



# ANSI C63.19

# TEST REPORT

<b>Product Name</b>	UMTS Triband / GSM Quadband mobile phone
<b>Model Name</b>	RAV4 TMOUS
<b>Brand Name</b>	ALCATEL
<b>Marketing Name</b>	ONE TOUCH 7024W
<b>FCC ID</b>	RAD386
<b>Client</b>	TCT Mobile Limited
<b>Manufacturer</b>	TCT Mobile Limited
<b>Date of issue</b>	July 26, 2013

**TA Technology (Shanghai) Co., Ltd.**

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**GENERAL SUMMARY**

<b>Reference Standard(s)</b>	<b>ANSI C63.19-2007:</b> American National Standard Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids.
<b>Conclusion</b>	This portable wireless equipment has been measured in all cases requested by the relevant standards.  General Judgment: <b>M3 (RF Emission)</b>
<b>Comment</b>	The test result only responds to the measured sample.

Approved by 初伟中  
Director

Revised by 凌敏宝  
HAC Manager

Performed by 张磊  
HAC Engineer

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## 1. General Information

### 1.1. Notes of the Test Report

**TA Technology (Shanghai) Co., Ltd.** has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS), and accreditation number: L2264.

**TA Technology (Shanghai) Co., Ltd.** guarantees the reliability of the data presented in this test report, which is the results of measurements and tests performed for the items under test on the date and under the conditions stated in this test report and is based on the knowledge and technical facilities available at TA Technology (Shanghai) Co., Ltd. at the time of execution of the test.

**TA Technology (Shanghai) Co., Ltd.** is liable to the client for the maintenance by its personnel of the confidentiality of all information related to the items under test and the results of the test. This report only refers to the item that has undergone the test.

This report standalone does not constitute or imply by its own an approval of the product by the certification Bodies or competent Authorities. This report cannot be used partially or in full for publicity and/or promotional purposes without previous written approval of **TA Technology (Shanghai) Co., Ltd.** and the Accreditation Bodies, if it applies.

If the electrical report is inconsistent with the printed one, it should be subject to the latter.

### 1.2. Testing Laboratory

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### **1.3. Applicant Information**

Company: TCT Mobile Limited  
Address: 5F, C building, No. 232, Liang Jing Road ZhangJiang High-Tech Park, Pudong Area  
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City: Shanghai  
Postal Code: 201203  
Country: P.R. China

### **1.4. Manufacturer Information**

Company: TCT Mobile Limited  
Address: 5F, C building, No. 232, Liang Jing Road ZhangJiang High-Tech Park, Pudong Area  
Shanghai, P.R. China. 201203  
City: Shanghai  
Postal Code: 201203  
Country: P.R. China

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### 1.5. Information of EUT

#### General Information

Device Type:	Portable Device		
State of Sample:	Prototype Unit		
Product IMEI:	013775000250698		
Hardware Version:	PIO		
Software Version:	L15		
Antenna Type:	Internal Antenna		
Device Operating Configurations :			
Supporting Mode(s):	GSM 850/GSM 1900; (tested) UMTS Band II/UMTS Band IV/ UMTS Band V; (tested) GSM 900/GSM 1800; (untested) Bluetooth; (untested) WiFi (802.11b/g/n HT20/ n HT40); (untested)		
Test Modulation:	(GSM)GMSK; (UMTS)QPSK		
Operating Frequency Range(s):	Mode	Tx (MHz)	Rx (MHz)
	GSM 850	824.2 ~ 848.8	869.2 ~ 893.8
	GSM 1900	1850.2 ~ 1909.8	1930.2 ~ 1989.8
	UMTS Band II	1852.4 ~ 1907.6	1932.4 ~ 1987.6
	UMTS Band IV	1712.4 ~ 1752.6	2112.4 ~ 2152.6
	UMTS Band V	826.4 ~ 846.6	871.4 ~ 891.6
Power Class:	GSM 850: 4		
	GSM 1900: 1		
	UMTS Band II: 3		
	UMTS Band IV: 3		
	UMTS Band V: 3		
Power Level	GSM 850: tested with power level 5		
	GSM 1900: tested with power level 0		
	UMTS Band II: tested with power control all up bits		
	UMTS Band IV: tested with power control all up bits		
	UMTS Band V: tested with power control all up bits		
Test Channel: (Low - Middle - High)	128 - 190 - 251	(GSM 850)	(tested)
	512 - 661 - 810	(GSM 1900)	(tested)
	9262 - 9400 - 9538	(UMTS Band II)	(tested)
	1312 - 1413 - 1513	(UMTS Band IV)	(tested)
	4132 - 4183 - 4233	(UMTS Band V)	(tested)

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### Auxiliary Equipment Details

#### AE1:Battery

Model: CAC1800000C3

Manufacturer: SCUD

SN: /

Equipment under Test (EUT) has a GSM/UMTS antenna that is used for Tx/Rx, the second is BT/WiFi antenna that is used for Tx/Rx, and the third is diversity antenna that is used for Rx. The detail about EUT and Lithium Battery is in chapter 1.5 in this report. HAC is tested for GSM 850, GSM 1900, UMTS Band II, UMTS Band IV and UMTS Band V.

The sample under test was selected by the Client.

Components list please refer to documents of the manufacturer.

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Air-Interface	Band (MHz)	Type	C63.19/ tested	Simultaneous Transmissions Note: Not to be tested	Concurrent single transmission	Reduced power 20.19(c)(1)	Voice Over Digital Transport (Data)
GSM	850	VO	Yes	Yes WIFI or BT	Yes: WIFI, BT	NA	NA
	1900	VO				NA	NA
	GPRS/EGPRS	DT	NA	Yes WIFI or BT	Yes: * see note	NA	NA
WCDMA	Band II	VO	Yes	Yes WIFI or BT	Yes: * see note	NA	NA
	Band IV	VO	Yes	Yes WIFI or BT	Yes: * see note	NA	NA
	Band V	VO	Yes	Yes WIFI or BT	Yes: * see note	NA	NA
	HSDPA/HSUPA/RMC/HSPA+/DC-HSDPA	DT	NA	Yes WIFI or BT	Yes: * see note	NA	NA
WIFI	2450	DT	NA	Yes GSM,GPRS,EGPRS, HSDPA/HSUPA/RMC/HSPA+/ DC-HSDPA	NA	NA	Yes
Bluetooth (BT)	2400	DT	NA	Yes GSM,GPRS,EGPRS, HSDPA/HSUPA/RMC/HSPA+/ DC-HSDPA	NA	NA	NA

VO Voice CMRS/PSTN Service only  
V/D Voice CMRS/PSTN and Data Service  
DT Digital Transport

\*HAC Rating was based on concurrent voice and data modes, Non current mode was found to represent worst case rating for both M and T rating



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**1.6. The Ambient Conditions during Test**

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

**1.7. The Total M-rating of each tested band**

Mode	Rating
GSM 850	<b>M4</b>
GSM 1900	<b>M3</b>
UMTS Band II	<b>M4</b>
UMTS Band IV	<b>M4</b>
UMTS Band V	<b>M4</b>

**1.8. Test Date**

The test performed from July 18, 2013 to July 25, 2013.

## **2. Test Information**

### **2.1. Operational Conditions during Test**

#### **2.1.1. General Description of Test Procedures**

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

#### **2.1.2. GSM/WCDMA Test Configuration**

A communication link is set up with a System Simulator (SS) by air link, and a call is established. The EUT is commanded to operate at maximum transmitting power. Using E5515C the power lever is set to "5" for GSM 850, set to "0" for GSM 1900. Set to all up bits for UMTS. The test in the bands of GSM 850/GSM 1900 and UMTS Band II / UMTS Band IV /UMTS Band V are performed in the mode of speech transfer function.

## 2.2. HAC RF Measurements System Configuration

### 2.2.1. HAC Measurement Set-up

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

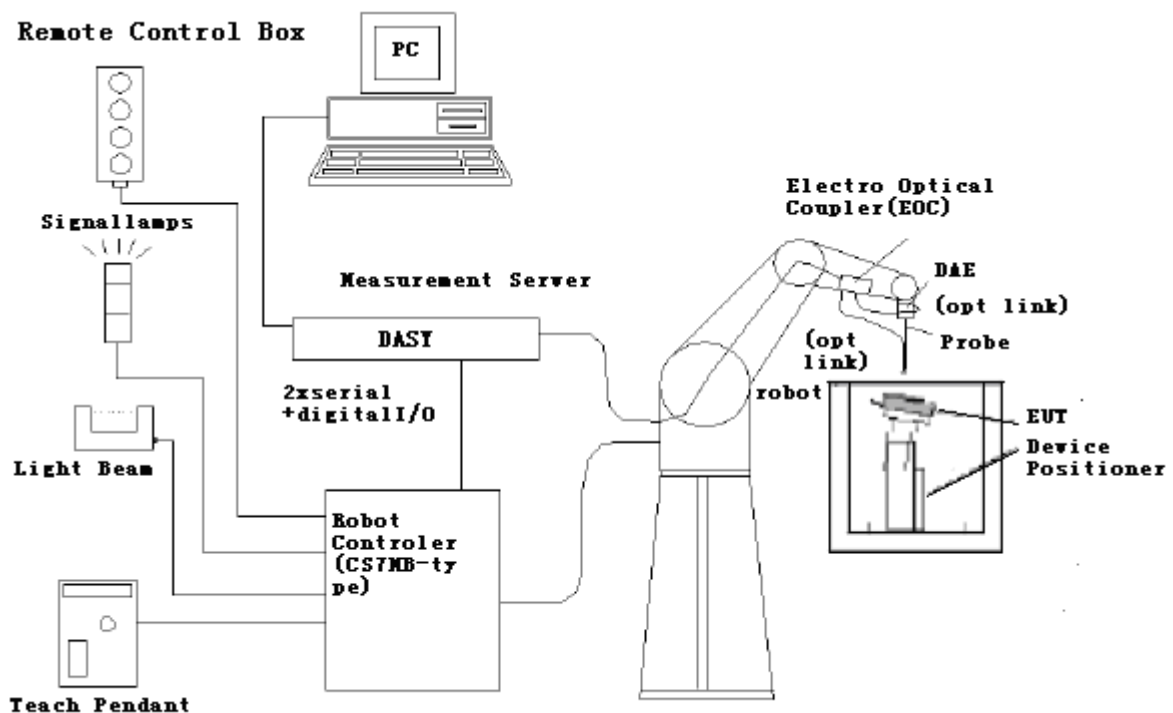


Figure 1 HAC Test Measurement Set-up

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

### 2.2.2. Probe System

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

#### E-Field Probe Description

Construction	One dipole parallel, two dipoles normal to probe axis Built-in shielding against static charges PEEK enclosure material
Calibration	In air from 100 MHz to 3.0 GHz (absolute accuracy $\pm 6.0\%$ , $k=2$ )
Frequency	40 MHz to > 6 GHz (can be extended to < 20 MHz) Linearity: $\pm 0.2$ dB (100 MHz to 3 GHz)
Directivity	$\pm 0.2$ dB in air (rotation around probe axis) $\pm 0.4$ dB in air (rotation normal to probe axis)
Dynamic Range	2 V/m to > 1000 V/m; Linearity: $\pm 0.2$ dB
Dimensions	Overall length: 330 mm (Tip: 16 mm) Tip diameter: 8 mm (Body: 12 mm) Distance from probe tip to dipole centers: 2.5 mm
Application	General near-field measurements up to 6 GHz Field component measurements Fast automatic scanning in phantoms



**Figure 2 ER3DV6 E-field Probe**

#### H-Field Probe Description

Construction	Three concentric loop sensors with 3.8 mm loop diameters Resistively loaded detector diodes for linear response Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., glycolether)
Frequency	200 MHz to 3 GHz (absolute accuracy $\pm 6.0\%$ , $k=2$ ); Output linearized
Directivity	$\pm 0.2$ dB (spherical isotropy error)
Dynamic Range	10 mA/m to 2 A/m at 1 GHz
E-Field Interference	< 10% at 3 GHz (for plane wave)
Dimensions	Overall length: 330 mm (Tip: 40 mm) Tip diameter: 6 mm (Body: 12 mm) Distance from probe tip to dipole centers: 3 mm



**Figure 3 H3DV6 H-field Probe**

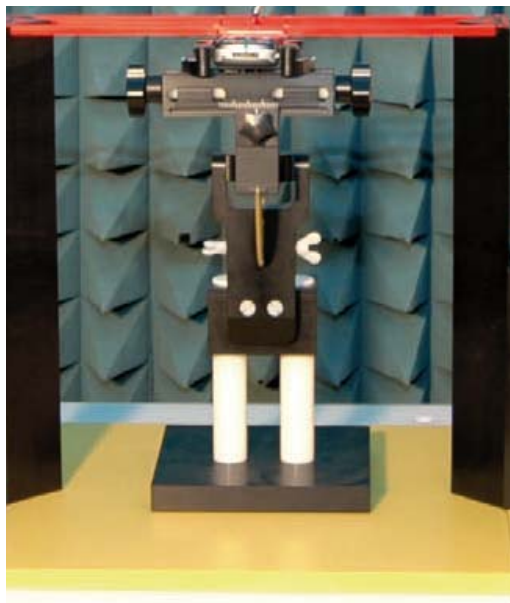
Application	General magnetic near-field measurements up to 3 GHz (in air or liquids) Field component measurements Surface current measurements Low interaction with the measured field
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**2.2.3. Test Arch Phantom & Phone Positioner**

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

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

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



**Figure 4 HAC Phantom & Device Holder**

### **2.3. RF Test Procedures**

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

1. Confirm proper operation of the field probe, probe measurement system and other instrumentation and the positioning system.
2. Position the WD in its intended test position. The gauge block can simplify this positioning. Note that a separate E-field and H-field gauge block will be needed if the center of the probe sensor elements is at different distances from the tip of the probe.
3. Configure the WD normal operation for maximum rated RF output power, at the desired channel and other operating parameters (e.g., test mode), as intended for the test.
4. The center sub-grid shall center on the center of the axial measurement point or the acoustic output, as appropriate. Locate the field probe at the initial test position in the 50 mm by 50 mm grid, which is contained in the measurement plane. If the field alignment method is used, align the probe for maximum field reception.
5. Record the reading.
6. Scan the entire 50 mm by 50 mm region in equally spaced increments and record the reading at each measurement point. The grid is 5 cm by 5 cm area that is divided into 9 evenly sized blocks or sub-grids. The distance between measurement points shall be sufficient to assure the identification of the maximum reading.
7. Identify the five contiguous sub-grids around the center sub-grid with the lowest maximum field strength readings. Thus the six areas to be used to determine the WD's highest emissions are identified and outlined for the final manual scan. Please note that a maximum of five blocks can be excluded for both E-field and H-field measurements for the WD output being measured. Stated another way, the center sub-grid and three others must be common to both the E-field and H-field measurements.
8. Identify the maximum field reading within the non-excluded sub-grids identified in Step 7.
9. Convert the maximum field strength reading identified in Step 8 to V/m or A/m, as appropriate. For probes which require a probe modulation factor, this conversion shall be done using the appropriate probe modulation factor and the calibration.
10. Repeat Step 1 through Step 10 for both the E-field and H-field measurements.
11. Compare this reading to the categories in ANSI C63.19 Clause 7 and record the resulting category. The lowest category number listed in 7.2, Table 7.4, or Table 7.5 obtained in Step 10 for either E- or H-field determines the M category for the audio coupling mode assessment. Record the WD category rating.



Figure 5 WD reference and plane for RF emission measurements

## 2.4. System Check

### Validation Procedure

Place a dipole antenna meeting the requirements given in ANSI C63.19 D.5 in the position normally occupied by the WD. The dipole antenna serves as a known source for an electrical and magnetic output. Position the E-field and H-field probes so that:

The probes and their cables are parallel to the coaxial feed of the dipole antenna.

The probe cables and the coaxial feed of the dipole antenna approach the measurement area from opposite directions.

The center point of the probe element(s) are 10 mm from the closest surface of the dipole elements. Validation was performed to verify that measured E-field and H-field values are within +/-25% from the target reference values provided by the manufacturer. "Values within +/-25% are acceptable. Of which 12% is deviation and 13% is measurement uncertainty."

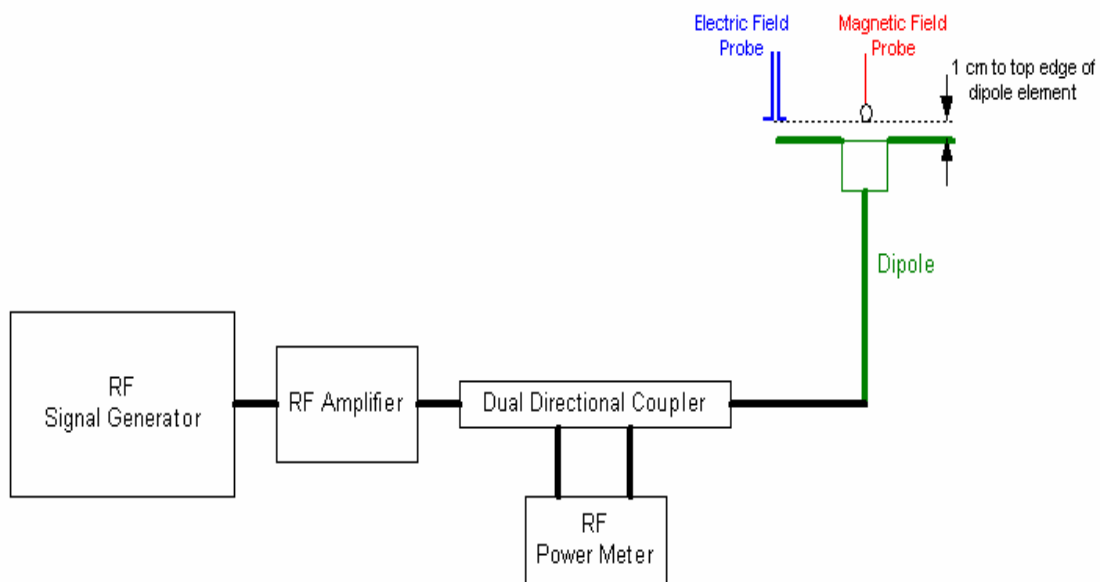


Figure 6 Dipole Validation Setup



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**Dipole Measurement Summary**

<b>E-Field Scan</b>					
<b>Mode</b>	<b>Frequency (MHz)</b>	<b>Input Power (mW)</b>	<b>Value</b>		<b>Test Date</b>
CW	835	100	Target <sup>1</sup> Value(V/m)	161.8	August 30,2012
			Measured <sup>2</sup> Value(V/m)	170.3	July 19, 2013
			Deviation <sup>3</sup> (%)	5.25	/
CW	1880	100	Target <sup>1</sup> Value(V/m)	139.0	August 30,2012
			Measured <sup>2</sup> Value(V/m)	148.1	July 18, 2013
			Deviation <sup>3</sup> (%)	6.55	/
<b>H-Field Scan</b>					
<b>Mode</b>	<b>Frequency (MHz)</b>	<b>Input Power (mW)</b>	<b>Value</b>		<b>Test Date</b>
CW	835	100	Target <sup>1</sup> Value(A/m)	0.460	August 30,2012
			Measured <sup>2</sup> Value(A/m)	0.471	July 24, 2013
			Deviation <sup>3</sup> (%)	2.39	/
CW	1880	100	Target <sup>1</sup> Value(A/m)	0.460	August 30,2012
			Measured <sup>2</sup> Value(A/m)	0.457	July 25, 2013
			Deviation <sup>3</sup> (%)	-0.65	/
<p>Notes: 1. Target value is provided by SPEAD in the calibration certificate of specific dipoles.                  2. Please refer to the attachment for detailed measurement data and plot.                  3. Deviation (%) = 100 * (Measured value minus Target value) divided by Target value.</p>					

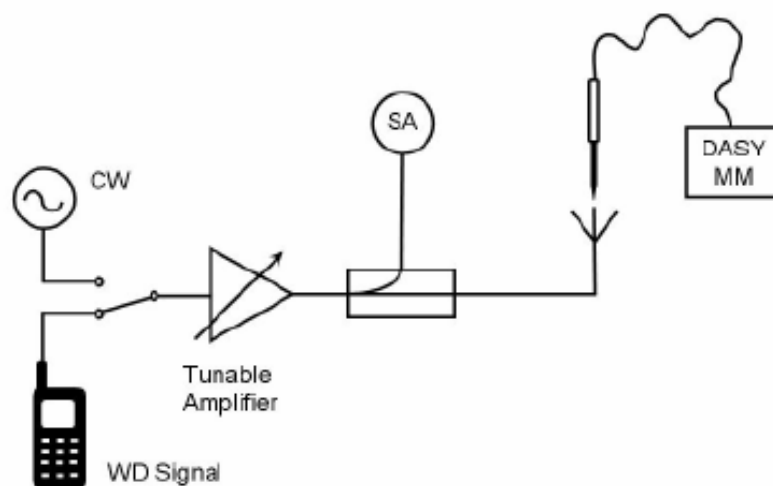
## 2.5. Probe Modulation Factor

The Probe Modulation Factor (PMF) is defined as the ratio of the field readings for a CW and a modulated signal with the equivalent Field Envelope Peak as defined in ANSI C63.19 (Chapter C.3.1). Calibration shall be made of the modulation response of the probe and its instrumentation chain. This Calibration shall be performed with the field probe, attached to the instrumentation that is to be used with it during the measurement. The response of the probe system to a CW field at the frequency(s) of interest is compared to its response to a modulated signal with equal peak amplitude. The field level of the test signals shall 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 field shall be applied to the readings taken of modulated fields of the specified type.

### Modulation Factor Test Procedure

This may be done using the following procedure:

1. Fix the field probe in a set location relative to a field generating device, such as the reference dipole antenna.
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 10 dB 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 ratio, in linear units, of the probe reading in Step 6 to the reading in Step 3 is the E-field modulation factor.  $PMF_E = E_{CW} / E_{mod}$  ( $PMF_H = H_{CW} / H_{mod}$ )
8. Repeat the previous steps using the H-field probe, except locate the probe at the center of the dipole.



**Figure 7 Probe Modulation Factor Test Setup**

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**PMF**

<b>Band</b>	<b>E-Field Probe Modulation Factor</b>	<b>H-Field Probe Modulation Factor</b>
GSM 850	2.81	2.75
GSM 1900	2.84	2.75
UMTS Band II	1.03	1.01
UMTS Band IV	1.03	1.01
UMTS Band V	1.03	1.01

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**2.6. Conducted Output Power Measurement**

**Summary**

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

**Conducted Power Results**

<b>GSM 850</b>	<b>Conducted Power(dBm)</b>		
	Channel 128	Channel 190	Channel 251
Test Results	31.83	31.98	32
<b>GSM 1900</b>	<b>Conducted Power(dBm)</b>		
	Channel 512	Channel 661	Channel 810
Test Results	29.41	29.64	29.76
<b>UMTS Band II</b>	<b>Conducted Power(dBm)</b>		
	Channel 9262	Channel 9400	Channel 9538
12.2kbps RMC	22.28	22.32	22.05
<b>UMTS Band IV</b>	<b>Conducted Power(dBm)</b>		
	Channel 1312	Channel 1413	Channel 1513
12.2kbps RMC	22.43	22.65	22.32
<b>UMTS Band V</b>	<b>Conducted Power(dBm)</b>		
	Channel 4132	Channel 4183	Channel 4233
12.2kbps RMC	21.98	22.11	21.86

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**3. Test Results**

**3.1. ANSI C63.19-2007 Limits**

Category		Telephone RF parameters < 960 MHz			
Near field	AWF	E-field emissions		H-field emissions	
Category M1	0	631.0 to 1122.0	V/m	1.91 to 3.39	A/m
	-5	473.2 to 841.4	V/m	1.43 to 2.54	A/m
Category M2	0	354.8 to 631.0	V/m	1.07 to 1.91	A/m
	-5	266.1 to 473.2	V/m	0.80 to 1.43	A/m
Category M3	0	199.5 to 354.8	V/m	0.60 to 1.07	A/m
	-5	149.6 to 266.1	V/m	0.45 to 0.80	A/m
Category M4	0	< 199.5	V/m	< 0.60	A/m
	-5	< 149.6	V/m	< 0.45	A/m
Category		Telephone RF parameters > 960 MHz			
Near field	AWF	E-field emissions		H-field emissions	
Category M1	0	199.5 to 354.8	V/m	0.60 to 1.07	A/m
	-5	149.6 to 266.1	V/m	0.45 to 0.80	A/m
Category M2	0	112.2 to 199.5	V/m	0.34 to 0.60	A/m
	-5	84.1 to 149.6	V/m	0.25 to 0.45	A/m
Category M3	0	63.1 to 112.2	V/m	0.19 to 0.34	A/m
	-5	47.3 to 84.1	V/m	0.14 to 0.25	A/m
Category M4	0	< 63.1	V/m	< 0.19	A/m
	-5	< 47.3	V/m	< 0.14	A/m

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**3.2. Summary Test Results**

**GSM 850 Results**

<b>E-Field</b>					
<b>Channel</b>	<b>Frequency (MHz)</b>	<b>Peak Field (V/m)</b>	<b>Power Drift (dB)</b>	<b>Rating</b>	<b>Graph Results</b>
High/251	848.8	38.9	0.081	M4	Figure 12
Middle/190	836.6	35.8	0.117	M4	Figure 13
Low/128	824.2	37.6	-0.194	M4	Figure 14
<b>H-Field</b>					
<b>Channel</b>	<b>Frequency (MHz)</b>	<b>Peak Field (A/m)</b>	<b>Power Drift (dB)</b>	<b>Rating</b>	<b>Graph Results</b>
High/251	848.8	0.078	-0.029	M4	Figure 15
Middle/190	836.6	0.075	0.023	M4	Figure 16
Low/128	824.2	0.073	-0.040	M4	Figure 17

**GSM 1900 Results**

<b>E-Field</b>					
<b>Channel</b>	<b>Frequency (MHz)</b>	<b>Peak Field (V/m)</b>	<b>Power Drift (dB)</b>	<b>Rating</b>	<b>Graph Results</b>
High/810	1909.8	51.7	-0.150	M3	Figure 18
Middle/661	1880	55.2	-0.092	M3	Figure 19
Low/512	1850.2	59.1	-0.034	M3	Figure 20
<b>H-Field</b>					
<b>Channel</b>	<b>Frequency (MHz)</b>	<b>Peak Field (A/m)</b>	<b>Power Drift (dB)</b>	<b>Rating</b>	<b>Graph Results</b>
High/810	1909.8	0.136	0.062	M4	Figure 21
Middle/661	1880	0.124	0.038	M4	Figure 22
Low/512	1850.2	0.132	0.016	M4	Figure 23

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**UMTS Band II Results**

<b>E-Field</b>					
<b>Channel</b>	<b>Frequency (MHz)</b>	<b>Peak Field (V/m)</b>	<b>Power Drift (dB)</b>	<b>Rating</b>	<b>Graph Results</b>
High/9538	1907.6	21.6	-0.093	M4	Figure 24
Middle/9400	1880	24.3	-0.022	M4	Figure 25
Low/9262	1852.4	25.5	-0.147	M4	Figure 26
<b>H-Field</b>					
<b>Channel</b>	<b>Frequency (MHz)</b>	<b>Peak Field (A/m)</b>	<b>Power Drift (dB)</b>	<b>Rating</b>	<b>Graph Results</b>
High/9538	1907.6	0.062	-0.028	M4	Figure 27
Middle/9400	1880	0.060	-0.010	M4	Figure 28
Low/9262	1852.4	0.061	-0.045	M4	Figure 29

**UMTS Band IV Results**

<b>E-Field</b>					
<b>Channel</b>	<b>Frequency (MHz)</b>	<b>Peak Field (V/m)</b>	<b>Power Drift (dB)</b>	<b>Rating</b>	<b>Graph Results</b>
High/1513	1752.6	25.4	-0.067	M4	Figure 30
Middle/1413	1732.6	31	-0.119	M4	Figure 31
Low/1312	1712.4	24.7	-0.178	M4	Figure 32
<b>H-Field</b>					
<b>Channel</b>	<b>Frequency (MHz)</b>	<b>Peak Field (A/m)</b>	<b>Power Drift (dB)</b>	<b>Rating</b>	<b>Graph Results</b>
High/1513	1752.6	0.078	-0.041	M4	Figure 33
Middle/1413	1732.6	0.092	0.010	M4	Figure 34
Low/1312	1712.4	0.080	-0.023	M4	Figure 35

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**UMTS Band V Results**

<b>E-Field</b>					
<b>Channel</b>	<b>Frequency (MHz)</b>	<b>Peak Field (V/m)</b>	<b>Power Drift (dB)</b>	<b>Rating</b>	<b>Graph Results</b>
High/4233	846.6	12.7	-0.099	M4	Figure 36
Middle/4183	836.6	13.5	-0.046	M4	Figure 37
Low/4132	826.4	12.7	-0.045	M4	Figure 38
<b>H-Field</b>					
<b>Channel</b>	<b>Frequency (MHz)</b>	<b>Peak Field (A/m)</b>	<b>Power Drift (dB)</b>	<b>Rating</b>	<b>Graph Results</b>
High/4233	846.6	0.025	0.045	M4	Figure 39
Middle/4183	836.6	0.026	0.023	M4	Figure 40
Low/4132	826.4	0.025	0.060	M4	Figure 41



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**4. Measurement Uncertainty**

No.	Error source	Type	Uncertainty Value (%)	Prob. Dist.	k	$c_{iE}$	$c_{iH}$	Standard Uncertainty (%) $u_i$ (%) E	Standard Uncertainty (%) $u_i$ (%) H	Degree of freedom $V_{eff}$ or $v_i$
<b>Measurement System</b>										
1	Probe Calibration	B	5.1	N	1	1	1	5.1	5.1	$\infty$
2	Axial Isotropy	B	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	$\infty$
3	Sensor Displacement	B	16.5	R	$\sqrt{3}$	1	0.145	9.5	1.4	$\infty$
4	Boundary Effects	B	2.4	R	$\sqrt{3}$	1	1	1.4	1.4	$\infty$
5	Test Arch	B	7.2	R	$\sqrt{3}$	1	0	4.1	0	$\infty$
6	Linearity	B	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	$\infty$
7	Scaling to Peak Envelope Power	B	2.0	R	$\sqrt{3}$	1	1	1.2	1.2	$\infty$
8	System Detection Limit	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	$\infty$
9	Readout Electronics	B	0.3	N	1	1	1	0.3	0.3	$\infty$
10	Response Time	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	$\infty$
11	Integration Time	B	2.6	R	$\sqrt{3}$	1	1	1.5	1.5	$\infty$
12	RF Ambient Conditions	B	3.0	R	$\sqrt{3}$	1	1	1.7	1.7	$\infty$
13	RF Reflections	B	12.0	R	$\sqrt{3}$	1	1	6.9	6.9	$\infty$
14	Probe Positioner	B	1.2	R	$\sqrt{3}$	1	0.67	0.7	0.5	$\infty$
15	Probe Positioning	A	4.7	R	$\sqrt{3}$	1	0.67	2.7	1.8	$\infty$
16	Extra. And Interpolation	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	$\infty$
<b>Test Sample Related</b>										
17	Device Positioning Vertical	B	4.7	R	$\sqrt{3}$	1	0.67	2.7	1.8	$\infty$
18	Device Positioning Lateral	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	$\infty$

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19	Device Holder and Phantom	B	2.4	R	$\sqrt{3}$	1	1	1.4	1.4	$\infty$
20	Power Drift	B	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	$\infty$
<b>Phantom and Setup related</b>										
21	Phantom Thickness	B	2.4	R	$\sqrt{3}$	1	0.67	1.4	0.9	$\infty$
Combined standard uncertainty (%)								15.19	10.82	
Expanded Std. uncertainty on power (K=2)								30.38	21.64	
Expanded Std. uncertainty on field (K=2)								15.19	10.82	

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**5. Main Test Instruments**

No.	Name	Type	Serial Number	Calibration Date	Valid Period
01	Power meter	Agilent E4417A	GB41291714	March 10, 2013	One year
02	Power sensor	Agilent N8481H	MY50350004	September 24, 2012	One year
03	Signal Generator	HP 8341B	2730A00804	September 11, 2012	One year
04	Amplifier	IXA-020	0401	No Calibration Requested	
05	BTS	E5515C	MY48360988	December 1, 2012	One year
06	E-Field Probe	ER3DV6	2428	August 30, 2012	One year
07	H-Field Probe	H3DV6	6260	August 30, 2012	One year
08	DAE	DAE4	1317	January 25, 2013	One year
09	Validation Kit 835MHz	CD835V3	1023	August 30, 2012	One year
10	Validation Kit 1880MHz	CD1880V3	1018	August 30, 2012	One year
11	Hygrothermograph	WS-1	64591	September 27, 2012	One year

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

## ANNEX A: System Check Results

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

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

Date/Time: 7/19/2013 4:30:52 PM

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

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

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: ER3DV6 - SN2428; ConvF(1, 1, 1); Calibrated: 8/30/2012

Electronics: DAE4 Sn1317; Calibrated: 1/25/2013

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

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**E Scan - measurement distance from the probe sensor center to CD835 Dipole = 10mm**

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

Maximum value of peak Total field = 170.3 V/m

Probe Modulation Factor = 1.00

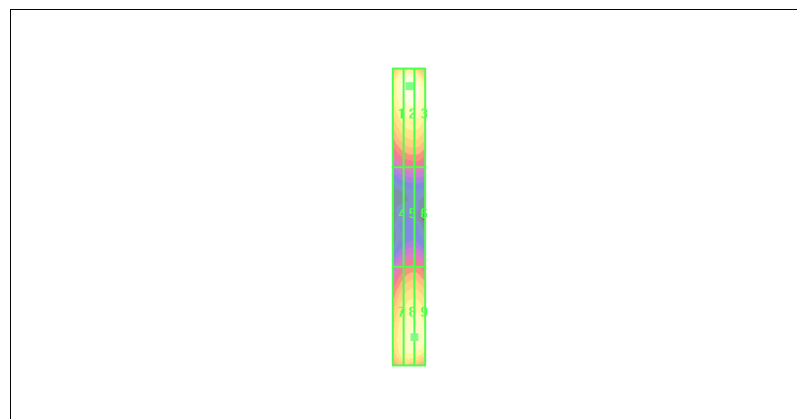
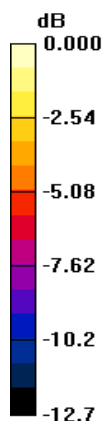
Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 118.7 V/m; Power Drift = 0.003 dB

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

Peak E-field in V/m

Grid 1 <b>161.9 M4</b>	Grid 2 <b>170.3 M4</b>	Grid 3 <b>166.1 M4</b>
Grid 4 <b>81.2 M4</b>	Grid 5 <b>88.2 M4</b>	Grid 6 <b>87.9 M4</b>
Grid 7 <b>144.5 M4</b>	Grid 8 <b>157.6 M4</b>	Grid 9 <b>157.6 M4</b>



0 dB = 170.3V/m

**Figure 8 System Performance Check 835MHz\_E**

# TA Technology (Shanghai) Co., Ltd. Test Report

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

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

Date/Time: 7/24/2013 10:25:52 AM

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

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

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: H3DV6 - SN6260; Calibrated: 8/30/2012

Electronics: DAE4 Sn1317; Calibrated: 1/25/2013

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

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**H Scan - measurement distance from the probe sensor center to CD835 Dipole = 10mm/Hearing Aid Compatibility Test (41x381x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.471 A/m

Probe Modulation Factor = 1.00

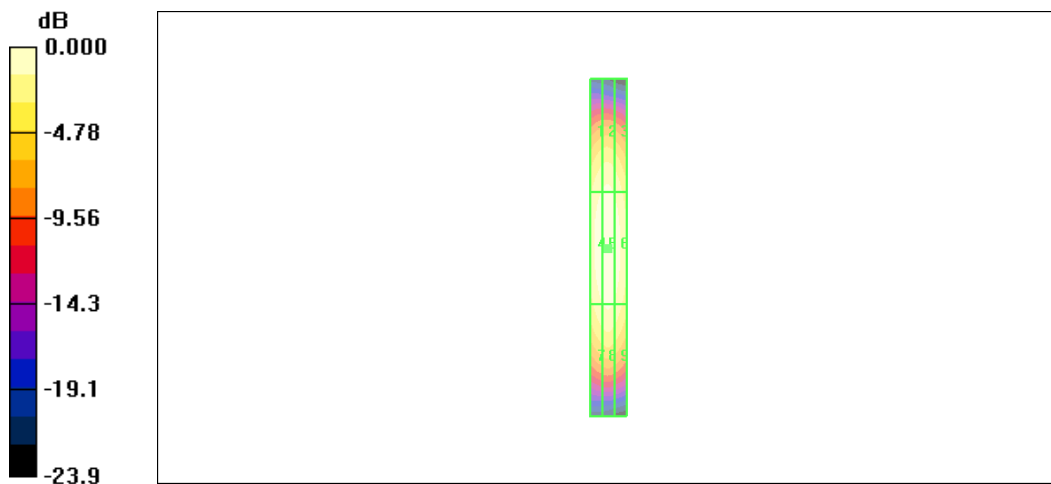
Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 0.503 A/m; Power Drift = -0.012 dB

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

Peak H-field in A/m

Grid 1	Grid 2	Grid 3
<b>0.397 M4</b>	<b>0.411 M4</b>	<b>0.382 M4</b>
Grid 4	Grid 5	Grid 6
<b>0.453 M4</b>	<b>0.471 M4</b>	<b>0.440 M4</b>
Grid 7	Grid 8	Grid 9
<b>0.388 M4</b>	<b>0.405 M4</b>	<b>0.380 M4</b>



0 dB = 0.471A/m

**Figure 9 System Performance Check 835MHz\_H**

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

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

Date/Time: 7/18/2013 4:59:52 PM

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

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

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: ER3DV6 - SN2428; ConvF(1, 1, 1); Calibrated: 8/30/2012

Electronics: DAE4 Sn1317; Calibrated: 1/25/2013

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

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**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 = 148.1 V/m

Probe Modulation Factor = 1.00

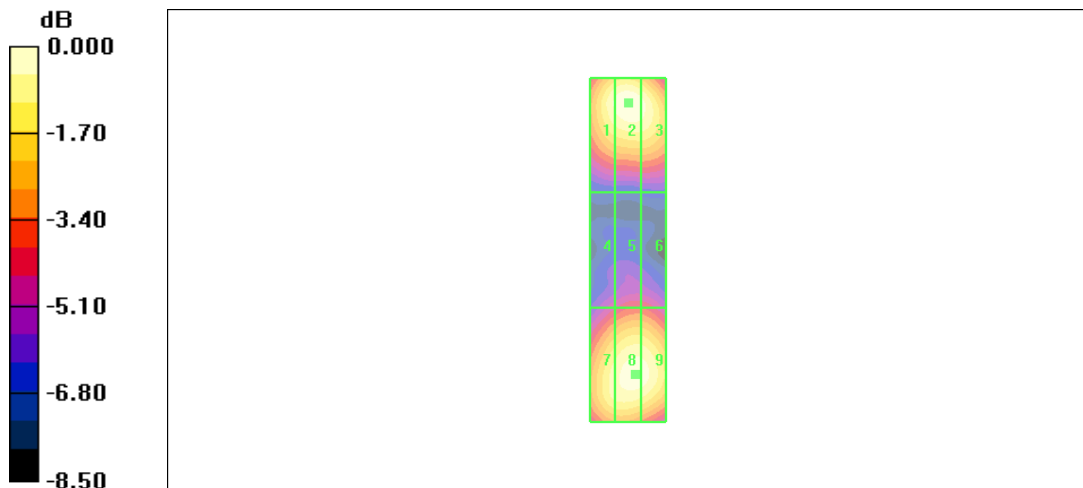
Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 146.4 V/m; Power Drift = 0.002 dB

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

Peak E-field in V/m

Grid 1 <b>140.5 M2</b>	Grid 2 <b>148.1 M2</b>	Grid 3 <b>143.0 M2</b>
Grid 4 <b>86.9 M3</b>	Grid 5 <b>93.9 M3</b>	Grid 6 <b>93.7 M3</b>
Grid 7 <b>136.0 M2</b>	Grid 8 <b>143.9 M2</b>	Grid 9 <b>143.2 M2</b>



0 dB = 148.1V/m

**Figure 10 System Performance Check 1880MHz\_E**

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

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

Date/Time: 7/25/2013 10:31:52 AM

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

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

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: H3DV6 - SN6260; Calibrated: 8/30/2012

Electronics: DAE4 Sn1317; Calibrated: 1/25/2013

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

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**H Scan - measurement distance from the probe sensor center to Dipole = 10mm/Hearing Aid**

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

Maximum value of peak Total field = 0.457 A/m

Probe Modulation Factor = 1.00

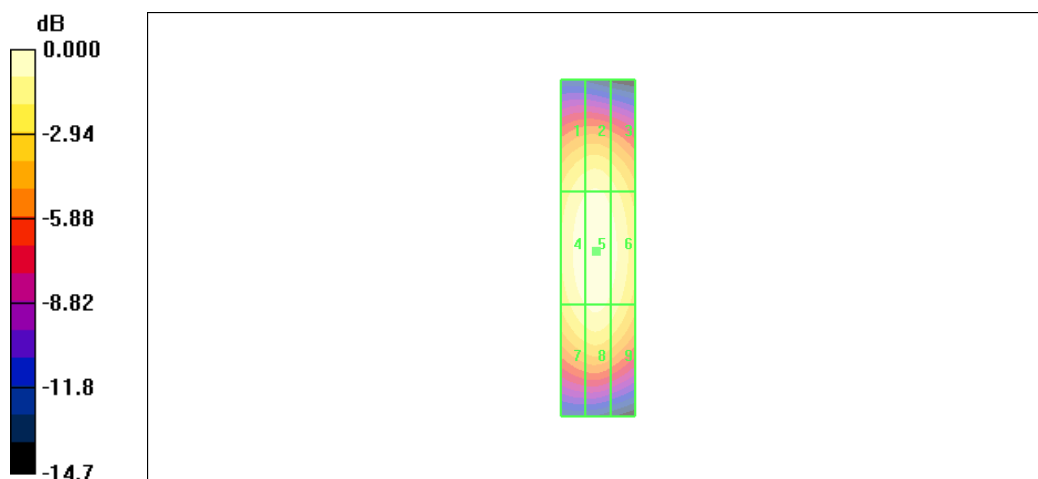
Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 0.483 A/m; Power Drift = 0.003 dB

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

Peak H-field in A/m

Grid 1 <b>0.403 M2</b>	Grid 2 <b>0.415 M2</b>	Grid 3 <b>0.387 M2</b>
Grid 4 <b>0.443 M2</b>	Grid 5 <b>0.457 M2</b>	Grid 6 <b>0.428 M2</b>
Grid 7 <b>0.408 M2</b>	Grid 8 <b>0.423 M2</b>	Grid 9 <b>0.393 M2</b>



0 dB = 0.457A/m

**Figure 11 System Performance Check 1880MHz\_H**

## **ANNEX B: Graph Results**

### **HAC RF E-Field GSM 850 High**

Date/Time: 7/19/2013 6:10:47 PM

Communication System: GSM; Frequency: 848.8 MHz; Duty Cycle: 1:8.30042

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

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: ER3DV6 - SN2428; ConvF(1, 1, 1); Calibrated: 8/30/2012

Electronics: DAE4 Sn1317; Calibrated: 1/25/2013

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

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

### **RAV4 GSM850 HAC RF E-Field/E Scan - ER3D - 2007: 15 mm from Probe Center to the Device High/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 38.9 V/m

Probe Modulation Factor = 2.81

Device Reference Point: 0, 0, -6.3 mm

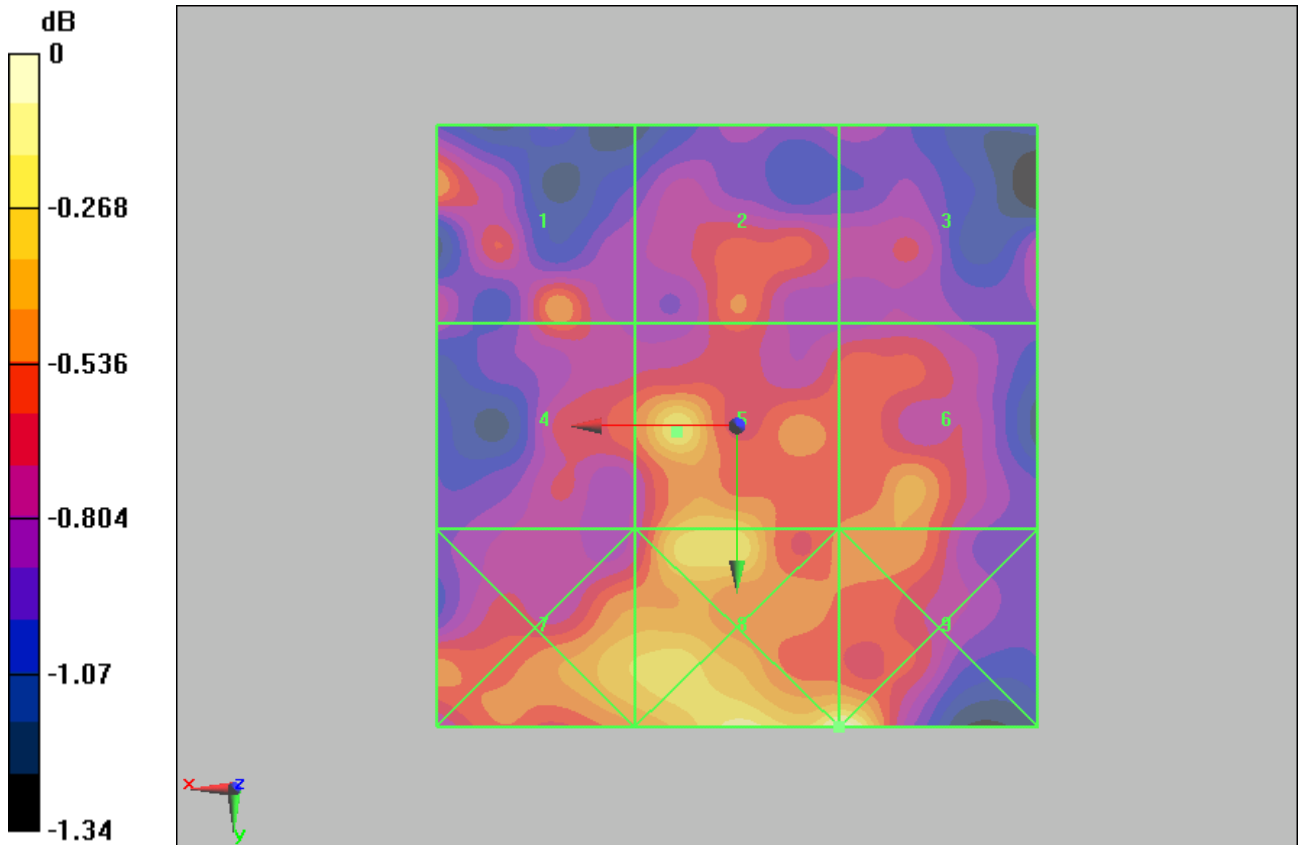
Reference Value = 13.5 V/m; Power Drift = 0.081 dB

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

Peak E-field in V/m

Grid 1	Grid 2	Grid 3
<b>37.7 M4</b>	<b>37.4 M4</b>	<b>36.7 M4</b>
Grid 4	Grid 5	Grid 6
<b>37.3 M4</b>	<b>38.9 M4</b>	<b>37.9 M4</b>
Grid 7	Grid 8	Grid 9
<b>38.5 M4</b>	<b>39.7 M4</b>	<b>39.7 M4</b>





0 dB = 39.7V/m

Figure 12 HAC RF E-Field GSM 850 Channel 251

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

Date/Time: 7/19/2013 6:47:19 PM

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

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

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: ER3DV6 - SN2428; ConvF(1, 1, 1); Calibrated: 8/30/2012

Electronics: DAE4 Sn1317; Calibrated: 1/25/2013

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

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**RAV4 GSM850 HAC RF E-Field/E Scan - ER3D - 2007: 15 mm from Probe Center to the Device Middle 2/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 35.8 V/m

Probe Modulation Factor = 2.81

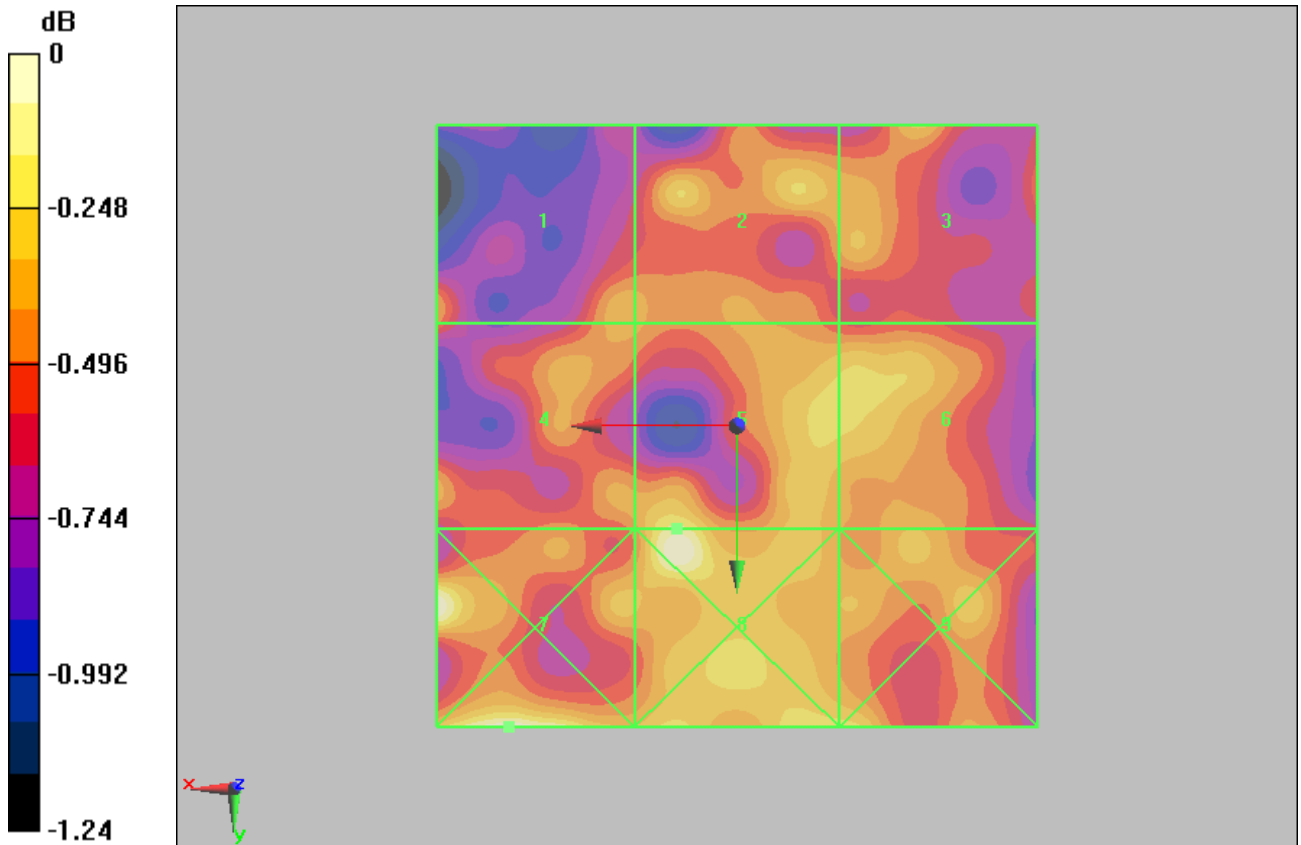
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 12.6 V/m; Power Drift = 0.117 dB

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

Peak E-field in V/m

Grid 1	Grid 2	Grid 3
<b>34.9 M4</b>	<b>35.3 M4</b>	<b>35.1 M4</b>
Grid 4	Grid 5	Grid 6
<b>34.8 M4</b>	<b>35.8 M4</b>	<b>35.4 M4</b>
Grid 7	Grid 8	Grid 9
<b>36.3 M4</b>	<b>36.3 M4</b>	<b>35.5 M4</b>



0 dB = 36.3V/m

Figure 13 HAC RF E-Field GSM 850 Channel 190

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

Date/Time: 7/19/2013 6:16:19 PM

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

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

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: ER3DV6 - SN2428; ConvF(1, 1, 1); Calibrated: 8/30/2012

Electronics: DAE4 Sn1317; Calibrated: 1/25/2013

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

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**RAV4 GSM850 HAC RF E-Field/E Scan - ER3D - 2007: 15 mm from Probe Center to the Device  
Low/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 37.6 V/m

Probe Modulation Factor = 2.81

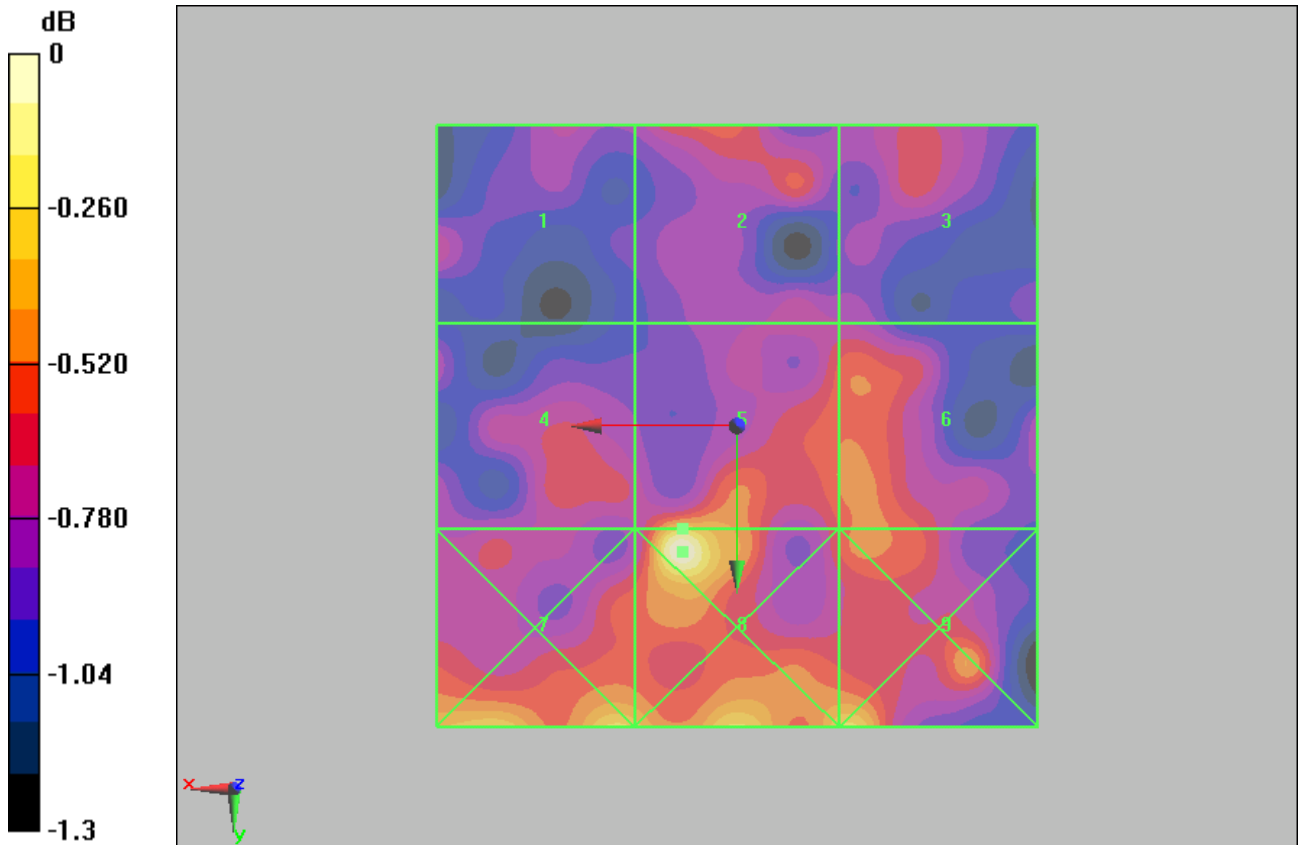
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 13.4 V/m; Power Drift = -0.194 dB

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

Peak E-field in V/m

Grid 1	Grid 2	Grid 3
<b>35.9 M4</b>	<b>36.5 M4</b>	<b>36.2 M4</b>
Grid 4	Grid 5	Grid 6
<b>36.2 M4</b>	<b>37.6 M4</b>	<b>36.8 M4</b>
Grid 7	Grid 8	Grid 9
<b>37.9 M4</b>	<b>38.9 M4</b>	<b>37.9 M4</b>



0 dB = 38.9V/m

Figure 14 HAC RF E-Field GSM 850 Channel 128

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**HAC RF H-Field GSM 850 High**

Date/Time: 7/24/2013 11:59:34 AM

Communication System: GSM; Frequency: 848.8 MHz; Duty Cycle: 1:8.30042

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

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: H3DV6 - SN6260; Calibrated: 8/30/2012

Electronics: DAE4 Sn1317; Calibrated: 1/25/2013

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

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**RAV4 GSM850 HAC RF H-Field/H Scan - H3DV6 - 2007: 15 mm from Probe Center to the Device  
High/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.078 A/m

Probe Modulation Factor = 2.75

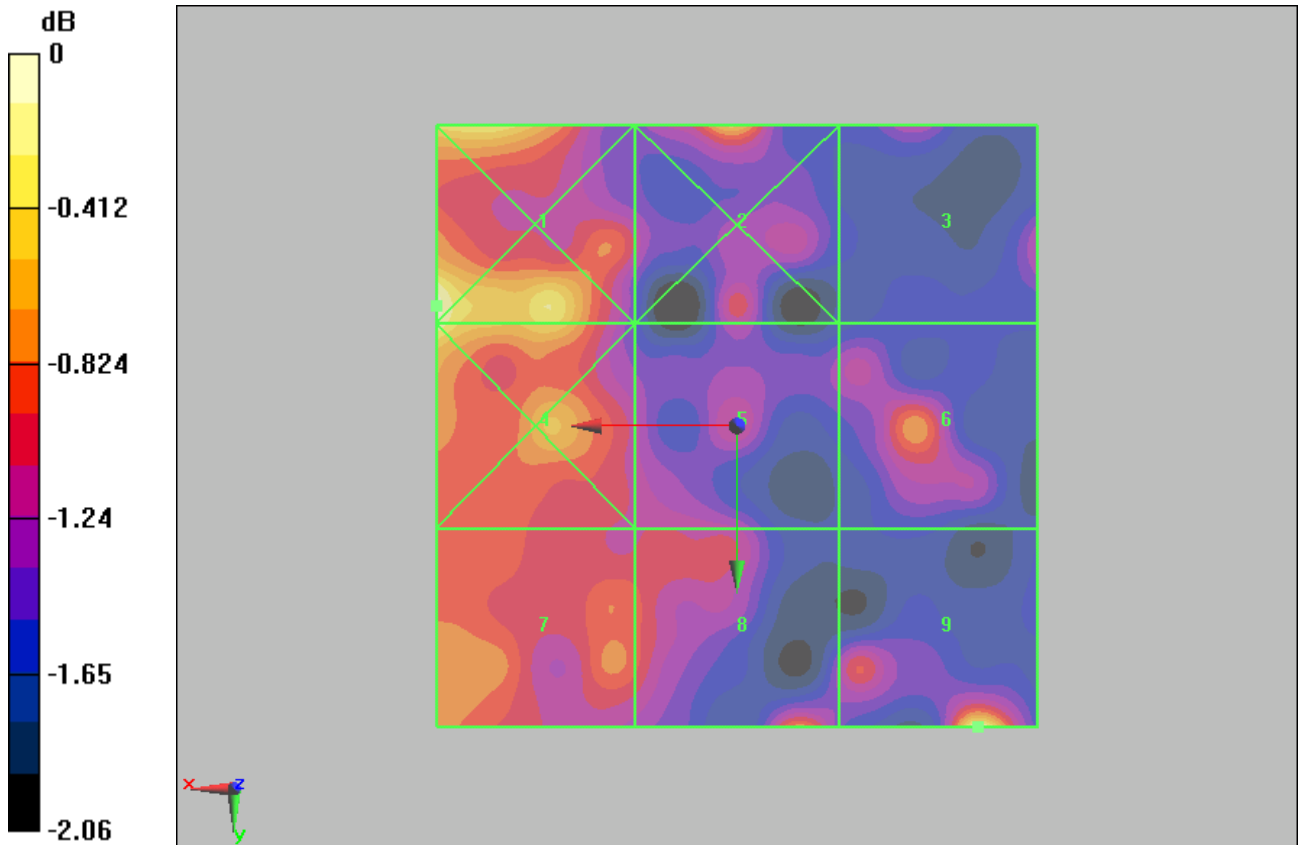
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.025 A/m; Power Drift = -0.029 dB

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

Peak H-field in A/m

Grid 1 <b>0.079 M4</b>	Grid 2 <b>0.075 M4</b>	Grid 3 <b>0.069 M4</b>
Grid 4 <b>0.078 M4</b>	Grid 5 <b>0.070 M4</b>	Grid 6 <b>0.073 M4</b>
Grid 7 <b>0.073 M4</b>	Grid 8 <b>0.073 M4</b>	Grid 9 <b>0.078 M4</b>



0 dB = 0.079A/m

Figure 15 HAC RF H-Field GSM 850Channel 251

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

Date/Time: 7/24/2013 11:53:50 AM

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

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

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: H3DV6 - SN6260; Calibrated: 8/30/2012

Electronics: DAE4 Sn1317; Calibrated: 1/25/2013

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

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**RAV4 GSM850 HAC RF H-Field/H Scan - H3DV6 - 2007: 15 mm from Probe Center to the Device Middle/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.075 A/m

Probe Modulation Factor = 2.75

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.024 A/m; Power Drift = 0.023 dB

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

Peak H-field in A/m

Grid 1 <b>0.080 M4</b>	Grid 2 <b>0.073 M4</b>	Grid 3 <b>0.075 M4</b>
Grid 4 <b>0.080 M4</b>	Grid 5 <b>0.072 M4</b>	Grid 6 <b>0.072 M4</b>
Grid 7 <b>0.077 M4</b>	Grid 8 <b>0.075 M4</b>	Grid 9 <b>0.070 M4</b>



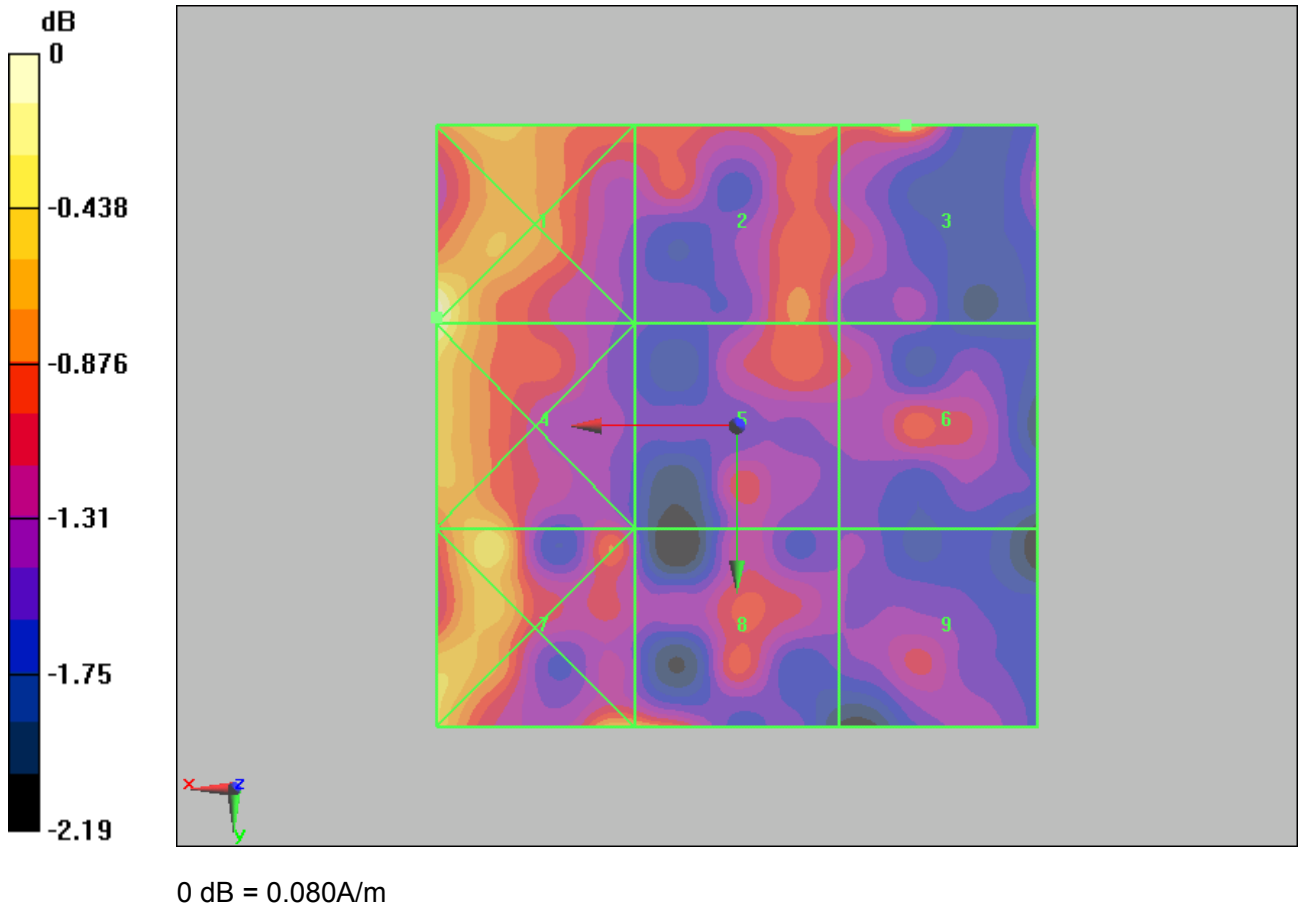


Figure 16 HAC RF H-Field GSM 850 Channel 190

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

Date/Time: 7/24/2013 12:24:07 PM

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

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

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: H3DV6 - SN6260; Calibrated: 8/30/2012

Electronics: DAE4 Sn1317; Calibrated: 1/25/2013

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

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**RAV4 GSM850 HAC RF H-Field/H Scan - H3DV6 - 2007: 15 mm from Probe Center to the Device  
Low/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.073 A/m

Probe Modulation Factor = 2.75

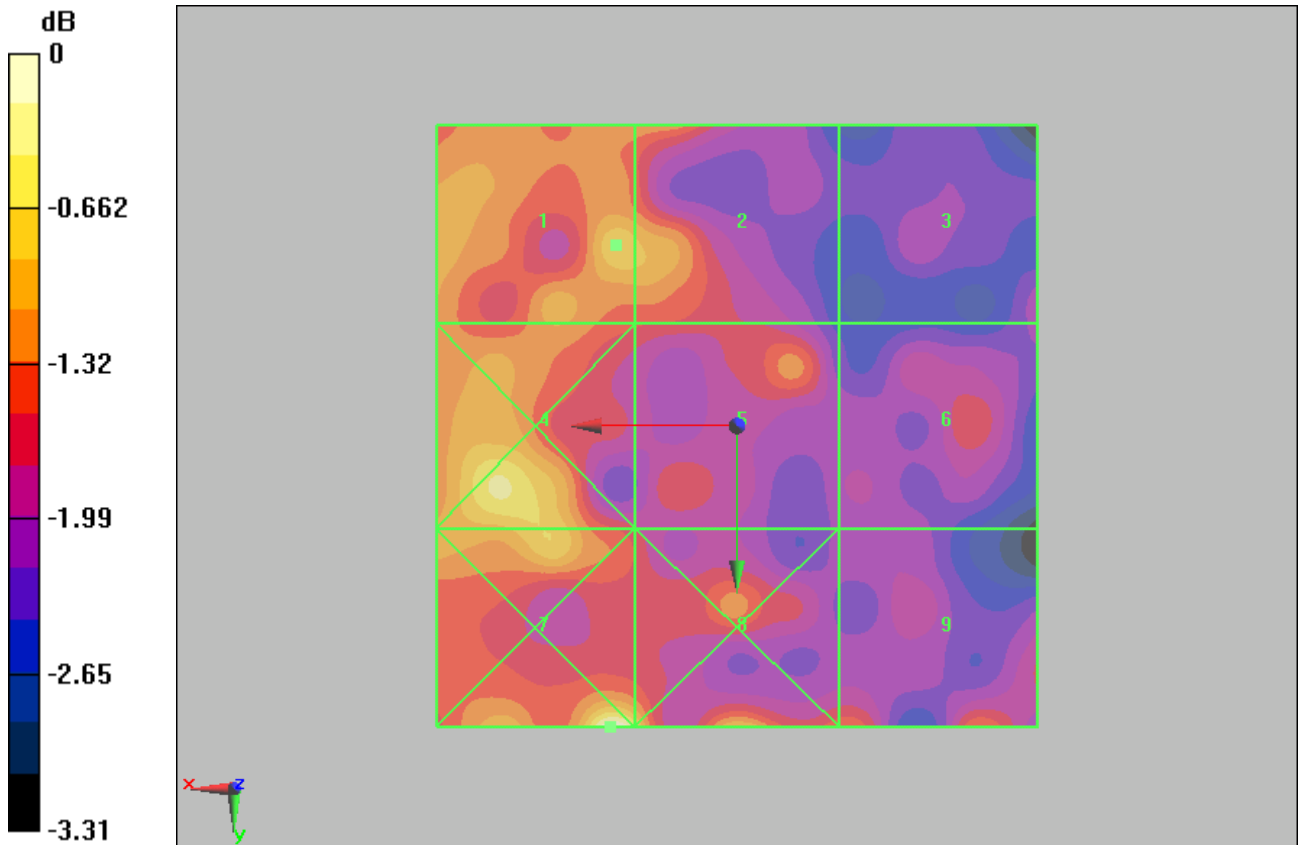
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.024 A/m; Power Drift = -0.040 dB

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

Peak H-field in A/m

Grid 1 <b>0.076 M4</b>	Grid 2 <b>0.075 M4</b>	Grid 3 <b>0.065 M4</b>
Grid 4 <b>0.078 M4</b>	Grid 5 <b>0.071 M4</b>	Grid 6 <b>0.069 M4</b>
Grid 7 <b>0.082 M4</b>	Grid 8 <b>0.078 M4</b>	Grid 9 <b>0.071 M4</b>



0 dB = 0.080A/m

Figure 17 HAC RF H-Field GSM 850 Channel 128

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

Date/Time: 7/18/2013 6:34:29 PM

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

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

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: ER3DV6 - SN2428; ConvF(1, 1, 1); Calibrated: 8/30/2012

Electronics: DAE4 Sn1317; Calibrated: 1/25/2013

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

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**RAV4 GSM1900 HAC RF E-Field/E Scan - ER3D - 2007: 15 mm from Probe Center to the Device  
High/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 51.7 V/m

Probe Modulation Factor = 2.84

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 16 V/m; Power Drift = -0.150 dB

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

Peak E-field in V/m

Grid 1	Grid 2	Grid 3
<b>49.1 M3</b>	<b>51.3 M3</b>	<b>50.3 M3</b>
Grid 4	Grid 5	Grid 6
<b>42.5 M4</b>	<b>51.5 M3</b>	<b>51.7 M3</b>
Grid 7	Grid 8	Grid 9
<b>56.2 M3</b>	<b>65.5 M3</b>	<b>64.3 M3</b>

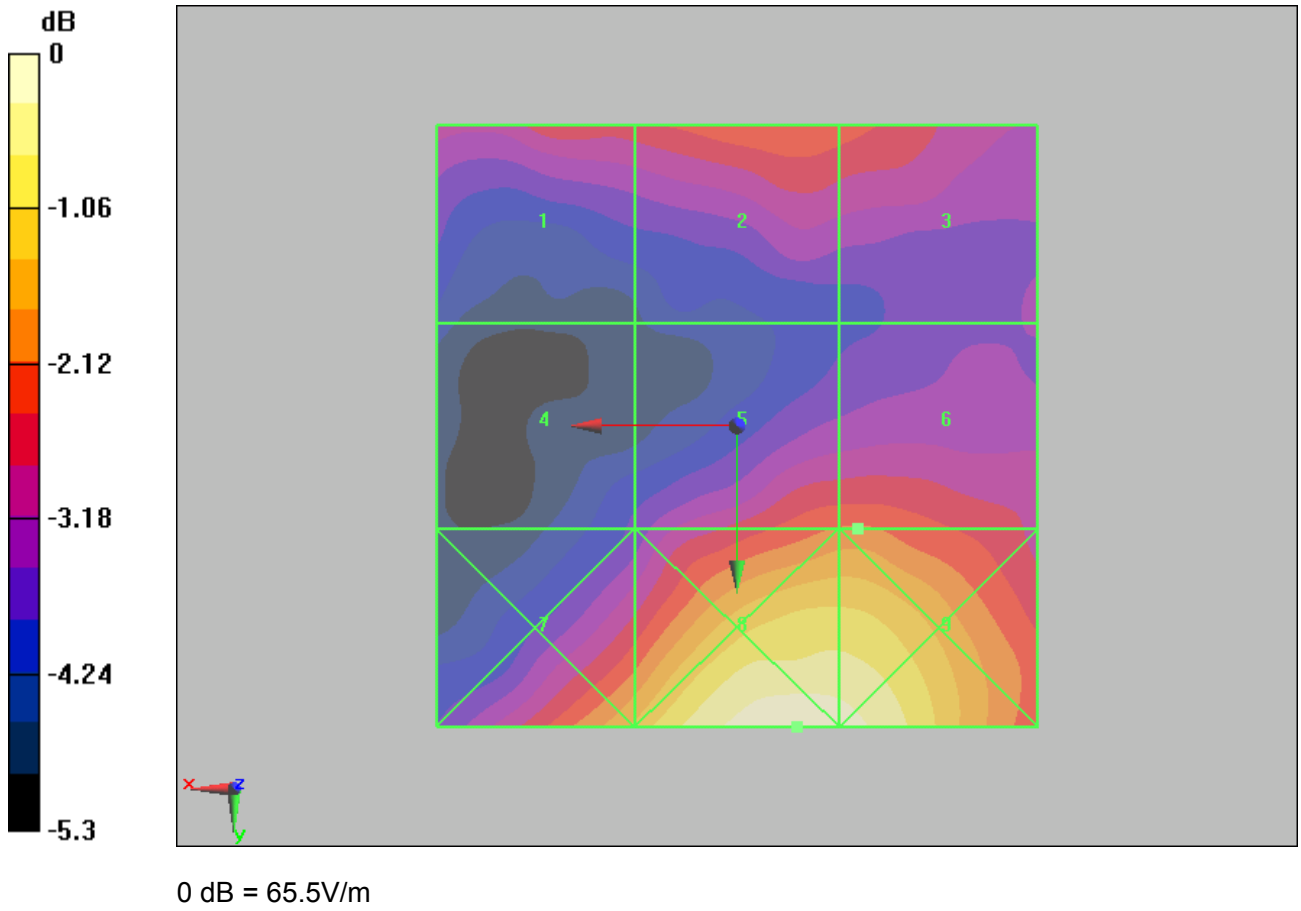


Figure 18 HAC RF E-Field GSM 1900 Channel 810

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

Date/Time: 7/18/2013 6:40:02 PM

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

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

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: ER3DV6 - SN2428; ConvF(1, 1, 1); Calibrated: 8/30/2012

Electronics: DAE4 Sn1317; Calibrated: 1/25/2013

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

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**RAV4 GSM1900 HAC RF E-Field/E Scan - ER3D - 2007: 15 mm from Probe Center to the Device Middle 2/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 55.2 V/m

Probe Modulation Factor = 2.84

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 16.6 V/m; Power Drift = -0.092 dB

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

Peak E-field in V/m

Grid 1	Grid 2	Grid 3
<b>52.2 M3</b>	<b>55.2 M3</b>	<b>55.1 M3</b>
Grid 4	Grid 5	Grid 6
<b>43.5 M4</b>	<b>54.6 M3</b>	<b>54.7 M3</b>
Grid 7	Grid 8	Grid 9
<b>62.5 M3</b>	<b>70.4 M3</b>	<b>67.7 M3</b>

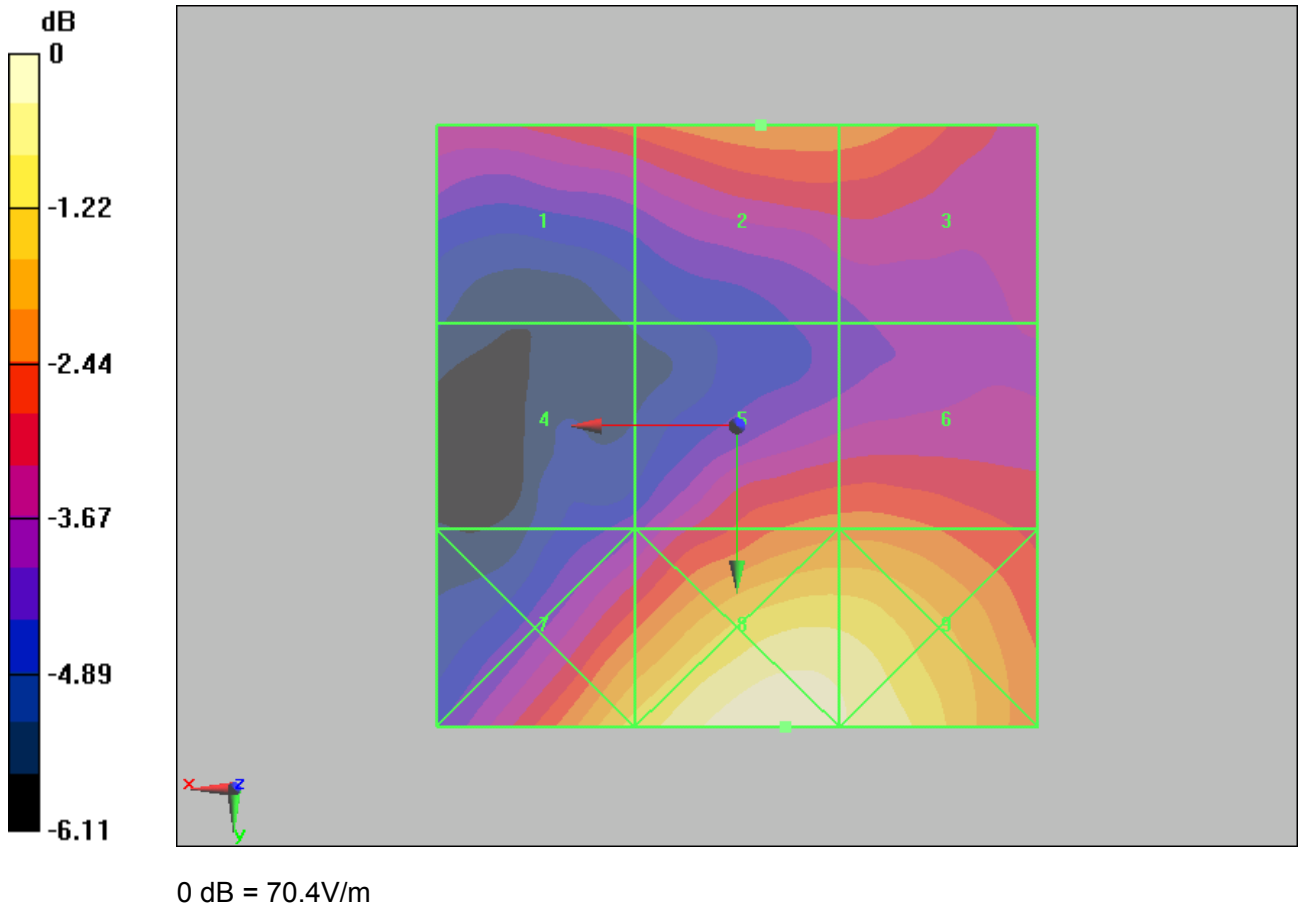


Figure 19 HAC RF E-Field GSM 1900 Channel 661

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

Date/Time: 7/18/2013 6:28:38 PM

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

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

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: ER3DV6 - SN2428; ConvF(1, 1, 1); Calibrated: 8/30/2012

Electronics: DAE4 Sn1317; Calibrated: 1/25/2013

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

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**RAV4 GSM1900 HAC RF E-Field/E Scan - ER3D - 2007: 15 mm from Probe Center to the Device  
Low/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 59.1 V/m

Probe Modulation Factor = 2.84

Device Reference Point: 0, 0, -6.3 mm

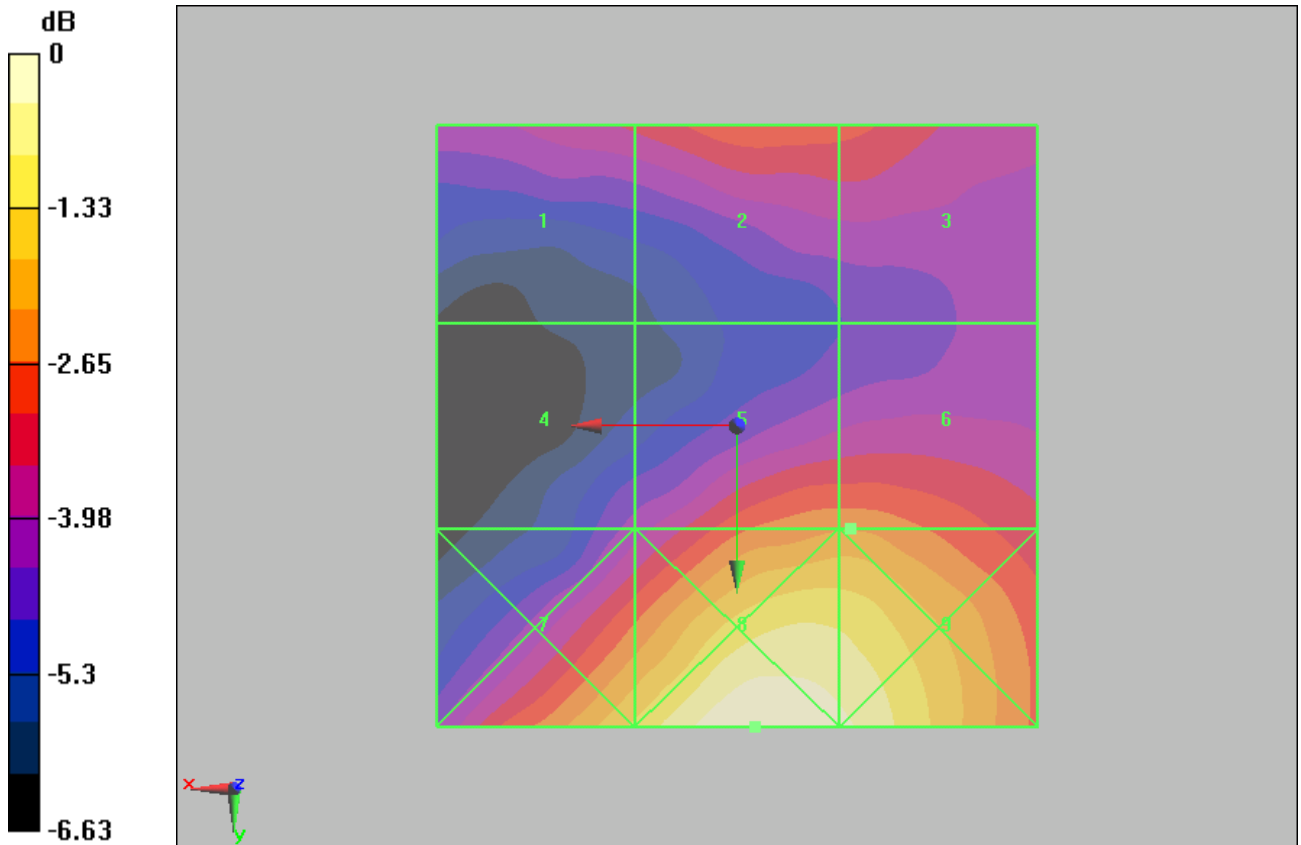
Reference Value = 17.4 V/m; Power Drift = -0.034 dB

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

Peak E-field in V/m

Grid 1	Grid 2	Grid 3
<b>51.7 M3</b>	<b>56.2 M3</b>	<b>55 M3</b>
Grid 4	Grid 5	Grid 6
<b>47.3 M4</b>	<b>59.1 M3</b>	<b>59.1 M3</b>
Grid 7	Grid 8	Grid 9
<b>66.6 M3</b>	<b>76.6 M3</b>	<b>73.7 M3</b>





0 dB = 76.6V/m

Figure 20 HAC RF E-Field GSM 1900 Channel 512

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

Date/Time: 7/25/2013 12:12:42 PM

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

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

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: H3DV6 - SN6260; Calibrated: 8/30/2012

Electronics: DAE4 Sn1317; Calibrated: 1/25/2013

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

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**RAV4 GSM850 HAC RF H-Field/H Scan - H3DV6 - 2007: 15 mm from Probe Center to the Device  
High/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.136 A/m

Probe Modulation Factor = 2.75

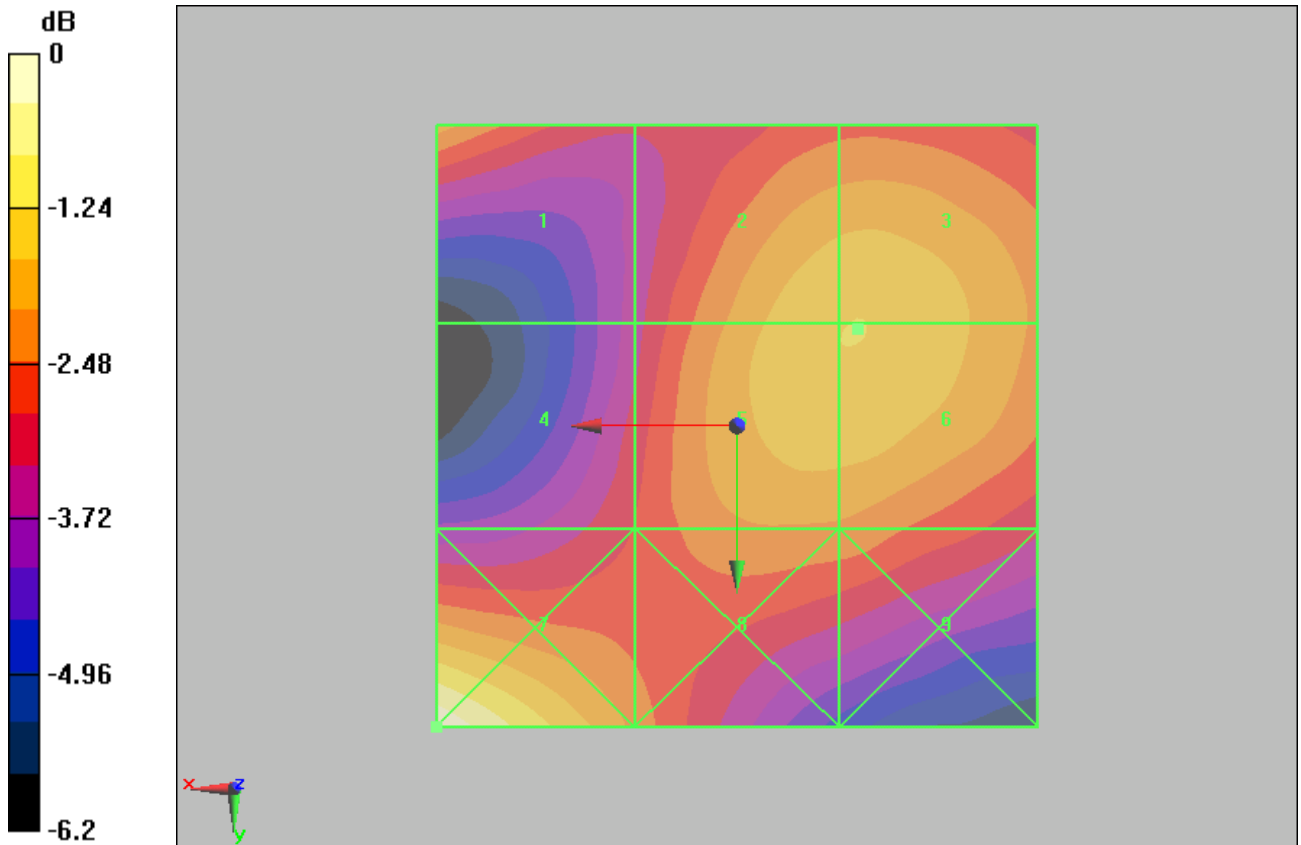
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.056 A/m; Power Drift = 0.062 dB

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

Peak H-field in A/m

Grid 1	Grid 2	Grid 3
<b>0.127 M4</b>	<b>0.136 M4</b>	<b>0.136 M4</b>
Grid 4	Grid 5	Grid 6
<b>0.113 M4</b>	<b>0.136 M4</b>	<b>0.136 M4</b>
Grid 7	Grid 8	Grid 9
<b>0.157 M3</b>	<b>0.124 M4</b>	<b>0.123 M4</b>



0 dB = 0.157A/m

Figure 21 HAC RF H-Field GSM 1900 Channel 810

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

Date/Time: 7/25/2013 12:05:54 PM

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

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

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: H3DV6 - SN6260; Calibrated: 8/30/2012

Electronics: DAE4 Sn1317; Calibrated: 1/25/2013

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

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**RAV4 GSM850 HAC RF H-Field/H Scan - H3DV6 - 2007: 15 mm from Probe Center to the Device Middle/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.124 A/m

Probe Modulation Factor = 2.75

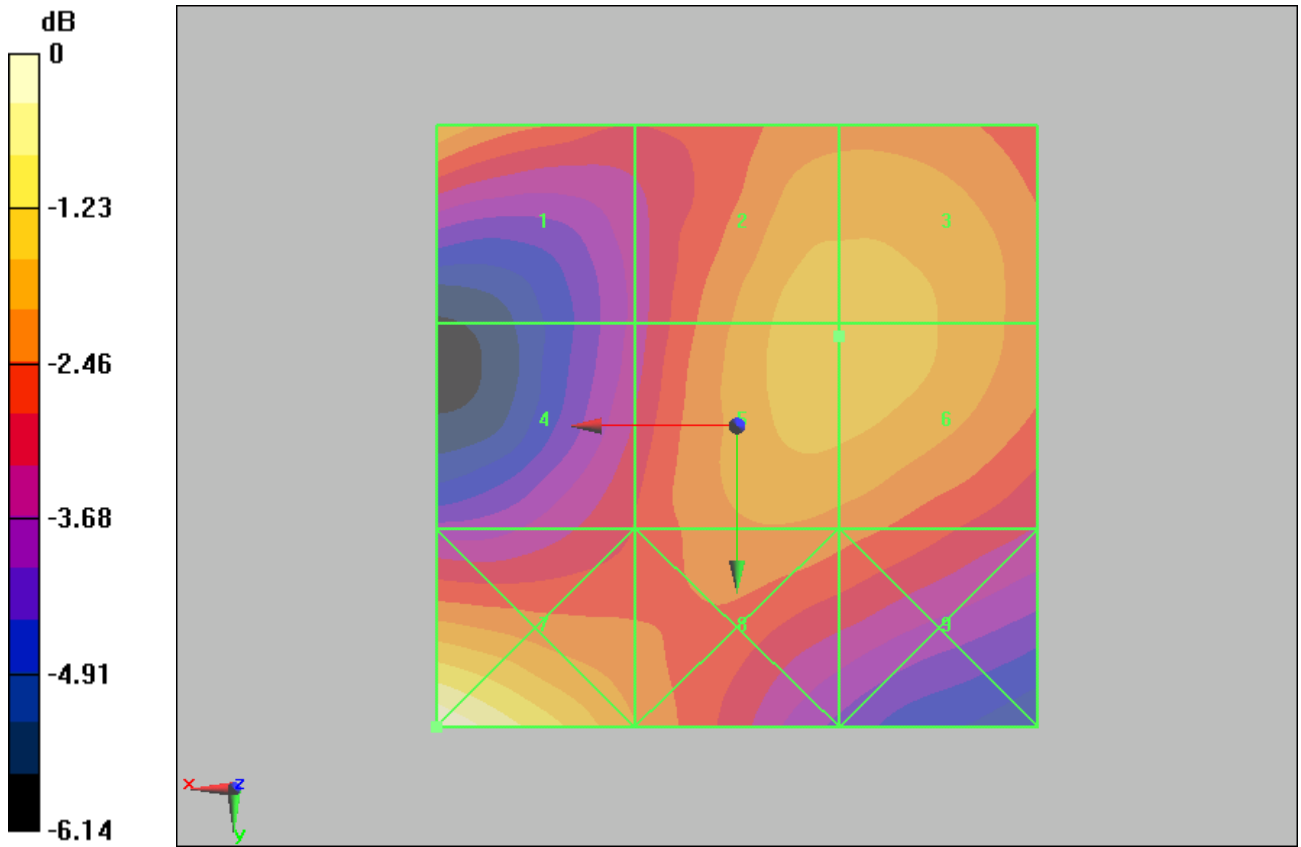
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.051 A/m; Power Drift = 0.038 dB

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

Peak H-field in A/m

Grid 1 <b>0.120 M4</b>	Grid 2 <b>0.124 M4</b>	Grid 3 <b>0.124 M4</b>
Grid 4 <b>0.105 M4</b>	Grid 5 <b>0.124 M4</b>	Grid 6 <b>0.124 M4</b>
Grid 7 <b>0.145 M3</b>	Grid 8 <b>0.115 M4</b>	Grid 9 <b>0.112 M4</b>



0 dB = 0.145A/m

Figure 22 HAC RF H-Field GSM 1900 Channel 661

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**HAC RF H-Field GSM 1900 Low**

Date/Time: 7/25/2013 12:18:22 PM

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

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

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: H3DV6 - SN6260; Calibrated: 8/30/2012

Electronics: DAE4 Sn1317; Calibrated: 1/25/2013

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

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**RAV4 GSM850 HAC RF H-Field/H Scan - H3DV6 - 2007: 15 mm from Probe Center to the Device  
Low/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.132 A/m

Probe Modulation Factor = 2.75

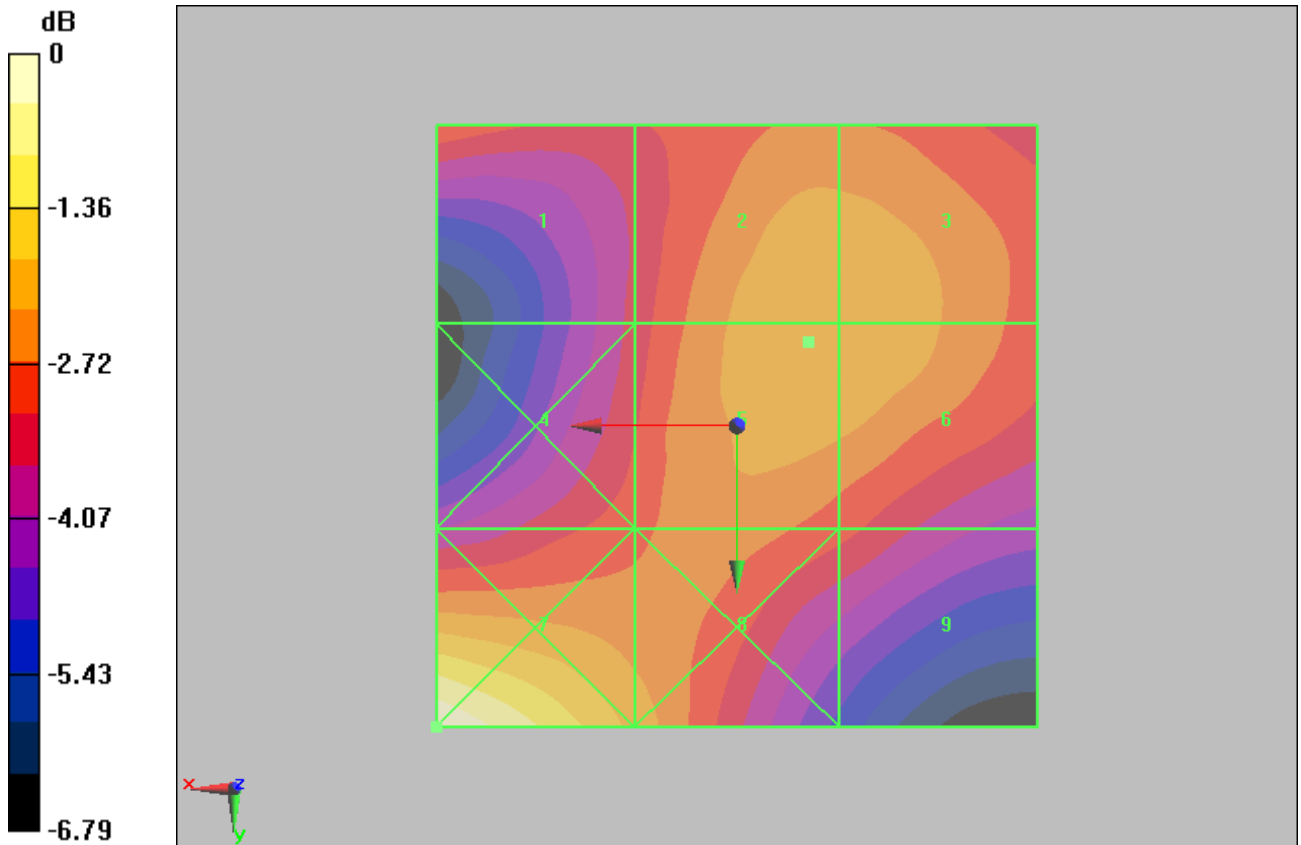
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.055 A/m; Power Drift = 0.016 dB

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

Peak H-field in A/m

Grid 1 <b>0.120 M4</b>	Grid 2 <b>0.132 M4</b>	Grid 3 <b>0.132 M4</b>
Grid 4 <b>0.117 M4</b>	Grid 5 <b>0.132 M4</b>	Grid 6 <b>0.132 M4</b>
Grid 7 <b>0.163 M3</b>	Grid 8 <b>0.130 M4</b>	Grid 9 <b>0.116 M4</b>



0 dB = 0.163A/m

Figure 23 HAC RF H-Field GSM 1900 Channel 512

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**HAC RF E-Field UMTS Band II High**

Date/Time: 7/18/2013 7:06:58 PM

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

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

Ambient Temperature:22.3 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: ER3DV6 - SN2428; ConvF(1, 1, 1); Calibrated: 8/30/2012

Electronics: DAE4 Sn1317; Calibrated: 1/25/2013

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

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**RAV4 WCDMA II HAC RF E-Field/E Scan - ER3D - 2007: 15 mm from Probe Center to the Device High/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 21.6 V/m

Probe Modulation Factor = 1.03

Device Reference Point: 0, 0, -6.3 mm

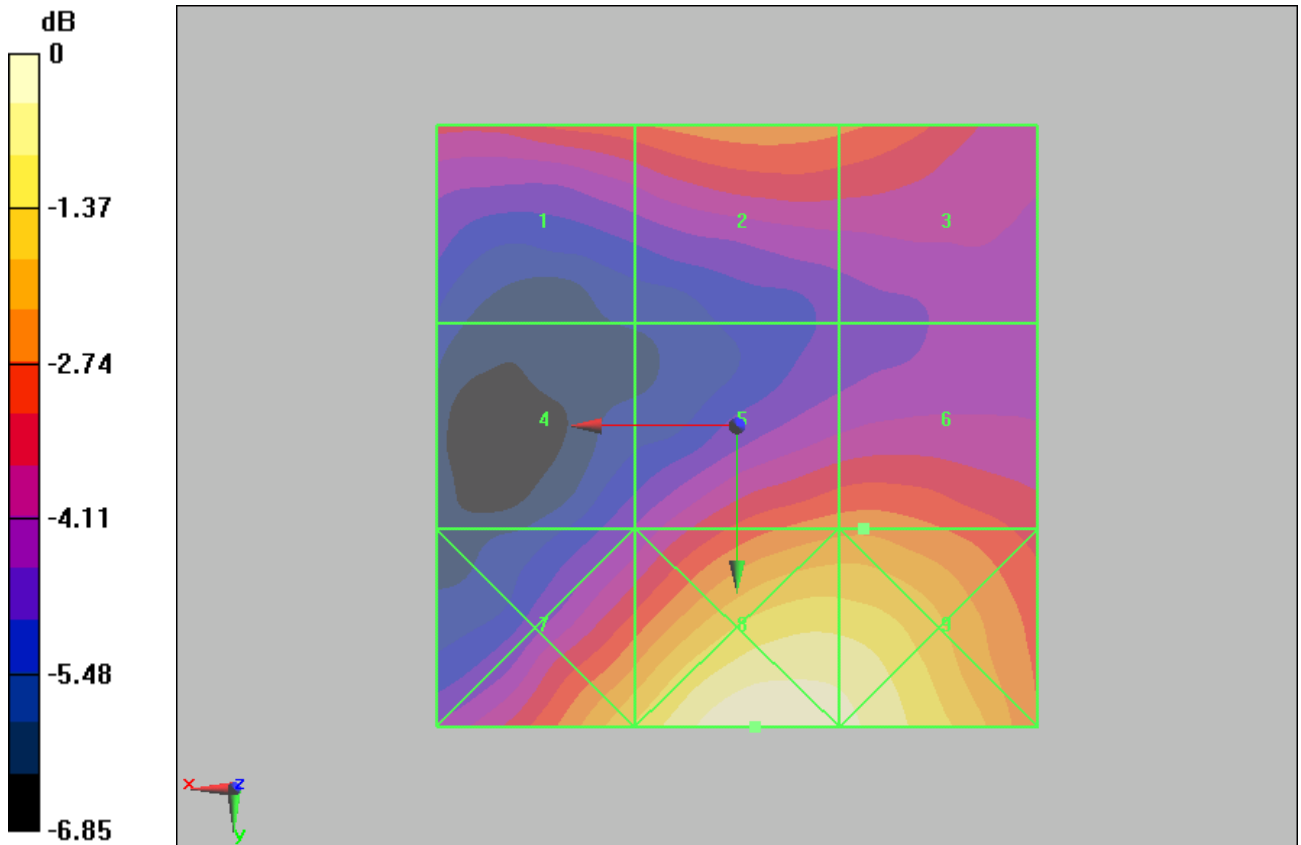
Reference Value = 18 V/m; Power Drift = -0.093 dB

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

Peak E-field in V/m

Grid 1	Grid 2	Grid 3
<b>20.6 M4</b>	<b>21.4 M4</b>	<b>21.1 M4</b>
Grid 4	Grid 5	Grid 6
<b>16.9 M4</b>	<b>21.5 M4</b>	<b>21.6 M4</b>
Grid 7	Grid 8	Grid 9
<b>24.4 M4</b>	<b>28.4 M4</b>	<b>27.4 M4</b>





0 dB = 28.4V/m

Figure 24 HAC RF E-Field UMTS Band II Channel 9538

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**HAC RF E-Field UMTS Band II Middle**

Date/Time: 7/18/2013 7:01:09 PM

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

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

Ambient Temperature:22.3 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: ER3DV6 - SN2428; ConvF(1, 1, 1); Calibrated: 8/30/2012

Electronics: DAE4 Sn1317; Calibrated: 1/25/2013

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

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**RAV4 WCDMA II HAC RF E-Field/E Scan - ER3D - 2007: 15 mm from Probe Center to the Device Middle 2/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 24.3 V/m

Probe Modulation Factor = 1.03

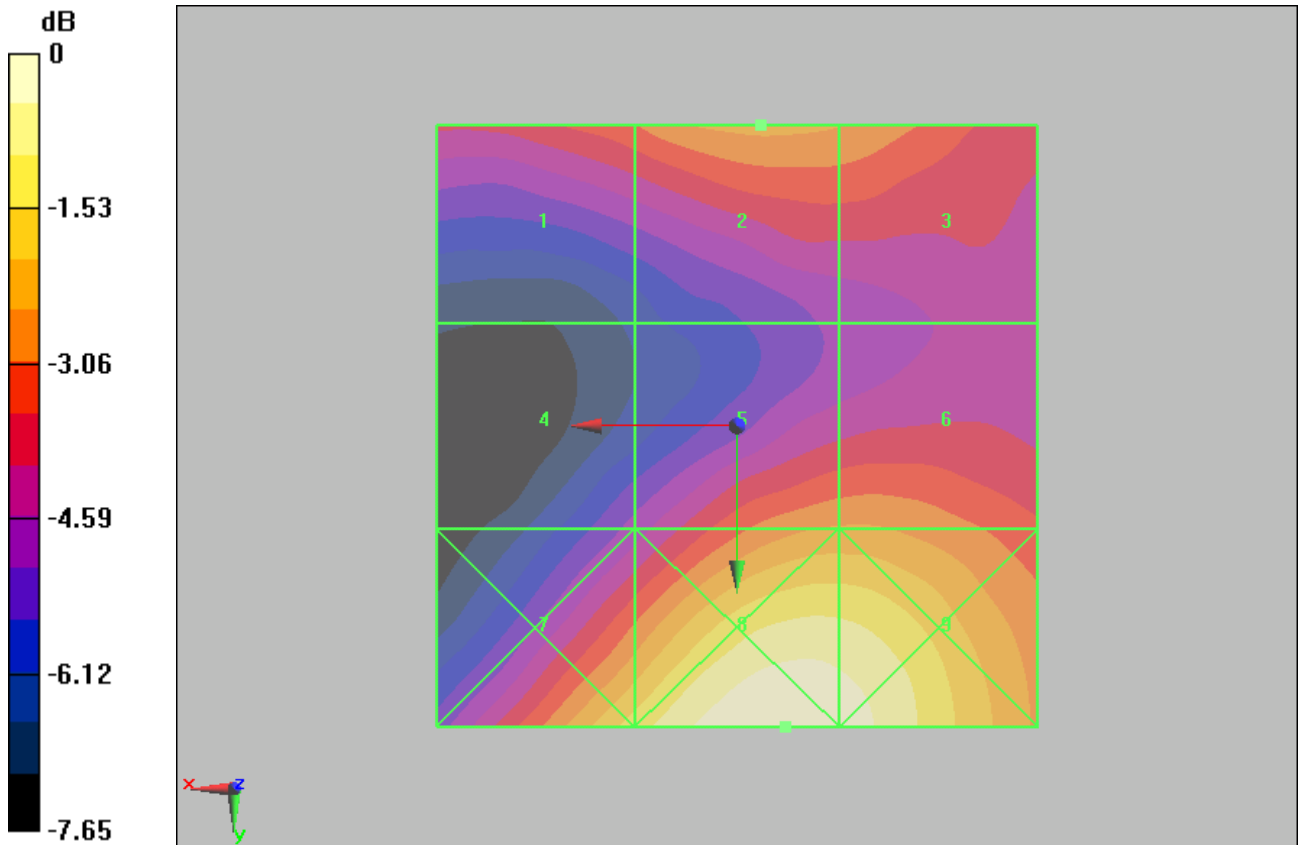
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 19.4 V/m; Power Drift = -0.022 dB

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

Peak E-field in V/m

Grid 1 <b>22.4 M4</b>	Grid 2 <b>24.3 M4</b>	Grid 3 <b>23.9 M4</b>
Grid 4 <b>18.3 M4</b>	Grid 5 <b>23.9 M4</b>	Grid 6 <b>24 M4</b>
Grid 7 <b>27.6 M4</b>	Grid 8 <b>31.9 M4</b>	Grid 9 <b>31.1 M4</b>



0 dB = 31.9V/m

Figure 25 HAC RF E-Field UMTS Band II Channel 9400

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**HAC RF E-Field UMTS Band II Low**

Date/Time: 7/18/2013 7:16:59 PM

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

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

Ambient Temperature:22.3 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: ER3DV6 - SN2428; ConvF(1, 1, 1); Calibrated: 8/30/2012

Electronics: DAE4 Sn1317; Calibrated: 1/25/2013

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

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**RAV4 WCDMA II HAC RF E-Field/E Scan - ER3D - 2007: 15 mm from Probe Center to the Device Low 2/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 25.5 V/m

Probe Modulation Factor = 1.03

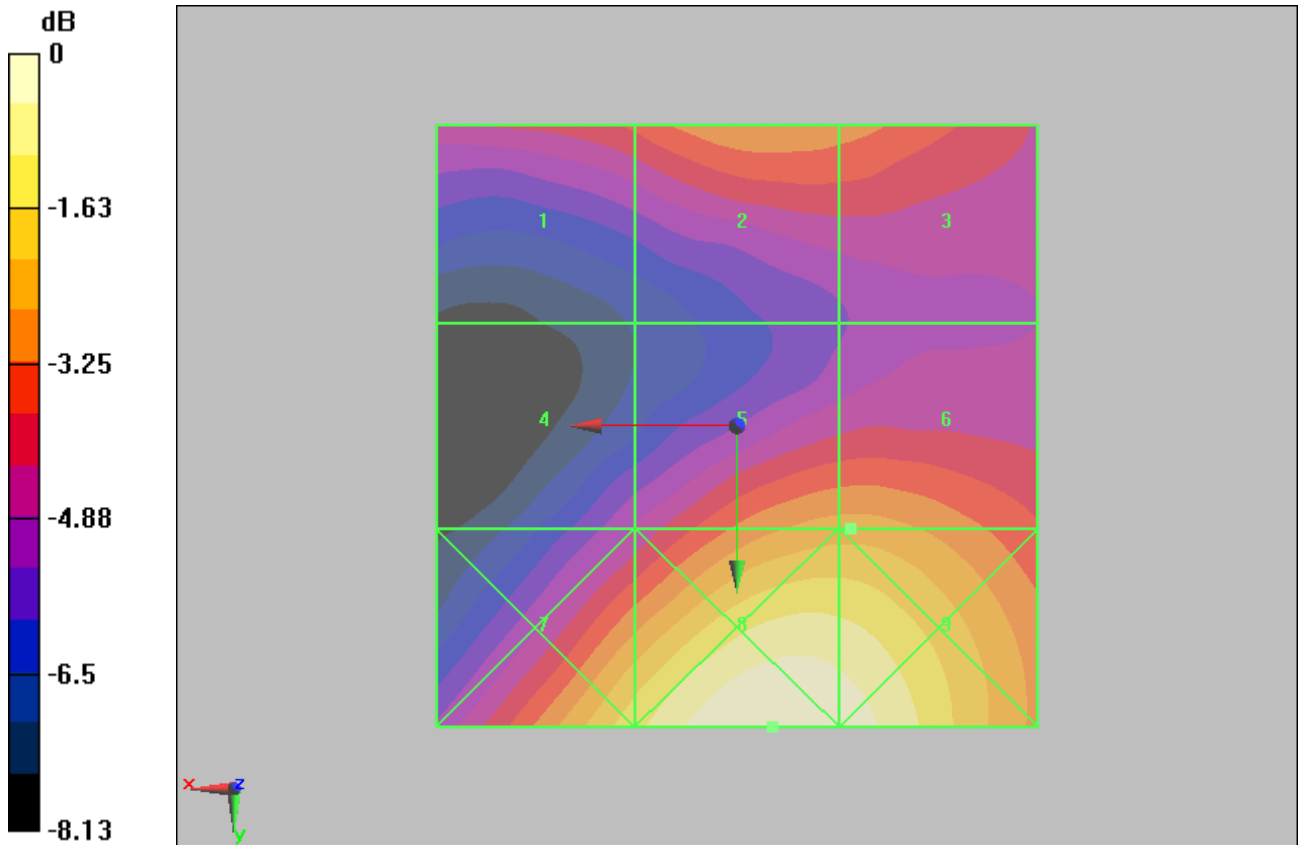
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 20.3 V/m; Power Drift = -0.147 dB

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

Peak E-field in V/m

Grid 1	Grid 2	Grid 3
<b>22.2 M4</b>	<b>24.5 M4</b>	<b>23.9 M4</b>
Grid 4	Grid 5	Grid 6
<b>19.4 M4</b>	<b>25.4 M4</b>	<b>25.5 M4</b>
Grid 7	Grid 8	Grid 9
<b>29.2 M4</b>	<b>33.7 M4</b>	<b>33 M4</b>



0 dB = 33.7V/m

Figure 26 HAC RF E-Field UMTS Band II Channel 9262

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**HAC RF H-Field UMTS Band II High**

Date/Time: 7/25/2013 12:39:07 PM

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

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

Ambient Temperature:22.3 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: H3DV6 - SN6260; Calibrated: 8/30/2012

Electronics: DAE4 Sn1317; Calibrated: 1/25/2013

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

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**RAV4 WCDMA II HAC RF H-Field/H Scan - H3DV6 - 2007: 15 mm from Probe Center to the Device High/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.062 A/m

Probe Modulation Factor = 1.01

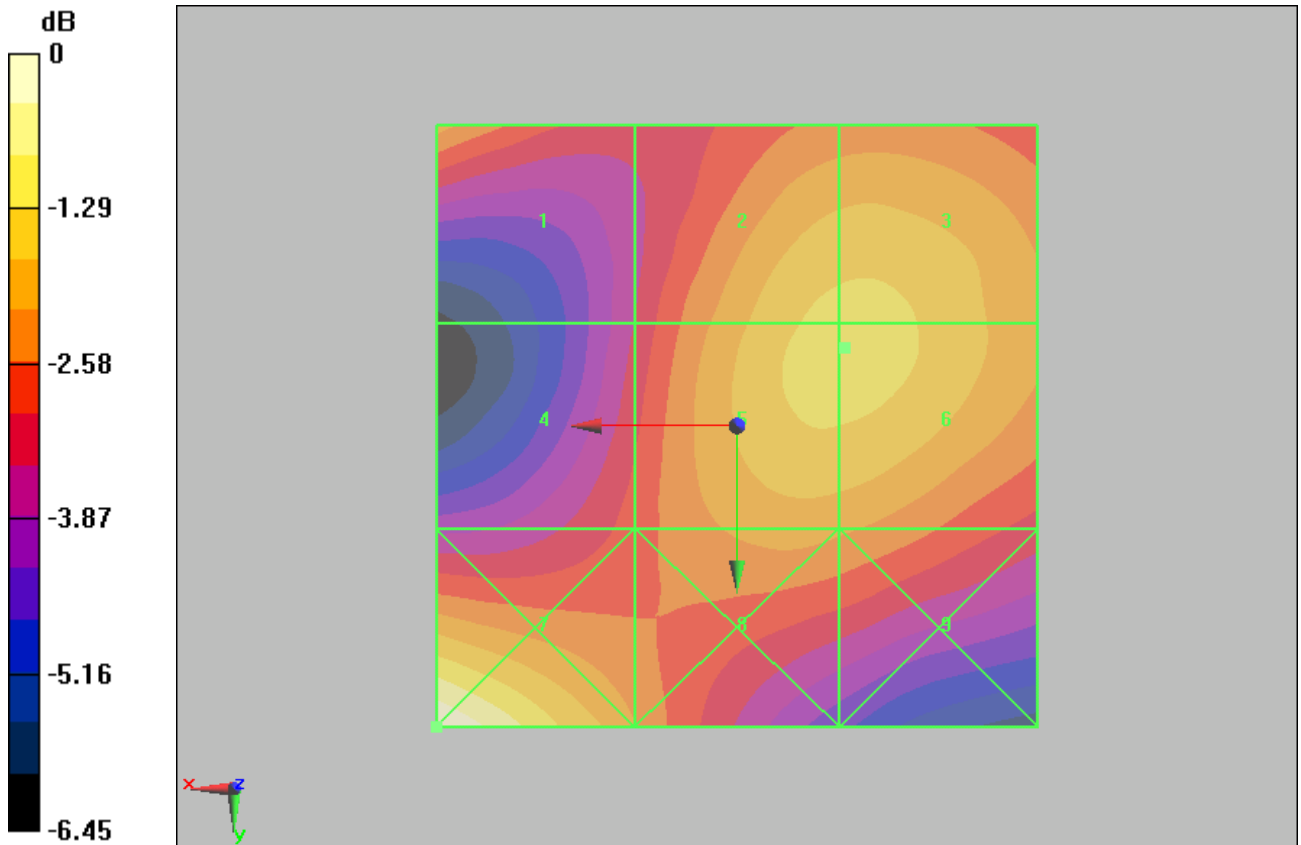
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.069 A/m; Power Drift = -0.028 dB

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

Peak H-field in A/m

Grid 1 <b>0.056 M4</b>	Grid 2 <b>0.061 M4</b>	Grid 3 <b>0.061 M4</b>
Grid 4 <b>0.051 M4</b>	Grid 5 <b>0.062 M4</b>	Grid 6 <b>0.062 M4</b>
Grid 7 <b>0.070 M4</b>	Grid 8 <b>0.056 M4</b>	Grid 9 <b>0.055 M4</b>



0 dB = 0.070A/m

Figure 27 HAC RF H-Field UMTS Band II Channel 9538

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**HAC RF H-Field UMTS Band II Middle**

Date/Time: 7/25/2013 12:33:27 PM

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

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

Ambient Temperature:22.3 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: H3DV6 - SN6260; Calibrated: 8/30/2012

Electronics: DAE4 Sn1317; Calibrated: 1/25/2013

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

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**RAV4 WCDMA II HAC RF H-Field/H Scan - H3DV6 - 2007: 15 mm from Probe Center to the Device Middle/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.060 A/m

Probe Modulation Factor = 1.01

Device Reference Point: 0, 0, -6.3 mm

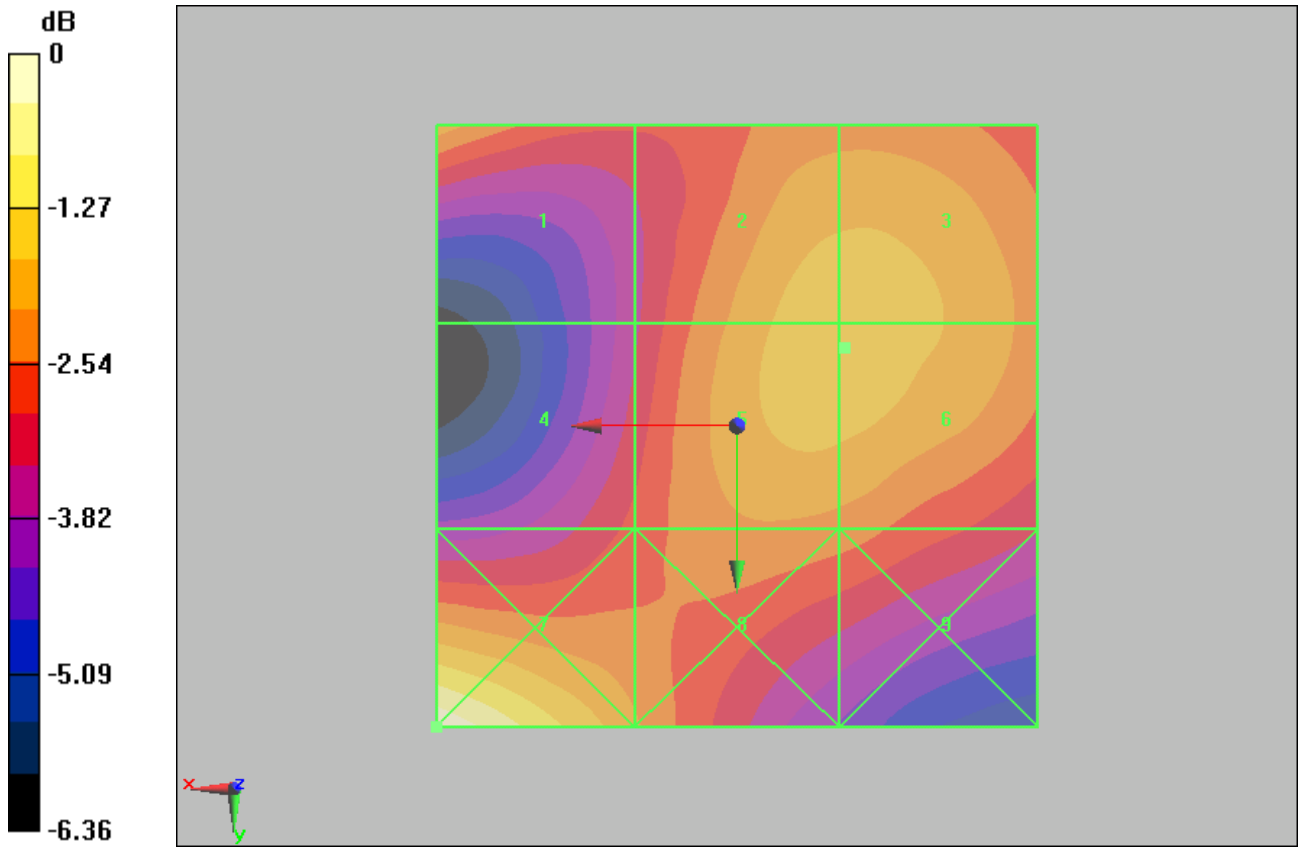
Reference Value = 0.067 A/m; Power Drift = -0.010 dB

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

Peak H-field in A/m

Grid 1 <b>0.057 M4</b>	Grid 2 <b>0.059 M4</b>	Grid 3 <b>0.059 M4</b>
Grid 4 <b>0.051 M4</b>	Grid 5 <b>0.060 M4</b>	Grid 6 <b>0.060 M4</b>
Grid 7 <b>0.070 M4</b>	Grid 8 <b>0.055 M4</b>	Grid 9 <b>0.054 M4</b>





0 dB = 0.070A/m

Figure 28 HAC RF H-Field UMTS Band II Channel 9400

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**HAC RF H-Field UMTS Band II Low**

Date/Time: 7/25/2013 12:44:46 PM

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

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

Ambient Temperature:22.3 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: H3DV6 - SN6260; Calibrated: 8/30/2012

Electronics: DAE4 Sn1317; Calibrated: 1/25/2013

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

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**RAV4 WCDMA II HAC RF H-Field/H Scan - H3DV6 - 2007: 15 mm from Probe Center to the Device Low/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.061 A/m

Probe Modulation Factor = 1.01

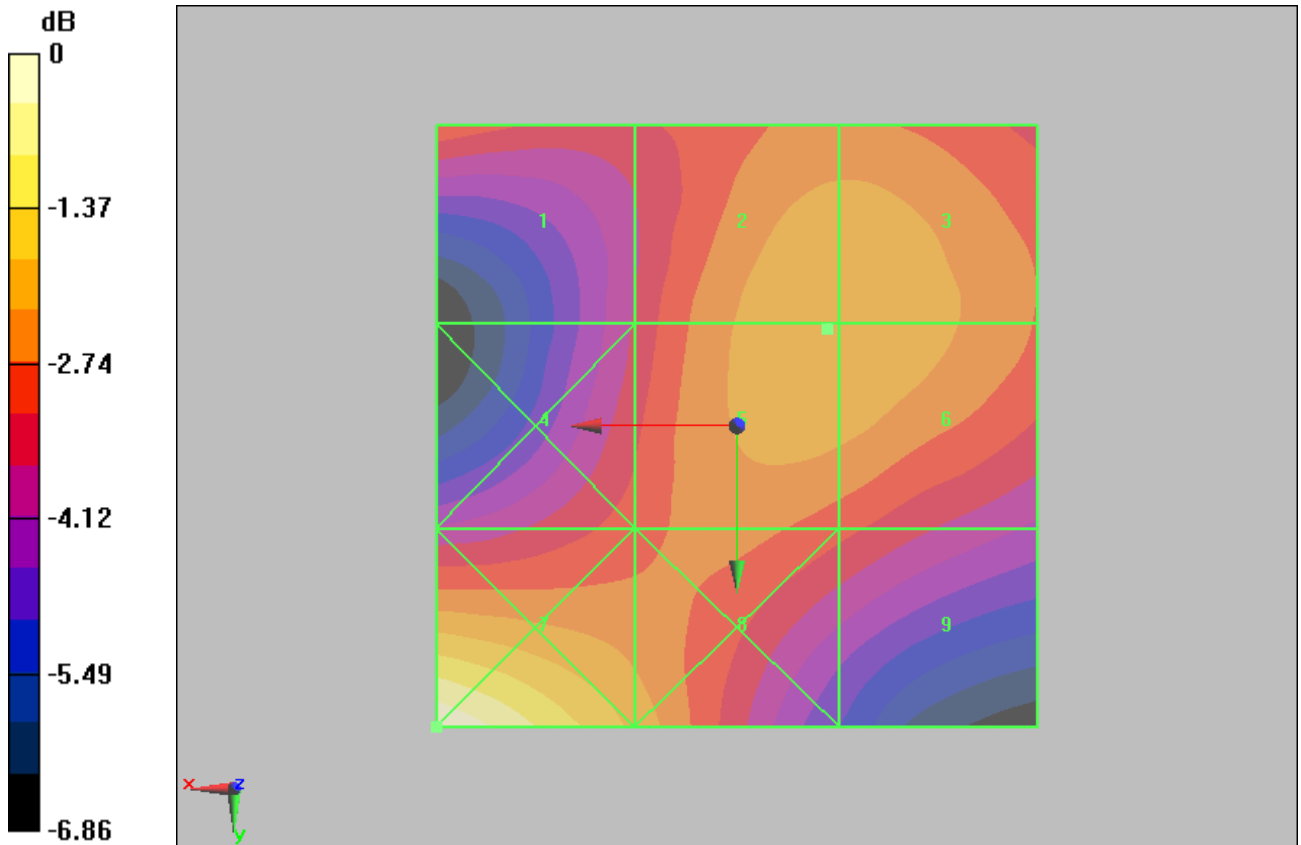
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.069 A/m; Power Drift = -0.045 dB

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

Peak H-field in A/m

Grid 1 <b>0.055 M4</b>	Grid 2 <b>0.061 M4</b>	Grid 3 <b>0.061 M4</b>
Grid 4 <b>0.053 M4</b>	Grid 5 <b>0.061 M4</b>	Grid 6 <b>0.061 M4</b>
Grid 7 <b>0.075 M4</b>	Grid 8 <b>0.060 M4</b>	Grid 9 <b>0.053 M4</b>



0 dB = 0.075A/m

Figure 29 HAC RF H-Field UMTS Band II Channel 9262

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**HAC RF E-Field UMTS Band IV High**

Date/Time: 7/18/2013 7:28:20 PM

Communication System: WCDMA ; Frequency: 1752.6 MHz;Duty Cycle: 1:1

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

Ambient Temperature:22.3 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: ER3DV6 - SN2428; ConvF(1, 1, 1); Calibrated: 8/30/2012

Electronics: DAE4 Sn1317; Calibrated: 1/25/2013

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

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**RAV4 WCDMA IV HAC RF E-Field/E Scan - ER3D - 2007: 15 mm from Probe Center to the Device High/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 25.4 V/m

Probe Modulation Factor = 1.03

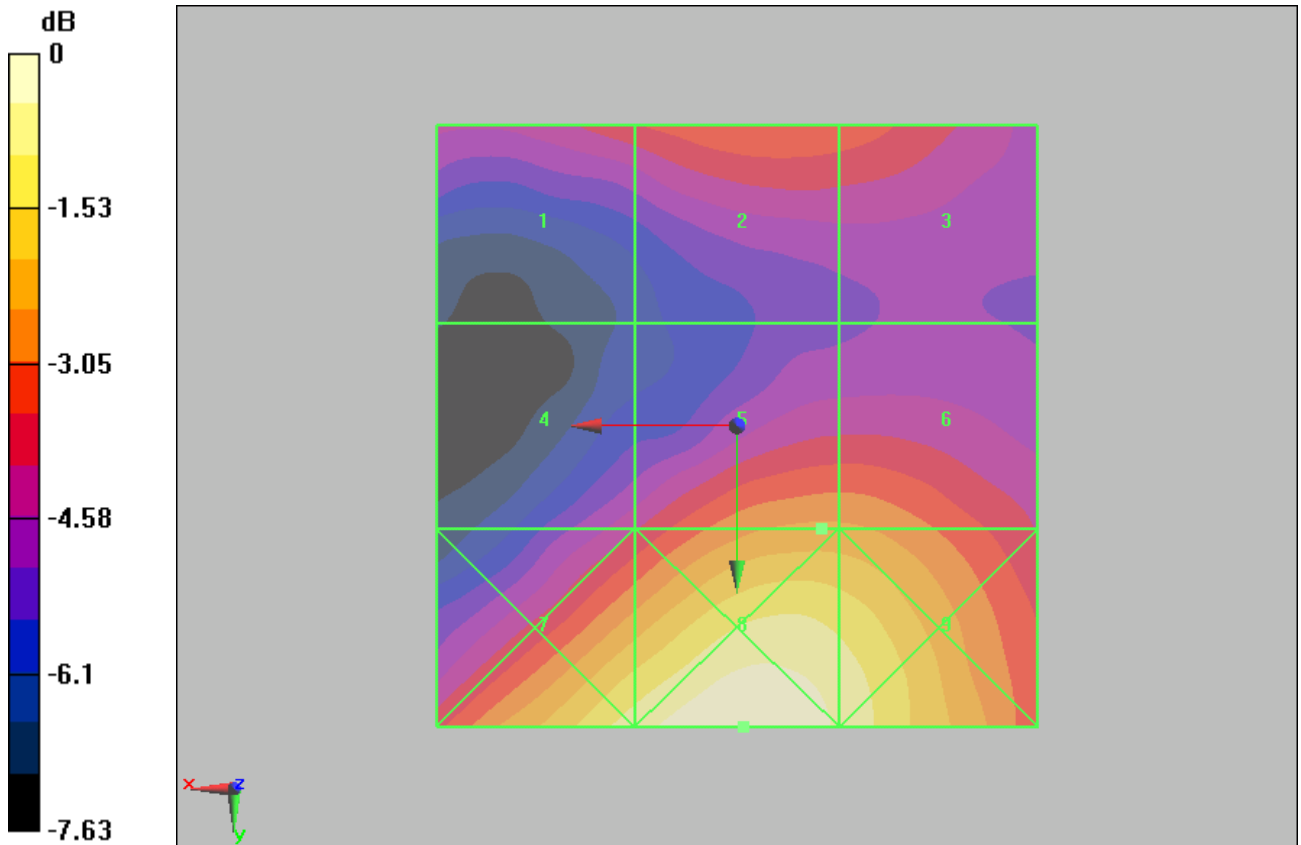
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 21.7 V/m; Power Drift = -0.067 dB

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

Peak E-field in V/m

Grid 1	Grid 2	Grid 3
<b>22.2 M4</b>	<b>23.7 M4</b>	<b>23.3 M4</b>
Grid 4	Grid 5	Grid 6
<b>20.9 M4</b>	<b>25.4 M4</b>	<b>25.3 M4</b>
Grid 7	Grid 8	Grid 9
<b>30.8 M4</b>	<b>33.5 M4</b>	<b>31.3 M4</b>



0 dB = 33.5V/m

Figure 30 HAC RF E-Field UMTS Band IV Channel 1513

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**HAC RF E-Field UMTS Band IV Middle**

Date/Time: 7/18/2013 7:22:45 PM

Communication System: WCDMA ; Frequency: 1732.6 MHz;Duty Cycle: 1:1

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

Ambient Temperature:22.3 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: ER3DV6 - SN2428; ConvF(1, 1, 1); Calibrated: 8/30/2012

Electronics: DAE4 Sn1317; Calibrated: 1/25/2013

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

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**RAV4 WCDMA IV HAC RF E-Field/E Scan - ER3D - 2007: 15 mm from Probe Center to the Device Middle/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 31 V/m

Probe Modulation Factor = 1.03

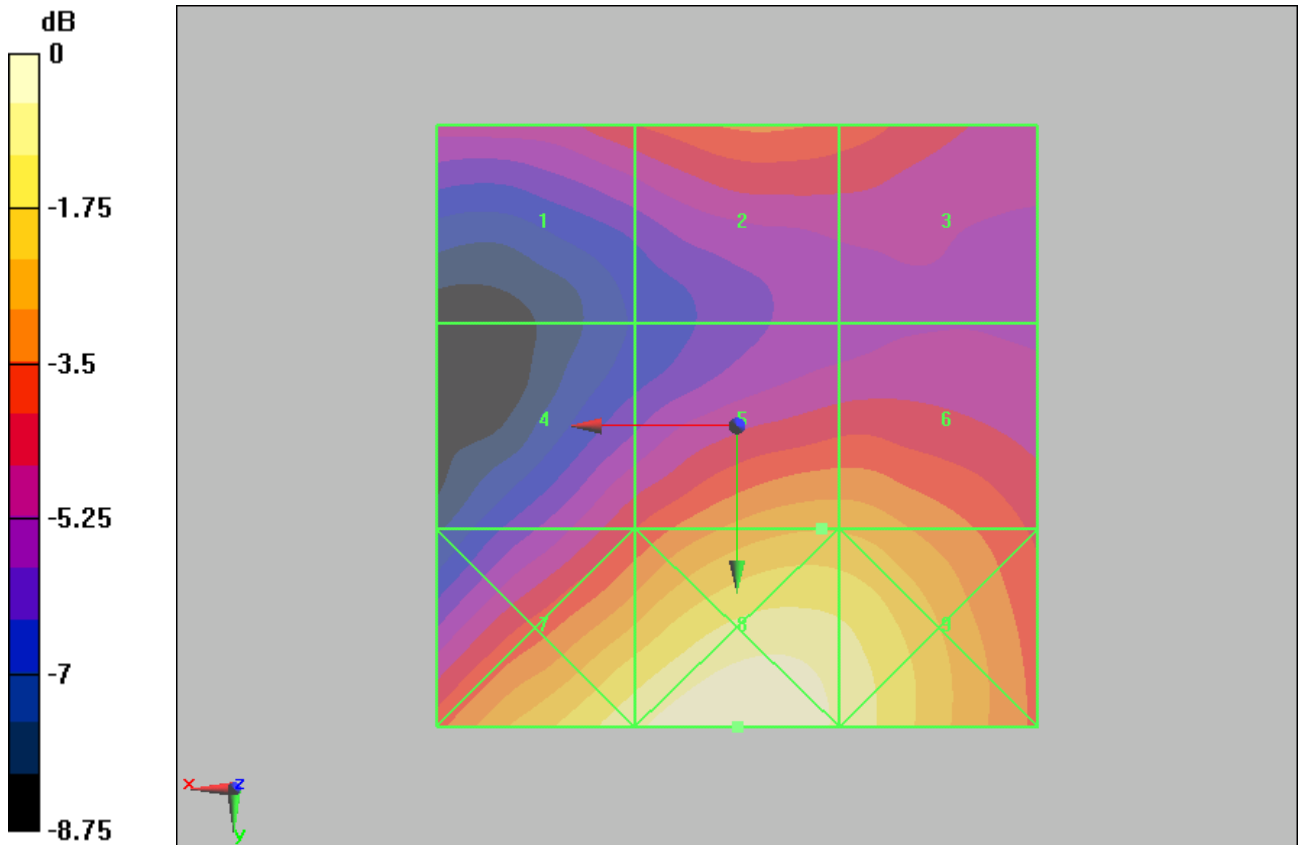
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 26.2 V/m; Power Drift = -0.119 dB

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

Peak E-field in V/m

Grid 1	Grid 2	Grid 3
<b>25.4 M4</b>	<b>27.7 M4</b>	<b>26.8 M4</b>
Grid 4	Grid 5	Grid 6
<b>25.4 M4</b>	<b>31 M4</b>	<b>30.9 M4</b>
Grid 7	Grid 8	Grid 9
<b>37.5 M4</b>	<b>40.7 M4</b>	<b>37.6 M4</b>



0 dB = 40.7V/m

Figure 31 HAC RF E-Field UMTS Band IV Channel 1413

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**HAC RF E-Field UMTS Band IV Low**

Date/Time: 7/18/2013 7:34:02 PM

Communication System: WCDMA ; Frequency: 1712.4 MHz;Duty Cycle: 1:1

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

Ambient Temperature:22.3 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: ER3DV6 - SN2428; ConvF(1, 1, 1); Calibrated: 8/30/2012

Electronics: DAE4 Sn1317; Calibrated: 1/25/2013

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

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**RAV4 WCDMA IV HAC RF E-Field/E Scan - ER3D - 2007: 15 mm from Probe Center to the Device Low 2/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 24.7 V/m

Probe Modulation Factor = 1.03

Device Reference Point: 0, 0, -6.3 mm

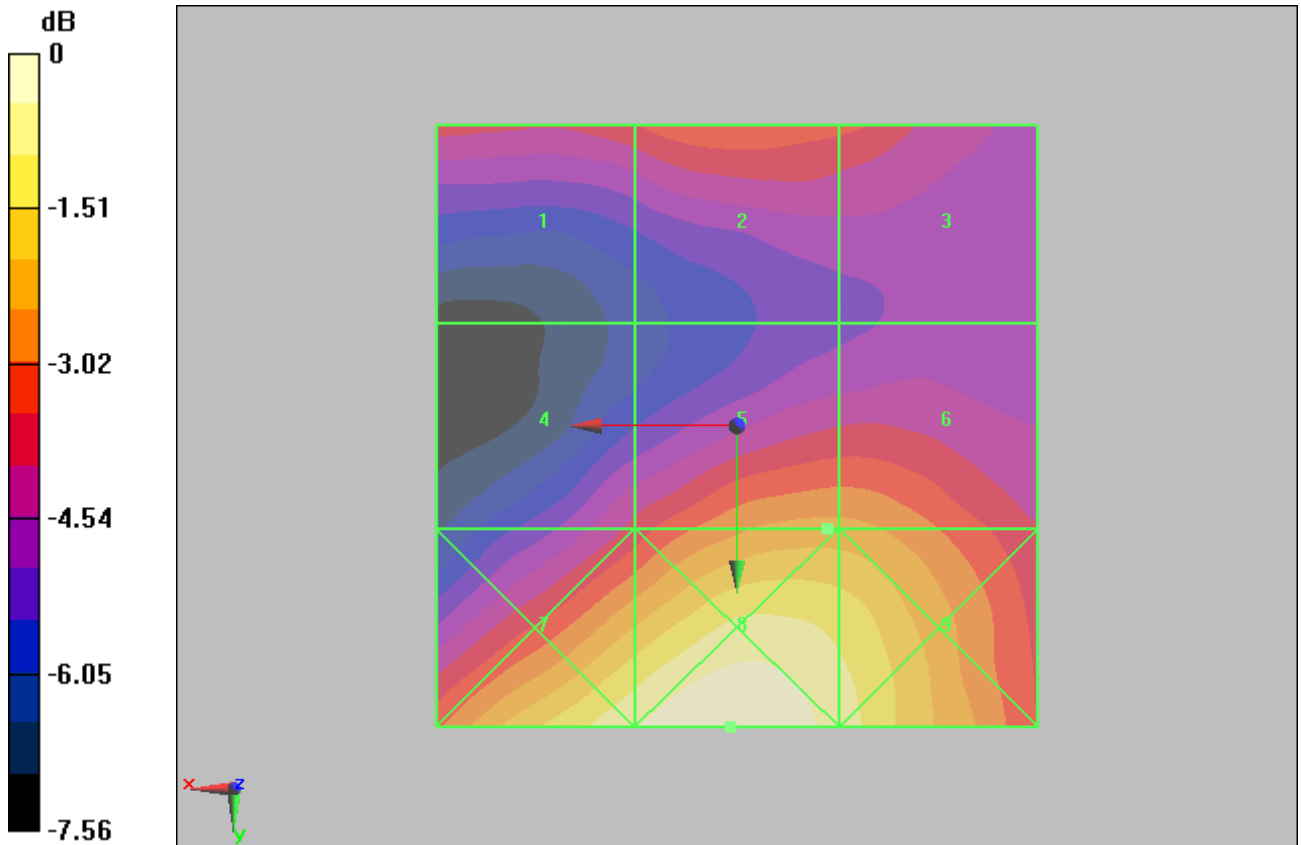
Reference Value = 21.1 V/m; Power Drift = -0.178 dB

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

Peak E-field in V/m

Grid 1	Grid 2	Grid 3
<b>21.4 M4</b>	<b>22.6 M4</b>	<b>21.9 M4</b>
Grid 4	Grid 5	Grid 6
<b>20.7 M4</b>	<b>24.7 M4</b>	<b>24.6 M4</b>
Grid 7	Grid 8	Grid 9
<b>30.3 M4</b>	<b>32.2 M4</b>	<b>29.6 M4</b>





0 dB = 32.2V/m

Figure 32 HAC RF E-Field UMTS Band IV Channel 1312

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**HAC RF H-Field UMTS Band IV High**

Date/Time: 7/25/2013 1:00:31 PM

Communication System: WCDMA ; Frequency: 1752.6 MHz;Duty Cycle: 1:1

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

Ambient Temperature:22.3 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: H3DV6 - SN6260; Calibrated: 8/30/2012

Electronics: DAE4 Sn1317; Calibrated: 1/25/2013

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

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**RAV4 WCDMA IV HAC RF H-Field/H Scan - H3DV6 - 2007: 15 mm from Probe Center to the Device High/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.078 A/m

Probe Modulation Factor = 1.01

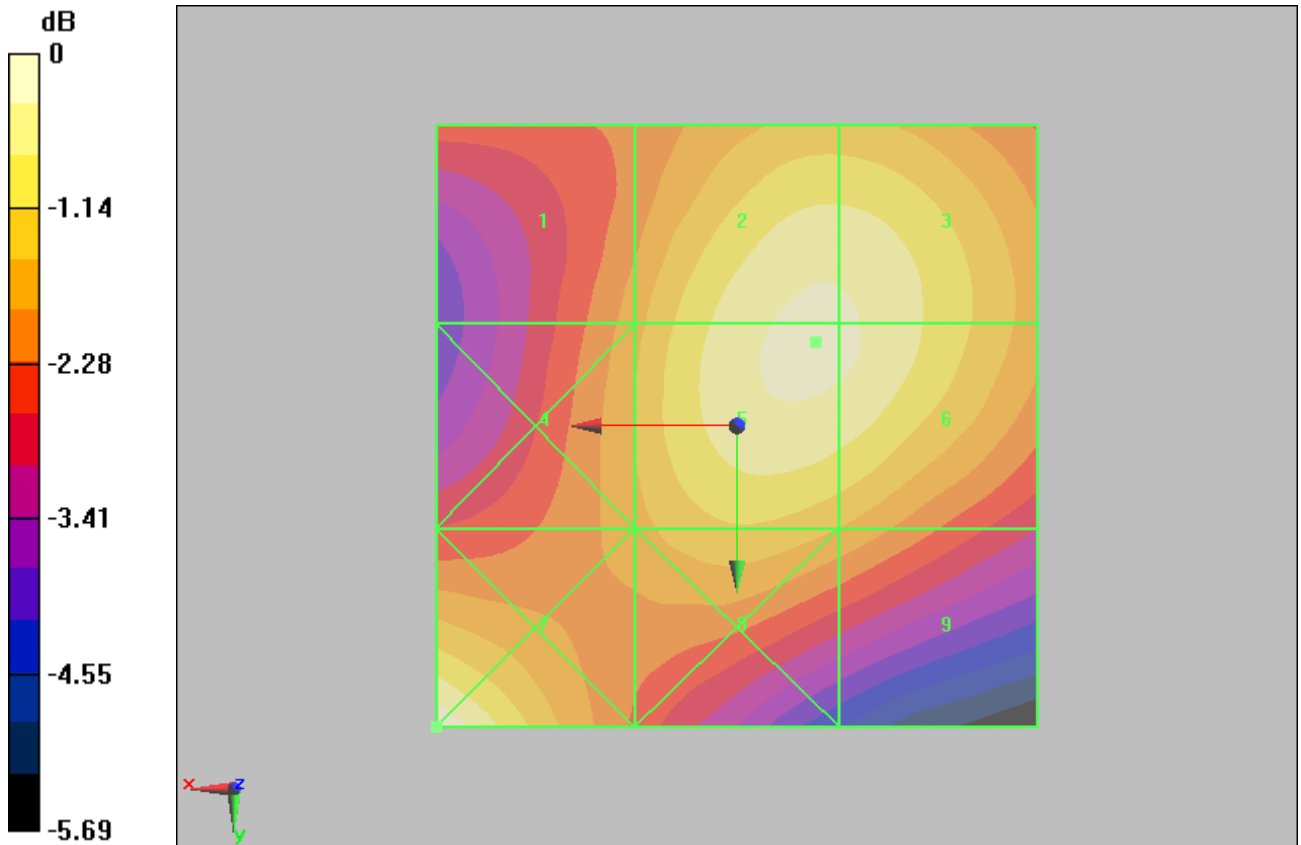
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.090 A/m; Power Drift = -0.041 dB

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

Peak H-field in A/m

Grid 1 <b>0.067 M4</b>	Grid 2 <b>0.078 M4</b>	Grid 3 <b>0.078 M4</b>
Grid 4 <b>0.068 M4</b>	Grid 5 <b>0.078 M4</b>	Grid 6 <b>0.078 M4</b>
Grid 7 <b>0.081 M4</b>	Grid 8 <b>0.071 M4</b>	Grid 9 <b>0.068 M4</b>



0 dB = 0.081A/m

Figure 33 HAC RF H-Field UMTS Band IV Channel 1513

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**HAC RF H-Field UMTS Band IV Middle**

Date/Time: 7/25/2013 12:50:44 PM

Communication System: WCDMA ; Frequency: 1732.6 MHz;Duty Cycle: 1:1

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

Ambient Temperature:22.3 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: H3DV6 - SN6260; Calibrated: 8/30/2012

Electronics: DAE4 Sn1317; Calibrated: 1/25/2013

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

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**RAV4 WCDMA IV HAC RF H-Field/H Scan - H3DV6 - 2007: 15 mm from Probe Center to the Device Middle/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.092 A/m

Probe Modulation Factor = 1.01

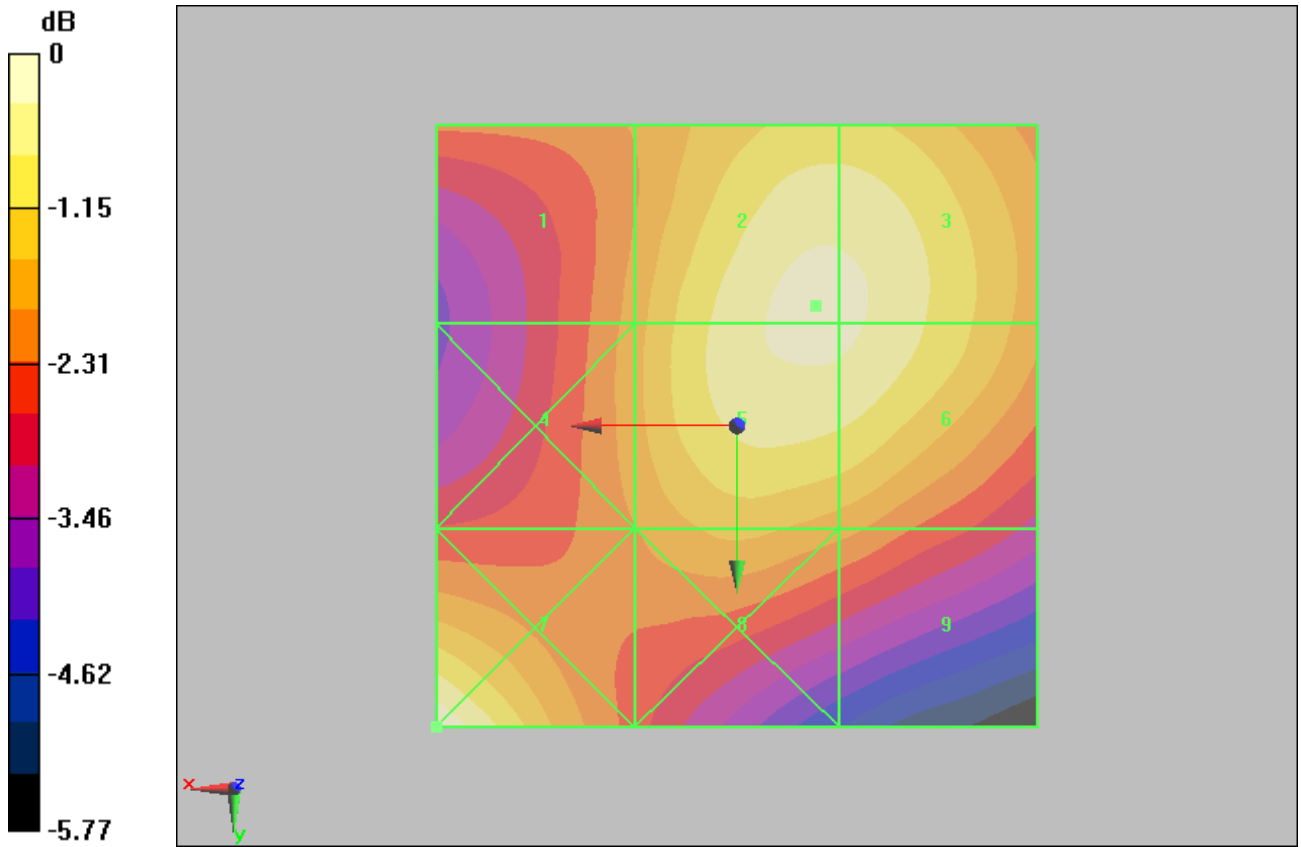
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.103 A/m; Power Drift = 0.010 dB

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

Peak H-field in A/m

Grid 1 <b>0.078 M4</b>	Grid 2 <b>0.092 M4</b>	Grid 3 <b>0.092 M4</b>
Grid 4 <b>0.079 M4</b>	Grid 5 <b>0.092 M4</b>	Grid 6 <b>0.092 M4</b>
Grid 7 <b>0.095 M4</b>	Grid 8 <b>0.081 M4</b>	Grid 9 <b>0.078 M4</b>



0 dB = 0.095A/m

Figure 34 HAC RF H-Field UMTS Band IV Channel 1413

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**HAC RF H-Field UMTS Band IV Low**

Date/Time: 7/25/2013 1:06:08 PM

Communication System: WCDMA ; Frequency: 1712.4 MHz;Duty Cycle: 1:1

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

Ambient Temperature:22.3 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: H3DV6 - SN6260; Calibrated: 8/30/2012

Electronics: DAE4 Sn1317; Calibrated: 1/25/2013

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

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**RAV4 WCDMA IV HAC RF H-Field/H Scan - H3DV6 - 2007: 15 mm from Probe Center to the Device Low/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.080 A/m

Probe Modulation Factor = 1.01

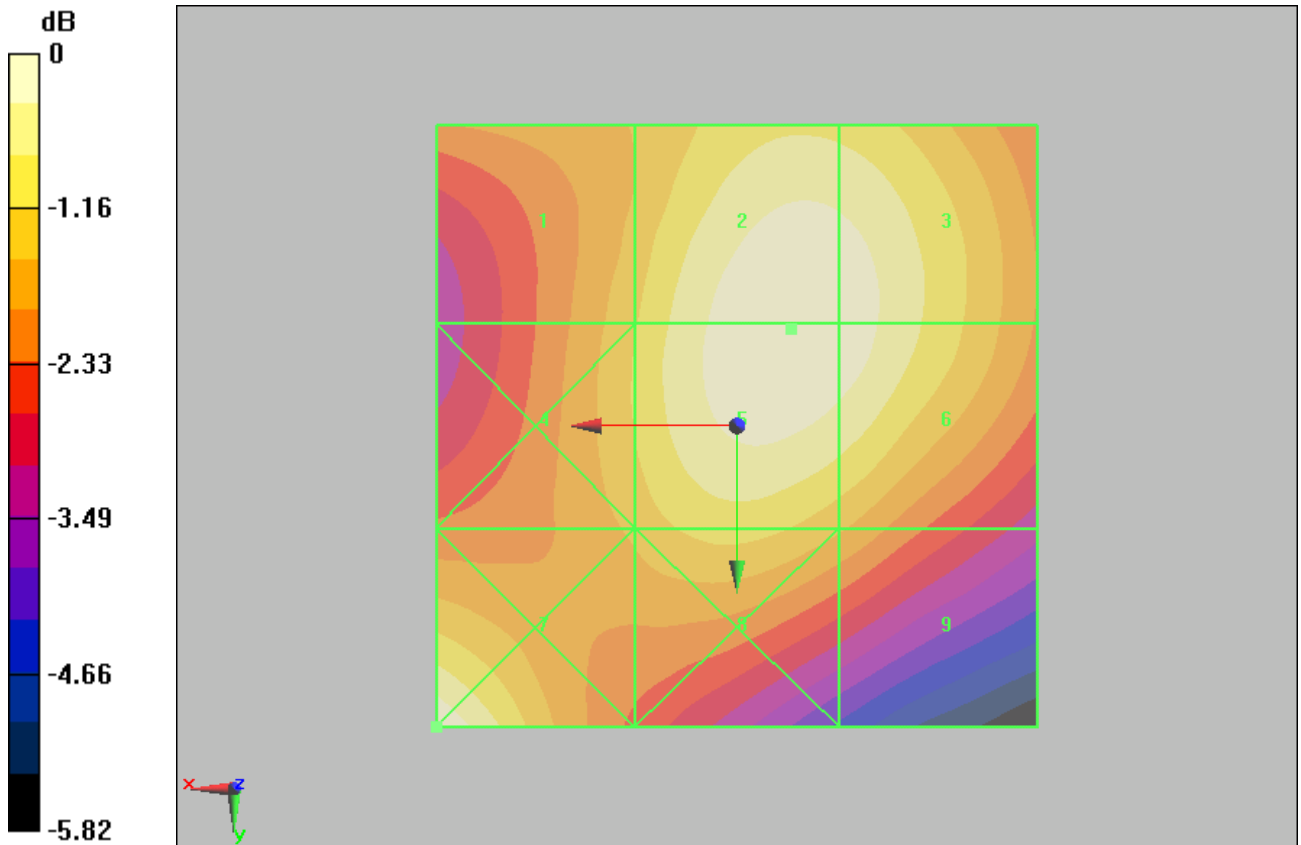
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.090 A/m; Power Drift = -0.023 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>0.080 M4</b>	Grid 3 <b>0.079 M4</b>
Grid 4 <b>0.070 M4</b>	Grid 5 <b>0.080 M4</b>	Grid 6 <b>0.079 M4</b>
Grid 7 <b>0.080 M4</b>	Grid 8 <b>0.071 M4</b>	Grid 9 <b>0.067 M4</b>



0 dB = 0.080A/m

Figure 35 HAC RF H-Field UMTS Band IV Channel 1312

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**HAC RF E-Field UMTS Band V High**

Date/Time: 7/19/2013 7:45:41 PM

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

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

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: ER3DV6 - SN2428; ConvF(1, 1, 1); Calibrated: 8/30/2012

Electronics: DAE4 Sn1317; Calibrated: 1/25/2013

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

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**RAV4 WCDMA V HAC RF E-Field/E Scan - ER3D - 2007: 15 mm from Probe Center to the Device High/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 12.7 V/m

Probe Modulation Factor = 1.03

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 12.3 V/m; Power Drift = -0.099 dB

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

Peak E-field in V/m

Grid 1	Grid 2	Grid 3
<b>12.5 M4</b>	<b>12.6 M4</b>	<b>12.1 M4</b>
Grid 4	Grid 5	Grid 6
<b>12.5 M4</b>	<b>12.7 M4</b>	<b>12.4 M4</b>
Grid 7	Grid 8	Grid 9
<b>12.7 M4</b>	<b>12.9 M4</b>	<b>12.7 M4</b>



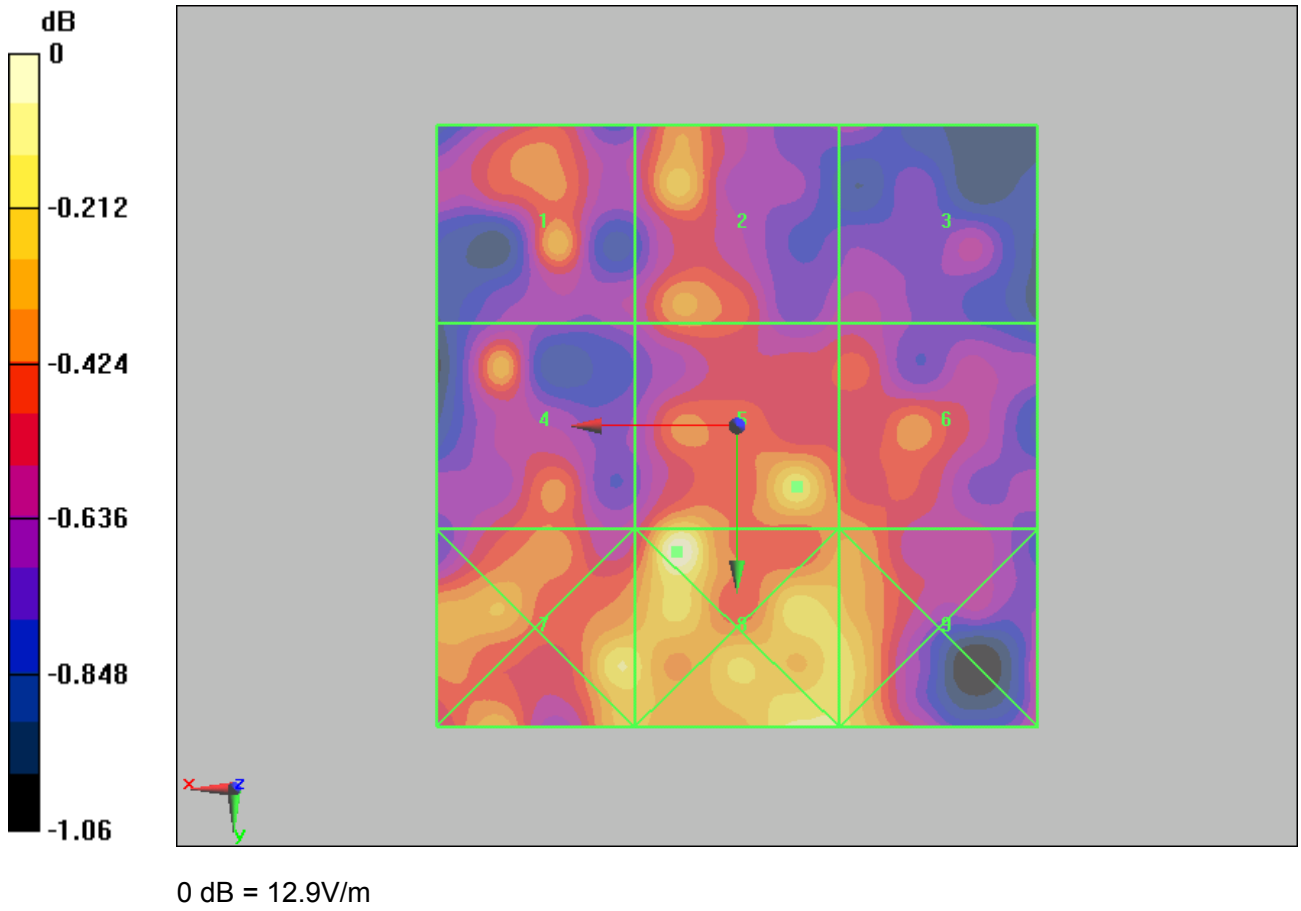


Figure 36 HAC RF E-Field UMTS Band V Channel 4233

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**HAC RF E-Field UMTS Band V Middle**

Date/Time: 7/19/2013 7:39:47 PM

Communication System: WCDMA ; Frequency: 836.6 MHz;Duty Cycle: 1:1

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

Ambient Temperature:22.3 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: ER3DV6 - SN2428; ConvF(1, 1, 1); Calibrated: 8/30/2012

Electronics: DAE4 Sn1317; Calibrated: 1/25/2013

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

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**RAV4 WCDMA V HAC RF E-Field/E Scan - ER3D - 2007: 15 mm from Probe Center to the Device Middle/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 13.5 V/m

Probe Modulation Factor = 1.03

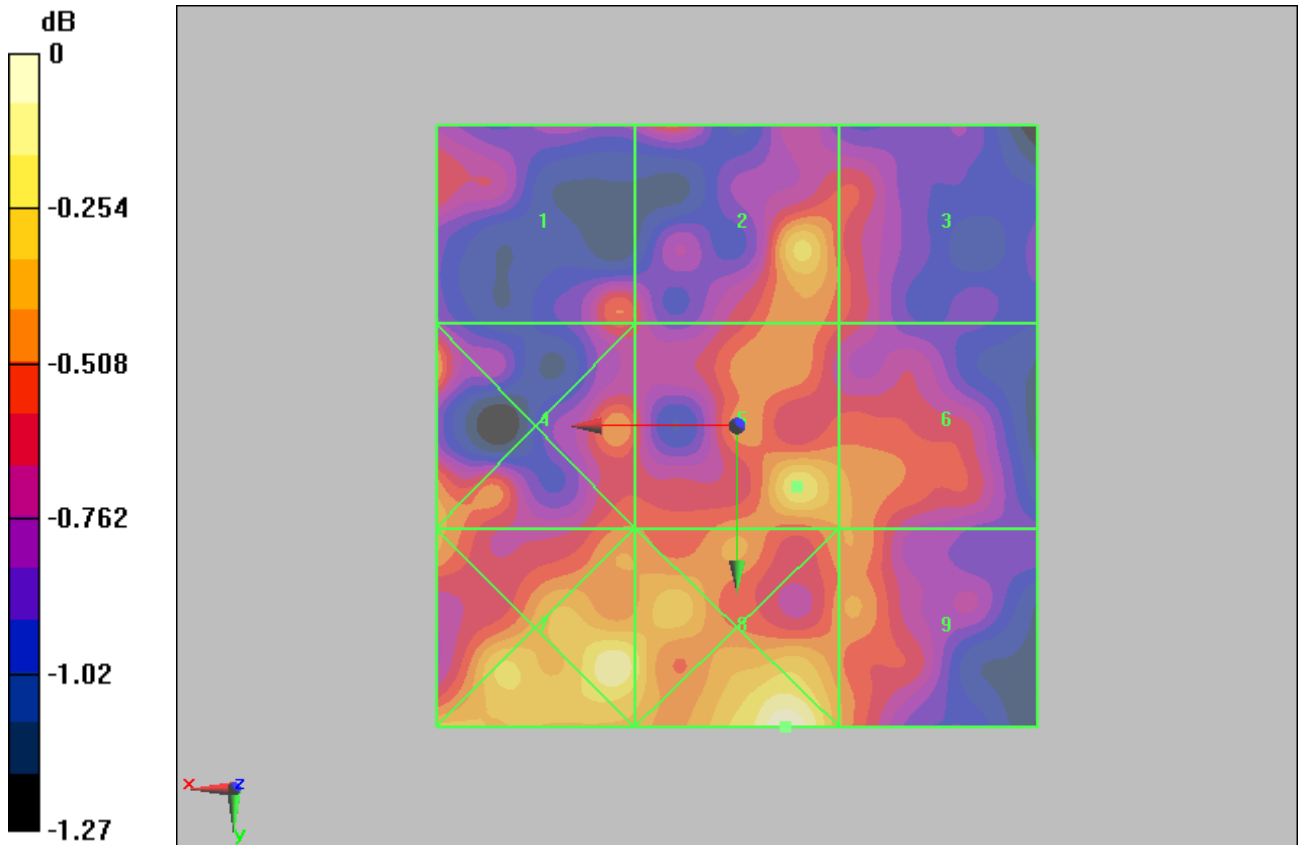
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 14 V/m; Power Drift = -0.046 dB

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

Peak E-field in V/m

Grid 1 <b>13 M4</b>	Grid 2 <b>13.5 M4</b>	Grid 3 <b>13 M4</b>
Grid 4 <b>13.3 M4</b>	Grid 5 <b>13.5 M4</b>	Grid 6 <b>13.2 M4</b>
Grid 7 <b>13.7 M4</b>	Grid 8 <b>13.8 M4</b>	Grid 9 <b>13.2 M4</b>



0 dB = 13.8V/m

Figure 37 HAC RF E-Field UMTS Band V Channel 4183

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**HAC RF E-Field UMTS Band V Low**

Date/Time: 7/19/2013 7:51:17 PM

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

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

Ambient Temperature:22.3 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: ER3DV6 - SN2428; ConvF(1, 1, 1); Calibrated: 8/30/2012

Electronics: DAE4 Sn1317; Calibrated: 1/25/2013

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

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**RAV4 WCDMA V HAC RF E-Field/E Scan - ER3D - 2007: 15 mm from Probe Center to the Device Low 2/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 12.7 V/m

Probe Modulation Factor = 1.03

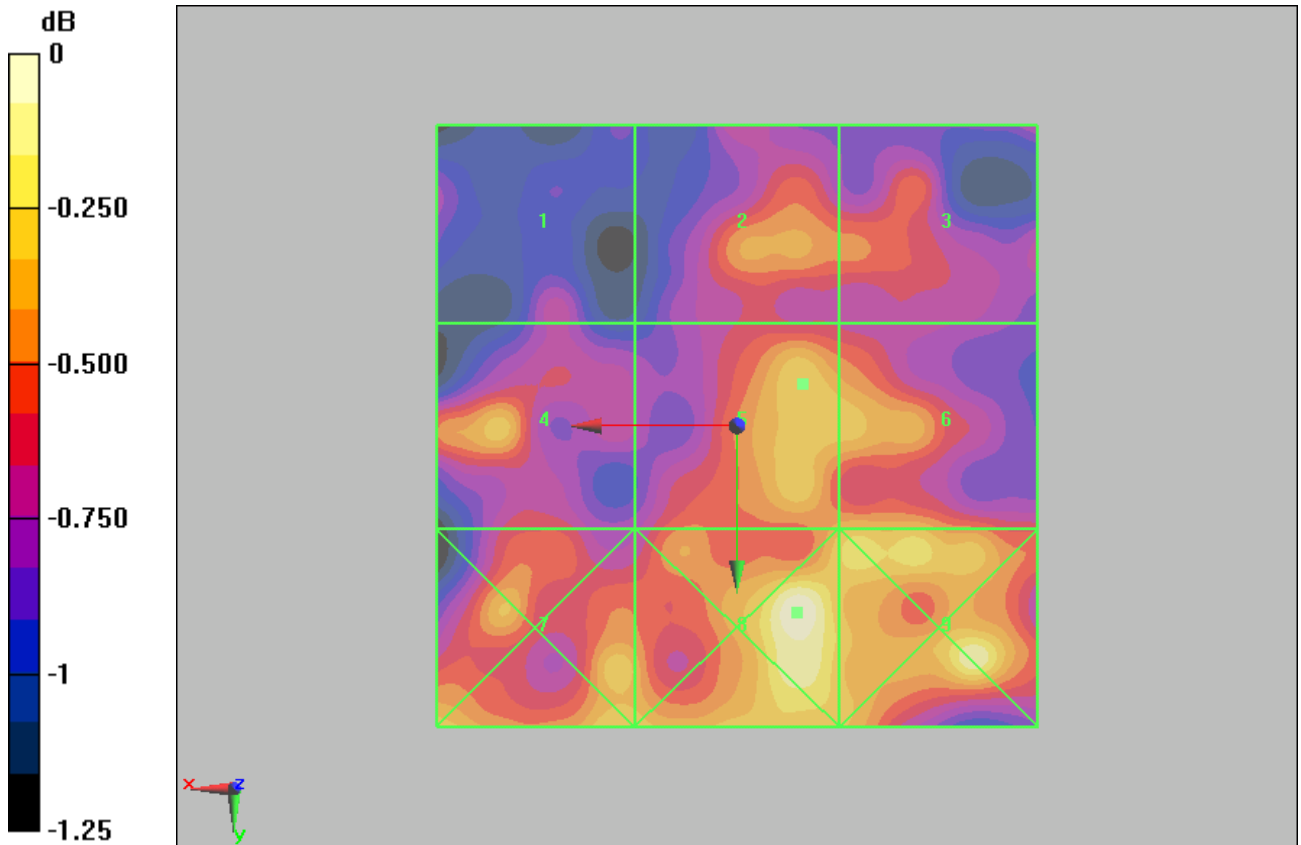
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 12.4 V/m; Power Drift = -0.045 dB

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

Peak E-field in V/m

Grid 1	Grid 2	Grid 3
<b>12.1 M4</b>	<b>12.5 M4</b>	<b>12.4 M4</b>
Grid 4	Grid 5	Grid 6
<b>12.7 M4</b>	<b>12.7 M4</b>	<b>12.7 M4</b>
Grid 7	Grid 8	Grid 9
<b>12.7 M4</b>	<b>13.1 M4</b>	<b>13 M4</b>



0 dB = 13.1V/m

Figure 38 HAC RF E-Field UMTS Band V Channel 4132

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**HAC RF H-Field UMTS Band V High**

Date/Time: 7/24/2013 1:17:46 PM

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

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

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: H3DV6 - SN6260; Calibrated: 8/30/2012

Electronics: DAE4 Sn1317; Calibrated: 1/25/2013

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

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**RAV4 WCDMA V HAC RF H-Field/H Scan - H3DV6 - 2007: 15 mm from Probe Center to the Device High/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.025 A/m

Probe Modulation Factor = 1.01

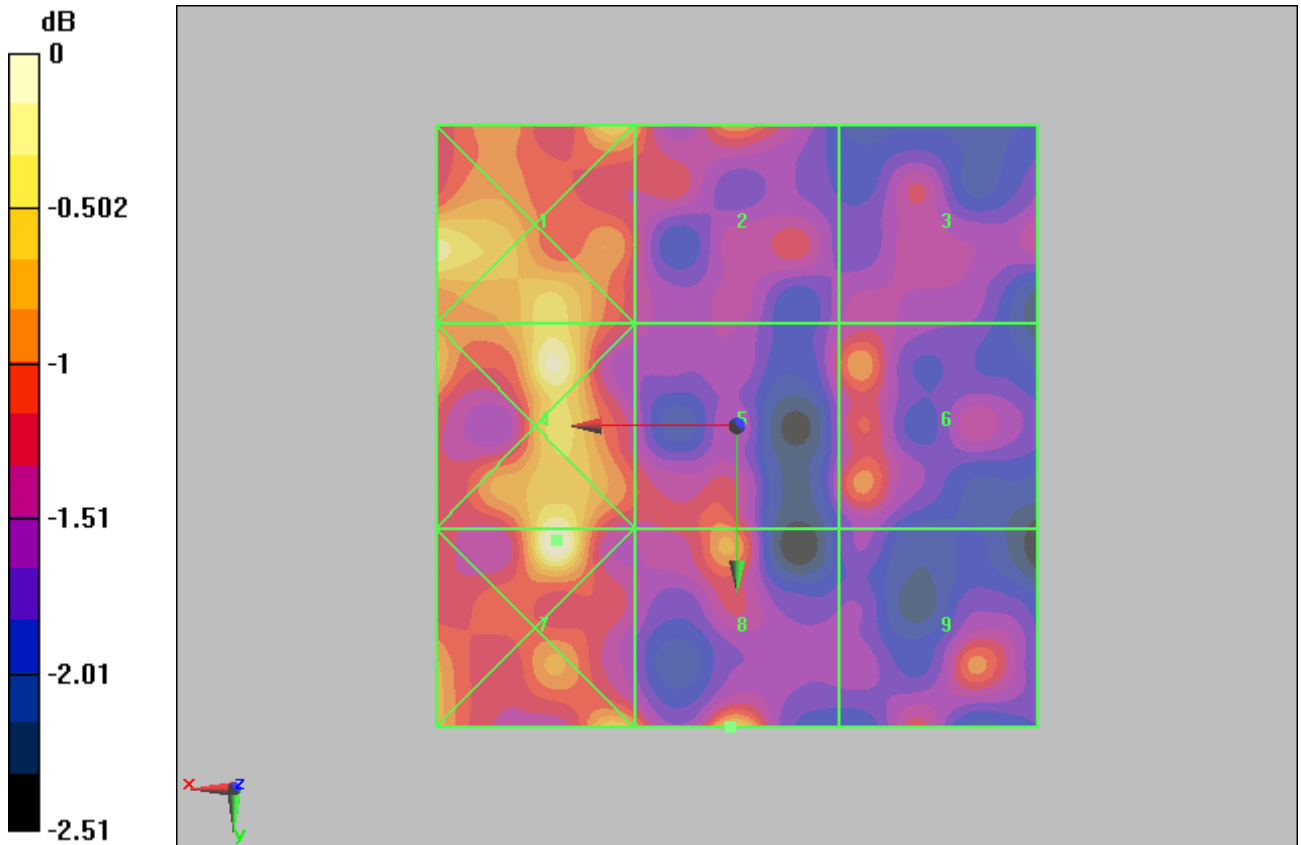
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.023 A/m; Power Drift = 0.045 dB

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

Peak H-field in A/m

Grid 1 <b>0.025 M4</b>	Grid 2 <b>0.024 M4</b>	Grid 3 <b>0.022 M4</b>
Grid 4 <b>0.026 M4</b>	Grid 5 <b>0.023 M4</b>	Grid 6 <b>0.024 M4</b>
Grid 7 <b>0.026 M4</b>	Grid 8 <b>0.025 M4</b>	Grid 9 <b>0.023 M4</b>



0 dB = 0.026A/m

Figure 39 HAC RF H-Field UMTS Band V Channel 4233

**TA Technology (Shanghai) Co., Ltd.**  
**Test Report**

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**HAC RF H-Field UMTS Band V Middle**

Date/Time: 7/24/2013 1:12:05 PM

Communication System: WCDMA ; Frequency: 836.6 MHz;Duty Cycle: 1:1

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

Ambient Temperature:22.3 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: H3DV6 - SN6260; Calibrated: 8/30/2012

Electronics: DAE4 Sn1317; Calibrated: 1/25/2013

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

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**RAV4 WCDMA V HAC RF H-Field/H Scan - H3DV6 - 2007: 15 mm from Probe Center to the Device Middle/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.026 A/m

Probe Modulation Factor = 1.01

Device Reference Point: 0, 0, -6.3 mm

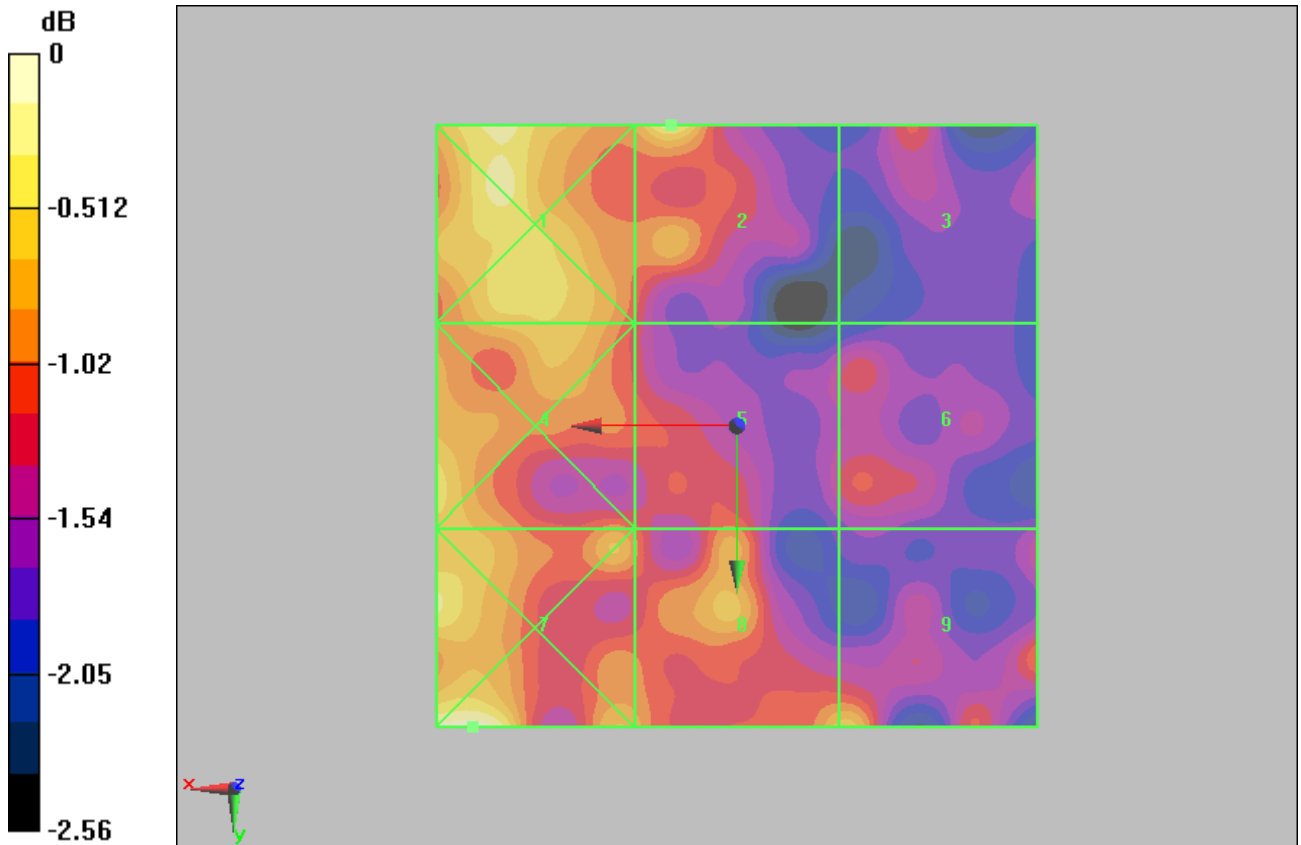
Reference Value = 0.023 A/m; Power Drift = 0.023 dB

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

Peak H-field in A/m

Grid 1 <b>0.026 M4</b>	Grid 2 <b>0.026 M4</b>	Grid 3 <b>0.024 M4</b>
Grid 4 <b>0.026 M4</b>	Grid 5 <b>0.024 M4</b>	Grid 6 <b>0.024 M4</b>
Grid 7 <b>0.027 M4</b>	Grid 8 <b>0.025 M4</b>	Grid 9 <b>0.025 M4</b>





0 dB = 0.027A/m

Figure 40 HAC RF H-Field UMTS Band V Channel 4183

**TA Technology (Shanghai) Co., Ltd.**  
**Test Report**

Report No. RXA1307-0093HAC01

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**HAC RF H-Field UMTS Band V Low**

Date/Time: 7/24/2013 1:23:27 PM

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

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

Ambient Temperature:22.3 °C

Phantom section: RF Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: H3DV6 - SN6260; Calibrated: 8/30/2012

Electronics: DAE4 Sn1317; Calibrated: 1/25/2013

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

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**RAV4 WCDMA V HAC RF H-Field/H Scan - H3DV6 - 2007: 15 mm from Probe Center to the Device Low/Hearing Aid Compatibility Test (101x101x1):** Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.025 A/m

Probe Modulation Factor = 1.01

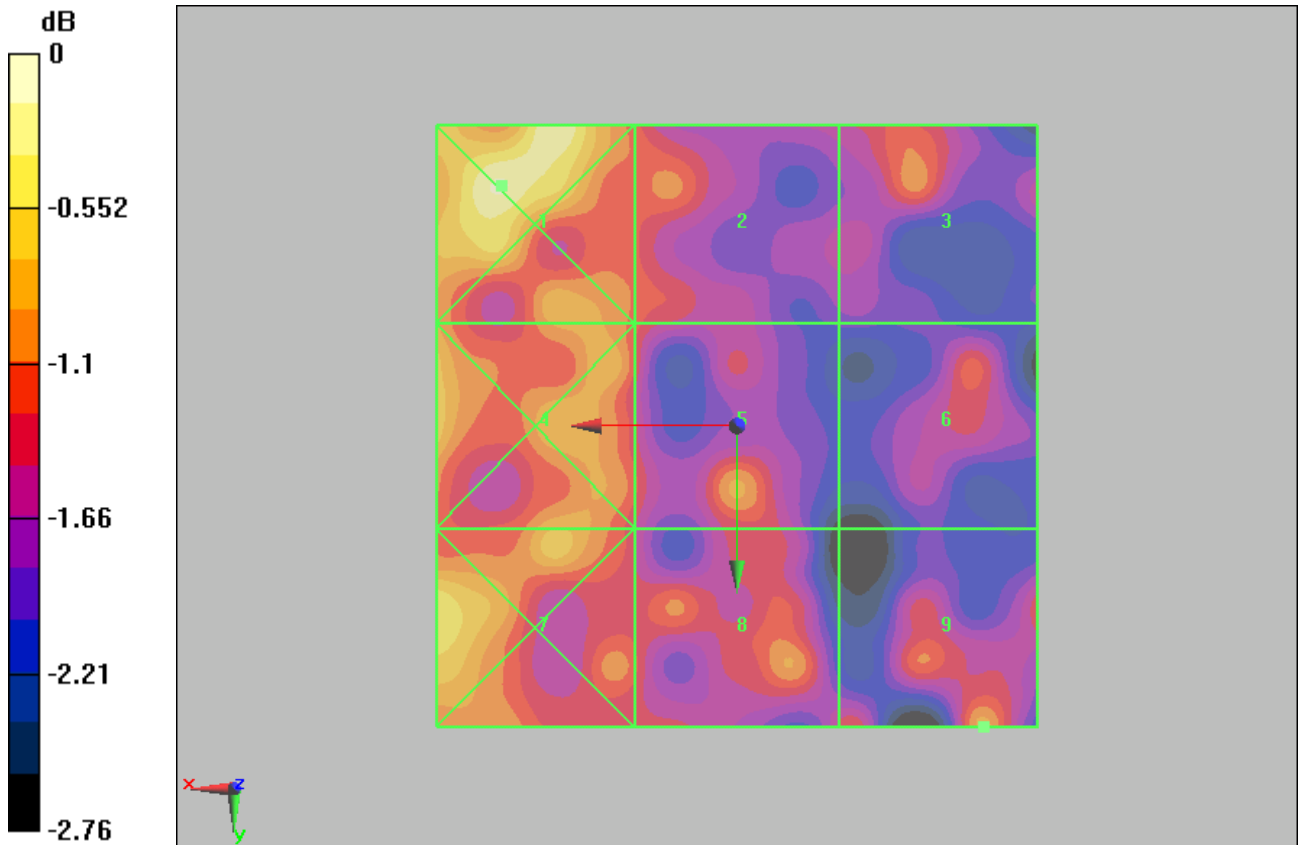
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.021 A/m; Power Drift = 0.060 dB

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

Peak H-field in A/m

Grid 1 <b>0.027 M4</b>	Grid 2 <b>0.024 M4</b>	Grid 3 <b>0.024 M4</b>
Grid 4 <b>0.025 M4</b>	Grid 5 <b>0.024 M4</b>	Grid 6 <b>0.024 M4</b>
Grid 7 <b>0.026 M4</b>	Grid 8 <b>0.024 M4</b>	Grid 9 <b>0.025 M4</b>



0 dB = 0.027A/m

Figure 41 HAC RF H-Field UMTS Band V Channel 4132



# TA Technology (Shanghai) Co., Ltd. Test Report

Report No. RXA1307-0093HAC01

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## ANNEX C: E-Probe Calibration Certificate

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

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

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

Accreditation No.: **SCS 108**

Client: **TMC Beijing (Auden)**

Certificate No: **ER3-2428\_Aug12**

### CALIBRATION CERTIFICATE

Object: **ER3DV6 - SN:2428**

Calibration procedure(s): **QA CAL-02.v6, QA CAL-25.v4  
Calibration procedure for E-field probes optimized for close near field  
evaluations in air**

Calibration date: **August 30, 2012**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S5129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe ER3DV6	SN: 2328	11-Oct-11 (No. ER3-2328_Oct11)	Oct-12
D4E4	SN: 789	30-Jan-12 (No. D4E4-789_Jan12)	Jan-13
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-09 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

Calibrated by:


Approved by:


Name: **Jeton Kastrali**

Name: **Katja Pokovic**

Function: **Laboratory Technician**

Function: **Technical Manager**

Signature: 

Signature: 

Issued: August 30, 2012

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

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Certificate No: ER3-2428\_Aug12

Page 1 of 10

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



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

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

Accreditation No.: **SCS 108**

**Glossary:**

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

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

- a) IEEE Std 1309-2005, "IEEE Standard for calibration of electromagnetic field sensors and probes, excluding antennas, from 9 kHz to 40 GHz", December 2005
- b) CTIA Test Plan for Hearing Aid Compatibility, April 2010.

**Methods Applied and Interpretation of Parameters:**

- **NORM<sub>x,y,z</sub>**: Assessed for E-field polarization  $\vartheta = 0$  for XY sensors and  $\vartheta = 90$  for Z sensor ( $f \leq 900$  MHz in TEM-cell;  $f > 1800$  MHz: R22 waveguide).
- **NORM(f)<sub>x,y,z</sub>** = NORM<sub>x,y,z</sub> \* frequency\_response (see Frequency Response Chart).
- **DCP<sub>x,y,z</sub>**: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- **PAR**: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- **A<sub>x,y,z</sub>; B<sub>x,y,z</sub>; C<sub>x,y,z</sub>; VR<sub>x,y,z</sub>; A, B, C** are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- **Spherical isotropy (3D deviation from isotropy)**: in a locally homogeneous field realized using an open waveguide setup.
- **Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- **Connector Angle**: The angle is assessed using the information gained by determining the NORM<sub>x</sub> (no uncertainty required).

ER3DV6 – SN:2428

August 30, 2012

# Probe ER3DV6

## SN:2428

Manufactured: September 11, 2007  
Calibrated: August 30, 2012

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

# TA Technology (Shanghai) Co., Ltd.

## Test Report

ER3DV6-- SN:2428

August 30, 2012

### DASY/EASY - Parameters of Probe: ER3DV6 - SN:2428

#### Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ( $\mu\text{V}/(\text{V}/\text{m})^2$ )	1.50	1.57	1.84	$\pm 10.1\%$
DCP (mV) <sup>b</sup>	100.9	100.7	99.6	

#### Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc <sup>c</sup> (k=2)
0	CW	0.00	X	0.00	0.00	1.00	206.3	$\pm 3.3\%$
			Y	0.00	0.00	1.00	201.2	
			Z	0.00	0.00	1.00	209.4	

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

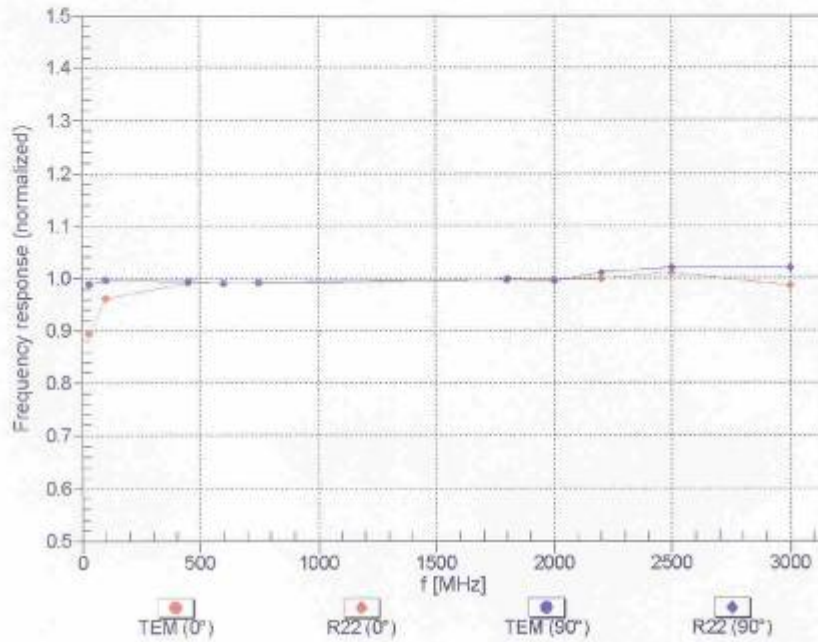
<sup>a</sup> Numerical linearization parameter; uncertainty not required.

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

ER3DV6- SN:2428

August 30, 2012

### Frequency Response of E-Field (TEM-Cell: if1110 EXX, Waveguide: R22)



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



ER3DV6- SN:2428

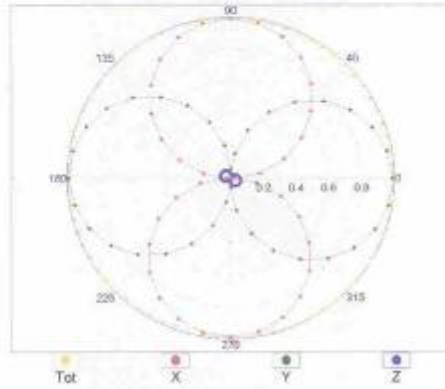
August 30, 2012

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

f=600 MHz,TEM,0°

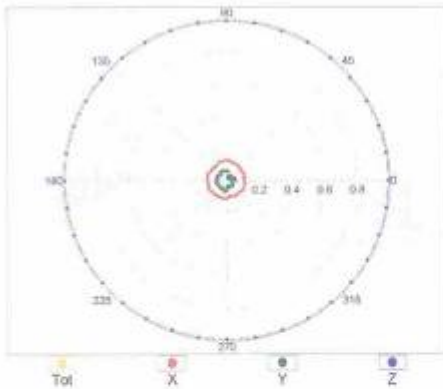


f=2500 MHz,R22,0°

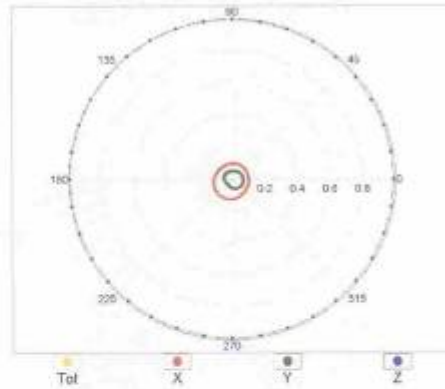


Receiving Pattern ( $\phi$ ),  $\vartheta = 90^\circ$

f=600 MHz,TEM,90°



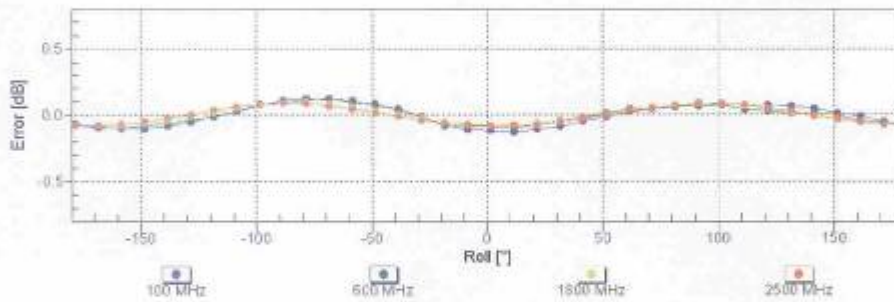
f=2500 MHz,R22,90°



ER3DV6- SN:2428

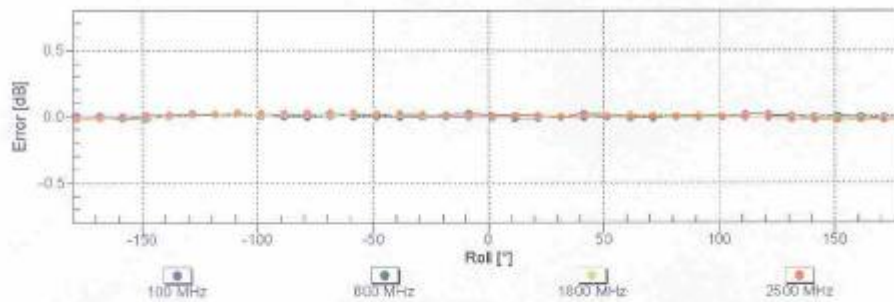
August 30, 2012

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



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

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

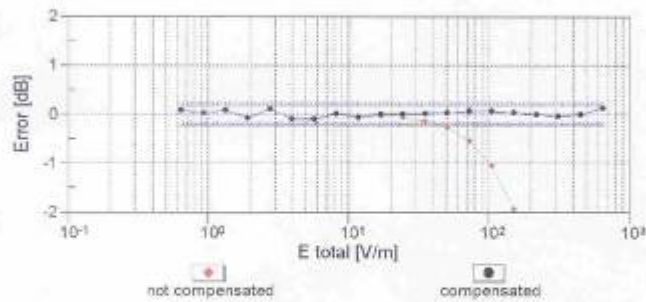
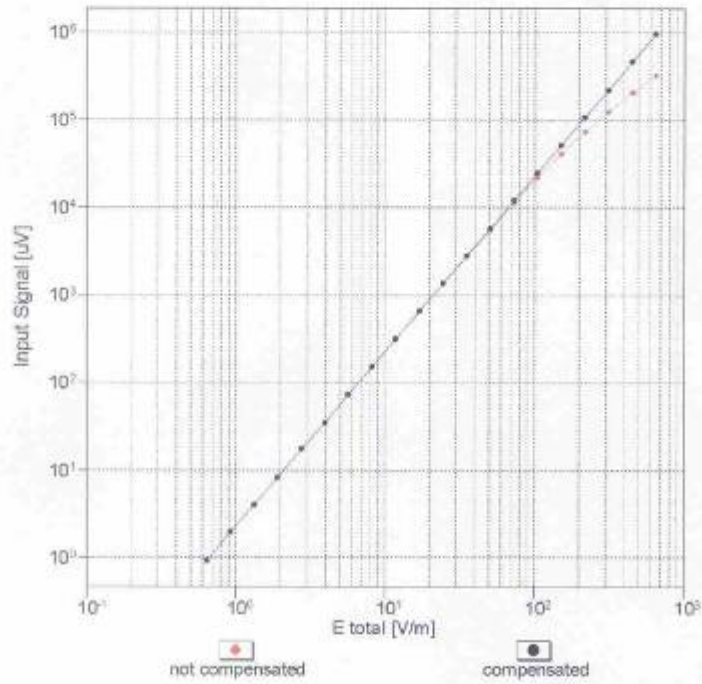


Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

ER3DV6-SN:2428

August 30, 2012

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

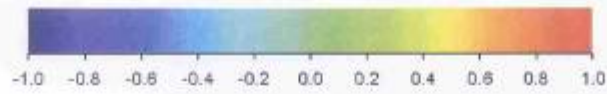
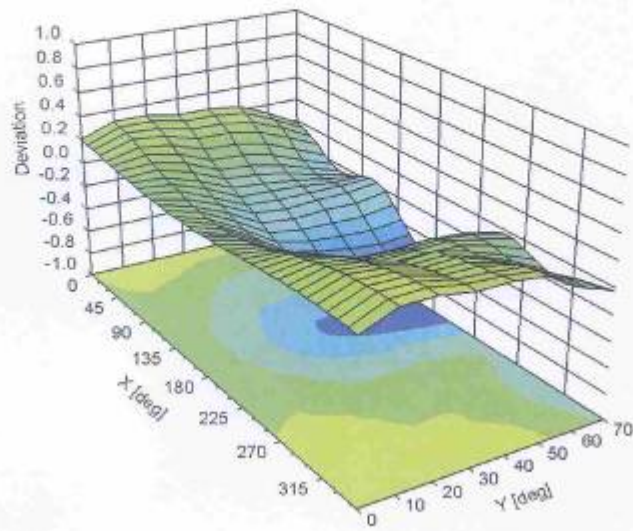


Uncertainty of Linearity Assessment:  $\pm 0.6\%$  (k=2)

ER3DV6-SN.2428

August 30, 2012

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



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

ER3DV6-- SN:2428

August 30, 2012

### DASY/EASY - Parameters of Probe: ER3DV6 - SN:2428

#### Other Probe Parameters



Sensor Arrangement	Rectangular
Connector Angle (°)	141.5
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	8 mm
Probe Tip to Sensor X Calibration Point	2.5 mm
Probe Tip to Sensor Y Calibration Point	2.5 mm
Probe Tip to Sensor Z Calibration Point	2.5 mm

# TA Technology (Shanghai) Co., Ltd.

## Test Report

### ANNEX D: H-Probe Calibration Certificate

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

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

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

Accreditation No.: **SCS 108**

Client: **TMC Beijing (Auden)**

Certificate No: **H3-6260\_Aug12**

### CALIBRATION CERTIFICATE

Object: **H3DV6 - SN:6260**

Calibration procedure(s): **QA CAL-03.v6, QA CAL-25.v4  
Calibration procedure for H-field probes optimized for close near field  
evaluations in air**

Calibration date: **August 30, 2012**

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



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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cat Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S5129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe H3DV6	SN: 6182	11-Oct-11 (No. H3-6182_Oct11)	Oct-12
DAE4	SN: 789	30-Jan-12 (No. DAE4-789_Jan12)	Jan-13
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

Calibrated by:

Approved by:

Name	Function	Signature
Jeton Kastrelli	Laboratory Technician	
Name	Function	Signature
Katja Pokovic	Technical Manager	

Issued: August 30, 2012

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

Certificate No: H3-6260\_Aug12

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# TA Technology (Shanghai) Co., Ltd.

## Test Report

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



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

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

Accreditation No.: **SCS 108**

### Glossary:

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

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

- IEEE Std 1309-2005, "IEEE Standard for calibration of electromagnetic field sensors and probes, excluding antennas, from 9 kHz to 40 GHz", December 2005.
- CTIA Test Plan for Hearing Aid Compatibility, April 2010.

### Methods Applied and Interpretation of Parameters:

- NORM<sub>x,y,z</sub>**: Assessed for E-field polarization  $\vartheta = 0$  for XY sensors and  $\vartheta = 90$  for Z sensor ( $f \leq 900$  MHz in TEM-cell;  $f > 1800$  MHz: R22 waveguide).
- X, Y, Z(f)\_a0a1a2 = X, Y, Z\_a0a1a2\* frequency\_response** (see Frequency Response Chart).
- DCP<sub>x,y,z</sub>**: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR**: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- A<sub>x,y,z</sub>, B<sub>x,y,z</sub>, C<sub>x,y,z</sub>, VR<sub>x,y,z</sub>: A, B, C** are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- Spherical isotropy (3D deviation from isotropy)**: in a locally homogeneous field realized using an open waveguide setup.
- Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- Connector Angle**: The angle is assessed using the information gained by determining the X\_a0a1a2 (no uncertainty required).

H3DV6 – SN:6260

August 30, 2012

# Probe H3DV6

## SN:6260

Manufactured: September 7, 2007  
Calibrated: August 30, 2012

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



# TA Technology (Shanghai) Co., Ltd.

## Test Report

H3DV6-SN:6260

August 30, 2012

### DASY/EASY - Parameters of Probe: H3DV6 - SN:6260

#### Basic Calibration Parameters

		Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm (A/m / $\sqrt{mV}$ )	a0	2.48E-003	2.50E-003	2.92E-003	$\pm 5.1\%$
Norm (A/m / $\sqrt{mV}$ )	a1	-2.59E-005	-5.62E-006	-1.13E-005	$\pm 5.1\%$
Norm (A/m / $\sqrt{mV}$ )	a2	4.45E-005	3.83E-005	5.02E-005	$\pm 5.1\%$
DCP (mV) <sup>B</sup>		92.3	93.0	92.1	

#### Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc <sup>E</sup> (k=2)
0	CW	0.00	X	0.00	0.00	1.00	139.0	$\pm 2.7\%$
			Y	0.00	0.00	1.00	136.0	
			Z	0.00	0.00	1.00	136.0	

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

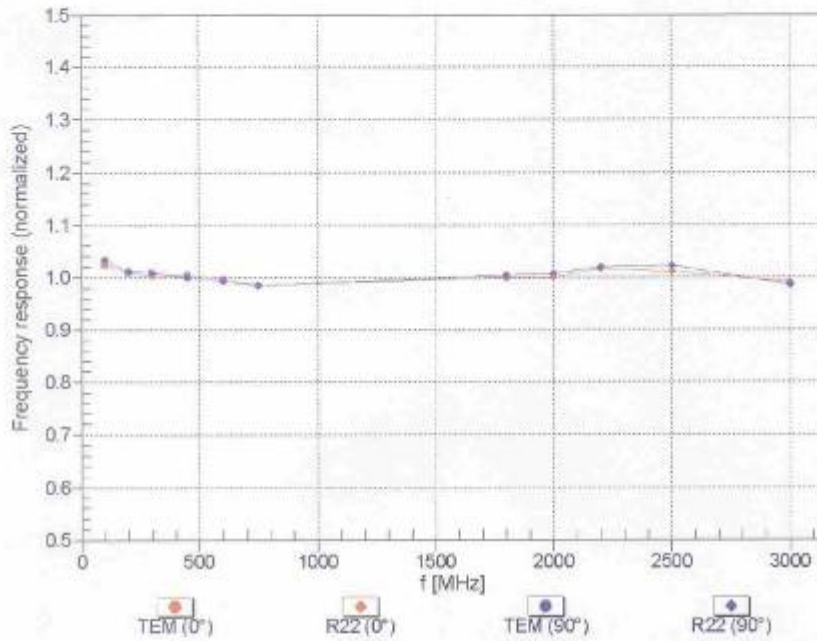
<sup>B</sup> Numerical linearization parameter; uncertainty not required.

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

H3DV6- SN:6260

August 30, 2012

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



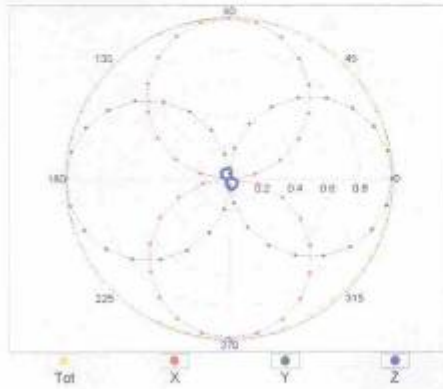
Uncertainty of Frequency Response of H-field:  $\pm 6.3\%$  (k=2)

H3DV6-SN:6260

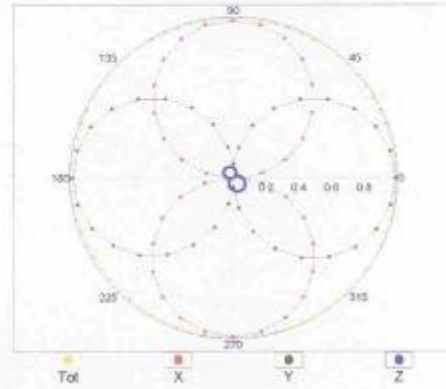
August 30, 2012

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

f=600 MHz, TEM,  $0^\circ$

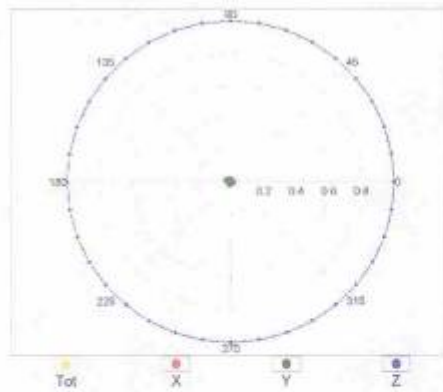


f=2500 MHz, R22,  $0^\circ$

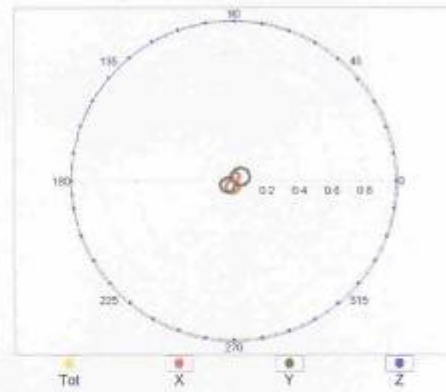


Receiving Pattern ( $\phi$ ),  $\theta = 90^\circ$

f=600 MHz, TEM,  $90^\circ$



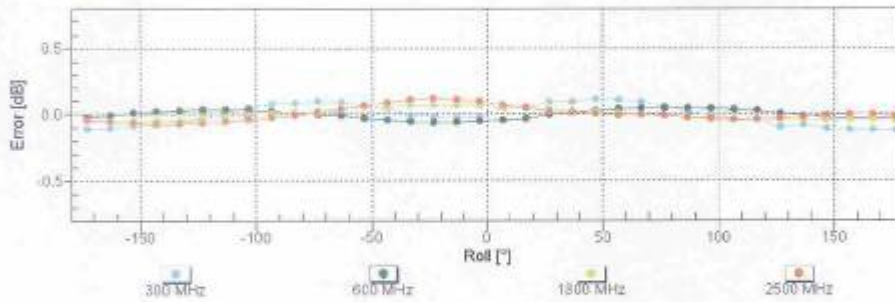
f=2500 MHz, R22,  $90^\circ$



H3DV6-SN:6260

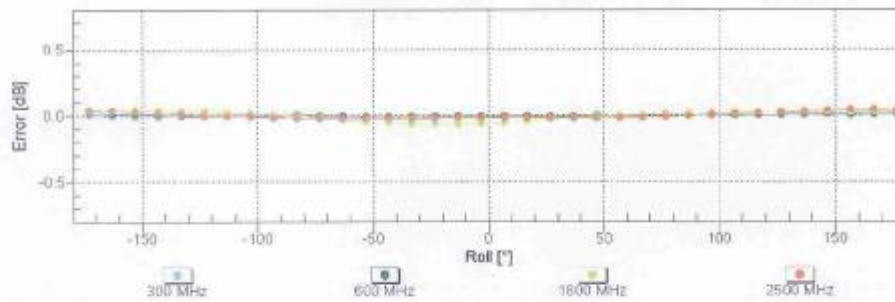
August 30, 2012

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



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

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

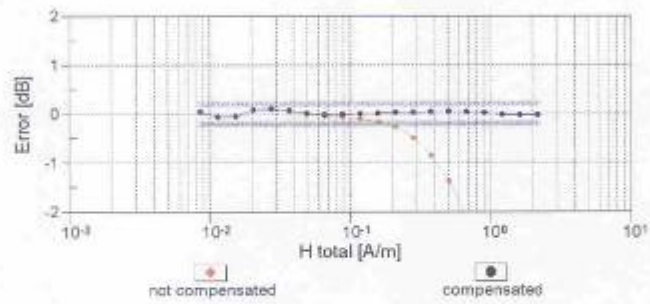
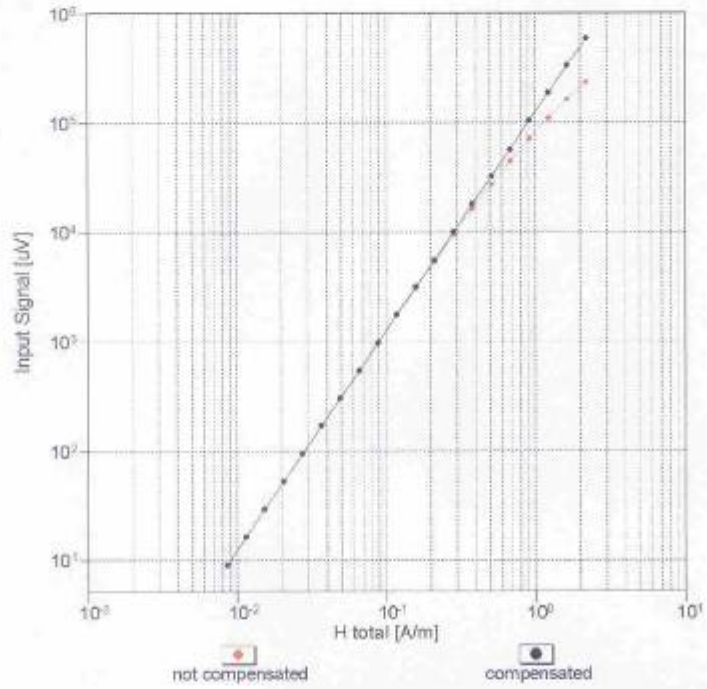


Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

H3DV6-SN:6260

August 30, 2012

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

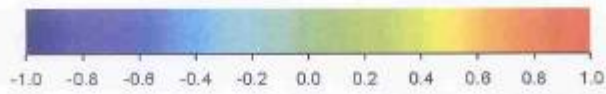
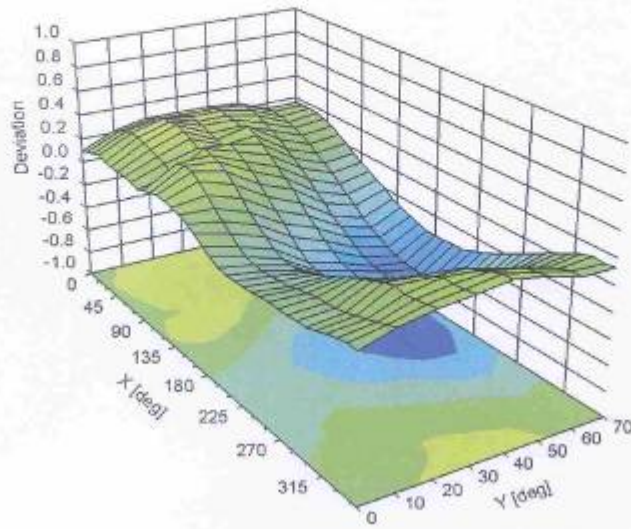


Uncertainty of Linearity Assessment:  $\pm 0.6\%$  (k=2)

H3DV6-SN:6260

August 30, 2012

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



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

H3DV6- SN:6260

August 30, 2012

### DASY/EASY - Parameters of Probe: H3DV6 - SN:6260

#### Other Probe Parameters

Sensor Arrangement	Rectangular
Connector Angle (°)	26.8
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	20 mm
Tip Diameter	6 mm
Probe Tip to Sensor X Calibration Point	3 mm
Probe Tip to Sensor Y Calibration Point	3 mm
Probe Tip to Sensor Z Calibration Point	3 mm

# TA Technology (Shanghai) Co., Ltd. Test Report

Report No. RXA1307-0093HAC01

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## ANNEX E: CD835V3 Dipole Calibration Certificate

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



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

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

Accreditation No.: **SCS 108**

Client: **TMC Beijing (Auden)**

Certificate No: **CD835V3-1023\_Aug12**

### CALIBRATION CERTIFICATE

Object: **CD835V3 - SN: 1023**

Calibration procedure(s): **QA CAL-20.v6  
Calibration procedure for dipoles in air**

Calibration date: **August 30, 2012**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	05-Oct-11 (No. 217-01451)	Oct-12
Power sensor HP 8481A	US37292783	05-Oct-11 (No. 217-01451)	Oct-12
Probe ER3DV6	SN: 2336	29-Dec-11 (No. ER3-2336_Dec11)	Dec-12
Probe H3DV8	SN: 6065	29-Dec-11 (No. H3-6065_Dec11)	Dec-12
DAE4	SN: 781	29-May-12 (No. DAE4-781_May12)	May-13
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter Agilent 4419B	SN: GB42420191	09-Oct-09 (in house check Oct-11)	In house check: Oct-12
Power sensor HP 8482H	SN: 3318A09450	09-Oct-09 (in house check Oct-11)	In house check: Oct-12
Power sensor HP 8482A	SN: US37295597	09-Oct-09 (in house check Oct-11)	In house check: Oct-12
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-11)	In house check: Oct-12
RF generator E4433B	MY 41000675	03-Nov-04 (in house check Oct-11)	In house check: Oct-13

	Name	Function	Signature
Calibrated by:	Fin Bornholt	R&D Director	
Approved by:	Katja Pokovic	Laboratory Director	

Issued: September 4, 2012

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



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



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

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

Accreditation No.: SCS 108

#### 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.

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

**Measurement Conditions**

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

DASY Version	DASY5	V52.8.2
Extrapolation	Advanced Extrapolation	
Phantom	HAC Test Arch	
Distance Dipole Top - Probe Center	10mm	
Scan resolution	dx, dy = 5 mm	
Frequency	835 MHz $\pm$ 1 MHz	
Input power drift	< 0.05 dB	

**Maximum Field values at 835 MHz**

H-field 10 mm above dipole surface	condition	interpolated maximum
Maximum measured	100 mW input power	<b>0.461 A / m <math>\pm</math> 8.2 % (k=2)</b>

E-field 10 mm above dipole surface	condition	Interpolated maximum
Maximum measured above high end	100 mW input power	161.8 V / m
Maximum measured above low end	100 mW input power	159.0 V / m
Averaged maximum above arm	100 mW input power	<b>160.4 V / m <math>\pm</math> 12.8 % (k=2)</b>

**Appendix**

**Antenna Parameters**

Frequency	Return Loss	Impedance
800 MHz	16.2 dB	45.1 $\Omega$ - 14.1 j $\Omega$
835 MHz	29.5 dB	49.6 $\Omega$ + 3.3 j $\Omega$
900 MHz	16.7 dB	59.4 $\Omega$ - 13.1 j $\Omega$
950 MHz	26.0 dB	46.0 $\Omega$ + 2.7 j $\Omega$
960 MHz	19.3 dB	51.1 $\Omega$ + 10.9 j $\Omega$

**3.2 Antenna Design and Handling**

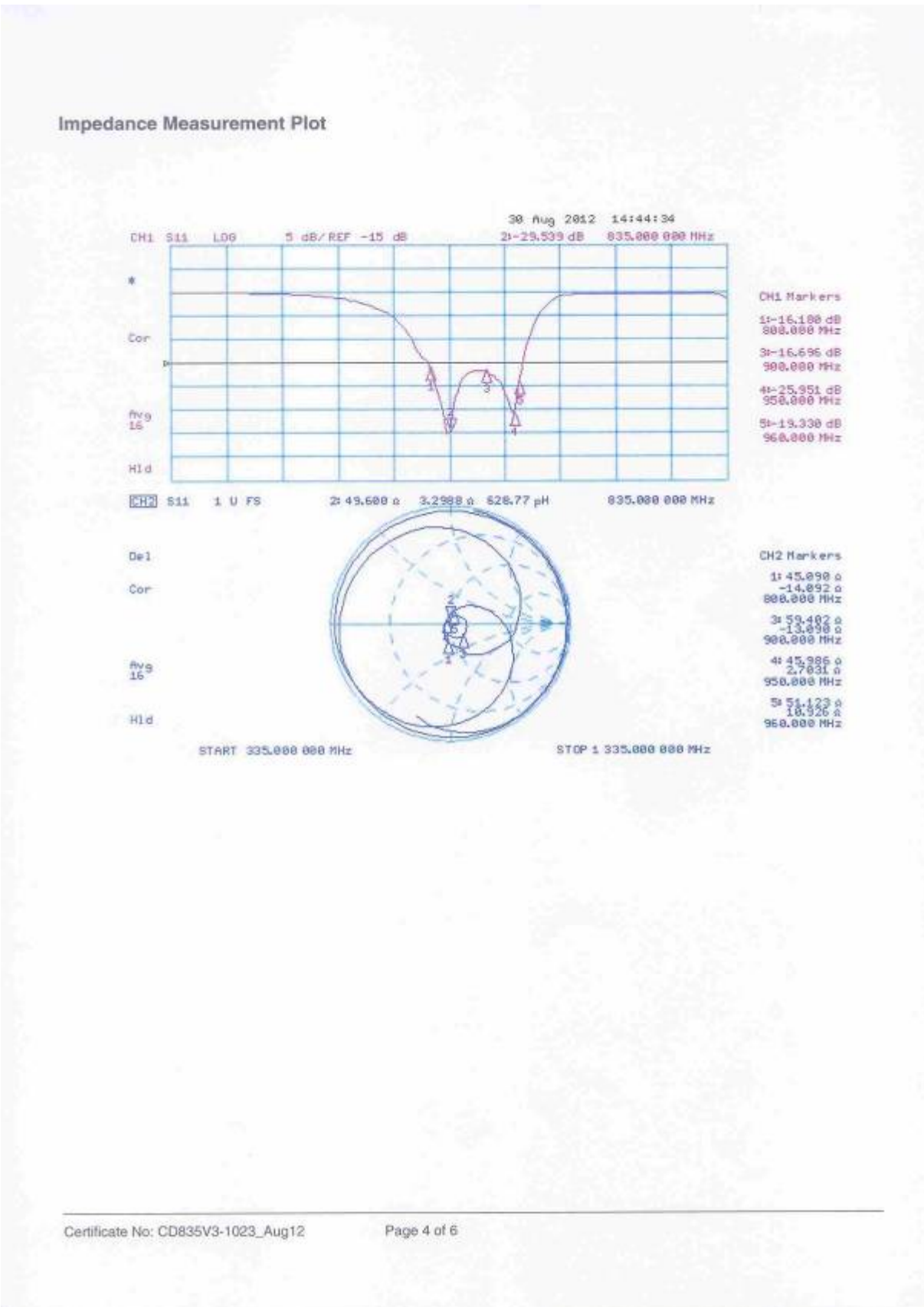
The calibration dipole has a symmetric geometry with a built-in two stub matching network, which leads to the enhanced bandwidth. The dipole is built of standard semirigid coaxial cable. The internal matching line is open ended. The antenna is therefore open for DC signals. Do not apply force to dipole arms, as they are liable to bend. The soldered connections near the feedpoint may be damaged. After excessive mechanical stress or overheating, check the impedance characteristics to ensure that the internal matching network is not affected.

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

# TA Technology (Shanghai) Co., Ltd. Test Report

Report No. RXA1307-0093HAC01

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**DASY5 H-field Result**

Date: 30.08.2012

Test Laboratory: SPEAG Lab2

**DUT: HAC-Dipole 835 MHz; Type: CD835V3; Serial: CD835V3 - SN: 1023**

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

DASY52 Configuration:

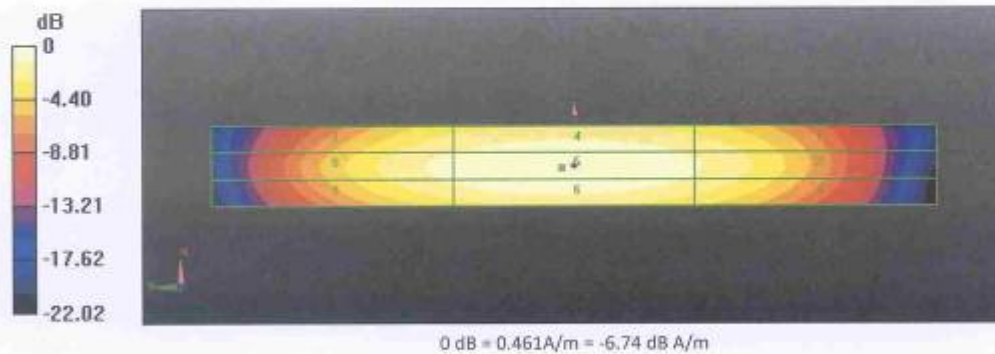
- Probe: H3DV6 - SN6065; ; Calibrated: 29.12.2011
- Sensor-Surface: [Fix Surface]
- Electronics: DAE4 5n781; Calibrated: 29.05.2012
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- DASY52 52.8.2(969); SEMCAD X 14.6.4(4989)

**Dipole H-Field measurement @ 835MHz/H-Scan - 835MHz d=10mm/Hearing Aid Compatibility Test (41x361x1):**

Measurement grid: dx=5mm, dy=5mm  
 Device Reference Point: 0, 0, -6.3 mm  
 Reference Value = 0.49 V/m; Power Drift = 0.01 dB  
 PMR not calibrated. PMF = 1.000 is applied.  
 H-field emissions = 0.46 A/m  
 Near-field category: M4 (AWF 0 dB)

PMF scaled H-field

Grid 1 M4	Grid 2 M4	Grid 3 M4
0.38 A/m	0.40 A/m	0.38 A/m
Grid 4 M4	Grid 5 M4	Grid 6 M4
0.43 A/m	0.46 A/m	0.44 A/m
Grid 7 M4	Grid 8 M4	Grid 9 M4
0.39 A/m	0.42 A/m	0.40 A/m



# TA Technology (Shanghai) Co., Ltd. Test Report

## DASY5 E-field Result

Date: 30.08.2012

Test Laboratory: SPEAG Lab2

DUT: HAC-Dipole 835 MHz; Type: CD835V3; Serial: CD835V3 - SN: 1023

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)

DASY52 Configuration:

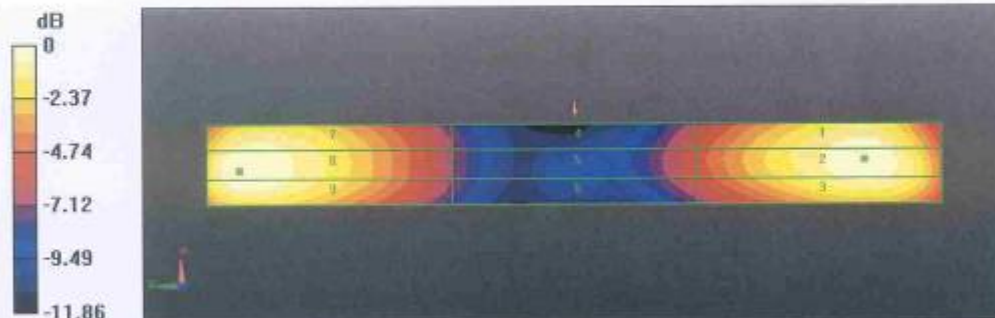
- Probe: ER30V6 - 5N2336; ConvF[1, 1, 1]; Calibrated: 29.12.2011
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 29.05.2012
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- DASY52 52.8.2(969); SEMCAD X 14.6.4(4989)

Dipole E-Field measurement @ 835MHz/E-Scan - 835MHz d=10mm/Hearing Aid Compatibility Test (41x361x1):

Measurement grid: dx=5mm, dy=5mm  
 Device Reference Point: 0, 0, -6.3 mm  
 Reference Value = 104.0 V/m; Power Drift = -0.04 dB  
 PMR not calibrated. PMF = 1.000 is applied.  
 E-field emissions = 161.8 V/m  
 Near-field category: M4 (AWF 0 dB)

PMF scaled E-field

Grid 1 M4	Grid 2 M4	Grid 3 M4
156.0 V/m	159.0 V/m	151.3 V/m
Grid 4 M4	Grid 5 M4	Grid 6 M4
87.06 V/m	88.87 V/m	85.39 V/m
Grid 7 M4	Grid 8 M4	Grid 9 M4
154.8 V/m	161.8 V/m	159.2 V/m



0 dB = 161.8V/m = 44.18 dB V/m

# TA Technology (Shanghai) Co., Ltd. Test Report

Report No. RXA1307-0093HAC01

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## ANNEX F: CD1880V3 Dipole Calibration Certificate

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



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

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

Accreditation No.: **SCS 108**

Client: **TMC Beijing (Auden)**

Certificate No: **CD1880V3-1018\_Aug12**

CALIBRATION CERTIFICATE																																																			
Object	CD1880V3 - SN: 1018																																																		
Calibration procedure(s)	QA CAL-20.v6 Calibration procedure for dipoles in air																																																		
Calibration date:	August 30, 2012																																																		
<p>This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.</p> <p>All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity &lt; 70%.</p> <p>Calibration Equipment used (M&amp;TE critical for calibration)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Primary Standards</th> <th>ID #</th> <th>Cal Date (Certificate No.)</th> <th>Scheduled Calibration</th> </tr> </thead> <tbody> <tr> <td>Power meter EPM-442A</td> <td>GB37480704</td> <td>05-Oct-11 (No. 217-01451)</td> <td>Oct-12</td> </tr> <tr> <td>Power sensor HP 8481A</td> <td>US37292783</td> <td>05-Oct-11 (No. 217-01451)</td> <td>Oct-12</td> </tr> <tr> <td>Probe ER3DV6</td> <td>SN: 2336</td> <td>29-Dec-11 (No. ER3-2336_Dec11)</td> <td>Dec-12</td> </tr> <tr> <td>Probe H3DV6</td> <td>SN: 6065</td> <td>29-Dec-11 (No. H3-6065_Dec11)</td> <td>Dec-12</td> </tr> <tr> <td>DAE4</td> <td>SN: 781</td> <td>29-May-12 (No. DAE4-781_May12)</td> <td>May-13</td> </tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Secondary Standards</th> <th>ID #</th> <th>Check Date (in house)</th> <th>Scheduled Check</th> </tr> </thead> <tbody> <tr> <td>Power meter Agilent 4419B</td> <td>SN: GB42420191</td> <td>09-Oct-09 (in house check Oct-11)</td> <td>In house check: Oct-12</td> </tr> <tr> <td>Power sensor HP 8482H</td> <td>SN: 3316A09450</td> <td>09-Oct-09 (in house check Oct-11)</td> <td>In house check: Oct-12</td> </tr> <tr> <td>Power sensor HP 8482A</td> <td>SN: US37295597</td> <td>09-Oct-09 (in house check Oct-11)</td> <td>In house check: Oct-12</td> </tr> <tr> <td>Network Analyzer HP 8753E</td> <td>US37390585</td> <td>18-Oct-01 (in house check Oct-11)</td> <td>In house check: Oct-12</td> </tr> <tr> <td>RF generator E4433B</td> <td>MY 41006675</td> <td>03-Nov-04 (in house check Oct-11)</td> <td>In house check: Oct-13</td> </tr> </tbody> </table>				Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration	Power meter EPM-442A	GB37480704	05-Oct-11 (No. 217-01451)	Oct-12	Power sensor HP 8481A	US37292783	05-Oct-11 (No. 217-01451)	Oct-12	Probe ER3DV6	SN: 2336	29-Dec-11 (No. ER3-2336_Dec11)	Dec-12	Probe H3DV6	SN: 6065	29-Dec-11 (No. H3-6065_Dec11)	Dec-12	DAE4	SN: 781	29-May-12 (No. DAE4-781_May12)	May-13	Secondary Standards	ID #	Check Date (in house)	Scheduled Check	Power meter Agilent 4419B	SN: GB42420191	09-Oct-09 (in house check Oct-11)	In house check: Oct-12	Power sensor HP 8482H	SN: 3316A09450	09-Oct-09 (in house check Oct-11)	In house check: Oct-12	Power sensor HP 8482A	SN: US37295597	09-Oct-09 (in house check Oct-11)	In house check: Oct-12	Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-11)	In house check: Oct-12	RF generator E4433B	MY 41006675	03-Nov-04 (in house check Oct-11)	In house check: Oct-13
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Calibrated by:	Name: Fin Bornholt	Function: R&D Director	Signature: 																																																
Approved by:	Name: Katja Pokovic	Function: Laboratory Director	Signature: 																																																
Issued: September 4, 2012																																																			
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.																																																			

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



S Schweizerischer Kalibrierdienst  
C Service suisse d'étalonnage  
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Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signatories to the EA  
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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 eliminating by applying the averaging function while moving the dipole in the air, at least 70cm away from any obstacles.
- **E-field distribution:** E field is measured in the x-y-plane with an isotropic 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.

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

**Measurement Conditions**

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

DASY Version	DASY5	V52.8.2
Extrapolation	Advanced Extrapolation	
Phantom	HAC Test Arch	
Distance Dipole Top - Probe Center	10mm	
Scan resolution	dx, dy = 5 mm	
Frequency	1880 MHz ± 1 MHz	
Input power drift	< 0.05 dB	

**Maximum Field values at 1880 MHz**

H-field 10 mm above dipole surface	condition	interpolated maximum
Maximum measured	100 mW input power	0.463 A / m ± 8.2 % (k=2)

E-field 10 mm above dipole surface	condition	Interpolated maximum
Maximum measured above high end	100 mW input power	139.0 V / m
Maximum measured above low end	100 mW input power	138.8 V / m
Averaged maximum above arm	100 mW input power	138.9 V / m ± 12.8 % (k=2)

**Appendix**

**Antenna Parameters**

Frequency	Return Loss	Impedance
1730 MHz	27.8 dB	52.8 Ω + 3.1 jΩ
1880 MHz	21.7 dB	49.4 Ω + 8.2 jΩ
1900 MHz	22.2 dB	51.6 Ω + 7.7 jΩ
1950 MHz	30.1 dB	52.3 Ω + 2.3 jΩ
2000 MHz	20.7 dB	42.8 Ω + 4.7 jΩ

**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.

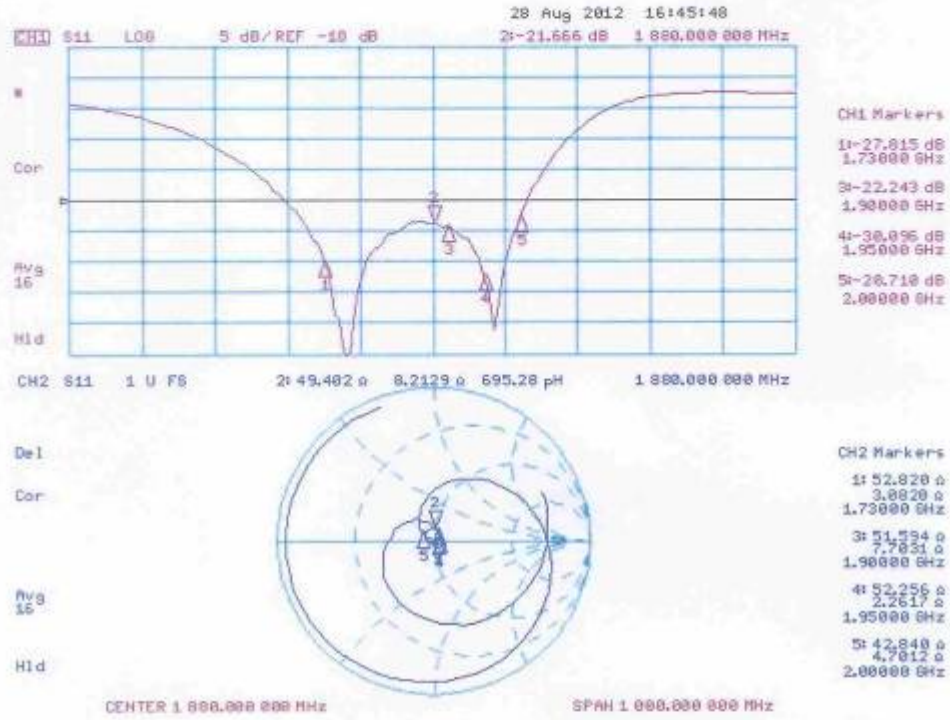


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## Impedance Measurement Plot



**DASY5 H-field Result**

Date: 30.08.2012

Test Laboratory: SPEAG Lab2

**DUT: HAC Dipole 1880 MHz; Type: CD1880V3; Serial: CD1880V3 - SN: 1018**

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)

DASY52 Configuration:

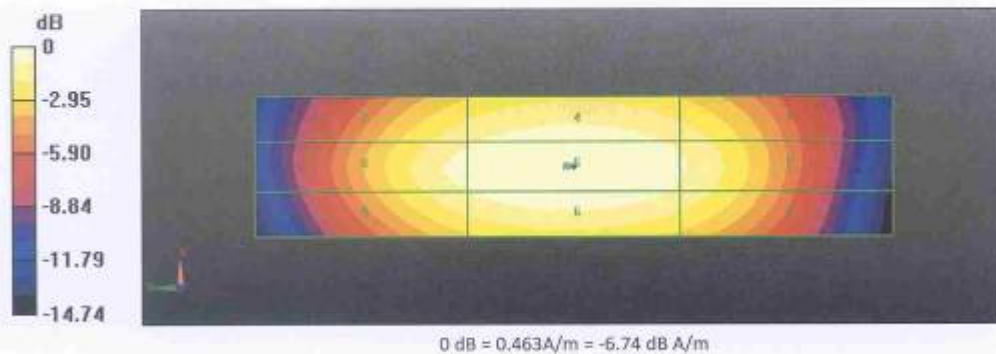
- Probe: H3DV6 - SN6065; ; Calibrated: 29.12.2011
- Sensor-Surface: {Fix Surface}
- Electronics: DAE4 Sn781; Calibrated: 29.05.2012
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- DASY52 52.8.2(969); SEMCAD X 14.6.4(4989)

**Dipole H-Field measurement @ 1880MHz/H-Scan - 1880MHz d=10mm/Hearing Aid Compatibility Test (41x181x1):**

Measurement grid: dx=5mm, dy=5mm  
 Device Reference Point: 0, 0, -6.3 mm  
 Reference Value = 0.49 V/m; Power Drift = 0.03 dB  
 PMR not calibrated. PMF = 1.000 is applied.  
 H-field emissions = 0.46 A/m  
 Near-field category: M2 (AWF 0 dB)

PMF scaled H-field

Grid 1 M2	Grid 2 M2	Grid 3 M2
0.40 A/m	0.42 A/m	0.40 A/m
Grid 4 M2	Grid 5 M2	Grid 6 M2
0.44 A/m	0.46 A/m	0.44 A/m
Grid 7 M2	Grid 8 M2	Grid 9 M2
0.40 A/m	0.43 A/m	0.41 A/m



**DASY5 E-field Result**

Date: 30.08.2012

Test Laboratory: SPEAG Lab2

**DUT: HAC Dipole 1880 MHz; Type: CD1880V3; Serial: CD1880V3 - SN: 1018**

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)

DASY52 Configuration:

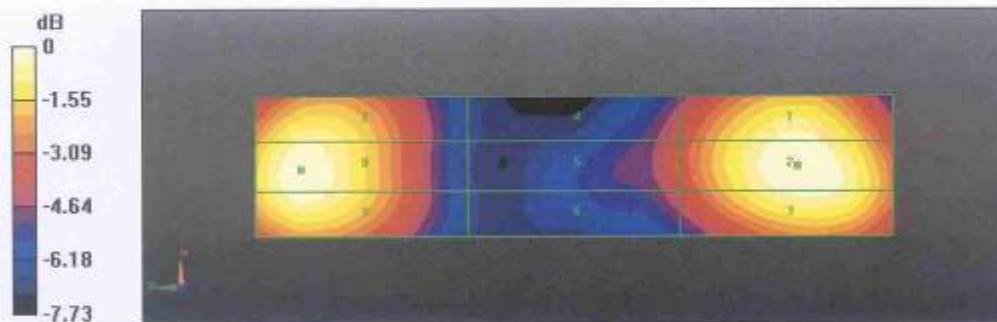
- Probe: ER3DV6 - SN2336; ConvF(1, 1, 1); Calibrated: 29.12.2011
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 29.05.2012
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- DASY52 52.8.2(969); SEMCAD X 14.6.4(4989)

**Dipole E-Field measurement @ 1880MHz/E-Scan - 1880MHz d=10mm/Hearing Aid Compatibility Test (41x181x1):**

Measurement grid: dx=5mm, dy=5mm  
 Device Reference Point: 0, 0, -6.3 mm  
 Reference Value = 156.8 V/m; Power Drift = 0.01 dB  
 PMR not calibrated. PMF = 1.000 is applied.  
 E-field emissions = 139.0 V/m  
 Near-field category: M2 (AWF 0 dB)

PMF scaled E-field

Grid 1 M2	Grid 2 M2	Grid 3 M2
135.0 V/m	138.8 V/m	134.4 V/m
Grid 4 M3	Grid 5 M3	Grid 6 M3
91.42 V/m	93.60 V/m	89.22 V/m
Grid 7 M2	Grid 8 M2	Grid 9 M2
130.8 V/m	139.0 V/m	136.3 V/m



0 dB = 139.0V/m = 42.86 dB V/m

# TA Technology (Shanghai) Co., Ltd.

## Test Report

### ANNEX G: DAE4 Calibration Certificate

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



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

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

Accreditation No.: **SCS 108**

Client **TA Shanghai (Auden)**

Certificate No: **DAE4-1317\_Jan13**

<b>CALIBRATION CERTIFICATE</b>																							
Object	DAE4 - SD 000 D04 BJ - SN: 1317																						
Calibration procedure(s)	QA CAL-06.v25 Calibration procedure for the data acquisition electronics (DAE)																						
Calibration date:	January 25, 2013																						
<p>This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.</p> <p>All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity &lt; 70%.</p> <p>Calibration Equipment used (M&amp;TE critical for calibration)</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="width: 30%;">Primary Standards</th> <th style="width: 15%;">ID #</th> <th style="width: 35%;">Cal Date (Certificate No.)</th> <th style="width: 20%;">Scheduled Calibration</th> </tr> </thead> <tbody> <tr> <td>Keithley Multimeter Type 2001</td> <td>SN: 0810278</td> <td>02-Oct-12 (No:12728)</td> <td>Oct-13</td> </tr> <tr> <th style="width: 30%;">Secondary Standards</th> <th style="width: 15%;">ID #</th> <th style="width: 35%;">Check Date (in house)</th> <th style="width: 20%;">Scheduled Check</th> </tr> <tr> <td>Auto DAE Calibration Unit</td> <td>SE UWS 053 AA 1001</td> <td>07-Jan-13 (in house check)</td> <td>In house check: Jan-14</td> </tr> <tr> <td>Calibrator Box V2.1</td> <td>SE UMS 006 AA 1002</td> <td>07-Jan-13 (in house check)</td> <td>In house check: Jan-14</td> </tr> </tbody> </table>				Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration	Keithley Multimeter Type 2001	SN: 0810278	02-Oct-12 (No:12728)	Oct-13	Secondary Standards	ID #	Check Date (in house)	Scheduled Check	Auto DAE Calibration Unit	SE UWS 053 AA 1001	07-Jan-13 (in house check)	In house check: Jan-14	Calibrator Box V2.1	SE UMS 006 AA 1002	07-Jan-13 (in house check)	In house check: Jan-14
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Calibrator Box V2.1	SE UMS 006 AA 1002	07-Jan-13 (in house check)	In house check: Jan-14																				
Calibrated by:	Name R.Mayoraz	Function Technician	Signature 																				
Approved by:	Fin Bomholt	Deputy Technical Manager	Signature 																				
			Issued: January 25, 2013																				
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.																							

# TA Technology (Shanghai) Co., Ltd.

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



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

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

Accreditation No.: **SCS 108**

### Glossary

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

### Methods Applied and Interpretation of Parameters

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

**TA Technology (Shanghai) Co., Ltd.**  
**Test Report**

**DC Voltage Measurement**

A/D - Converter Resolution nominal

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

Low Range: 1LSB = 61nV, full range = -1.....+3mV

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

Calibration Factors	X	Y	Z
High Range	404.011 $\pm$ 0.02% (k=2)	404.006 $\pm$ 0.02% (k=2)	403.901 $\pm$ 0.02% (k=2)
Low Range	3.98819 $\pm$ 1.55% (k=2)	3.99805 $\pm$ 1.55% (k=2)	3.98192 $\pm$ 1.55% (k=2)

**Connector Angle**

Connector Angle to be used in DASY system	117 $^{\circ}$ $\pm$ 1 $^{\circ}$
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# TA Technology (Shanghai) Co., Ltd.

## Test Report

### Appendix

#### 1. DC Voltage Linearity

High Range		Reading ( $\mu\text{V}$ )	Difference ( $\mu\text{V}$ )	Error (%)
Channel X	+ Input	199994.16	-0.78	-0.00
Channel X	+ Input	20000.75	0.37	0.00
Channel X	- Input	-19997.98	2.89	-0.01
Channel Y	+ Input	199995.20	0.02	0.00
Channel Y	+ Input	19999.08	-1.15	-0.01
Channel Y	- Input	-20002.66	-1.68	0.01
Channel Z	+ Input	199994.67	-0.43	-0.00
Channel Z	+ Input	19997.92	-2.31	-0.01
Channel Z	- Input	-20000.66	0.26	-0.00

Low Range		Reading ( $\mu\text{V}$ )	Difference ( $\mu\text{V}$ )	Error (%)
Channel X	+ Input	2001.23	0.59	0.03
Channel X	+ Input	201.53	0.55	0.28
Channel X	- Input	-198.20	0.62	-0.31
Channel Y	+ Input	2000.33	-0.29	-0.01
Channel Y	+ Input	200.43	-0.68	-0.34
Channel Y	- Input	-199.64	-0.69	0.35
Channel Z	+ Input	2000.78	0.22	0.01
Channel Z	+ Input	200.32	-0.69	-0.34
Channel Z	- Input	-199.27	-0.35	0.18

#### 2. Common mode sensitivity

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

	Common mode Input Voltage (mV)	High Range Average Reading ( $\mu\text{V}$ )	Low Range Average Reading ( $\mu\text{V}$ )
Channel X	200	-23.69	-25.75
	- 200	28.59	26.45
Channel Y	200	-1.44	-1.70
	- 200	-0.06	-0.16
Channel Z	200	-10.76	-11.18
	- 200	9.82	9.91

#### 3. Channel separation

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

	Input Voltage (mV)	Channel X ( $\mu\text{V}$ )	Channel Y ( $\mu\text{V}$ )	Channel Z ( $\mu\text{V}$ )
Channel X	200	-	1.52	-4.72
Channel Y	200	8.54	-	4.31
Channel Z	200	10.79	5.34	-

# TA Technology (Shanghai) Co., Ltd.

## Test Report

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

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

	High Range (LSB)	Low Range (LSB)
Channel X	16104	15986
Channel Y	16111	15993
Channel Z	16217	16069

#### 5. Input Offset Measurement

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

Input 10MΩ

	Average (μV)	min. Offset (μV)	max. Offset (μV)	Std. Deviation (μV)
Channel X	1.28	0.53	2.45	0.33
Channel Y	-1.29	-2.89	0.51	0.58
Channel Z	-0.39	-1.47	1.06	0.37

#### 6. Input Offset Current

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

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

	Zeroing (kOhm)	Measuring (MOhm)
Channel X	200	200
Channel Y	200	200
Channel Z	200	200

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

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

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

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



## ANNEX H: The EUT Appearances and Test Configuration



EUT

Picture 1: Constituents of EUT



Picture 2: Test Setup