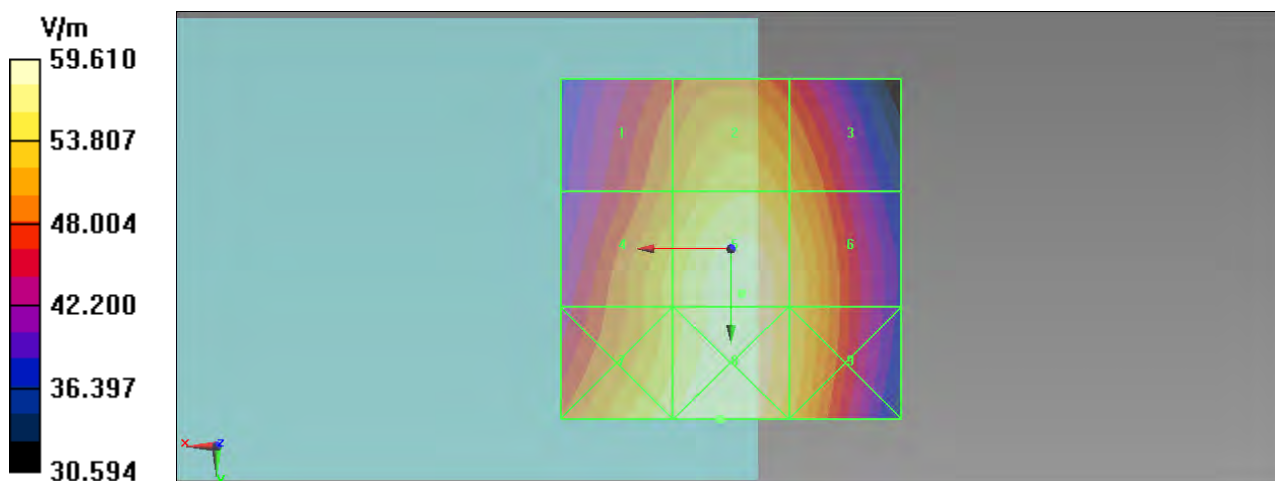
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 78.886 V/m; Power Drift = -0.03 dB

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

Peak E-field in V/m

Grid 1 <b>51.188 M4</b>	Grid 2 <b>55.564 M4</b>	Grid 3 <b>53.108 M4</b>
Grid 4 <b>54.975 M4</b>	Grid 5 <b>59.122 M4</b>	Grid 6 <b>56.330 M4</b>
Grid 7 <b>57.471 M4</b>	Grid 8 <b>59.610 M4</b>	Grid 9 <b>56.250 M4</b>



## P16 E\_Field WCDMA V\_RMC12.2K\_Ch4182\_Battery2

**DUT: 111130C18**

Communication System: WCDMA V; Frequency: 836.4 MHz; Duty Cycle: 1:1

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

Ambient Temperature : 21.7 °C

DASY4 Configuration:

- Probe: ER3DV6 - SN2302; ConvF(1, 1, 1); Calibrated: 2011/06/15
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: HAC Test Arch; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Ch4182/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 54.9 V/m

Probe Modulation Factor = 0.960

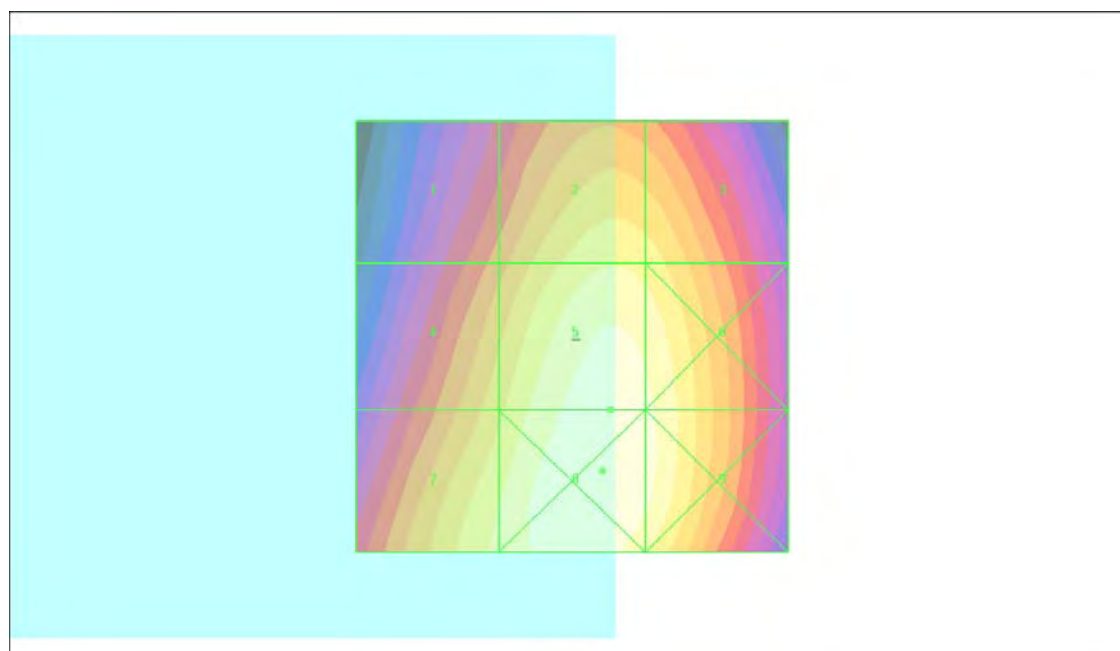
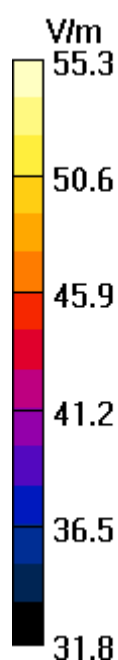
Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 65.0 V/m; Power Drift = 0.021 dB

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

Peak E-field in V/m

Grid 1 <b>46.8 M4</b>	Grid 2 <b>52.1 M4</b>	Grid 3 <b>51.6 M4</b>
Grid 4 <b>50.2 M4</b>	Grid 5 <b>54.9 M4</b>	Grid 6 <b>54.1 M4</b>
Grid 7 <b>52.5 M4</b>	Grid 8 <b>55.3 M4</b>	Grid 9 <b>54.4 M4</b>



### P09 E-Field WCDMA II\_RMC12.2K\_Ch9262\_Battery1

**DUT: 111130C18**

Communication System: WCDMA ; Frequency: 1852.4 MHz;Duty Cycle: 1:1

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

Ambient Temperature : 22.0 °C ;

DASY5 Configuration:

- Probe: ER3DV6 - SN2293; ConvF(1, 1, 1); Calibrated: 2011/01/24
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

**Ch9262/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 22.767 V/m

Probe Modulation Factor = 0.980

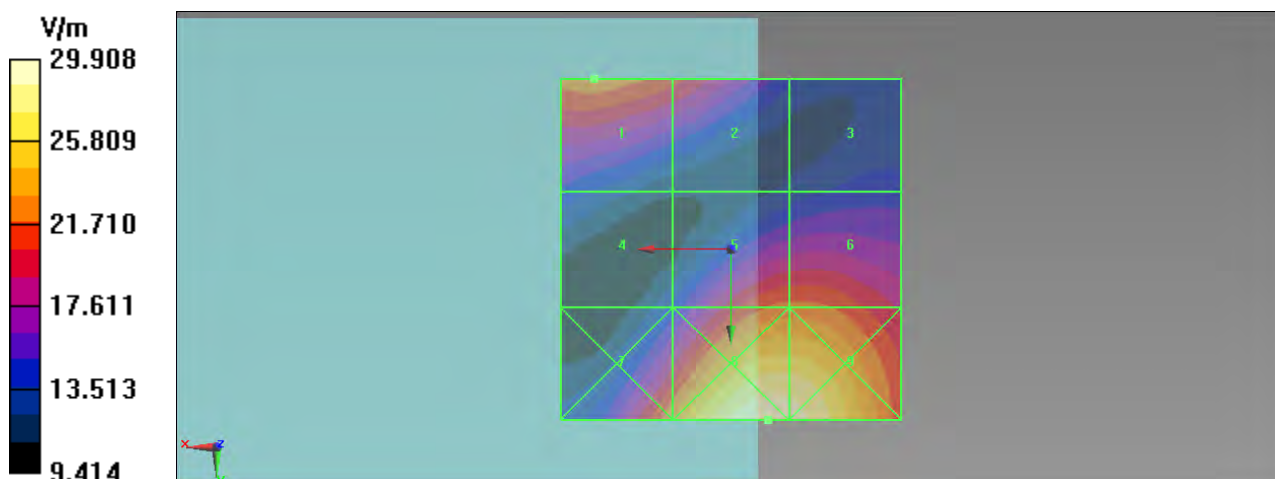
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 16.746 V/m; Power Drift = -0.04 dB

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

Peak E-field in V/m

Grid 1 <b>22.767 M4</b>	Grid 2 <b>20.901 M4</b>	Grid 3 <b>14.347 M4</b>
Grid 4 <b>14.734 M4</b>	Grid 5 <b>22.170 M4</b>	Grid 6 <b>22.184 M4</b>
Grid 7 <b>23.280 M4</b>	Grid 8 <b>29.907 M4</b>	Grid 9 <b>29.395 M4</b>



### P10 E-Field WCDMA II\_RMC12.2K\_Ch9400\_Battery1

**DUT: 111130C18**

Communication System: WCDMA; 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>

Ambient Temperature : 22.0 °C

DASY5 Configuration:

- Probe: ER3DV6 - SN2293; ConvF(1, 1, 1); Calibrated: 2011/01/24
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.4.5 (3634)

**Ch9400/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 25.896 V/m

Probe Modulation Factor = 0.980

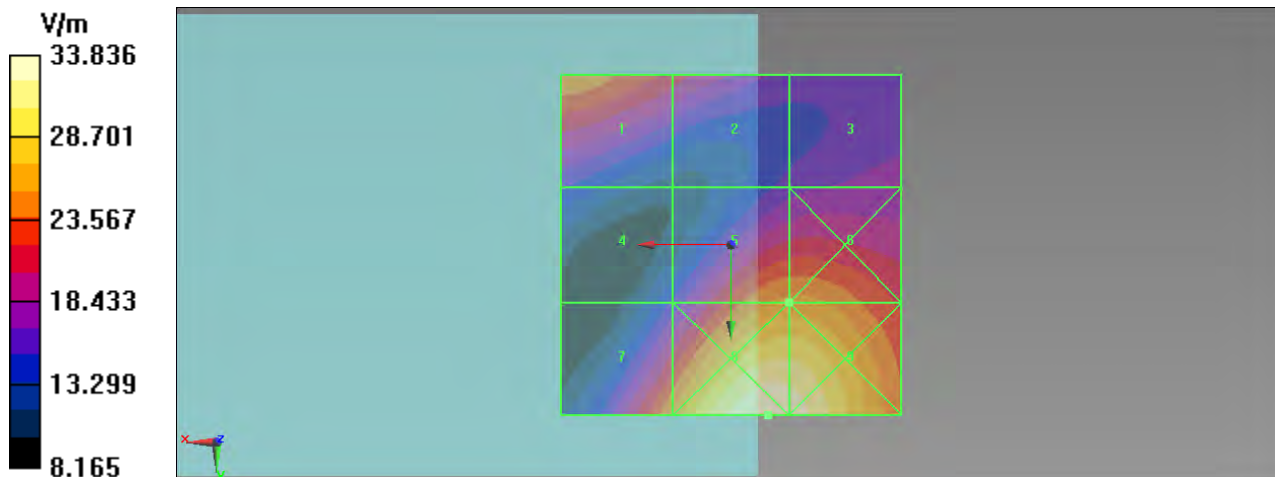
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 20.828 V/m; Power Drift = -0.09 dB

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

Peak E-field in V/m

Grid 1 <b>25.294 M4</b>	Grid 2 <b>21.186 M4</b>	Grid 3 <b>17.535 M4</b>
Grid 4 <b>15.545 M4</b>	Grid 5 <b>25.896 M4</b>	Grid 6 <b>25.923 M4</b>
Grid 7 <b>25.806 M4</b>	Grid 8 <b>33.836 M4</b>	Grid 9 <b>33.326 M4</b>



### P11 E-Field WCDMA II\_RMC12.2K\_Ch9538\_Battery1

**DUT: 111130C18**

Communication System: WCDMA; Frequency: 1907.6 MHz; Duty Cycle: 1:1

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

Ambient Temperature : 22.0 °C

DASY5 Configuration:

- Probe: ER3DV6 - SN2293; ConvF(1, 1, 1); Calibrated: 2011/01/24
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.4.5 (3634)

**Ch9538/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 22.501 V/m

Probe Modulation Factor = 0.980

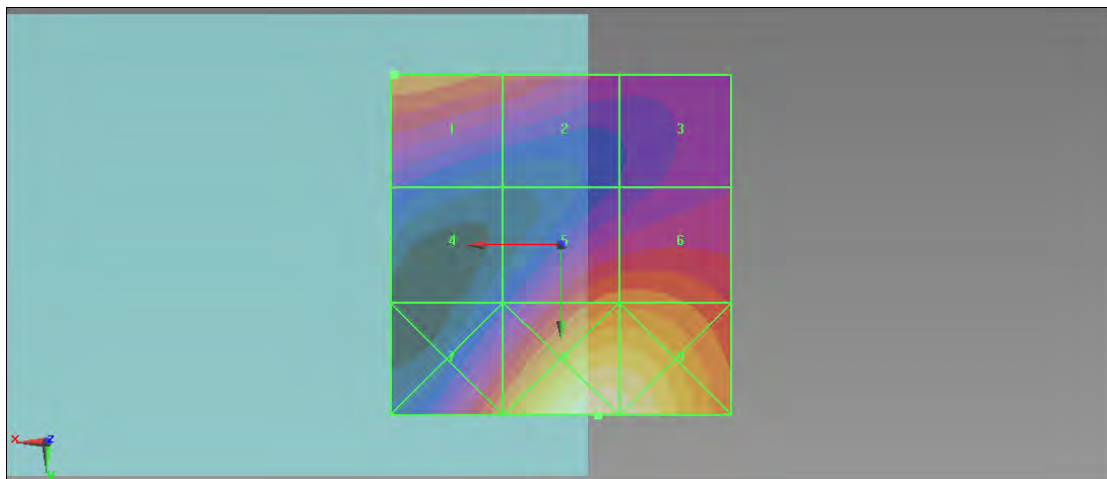
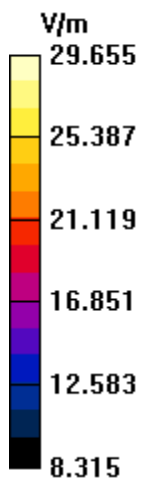
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 17.298 V/m; Power Drift = -0.32 dB

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

Peak E-field in V/m

Grid 1 <b>22.501 M4</b>	Grid 2 <b>20.608 M4</b>	Grid 3 <b>16.868 M4</b>
Grid 4 <b>14.567 M4</b>	Grid 5 <b>22.013 M4</b>	Grid 6 <b>22.108 M4</b>
Grid 7 <b>22.736 M4</b>	Grid 8 <b>29.655 M4</b>	Grid 9 <b>29.195 M4</b>



## P12 E\_Field WCDMA II\_RMC12.2K\_Ch9400\_Battery2

**DUT: 111130C18**

Communication System: WCDMA II; 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>

Ambient Temperature : 21.7 °C

DASY4 Configuration:

- Probe: ER3DV6 - SN2302; ConvF(1, 1, 1); Calibrated: 2011/06/15
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: HAC Test Arch; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Ch9400/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 19.6 V/m

Probe Modulation Factor = 0.980

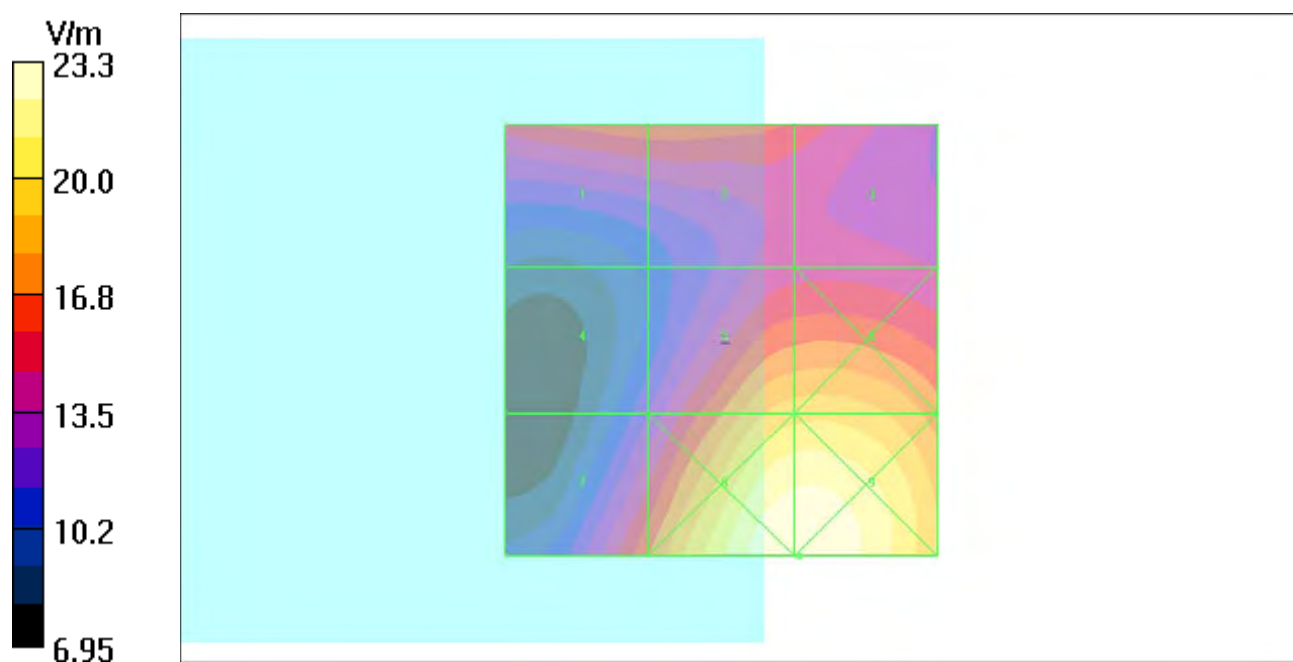
Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 17.7 V/m; Power Drift = 0.012 dB

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

Peak E-field in V/m

Grid 1 <b>16.6 M4</b>	Grid 2 <b>16.6 M4</b>	Grid 3 <b>15.5 M4</b>
Grid 4 <b>12.4 M4</b>	Grid 5 <b>19.6 M4</b>	Grid 6 <b>19.8 M4</b>
Grid 7 <b>16.8 M4</b>	Grid 8 <b>23.3 M4</b>	Grid 9 <b>23.3 M4</b>





## P17 H-Field GSM850\_Ch128\_Battery1

**DUT: 111130C18**

Communication System: GSM; Frequency: 824.2 MHz; Duty Cycle: 1:1  
 Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1$  kg/m<sup>3</sup>  
 Ambient Temperature : 22.0 °C

DASY5 Configuration:

- Probe: H3DV6 - SN6124; ; Calibrated: 2011/01/14
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.4.5 (3634)

**Ch128/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.172 A/m

Probe Modulation Factor = 1.420

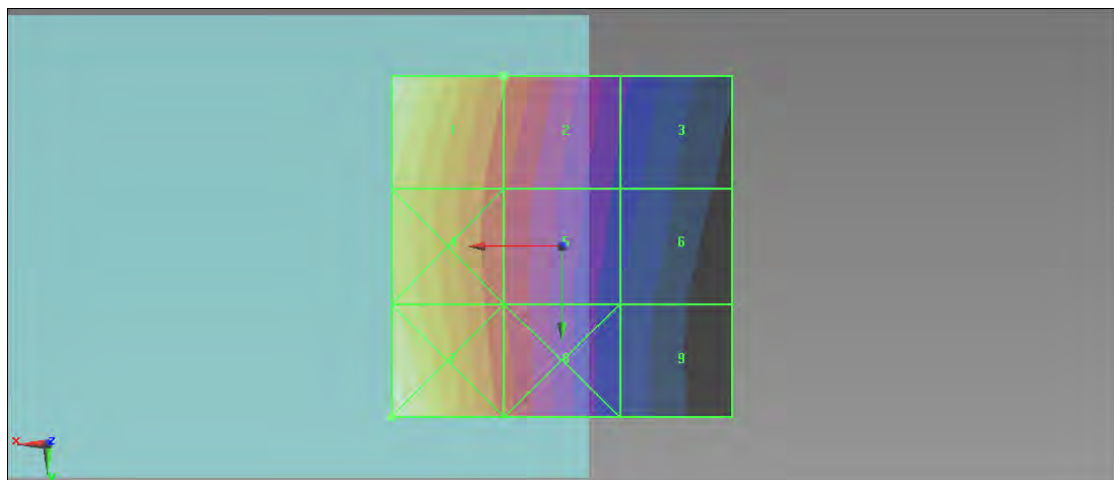
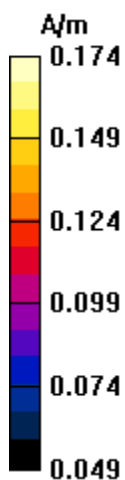
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.070 A/m; Power Drift = -0.06 dB

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

Peak H-field in A/m

Grid 1 <b>0.172 M4</b>	Grid 2 <b>0.126 M4</b>	Grid 3 <b>0.086 M4</b>
Grid 4 <b>0.160 M4</b>	Grid 5 <b>0.118 M4</b>	Grid 6 <b>0.080 M4</b>
Grid 7 <b>0.174 M4</b>	Grid 8 <b>0.121 M4</b>	Grid 9 <b>0.075 M4</b>



### P18 H-Field GSM850\_Ch189\_Battery1

**DUT: 111130C18**

Communication System: GSM; Frequency: 836.4 MHz; Duty Cycle: 1:1  
 Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1$  kg/m<sup>3</sup>  
 Ambient Temperature : 22.0 °C

DASY5 Configuration:

- Probe: H3DV6 - SN6124; ; Calibrated: 2011/01/14
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.4.5 (3634)

**Ch189/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.177 A/m

Probe Modulation Factor = 1.420

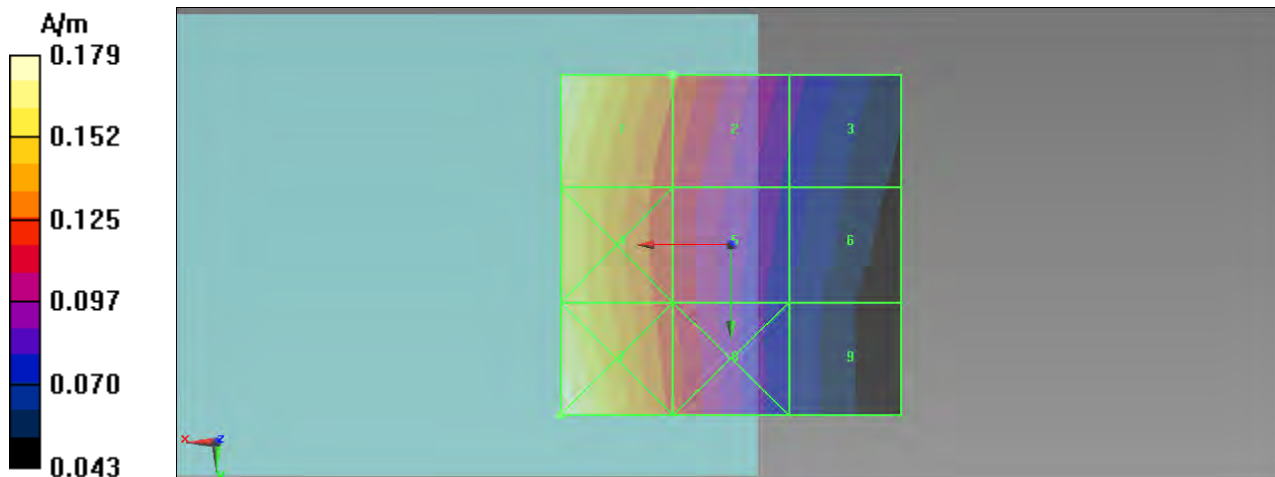
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.068 A/m; Power Drift = -0.11 dB

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

Peak H-field in A/m

Grid 1 <b>0.177 M4</b>	Grid 2 <b>0.127 M4</b>	Grid 3 <b>0.085 M4</b>
Grid 4 <b>0.163 M4</b>	Grid 5 <b>0.117 M4</b>	Grid 6 <b>0.077 M4</b>
Grid 7 <b>0.179 M4</b>	Grid 8 <b>0.121 M4</b>	Grid 9 <b>0.071 M4</b>



### P19 H-Field GSM850\_Ch251\_Battery1

**DUT: 111130C18**

Communication System: GSM; Frequency: 848.8 MHz; Duty Cycle: 1:1  
 Medium: Air Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1$  kg/m<sup>3</sup>  
 Ambient Temperature : 22.0 °C

**DASY5 Configuration:**

- Probe: H3DV6 - SN6124; ; Calibrated: 2011/01/14
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.4.5 (3634)

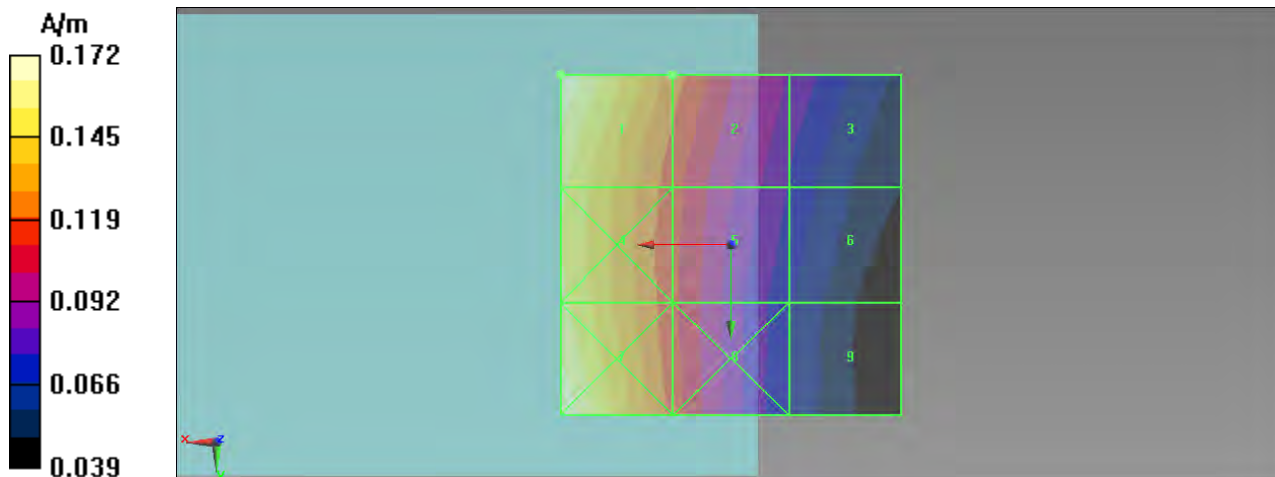
**Ch251/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.172 A/m  
 Probe Modulation Factor = 1.420  
 Device Reference Point: 0, 0, -6.3 mm  
 Reference Value = 0.066 A/m; Power Drift = -0.11 dB

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

Peak H-field in A/m

Grid 1 <b>0.172 M4</b>	Grid 2 <b>0.124 M4</b>	Grid 3 <b>0.083 M4</b>
Grid 4 <b>0.157 M4</b>	Grid 5 <b>0.114 M4</b>	Grid 6 <b>0.074 M4</b>
Grid 7 <b>0.171 M4</b>	Grid 8 <b>0.115 M4</b>	Grid 9 <b>0.067 M4</b>



## P20 H\_Field GSM850\_Ch189\_Battery2

**DUT: 111130C18**

Communication System: GSM850; Frequency: 836.4 MHz; Duty Cycle: 1:8.3

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

Ambient Temperature : 20.7 °C;

DASY4 Configuration:

- Probe: H3DV6 - SN6124; ; Calibrated: 2011/01/14
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: HAC Test Arch; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Ch189/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.146 A/m

Probe Modulation Factor = 1.42

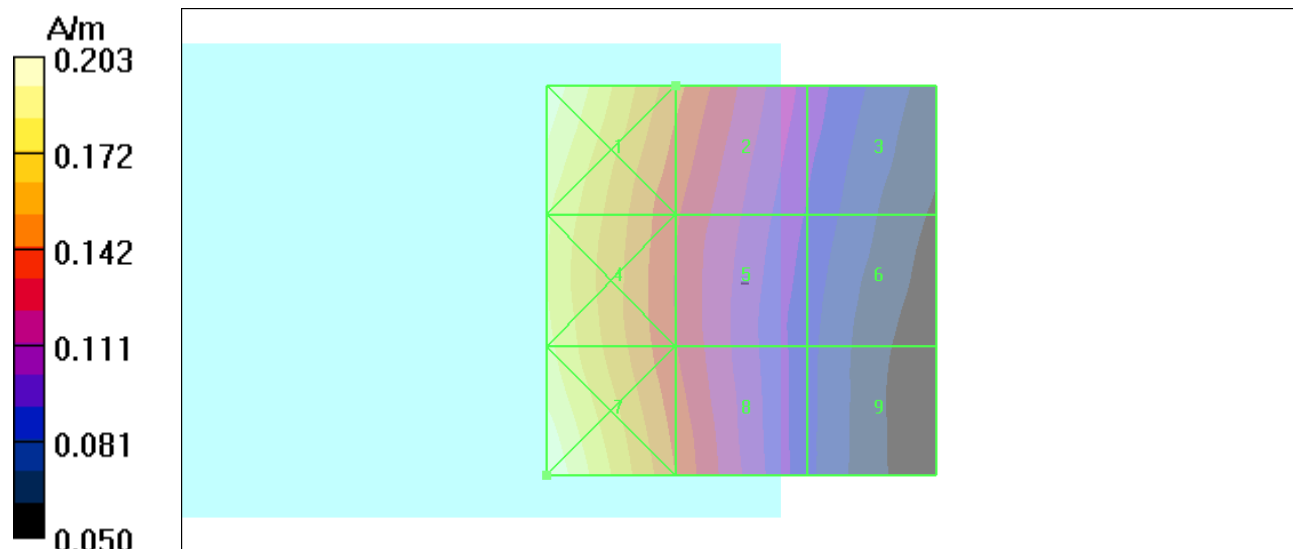
Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 0.078 A/m; Power Drift = 0.065 dB

**Hearing Aid Near-Field Category: M4 (AWF -5 dB)**

Peak H-field in A/m

Grid 1 <b>0.201 M4</b>	Grid 2 <b>0.146 M4</b>	Grid 3 <b>0.098 M4</b>
Grid 4 <b>0.186 M4</b>	Grid 5 <b>0.134 M4</b>	Grid 6 <b>0.090 M4</b>
Grid 7 <b>0.203 M4</b>	Grid 8 <b>0.142 M4</b>	Grid 9 <b>0.085 M4</b>



## P21 H-Field GSM1900\_Ch512\_Battery1

**DUT: 111130C18**

Communication System: GSM; Frequency: 1850.2 MHz; Duty Cycle: 1:1

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

Ambient Temperature : 22.0 °C

DASY5 Configuration:

- Probe: H3DV6 - SN6124; ; Calibrated: 2011/01/14

- Sensor-Surface: (Fix Surface)

- Electronics: DAE4 Sn861; Calibrated: 2011/08/29

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

- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.4.5 (3634)

**Ch512/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.076 A/m

Probe Modulation Factor = 1.240

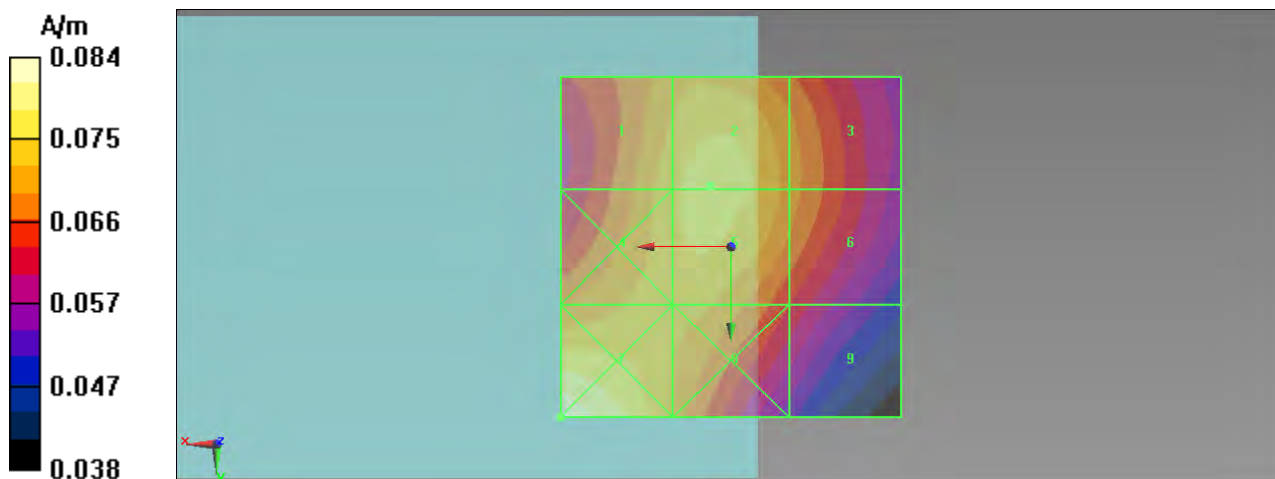
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.067 A/m; Power Drift = -0.07 dB

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

Peak H-field in A/m

Grid 1 <b>0.074 M4</b>	Grid 2 <b>0.076 M4</b>	Grid 3 <b>0.071 M4</b>
Grid 4 <b>0.074 M4</b>	Grid 5 <b>0.076 M4</b>	Grid 6 <b>0.071 M4</b>
Grid 7 <b>0.084 M4</b>	Grid 8 <b>0.073 M4</b>	Grid 9 <b>0.063 M4</b>



## P22 H-Field GSM1900\_Ch661\_Battery1

**DUT: 111130C18**

Communication System: GSM; 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>  
 Ambient Temperature : 22.0 °C

DASY5 Configuration:

- Probe: H3DV6 - SN6124; ; Calibrated: 2011/01/14
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.4.5 (3634)

**Ch661/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.074 A/m

Probe Modulation Factor = 1.240

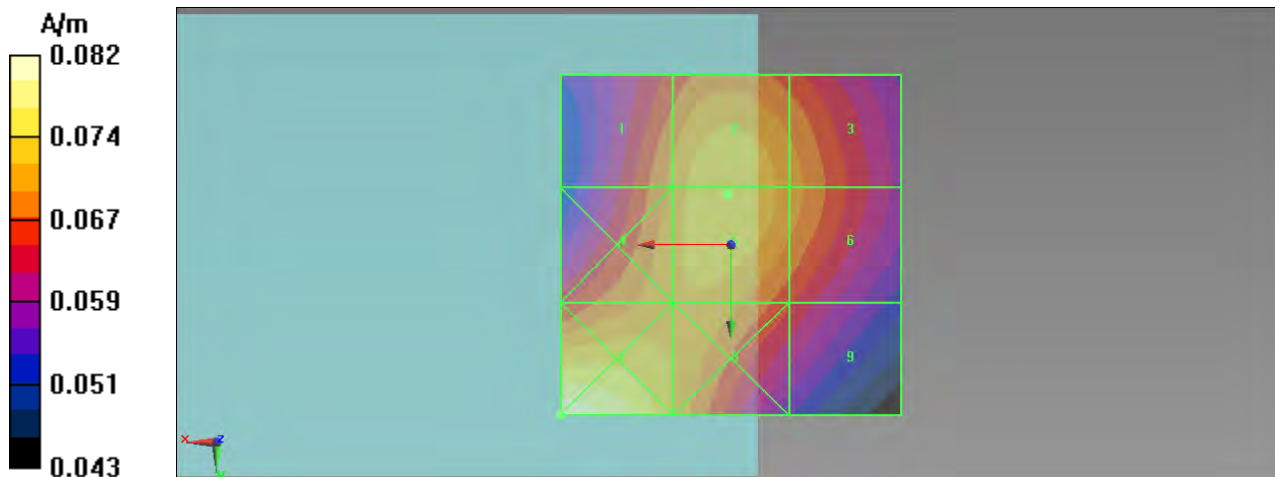
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.066 A/m; Power Drift = -0.07 dB

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

Peak H-field in A/m

Grid 1 <b>0.070 M4</b>	Grid 2 <b>0.074 M4</b>	Grid 3 <b>0.071 M4</b>
Grid 4 <b>0.071 M4</b>	Grid 5 <b>0.074 M4</b>	Grid 6 <b>0.071 M4</b>
Grid 7 <b>0.082 M4</b>	Grid 8 <b>0.072 M4</b>	Grid 9 <b>0.065 M4</b>



## P23 H-Field GSM1900\_Ch810\_Battery1

**DUT: 111130C18**

Communication System: GSM; Frequency: 1909.8 MHz; Duty Cycle: 1:1

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

Ambient Temperature : 22.0 °C

DASY5 Configuration:

- Probe: H3DV6 - SN6124; ; Calibrated: 2011/01/14
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.4.5 (3634)

**Ch810/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.075 A/m

Probe Modulation Factor = 1.240

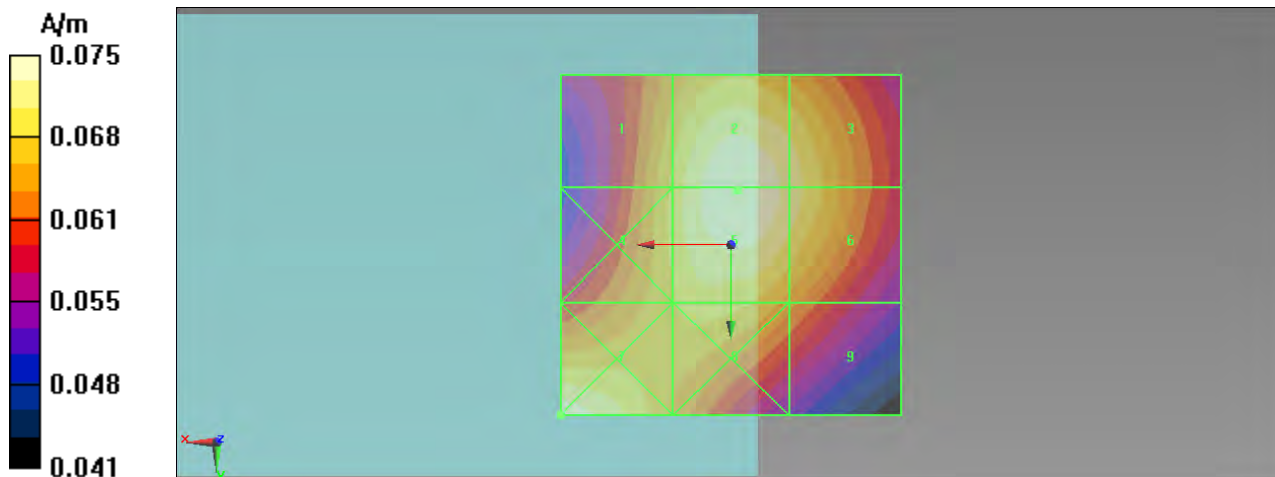
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.066 A/m; Power Drift = 0.22 dB

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

Peak H-field in A/m

Grid 1 <b>0.069 M4</b>	Grid 2 <b>0.075 M4</b>	Grid 3 <b>0.072 M4</b>
Grid 4 <b>0.069 M4</b>	Grid 5 <b>0.075 M4</b>	Grid 6 <b>0.072 M4</b>
Grid 7 <b>0.075 M4</b>	Grid 8 <b>0.070 M4</b>	Grid 9 <b>0.065 M4</b>



## P24 H\_Field GSM1900\_Ch512\_Battery2

**DUT: 111130C18**

Communication System: GSM1900; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3

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

Ambient Temperature : 20.7 °C;

DASY4 Configuration:

- Probe: H3DV6 - SN6124; ; Calibrated: 2011/01/14
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: HAC Test Arch; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Ch512/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.071 A/m

Probe Modulation Factor = 1.24

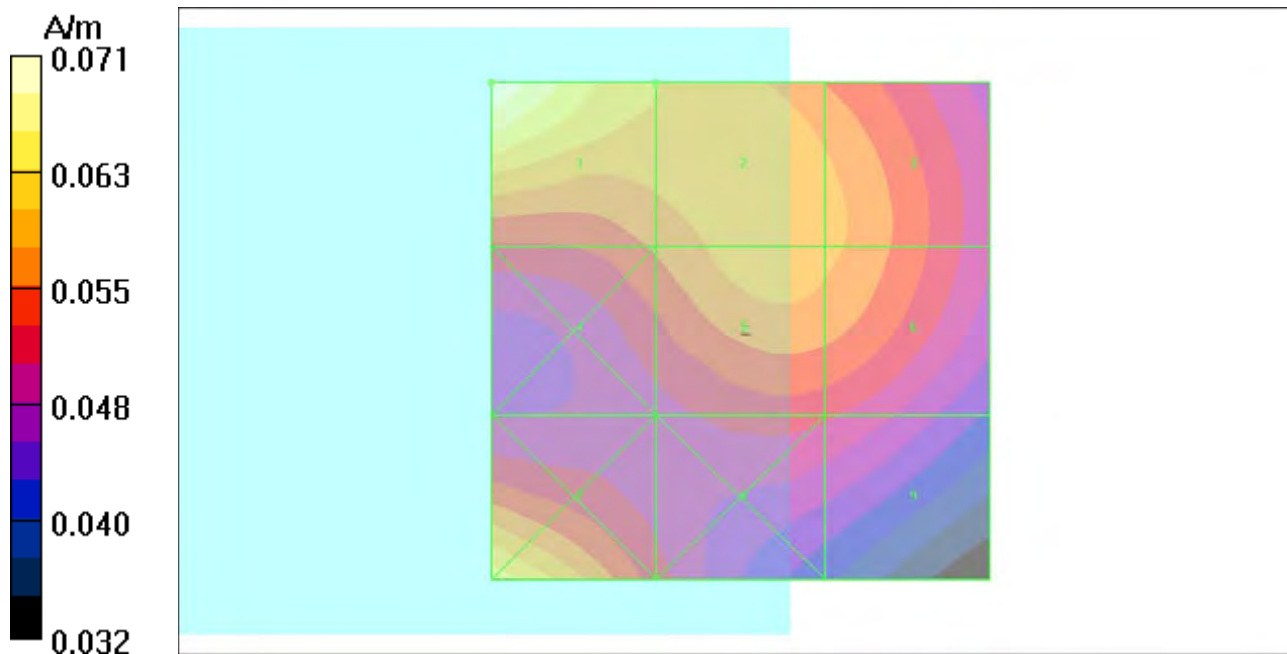
Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 0.051 A/m; Power Drift = 0.024 dB

**Hearing Aid Near-Field Category: M4 (AWF -5 dB)**

Peak H-field in A/m

Grid 1 <b>0.071 M4</b>	Grid 2 <b>0.061 M4</b>	Grid 3 <b>0.059 M4</b>
Grid 4 <b>0.056 M4</b>	Grid 5 <b>0.060 M4</b>	Grid 6 <b>0.059 M4</b>
Grid 7 <b>0.065 M4</b>	Grid 8 <b>0.052 M4</b>	Grid 9 <b>0.051 M4</b>





### P29 H\_Field WCDMA V\_RMC12.2K\_Ch4132\_Battery1

**DUT: 111130C18**

Communication System: WCDMA V; Frequency: 826.4 MHz; Duty Cycle: 1:1

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

Ambient Temperature : 21.7 °C

DASY4 Configuration:

- Probe: H3DV6 - SN6187; ; Calibrated: 2011/06/17
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: HAC Test Arch; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Ch4132/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.080 A/m

Probe Modulation Factor = 0.770

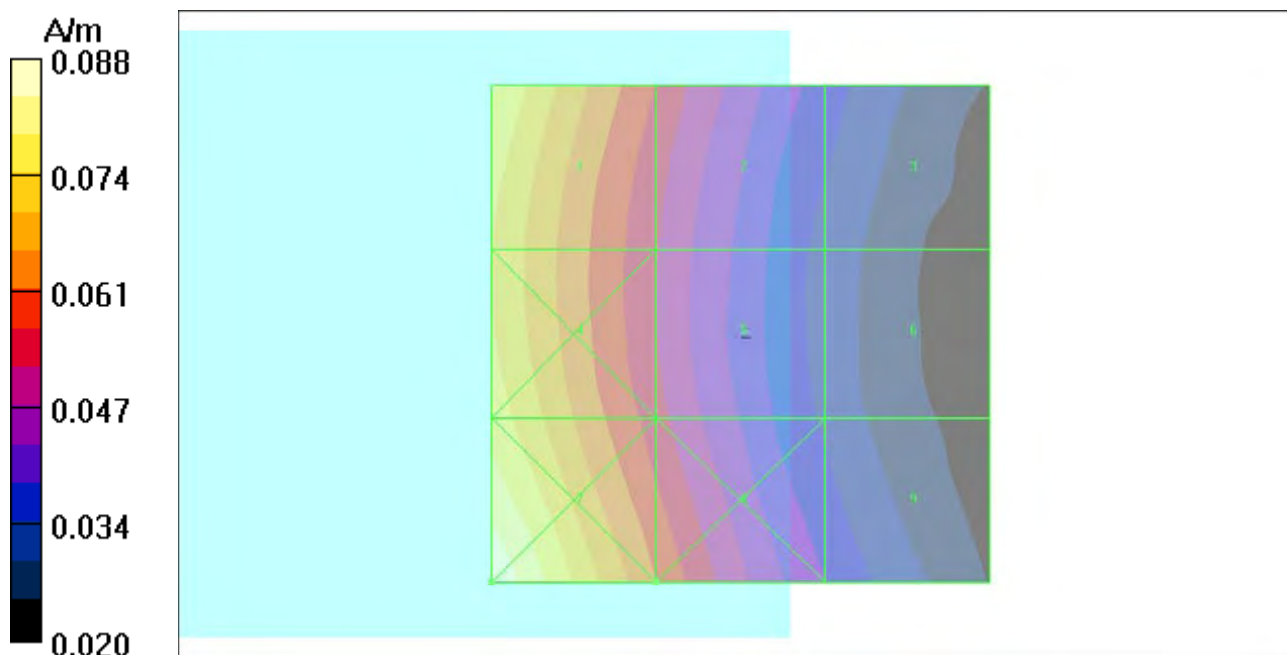
Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 0.053 A/m; Power Drift = -0.101 dB

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

Peak H-field in A/m

Grid 1 <b>0.080 M4</b>	Grid 2 <b>0.056 M4</b>	Grid 3 <b>0.036 M4</b>
Grid 4 <b>0.077 M4</b>	Grid 5 <b>0.054 M4</b>	Grid 6 <b>0.033 M4</b>
Grid 7 <b>0.088 M4</b>	Grid 8 <b>0.061 M4</b>	Grid 9 <b>0.039 M4</b>



### P30 H-Field WCDMA V\_RMC12.2K\_Ch4182\_Battery1

**DUT: 111130C18**

Communication System: WCDMA; Frequency: 836.4 MHz; Duty Cycle: 1:1

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

Ambient Temperature : 22.0 °C

DASY5 Configuration:

- Probe: H3DV6 - SN6124; ; Calibrated: 2011/01/14
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.4.5 (3634)

**Ch4182/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.101 A/m

Probe Modulation Factor = 0.770

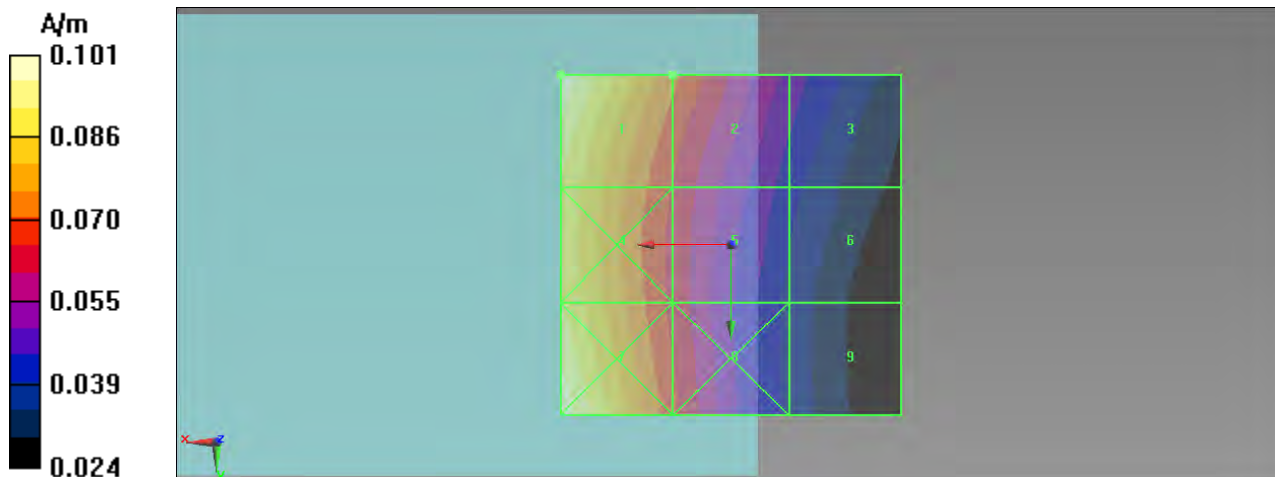
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.065 A/m; Power Drift = 0.0014 dB

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

Peak H-field in A/m

Grid 1 <b>0.101 M4</b>	Grid 2 <b>0.072 M4</b>	Grid 3 <b>0.048 M4</b>
Grid 4 <b>0.091 M4</b>	Grid 5 <b>0.065 M4</b>	Grid 6 <b>0.042 M4</b>
Grid 7 <b>0.100 M4</b>	Grid 8 <b>0.067 M4</b>	Grid 9 <b>0.038 M4</b>



**P31 H-Field WCDMA V\_RMC12.2K\_Ch4233\_Battery1**

**DUT: 111130C18**

Communication System: WCDMA; Frequency: 846.6 MHz; Duty Cycle: 1:1

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

Ambient Temperature : 22.0 °C

DASY5 Configuration:

- Probe: H3DV6 - SN6124; ; Calibrated: 2011/01/14
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.4.5 (3634)

**Ch4233/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.095 A/m

Probe Modulation Factor = 0.770

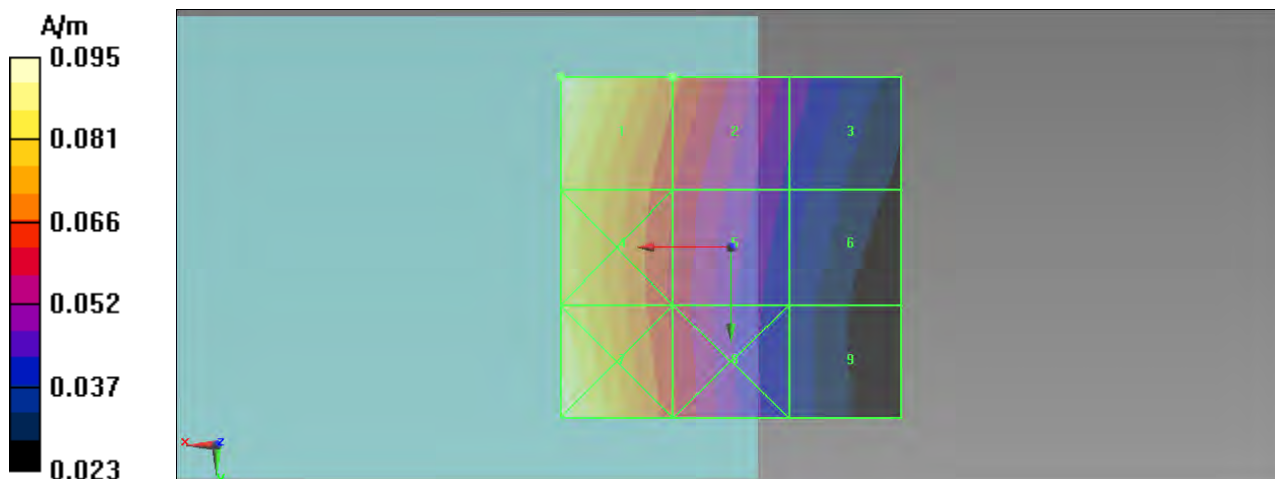
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.064 A/m; Power Drift = 0.06 dB

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

Peak H-field in A/m

Grid 1 <b>0.095 M4</b>	Grid 2 <b>0.068 M4</b>	Grid 3 <b>0.046 M4</b>
Grid 4 <b>0.086 M4</b>	Grid 5 <b>0.062 M4</b>	Grid 6 <b>0.041 M4</b>
Grid 7 <b>0.094 M4</b>	Grid 8 <b>0.063 M4</b>	Grid 9 <b>0.037 M4</b>



### P32 H\_Field WCDMA V\_RMC12.2K\_Ch4182\_Battery2

**DUT: 111130C18**

Communication System: WCDMA V; Frequency: 836.4 MHz; Duty Cycle: 1:1

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

Ambient Temperature : 21.7 °C

DASY4 Configuration:

- Probe: H3DV6 - SN6187; ; Calibrated: 2011/06/17
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: HAC Test Arch; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Ch4182/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.086 A/m

Probe Modulation Factor = 0.770

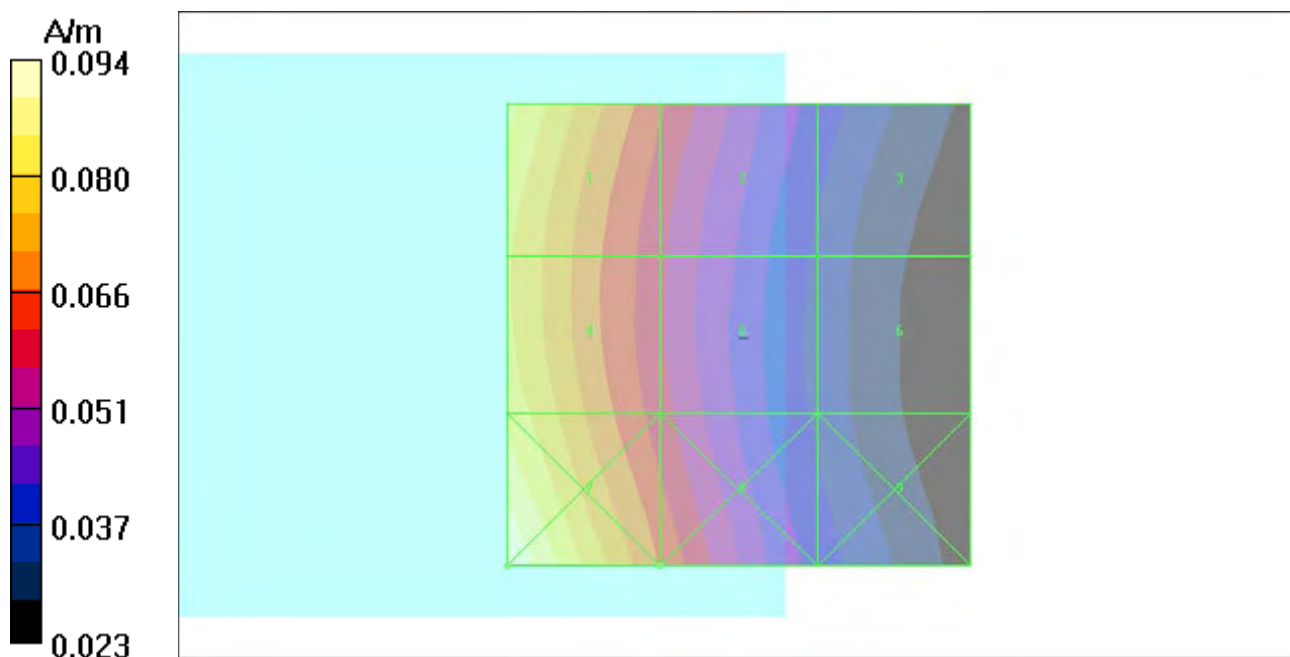
Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 0.056 A/m; Power Drift = 0.014 dB

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

Peak H-field in A/m

Grid 1 <b>0.086 M4</b>	Grid 2 <b>0.062 M4</b>	Grid 3 <b>0.040 M4</b>
Grid 4 <b>0.083 M4</b>	Grid 5 <b>0.059 M4</b>	Grid 6 <b>0.037 M4</b>
Grid 7 <b>0.094 M4</b>	Grid 8 <b>0.065 M4</b>	Grid 9 <b>0.040 M4</b>



## P25 H-Field WCDMA II\_RMC12.2K\_Ch9262\_Battery1

**DUT: 111130C18**

Communication System: WCDMA; Frequency: 1852.4 MHz; Duty Cycle: 1:1

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

Ambient Temperature : 22.0 °C

DASY5 Configuration:

- Probe: H3DV6 - SN6124; ; Calibrated: 2011/01/14
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.4.5 (3634)

**Ch9262/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.046 A/m

Probe Modulation Factor = 0.510

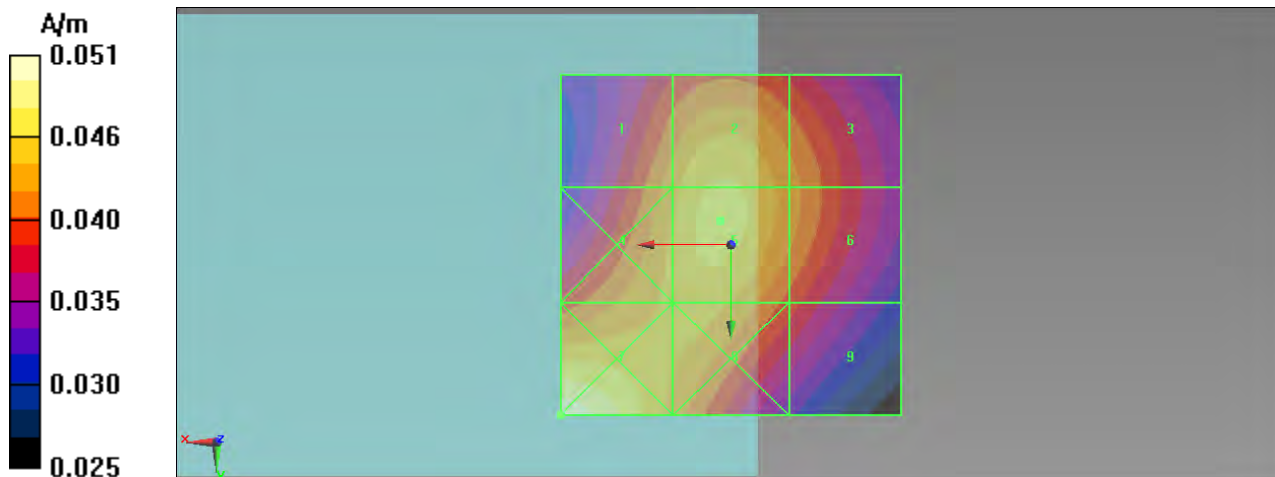
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.103 A/m; Power Drift = -0.12 dB

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

Peak H-field in A/m

Grid 1 <b>0.043 M4</b>	Grid 2 <b>0.046 M4</b>	Grid 3 <b>0.043 M4</b>
Grid 4 <b>0.044 M4</b>	Grid 5 <b>0.046 M4</b>	Grid 6 <b>0.043 M4</b>
Grid 7 <b>0.051 M4</b>	Grid 8 <b>0.045 M4</b>	Grid 9 <b>0.040 M4</b>



## P26 H-Field WCDMA II\_RMC12.2K\_Ch9400\_Battery1

**DUT: 111130C18**

Communication System: WCDMA; 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>

Ambient Temperature : 22.0 °C

DASY5 Configuration:

- Probe: H3DV6 - SN6124; ; Calibrated: 2011/01/14
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.4.5 (3634)

**Ch9400/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.044 A/m

Probe Modulation Factor = 0.510

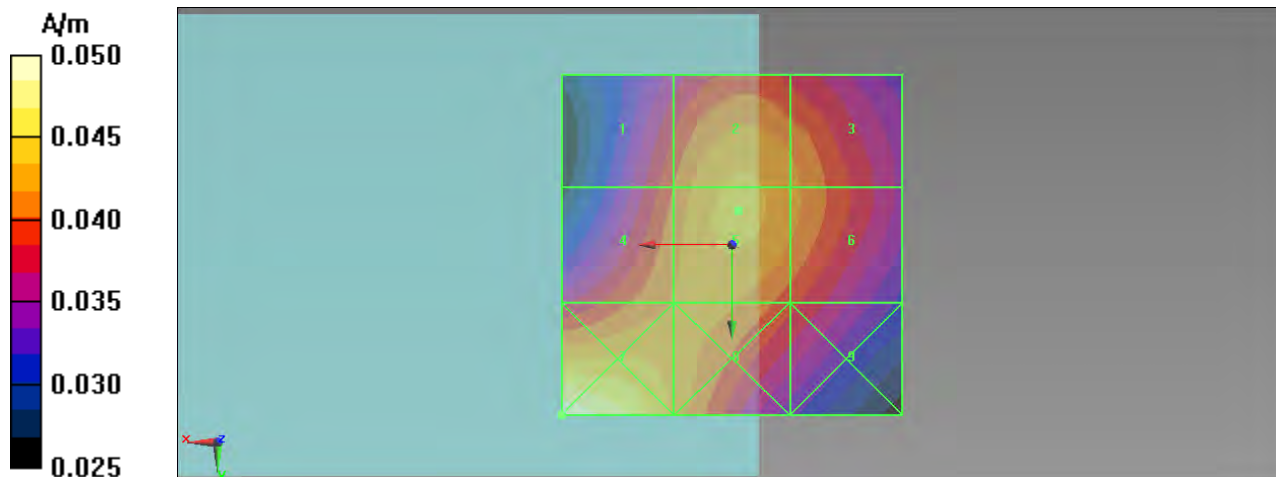
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.094 A/m; Power Drift = 0.23 dB

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

Peak H-field in A/m

Grid 1 <b>0.040 M4</b>	Grid 2 <b>0.044 M4</b>	Grid 3 <b>0.042 M4</b>
Grid 4 <b>0.042 M4</b>	Grid 5 <b>0.044 M4</b>	Grid 6 <b>0.043 M4</b>
Grid 7 <b>0.050 M4</b>	Grid 8 <b>0.043 M4</b>	Grid 9 <b>0.039 M4</b>



## P27 H-Field WCDMA II\_RMC12.2K\_Ch9538\_Battery1

**DUT: 111130C18**

Communication System: WCDMA; Frequency: 1907.6 MHz; Duty Cycle: 1:1

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

Ambient Temperature : 22.0 °C

DASY5 Configuration:

- Probe: H3DV6 - SN6124; ; Calibrated: 2011/01/14
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.4.5 (3634)

**Ch9538/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.038 A/m

Probe Modulation Factor = 0.510

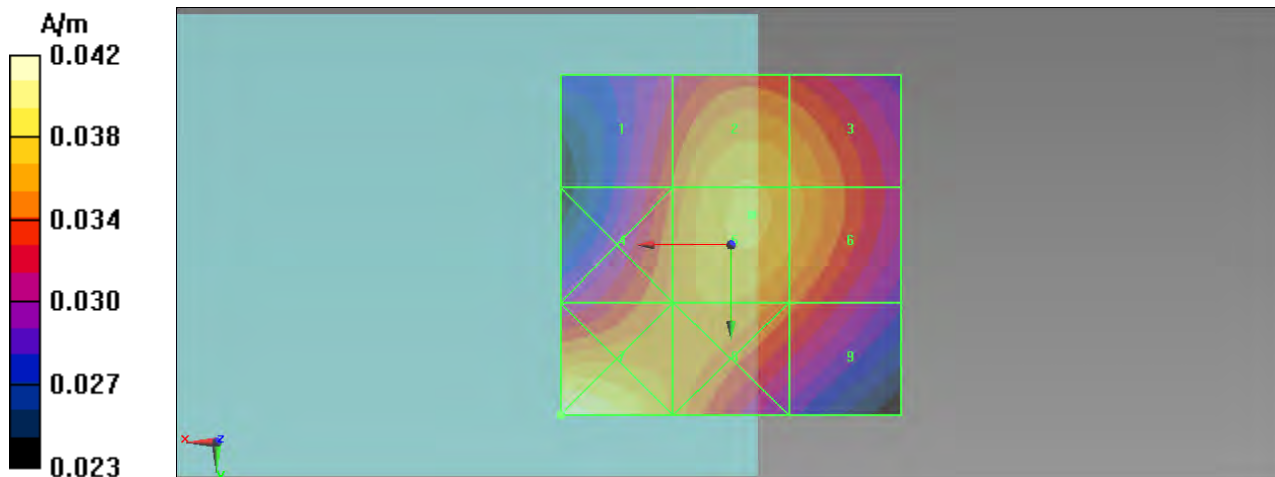
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.085 A/m; Power Drift = 0.10 dB

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

Peak H-field in A/m

Grid 1 <b>0.034 M4</b>	Grid 2 <b>0.038 M4</b>	Grid 3 <b>0.037 M4</b>
Grid 4 <b>0.036 M4</b>	Grid 5 <b>0.038 M4</b>	Grid 6 <b>0.037 M4</b>
Grid 7 <b>0.042 M4</b>	Grid 8 <b>0.037 M4</b>	Grid 9 <b>0.035 M4</b>



**P28 H\_Field WCDMA II\_RMC12.2K\_Ch9262\_Battery2**

**DUT: 111130C18**

Communication System: WCDMA II; Frequency: 1852.4 MHz; Duty Cycle: 1:1

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

Ambient Temperature : 21.7 °C

DASY4 Configuration:

- Probe: H3DV6 - SN6187; ; Calibrated: 2011/06/17
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: HAC Test Arch; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Ch9262/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.034 A/m

Probe Modulation Factor = 0.510

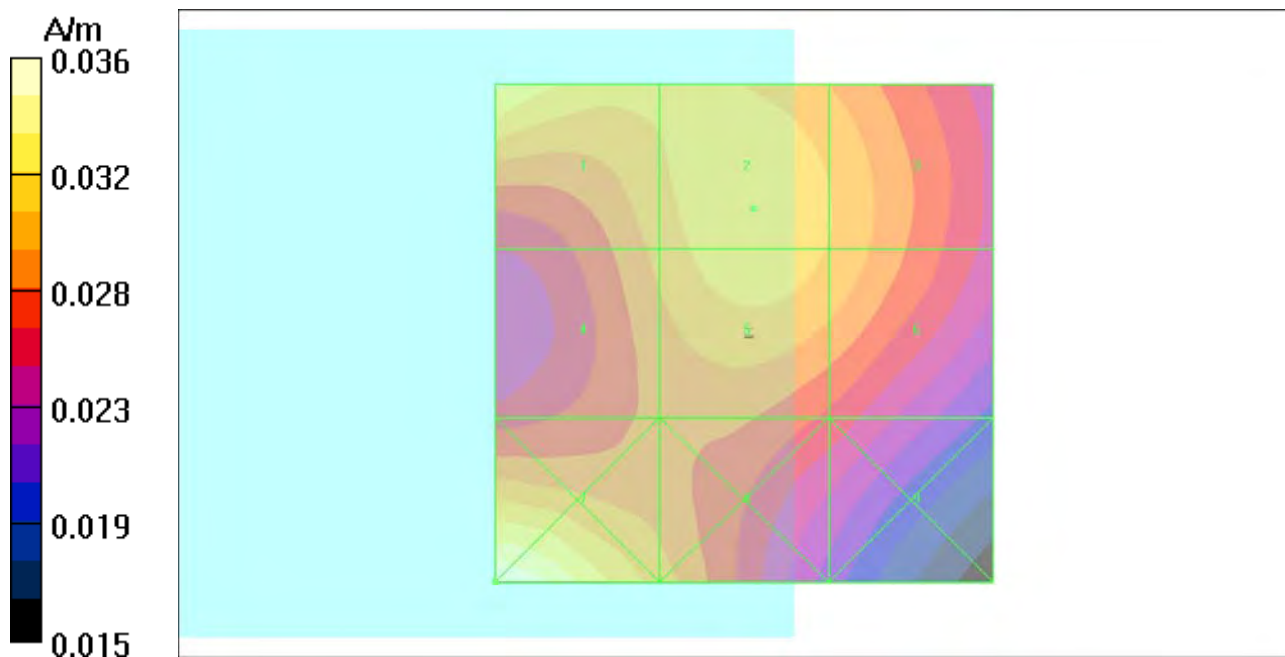
Device Reference Point: 0.000, 0.000, 353.7 mm

Reference Value = 0.068 A/m; Power Drift = -0.085 dB

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

Peak H-field in A/m

Grid 1 <b>0.034 M4</b>	Grid 2 <b>0.031 M4</b>	Grid 3 <b>0.031 M4</b>
Grid 4 <b>0.029 M4</b>	Grid 5 <b>0.031 M4</b>	Grid 6 <b>0.030 M4</b>
Grid 7 <b>0.036 M4</b>	Grid 8 <b>0.030 M4</b>	Grid 9 <b>0.026 M4</b>







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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 **B.V. ADT (Auden)**

Certificate No: **CD835V3-1041\_Mar11**

## CALIBRATION CERTIFICATE

Object **CD835V3 - SN: 1041**

Calibration procedure(s) **QA CAL-20.v5  
Calibration procedure for dipoles in air**

Calibration date: **March 15, 2011**

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	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Probe ER3DV6	SN: 2336	29-Dec-10 (No. ER3-2336_Dec10)	Dec-11
Probe H3DV6	SN: 6065	29-Dec-10 (No. H3-6065_Dec10)	Dec-11
DAE4	SN: 781	20-Oct-10 (No. DAE4-781_Oct10)	Oct-11
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter Agilent 4419B	SN: GB42420191	09-Oct-09 (in house check Oct-10)	In house check: Oct-11
Power sensor HP 8482H	SN: 3318A09450	09-Oct-09 (in house check Oct-10)	In house check: Oct-11
Power sensor HP 8482A	SN: US37295597	09-Oct-09 (in house check Oct-10)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-10)	In house check: Oct-11
RF generator E4433B	MY 41000675	03-Nov-04 (in house check Oct-09)	In house check: Oct-11

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

Approved by: **Fin Bomholt**      Name: Fin Bomholt      Function: Technical Director

Signature

Issued: March 16, 2011

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



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

### References

- [1] ANSI-C63.19-2007  
American National Standard for Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids.

### Methods Applied and Interpretation of Parameters:

- *Coordinate System:* y-axis is in the direction of the dipole arms. z-axis is from the basis of the antenna (mounted on the table) towards its feed point between the two dipole arms. x-axis is normal to the other axes. In coincidence with the standards [1], the measurement planes (probe sensor center) are selected to be at a distance of 10 mm above the top edge of the dipole arms.
- *Measurement Conditions:* Further details are available from the hardcopies at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated. The forward power to the dipole connector is set with a calibrated power meter connected and monitored with an auxiliary power meter connected to a directional coupler. While the dipole under test is connected, the forward power is adjusted to the same level.
- *Antenna Positioning:* The dipole is mounted on a HAC Test Arch phantom using the matching dipole positioner with the arms horizontal and the feeding cable coming from the floor. The measurements are performed in a shielded room with absorbers around the setup to reduce the reflections. It is verified before the mounting of the dipole under the Test Arch phantom, that its arms are perfectly in a line. It is installed on the HAC dipole positioner with its arms parallel below the dielectric reference wire and able to move elastically in vertical direction without changing its relative position to the top center of the Test Arch phantom. The vertical distance to the probe is adjusted after dipole mounting with a DASY5 Surface Check job. Before the measurement, the distance between phantom surface and probe tip is verified. The proper measurement distance is selected by choosing the matching section of the HAC Test Arch phantom with the proper device reference point (upper surface of the dipole) and the matching grid reference point (tip of the probe) considering the probe sensor offset. The vertical distance to the probe is essential for the accuracy.
- *Feed Point Impedance and Return Loss:* These parameters are measured using a HP 8753E Vector Network Analyzer. The impedance is specified at the SMA connector of the dipole. The influence of reflections was eliminated by applying the averaging function while moving the dipole in the air, at least 70cm away from any obstacles.
- *E-field distribution:* E field is measured in the x-y-plane with an isotropic ER3D-field probe with 100 mW forward power to the antenna feed point. In accordance with [1], the scan area is 20mm wide, its length exceeds the dipole arm length (180 or 90mm). The sensor center is 10 mm (in z) above the top of the dipole arms. Two 3D maxima are available near the end of the dipole arms. Assuming the dipole arms are perfectly in one line, the average of these two maxima (in subgrid 2 and subgrid 8) is determined to compensate for any non-parallelity to the measurement plane as well as the sensor displacement. The E-field value stated as calibration value represents the maximum of the interpolated 3D-E-field, 10mm above the dipole surface.
- *H-field distribution:* H-field is measured with an isotropic H-field probe with 100mW forward power to the antenna feed point, in the x-y-plane. The scan area and sensor distance is equivalent to the E-field scan. The maximum of the field is available at the center (subgrid 5) above the feed point. The H-field value stated as calibration value represents the maximum of the interpolated H-field, 10mm above the dipole surface at the feed point.

## 1 Measurement Conditions

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

DASY Version	DASY5	V52.6.2 (424)
DASY PP Version	SEMCAD X	V14.4.4 (2829)
Phantom	HAC Test Arch	SD HAC P01 BA, #1070
Distance Dipole Top - Probe Center	10 mm	
Scan resolution	dx, dy = 5 mm	area = 20 x 180 mm
Frequency	<b>835 MHz ± 1 MHz</b>	
Forward power at dipole connector	20.0 dBm = 100mW	
Input power drift	< 0.05 dB	

## 2 Maximum Field values

H-field 10 mm above dipole surface	condition	interpolated maximum
Maximum measured	100 mW forward power	<b>0.471 A/m</b>

Uncertainty for H-field measurement: 8.2% (k=2)

E-field 10 mm above dipole surface	condition	Interpolated maximum
Maximum measured above high end-	100 mW forward power	170.8 V/m
Maximum measured above low end	100 mW forward power	163.2 V/m
Averaged maximum above arm	100 mW forward power	<b>168.0 V/m</b>

Uncertainty for E-field measurement: 12.8% (k=2)

## 3 Appendix

### 3.1 Antenna Parameters

Frequency	Return Loss	Impedance
800 MHz	15.8 dB	( 42.4 – j13.1 ) Ohm
<b>835 MHz</b>	<b>26.7 dB</b>	<b>( 47.1 + j3.4 ) Ohm</b>
900 MHz	17.1 dB	( 57.3 – j13.3 ) Ohm
950 MHz	17.8 dB	( 47.6 + j12.4 ) Ohm
960 MHz	13.9 dB	( 56.7 + j20.9 ) Ohm

### 3.2 Antenna Design and Handling

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

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

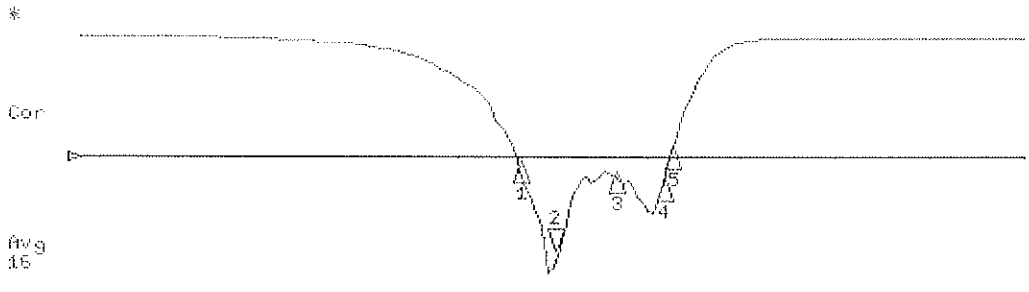
Do not apply force to dipole arms, as they are liable to bend. The soldered connections near the feedpoint may be damaged. After excessive mechanical stress or overheating, check the impedance characteristics to ensure that the internal matching network is not affected.

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

### 3.3 Measurement Sheets

#### 3.3.1 Return Loss and Smith Chart

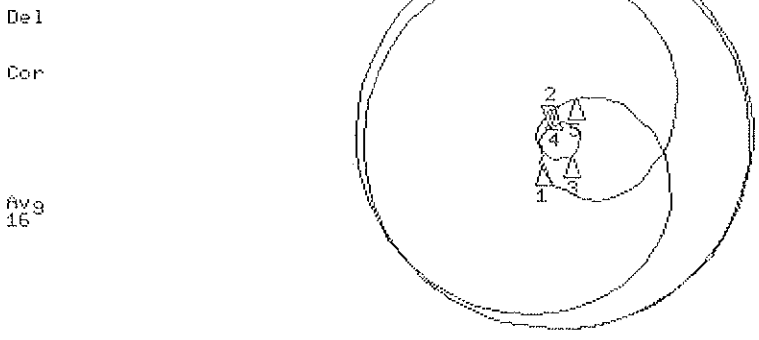
15 Mar 2011 16:17:56  
 CH1 S11 LOG 5 dB/REF -15 dB 21-26.665 dB 835.000 000 MHz



CH1 Markers

1:	-15.832 dB	800.000 MHz
3:	-17.063 dB	900.000 MHz
4:	-17.947 dB	950.000 MHz
5:	-13.896 dB	960.000 MHz

CH2 S11 1 U FS 2: 47.064  $\Omega$  3: 42.19  $\Omega$  652.23  $\mu$ H 835.000 000 MHz



CH2 Markers

1:	42.447 $\Omega$	-13.061 $\Omega$	800.000 MHz
3:	57.330 $\Omega$	-13.271 $\Omega$	900.000 MHz
4:	47.574 $\Omega$	12.365 $\Omega$	950.000 MHz
5:	56.738 $\Omega$	20.904 $\Omega$	960.000 MHz

START 335.000 000 MHz

STOP 1 335.000 000 MHz

### 3.3.3 DASY4 H-field Result

Date/Time: 15.03.2011 10:09:03

Test Laboratory: SPEAG Lab2

**HAC RF\_CD835\_1041\_H\_110315\_CL**

**DUT: HAC-Dipole 835 MHz; Type: CD835V3; Serial: 1041**

Communication System: CW; Frequency: 835 MHz

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

Phantom section: RF Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: H3DV6 - SN6065; ; Calibrated: 29.12.2010
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 20.10.2010
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- Measurement SW: DASY52, V52.6 Build 2, Version 52.6.2 (424)
- Postprocessing SW: SEMCAD X, V14.4 Build 4, Version 14.4.4 (2829)

**Dipole H-Field measurement @ 835MHz/H Scan - measurement distance from the probe sensor center to CD835**

**Dipole = 10mm/Hearing Aid Compatibility Test (41x361x1):**

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

Maximum value of peak Total field = 0.471 A/m

Probe Modulation Factor = 1.000

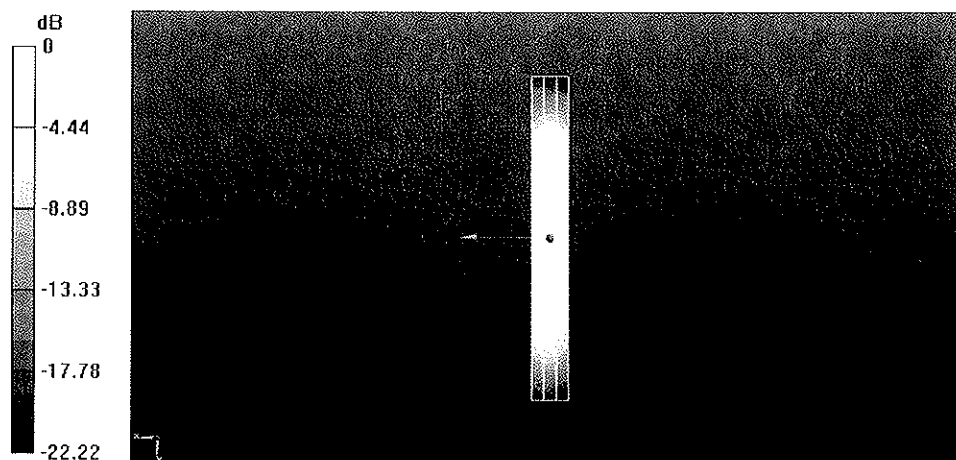
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.502 A/m; Power Drift = 0.01 dB

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

Peak H-field in A/m

Grid 1 <b>0.390</b> <b>M4</b>	Grid 2 <b>0.413</b> <b>M4</b>	Grid 3 <b>0.392</b> <b>M4</b>
Grid 4 <b>0.449</b> <b>M4</b>	Grid 5 <b>0.471</b> <b>M4</b>	Grid 6 <b>0.442</b> <b>M4</b>
Grid 7 <b>0.398</b> <b>M4</b>	Grid 8 <b>0.414</b> <b>M4</b>	Grid 9 <b>0.385</b> <b>M4</b>



0 dB = 0.470A/m

### 3.3.2 DASY4 E-field Result

Date/Time: 15.03.2011 12:53:58

Test Laboratory: SPEAG Lab2

**HAC RF\_CD835\_1041\_E\_110315\_CL**

**DUT: HAC-Dipole 835 MHz; Type: CD835V3; Serial: 1041**

Communication System: CW; Frequency: 835 MHz  
 Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Phantom section: RF Section  
 Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ER3DV6 - SN2336; ConvF(1, 1, 1); Calibrated: 29.12.2010
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 20.10.2010
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- Measurement SW: DASY52, V52.6 Build 2, Version 52.6.2 (424)
- Postprocessing SW: SEMCAD X, V14.4 Build 4, Version 14.4.4 (2829)

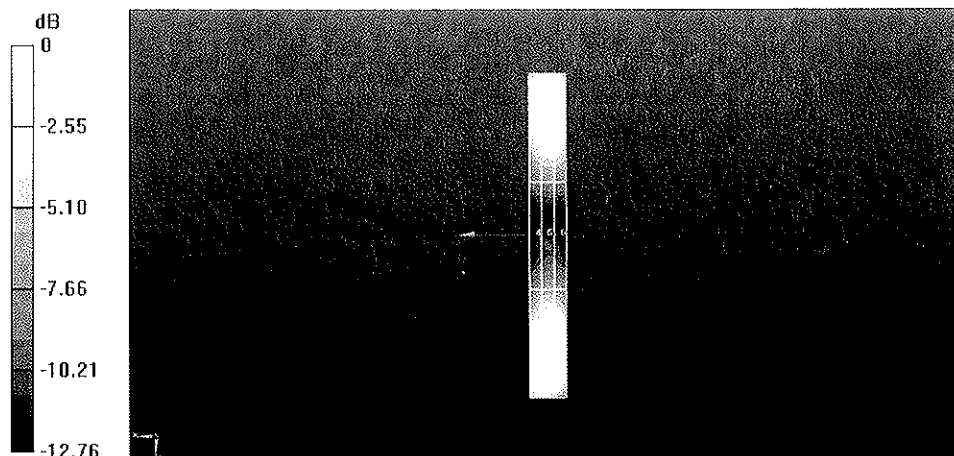
**Dipole E-Field measurement @ 835MHz/E Scan - measurement distance from the probe sensor center to CD835**

**Dipole = 10mm/Hearing Aid Compatibility Test (41x361x1):**

Measurement grid: dx=5mm, dy=5mm  
 Maximum value of peak Total field = 170.8 V/m  
 Probe Modulation Factor = 1.000  
 Device Reference Point: 0, 0, -6.3 mm  
 Reference Value = 124.9 V/m; Power Drift = -0.02 dB  
**Hearing Aid Near-Field Category: M4 (AWF 0 dB)**

Peak E-field in V/m

Grid 1 <b>158.6</b> <b>M4</b>	Grid 2 <b>170.8</b> <b>M4</b>	Grid 3 <b>167.4</b> <b>M4</b>
Grid 4 <b>86.752</b> <b>M4</b>	Grid 5 <b>90.542</b> <b>M4</b>	Grid 6 <b>88.762</b> <b>M4</b>
Grid 7 <b>158.6</b> <b>M4</b>	Grid 8 <b>163.2</b> <b>M4</b>	Grid 9 <b>158.5</b> <b>M4</b>



0 dB = 170.8V/m



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 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 **B.V. ADT (Auden)**

Certificate No: **CD1880V3-1032\_Apr11**

## CALIBRATION CERTIFICATE

Object **CD1880V3 - SN: 1032**

Calibration procedure(s) **QA CAL-20.v5  
 Calibration procedure for dipoles in air**

Calibration date: **April 12, 2011**

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	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Probe ER3DV6	SN: 2336	29-Dec-10 (No. ER3-2336_Dec10)	Dec-11
Probe H3DV6	SN: 6065	29-Dec-10 (No. H3-6065_Dec10)	Dec-11
DAE4	SN: 781	20-Oct-10 (No. DAE4-781_Oct10)	Oct-11
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter Agilent 4419B	SN: GB42420191	09-Oct-09 (in house check Oct-10)	In house check: Oct-11
Power sensor HP 8482H	SN: 3318A09450	09-Oct-09 (in house check Oct-10)	In house check: Oct-11
Power sensor HP 8482A	SN: US37295597	09-Oct-09 (in house check Oct-10)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-10)	In house check: Oct-11
RF generator E4433B	MY 41000675	03-Nov-04 (in house check Oct-09)	In house check: Oct-11

Calibrated by:	Name <b>Claudio Leubler</b>	Function <b>Laboratory Technician</b>	Signature 
Approved by:	Name <b>Fin Bornholt</b>	Function <b>R&amp;D Director</b>	Signature 

Issued: April 12, 2011

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



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

## References

- [1] ANSI-C63.19-2007  
American National Standard for Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids.

## Methods Applied and Interpretation of Parameters:

- *Coordinate System:* y-axis is in the direction of the dipole arms. z-axis is from the basis of the antenna (mounted on the table) towards its feed point between the two dipole arms. x-axis is normal to the other axes. In coincidence with the standards [1], the measurement planes (probe sensor center) are selected to be at a distance of 10 mm above the top edge of the dipole arms.
- *Measurement Conditions:* Further details are available from the hardcopies at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated. The forward power to the dipole connector is set with a calibrated power meter connected and monitored with an auxiliary power meter connected to a directional coupler. While the dipole under test is connected, the forward power is adjusted to the same level.
- *Antenna Positioning:* The dipole is mounted on a HAC Test Arch phantom using the matching dipole positioner with the arms horizontal and the feeding cable coming from the floor. The measurements are performed in a shielded room with absorbers around the setup to reduce the reflections. It is verified before the mounting of the dipole under the Test Arch phantom, that its arms are perfectly in a line. It is installed on the HAC dipole positioner with its arms parallel below the dielectric reference wire and able to move elastically in vertical direction without changing its relative position to the top center of the Test Arch phantom. The vertical distance to the probe is adjusted after dipole mounting with a DASYS5 Surface Check job. Before the measurement, the distance between phantom surface and probe tip is verified. The proper measurement distance is selected by choosing the matching section of the HAC Test Arch phantom with the proper device reference point (upper surface of the dipole) and the matching grid reference point (tip of the probe) considering the probe sensor offset. The vertical distance to the probe is essential for the accuracy.
- *Feed Point Impedance and Return Loss:* These parameters are measured using a HP 8753E Vector Network Analyzer. The impedance is specified at the SMA connector of the dipole. The influence of reflections was eliminated by applying the averaging function while moving the dipole in the air, at least 70cm away from any obstacles.
- *E-field distribution:* E field is measured in the x-y-plane with an isotropic ER3D-field probe with 100 mW forward power to the antenna feed point. In accordance with [1], the scan area is 20mm wide, its length exceeds the dipole arm length (180 or 90mm). The sensor center is 10 mm (in z) above the top of the dipole arms. Two 3D maxima are available near the end of the dipole arms. Assuming the dipole arms are perfectly in one line, the average of these two maxima (in subgrid 2 and subgrid 8) is determined to compensate for any non-parallelity to the measurement plane as well as the sensor displacement. The E-field value stated as calibration value represents the maximum of the interpolated 3D-E-field, 10mm above the dipole surface.
- *H-field distribution:* H-field is measured with an isotropic H-field probe with 100mW forward power to the antenna feed point, in the x-y-plane. The scan area and sensor distance is equivalent to the E-field scan. The maximum of the field is available at the center (subgrid 5) above the feed point. The H-field value stated as calibration value represents the maximum of the interpolated H-field, 10mm above the dipole surface at the feed point.



## 1. Measurement Conditions

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

<b>DASY Version</b>	DASY5	V52.6.2 (424)
<b>DASY PP Version</b>	SEMCAD X	V14.4.4 (2829)
<b>Phantom</b>	HAC Test Arch	SD HAC P01 BA, #1070
<b>Distance Dipole Top - Probe Center</b>	10 mm	
<b>Scan resolution</b>	dx, dy = 5 mm	area = 20 x 90 mm
<b>Frequency</b>	<b>1880 MHz</b> ± 1 MHz	
<b>Forward power at dipole connector</b>	20.0 dBm = 100mW	
<b>Input power drift</b>	< 0.05 dB	

## 2. Maximum Field values

<b>H-field 10 mm above dipole surface</b>	condition	<b>Interpolated maximum</b>
Maximum measured	100 mW forward power	<b>0.471 A/m</b>

Uncertainty for H-field measurement: 8.2% (k=2)

<b>E-field 10 mm above dipole surface</b>	condition	<b>Interpolated maximum</b>
Maximum measured above high end	100 mW forward power	143.9 V/m
Maximum measured above low end	100 mW forward power	140.3 V/m
Averaged maximum above arm	100 mW forward power	<b>142.1 V/m</b>

Uncertainty for E-field measurement: 12.8% (k=2)

## 3. Appendix

### 3.1 Antenna Parameters

<b>Frequency</b>	<b>Return Loss</b>	<b>Impedance</b>
1730 MHz	25.8 dB	( 51.2 + j5.1 ) Ohm
<b>1880 MHz</b>	<b>21.1 dB</b>	<b>( 51.2 + j8.9 ) Ohm</b>
1900 MHz	21.2 dB	( 53.5 + j8.4 ) Ohm
1950 MHz	27.3 dB	( 54.5 – j0.1 ) Ohm
2000 MHz	22.8 dB	( 43.5 + j1.9 ) Ohm

### 3.2 Antenna Design and Handling

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

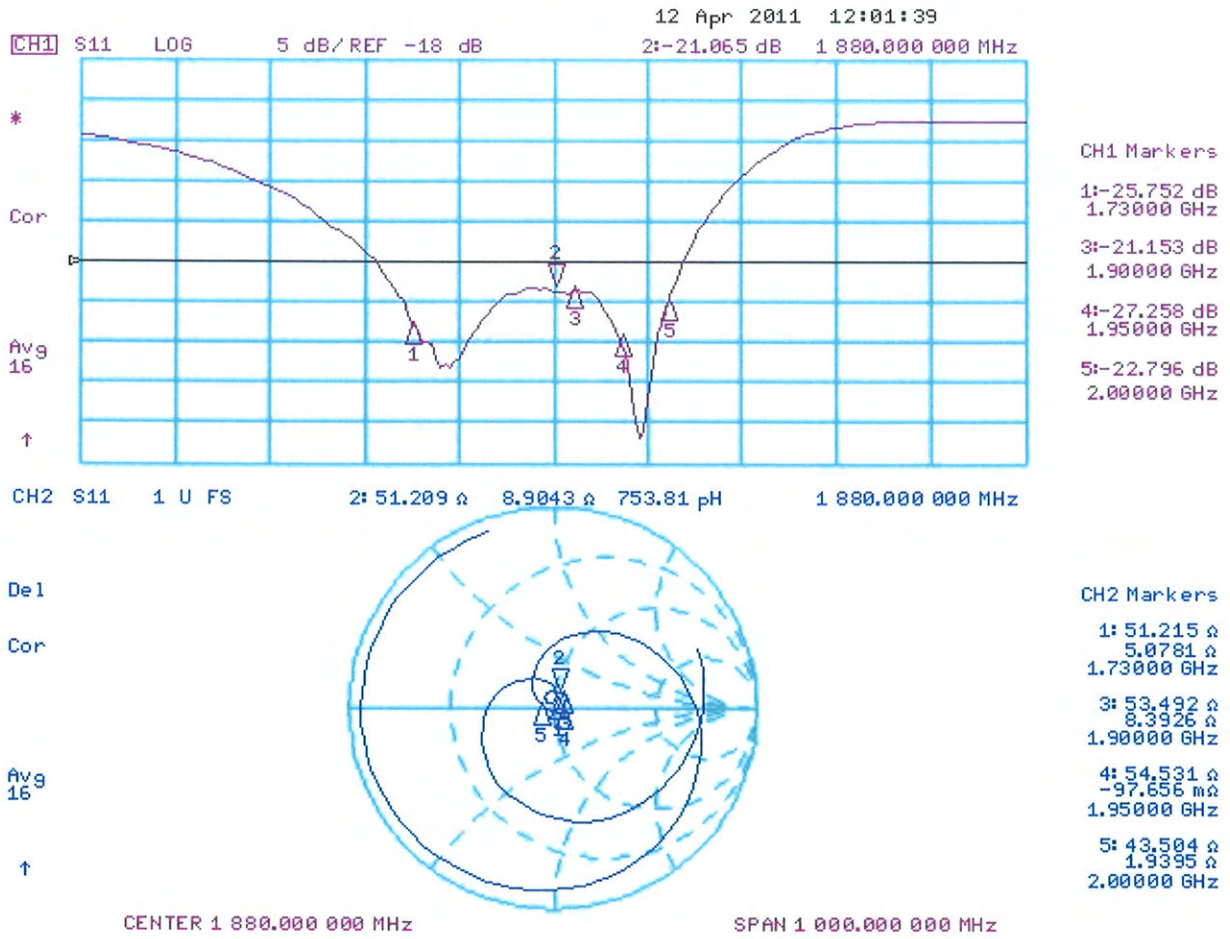
The dipole is built of standard semirigid coaxial cable. The internal matching line is open ended. The antenna is therefore open for DC signals.

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

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

### 3.3 Measurement Sheets

#### 3.3.1 Return Loss and Smith Chart



### 3.3.2 DASY4 H-Field Result

Date/Time: 12.04.2011 12:39:46

Test Laboratory: SPEAG Lab2

**HAC\_RF\_CD1880\_1032\_H\_110412\_CL**

**DUT: HAC Dipole 1880 MHz; Type: CD1880V3; Serial: 1032**

Communication System: CW; Frequency: 1880 MHz

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

Phantom section: RF Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: H3DV6 - SN6065; ; Calibrated: 29.12.2010
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 20.10.2010
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- Measurement SW: DASY52, V52.6 Build 2, Version 52.6.2 (424)
- Postprocessing SW: SEMCAD X, V14.4 Build 4, Version 14.4.4 (2829)

**Dipole H-Field measurement @ 1880MHz/H Scan - measurement distance from the probe sensor center to CD1880**

**Dipole = 10mm/Hearing Aid Compatibility Test (41x181x1):**

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

Maximum value of peak Total field = 0.471 A/m

Probe Modulation Factor = 1.000

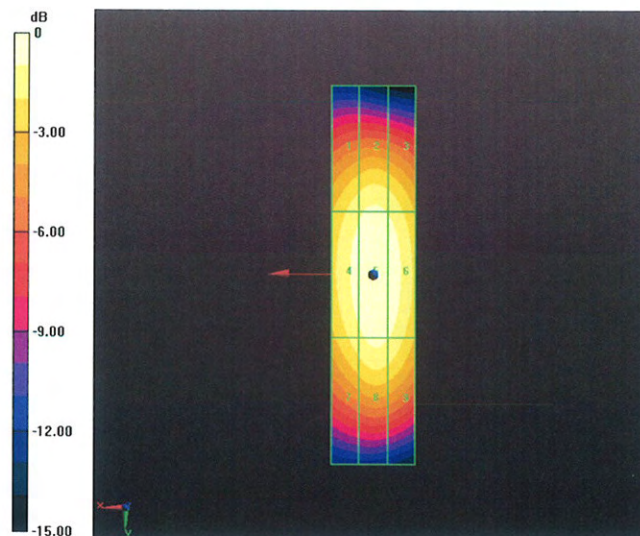
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.500 A/m; Power Drift = -0.0016 dB

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

Peak H-field in A/m

Grid 1 <b>0.406</b> M2	Grid 2 <b>0.432</b> M2	Grid 3 <b>0.416</b> M2
Grid 4 <b>0.441</b> M2	Grid 5 <b>0.471</b> M2	Grid 6 <b>0.457</b> M2
Grid 7 <b>0.401</b> M2	Grid 8 <b>0.433</b> M2	Grid 9 <b>0.421</b> M2



0 dB = 0.470A/m

### 3.3.3 DASY4 E-Field Result

Date/Time: 12.04.2011 15:07:52

Test Laboratory: SPEAG Lab2

**HAC\_RF\_CD1880\_1032\_E\_110412\_CL**

**DUT: HAC Dipole 1880 MHz; Type: CD1880V3; Serial: 1032**

Communication System: CW; Frequency: 1880 MHz

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

Phantom section: RF Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ER3DV6 - SN2336; ConvF(1, 1, 1); Calibrated: 29.12.2010
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 20.10.2010
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- Measurement SW: DASY52, V52.6 Build 2, Version 52.6.2 (424)
- Postprocessing SW: SEMCAD X, V14.4 Build 4, Version 14.4.4 (2829)

**Dipole E-Field measurement @ 1880MHz/E Scan - measurement distance from the probe sensor center to CD1880**

**Dipole = 10mm/Hearing Aid Compatibility Test (41x181x1):**

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

Maximum value of peak Total field = 143.9 V/m

Probe Modulation Factor = 1.000

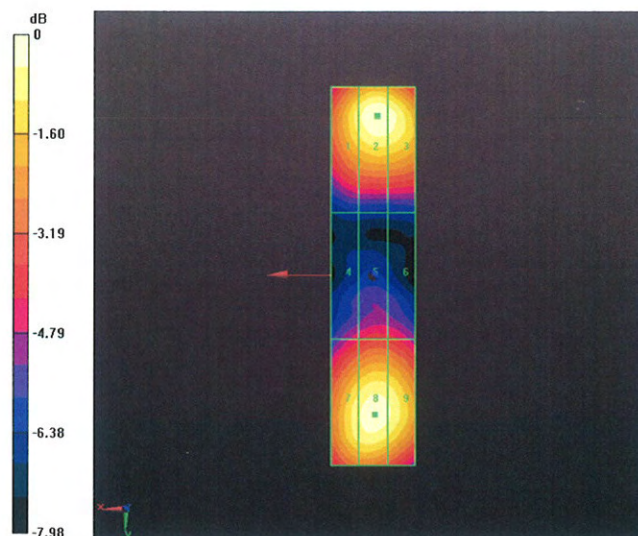
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 144.4 V/m; Power Drift = -0.0043 dB

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

Peak E-field in V/m

Grid 1 <b>131.8</b> M2	Grid 2 <b>143.9</b> M2	Grid 3 <b>141.3</b> M2
Grid 4 <b>86.926</b> M3	Grid 5 <b>92.728</b> M3	Grid 6 <b>91.584</b> M3
Grid 7 <b>133.8</b> M2	Grid 8 <b>140.3</b> M2	Grid 9 <b>137.0</b> M2



0 dB = 143.9V/m