



ANSI C63.19

TEST REPORT

Product Name	WCDMA/GSM (GPRS) Dual-Mode Digital Mobile Phone
Model Name	ZTE V768
FCC ID	Q78-ZTEV768
Client	ZTE CORPORATION

TA Technology (Shanghai) Co., Ltd.

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

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GENERAL SUMMARY

Product Name	WCDMA/GSM (GPRS) Dual-Mode Digital Mobile Phone	Model	ZTE V768
Report No.	RZA1203-0414HAC01R2	FCC ID	Q78-ZTEV768
Client	ZTE CORPORATION		
Manufacturer	ZTE CORPORATION		
Reference Standard(s)	ANSI C63.19-2007: American National Standard Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids.		
Conclusion	This portable wireless equipment has been measured in all cases requested by the relevant standards. General Judgment: M3 (RF Emission)  (Stamp) Date of issue: June 13th, 2012		
Comment	The test result only responds to the measured sample.		

Approved by 杨伟中
Director

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SAR Manager

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1. General Information

1.1. Notes of the Test Report

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 dose 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: ZTE CORPORATION
Address: ZTE Plaza, Keji Road South, Hi-Tech Industrial Park, Nanshan District, Shenzhen,
Guangdong, 518057, P.R. China
City: Shenzhen
Postal Code: 518057
Country: P.R. China

1.4. Manufacturer Information

Company: ZTE CORPORATION
Address: ZTE Plaza, Keji Road South, Hi-Tech Industrial Park, Nanshan District, Shenzhen,
Guangdong, 518057, P.R. China
City: Shenzhen
Postal Code: 518057
Country: P.R. China

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1.5. Information of EUT

General Information

Device Type:	Portable Device		
Product Name:	WCDMA/GSM（GPRS）Dual-Mode Digital Mobile Phone		
IMEI:	004401782382770		
Hardware Version:	gcnb		
Software Version:	V768V1.0.0B01		
Antenna Type:	Internal Antenna		
Device Operating Configurations:			
Supporting Mode(s):	GSM 850/GSM 1900; (tested)		
	WCDMA Band II/WCDMA Band IV/ WCDMA Band V; (tested)		
	WiFi(802.11b/g/n)/ Bluetooth; (untested)		
Test Modulation:	(GSM)GMSK; (WCDMA) QPSK		
Device Class:	B		
HSDPA UE Category:	8		
HSUPA UE Category:	6		
GPRS Multislot Class(12):	Max Number of Timeslots in Uplink		4
	Max Number of Timeslots in Downlink		4
	Max Total Timeslot		5
EGPRS Multislot Class(12):	Max Number of Timeslots in Uplink		4
	Max Number of Timeslots in Downlink		4
	Max Total Timeslot		5
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
	WCDMA Band II	1852.4 ~ 1907.6	1932.4 ~ 1987.6
	WCDMA Band IV	1712.4 ~ 1752.6	2112.4 ~ 2152.6
	WCDMA Band V	826.4 ~ 846.6	871.4 ~ 891.6
Test Channel(Middle):	128-190-251 (GSM 850) (tested)		
	512-661-810 (GSM 1900) (tested)		
	9262-9400-9538 (WCDMA Band II) (tested)		
	1312-1413-1513 (WCDMA Band IV) (tested)		
	4132-4183-4233 (WCDMA Band V) (tested)		

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Power Class:	GSM 850: 4, tested with power level 5
	GSM 1900: 1, tested with power level 0
	WCDMA Band II: 3, tested with power control all up bits
	WCDMA Band IV: 3, tested with power control all up bits
	WCDMA Band V: 3, tested with power control all up bits

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Auxiliary Equipment Details

AE1:Battery

Model: Li3715T42P3h504857

Manufacturer: ZTE CORPORATION

SN: 10101112282585164

Equipment Under Test (EUT) is a WCDMA/GSM (GPRS) Dual-Mode Digital Mobile Phone. The detail about EUT and Lithium Battery is in chapter 1.5 in this report. The device has an internal antenna for GSM/WCDMA Tx/Rx, and the other is BT/WIFI antenna that is used for Tx/Rx. HAC tested for GSM 850, GSM 1900, WCDMA Band II, WCDMA Band IV and WCDMA Band V.

WiFi and Bluetooth modes don't have voice capability, and do not operate in the held to ear mode for providing handset service.

The sample under test was selected by the Client.

Components list please refer to documents of the manufacturer.

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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	M3
GSM 1900	M3
WCDMA Band II	M4
WCDMA Band IV	M4
WCDMA Band V	M4

1.8. Test Date

The test performed on April 10, 2012 and on June 11, 2012.

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 Absolute Radiofrequency Channel Number (ARFCN) is allocated to 128, 190 and 251 in the case of GSM 850, to 512, 661 and 810 in the case of GSM 1900, to 9262, 9400 and 9538 in the case of WCDMA Band II, to 1312, 1413 and 1513 in the case of WCDMA Band IV, to 4132, 4183 and 4233 in the case of WCDMA Band V. The EUT is commanded to operate at maximum transmitting power. Using E5515C the power lever is set to "5" in SAR of GSM 850, set to "0" in SAR of GSM 1900. Set to all up bits for WCDMA. The test in the bands of GSM 850, GSM 1900, WCDMA Band II, WCDMA Band IV and WCDMA 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 DASY4 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.

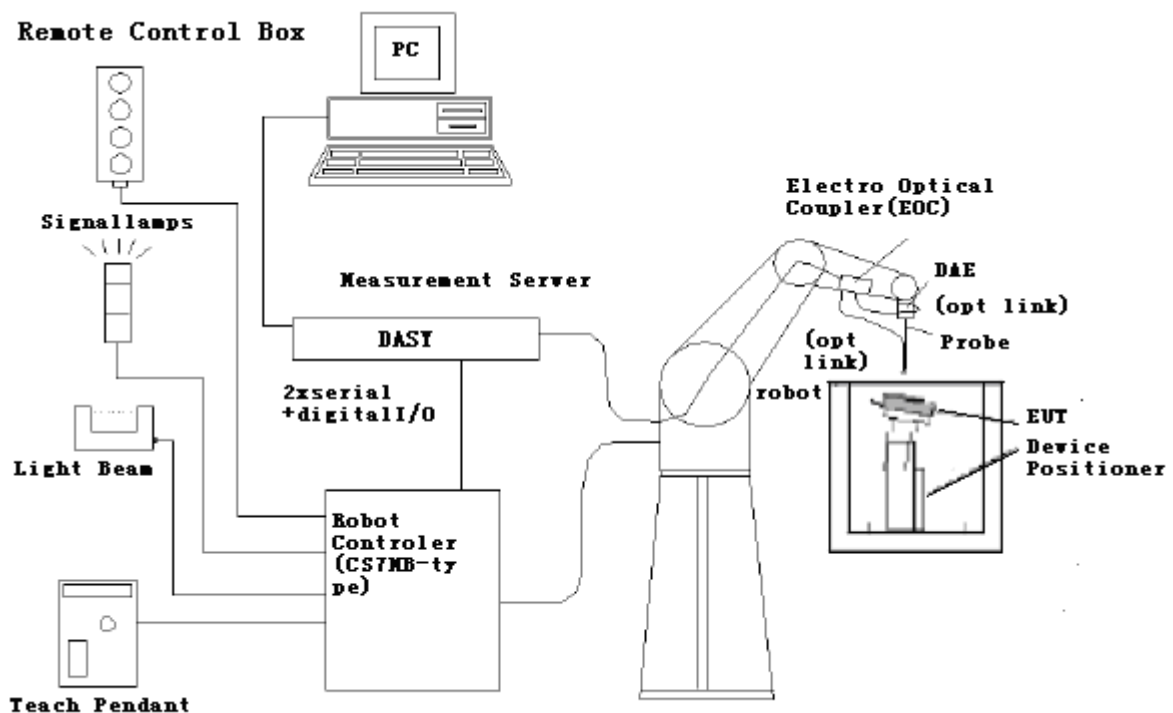


Figure 1 HAC Test Measurement Set-up

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: ± 0.2 dB (100 MHz to 3 GHz)
Directivity	± 0.2 dB in air (rotation around probe axis) ± 0.4 dB in air (rotation normal to probe axis)
Dynamic Range	2 V/m to > 1000 V/m; Linearity: ± 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	± 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 $\leq \pm 0.5$ dB.

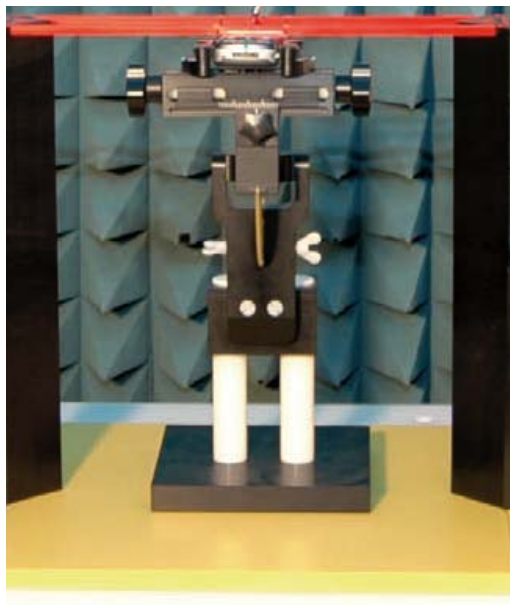


Figure 4 HAC Phantom & Device Holder

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.

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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."

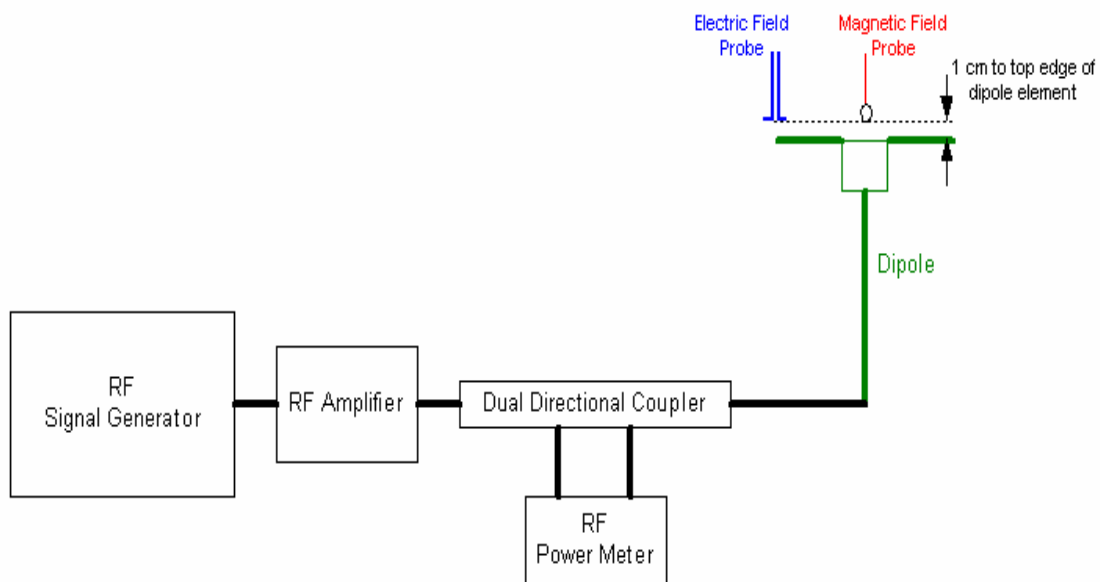


Figure 6 Dipole Validation Setup

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Dipole Measurement Summary

E-Field Scan					
Mode	Frequency (MHz)	Input Power (mW)	Value		Test Date
CW	835	100	Target ¹ Value(V/m)	161.4	February 21, 2012
			Measured ² Value(V/m)	149.4	June 11, 2012
			Deviation ³ (%)	-7.43	/
CW	1880	100	Target ¹ Value(V/m)	143.4	February 21, 2012
			Measured ² Value(V/m)	139.3	April 10, 2012
			Deviation ³ (%)	-2.86	/
			Measured ² Value(V/m)	140.9	June 11, 2012
			Deviation ³ (%)	-1.74	/
H-Field Scan					
Mode	Frequency (MHz)	Input Power (mW)	Value		Test Date
CW	835	100	Target ¹ Value(A/m)	0.46	February 21, 2012
			Measured ² Value(A/m)	0.439	June 11, 2012
			Deviation ³ (%)	-4.57	/
CW	1880	100	Target ¹ Value(A/m)	0.47	February 21, 2012
			Measured ² Value(A/m)	0.462	April 10, 2012
			Deviation ³ (%)	-1.70	/
			Measured ² Value(A/m)	0.456	June 11, 2012
			Deviation ³ (%)	-2.98	/
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.					

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.

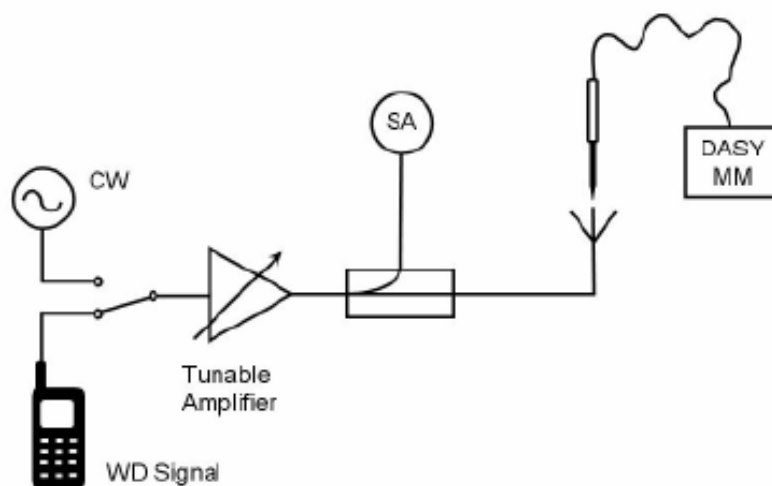


Figure 7 Probe Modulation Factor Test Setup

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PMF

Band	E-Field Probe Modulation Factor	H-Field Probe Modulation Factor
GSM 850	2.81	2.75
GSM 1900	2.84	2.84
WCDMA Band II	1.02	1.01
WCDMA Band IV	1.02	1.01
WCDMA 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

GSM 850	Conducted Power(dBm)		
	Channel 128	Channel 190	Channel 251
Test Results	32.63	32.62	32.52
GSM 1900	Conducted Power(dBm)		
	Channel 512	Channel 661	Channel 810
Test Results	29.15	29.71	29.47
WCDMA Band II	Conducted Power(dBm)		
	Channel 9262	Channel 9400	Channel 9538
12.2kbps RMC	22.41	22.85	22.9
WCDMA Band IV	Conducted Power(dBm)		
	Channel 1312	Channel 1413	Channel 1513
12.2kbps RMC	23.22	23.25	23.29
WCDMA Band V	Conducted Power(dBm)		
	Channel 4132	Channel 4183	Channel 4233
12.2kbps RMC	22.81	22.5	22.65

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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

E-Field					
Channel	Frequency (MHz)	Peak Field (V/m)	Power Drift (dB)	Rating	Graph Results
High/251	848.8	202.5	-0.047	M3	Figure 14
Middle/190	836.6	221	-0.064	M3	Figure 15
Low/128	824.2	211.7	-0.026	M3	Figure 16
H-Field					
Channel	Frequency (MHz)	Peak Field (A/m)	Power Drift (dB)	Rating	Graph Results
High/251	848.8	0.311	-0.038	M4	Figure 17
Middle/190	836.6	0.33	-0.073	M4	Figure 18
Low/128	824.2	0.311	0.050	M4	Figure 19

GSM 1900 Results

E-Field					
Channel	Frequency (MHz)	Peak Field (V/m)	Power Drift (dB)	Rating	Graph Results
High/810	1909.8	72.8	-0.031	M3	Figure 20
Middle/661	1880	78.4	-0.024	M3	Figure 21
Low/512	1850.2	78.3	-0.029	M3	Figure 22
H-Field					
Channel	Frequency (MHz)	Peak Field (A/m)	Power Drift (dB)	Rating	Graph Results
High/810	1909.8	0.213	-0.020	M3	Figure 23
Middle/661	1880	0.22	-0.009	M3	Figure 24
Low/512	1850.2	0.217	0.180	M3	Figure 25

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WCDMA Band II Results

E-Field					
Channel	Frequency (MHz)	Peak Field (V/m)	Power Drift (dB)	Rating	Graph Results
High/9538	1907.6	32.1	-0.169	M4	Figure 26
Middle/9400	1880	32.9	-0.099	M4	Figure 27
Low/9262	1852.4	30.8	0.033	M4	Figure 28
H-Field					
Channel	Frequency (MHz)	Peak Field (A/m)	Power Drift (dB)	Rating	Graph Results
High/9538	1907.6	0.097	-0.152	M4	Figure 29
Middle/9400	1880	0.103	0.183	M4	Figure 30
Low/9262	1852.4	0.1	-0.082	M4	Figure 31

WCDMA Band IV Results

E-Field					
Channel	Frequency (MHz)	Peak Field (V/m)	Power Drift (dB)	Rating	Graph Results
High/1513	1752.6	45.6	-0.039	M4	Figure 32
Middle/1413	1732.6	44.9	0.075	M4	Figure 33
Low/1312	1712.4	43.8	-0.047	M4	Figure 34
H-Field					
Channel	Frequency (MHz)	Peak Field (A/m)	Power Drift (dB)	Rating	Graph Results
High/1513	1752.6	0.118	0.068	M4	Figure 35
Middle/1413	1732.6	0.111	0.122	M4	Figure 36
Low/1312	1712.4	0.115	0.040	M4	Figure 37

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WCDMA Band V Results

E-Field					
Channel	Frequency (MHz)	Peak Field (V/m)	Power Drift (dB)	Rating	Graph Results
High/4233	846.6	66.9	-0.016	M4	Figure 38
Middle/4183	836.6	60	-0.133	M4	Figure 39
Low/4132	826.4	65.6	-0.102	M4	Figure 40
H-Field					
Channel	Frequency (MHz)	Peak Field (A/m)	Power Drift (dB)	Rating	Graph Results
High/4233	846.6	0.105	-0.062	M4	Figure 41
Middle/4183	836.6	0.09	-0.076	M4	Figure 42
Low/4132	826.4	0.095	-0.010	M4	Figure 43

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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
Measurement System										
1	Probe Calibration	B	5.1	N	1	1	1	5.1	5.1	∞
2	Axial Isotropy	B	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	∞
3	Sensor Displacement	B	16.5	R	$\sqrt{3}$	1	0.145	9.5	1.4	∞
4	Boundary Effects	B	2.4	R	$\sqrt{3}$	1	1	1.4	1.4	∞
5	Test Arch	B	7.2	R	$\sqrt{3}$	1	0	4.1	0	∞
6	Linearity	B	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	∞
7	Scaling to Peak Envelope Power	B	2.0	R	$\sqrt{3}$	1	1	1.2	1.2	∞
8	System Detection Limit	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
9	Readout Electronics	B	0.3	N	1	1	1	0.3	0.3	∞
10	Response Time	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
11	Integration Time	B	2.6	R	$\sqrt{3}$	1	1	1.5	1.5	∞
12	RF Ambient Conditions	B	3.0	R	$\sqrt{3}$	1	1	1.7	1.7	∞
13	RF Reflections	B	12.0	R	$\sqrt{3}$	1	1	6.9	6.9	∞
14	Probe Positioner	B	1.2	R	$\sqrt{3}$	1	0.67	0.7	0.5	∞
15	Probe Positioning	A	4.7	R	$\sqrt{3}$	1	0.67	2.7	1.8	∞
16	Extra. And Interpolation	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
Test Sample Related										
17	Device Positioning Vertical	B	4.7	R	$\sqrt{3}$	1	0.67	2.7	1.8	∞
18	Device Positioning Lateral	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞

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19	Device Holder and Phantom	B	2.4	R	$\sqrt{3}$	1	1	1.4	1.4	∞
20	Power Drift	B	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and Setup related										
21	Phantom Thickness	B	2.4	R	$\sqrt{3}$	1	0.67	1.4	0.9	∞
Combined standard uncertainty (%)								15.19	10.82	
Expanded Std. uncertainty on power (K=2)								30.38	21.65	
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 11, 2012	One year
02	Power sensor	Agilent N8481H	MY50350004	September 25, 2011	One year
03	Signal Generator	HP 8341B	2730A00804	September 12, 2011	One year
04	Amplifier	IXA-020	0401	No Calibration Requested	
05	BTS	E5515C	MY48360988	December 2, 2011	One year
06	E-Field Probe	ER3DV6	2302	June 15, 2011	One year
07	H-Field Probe	H3DV6	6187	June 17, 2011	One year
08	DAE	DAE4	871	November 22, 2011	One year
09	Validation Kit 835MHz	CD835V3	1133	February 21, 2012	One year
10	Validation Kit 1880MHz	CD1880V3	1115	February 21, 2012	One year
11	Hygrothermograph	WS-1	64591	September 28, 2011	One year

*****END OF REPORT BODY*****

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ANNEX A: System Check Results

HAC_System Performance Check at 835MHz_E

DUT: Dipole 835 MHz; Type: CD835V3; SN:1133

Date/Time: 6/11/2012 12:33:18 PM

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

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY4 Configuration:

Probe: ER3DV6 - SN2302; ConvF (1, 1, 1); Calibrated: 06/15/2011

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

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

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

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

Maximum value of peak Total field = 149.4 V/m

Probe Modulation Factor = 1.00

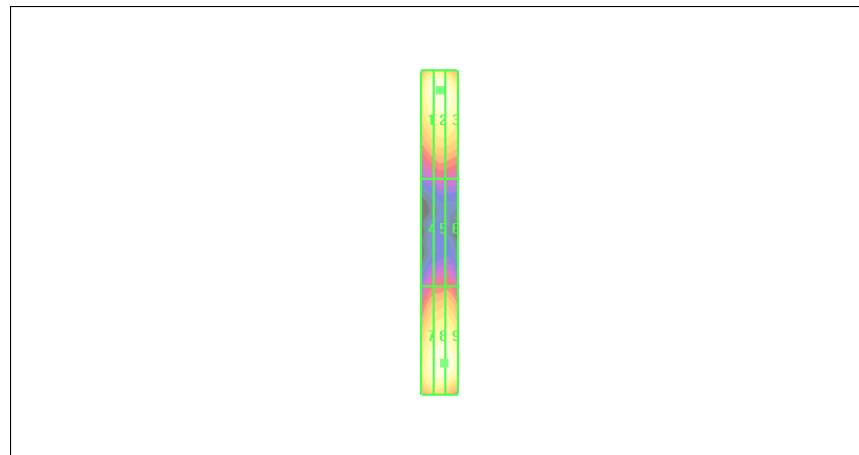
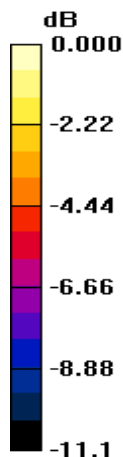
Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 109.1 V/m; Power Drift = 0.144 dB

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

Peak E-field in V/m

Grid 1 145.3 M4	Grid 2 149.4 M4	Grid 3 146.9 M4
Grid 4 81.6 M4	Grid 5 85.4 M4	Grid 6 85.4 M4
Grid 7 141.7 M4	Grid 8 149.0 M4	Grid 9 148.6 M4



0 dB = 149.4V/m

Figure 8 System Performance Check 835MHz_E

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HAC_System Performance Check at 835MHz_H

DUT: Dipole 835 MHz; Type: CD835V3; SN: 1133

Date/Time: 6/11/2012 3:28:40 PM

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

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1$ kg/m³

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY4 Configuration:

Probe: H3DV6 - SN6187; Calibrated: 06/17/2011

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

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

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

H Scan - measurement distance from the probe sensor center to CD835 Dipole = 10mm/Hearing Aid Compatibility Test (41x361x1): Measurement grid: dx=5mm, dy=5mm

Maximum value of peak Total field = 0.439 A/m

Probe Modulation Factor = 1.00

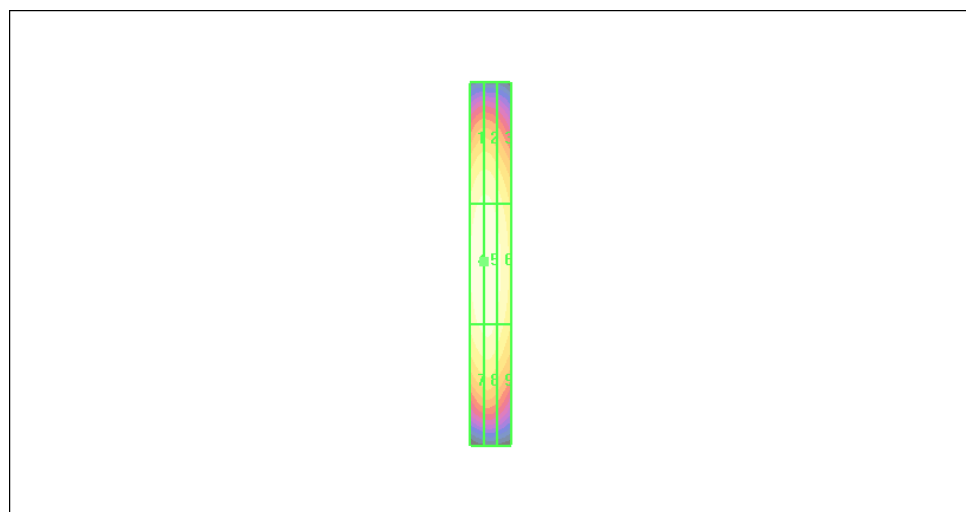
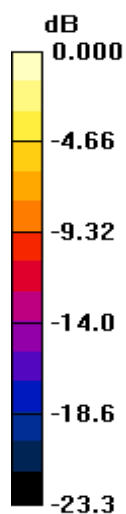
Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 0.451 A/m; Power Drift = 0.313 dB

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

Peak H-field in A/m

Grid 1 0.384 M4	Grid 2 0.385 M4	Grid 3 0.340 M4
Grid 4 0.438 M4	Grid 5 0.439 M4	Grid 6 0.390 M4
Grid 7 0.386 M4	Grid 8 0.392 M4	Grid 9 0.347 M4



0 dB = 0.439A/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: 1115

Date/Time: 4/10/2012 8:36:34 AM

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

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY4 Configuration:

Probe: ER3DV6 - SN2302; ConvF (1, 1, 1); Calibrated: 06/15/2011

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

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

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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 = 139.3 V/m

Probe Modulation Factor = 1.00

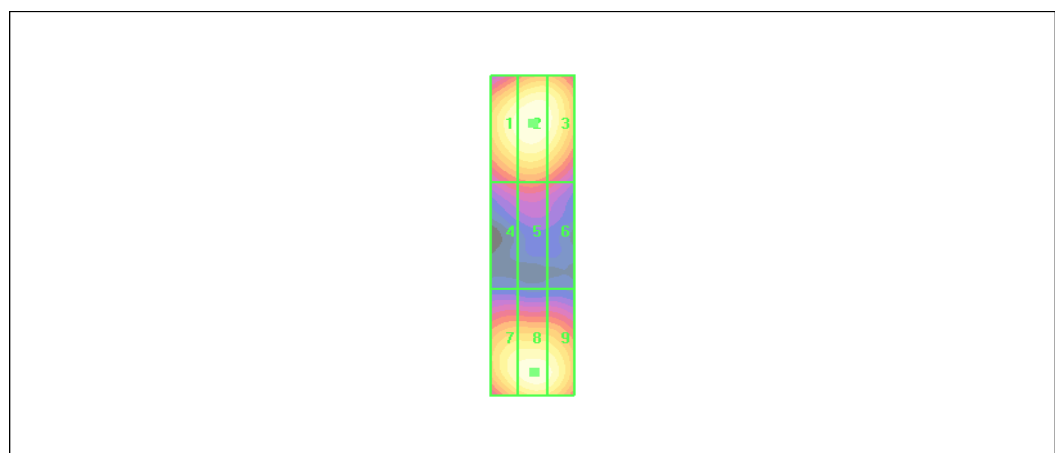
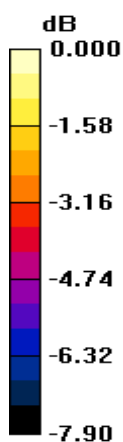
Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 156.5 V/m; Power Drift = -0.007 dB

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

Peak E-field in V/m

Grid 1 134.9 M2	Grid 2 139.3 M2	Grid 3 135.0 M2
Grid 4 93.7 M3	Grid 5 96.0 M3	Grid 6 91.5 M3
Grid 7 132.3 M2	Grid 8 138.1 M2	Grid 9 134.6 M2



0 dB = 139.3V/m

Figure 10 System Performance Check 1880MHz_E

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HAC_System Performance Check at 1880MHz_E

DUT: Dipole 1880 MHz; Type: CD1880V3; SN: 1115

Date/Time: 6/11/2012 1:08:52 PM

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

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Ambient Temperature:22.3 °C

Phantom section: RF Section

DASY4 Configuration:

Probe: ER3DV6 - SN2302; ConvF (1, 1, 1); Calibrated: 06/15/2011

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

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

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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 = 140.9 V/m

Probe Modulation Factor = 1.00

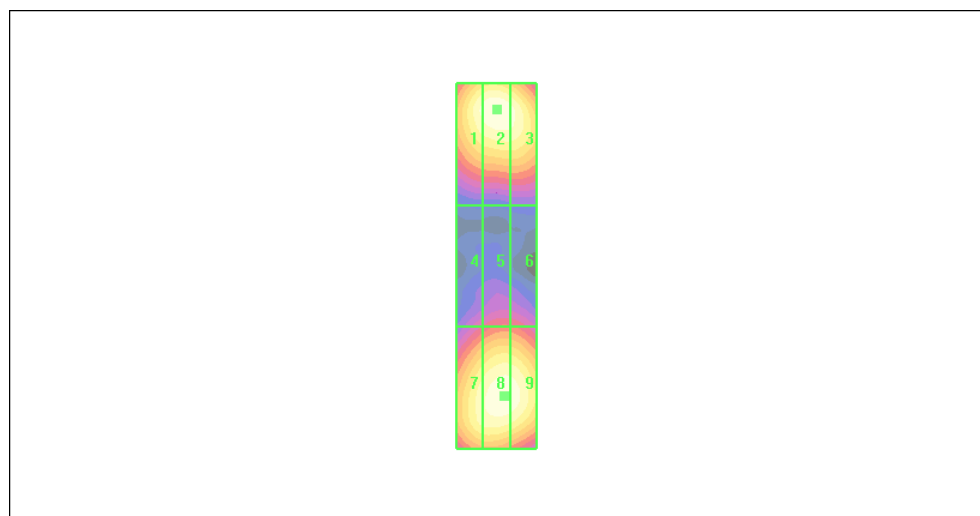
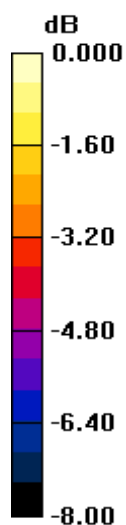
Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 139.7 V/m; Power Drift = -0.027 dB

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

Peak E-field in V/m

Grid 1 134.8 M2	Grid 2 140.9 M2	Grid 3 136.2 M2
Grid 4 87.2 M3	Grid 5 93.7 M3	Grid 6 93.3 M3
Grid 7 131.0 M2	Grid 8 138.5 M2	Grid 9 137.8 M2



0 dB = 140.9V/m

Figure 11 System Performance Check 1880MHz_E

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HAC_System Performance Check at 1880MHz_H

DUT: Dipole 1880 MHz; Type: CD1880V3; SN: 1115

Date/Time: 4/10/2012 3:20:22 PM

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

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1$ kg/m³

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY4 Configuration:

Probe: H3DV6 - SN6187; Calibrated: 06/17/2011

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

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

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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 = 0.462 A/m

Probe Modulation Factor = 1.00

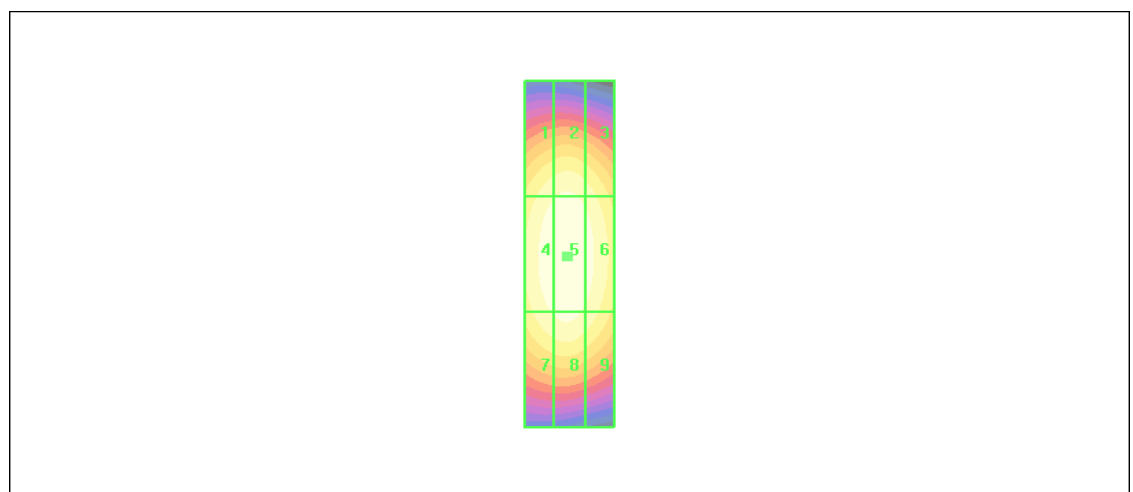
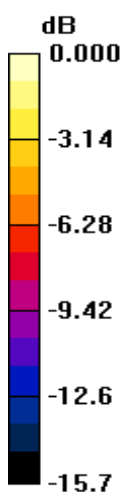
Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 0.489 A/m; Power Drift = 0.040 dB

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

Peak H-field in A/m

Grid 1 0.405 M2	Grid 2 0.419 M2	Grid 3 0.394 M2
Grid 4 0.448 M2	Grid 5 0.462 M2	Grid 6 0.435 M2
Grid 7 0.414 M2	Grid 8 0.427 M2	Grid 9 0.400 M2



0 dB = 0.462A/m

Figure 12 System Performance Check 1880MHz_H

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HAC_System Performance Check at 1880MHz_H

DUT: Dipole 1880 MHz; Type: CD1880V3; SN: 1115

Date/Time: 6/11/2012 3:44:41 PM

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

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1$ kg/m³

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY4 Configuration:

Probe: H3DV6 - SN6187; Calibrated: 06/17/2011

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

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

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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 = 0.456 A/m

Probe Modulation Factor = 1.00

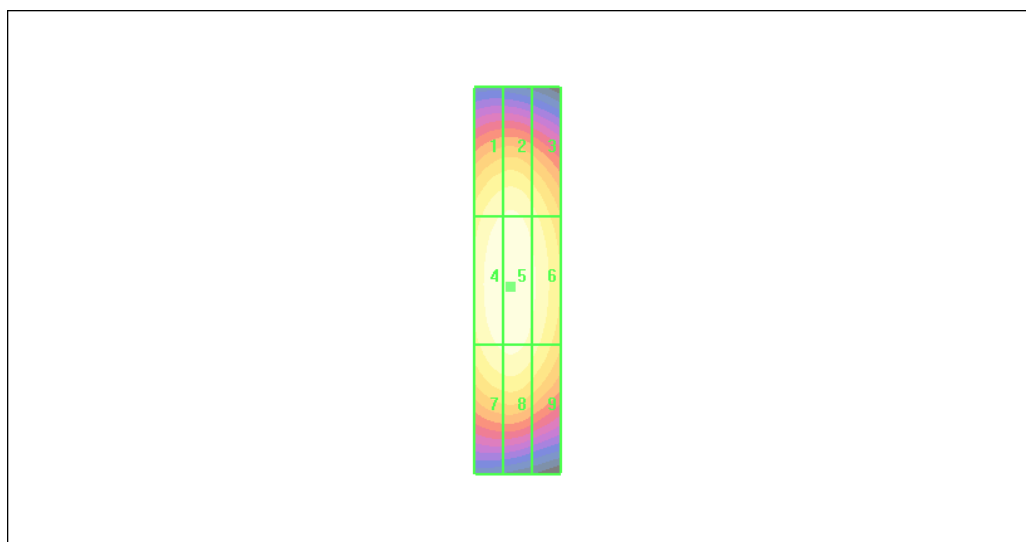
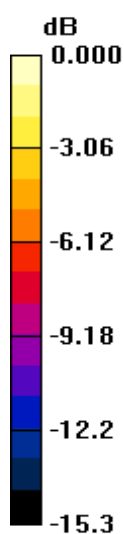
Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 0.478 A/m; Power Drift = -0.003 dB

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

Peak H-field in A/m

Grid 1 0.409 M2	Grid 2 0.415 M2	Grid 3 0.377 M2
Grid 4 0.450 M2	Grid 5 0.456 M2	Grid 6 0.416 M2
Grid 7 0.415 M2	Grid 8 0.421 M2	Grid 9 0.380 M2



0 dB = 0.456A/m

Figure 13 System Performance Check 1880MHz_H

ANNEX B: Graph Results

HAC RF E-Field GSM 850 High

Date/Time: 6/12/2012 11:32:50 AM

Communication System: GSM850; Frequency: 848.8 MHz; Duty Cycle: 1:8.3

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY4 Configuration:

Probe: ER3DV6 - SN2302; ConvF (1, 1, 1); Calibrated: 06/15/2011

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

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

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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 = 202.5 V/m

Probe Modulation Factor = 2.81

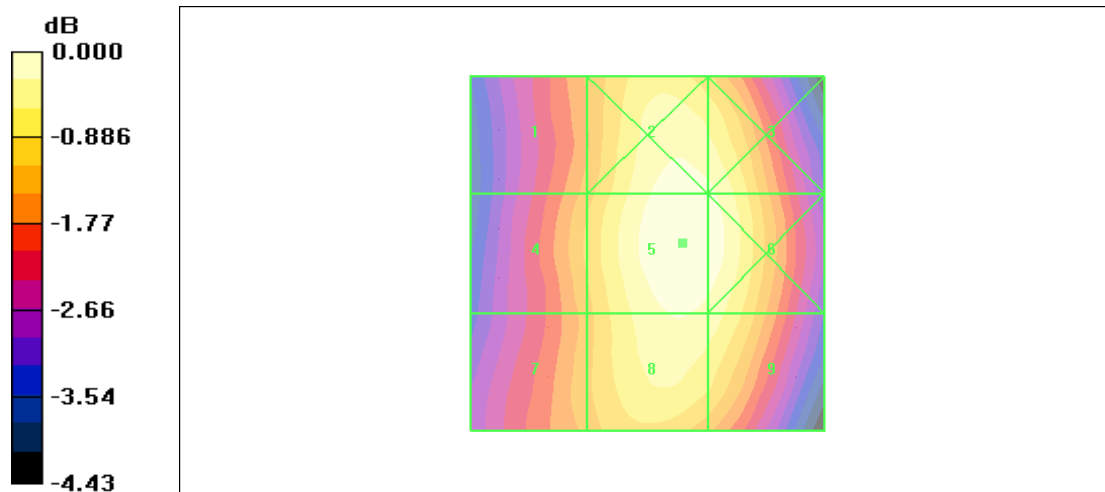
Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 90.1 V/m; Power Drift = -0.047 dB

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

Peak E-field in V/m

Grid 1 174.1 M3	Grid 2 199.0 M3	Grid 3 197.5 M3
Grid 4 178.2 M3	Grid 5 202.5 M3	Grid 6 200.6 M3
Grid 7 175.6 M3	Grid 8 196.3 M3	Grid 9 193.7 M3



0 dB = 202.5V/m

Figure 14 HAC RF E-Field GSM 850 Channel 251

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HAC RF E-Field GSM 850 Middle

Date/Time: 6/12/2012 11:37:37 AM

Communication System: GSM850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY4 Configuration:

Probe: ER3DV6 - SN2302; ConvF (1, 1, 1); Calibrated: 06/15/2011

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

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

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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 = 221.0 V/m

Probe Modulation Factor = 2.81

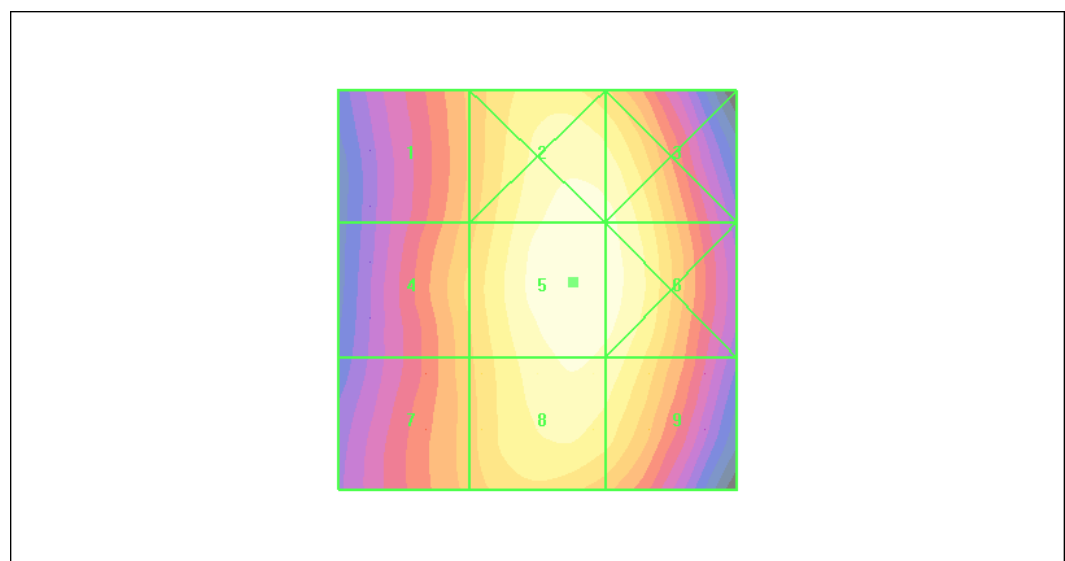
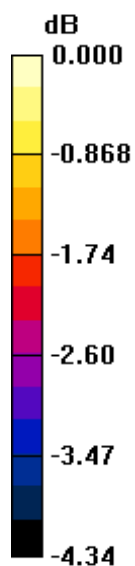
Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 99.1 V/m; Power Drift = -0.064 dB

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

Peak E-field in V/m

Grid 1 190.8 M3	Grid 2 217.9 M3	Grid 3 216.3 M3
Grid 4 195.4 M3	Grid 5 221.0 M3	Grid 6 218.3 M3
Grid 7 192.2 M3	Grid 8 214.8 M3	Grid 9 212.1 M3



0 dB = 221.0V/m

Figure 15 HAC RF E-Field GSM 850 Channel 190

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HAC RF E-Field GSM 850 Low

Date/Time: 6/12/2012 11:27:45 AM

Communication System: GSM850; Frequency: 824.2 MHz; Duty Cycle: 1:8.3

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY4 Configuration:

Probe: ER3DV6 - SN2302; ConvF (1, 1, 1); Calibrated: 06/15/2011

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

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

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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 = 211.7 V/m

Probe Modulation Factor = 2.81

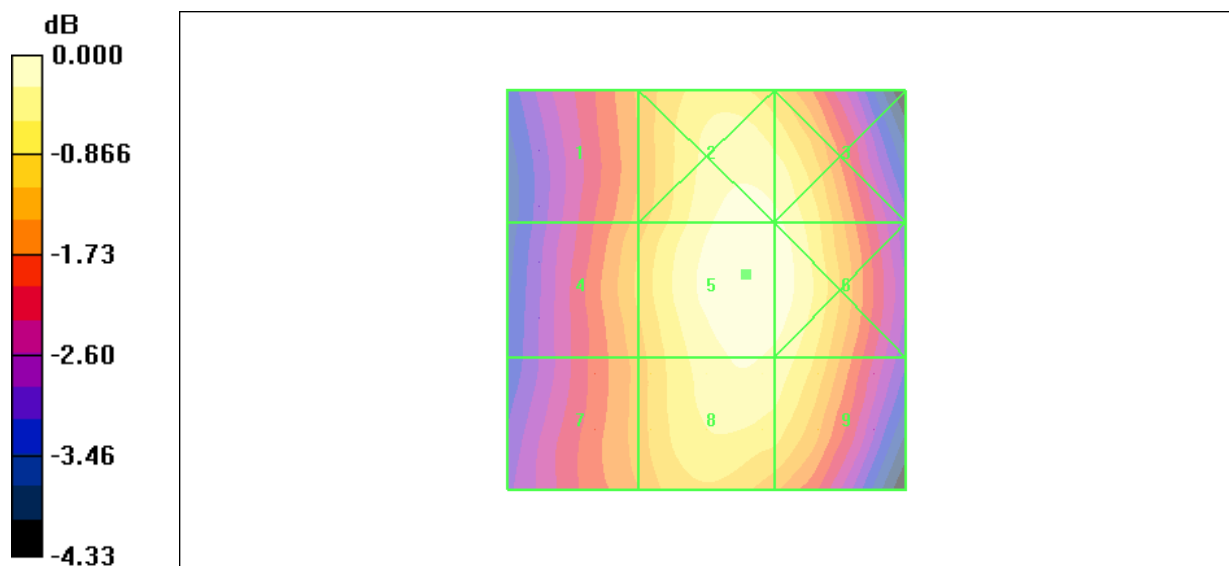
Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 93.9 V/m; Power Drift = -0.026 dB

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

Peak E-field in V/m

Grid 1 182.2 M3	Grid 2 208.5 M3	Grid 3 206.6 M3
Grid 4 187.0 M3	Grid 5 211.7 M3	Grid 6 210.0 M3
Grid 7 182.7 M3	Grid 8 205.6 M3	Grid 9 203.3 M3



0 dB = 211.7V/m

Figure 16 HAC RF E-Field GSM 850 Channel 128

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HAC RF H-Field GSM 850 High

Date/Time: 6/12/2012 10:05:26 AM

Communication System: GSM850; Frequency: 848.8 MHz; Duty Cycle: 1:8.3

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1$ kg/m³

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY4 Configuration:

Probe: H3DV6 - SN6187; Calibrated: 06/17/2011

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

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

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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 = 0.311 A/m

Probe Modulation Factor = 2.75

Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 0.094 A/m; Power Drift = -0.038 dB

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

Peak H-field in A/m

Grid 1 0.432 M4	Grid 2 0.311 M4	Grid 3 0.196 M4
Grid 4 0.399 M4	Grid 5 0.300 M4	Grid 6 0.197 M4
Grid 7 0.422 M4	Grid 8 0.308 M4	Grid 9 0.198 M4

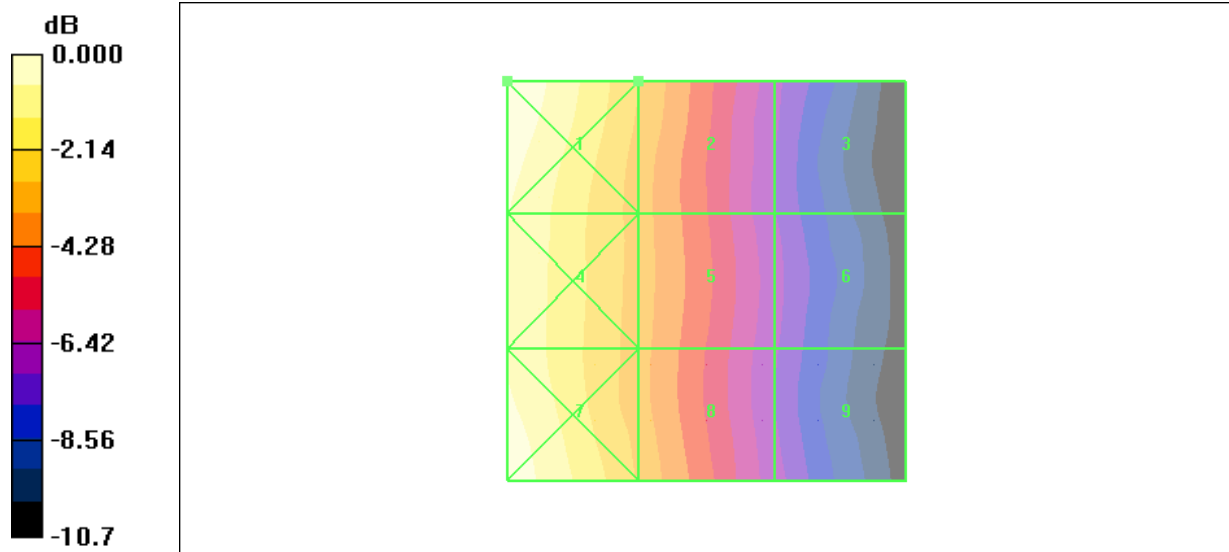


Figure 17 HAC RF H-Field GSM 850Channel 251

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HAC RF H-Field GSM 850 Middle

Date/Time: 6/12/2012 10:00:32 AM

Communication System: GSM850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1$ kg/m³

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY4 Configuration:

Probe: H3DV6 - SN6187; Calibrated: 06/17/2011

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

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

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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 = 0.330 A/m

Probe Modulation Factor = 2.75

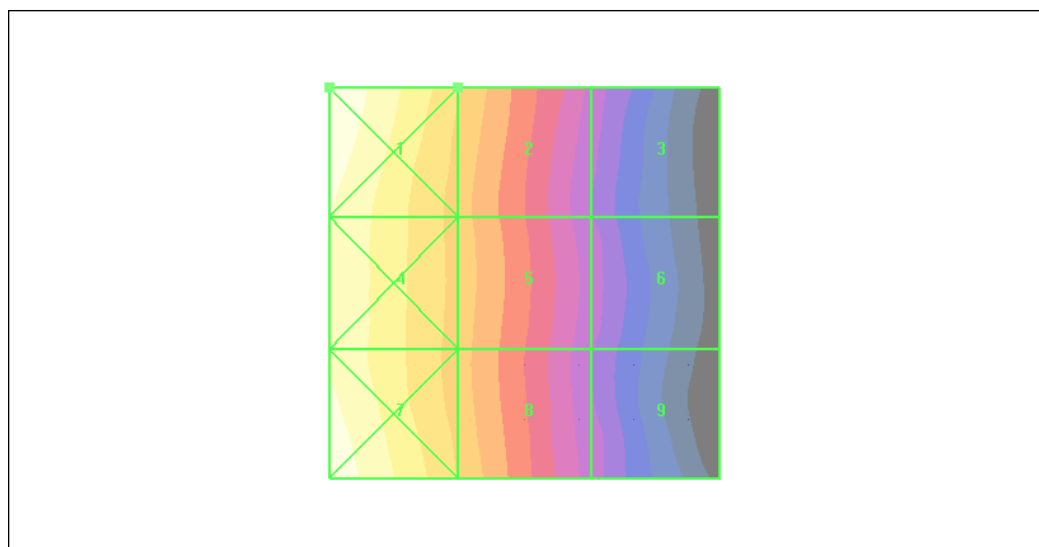
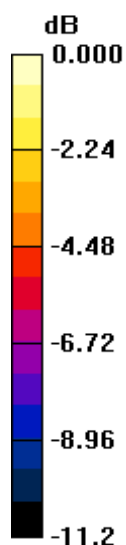
Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 0.098 A/m; Power Drift = -0.073 dB

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

Peak H-field in A/m

Grid 1 0.460 M3	Grid 2 0.330 M4	Grid 3 0.208 M4
Grid 4 0.424 M4	Grid 5 0.316 M4	Grid 6 0.205 M4
Grid 7 0.450 M4	Grid 8 0.325 M4	Grid 9 0.205 M4



0 dB = 0.460 A/m

Figure 18 HAC RF H-Field GSM 850 Channel 190

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HAC RF H-Field GSM 850 Low

Date/Time: 6/12/2012 10:10:15 AM

Communication System: GSM850; Frequency: 824.2 MHz; Duty Cycle: 1:8.3

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1$ kg/m³

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY4 Configuration:

Probe: H3DV6 - SN6187; Calibrated: 06/17/2011

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

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

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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 = 0.311 A/m

Probe Modulation Factor = 2.75

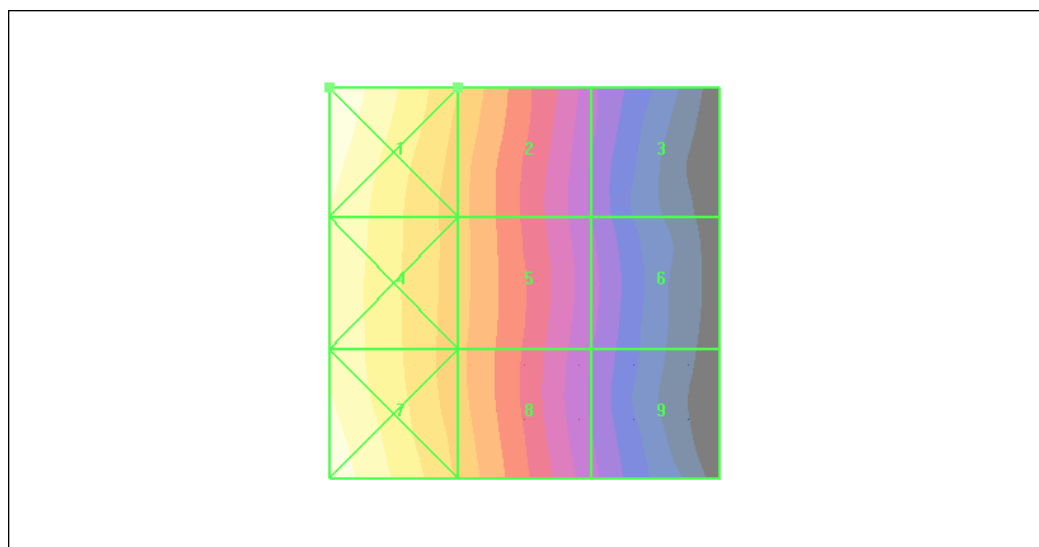
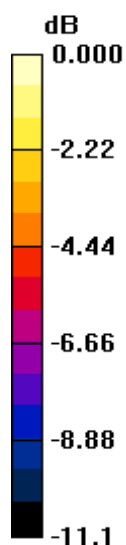
Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 0.093 A/m; Power Drift = 0.050 dB

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

Peak H-field in A/m

Grid 1 0.437 M4	Grid 2 0.311 M4	Grid 3 0.193 M4
Grid 4 0.401 M4	Grid 5 0.296 M4	Grid 6 0.193 M4
Grid 7 0.423 M4	Grid 8 0.307 M4	Grid 9 0.193 M4



0 dB = 0.437A/m

Figure 19 HAC RF H-Field GSM 850 Channel 128

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HAC RF E-Field GSM 1900 High

Date/Time: 4/10/2012 10:21:33 AM

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/m³

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY4 Configuration:

Probe: ER3DV6 - SN2302; ConvF (1, 1, 1); Calibrated: 06/15/2011

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

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

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

GSM 1900 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 = 72.8 V/m

Probe Modulation Factor = 2.84

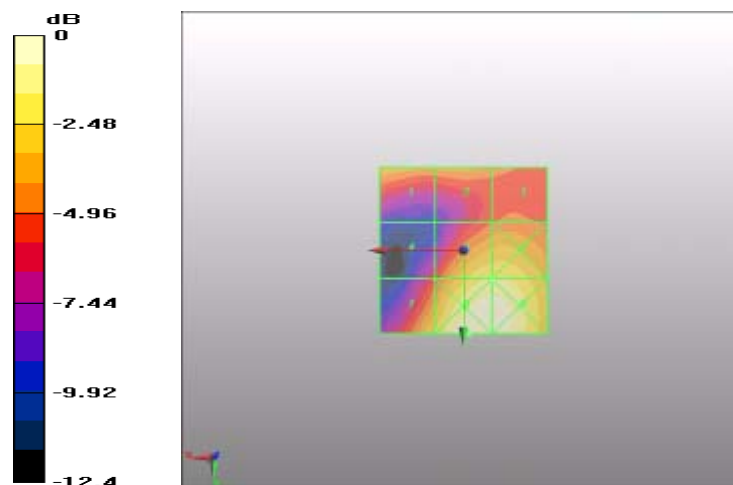
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 23 V/m; Power Drift = -0.031 dB

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

Peak E-field in V/m

Grid 1 59.5 M3	Grid 2 57 M3	Grid 3 52.6 M3
Grid 4 45.9 M4	Grid 5 72.8 M3	Grid 6 72.8 M3
Grid 7 68.3 M3	Grid 8 87.6 M2	Grid 9 85.1 M2



0 dB = 87.6V/m

Figure 20 HAC RF E-Field GSM 1900 Channel 810

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HAC RF E-Field GSM 1900 Middle

Date/Time: 4/10/2012 10:15:49 AM

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

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY4 Configuration:

Probe: ER3DV6 - SN2302; ConvF (1, 1, 1); Calibrated: 06/15/2011

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

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

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

GSM 1900 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 = 78.4 V/m

Probe Modulation Factor = 2.84

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 25.1 V/m; Power Drift = -0.024 dB

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

Peak E-field in V/m

Grid 1 65.6 M3	Grid 2 60.8 M3	Grid 3 57.5 M3
Grid 4 51 M3	Grid 5 78.4 M3	Grid 6 78.4 M3
Grid 7 75.3 M3	Grid 8 92.4 M2	Grid 9 92 M2

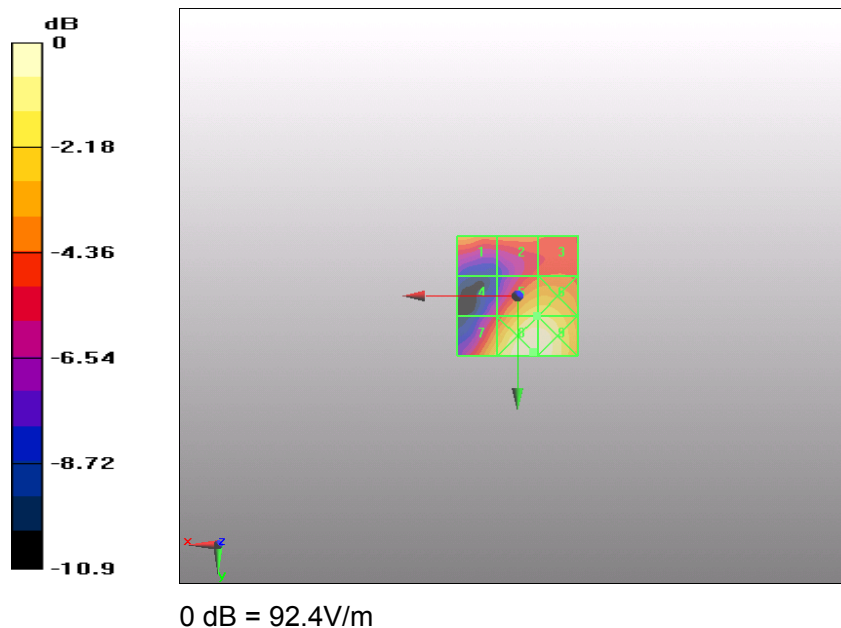


Figure 21 HAC RF E-Field GSM 1900 Channel 661

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HAC RF E-Field GSM 1900 Low

Date/Time: 4/10/2012 10:27:12 AM

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/m³

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY4 Configuration:

Probe: ER3DV6 - SN2302; ConvF (1, 1, 1); Calibrated: 06/15/2011

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

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

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

GSM 1900 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 = 78.3 V/m

Probe Modulation Factor = 2.84

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 25.9 V/m; Power Drift = -0.029 dB

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

Peak E-field in V/m

Grid 1 63.4 M3	Grid 2 59.5 M3	Grid 3 57.8 M3
Grid 4 51.5 M3	Grid 5 78.3 M3	Grid 6 78.3 M3
Grid 7 74.7 M3	Grid 8 91 M2	Grid 9 89.7 M2

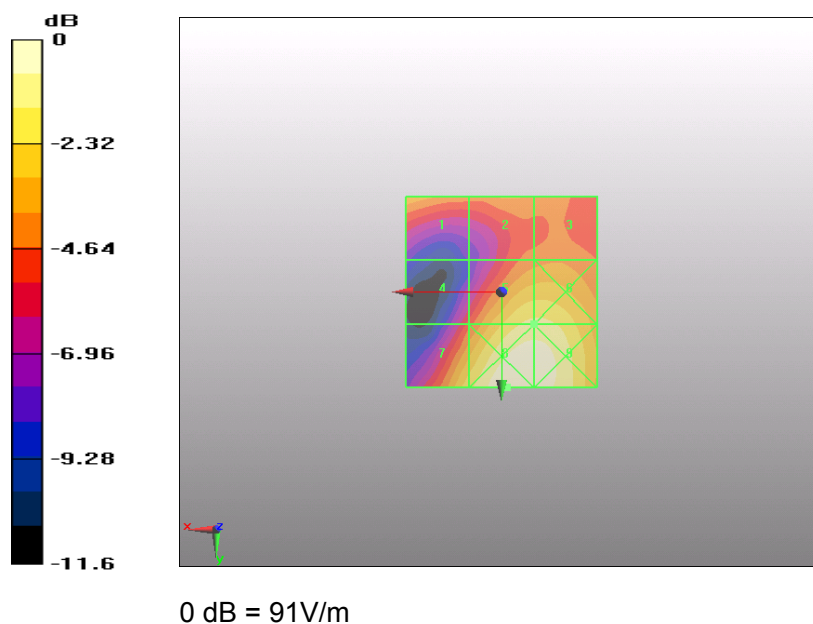


Figure 22 HAC RF E-Field GSM 1900 Channel 512

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HAC RF H-Field GSM 1900 High

Date/Time: 4/10/2012 4:51:09 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/m³

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY4 Configuration:

Probe: H3DV6 - SN6187; Calibrated: 06/17/2011

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

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

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

GSM 1900 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 = 0.213 A/m

Probe Modulation Factor = 2.84

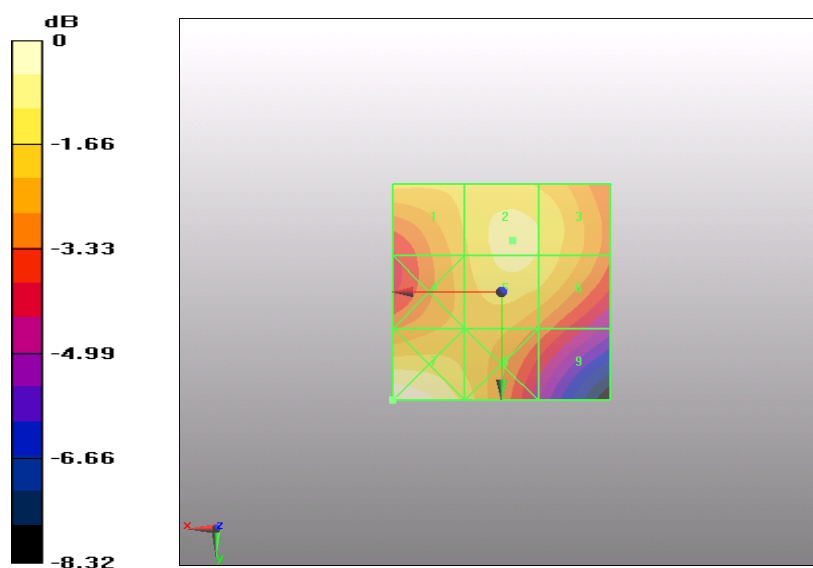
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.082 A/m; Power Drift = -0.020 dB

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

Peak H-field in A/m

Grid 1 0.200 M3	Grid 2 0.213 M3	Grid 3 0.208 M3
Grid 4 0.192 M3	Grid 5 0.212 M3	Grid 6 0.207 M3
Grid 7 0.236 M3	Grid 8 0.203 M3	Grid 9 0.169 M3



0 dB = 0.236A/m

Figure 23 HAC RF H-Field GSM 1900 Channel 810

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HAC RF H-Field GSM 1900 Middle

Date/Time: 4/10/2012 4:45:40 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/m³

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY4 Configuration:

Probe: H3DV6 - SN6187; Calibrated: 06/17/2011

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

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

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

GSM 1900 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 = 0.220 A/m

Probe Modulation Factor = 2.84

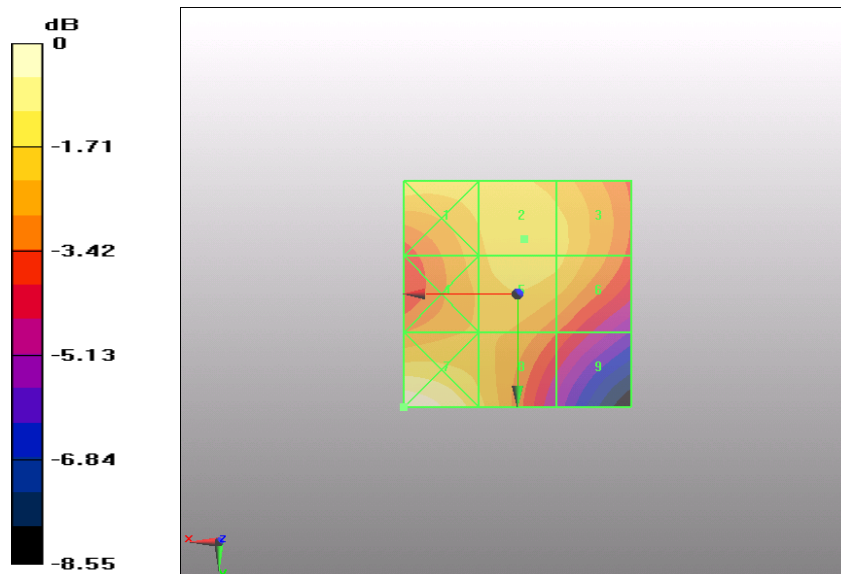
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.085 A/m; Power Drift = -0.009 dB

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

Peak H-field in A/m

Grid 1 0.223 M3	Grid 2 0.220 M3	Grid 3 0.215 M3
Grid 4 0.204 M3	Grid 5 0.219 M3	Grid 6 0.213 M3
Grid 7 0.254 M2	Grid 8 0.214 M3	Grid 9 0.173 M3



0 dB = 0.254A/m

Figure 24 HAC RF H-Field GSM 1900 Channel 661

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HAC RF H-Field GSM 1900 Low

Date/Time: 4/10/2012 4:56:44 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/m³

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY4 Configuration:

Probe: H3DV6 - SN6187; Calibrated: 06/17/2011

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

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

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

GSM 1900 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 = 0.217 A/m

Probe Modulation Factor = 2.84

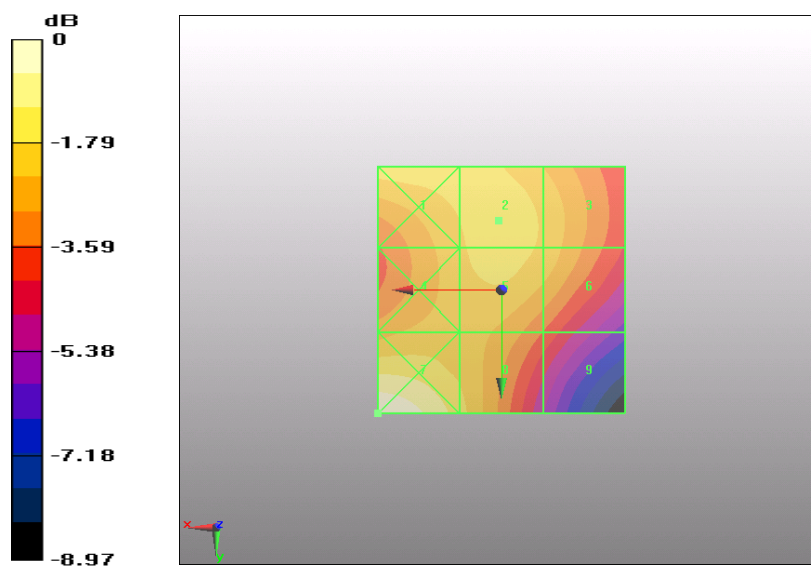
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.083 A/m; Power Drift = 0.180 dB

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

Peak H-field in A/m

Grid 1 0.218 M3	Grid 2 0.217 M3	Grid 3 0.206 M3
Grid 4 0.205 M3	Grid 5 0.216 M3	Grid 6 0.204 M3
Grid 7 0.256 M2	Grid 8 0.214 M3	Grid 9 0.169 M3



0 dB = 0.256 A/m

Figure 25 HAC RF H-Field GSM 1900 Channel 512

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HAC RF E-Field WCDMA Band II High

Date/Time: 6/12/2012 11:05:07 AM

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

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY4 Configuration:

Probe: ER3DV6 - SN2302; ConvF (1, 1, 1); Calibrated: 06/15/2011

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

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

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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 = 32.1 V/m

Probe Modulation Factor = 1.02

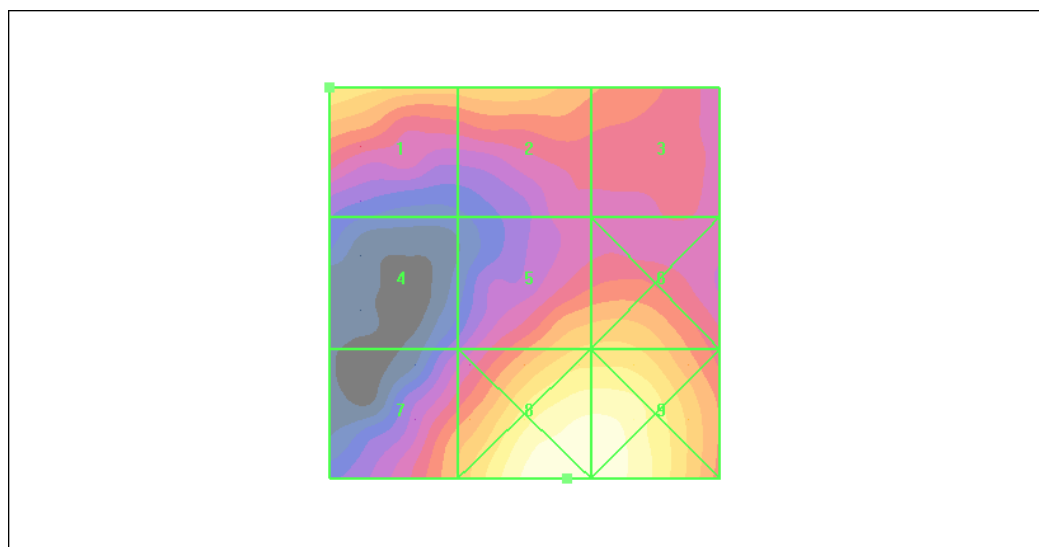
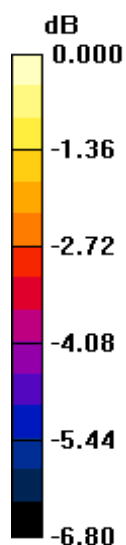
Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 27.4 V/m; Power Drift = -0.169 dB

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

Peak E-field in V/m

Grid 1 32.1 M4	Grid 2 30.6 M4	Grid 3 27.9 M4
Grid 4 22.3 M4	Grid 5 30.9 M4	Grid 6 31.1 M4
Grid 7 29.3 M4	Grid 8 37.7 M4	Grid 9 37.5 M4



0 dB = 37.7V/m

Figure 26 HAC RF E-Field WCDMA Band II Channel 9538

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HAC RF E-Field WCDMA Band II Middle

Date/Time: 6/12/2012 11:00:24 AM

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

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY4 Configuration:

Probe: ER3DV6 - SN2302; ConvF (1, 1, 1); Calibrated: 06/15/2011

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

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

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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 = 32.9 V/m

Probe Modulation Factor = 1.02

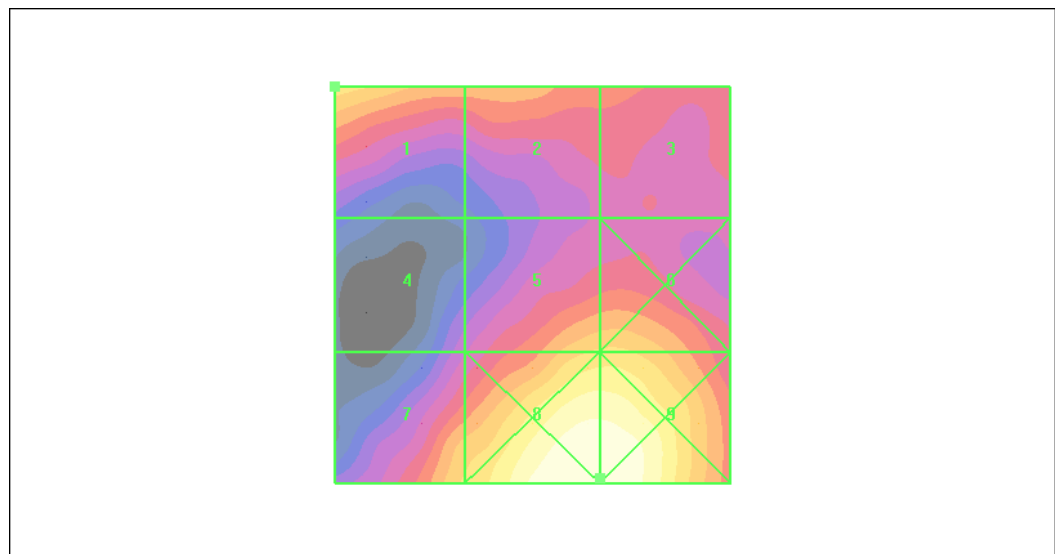
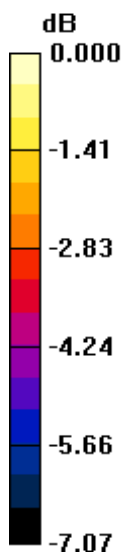
Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 29.4 V/m; Power Drift = -0.099 dB

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

Peak E-field in V/m

Grid 1 32.9 M4	Grid 2 29.7 M4	Grid 3 28.1 M4
Grid 4 24.2 M4	Grid 5 32.3 M4	Grid 6 32.4 M4
Grid 7 32.3 M4	Grid 8 39.6 M4	Grid 9 39.6 M4



0 dB = 39.6V/m

Figure 27 HAC RF E-Field WCDMA Band II Channel 9400

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HAC RF E-Field WCDMA Band II Low

Date/Time: 6/12/2012 10:55:19 AM

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

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY4 Configuration:

Probe: ER3DV6 - SN2302; ConvF (1, 1, 1); Calibrated: 06/15/2011

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

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

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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 = 30.8 V/m

Probe Modulation Factor = 1.02

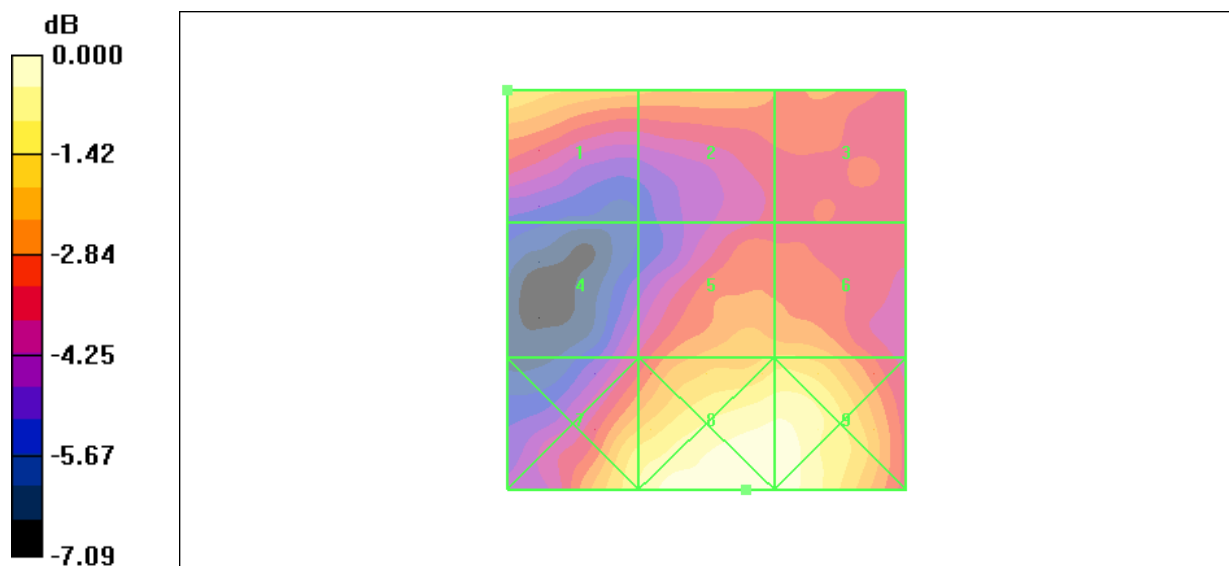
Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 28.7 V/m; Power Drift = 0.033 dB

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

Peak E-field in V/m

Grid 1 30.8 M4	Grid 2 27.7 M4	Grid 3 26.0 M4
Grid 4 23.4 M4	Grid 5 29.1 M4	Grid 6 29.2 M4
Grid 7 32.2 M4	Grid 8 35.7 M4	Grid 9 35.3 M4



0 dB = 35.7V/m

Figure 28 HAC RF E-Field WCDMA Band II Channel 9262

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HAC RF H-Field WCDMA Band II High

Date/Time: 6/12/2012 10:39:12 AM

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

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1$ kg/m³

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY4 Configuration:

Probe: H3DV6 - SN6187; Calibrated: 06/17/2011

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

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

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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 = 0.097 A/m

Probe Modulation Factor = 1.01

Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 0.109 A/m; Power Drift = -0.152 dB

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

Peak H-field in A/m

Grid 1 0.095 M4	Grid 2 0.097 M4	Grid 3 0.094 M4
Grid 4 0.091 M4	Grid 5 0.097 M4	Grid 6 0.094 M4
Grid 7 0.100 M4	Grid 8 0.087 M4	Grid 9 0.080 M4

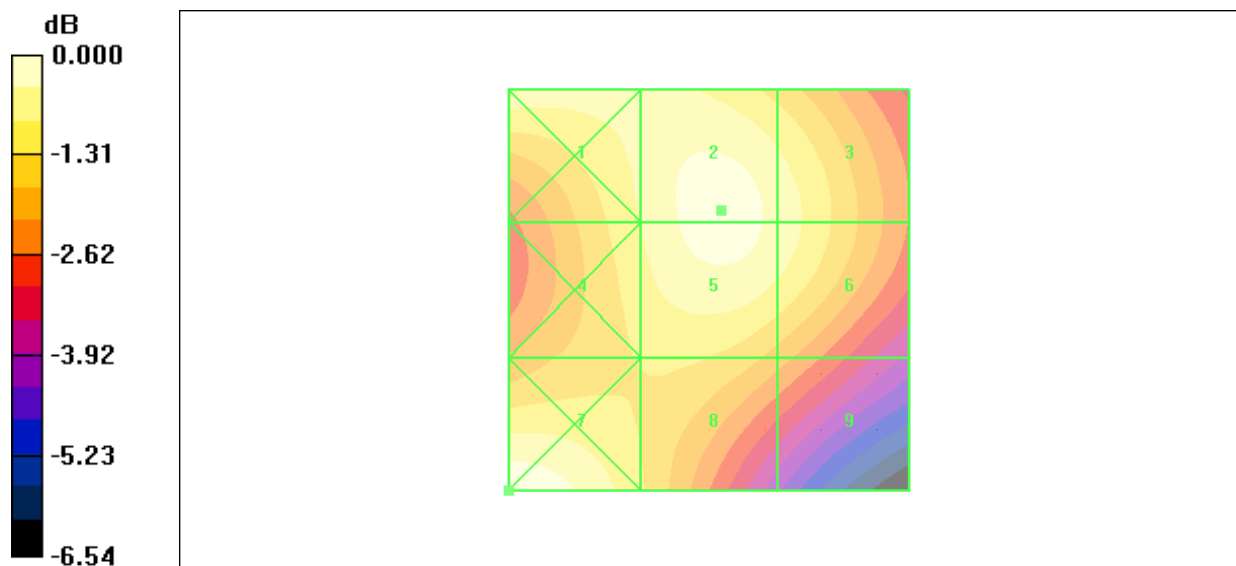


Figure 29 HAC RF H-Field WCDMA Band II Channel 9538

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HAC RF H-Field WCDMA Band II Middle

Date/Time: 6/12/2012 10:34:27 AM

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

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1$ kg/m³

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY4 Configuration:

Probe: H3DV6 - SN6187; Calibrated: 06/17/2011

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

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

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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 = 0.103 A/m

Probe Modulation Factor = 1.01

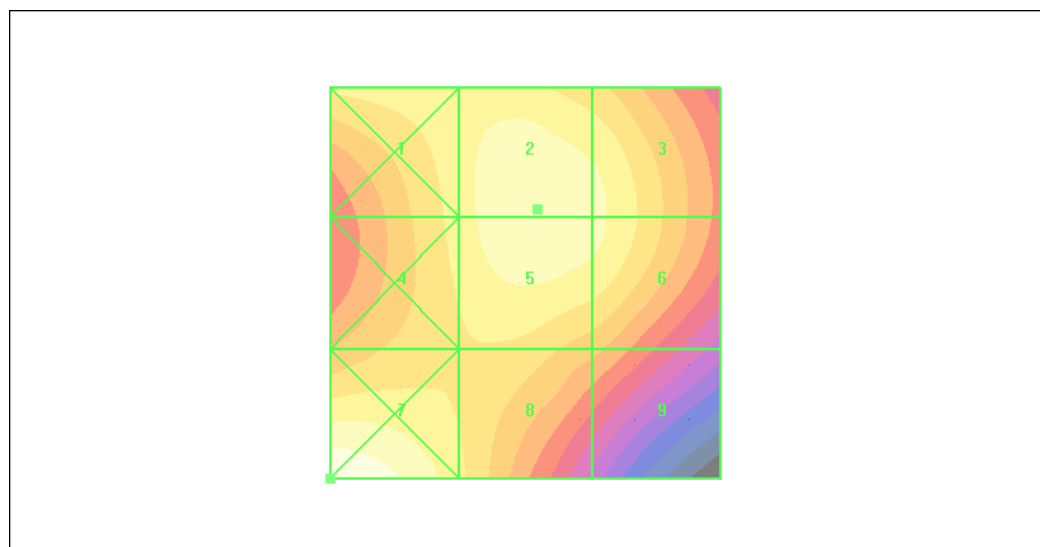
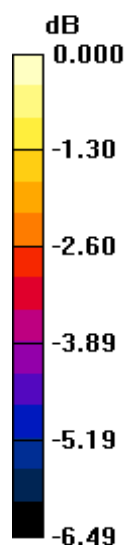
Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 0.112 A/m; Power Drift = 0.183 dB

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

Peak H-field in A/m

Grid 1 0.097 M4	Grid 2 0.103 M4	Grid 3 0.100 M4
Grid 4 0.096 M4	Grid 5 0.103 M4	Grid 6 0.100 M4
Grid 7 0.109 M4	Grid 8 0.095 M4	Grid 9 0.086 M4



0 dB = 0.109 A/m

Figure 30 HAC RF H-Field WCDMA Band II Channel 9400

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HAC RF H-Field WCDMA Band II Low

Date/Time: 6/12/2012 10:44:01 AM

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

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1$ kg/m³

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY4 Configuration:

Probe: H3DV6 - SN6187; Calibrated: 06/17/2011

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

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

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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 = 0.100 A/m

Probe Modulation Factor = 1.01

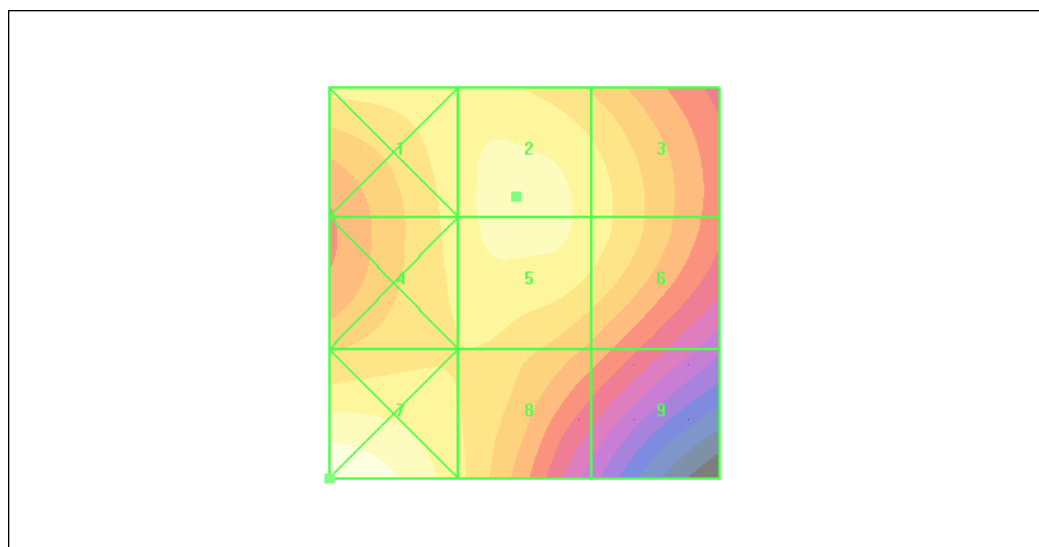
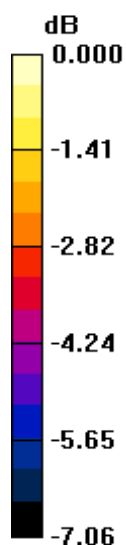
Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 0.111 A/m; Power Drift = -0.082 dB

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

Peak H-field in A/m

Grid 1 0.097 M4	Grid 2 0.100 M4	Grid 3 0.097 M4
Grid 4 0.096 M4	Grid 5 0.100 M4	Grid 6 0.097 M4
Grid 7 0.110 M4	Grid 8 0.095 M4	Grid 9 0.083 M4



0 dB = 0.110 A/m

Figure 31 HAC RF H-Field WCDMA Band II Channel 9262

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HAC RF E-Field WCDMA Band IV High

Date/Time: 4/10/2012 11:03:41 AM

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

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Ambient Temperature:22.3 °C

Phantom section: RF Section

DASY4 Configuration:

Probe: ER3DV6 - SN2302; ConvF (1, 1, 1); Calibrated: 06/15/2011

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

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

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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 = 45.6 V/m

Probe Modulation Factor = 1.02

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 41.4 V/m; Power Drift = -0.039 dB

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

Peak E-field in V/m

Grid 1 35.4 M4	Grid 2 29.5 M4	Grid 3 30.3 M4
Grid 4 31.5 M4	Grid 5 45.6 M4	Grid 6 45.6 M4
Grid 7 45 M4	Grid 8 53.9 M4	Grid 9 53.1 M4

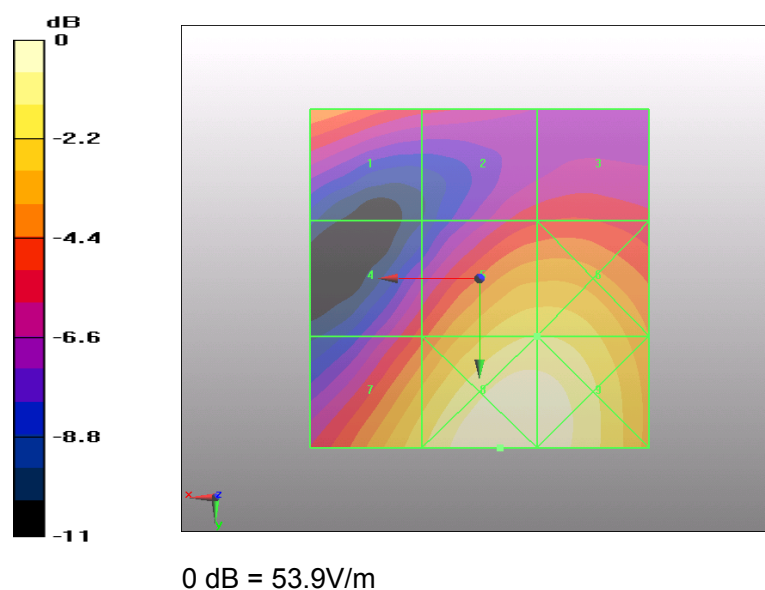


Figure 32 HAC RF E-Field WCDMA Band IV Channel 1513

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HAC RF E-Field WCDMA Band IV Middle

Date/Time: 4/10/2012 10:58:03 AM

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

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Ambient Temperature:22.3 °C

Phantom section: RF Section

DASY4 Configuration:

Probe: ER3DV6 - SN2302; ConvF (1, 1, 1); Calibrated: 06/15/2011

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

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

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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 = 44.9 V/m

Probe Modulation Factor = 1.02

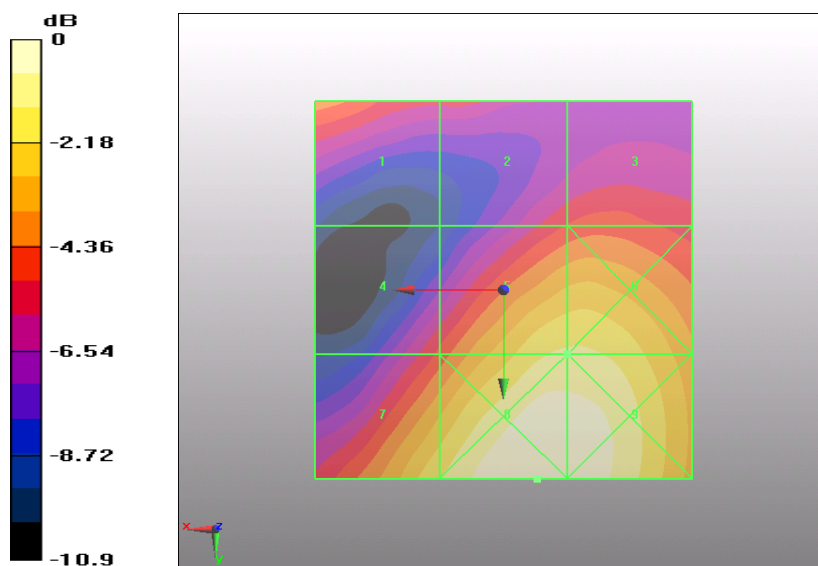
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 39.9 V/m; Power Drift = 0.075 dB

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

Peak E-field in V/m

Grid 1 33.4 M4	Grid 2 29.5 M4	Grid 3 30.7 M4
Grid 4 30.1 M4	Grid 5 44.9 M4	Grid 6 44.9 M4
Grid 7 44.2 M4	Grid 8 52.4 M4	Grid 9 51.7 M4



0 dB = 52.4V/m

Figure 33 HAC RF E-Field WCDMA Band IV Channel 1413

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HAC RF E-Field WCDMA Band IV Low

Date/Time: 4/10/2012 11:09:20 AM

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

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Ambient Temperature:22.3 °C

Phantom section: RF Section

DASY4 Configuration:

Probe: ER3DV6 - SN2302; ConvF (1, 1, 1); Calibrated: 06/15/2011

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

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

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WCDMA IV 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 = 43.8 V/m

Probe Modulation Factor = 1.02

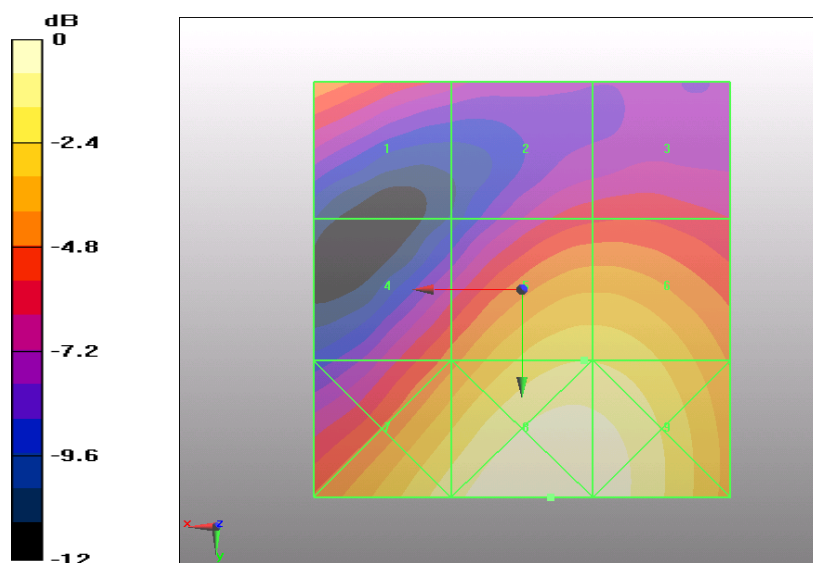
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 41.5 V/m; Power Drift = -0.047 dB

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

Peak E-field in V/m

Grid 1 33 M4	Grid 2 27.2 M4	Grid 3 27.7 M4
Grid 4 32 M4	Grid 5 43.8 M4	Grid 6 43.7 M4
Grid 7 46.6 M4	Grid 8 52.7 M4	Grid 9 51.6 M4



0 dB = 52.7V/m

Figure 34 HAC RF E-Field WCDMA Band IV Channel 1312

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HAC RF H-Field WCDMA Band IV High

Date/Time: 4/10/2012 5:15:47 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/m³

Ambient Temperature:22.3 °C

Phantom section: RF Section

DASY4 Configuration:

Probe: H3DV6 - SN6187; Calibrated: 06/17/2011

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

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

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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 = 0.118 A/m

Probe Modulation Factor = 1.01

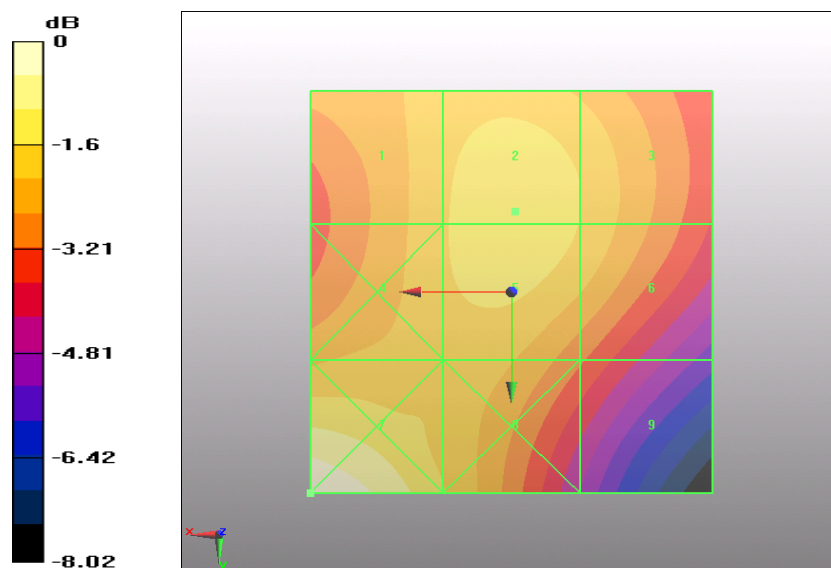
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.130 A/m; Power Drift = 0.068 dB

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

Peak H-field in A/m

Grid 1 0.112 M4	Grid 2 0.118 M4	Grid 3 0.113 M4
Grid 4 0.112 M4	Grid 5 0.118 M4	Grid 6 0.113 M4
Grid 7 0.136 M4	Grid 8 0.114 M4	Grid 9 0.095 M4



0 dB = 0.136A/m

Figure 35 HAC RF H-Field WCDMA Band IV Channel 1513

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HAC RF H-Field WCDMA Band IV Middle

Date/Time: 4/10/2012 5:10:03 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/m³

Ambient Temperature:22.3 °C

Phantom section: RF Section

DASY4 Configuration:

Probe: H3DV6 - SN6187; Calibrated: 06/17/2011

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

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

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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 = 0.111 A/m

Probe Modulation Factor = 1.01

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.121 A/m; Power Drift = 0.122 dB

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

Peak H-field in A/m

Grid 1 0.107 M4	Grid 2 0.111 M4	Grid 3 0.106 M4
Grid 4 0.108 M4	Grid 5 0.110 M4	Grid 6 0.105 M4
Grid 7 0.139 M4	Grid 8 0.112 M4	Grid 9 0.088 M4

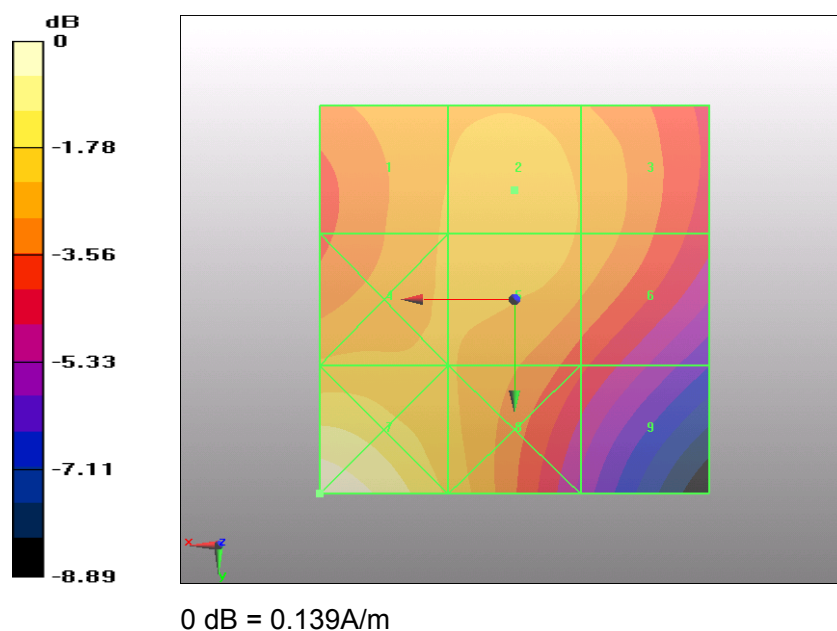


Figure 36 HAC RF H-Field WCDMA Band IV Channel 1413

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HAC RF H-Field WCDMA Band IV Low

Date/Time: 4/10/2012 5:21:19 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/m³

Ambient Temperature:22.3 °C

Phantom section: RF Section

DASY4 Configuration:

Probe: H3DV6 - SN6187; Calibrated: 06/17/2011

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

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

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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 = 0.115 A/m

Probe Modulation Factor = 1.01

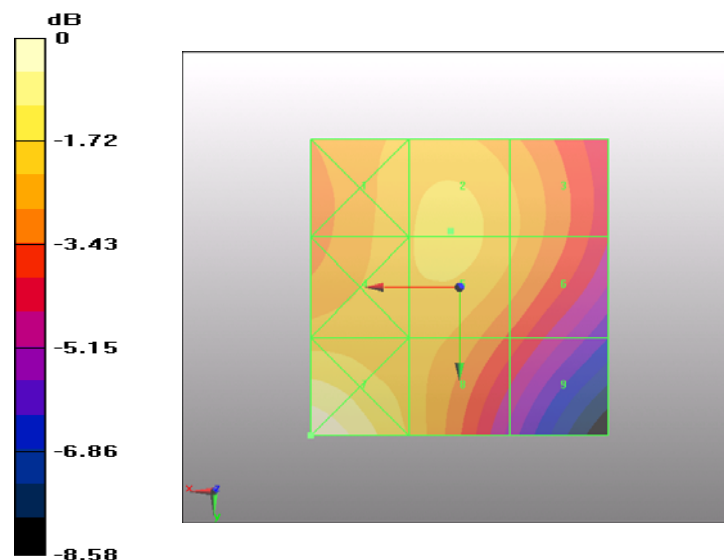
Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.125 A/m; Power Drift = 0.040 dB

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

Peak H-field in A/m

Grid 1 0.112 M4	Grid 2 0.115 M4	Grid 3 0.108 M4
Grid 4 0.112 M4	Grid 5 0.115 M4	Grid 6 0.107 M4
Grid 7 0.137 M4	Grid 8 0.112 M4	Grid 9 0.091 M4



0 dB = 0.137A/m

Figure 37 HAC RF H-Field WCDMA Band IV Channel 1312

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HAC RF E-Field WCDMA Band V High

Date/Time: 6/12/2012 11:14:48 AM

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

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY4 Configuration:

Probe: ER3DV6 - SN2302; ConvF (1, 1, 1); Calibrated: 06/15/2011

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

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

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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 = 66.9 V/m

Probe Modulation Factor = 1.03

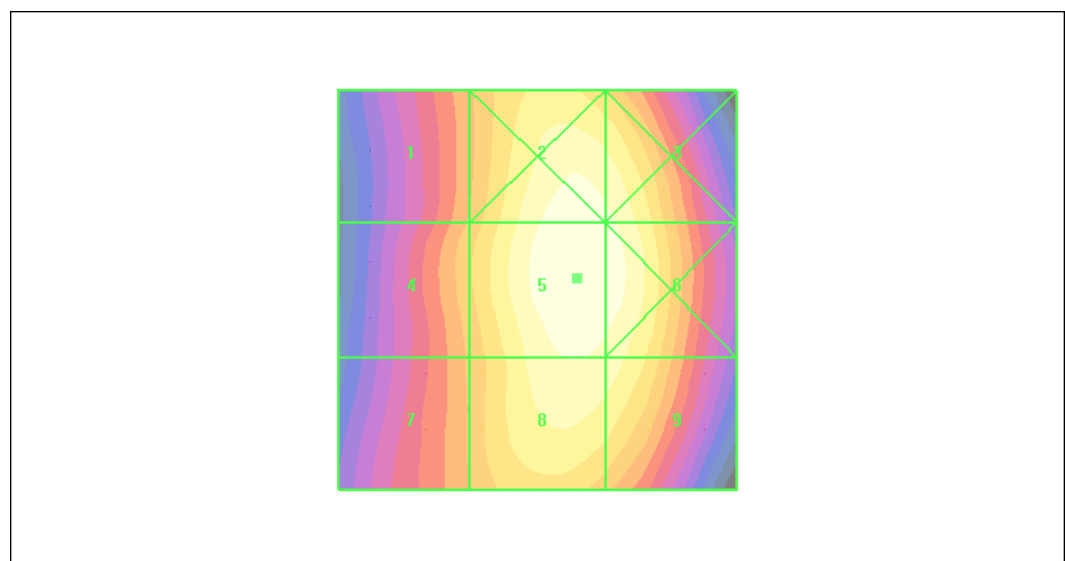
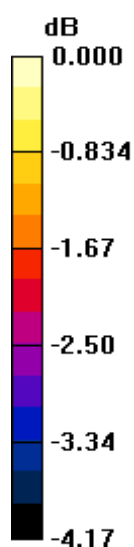
Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 81.3 V/m; Power Drift = -0.016 dB

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

Peak E-field in V/m

Grid 1 57.4 M4	Grid 2 66.0 M4	Grid 3 65.4 M4
Grid 4 58.7 M4	Grid 5 66.9 M4	Grid 6 66.4 M4
Grid 7 57.5 M4	Grid 8 64.9 M4	Grid 9 64.2 M4



0 dB = 66.9V/m

Figure 38 HAC RF E-Field WCDMA Band V Channel 4233

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HAC RF E-Field WCDMA Band V Middle

Date/Time: 6/12/2012 11:19:31 AM

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

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY4 Configuration:

Probe: ER3DV6 - SN2302; ConvF (1, 1, 1); Calibrated: 06/15/2011

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

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

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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 = 60.0 V/m

Probe Modulation Factor = 1.03

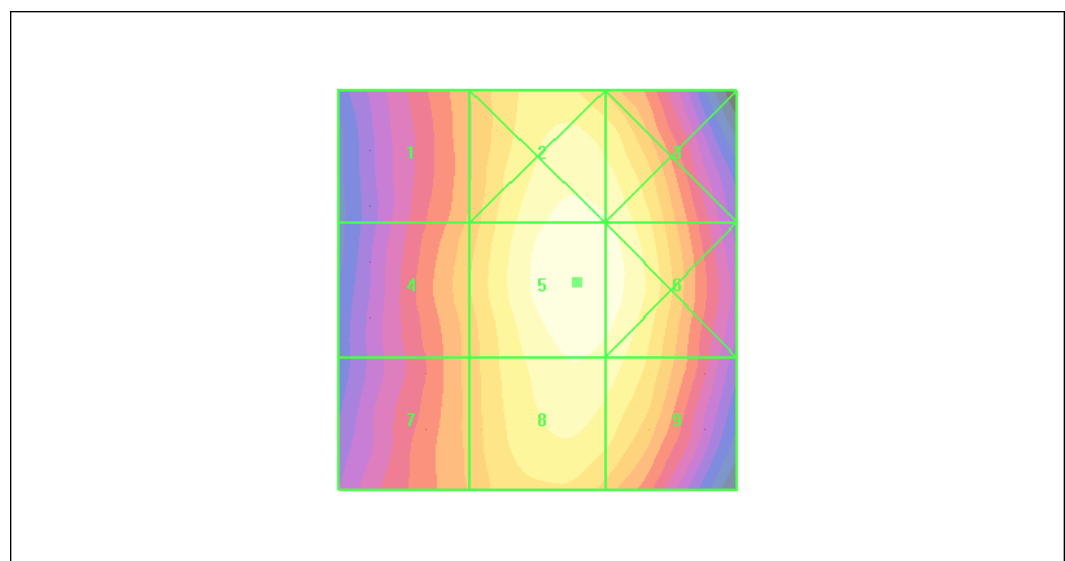
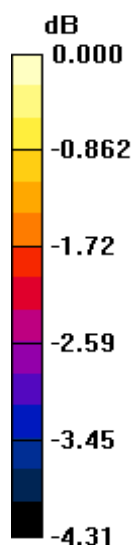
Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 73.4 V/m; Power Drift = -0.133 dB

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

Peak E-field in V/m

Grid 1 51.4 M4	Grid 2 58.8 M4	Grid 3 58.2 M4
Grid 4 52.5 M4	Grid 5 60.0 M4	Grid 6 59.4 M4
Grid 7 51.6 M4	Grid 8 58.1 M4	Grid 9 57.4 M4



0 dB = 60.0V/m

Figure 39 HAC RF E-Field WCDMA Band V Channel 4183

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HAC RF E-Field WCDMA Band V Low

Date/Time: 6/12/2012 11:10:06 AM

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

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY4 Configuration:

Probe: ER3DV6 - SN2302; ConvF (1, 1, 1); Calibrated: 06/15/2011

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

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

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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 = 65.6 V/m

Probe Modulation Factor = 1.03

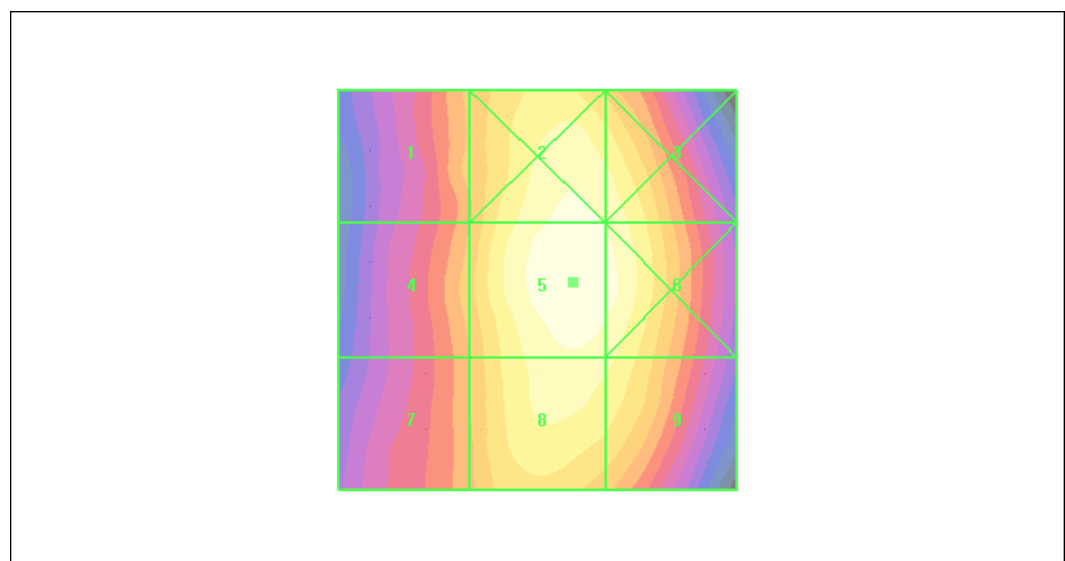
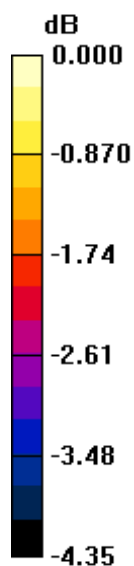
Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 79.4 V/m; Power Drift = -0.102 dB

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

Peak E-field in V/m

Grid 1 56.3 M4	Grid 2 64.3 M4	Grid 3 63.3 M4
Grid 4 56.8 M4	Grid 5 65.6 M4	Grid 6 64.5 M4
Grid 7 55.5 M4	Grid 8 63.0 M4	Grid 9 62.0 M4



0 dB = 65.6V/m

Figure 40 HAC RF E-Field WCDMA Band V Channel 4132

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HAC RF H-Field WCDMA Band V High

Date/Time: 6/12/2012 10:24:34 AM

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

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1$ kg/m³

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY4 Configuration:

Probe: H3DV6 - SN6187; Calibrated: 06/17/2011

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

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

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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 = 0.105 A/m

Probe Modulation Factor = 1.01

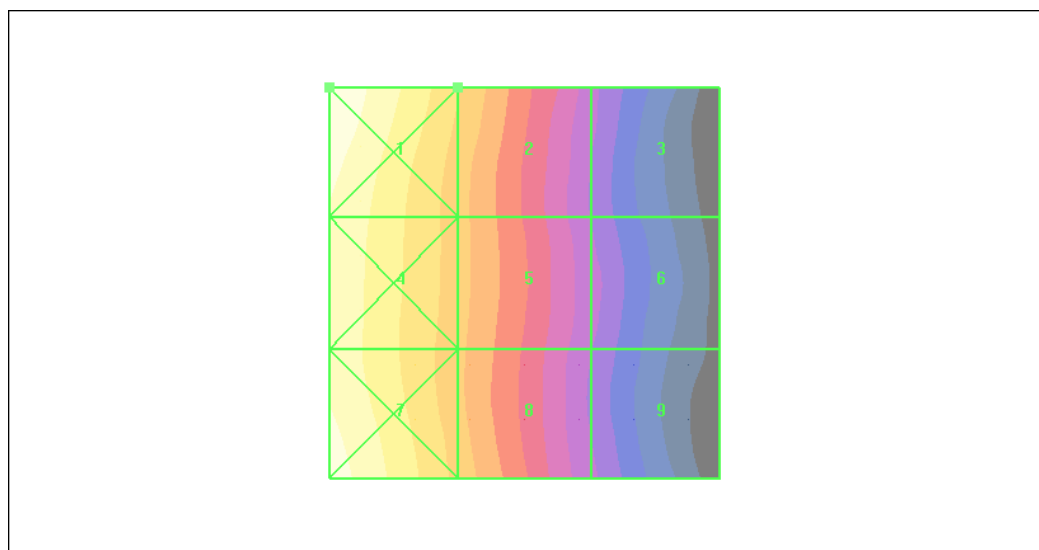
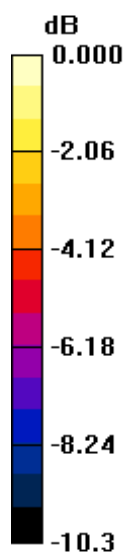
Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 0.085 A/m; Power Drift = -0.062 dB

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

Peak H-field in A/m

Grid 1 0.143 M4	Grid 2 0.105 M4	Grid 3 0.067 M4
Grid 4 0.132 M4	Grid 5 0.100 M4	Grid 6 0.067 M4
Grid 7 0.138 M4	Grid 8 0.102 M4	Grid 9 0.067 M4



0 dB = 0.143A/m

Figure 41 HAC RF H-Field WCDMA Band V Channel 4233

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HAC RF H-Field WCDMA Band V Middle

Date/Time: 6/12/2012 10:19:46 AM

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

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1$ kg/m³

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY4 Configuration:

Probe: H3DV6 - SN6187; Calibrated: 06/17/2011

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

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

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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 = 0.090 A/m

Probe Modulation Factor = 1.01

Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 0.075 A/m; Power Drift = -0.076 dB

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

Peak H-field in A/m

Grid 1 0.123 M4	Grid 2 0.090 M4	Grid 3 0.058 M4
Grid 4 0.114 M4	Grid 5 0.087 M4	Grid 6 0.059 M4
Grid 7 0.119 M4	Grid 8 0.088 M4	Grid 9 0.057 M4

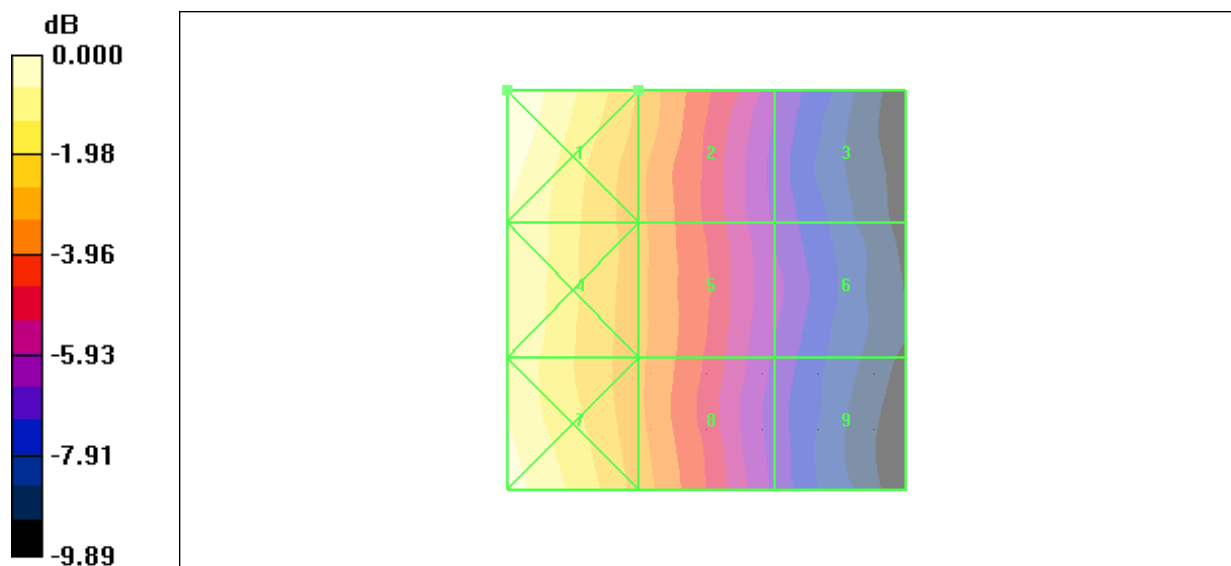


Figure 42 HAC RF H-Field WCDMA Band V Channel 4183

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HAC RF H-Field WCDMA Band V Low

Date/Time: 6/12/2012 10:29:34 AM

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

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1$ kg/m³

Ambient Temperature: 22.3 °C

Phantom section: RF Section

DASY4 Configuration:

Probe: H3DV6 - SN6187; Calibrated: 06/17/2011

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

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

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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 = 0.095 A/m

Probe Modulation Factor = 1.01

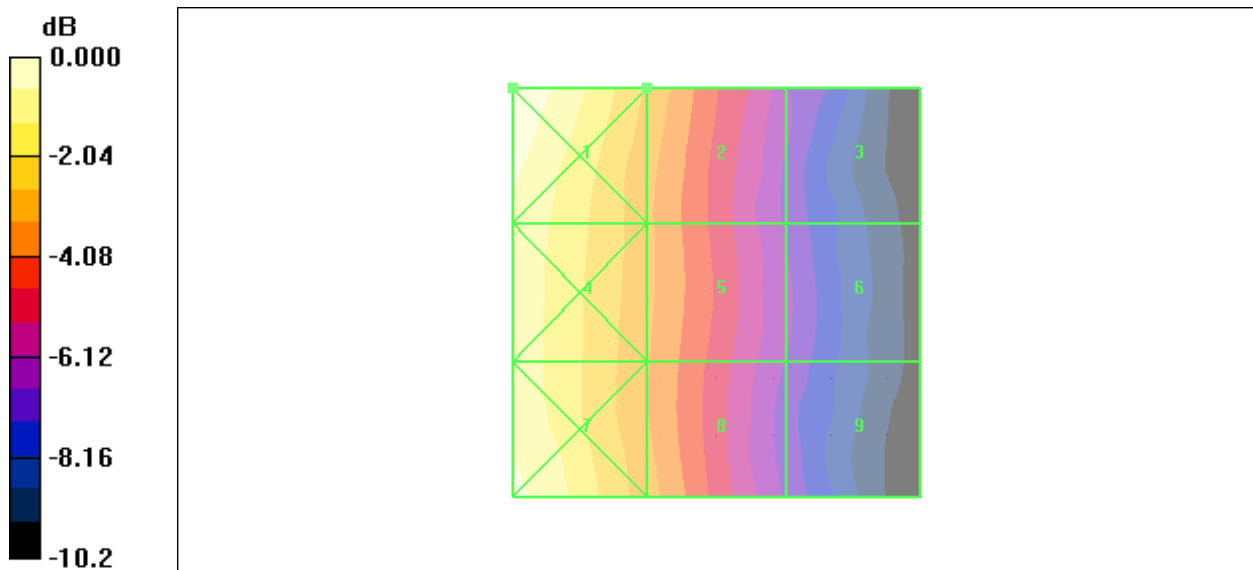
Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 0.078 A/m; Power Drift = -0.010 dB

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

Peak H-field in A/m

Grid 1 0.132 M4	Grid 2 0.095 M4	Grid 3 0.062 M4
Grid 4 0.121 M4	Grid 5 0.091 M4	Grid 6 0.062 M4
Grid 7 0.125 M4	Grid 8 0.092 M4	Grid 9 0.060 M4



0 dB = 0.132A/m

Figure 43 HAC RF H-Field WCDMA Band V Channel 4132

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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

Auden

Certificate No: ER3-2302_Jun11

CALIBRATION CERTIFICATE

Object: ER3DV6 - SN:2302

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: June 15, 2011

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41498087	31-Mar-11 (No. 217-01372)	Apr-12
Reference 3 dB Attenuator	SN: S5054 (3c)	29-Mar-11 (No. 217-01369)	Apr-12
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Reference 30 dB Attenuator	SN: S5129 (30b)	29-Mar-11 (No. 217-01370)	Apr-12
Reference Probe ER3DV6	SN: 2328	4-Oct-10 (No. ER3-2328_Oct10)	Oct-11
DAE4	SN: 789	6-Apr-11 (No. DAE4-789_Apr11)	Apr-12
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642UD1700	4-Aug-09 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37380585	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

	Name	Function	Signature
Calibrated by:	Jeton Kasrat	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			
Issued: June 17, 2011			

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
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 _{x,y,z}	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 ϕ	ϕ rotation around probe axis
Polarization θ	θ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\theta = 0$ is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}**: Assessed for E-field polarization $\theta = 0$ for XY sensors and $\theta = 90$ for Z sensor ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide).
- NORM(f)_{x,y,z}** = NORM_{x,y,z} * frequency_response (see Frequency Response Chart).
- DCP_{x,y,z}**: 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_{x,y,z}; B_{x,y,z}; C_{x,y,z}; VR_{x,y,z}**: 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_x (no uncertainty required).

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

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ER3DV6 – SN:2302

June 15, 2011

Probe ER3DV6

SN:2302

Manufactured: November 6, 2002
Calibrated: June 15, 2011

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

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

Report No. RZA1203-0414HAC01R2

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ER3DV6- SN:2302

June 15, 2011

DASY/EASY - Parameters of Probe: ER3DV6 - SN:2302

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)	1.47	1.34	1.44	$\pm 10.1 \%$
DCP (mV) ^a	98.2	96.7	101.8	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc ^E (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	113.8	$\pm 3.0 \%$
			Y	0.00	0.00	1.00	99.1	
			Z	0.00	0.00	1.00	95.3	

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%.

^a Numerical linearization parameter: uncertainty not required.

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

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Test Report

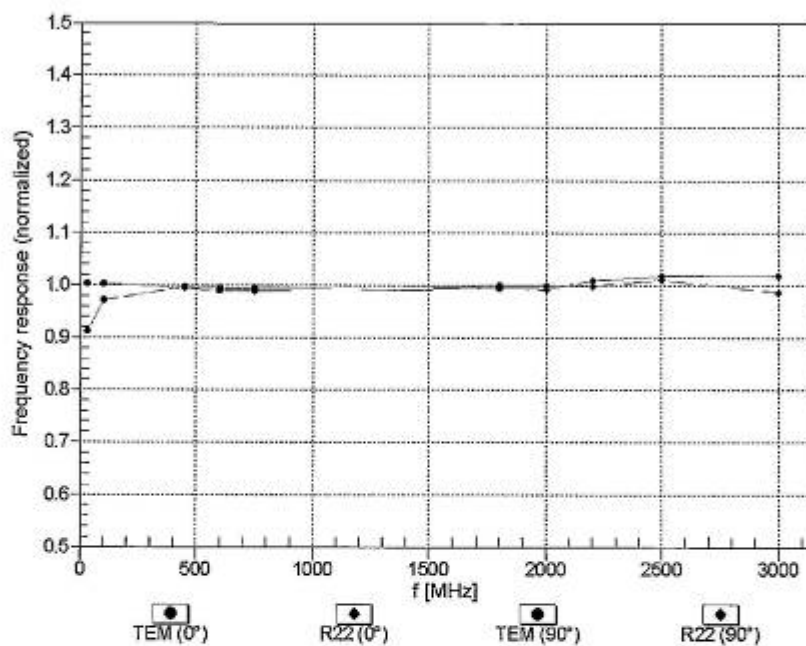
Report No. RZA1203-0414HAC01R2

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ER3DV6-SN:2302

June 15, 2011

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



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

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Test Report

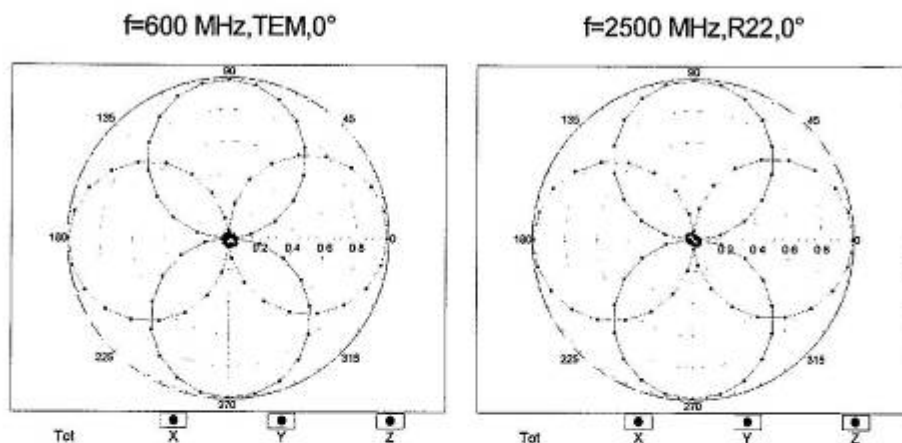
Report No. RZA1203-0414HAC01R2

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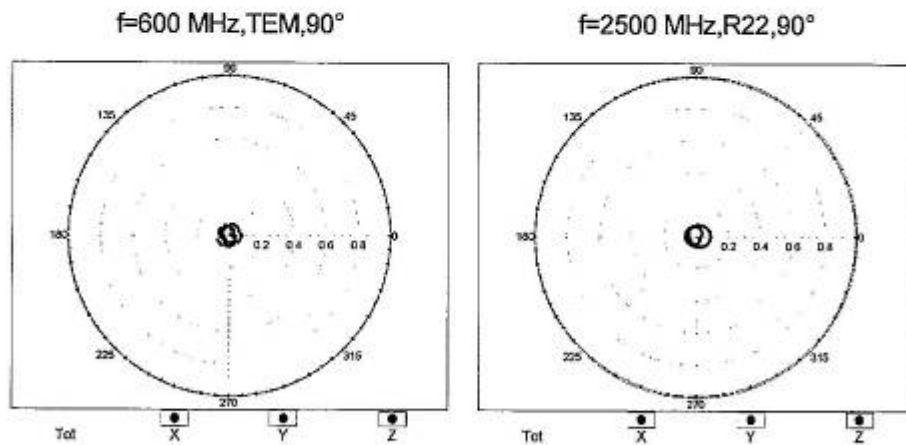
ER3DV6-SN:2302

June 15, 2011

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



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



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Test Report

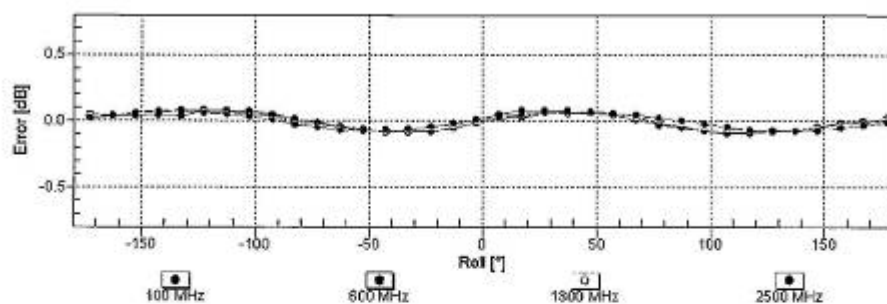
Report No. RZA1203-0414HAC01R2

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ER3DV6- SN:2302

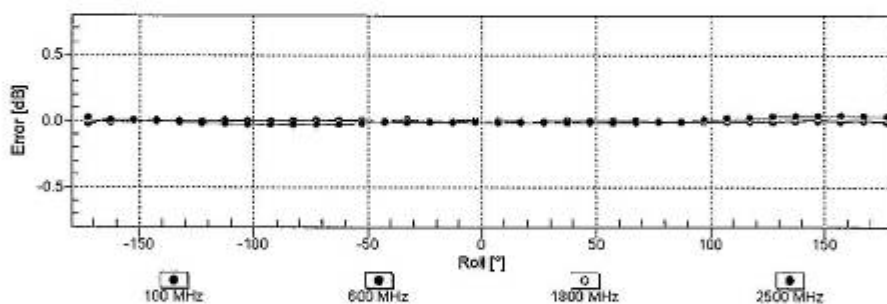
June 15, 2011

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



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

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



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

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Test Report

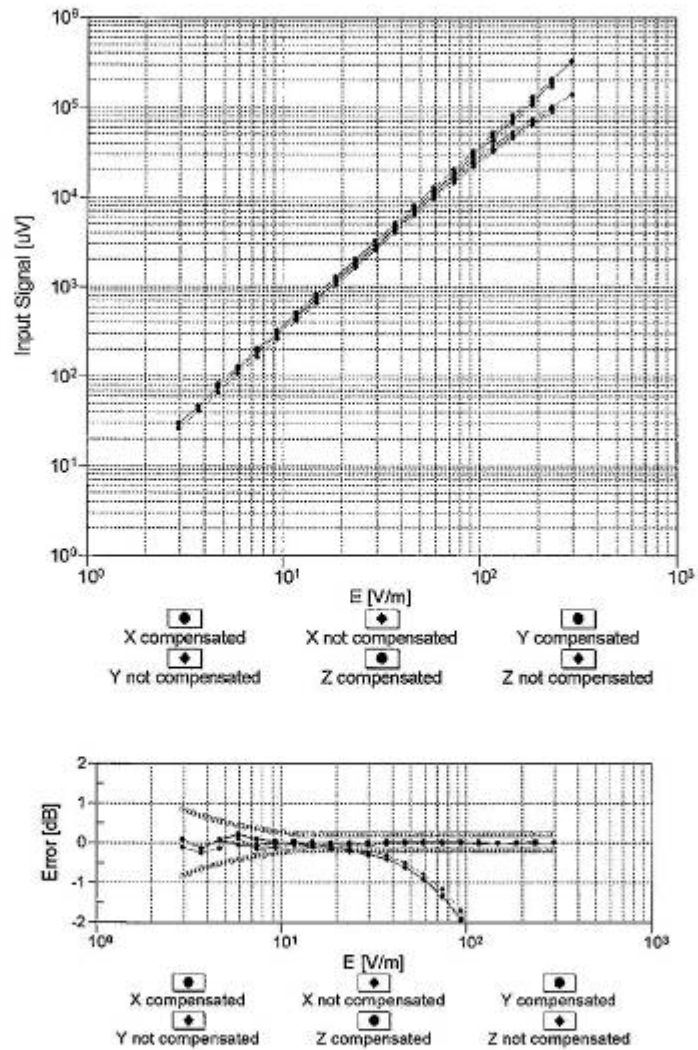
Report No. RZA1203-0414HAC01R2

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ER3DV6-SN:2302

June 15, 2011

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



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

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Test Report

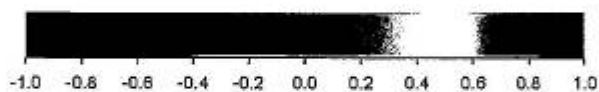
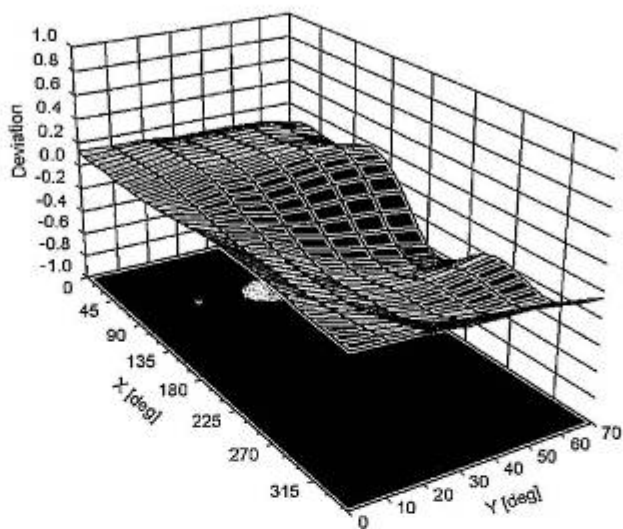
Report No. RZA1203-0414HAC01R2

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ER3DV6-SN:2302

June 15, 2011

Deviation from Isotropy in Air
Error (ϕ , θ), $f = 900$ MHz



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

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

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ER3DV6- SN:2302

June 15, 2011

DASY/EASY - Parameters of Probe: ER3DV6 - SN:2302

Other Probe Parameters

Sensor Arrangement	Rectangular
Connector Angle (°)	-2.7
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

Report No. RZA1203-0414HAC01R2

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ANNEX D: H-Probe Calibration Certificate

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



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client

Auden

Certificate No: **H3-6187_Jun11**

CALIBRATION CERTIFICATE

Object **H3DV6 - SN:6187**

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: **June 17, 2011**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293674	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41488087	31-Mar-11 (No. 217-01372)	Apr-12
Reference 3 dB Attenuator	SN: S5054 (3c)	29-Mar-11 (No. 217-01369)	Apr-12
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Reference 30 dB Attenuator	SN: S5129 (30b)	29-Mar-11 (No. 217-01370)	Apr-12
Reference Probe H3DV6	SN: 6182	4-Oct-10 (No. H3-6182_Oct10)	Oct-11
DAE4	SN: 789	6-Apr-11 (No. DAE4-789_Apr11)	Apr-12
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

Calibrated by:	Name Claudio Leubler	Function Laboratory Technician	Signature
Approved by:	Name Karla Pokovic	Function Technical Manager	Signature

Issued: June 17, 2011

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TA Technology (Shanghai) Co., Ltd.

Test Report

Report No. RZA1203-0414HAC01R2

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



S Schweizerischer Kalibrierdienst
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Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

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Multilateral Agreement for the recognition of calibration certificates

Glossary:

NORM _{x,y,z}	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 ϕ	ϕ rotation around probe axis
Polarization θ	θ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\theta = 0$ is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}**: Assessed for E-field polarization $\theta = 0$ for XY sensors and $\theta = 90$ for Z sensor ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide).
- X, Y, Z(f)**: $X, Y, Z_{a0a1a2} = X, Y, Z_{a0a1a2} \cdot \text{frequency_response}$ (see Frequency Response Chart).
- DCP_{x,y,z}**: 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_{x,y,z}; B_{x,y,z}; C_{x,y,z}; VR_{x,y,z}**: 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).

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

Report No. RZA1203-0414HAC01R2

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H3DV6 – SN:6187

June 17, 2011

Probe H3DV6

SN:6187

Manufactured: June 8, 2004
Calibrated: June 17, 2011

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

TA Technology (Shanghai) Co., Ltd.

Test Report

Report No. RZA1203-0414HAC01R2

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H3DV6- SN:6187

June 17, 2011

DASY/EASY - Parameters of Probe: H3DV6 - SN:6187

Basic Calibration Parameters

		Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm (A/m / $\sqrt{\text{mV}}$)	a0	3.25E-003	2.53E-003	3.06E-003	$\pm 5.1 \%$
Norm (A/m / $\sqrt{\text{mV}}$)	a1	-2.03E-005	4.43E-005	-4.88E-005	$\pm 5.1 \%$
Norm (A/m / $\sqrt{\text{mV}}$)	a2	2.36E-005	1.59E-005	7.21E-005	$\pm 5.1 \%$
DCP (mV) ^B		108.1	92.6	91.8	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc ^E (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	77.7	$\pm 3.0 \%$
			Y	0.00	0.00	1.00	72.9	
			Z	0.00	0.00	1.00	90.7	

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%.

^B Numerical linearization parameter; uncertainty not required.

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

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Test Report

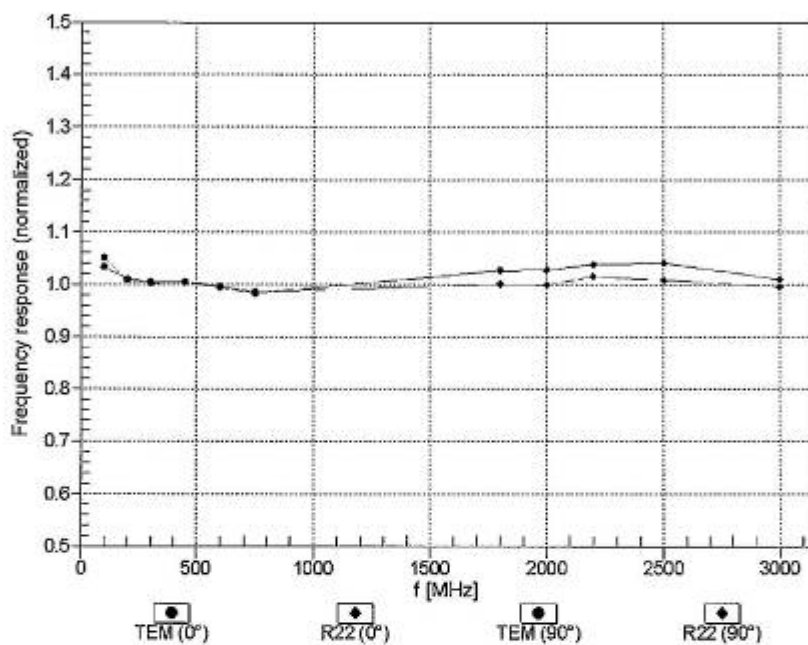
Report No. RZA1203-0414HAC01R2

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H3DV6- SN:6187

June 17, 2011

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



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

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

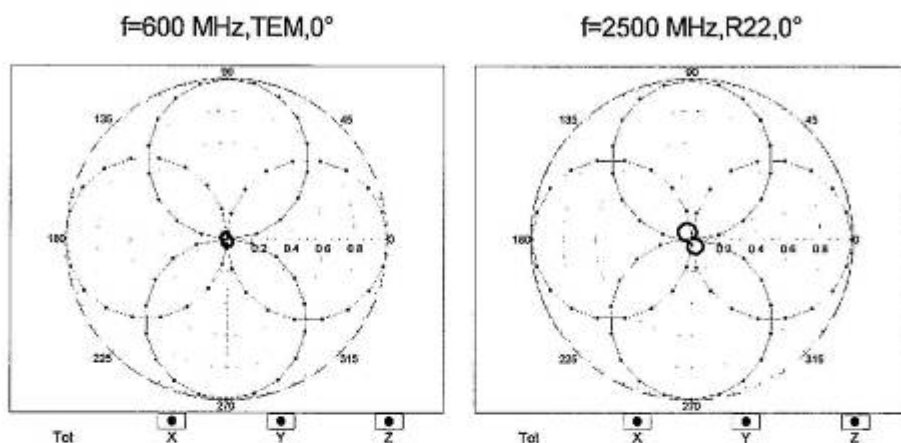
Report No. RZA1203-0414HAC01R2

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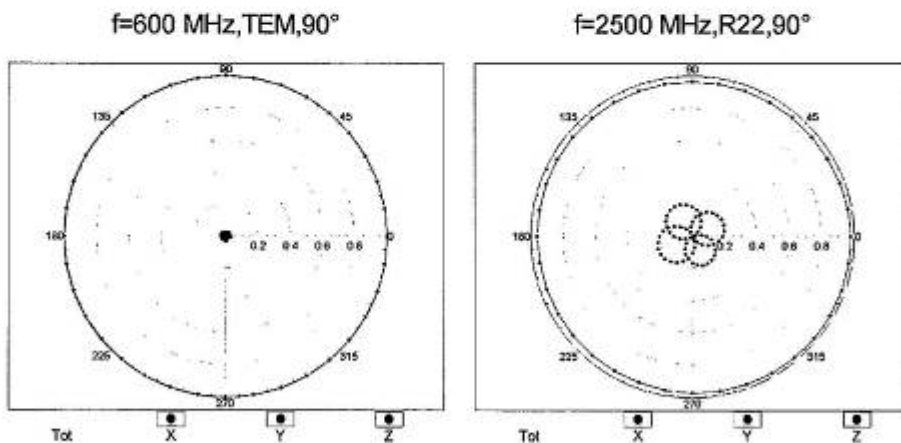
H3DV6- SN:8187

June 17, 2011

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



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



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Test Report

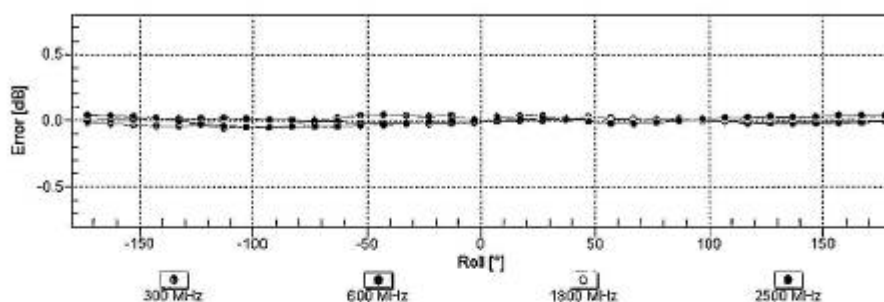
Report No. RZA1203-0414HAC01R2

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H3DV6- SN:6187

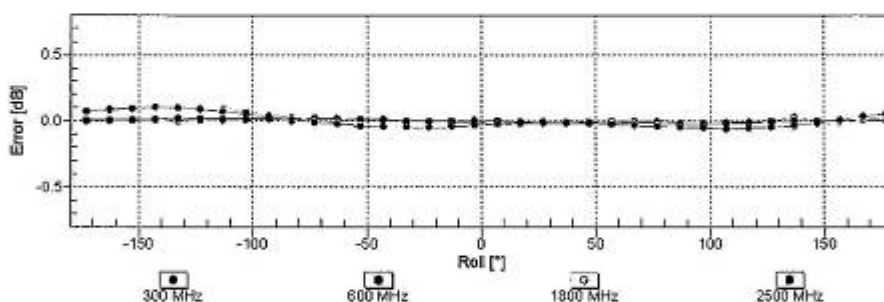
June 17, 2011

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



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

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



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

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

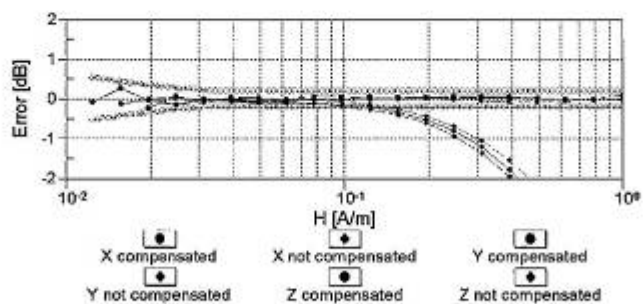
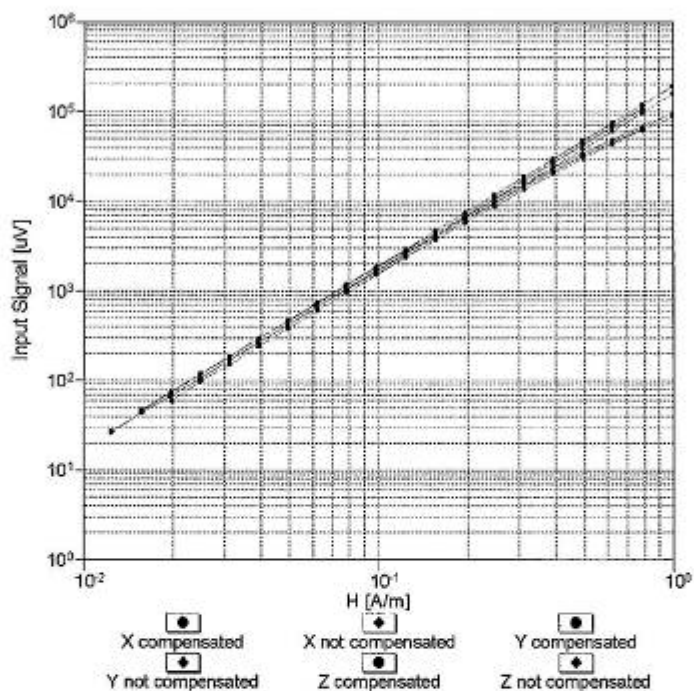
Report No. RZA1203-0414HAC01R2

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H3DV6- SN:6167

June 17, 2011

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



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

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Test Report

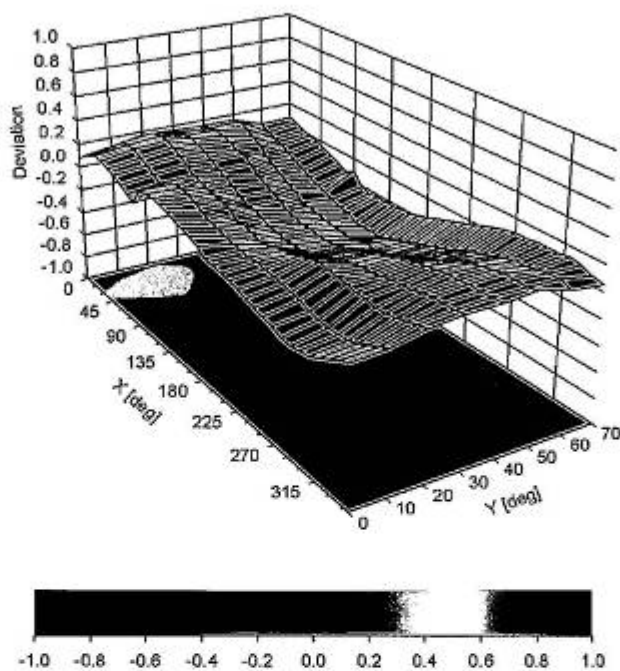
Report No. RZA1203-0414HAC01R2

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H3DV6- SN:6167

June 17, 2011

Deviation from Isotropy in Air
Error (ϕ , θ), $f = 900$ MHz



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

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

Report No. RZA1203-0414HAC01R2

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H3DV6- SN:6187

June 17, 2011

DASY/EASY - Parameters of Probe: H3DV6 - SN:6187

Other Probe Parameters

Sensor Arrangement	Rectangular
Connector Angle (°)	-113
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. RZA1203-0414HAC01R2

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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
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S Swiss Calibration Service

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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **TA Shanghai (Auden)**

Certificate No: **CD835V3-1133_Feb12**

CALIBRATION CERTIFICATE

Object **CD835V3 - SN: 1133**

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

Calibration date: **February 21, 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 H3DV6	SN: 6065	29-Dec-11 (No. H3-6065_Dec11)	Dec-12
DAE4	SN: 781	20-Apr-11 (No. DAE4-781_Apr11)	Apr-12

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

Calibrated by:	Name Dince Iliev	Function Laboratory Technician	Signature
Approved by:	Name Fin Bomholt	Function R&D Director	Signature

Issued: February 22, 2012

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TA Technology (Shanghai) Co., Ltd.

Test Report

Report No. RZA1203-0414HAC01R2

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



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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 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.

TA Technology (Shanghai) Co., Ltd.

Test Report

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Measurement Conditions

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

DASY Version	DASY5	V52.8.0
Extrapolation	Advanced Extrapolation	
Phantom	HAC Test Arch	
Distance Dipole Top - Probe Center	10mm	
Scan resolution	dx, dy = 5 mm	
Frequency	835MHz $\pm$ 1 MHz	
Input power drift	< 0.05 dB	

Maximum Field values

H-field 10 mm above dipole surface	condition	interpolated maximum
Maximum measured	100 mW input power	0.456 A / m $\pm$ 8.2 % (k=2)

E-field 10 mm above dipole surface	condition	Interpolated maximum
Maximum measured above high end	100 mW input power	161.4 V / m
Maximum measured above low end	100 mW input power	160.0 V / m
Averaged maximum above arm	100 mW input power	160.7 V / m $\pm$ 12.8 % (k=2)

Appendix

Antenna Parameters

Frequency	Return Loss	Impedance
800 MHz	15.7 dB	42.6 Ω - 13.5 $\mu\Omega$
835 MHz	25.2 dB	47.3 Ω + 4.7 $\mu\Omega$
900 MHz	17.9 dB	52.9 Ω - 12.8 $\mu\Omega$
950 MHz	20.7 dB	46.3 Ω + 8.2 $\mu\Omega$
960 MHz	15.5 dB	52.8 Ω + 17.3 $\mu\Omega$

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.

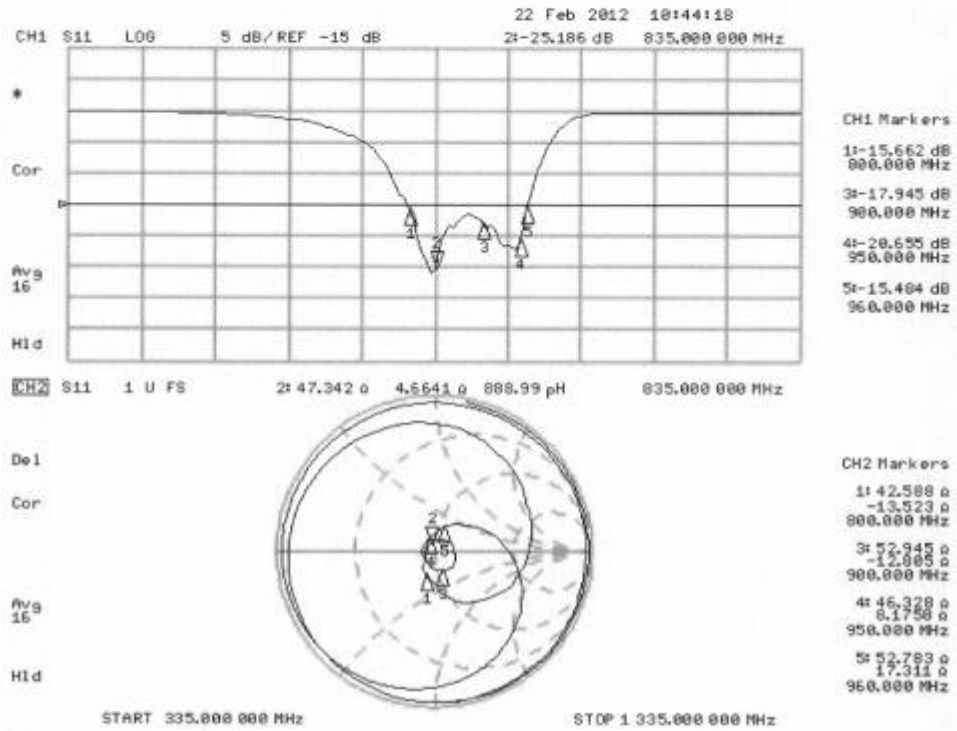
After long term use with 40W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

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Impedance Measurement Plot



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DASY5 H-field Result

Date: 21.02.2012

Test Laboratory: SPEAG Lab2

DUT: HAC-Dipole 835 MHz; Type: CD835V3; Serial: CD835V3 - SN: 1133

Communication System: CW; Frequency: 835 MHz
Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1$ kg/m³
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: 20.04.2011
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- DASY52 52.8.0(692); 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 = 0.00 dB

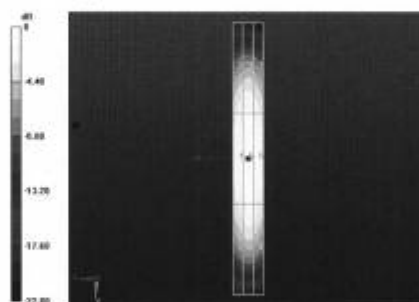
PMR not calibrated. PMF = 1.000 is applied.

H-field emissions = 0.46 A/m

Near-field category: M4 (AWF 0 dB)

PMF scaled H-field

Grid 1 M4 0.38 A/m	Grid 2 M4 0.40 A/m	Grid 3 M4 0.39 A/m
Grid 4 M4 0.43 A/m	Grid 5 M4 0.46 A/m	Grid 6 M4 0.44 A/m
Grid 7 M4 0.37 A/m	Grid 8 M4 0.40 A/m	Grid 9 M4 0.39 A/m



0 dB = 0.46A/m = -6.74 dB A/m

TA Technology (Shanghai) Co., Ltd.

Test Report

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DASY5 E-field Result

Date: 21.02.2012

Test Laboratory: SPEAG Lab2

DUT: HAC-Dipole 835 MHz; Type: CD835V3; Serial: CD835V3 - SN: 1133

Communication System: CW; Frequency: 835 MHz

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

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: 20.04.2011
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- DASY52 52.8.0(692); 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 = 104.5 V/m; Power Drift = 0.00 dB

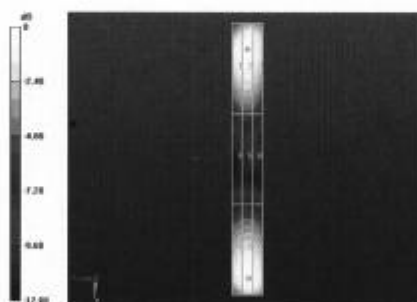
PMR not calibrated. PMF = 1.000 is applied.

E-field emissions = 161.4 V/m

Near-field category: M4 (AWF 0 dB)

PMF scaled E-field

Grid 1 M4 156.3 V/m	Grid 2 M4 161.4 V/m	Grid 3 M4 157.3 V/m
Grid 4 M4 86.05 V/m	Grid 5 M4 88.80 V/m	Grid 6 M4 86.30 V/m
Grid 7 M4 151.4 V/m	Grid 8 M4 160.0 V/m	Grid 9 M4 157.8 V/m



0 dB = 161.4V/m = 44.16 dB V/m

TA Technology (Shanghai) Co., Ltd.

Test Report

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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 **TA Shanghai (Auden)**

Certificate No: **CD1880V3-1115_Feb12**

CALIBRATION CERTIFICATE

Object **CD1880V3 - SN: 1115**

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

Calibration date: **February 21, 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 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	20-Apr-11 (No. DAE4-781_Apr11)	Apr-12
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:	Dimitre Iliev	Laboratory Technician	

Approved by:	Fin Bornholt	R&D Director
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Issued: February 22, 2012

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

Certificate No: CD1880V3-1115_Feb12

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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**

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.

TA Technology (Shanghai) Co., Ltd.

Test Report

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Measurement Conditions

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

DASY Version	DASY5	V52.8.0
Extrapolation	Advanced Extrapolation	
Phantom	HAC Test Arch	
Distance Dipole Top - Probe Center	10mm	
Scan resolution	dx, dy = 5 mm	
Frequency	1880MHz $\pm$ 1 MHz	
Input power drift	< 0.05 dB	

Maximum Field values

H-field 10 mm above dipole surface	condition	interpolated maximum
Maximum measured	100 mW input power	0.473 A / m $\pm$ 8.2 % (k=2)

E-field 10 mm above dipole surface	condition	Interpolated maximum
Maximum measured above high end	100 mW input power	143.4 V / m
Maximum measured above low end	100 mW input power	139.6 V / m
Averaged maximum above arm	100 mW input power	141.5 V / m $\pm$ 12.8 % (k=2)

Appendix

Antenna Parameters

Frequency	Return Loss	Impedance
1730 MHz	30.5 dB	52.6 Ω + 1.5 j Ω
1880 MHz	21.7 dB	46.1 Ω + 6.9 j Ω
1900 MHz	22.0 dB	47.6 Ω + 7.4 j Ω
1950 MHz	29.8 dB	49.9 Ω + 3.2 j Ω
2000 MHz	18.9 dB	41.3 Ω + 5.6 j Ω

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.

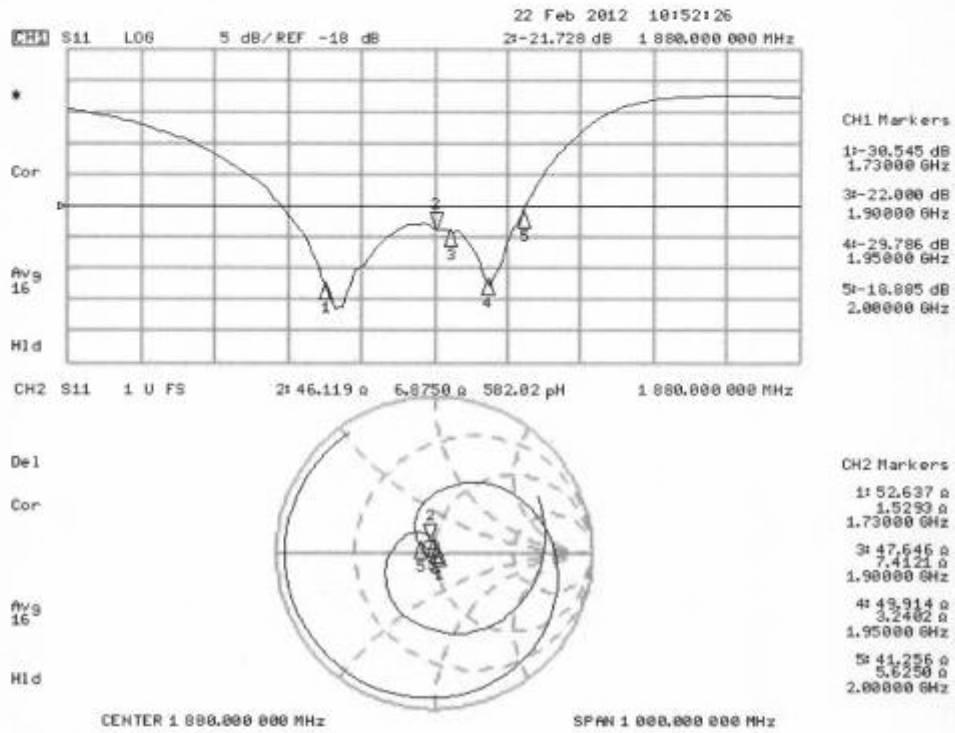
After long term use with 40W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

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Impedance Measurement Plot



TA Technology (Shanghai) Co., Ltd.

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DASY5 H-field Result

Date: 21.02.2012

Test Laboratory: SPEAG Lab2

DUT: HAC Dipole 1880 MHz; Type: CD1880V3; Serial: CD1880V3 - SN: 1115

Communication System: CW; Frequency: 1880 MHz

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1$ kg/m³

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: 20.04.2011
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- DASY52 52.8.0(692); 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 = 0.50 V/m; Power Drift = -0.01 dB

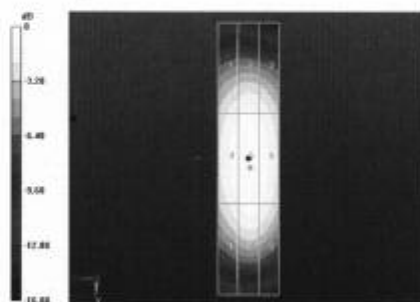
PMR not calibrated. PMF = 1.000 is applied.

H-field emissions = 0.47 A/m

Near-field category: M2 (AWF 0 dB)

PMF scaled H-field

Grid 1 M2 0.40 A/m	Grid 2 M2 0.43 A/m	Grid 3 M2 0.41 A/m
Grid 4 M2 0.45 A/m	Grid 5 M2 0.47 A/m	Grid 6 M2 0.46 A/m
Grid 7 M2 0.41 A/m	Grid 8 M2 0.44 A/m	Grid 9 M2 0.42 A/m



0 dB = 0.47A/m = -6.56 dB A/m

TA Technology (Shanghai) Co., Ltd.

Test Report

Report No. RZA1203-0414HAC01R2

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DASY5 E-field Result

Date: 21.02.2012

Test Laboratory: SPEAG Lab2

DUT: HAC Dipole 1880 MHz; Type: CD1880V3; Serial: CD1880V3 - SN: 1115

Communication System: CW; Frequency: 1880 MHz

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

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: 20.04.2011
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- DASY52 52.8.0(692); 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 = 161.1 V/m; Power Drift = -0.01 dB

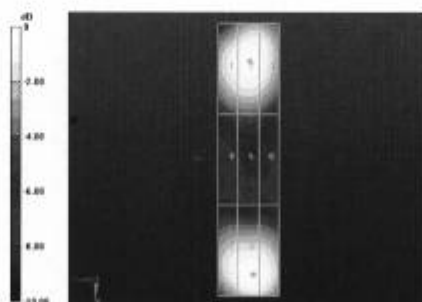
PMR not calibrated. PMF = 1.000 is applied.

E-field emissions = 143.4 V/m

Near-field category: M2 (AWF 0 dB)

PMF scaled E-field

Grid 1 M2 134.3 V/m	Grid 2 M2 139.6 V/m	Grid 3 M2 136.5 V/m
Grid 4 M3 90.34 V/m	Grid 5 M3 93.17 V/m	Grid 6 M3 89.93 V/m
Grid 7 M2 134.3 V/m	Grid 8 M2 143.4 V/m	Grid 9 M2 141.8 V/m



0 dB = 143.4V/m = 43.13 dB V/m

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

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ANNEX G: DAE4 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)

Accreditation No.: SCS 108

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

Client TA-SH (Auden)

Certificate No: DAE4-871_Nov11

CALIBRATION CERTIFICATE

Object DAE4 - SD 000 D04 BJ - SN: 871

Calibration procedure(s) QA CAL-06.v23
Calibration procedure for the data acquisition electronics (DAE)

Calibration date: November 22, 2011

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
Keithley Multimeter Type 2001	SN: 0810278	28-Sep-11 (No:11450)	Sep-12
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Calibrator Box V1.1	SE UMS 006 AB 1004	08-Jun-11 (in house check)	In house check: Jun-12

Calibrated by: Name Andrea Gunti Function Technician Signature

Approved by: Fin Bontholt R&D Director Signature

Issued: November 22, 2011

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

TA Technology (Shanghai) Co., Ltd.

Test Report

Report No. RZA1203-0414HAC01R2

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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.

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DC Voltage Measurement

A/D - Converter Resolution nominal

High Range: 1LSB = 6.1 μ 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	404.749 $\pm$ 0.1% (k=2)	404.733 $\pm$ 0.1% (k=2)	405.174 $\pm$ 0.1% (k=2)
Low Range	3.98175 $\pm$ 0.7% (k=2)	3.93601 $\pm$ 0.7% (k=2)	3.96830 $\pm$ 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	90.0 ° $\pm$ 1 °
---	------------------

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Appendix

1. DC Voltage Linearity

High Range	Reading (μV)	Difference (μV)	Error (%)
Channel X + Input	199991.9	-0.91	-0.00
Channel X + Input	20000.28	0.48	0.00
Channel X - Input	-19998.51	0.59	-0.00
Channel Y + Input	200003.0	1.24	0.00
Channel Y + Input	19999.67	0.17	0.00
Channel Y - Input	-20000.04	-0.34	0.00
Channel Z + Input	200010.1	-0.11	-0.00
Channel Z + Input	19999.33	-0.07	-0.00
Channel Z - Input	-20001.45	-0.85	0.00

Low Range	Reading (μV)	Difference (μV)	Error (%)
Channel X + Input	2000.0	0.05	0.00
Channel X + Input	199.81	-0.09	-0.04
Channel X - Input	-199.63	0.37	-0.19
Channel Y + Input	1999.9	-0.22	-0.01
Channel Y + Input	198.81	-1.19	-0.59
Channel Y - Input	-201.62	-1.72	0.86
Channel Z + Input	2000.4	0.48	0.02
Channel Z + Input	199.30	-0.70	-0.35
Channel Z - Input	-200.86	-1.06	0.53

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 (μV)	Low Range Average Reading (μV)
Channel X	200	14.43	13.13
	- 200	-12.22	-13.72
Channel Y	200	-10.07	-9.78
	- 200	9.61	8.66
Channel Z	200	-0.56	-0.83
	- 200	-0.01	0.11

3. Channel separation

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

	Input Voltage (mV)	Channel X (μV)	Channel Y (μV)	Channel Z (μV)
Channel X	200	-	3.08	0.09
Channel Y	200	3.19	-	4.59
Channel Z	200	0.90	-0.06	-

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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	15920	15519
Channel Y	16179	17567
Channel Z	15791	15270

5. Input Offset Measurement

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

Input 10M Ω

	Average (μ V)	min. Offset (μ V)	max. Offset (μ V)	Std. Deviation (μ V)
Channel X	0.03	-1.16	2.66	0.46
Channel Y	-0.63	-3.22	0.29	0.46
Channel Z	-0.87	-2.03	0.28	0.46

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