



A Test Lab Techno Corp.

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HAC EVALUATION REPORT



Test Report No.	: 1002FS13-05
Applicant	: HTC Corporation
Trade Name	: HTC
Model Number	: PB92110
EUT Type	: Smartphone
FCC ID	: NM8PB92110
Dates of Test	: Feb. 23, 2010 ~ Mar. 01, 2010
Test Environment	: Ambient Temperature : 22 ± 2 °C Relative Humidity : 40 - 70 %
FCC Rule Part(s)	: FCC 47 CFR § 20.19.
HAC Standard	: ANSI C63.19-2007
C63.19 HAC Rated Category	: M3 (RF EMISSIONS)
Test Lab.	: Chang-An Lab

1. The test operations have to be performed with cautious behavior, the test results are as attached.
2. The test results are under chamber environment of A Test Lab Techno Corp. A Test Lab Techno Corp. does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples.
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Sam Chuang
Approve Signer

20100409

Alex Wu
Testing Engineer

20100409

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1. Description of Equipment Under Test (EUT)

Applicant	:	HTC Corporation		
Applicant Address	:	No. 23, Xinghua Rd., Taoyuan City, Taoyuan County 330, Taiwan		
Manufacturer	:	HTC Corporation		
Manufacturer Address	:	No. 23, Xinghua Rd., Taoyuan City, Taoyuan County 330, Taiwan		
EUT Type	:	Smartphone		
Trade Name	:	HTC		
Model Number	:	PB92110		
FCC ID	:	NM8PB92110		
Time-Avg Output Power	:	2.094 W	(33.21 dBm)	GSM 850_1 st
	:	1.074 W	(30.31 dBm)	PCS 1900_1 st
	:	0.239 W	(23.79 dBm)	WCDMA Band II_1 st
	:	0.231 W	(23.63 dBm)	WCDMA Band V_1 st
	:	1.982 W	(32.97 dBm)	GSM 850_2 nd
	:	1.012 W	(30.05 dBm)	PCS 1900_2 nd
	:	0.226 W	(23.54 dBm)	WCDMA Band II_2 nd
	:	0.229 W	(23.59 dBm)	WCDMA Band V_2 nd
Tx Frequency	:	824.2	- 848.8	MHz (GSM 850)
	:	1850.2	- 1909.8	MHz (PCS 1900)
	:	826.6	- 846.4	MHz (WCDMA Band V)
	:	1852.6	- 1907.4	MHz (WCDMA Band II)
HW Version	:	XB		
SW Version	:	0.85.502.0		
Antenna Type	:	Fixed Internal		
Test Device	:	Production Unit		
Device Category	:	Portable		

This wireless portable device has performed Hearing Aid Compatibility (HAC) measurements for the portable cellular phone. The measurements were performed to ensure compliance to the ANSI C63.19-2006 standards.

Difference Description of EUT

The model (HTC PB92110) have different components source. The other circuit designed is the same.

Sample No.1 & Sample No.2 is use difference components (list below).

Component Name	Component Model No.	
	Sample 1 st	Sample 2 nd
Camera	Liteon / 09P1BA510	Primax / NBRB92



2. Introduction

The A Test Lab Techno Corp. has performed measurements of the maximum potential exposure to the user of **HTC Corporation Trade Name: HTC Model(s) : PB92110**. The test procedures, as described in ANSI C63.19-2006 standard were employed. A description of the product and operating configuration, detailed summary of the test results, methodology and procedures used in the equipment are included within this test report.

3. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	Dosimetric E-Filed Probe	ER3DV6	2256	Aug. 21, 2009	Aug. 21, 2010
SPEAG	Dosimetric H-Filed Probe	H3DV6	6076	Aug. 19, 2009	Aug. 19, 2010
SPEAG	835 MHz System Validation Kit	CD835V3	1017	Jul. 14, 2009	Jul. 14, 2010
SPEAG	1880 MHz System Validation Kit	CD1880V3	1036	Jul. 15, 2009	Jul. 15, 2010
SPEAG	Data Acquisition Electronics	DAE3	393	Aug. 24, 2009	Aug. 24, 2010
SPEAG	Device Holder	N/A	N/A	NCR	
SPEAG	Phantom	SAM V4.0	TP-1150	NCR	
SPEAG	Robot	Staubli TX90XL	F07/564ZA1/C/01	NCR	
SPEAG	Software	DASY5 V5.0 Build 91	N/A	NCR	
SPEAG	Software	SEMCAD X V12.4 Build 52	N/A	NCR	
SPEAG	Measurement Server	SE UMS 011 AA	1025	NCR	
Agilent	Wireless Communication Test Set	CMU200	109369	Jul. 29, 2009	Jul. 29, 2011
Agilent	Spectrum Analyzer(ESA-L)	E4408B	MY45107753	Jun. 23, 2009	Jun. 23, 2011
R&S	Spectrum Analyzer(FSL)	FSL6	100410	Mar. 25, 2009	Mar. 25, 2011
Agilent	Power Meter	E4418B	GB40206143	Jun. 18, 2009	Jun. 18, 2010
Agilent	Signal Generator	E8257D	MY44320425	NCR	
R&S	Power Sensor	8481H	3318A20779	Jun. 18, 2009	Jun. 18, 2010
Agilent	Dual Directional Coupler	778D	50334	NCR	
Mini-Circuits	Power Amplifier	ZVE-8G	D042005 671800514	NCR	
Mini-Circuits	Power Amplifier	ZHL-42W-SMA	D111103#5	NCR	

Table 1. Test Equipment List



4. Validation

Validations of the DASY5 v5.0 test system were performed using the measurement equipment listed in Section 3. All validations occur in free space using the DASY5 test arch. Note that the 10mm probe to dipole separation is measured from the top edge of the dipole to the calibration reference point of the probe. SPEAG uses the center point of the probe sensor(s) as the reference point when establishing targets for their dipoles. Therefore, because SPEAG's dipoles and targets are used, it is appropriate to measure the 10mm separation distance to the center of the sensors as they do. This reference point was used for validation only. Validations were performed at 835 MHz and/or 1880 MHz. These frequencies are within each operating band and are within 2MHz of the mid-band frequency of the test device.

Validations were performed to verify that measured E-field and H-field values are within +/- 25% from the target reference values provided by the manufacturer (Ref: Appendix D). Per Section 4.2.2.1 of the standard, "Values within +/-25% are acceptable, of which 12% is deviation and 13% is measurement uncertainty." Therefore, the E-Field and H-Field dipole verification results, shown in Table 2 & 3, are in accordance with the acceptable parameters defined by the standard.

Dipole	Freq. (MHz)	Protocol	Input Power (mW)	Target for Dipole (V/m)	E-Field Results (V/m)	Deviation	Date
SN:1017	835	CW	100	159.6	175.3	9.8%	Feb. 23, 2010
SN:1017	835	CW	100	159.6	174.6	9.4%	Mar. 01, 2010
SN:1036	1880	CW	100	137.5	143.4	4.3%	Feb. 23, 2010
SN:1036	1880	CW	100	137.5	147.7	7.2%	Mar. 01, 2010

Table 2. Dipole E-Field Measurement Summary

Dipole	Freq. (MHz)	Protocol	Input Power (mW)	Target for Dipole (A/m)	H-Field Results (A/m)	Deviation	Date
SN:1017	835	CW	100	0.457	0.444	-2.8%	Feb. 23, 2010
SN:1017	835	CW	100	0.457	-0.044	6.8%	Mar. 01, 2010
SN:1036	1880	CW	100	0.474	0.441	-7.0%	Feb. 23, 2010
SN:1036	1880	CW	100	0.474	0.458	-3.4%	Mar. 01, 2010

Table 3. Dipole H-Field Measurement Summary

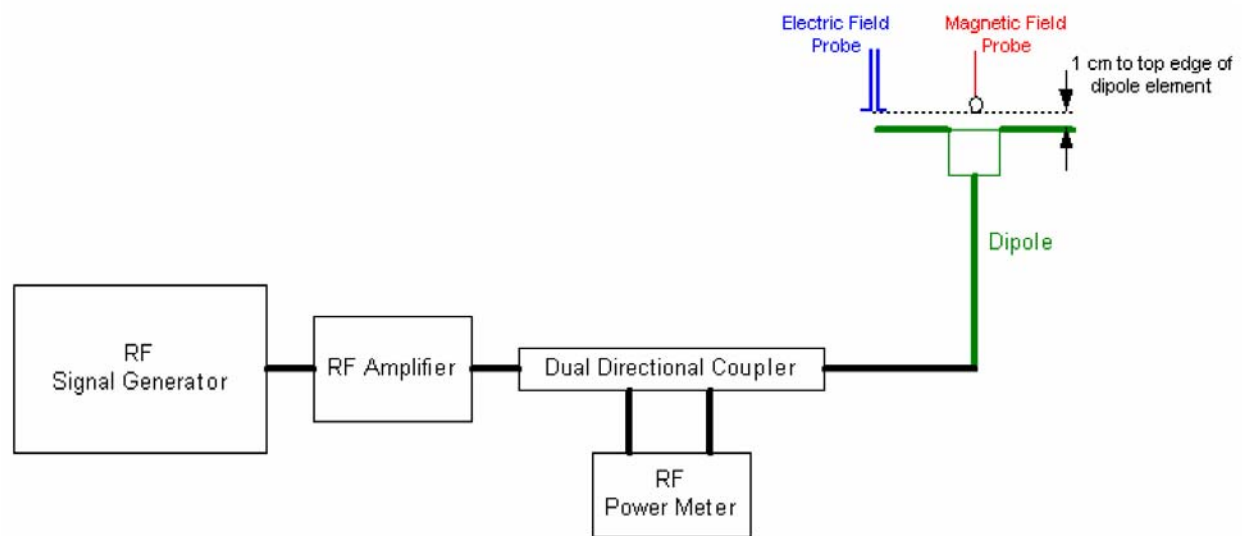


Figure 1. WD dipole calibration procedure

5. Probe Modulation Factor

After every probe calibration, the response of the probe to each applicable modulated signal (CDMA, GSM, WCDMA (UMTS), etc) must be assessed at both 835 MHz, 1880 MHz. 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. For each PMF assessment, a Signal Generator was used to replace the original CW signal with the desired modulated signal. The PMF results are shown in Table 4. RF Field Probe Modulation Response was measured with the field probe and associated measurement equipment. The PMF was measured per ANSI C63.19-2006 using a signal generator as follows:

1. Illuminate a dipole with a CW signal at the intended measured frequency.
2. Fix the probe at a set location relative to the dipole; typically located at the field reference point.
3. Record the reading of the probe measurement system of the CW signal.
4. Substitute a modulated signal of the same amplitude, using the same modulation as that used by the intended WD for the CW signal.
5. Record the reading of the probe measurement system of the modulated signal.
6. The ratio of the CW to modulated signal reading is the probe modulation factor.
7. Spectrum analyzer settings:
 - Center Frequency: nominal center frequency of channel
 - Span: zero
 - Resolution bandwidth $\geq$ emission bandwidth
 - Video bandwidth $\geq$ 20 kHz.
 - Detection: RMS detection.
 - Trigger: Video or IF trigger, adjusted to give a stable display of the transmission.
 - Sweep rate: Set to show a complete transmission cycle.
 - Line max hold may be used temporarily to ease the peak reading.

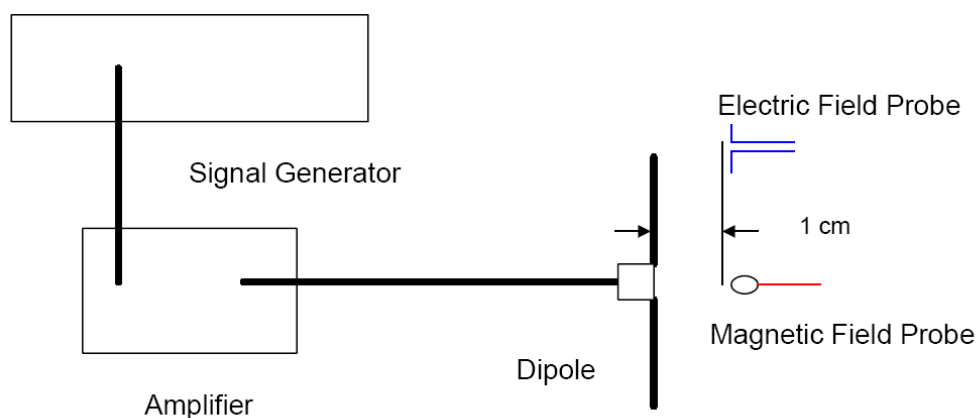


Figure 2. Dipole calibration procedure

Formula between PMF and test results

1. HAC test of device and determine the maximum value (M) of grids.
2. Determine the value (P) of PMF according to (M).
3. Find the maximum value (F) from the other data.

$$R = P * F$$

Example:

E-Field Maximum value (M) = 52, Maximum value (F) = 51.8, PMF (P) = 2.82

$R = 51.8 * 2.82 = 146.076 \text{ V/m}$

Frequency (MHz)	Protocol	E-Field Probe SN:2302		H-Field Probe SN:6187	
		E-Field (V/m)	E-Field Modulation Factor	H-Field (A/m)	H-Field Modulation Factor
835.0	GSM	< 47	2.53	< 0.14	1.81
		47 - 63	2.54	0.14 - 0.19	2.12
		63 - 84	2.54	0.19 - 0.25	2.37
		84 - 112	2.55	0.25 - 0.34	2.57
		112 - 150	2.56	0.34 - 0.45	2.68
		150 - 200	2.56	0.45 - 0.60	2.71
		200 - 266	2.57	0.60 - 0.80	2.64
		266 - 355	2.57	0.80 - 1.07	2.49
		355 - 473	2.58	1.07 - 1.43	2.26
		473 - 631	2.58	1.43 - 1.91	1.98
		631 - 841	2.59	1.91 - 2.54	1.67
		841 - 1122	2.60	2.54 - 3.39	1.36
1880.0	GSM	< 47	2.53	< 0.14	2.63
		47 - 63	2.52	0.14 - 0.19	2.59
		63 - 84	2.51	0.19 - 0.25	2.54
		84 - 112	2.50	0.25 - 0.34	2.44
		112 - 150	2.49	0.34 - 0.45	2.32
		150 - 200	2.48	0.45 - 0.60	2.18
		200 - 266	2.47	0.60 - 0.80	2.02
		266 - 355	2.46	0.80 - 1.07	1.92
		355 - 473	2.45	1.07 - 1.43	1.73
		473 - 631	2.44	1.43 - 1.91	1.54
		631 - 841	2.43	1.91 - 2.54	1.36
		841 - 1122	2.42	2.54 - 3.39	1.17

Frequency (MHz)	Protocol	E-Field Probe SN:2302		H-Field Probe SN:6187	
		E-Field (V/m)	E-Field Modulation Factor	H-Field (A/m)	H-Field Modulation Factor
835.0	WCDMA(UMTS)	< 47	1.07	< 0.14	0.86
		47 - 63	1.04	0.14 - 0.19	0.86
		63 - 84	1.01	0.19 - 0.25	0.85
		84 - 112	0.98	0.25 - 0.34	0.83
		112 - 150	0.95	0.34 - 0.45	0.81
		150 - 200	0.92	0.45 - 0.60	0.78
		200 - 266	0.89	0.60 - 0.80	0.75
		266 - 355	0.87	0.80 - 1.07	0.72
		355 - 473	0.84	1.07 - 1.43	0.68
		473 - 631	0.82	1.43 - 1.91	0.64
		631 - 841	0.79	1.91 - 2.54	0.61
		841 - 1122	0.77	2.54 - 3.39	0.56
1880.0	WCDMA(UMTS)	< 47	0.90	< 0.14	0.81
		47 - 63	0.89	0.14 - 0.19	0.76
		63 - 84	0.89	0.19 - 0.25	0.71
		84 - 112	0.89	0.25 - 0.34	0.65
		112 - 150	0.89	0.34 - 0.45	0.59
		150 - 200	0.89	0.45 - 0.60	0.52
		200 - 266	0.89	0.60 - 0.80	0.46
		266 - 355	0.89	0.80 - 1.07	0.39
		355 - 473	0.89	1.07 - 1.43	0.33
		473 - 631	0.88	1.43 - 1.91	0.28
		631 - 841	0.88	1.91 - 2.54	0.23
		841 - 1122	0.88	2.54 - 3.39	0.19

Table 4. PMF Measurement Summary

Note: PMF measurements were verified at WD's power as an input to the dipole.



6. Test Results

The phone was tested in all normal configurations for the ear use. A DUT is mounted in the device holder equivalent as for classic dosimetric measurements. The acoustic output of the DUT 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 DUT shall be moved vertically upwards until it touches the frame. The fine adjustment is possible by sliding the complete DUT holder 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.

CDMA Devices setup for HAC Measurement.

The signal was setup by creating and maintaining an over the coaxial connection between the DUT and an R&S CMU200 Wireless Communications Test Set. The CDMA radio is available on CDMA 2000(1X) and IS-95. The test equipment was configured to use "all up bits" for RC1 / SO2 on J-STD-008 for CDMA 1900 and TSB-84 for CDMA 800 MHz. The Wideband and Zero Span spectrum analyzer plots are shown in Appendix A.

The DASY5 v5.0 measurement system specified in section 3.1 was utilized within the intended operations as set by the SPEAG™ setup. The default settings for the grid spacing of the scan were set to 5mm as shown in the Field plots included in Appendix B and C. The 5cm x 5cm area measurement grid is centered on the acoustic output of the device. The Test Arch provided by SPEAG is used to position the DUT. The WD reference plane is parallel to the device and contains the highest point on its contour in the area of the phone that normally rests against the user's ear. The measurement plane contains the nearest point on the probe sensor(s) relative to the WD. The pictures of the setup are included in 7.3.

WCDMA Devices setup for HAC Measurement.

The following procedures are applicable to WCDMA handsets operating under 3GPP Release 99 and Release 5. The default test configuration is to measure HAC with an established radio link between the DUT and a communication test set using a 12.2 kbps RMC (reference measurement channel) configured in Test Loop Mode 1. HAC is selectively confirmed for other physical channel configurations (DPCH & DPDCH_n) according to output power, exposure conditions and device operating capabilities. Both uplink and downlink should be configured with the same RMC or AMR, when required. Maximum output power is verified according to 3GPP TS 34.121 and HAC must be measured according to these maximum output conditions.

HSDPA Devices setup for HAC Measurement.

Body HAC is not required for handsets with HSDPA capabilities when the maximum average output of each RF channel with HSDPA active is less than ¼ dB higher than that measured without HSDPA using 12.2 kbps RMC. Otherwise, HAC is measured for HSDPA, using FRC, with the body exposure configuration that results in the highest HAC in 12.2 RMC for that RF channel.

The device is positioned such that the WD reference plane is located 10mm from, and parallel to, the measurement plane. This is in accordance with section 4.3 of the standard, which states that “The WD reference plane is a plane parallel with the front “face” of the WD and containing the highest point on its contour in the area of the phone that normally rests against the user’s ear.”

The following figure shows the position of the measurement grid with respect to a typical device under test.

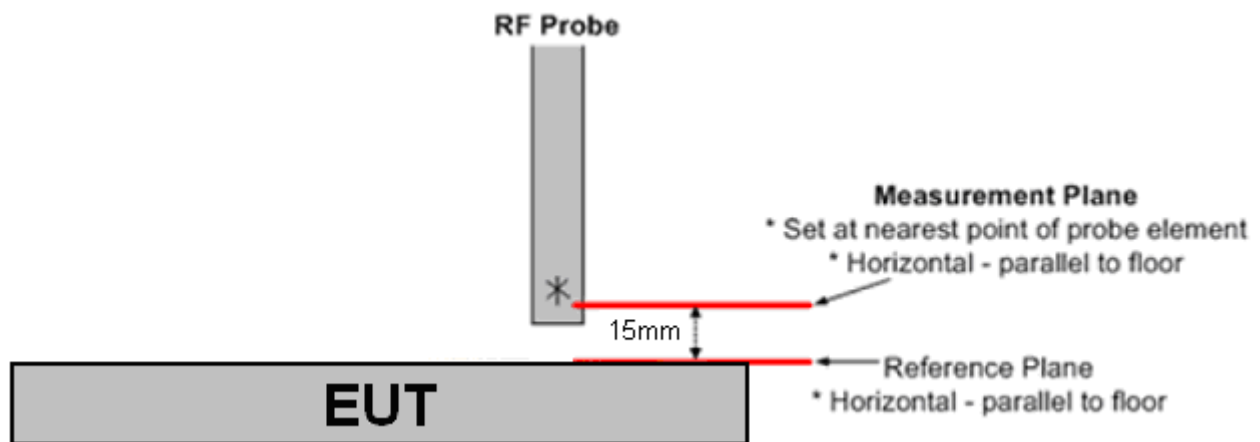


Figure 3. Clarification of Figure A-2 from the Standard

The HAC Rating results for E-Field and H-field are shown in 7.1 and 7.2. Also shown are the measured conducted output powers, the measured drifts, excluded areas, and the peak fields. PMF measurements are taken from Section 5. The worst-case test conditions are indicated with bold numbers in the tables and are detailed in Appendix C: HAC distribution plots for E-Field and H-Field.

Drift was measured using the typical DASY5 v5.0 measurement routines. The field is measured at the reference location (center of the ear piece) at the beginning of the test. Then after completion of the E or H field measurement, the probe returns to the same reference location and takes another measurement. The drift is the delta between these two values and is included in the test report scans.

The cellular phone model covered by this report has the following battery options:

Battery : BB92100 (3.7V 1200mAh)

6.1 HAC E-Field measurement results:

Band	Rating	E-Field
GSM 850	M3	149.6 to 266.1 V/m
	M4	< 149.6 V/m
PCS 1900	M3	47.3 to 84.1 V/m
	M4	< 47.3 V/m
WCDMA Band V	M3	199.5 to 354.8
	M4	< 199.5
WCDMA Band II	M3	63.1 to 112.2
	M4	< 63.1

Table 5. Emissions Limits

Band	Channel	Conducted Power (dBm)	Measured PMF	Drift (dB)	Excluded Cells	Peak Field (V/m)	Rating	Note
GSM 850	128	32.93	2.57	-0.018	2.3.6	240.5	M3	1 st
	190	32.89	2.57	-0.030	2.3.6	244.9	M3	1 st
	190	32.97	2.57	-0.012	2.3.6	252.3	M3	2 nd
	251	33.21	2.57	0.016	2.3.6	235.0	M3	1 st
PCS 1900	512	29.95	2.50	-0.053	7.8.9	82.6	M3	1 st
	512	30.05	2.50	-0.047	7.8.9	81.0	M3	2 nd
	661	30.31	2.50	-0.046	7.8.9	81.9	M3	1 st
	810	29.88	2.50	0.047	7.8.9	81.6	M3	1 st
WCDMA Band II	9262	23.43	0.90	-0.182	7.8.9	43.9	M4	1 st
	9262	23.54	0.89	-0.115	7.8.9	39.7	M4	2 nd
	9400	23.79	0.90	-0.0048	7.8.9	41.5	M4	1 st
	9537	23.49	0.89	-0.180	7.8.9	43.3	M4	1 st
WCDMA Band V	4132	23.48	0.98	0.079	2.3.6	98.7	M4	1 st
	4132	23.59	0.98	0.014	2.3.6	94.0	M4	2 nd
	4180	23.43	0.98	-0.023	2.3.6	87.3	M4	1 st
	4233	23.63	0.98	-0.0087	2.3.6	92.9	M4	1 st

Note:

1. HAC E-Field measurement results for the portable cellular telephone at highest possible output power.

6.2 HAC H-Field measurement results:

Band	Rating	H-Field
GSM 850	M3	0.45 to 0.80 A/m
	M4	< 0.45 A/m
PCS 1900	M3	0.14 to 0.25 A/m
	M4	<0.14 A/m
WCDMA Band V	M3	0.60 to 1.07
	M4	< 0.60
WCDMA Band II	M3	0.19 to 0.34
	M4	< 0.19

Table 6. Emissions Limits

Band	Channel	Conducted Power (dBm)	Measured PMF	Drift (dB)	Excluded Cells	Peak Field (A/m)	Rating	Note
GSM 850	128	32.93	2.71	-0.090	1.4.7	0.341	M4	1 st
	190	32.97	2.71	-0.019	1.4.7	0.347	M4	1 st
	190	32.89	2.71	-0.079	1.4.7	0.352	M4	2 nd
	251	33.21	2.18	0.057	1.4.7	0.271	M4	1 st
PCS 1900	512	29.95	2.44	0.061	7.8.9	0.221	M3	1 st
	661	30.31	2.44	0.022	7.8.9	0.219	M3	1 st
	810	29.88	2.44	0.032	7.8.9	0.222	M3	1 st
	810	29.98	2.44	0.00354	7.8.9	0.211	M3	2 nd
WCDMA Band II	9262	23.43	0.81	-0.048	7.8.9	0.107	M4	1 st
	9262	23.54	0.81	-0.138	7.8.9	0.101	M4	2 nd
	9400	23.79	0.81	-0.172	7.8.9	0.097	M4	1 st
	9538	23.49	0.81	-0.078	7.8.9	0.105	M4	1 st
WCDMA Band V	4132	23.48	0.86	-0.00379	1.4.7	0.111	M4	1 st
	4132	23.59	0.86	-0.039	1.4.7	0.106	M4	2 nd
	4180	23.43	0.86	-0.00181	1.4.7	0.099	M4	1 st
	4233	23.63	0.86	-0.023	1.4.7	0.109	M4	1 st

Note:

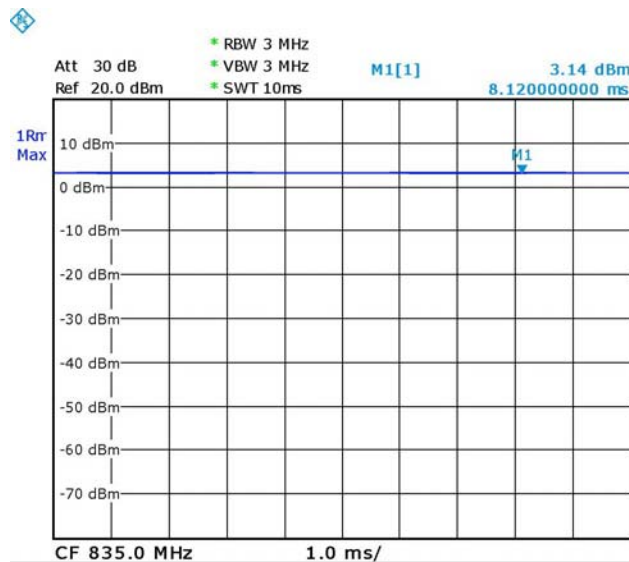
1. HAC H-Field measurement results for the portable cellular telephone at highest possible output power.

6.3 Description of the Device under Test (DUT)

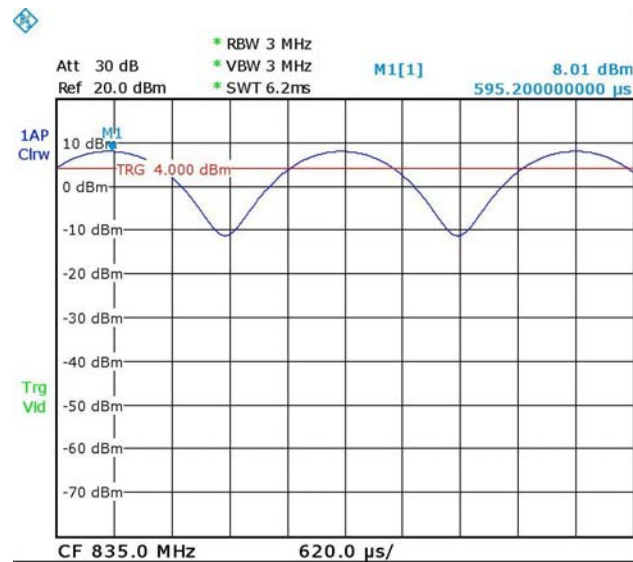
Modes and Bands of Operation	GSM 850	PCS 1900	WCDMA Band V	WCDMA Band II
Modulation Mode	GMSK	GMSK	QPSK	QPSK
Duty Cycle	1/8.3	1/8.3	1/1	1/1
Transmitter Frequency Range (MHz)	824.2 - 848.8	1850.2 -1909.8	826.6 - 846.4	1852.6 - 1907.4

Appendix A - Details of WD signal

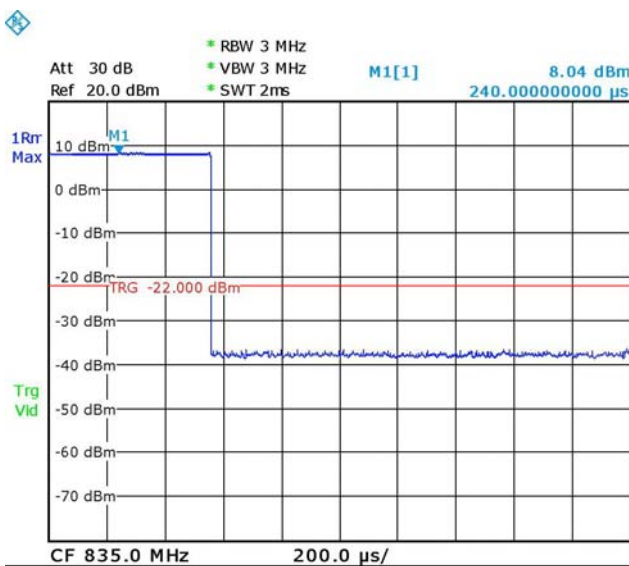
GSM 835 MHz



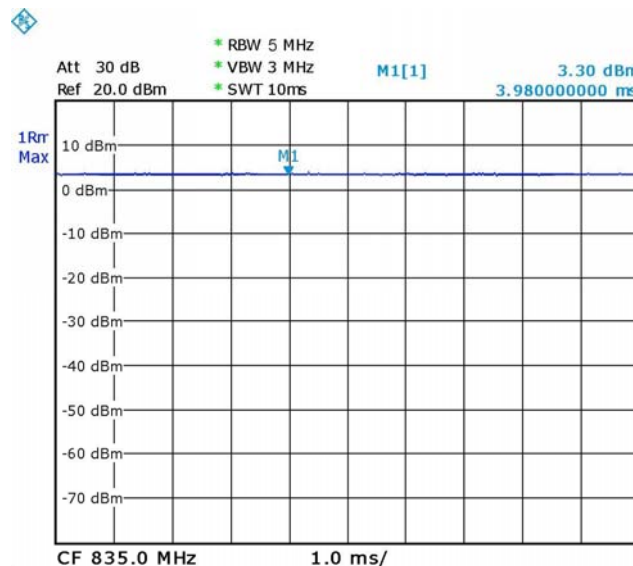
CW Signal



AM80%

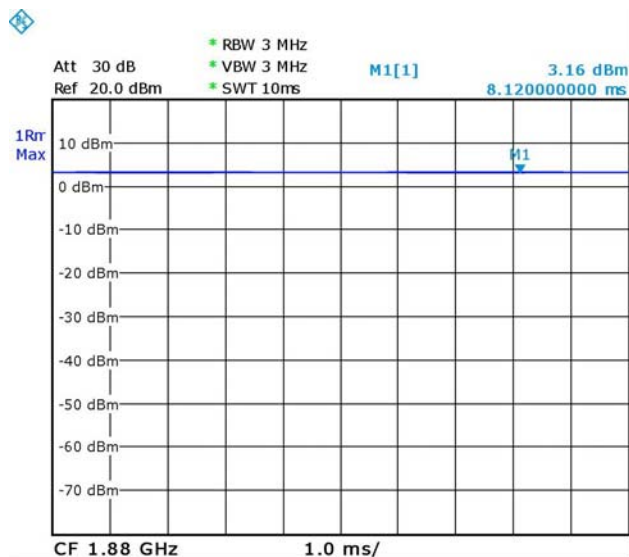


GSM Signal

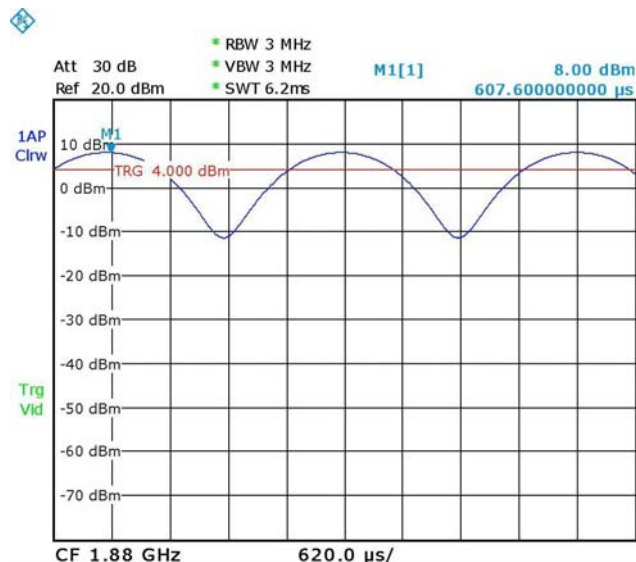


WCDMA Signal

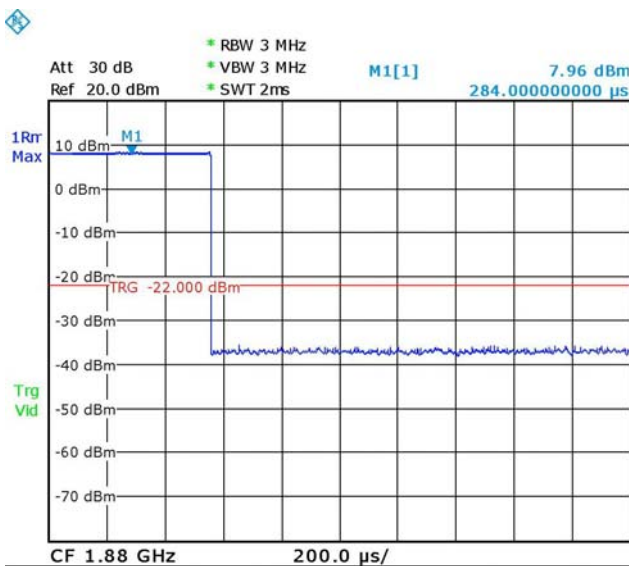
1880 MHz



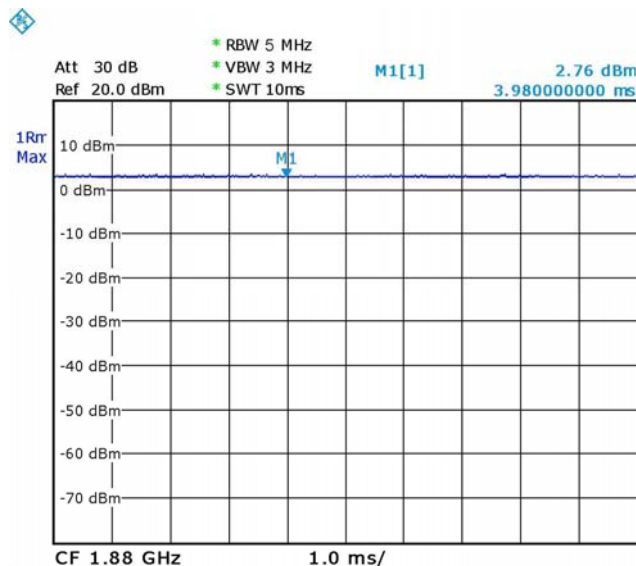
CW Signal



AM80%



GSM Signal



WCDMA Signal



Appendix B - Validation

See following Attached Pages for HAC distribution plots for E-Field and H-Field.



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 2/23/2010 8:15:34 AM

HAC_System Performance Check at 835MHz_20100223_E

DUT: Dipole 835 MHz; Type: CD835V3; Serial: CD835V3 - SN:1017

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

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

Phantom section: E Dipole Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: ER3DV6 - SN2256; ConvF(1, 1, 1); Calibrated: 8/21/2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/21/2010
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1038
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

E Scan - ER3DV6 - 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 = 175.3 V/m

Probe Modulation Factor = 1

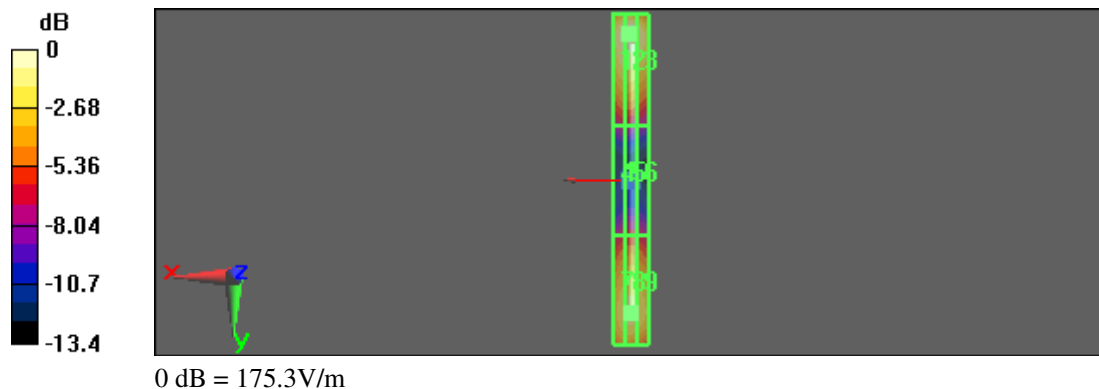
Device Reference Point: 0, 0, 354.7 mm

Reference Value = 115.7 V/m; Power Drift = 0.00355 dB

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

Peak E-field in V/m

Grid 1 172.0 M4	Grid 2 175.3 M4	Grid 3 163.7 M4
Grid 4 81.9 M4	Grid 5 84.2 M4	Grid 6 81.1 M4
Grid 7 145.3 M4	Grid 8 150.1 M4	Grid 9 144.3 M4





Test Laboratory: A Test Lab Techno Corp.

Date/Time: 3/1/2010 2:17:19 PM

HAC_System Performance Check at 835MHz_20100301_E

DUT: Dipole 835 MHz; Type: CD835V3; Serial: CD835V3 - SN:1017

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

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

Phantom section: E Dipole Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: ER3DV6 - SN2256; ConvF(1, 1, 1); Calibrated: 8/21/2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/21/2010
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1038
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

E Scan - ER3DV6 - 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 = 174.6 V/m

Probe Modulation Factor = 1

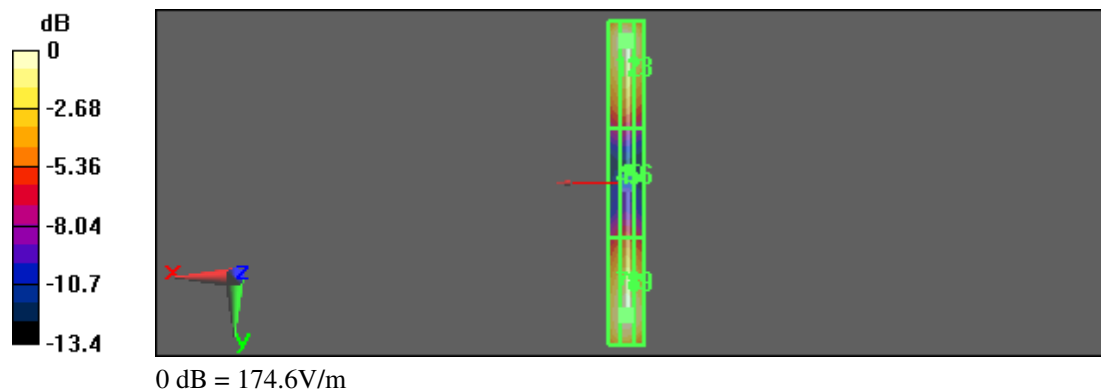
Device Reference Point: 0, 0, 354.7 mm

Reference Value = 128.6 V/m; Power Drift = -0.035 dB

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

Peak E-field in V/m

Grid 1 169.3 M4	Grid 2 174.6 M4	Grid 3 162.7 M4
Grid 4 88.7 M4	Grid 5 91.4 M4	Grid 6 87.2 M4
Grid 7 165.6 M4	Grid 8 171.3 M4	Grid 9 163.4 M4





Test Laboratory: A Test Lab Techno Corp.

Date/Time: 2/23/2010 8:30:38 AM

HAC_System Performance Check at 835MHz_20100223_H

DUT: Dipole 835 MHz; Type: CD835V3; Serial: CD835V3 - SN:1017

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

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

Phantom section: H Dipole Section

Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

- Probe: H3DV6 - SN6076; ; Calibrated: 8/19/2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/21/2010
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1038
- Measurement SW: DASYS, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

H Scan - H3DV6 - 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 = 0.444 A/m

Probe Modulation Factor = 1

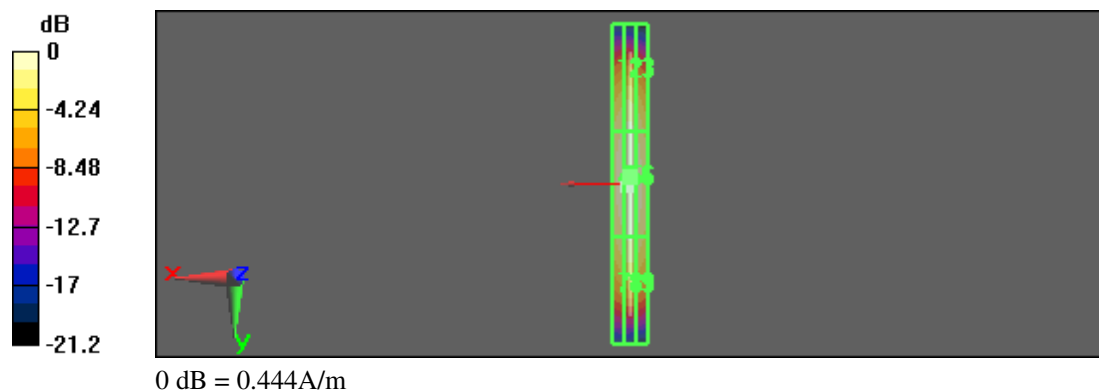
Device Reference Point: 0, 0, 354.7 mm

Reference Value = 0.470 A/m; Power Drift = -0.00856 dB

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

Peak H-field in A/m

Grid 1 0.384 M4	Grid 2 0.398 M4	Grid 3 0.377 M4
Grid 4 0.424 M4	Grid 5 0.444 M4	Grid 6 0.422 M4
Grid 7 0.368 M4	Grid 8 0.386 M4	Grid 9 0.370 M4





Test Laboratory: A Test Lab Techno Corp.

Date/Time: 3/1/2010 1:54:41 PM

HAC_System Performance Check at 835MHz_20100301_H

DUT: Dipole 835 MHz; Type: CD835V3; Serial: CD835V3 - SN:1017

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

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

Phantom section: H Dipole Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: H3DV6 - SN6076; ; Calibrated: 8/19/2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/21/2010
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1038
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

H Scan - H3DV6 - 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 = 0.488 A/m

Probe Modulation Factor = 1

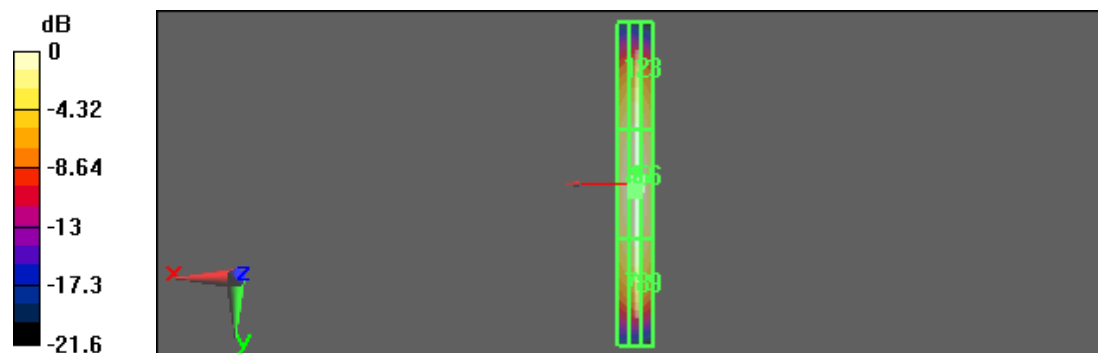
Device Reference Point: 0, 0, 354.7 mm

Reference Value = 0.521 A/m; Power Drift = -0.044 dB

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

Peak H-field in A/m

Grid 1 0.415 M4	Grid 2 0.432 M4	Grid 3 0.404 M4
Grid 4 0.467 M4	Grid 5 0.488 M4	Grid 6 0.461 M4
Grid 7 0.412 M4	Grid 8 0.434 M4	Grid 9 0.411 M4



0 dB = 0.488 A/m

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 2/23/2010 7:33:32 AM

HAC_System Performance Check at 1880MHz_20100223_E

DUT: Dipole 1880 MHz; Type: CD1880V3; Serial: CD1880V3 - SN:1036

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

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

Phantom section: E Dipole Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: ER3DV6 - SN2256; ConvF(1, 1, 1); Calibrated: 8/21/2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/21/2010
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1038
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

E Scan - ER3DV6 - measurement distance from the probe sensor center to CD1880

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

dx=5mm, dy=5mm

Maximum value of peak Total field = 143.4 V/m

Probe Modulation Factor = 1

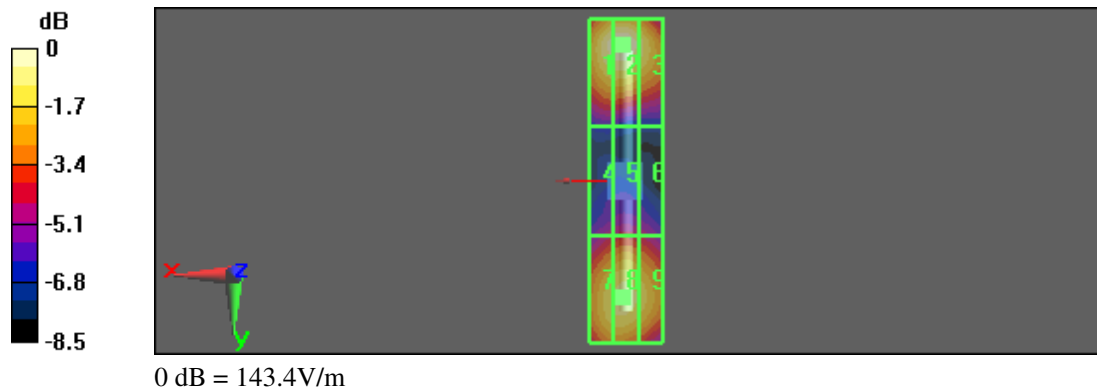
Device Reference Point: 0, 0, 354.7 mm

Reference Value = 134.8 V/m; Power Drift = -0.064 dB

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

Peak E-field in V/m

Grid 1 140.3 M2	Grid 2 143.4 M2	Grid 3 132.5 M2
Grid 4 84.8 M3	Grid 5 88.3 M3	Grid 6 85.4 M3
Grid 7 127.2 M2	Grid 8 130.4 M2	Grid 9 124.9 M2



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 3/1/2010 2:52:18 PM

HAC_System Performance Check at 1880MHz_20100301_E

DUT: Dipole 1880 MHz; Type: CD1880V3; Serial: CD1880V3 - SN:1036

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

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

Phantom section: E Dipole Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: ER3DV6 - SN2256; ConvF(1, 1, 1); Calibrated: 8/21/2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/21/2010
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1038
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

E Scan - ER3DV6 - 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 = 147.4 V/m

Probe Modulation Factor = 1

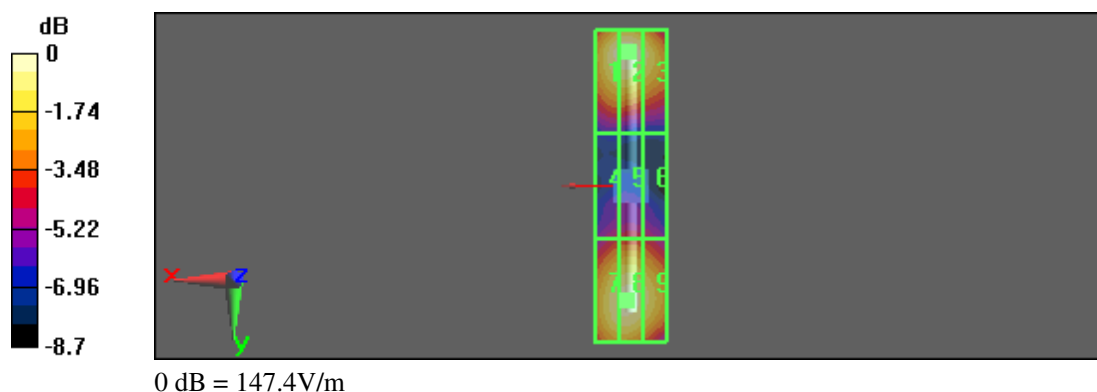
Device Reference Point: 0, 0, 354.7 mm

Reference Value = 146.6 V/m; Power Drift = -0.016 dB

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

Peak E-field in V/m

Grid 1 143.8 M2	Grid 2 147.4 M2	Grid 3 135.9 M2
Grid 4 90.4 M3	Grid 5 93.8 M3	Grid 6 90.1 M3
Grid 7 139.8 M2	Grid 8 142.8 M2	Grid 9 134.7 M2



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 2/23/2010 7:09:16 AM

HAC_System Performance Check at 1880MHz_20100223_H

DUT: Dipole 1880 MHz; Type: CD1880V3; Serial: CD1880V3 - SN:1036

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

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

Phantom section: H Dipole Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: H3DV6 - SN6076; ; Calibrated: 8/19/2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/21/2010
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1038
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

H Scan - H3DV6 - measurement distance from the probe sensor center to CD1880

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

dx=5mm, dy=5mm

Maximum value of peak Total field = 0.441 A/m

Probe Modulation Factor = 1

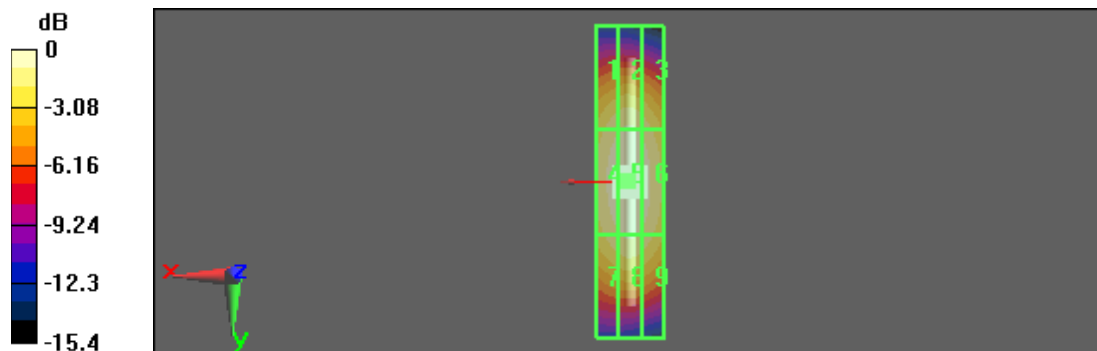
Device Reference Point: 0, 0, 354.7 mm

Reference Value = 0.467 A/m; Power Drift = -0.045 dB

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

Peak H-field in A/m

Grid 1	Grid 2	Grid 3
0.388 M2	0.403 M2	0.381 M2
Grid 4	Grid 5	Grid 6
0.424 M2	0.441 M2	0.420 M2
Grid 7	Grid 8	Grid 9
0.386 M2	0.401 M2	0.384 M2



0 dB = 0.441 A/m

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 3/1/2010 3:02:12 PM

HAC_System Performance Check at 1880MHz_20100301_H

DUT: Dipole 1880 MHz; Type: CD1880V3; Serial: CD1880V3 - SN:1036

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

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

Phantom section: H Dipole Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: H3DV6 - SN6076; ; Calibrated: 8/19/2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/21/2010
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1038
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

H Scan - H3DV6 - measurement distance from the probe sensor center to CD1880

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

dx=5mm, dy=5mm

Maximum value of peak Total field = 0.458 A/m

Probe Modulation Factor = 1

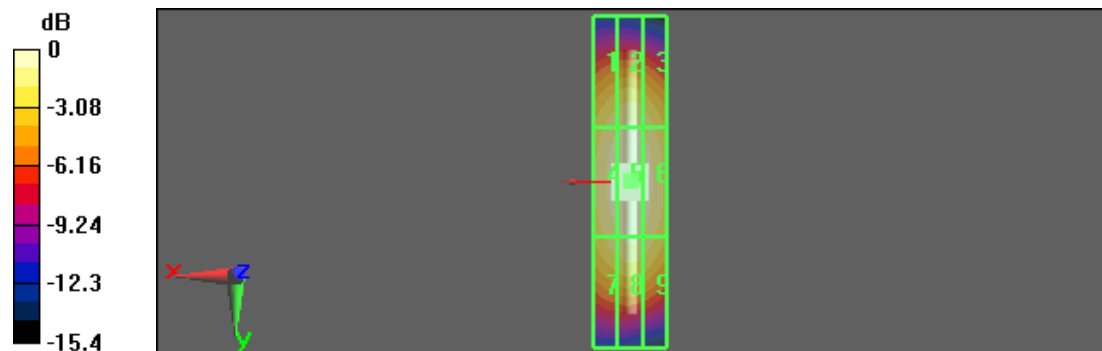
Device Reference Point: 0, 0, 354.7 mm

Reference Value = 0.484 A/m; Power Drift = 0.00302 dB

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

Peak H-field in A/m

Grid 1 0.399 M2	Grid 2 0.418 M2	Grid 3 0.397 M2
Grid 4 0.438 M2	Grid 5 0.458 M2	Grid 6 0.436 M2
Grid 7 0.399 M2	Grid 8 0.419 M2	Grid 9 0.400 M2



0 dB = 0.458A/m



Appendix C - HAC distribution plots for E-Field and H-Field

See following Attached Pages for HAC distribution plots for E-Field and H-Field.

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 2/23/2010 10:11:36 PM

HAC_GSM850 CH128_E_main

DUT: PB92110_main; Type: Smartphone; FCC ID:NM8PB92110

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

Phantom section: E Device Section

Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

- Probe: ER3DV6 - SN2256; ConvF(1, 1, 1); Calibrated: 8/21/2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/21/2010
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1038
- Measurement SW: DASYS, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

E Scan - ER3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1): Measurement grid:

dx=5mm, dy=5mm

Maximum value of peak Total field = 240.5 V/m

Probe Modulation Factor = 2.57

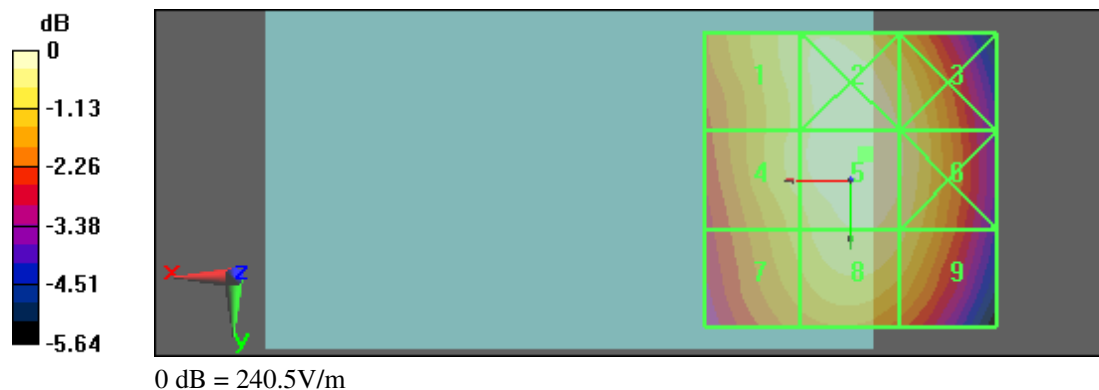
Device Reference Point: 0, 0, 353.7 mm

Reference Value = 122.9 V/m; Power Drift = -0.018 dB

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

Peak E-field in V/m

Grid 1 227.6 M3	Grid 2 239.0 M3	Grid 3 230.0 M3
Grid 4 227.8 M3	Grid 5 240.5 M3	Grid 6 232.0 M3
Grid 7 216.7 M3	Grid 8 230.6 M3	Grid 9 223.7 M3



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 2/23/2010 10:18:05 PM

HAC_GSM850 CH190_E_main

DUT: PB92110_main; Type: Smartphone; FCC ID:NM8PB92110

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

Phantom section: E Device Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: ER3DV6 - SN2256; ConvF(1, 1, 1); Calibrated: 8/21/2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/21/2010
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1038
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

E Scan - ER3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1): Measurement grid:

dx=5mm, dy=5mm

Maximum value of peak Total field = 244.9 V/m

Probe Modulation Factor = 2.57

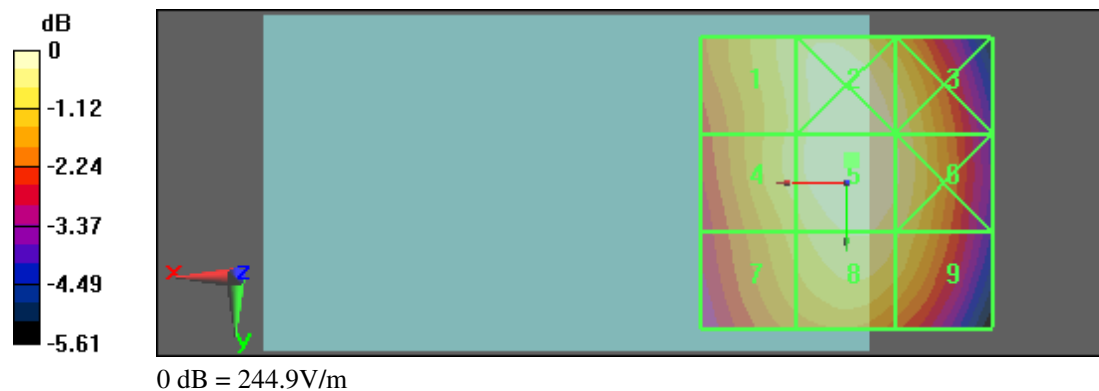
Device Reference Point: 0, 0, 353.7 mm

Reference Value = 124.8 V/m; Power Drift = -0.030 dB

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

Peak E-field in V/m

Grid 1 231.4 M3	Grid 2 243.5 M3	Grid 3 234.2 M3
Grid 4 231.5 M3	Grid 5 244.9 M3	Grid 6 236.3 M3
Grid 7 220.8 M3	Grid 8 235.4 M3	Grid 9 227.2 M3



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 3/1/2010 7:40:28 PM

HAC_GSM850 CH190_E

DUT: PB92110_2nd; Type: Smartphone; FCC ID:NM8PB92110

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

Phantom section: E Device Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: ER3DV6 - SN2256; ConvF(1, 1, 1); Calibrated: 8/21/2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/21/2010
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1038
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

E Scan - ER3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1): Measurement grid:

dx=5mm, dy=5mm

Maximum value of peak Total field = 252.3 V/m

Probe Modulation Factor = 2.57

Device Reference Point: 0, 0, 353.7 mm

Reference Value = 128.8 V/m; Power Drift = -0.012 dB

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

Peak E-field in V/m

Grid 1 238.7 M3	Grid 2 250.3 M3	Grid 3 239.2 M3
Grid 4 239.3 M3	Grid 5 252.3 M3	Grid 6 241.6 M3
Grid 7 227.0 M3	Grid 8 241.3 M3	Grid 9 232.7 M3



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 2/23/2010 10:23:47 PM

HAC_GSM850 CH251_E_main

DUT: PB92110_main; Type: Smartphone; FCC ID:NM8PB92110

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

Phantom section: E Device Section

Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

- Probe: ER3DV6 - SN2256; ConvF(1, 1, 1); Calibrated: 8/21/2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/21/2010
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1038
- Measurement SW: DASYS, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

E Scan - ER3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1): Measurement grid:

dx=5mm, dy=5mm

Maximum value of peak Total field = 235.0 V/m

Probe Modulation Factor = 2.57

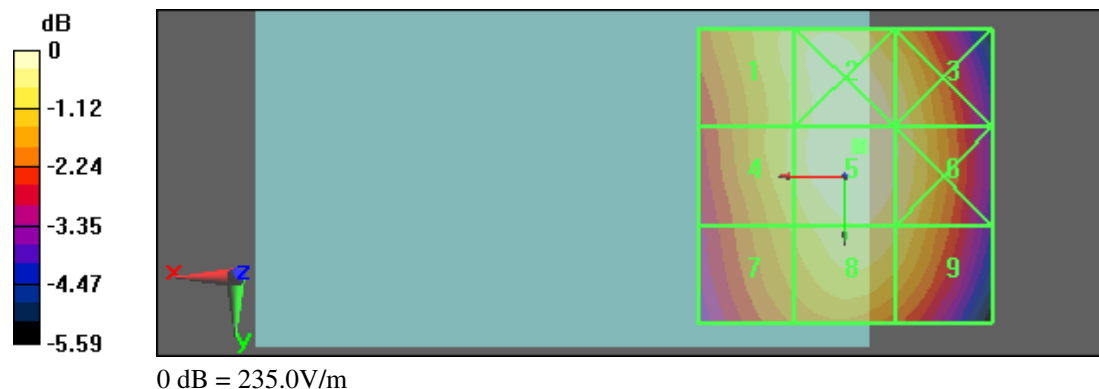
Device Reference Point: 0, 0, 353.7 mm

Reference Value = 119.1 V/m; Power Drift = 0.016 dB

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

Peak E-field in V/m

Grid 1 221.1 M3	Grid 2 233.4 M3	Grid 3 225.2 M3
Grid 4 220.2 M3	Grid 5 235.0 M3	Grid 6 226.9 M3
Grid 7 209.2 M3	Grid 8 224.9 M3	Grid 9 218.3 M3



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 2/23/2010 4:56:55 PM

HAC_PCS CH512_E_main

DUT: PB92110_main; Type: Smartphone; FCC ID:NM8PB92110

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

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

Phantom section: E Device Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: ER3DV6 - SN2256; ConvF(1, 1, 1); Calibrated: 8/21/2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/21/2010
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1038
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

E Scan - ER3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1): Measurement grid:

dx=5mm, dy=5mm

Maximum value of peak Total field = 82.6 V/m

Probe Modulation Factor = 2.5

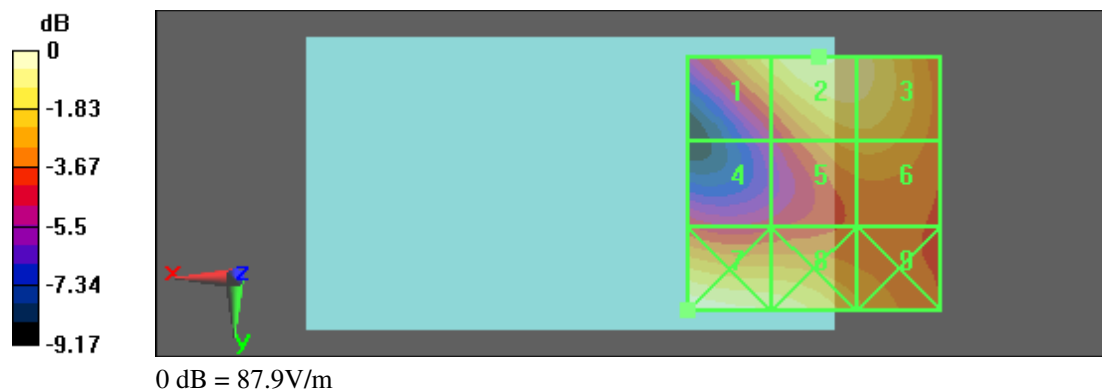
Device Reference Point: 0, 0, 353.7 mm

Reference Value = 24 V/m; Power Drift = -0.053 dB

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

Peak E-field in V/m

Grid 1	Grid 2	Grid 3
75.2 M3	82.6 M3	79.6 M3
Grid 4	Grid 5	Grid 6
54.4 M3	69 M3	69.2 M3
Grid 7	Grid 8	Grid 9
87.9 M2	82 M3	68 M3



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 3/1/2010 6:42:22 PM

HAC_PCS CH512_E

DUT: PB92110_2nd; Type: Smartphone; FCC ID:NM8PB92110

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

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

Phantom section: E Device Section

Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

- Probe: ER3DV6 - SN2256; ConvF(1, 1, 1); Calibrated: 8/21/2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/21/2010
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1038
- Measurement SW: DASYS, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

E Scan - ER3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1): Measurement grid:

dx=5mm, dy=5mm

Maximum value of peak Total field = 81 V/m

Probe Modulation Factor = 2.5

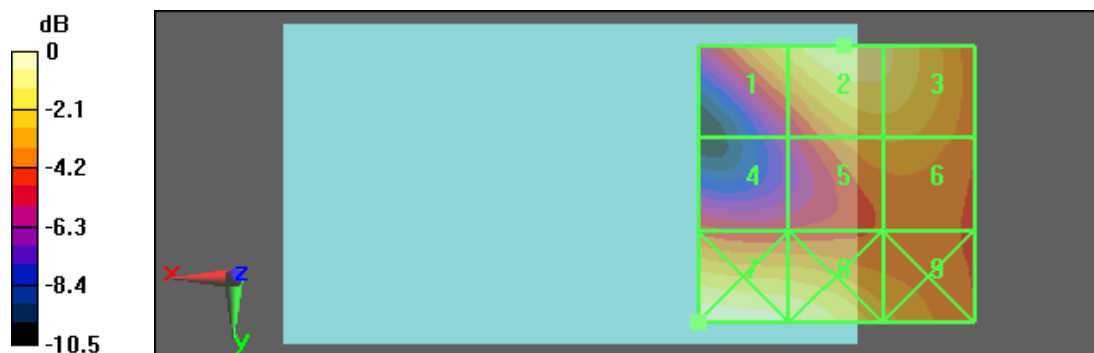
Device Reference Point: 0, 0, 353.7 mm

Reference Value = 23.4 V/m; Power Drift = -0.047 dB

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

Peak E-field in V/m

Grid 1	Grid 2	Grid 3
73.7 M3	81 M3	78 M3
Grid 4	Grid 5	Grid 6
54.2 M3	65.6 M3	65.7 M3
Grid 7	Grid 8	Grid 9
89.3 M2	84.4 M2	67.6 M3



0 dB = 89.3V/m

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 2/23/2010 5:09:56 PM

HAC_PCS CH661_E_main

DUT: PB92110_main; Type: Smartphone; FCC ID:NM8PB92110

Communication System: PCS; Frequency: 1880 MHz; Duty Cycle: 1:8.3

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

Phantom section: E Device Section

Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

- Probe: ER3DV6 - SN2256; ConvF(1, 1, 1); Calibrated: 8/21/2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/21/2010
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1038
- Measurement SW: DASYS, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

E Scan - ER3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1): Measurement grid:

dx=5mm, dy=5mm

Maximum value of peak Total field = 81.9 V/m

Probe Modulation Factor = 2.5

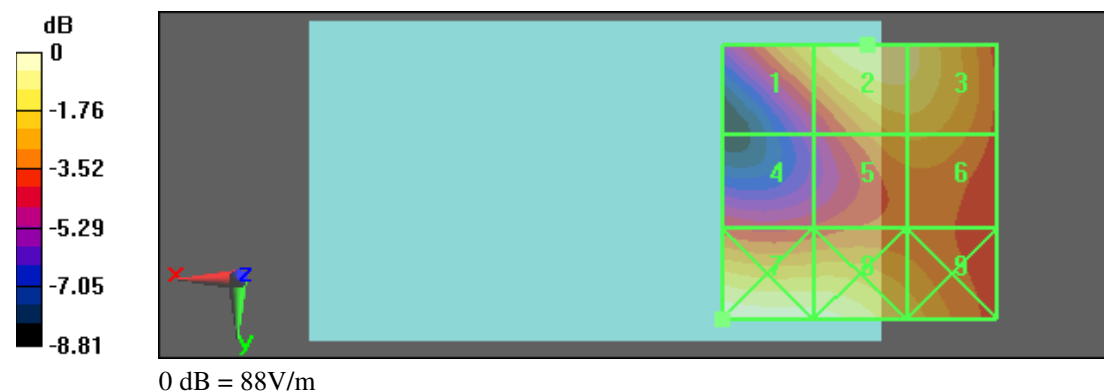
Device Reference Point: 0, 0, 353.7 mm

Reference Value = 24.2 V/m; Power Drift = -0.046 dB

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

Peak E-field in V/m

Grid 1	Grid 2	Grid 3
73.9 M3	81.9 M3	79 M3
Grid 4	Grid 5	Grid 6
56.3 M3	68 M3	68.2 M3
Grid 7	Grid 8	Grid 9
88 M2	85.2 M2	70.9 M3



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 2/23/2010 5:02:51 PM

HAC_PCS CH810_E_main

DUT: PB92110_main; Type: Smartphone; FCC ID:NM8PB92110

Communication System: PCS; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3

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

Phantom section: E Device Section

Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

- Probe: ER3DV6 - SN2256; ConvF(1, 1, 1); Calibrated: 8/21/2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/21/2010
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1038
- Measurement SW: DASYS, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

E Scan - ER3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1): Measurement grid:

dx=5mm, dy=5mm

Maximum value of peak Total field = 81.6 V/m

Probe Modulation Factor = 2.5

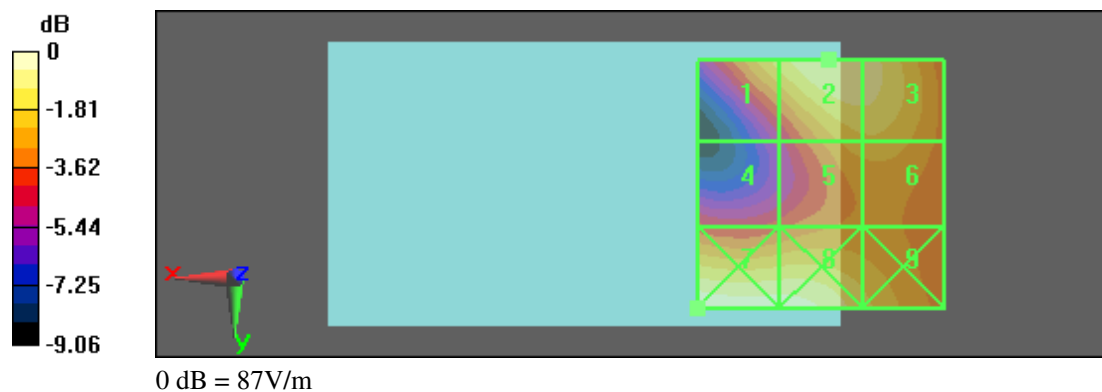
Device Reference Point: 0, 0, 353.7 mm

Reference Value = 24.8 V/m; Power Drift = 0.047 dB

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

Peak E-field in V/m

Grid 1	Grid 2	Grid 3
73.4 M3	81.6 M3	79.1 M3
Grid 4	Grid 5	Grid 6
55.8 M3	69.1 M3	69.4 M3
Grid 7	Grid 8	Grid 9
87 M2	85 M2	72.6 M3



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 2/23/2010 10:50:15 PM

HAC_WCDMA Band II CH9262_E_main

DUT: PB92110_main; Type: Smartphone; FCC ID:NM8PB92110

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

Phantom section: E Device Section

Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

- Probe: ER3DV6 - SN2256; ConvF(1, 1, 1); Calibrated: 8/21/2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/21/2010
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1038
- Measurement SW: DASYS, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

E Scan - ER3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1): Measurement grid:

dx=5mm, dy=5mm

Maximum value of peak Total field = 43.9 V/m

Probe Modulation Factor = 0.900

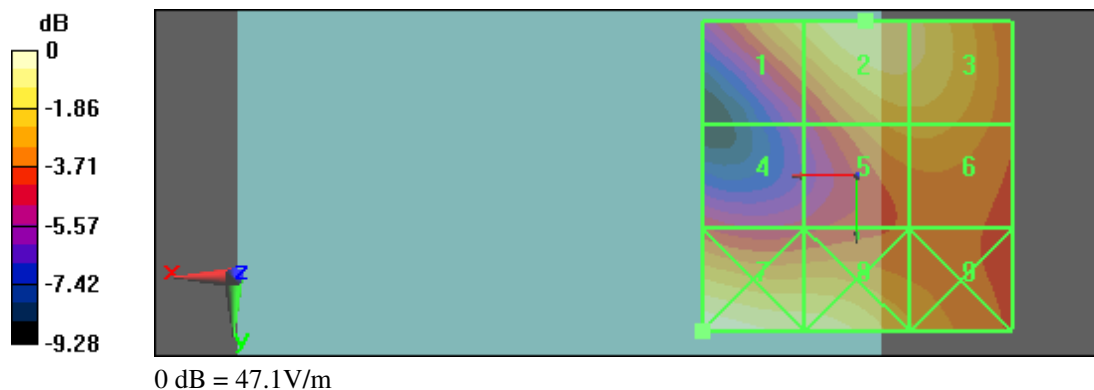
Device Reference Point: 0, 0, 353.7 mm

Reference Value = 36.2 V/m; Power Drift = -0.182 dB

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

Peak E-field in V/m

Grid 1	Grid 2	Grid 3
39.6 M4	43.9 M4	42.1 M4
Grid 4	Grid 5	Grid 6
29.1 M4	36.6 M4	36.7 M4
Grid 7	Grid 8	Grid 9
47.1 M4	43.4 M4	36.1 M4



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 3/1/2010 7:54:00 PM

HAC_WCDMA Band II CH9262_E

DUT: PB92110_2nd; Type: Smartphone; FCC ID:NM8PB92110

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

Phantom section: E Device Section

Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

- Probe: ER3DV6 - SN2256; ConvF(1, 1, 1); Calibrated: 8/21/2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/21/2010
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1038
- Measurement SW: DASYS, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

E Scan - ER3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1): Measurement grid:

dx=5mm, dy=5mm

Maximum value of peak Total field = 39.7 V/m

Probe Modulation Factor = 0.890

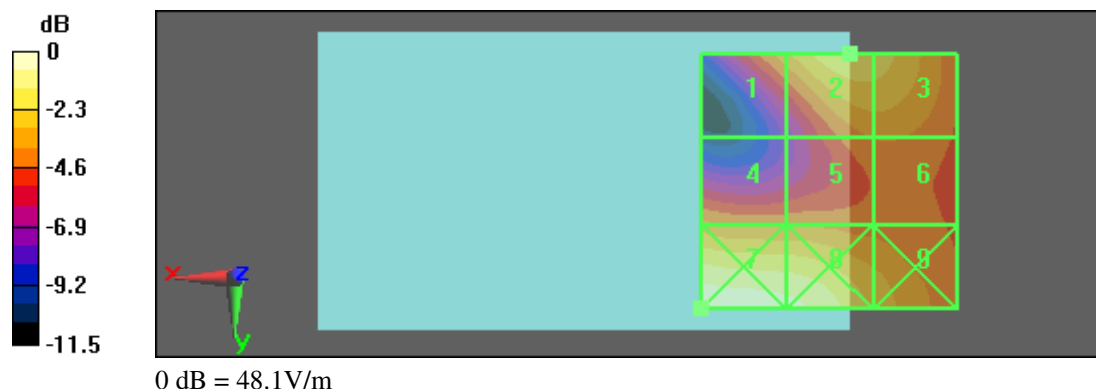
Device Reference Point: 0, 0, 353.7 mm

Reference Value = 32.6 V/m; Power Drift = -0.115 dB

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

Peak E-field in V/m

Grid 1	Grid 2	Grid 3
33.4 M4	39.7 M4	38.9 M4
Grid 4	Grid 5	Grid 6
32.1 M4	31.1 M4	31.3 M4
Grid 7	Grid 8	Grid 9
48.1 M4	45.9 M4	36.3 M4



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 2/23/2010 10:58:33 PM

HAC_WCDMA Band II CH9400_E_main

DUT: PB92110_main; Type: Smartphone; FCC ID:NM8PB92110

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

Phantom section: E Device Section

Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

- Probe: ER3DV6 - SN2256; ConvF(1, 1, 1); Calibrated: 8/21/2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/21/2010
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1038
- Measurement SW: DASYS, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

E Scan - ER3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1): Measurement grid:

dx=5mm, dy=5mm

Maximum value of peak Total field = 41.5 V/m

Probe Modulation Factor = 0.900

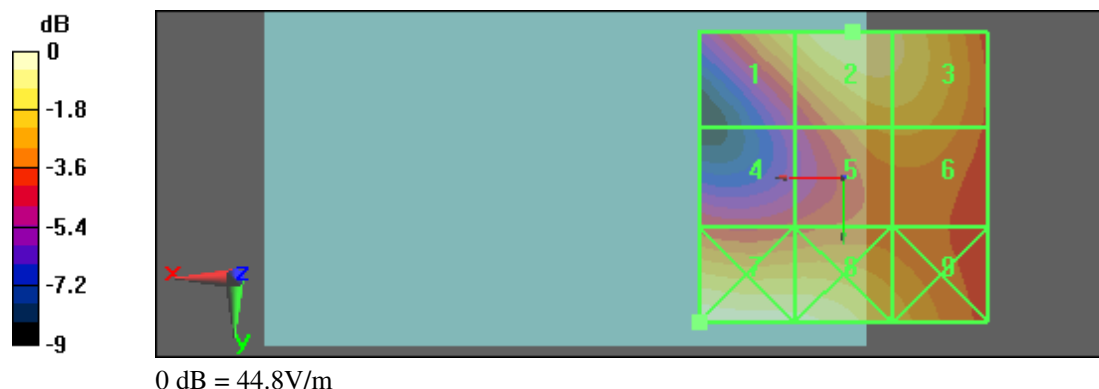
Device Reference Point: 0, 0, 353.7 mm

Reference Value = 34.7 V/m; Power Drift = -0.0048 dB

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

Peak E-field in V/m

Grid 1	Grid 2	Grid 3
37.6 M4	41.5 M4	39.9 M4
Grid 4	Grid 5	Grid 6
28.4 M4	34.6 M4	34.6 M4
Grid 7	Grid 8	Grid 9
44.8 M4	43.1 M4	35.9 M4



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 2/23/2010 11:04:14 PM

HAC_WCDMA Band II CH9538_E_main

DUT: PB92110_main; Type: Smartphone; FCC ID:NM8PB92110

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

Phantom section: E Device Section

Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

- Probe: ER3DV6 - SN2256; ConvF(1, 1, 1); Calibrated: 8/21/2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/21/2010
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1038
- Measurement SW: DASYS, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

E Scan - ER3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1): Measurement grid:

dx=5mm, dy=5mm

Maximum value of peak Total field = 43.3 V/m

Probe Modulation Factor = 0.890

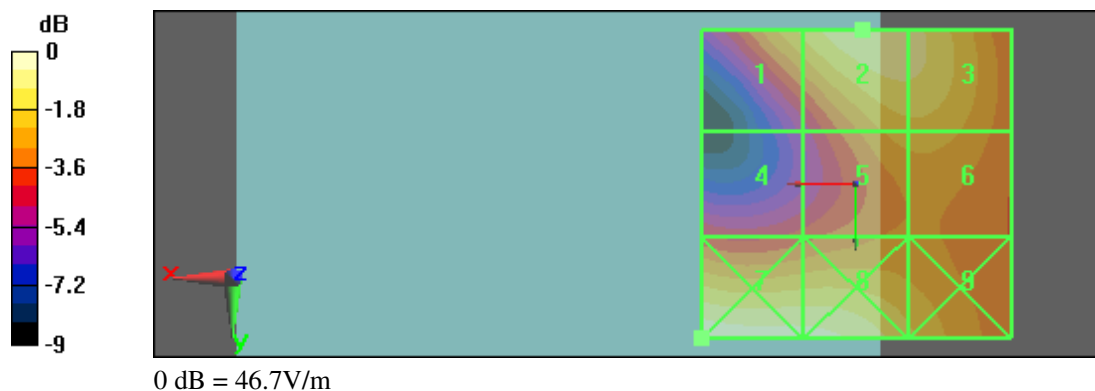
Device Reference Point: 0, 0, 353.7 mm

Reference Value = 38.8 V/m; Power Drift = -0.180 dB

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

Peak E-field in V/m

Grid 1 38.9 M4	Grid 2 43.3 M4	Grid 3 42 M4
Grid 4 30 M4	Grid 5 36.9 M4	Grid 6 37 M4
Grid 7 46.7 M4	Grid 8 45.3 M4	Grid 9 38.7 M4



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 2/23/2010 10:33:17 PM

HAC_WCDMA Band V CH4132_E_main

DUT: PB92110_main; Type: Smartphone; FCC ID:NM8PB92110

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

Phantom section: E Device Section

Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

- Probe: ER3DV6 - SN2256; ConvF(1, 1, 1); Calibrated: 8/21/2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/21/2010
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1038
- Measurement SW: DASYS, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

E Scan - ER3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1): Measurement grid:

dx=5mm, dy=5mm

Maximum value of peak Total field = 98.7 V/m

Probe Modulation Factor = 0.980

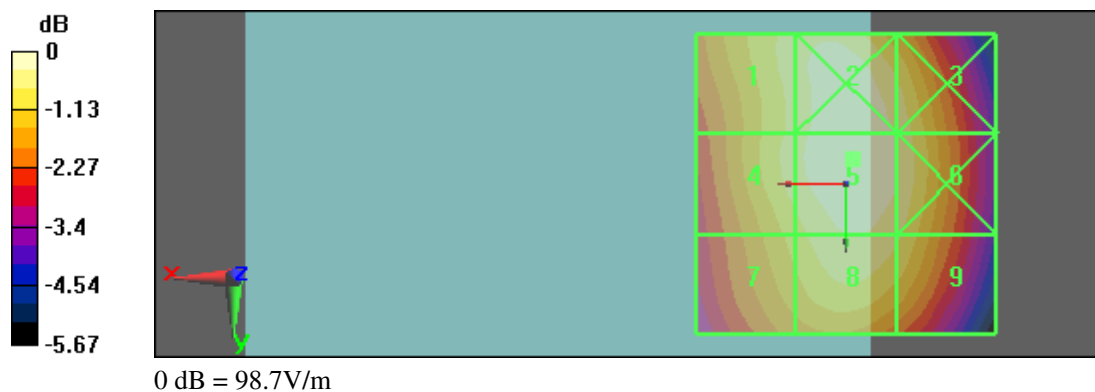
Device Reference Point: 0, 0, 353.7 mm

Reference Value = 130.3 V/m; Power Drift = 0.079 dB

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

Peak E-field in V/m

Grid 1	Grid 2	Grid 3
92.9 M4	97.9 M4	93.8 M4
Grid 4	Grid 5	Grid 6
93.1 M4	98.7 M4	94.7 M4
Grid 7	Grid 8	Grid 9
88.6 M4	94.5 M4	91.3 M4



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 3/1/2010 8:02:08 PM

HAC_WCDMA Band V CH4132_E

DUT: PB92110_2nd; Type: Smartphone; FCC ID:NM8PB92110

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

Phantom section: E Device Section

Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

- Probe: ER3DV6 - SN2256; ConvF(1, 1, 1); Calibrated: 8/21/2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/21/2010
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1038
- Measurement SW: DASYS, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

E Scan - ER3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1): Measurement grid:

dx=5mm, dy=5mm

Maximum value of peak Total field = 94 V/m

Probe Modulation Factor = 0.980

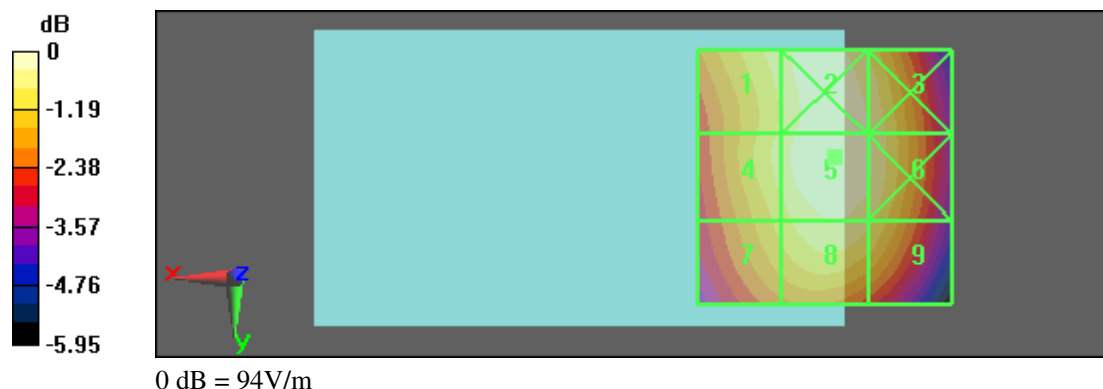
Device Reference Point: 0, 0, 353.7 mm

Reference Value = 124.3 V/m; Power Drift = 0.014 dB

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

Peak E-field in V/m

Grid 1	Grid 2	Grid 3
88.5 M4	93.2 M4	90.3 M4
Grid 4	Grid 5	Grid 6
87.8 M4	94 M4	91 M4
Grid 7	Grid 8	Grid 9
83.8 M4	89.6 M4	86.9 M4



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 2/23/2010 10:38:44 PM

HAC_WCDMA Band V CH4183_E_main

DUT: PB92110_main; Type: Smartphone; FCC ID:NM8PB92110

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

Phantom section: E Device Section

Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

- Probe: ER3DV6 - SN2256; ConvF(1, 1, 1); Calibrated: 8/21/2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/21/2010
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1038
- Measurement SW: DASYS, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

E Scan - ER3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1): Measurement grid:

dx=5mm, dy=5mm

Maximum value of peak Total field = 87.3 V/m

Probe Modulation Factor = 0.980

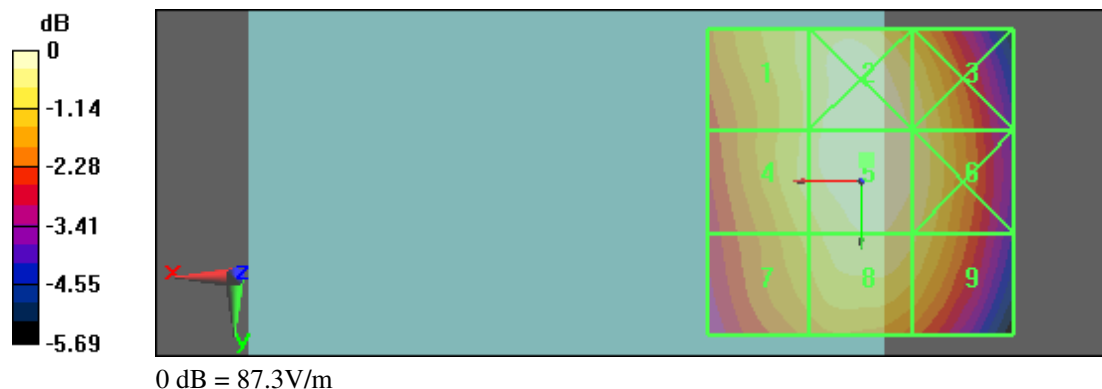
Device Reference Point: 0, 0, 353.7 mm

Reference Value = 116.2 V/m; Power Drift = -0.023 dB

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

Peak E-field in V/m

Grid 1	Grid 2	Grid 3
81.6 M4	86.3 M4	83.1 M4
Grid 4	Grid 5	Grid 6
82 M4	87.3 M4	83.9 M4
Grid 7	Grid 8	Grid 9
78.2 M4	83.7 M4	80.8 M4



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 2/23/2010 10:44:23 PM

HAC_WCDMA Band V CH4233_E_main

DUT: PB92110_main; Type: Smartphone; FCC ID:NM8PB92110

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

Phantom section: E Device Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: ER3DV6 - SN2256; ConvF(1, 1, 1); Calibrated: 8/21/2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/21/2010
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1038
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

E Scan - ER3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1): Measurement grid:

dx=5mm, dy=5mm

Maximum value of peak Total field = 92.9 V/m

Probe Modulation Factor = 0.980

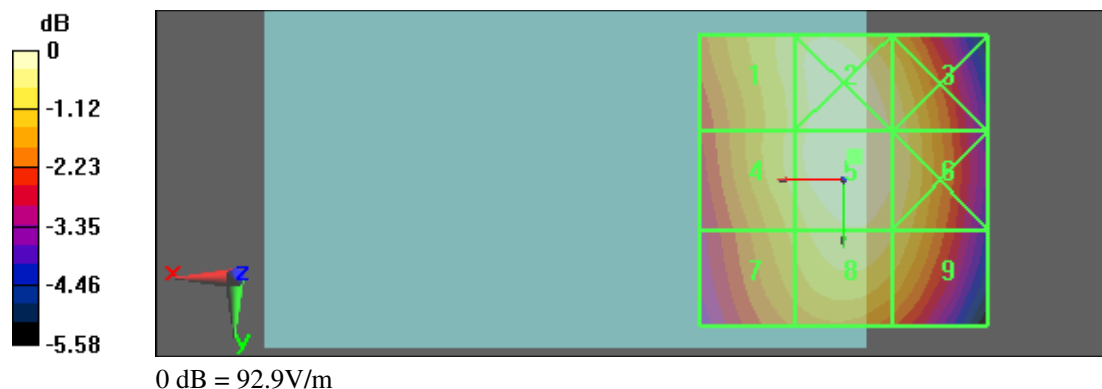
Device Reference Point: 0, 0, 353.7 mm

Reference Value = 124.2 V/m; Power Drift = -0.0087 dB

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

Peak E-field in V/m

Grid 1	Grid 2	Grid 3
87.7 M4	92.3 M4	88.8 M4
Grid 4	Grid 5	Grid 6
87.4 M4	92.9 M4	89.5 M4
Grid 7	Grid 8	Grid 9
83 M4	88.9 M4	86.1 M4



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 2/23/2010 8:58:42 PM

HAC_GSM850 CH128_H_main

DUT: PB92110_main; Type: Smartphone; FCC ID:NM8PB92110

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

Phantom section: H Device Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: H3DV6 - SN6076; ; Calibrated: 8/19/2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/21/2010
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1038
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

H Scan - H3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1): Measurement grid:

dx=5mm, dy=5mm

Maximum value of peak Total field = 0.341 A/m

Probe Modulation Factor = 2.71

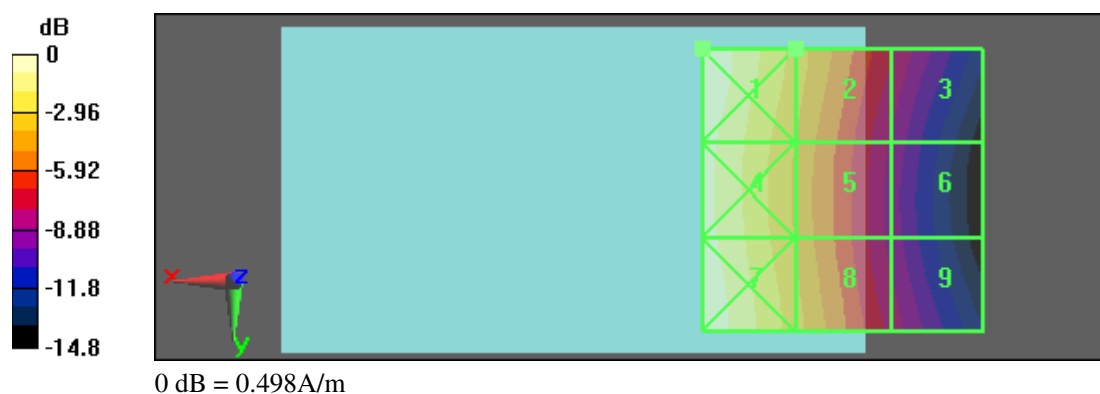
Device Reference Point: 0, 0, 353.7 mm

Reference Value = 0.088 A/m; Power Drift = -0.090 dB

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

Peak H-field in A/m

Grid 1 0.498 M3	Grid 2 0.341 M4	Grid 3 0.205 M4
Grid 4 0.468 M3	Grid 5 0.317 M4	Grid 6 0.178 M4
Grid 7 0.491 M3	Grid 8 0.333 M4	Grid 9 0.194 M4



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 2/23/2010 9:06:17 PM

HAC_GSM850 CH190_H_main

DUT: PB92110_main; Type: Smartphone; FCC ID:NM8PB92110

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

Phantom section: H Device Section

Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

- Probe: H3DV6 - SN6076; ; Calibrated: 8/19/2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/21/2010
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1038
- Measurement SW: DASYS, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

H Scan - H3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1): Measurement grid:

dx=5mm, dy=5mm

Maximum value of peak Total field = 0.347 A/m

Probe Modulation Factor = 2.71

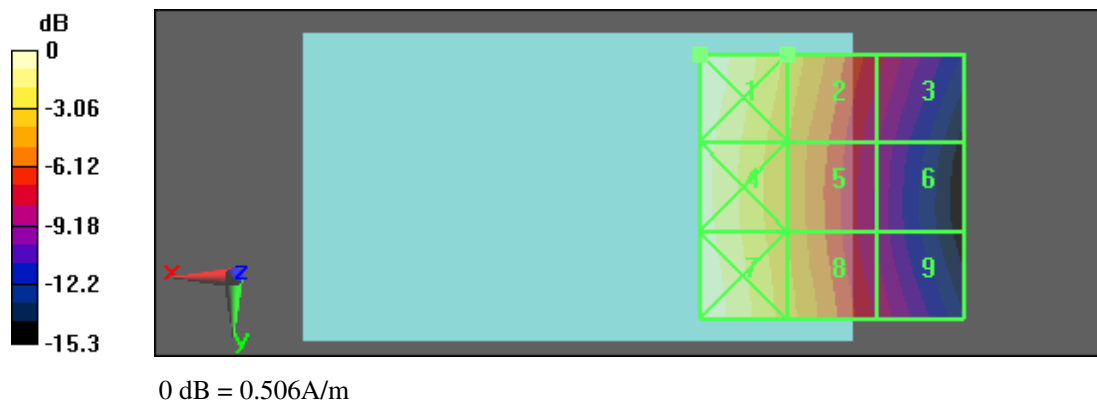
Device Reference Point: 0, 0, 353.7 mm

Reference Value = 0.088 A/m; Power Drift = -0.019 dB

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

Peak H-field in A/m

Grid 1 0.506 M3	Grid 2 0.347 M4	Grid 3 0.208 M4
Grid 4 0.475 M3	Grid 5 0.320 M4	Grid 6 0.178 M4
Grid 7 0.498 M3	Grid 8 0.334 M4	Grid 9 0.194 M4



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 3/1/2010 7:26:33 PM

HAC_GSM850 CH190_H

DUT: PB92110_2nd; Type: Smartphone; FCC ID:NM8PB92110

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

Phantom section: H Device Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: H3DV6 - SN6076; ; Calibrated: 8/19/2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/21/2010
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1038
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

H Scan - H3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1): Measurement grid:

dx=5mm, dy=5mm

Maximum value of peak Total field = 0.352 A/m

Probe Modulation Factor = 2.71

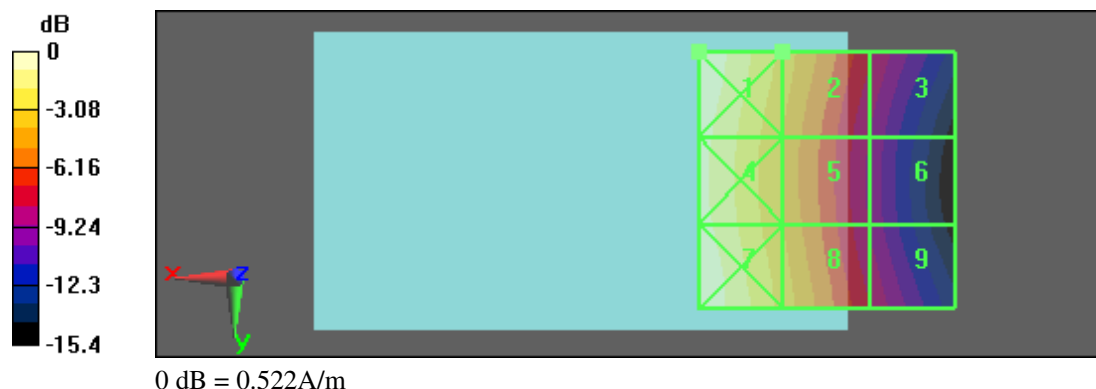
Device Reference Point: 0, 0, 353.7 mm

Reference Value = 0.089 A/m; Power Drift = -0.079 dB

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

Peak H-field in A/m

Grid 1 0.522 M3	Grid 2 0.352 M4	Grid 3 0.207 M4
Grid 4 0.490 M3	Grid 5 0.325 M4	Grid 6 0.179 M4
Grid 7 0.518 M3	Grid 8 0.349 M4	Grid 9 0.203 M4



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 2/23/2010 9:15:10 PM

HAC_GSM850 CH251_H_main

DUT: PB92110_main; Type: Smartphone; FCC ID:NM8PB92110

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

Phantom section: H Device Section

Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

- Probe: H3DV6 - SN6076; ; Calibrated: 8/19/2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/21/2010
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1038
- Measurement SW: DASYS, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

H Scan - H3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1): Measurement grid:

dx=5mm, dy=5mm

Maximum value of peak Total field = 0.271 A/m

Probe Modulation Factor = 2.18

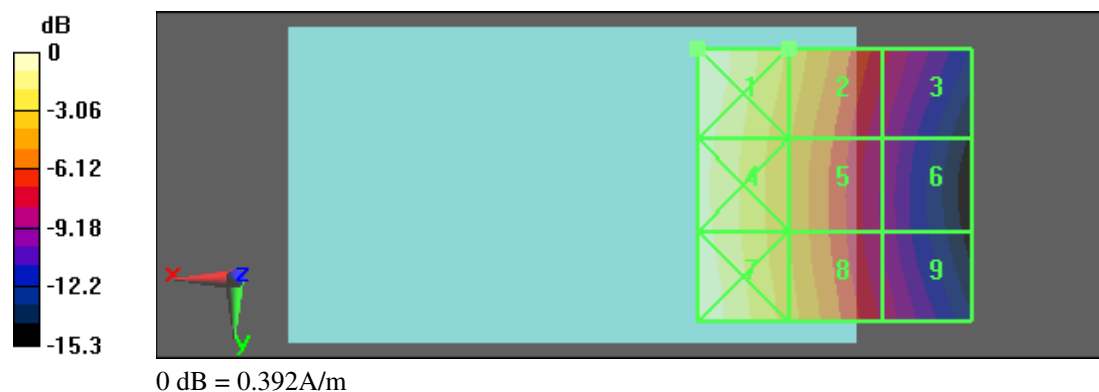
Device Reference Point: 0, 0, 353.7 mm

Reference Value = 0.086 A/m; Power Drift = -0.057 dB

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

Peak H-field in A/m

Grid 1 0.392 M4	Grid 2 0.271 M4	Grid 3 0.163 M4
Grid 4 0.368 M4	Grid 5 0.249 M4	Grid 6 0.140 M4
Grid 7 0.381 M4	Grid 8 0.260 M4	Grid 9 0.151 M4



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 2/23/2010 5:38:29 PM

HAC_PCS CH512_H_main

DUT: PB92110_main; Type: Smartphone; FCC ID:NM8PB92110

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

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

Phantom section: H Device Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: H3DV6 - SN6076; ; Calibrated: 8/19/2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/21/2010
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1038
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

H Scan - H3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1): Measurement grid:

dx=5mm, dy=5mm

Maximum value of peak Total field = 0.221 A/m

Probe Modulation Factor = 2.44

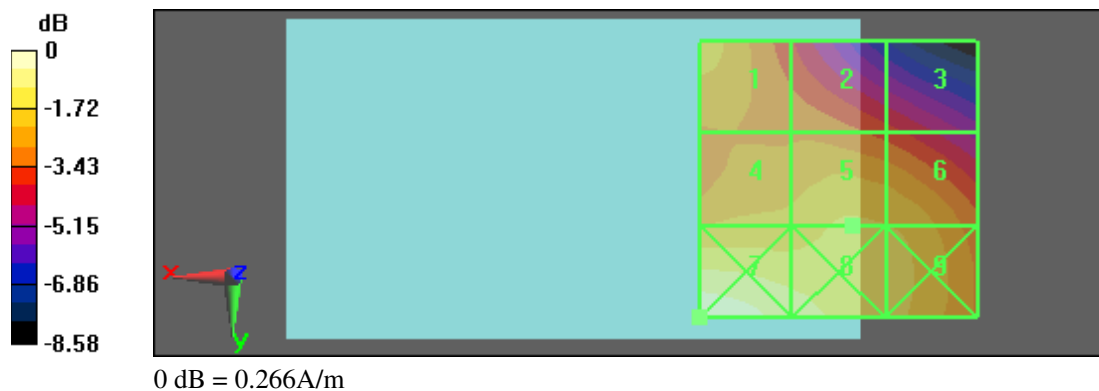
Device Reference Point: 0, 0, 353.7 mm

Reference Value = 0.095 A/m; Power Drift = 0.061 dB

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

Peak H-field in A/m

Grid 1 0.215 M3	Grid 2 0.190 M3	Grid 3 0.174 M3
Grid 4 0.211 M3	Grid 5 0.221 M3	Grid 6 0.219 M3
Grid 7 0.266 M2	Grid 8 0.240 M3	Grid 9 0.226 M3



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 2/23/2010 5:47:10 PM

HAC_PCS CH661_H_main

DUT: PB92110_main; Type: Smartphone; FCC ID:NM8PB92110

Communication System: PCS; Frequency: 1880 MHz; Duty Cycle: 1:8.3

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

Phantom section: H Device Section

Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

- Probe: H3DV6 - SN6076; ; Calibrated: 8/19/2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/21/2010
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1038
- Measurement SW: DASYS, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

H Scan - H3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1): Measurement grid:

dx=5mm, dy=5mm

Maximum value of peak Total field = 0.219 A/m

Probe Modulation Factor = 2.44

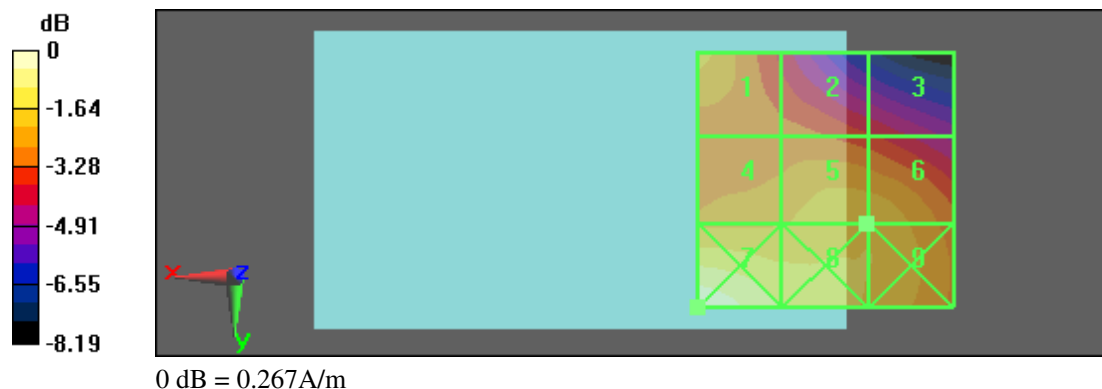
Device Reference Point: 0, 0, 353.7 mm

Reference Value = 0.095 A/m; Power Drift = 0.022 dB

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

Peak H-field in A/m

Grid 1	Grid 2	Grid 3
0.214 M3	0.188 M3	0.175 M3
Grid 4	Grid 5	Grid 6
0.207 M3	0.219 M3	0.219 M3
Grid 7	Grid 8	Grid 9
0.267 M2	0.235 M3	0.222 M3



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 2/23/2010 5:55:24 PM

HAC_PCS CH810_H_main

DUT: PB92110_main; Type: Smartphone; FCC ID:NM8PB92110

Communication System: PCS; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3

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

Phantom section: H Device Section

Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

- Probe: H3DV6 - SN6076; ; Calibrated: 8/19/2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/21/2010
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1038
- Measurement SW: DASYS, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

H Scan - H3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1): Measurement grid:

dx=5mm, dy=5mm

Maximum value of peak Total field = 0.222 A/m

Probe Modulation Factor = 2.44

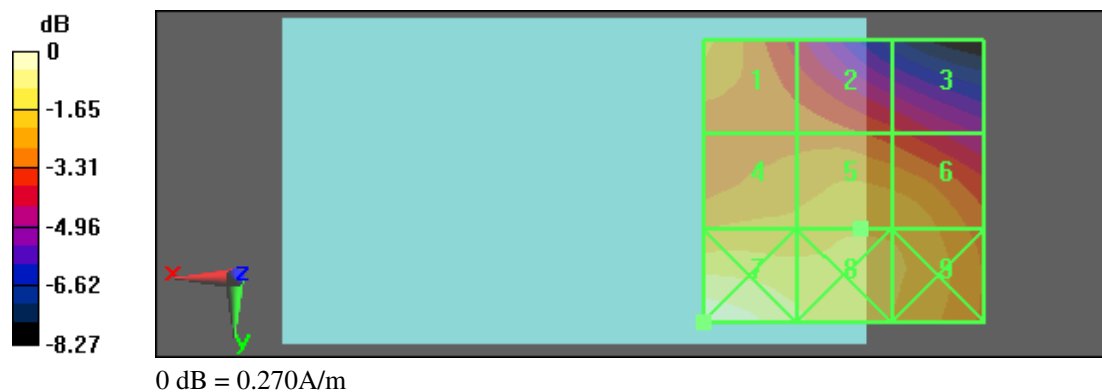
Device Reference Point: 0, 0, 353.7 mm

Reference Value = 0.097 A/m; Power Drift = 0.032 dB

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

Peak H-field in A/m

Grid 1 0.213 M3	Grid 2 0.192 M3	Grid 3 0.178 M3
Grid 4 0.215 M3	Grid 5 0.222 M3	Grid 6 0.221 M3
Grid 7 0.270 M2	Grid 8 0.242 M3	Grid 9 0.225 M3



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 3/1/2010 7:12:40 PM

HAC_PCS CH810_H

DUT: PB92110_2nd; Type: Smartphone; FCC ID:NM8PB92110

Communication System: PCS; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3

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

Phantom section: H Device Section

Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

- Probe: H3DV6 - SN6076; ; Calibrated: 8/19/2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/21/2010
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1038
- Measurement SW: DASYS, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

H Scan - H3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1): Measurement grid:

dx=5mm, dy=5mm

Maximum value of peak Total field = 0.211 A/m

Probe Modulation Factor = 2.44

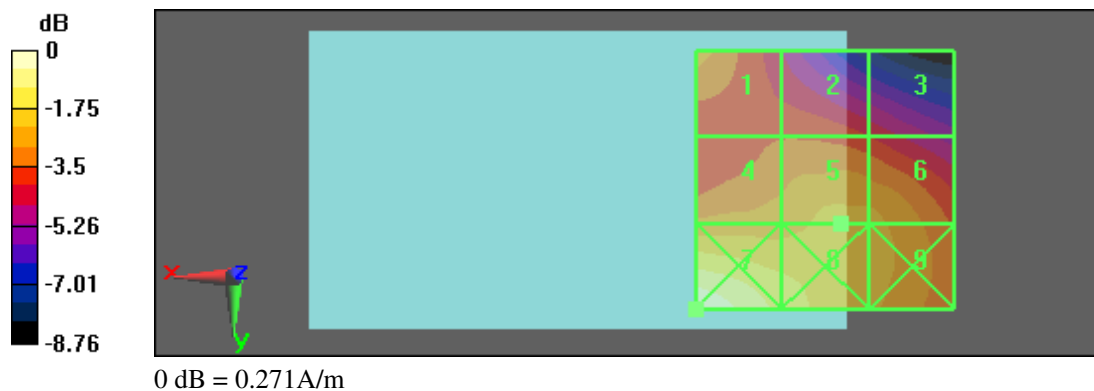
Device Reference Point: 0, 0, 353.7 mm

Reference Value = 0.094 A/m; Power Drift = 0.00354 dB

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

Peak H-field in A/m

Grid 1 0.201 M3	Grid 2 0.180 M3	Grid 3 0.169 M3
Grid 4 0.202 M3	Grid 5 0.211 M3	Grid 6 0.211 M3
Grid 7 0.271 M2	Grid 8 0.232 M3	Grid 9 0.213 M3



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 2/23/2010 9:25:41 PM

HAC_WCDMA Band II CH9262_H_main

DUT: PB92110_main; Type: Smartphone; FCC ID:NM8PB92110

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

Phantom section: H Device Section

Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

- Probe: H3DV6 - SN6076; ; Calibrated: 8/19/2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/21/2010
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1038
- Measurement SW: DASYS, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

H Scan - H3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1): Measurement grid:

dx=5mm, dy=5mm

Maximum value of peak Total field = 0.107 A/m

Probe Modulation Factor = 0.810

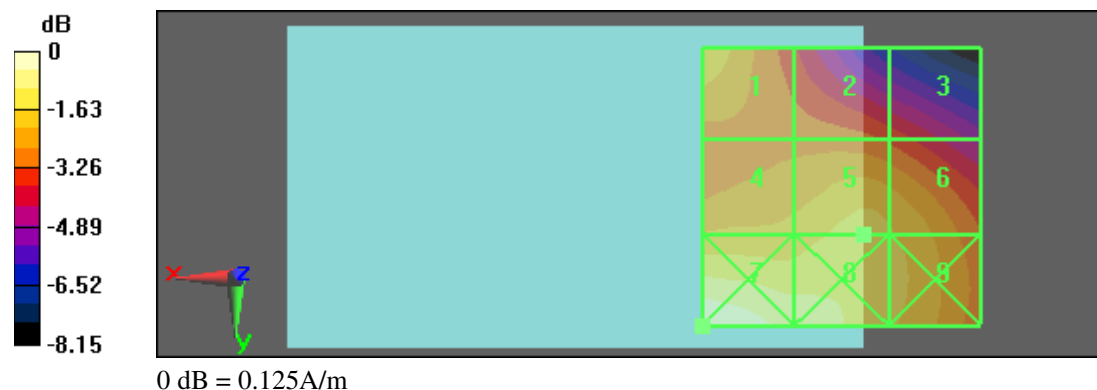
Device Reference Point: 0, 0, 353.7 mm

Reference Value = 0.135 A/m; Power Drift = -0.048 dB

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

Peak H-field in A/m

Grid 1 0.103 M4	Grid 2 0.090 M4	Grid 3 0.085 M4
Grid 4 0.100 M4	Grid 5 0.107 M4	Grid 6 0.105 M4
Grid 7 0.125 M4	Grid 8 0.115 M4	Grid 9 0.106 M4



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 3/1/2010 8:29:52 PM

HAC_WCDMA Band II CH9262_H

DUT: PB92110_2nd; Type: Smartphone; FCC ID:NM8PB92110

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

Phantom section: H Device Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: H3DV6 - SN6076; ; Calibrated: 8/19/2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/21/2010
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1038
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

H Scan - H3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1): Measurement grid:

dx=5mm, dy=5mm

Maximum value of peak Total field = 0.101 A/m

Probe Modulation Factor = 0.810

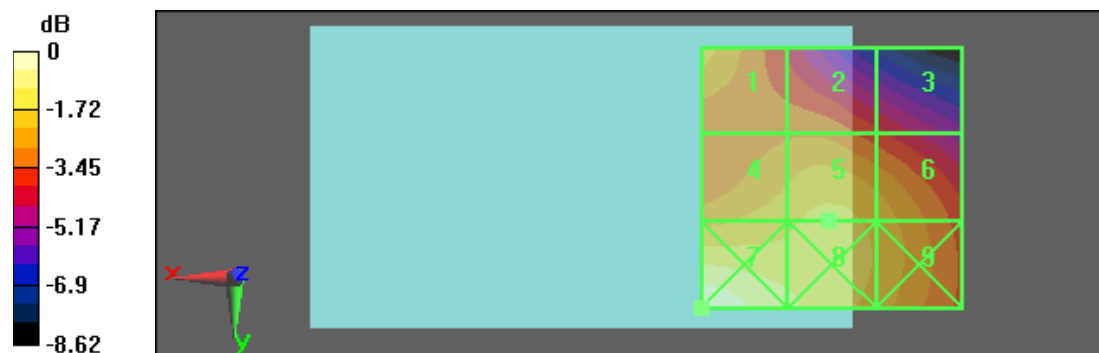
Device Reference Point: 0, 0, 353.7 mm

Reference Value = 0.137 A/m; Power Drift = -0.138 dB

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

Peak H-field in A/m

Grid 1 0.097 M4	Grid 2 0.086 M4	Grid 3 0.078 M4
Grid 4 0.098 M4	Grid 5 0.101 M4	Grid 6 0.097 M4
Grid 7 0.121 M4	Grid 8 0.107 M4	Grid 9 0.099 M4



0 dB = 0.121A/m

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 2/23/2010 9:34:16 PM

HAC_WCDMA Band II CH9400_H_main

DUT: PB92110_main; Type: Smartphone; FCC ID:NM8PB92110

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

Phantom section: H Device Section

Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

- Probe: H3DV6 - SN6076; ; Calibrated: 8/19/2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/21/2010
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1038
- Measurement SW: DASYS, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

H Scan - H3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1): Measurement grid:

dx=5mm, dy=5mm

Maximum value of peak Total field = 0.097 A/m

Probe Modulation Factor = 0.810

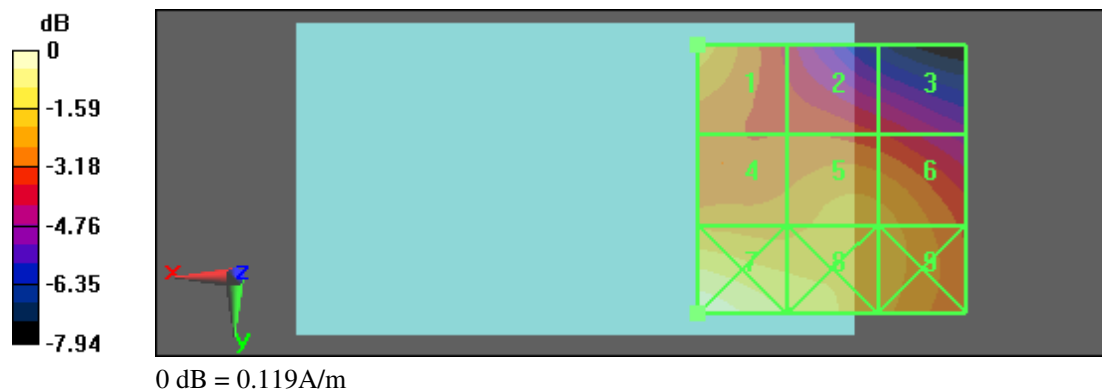
Device Reference Point: 0, 0, 353.7 mm

Reference Value = 0.127 A/m; Power Drift = -0.172 dB

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

Peak H-field in A/m

Grid 1 0.097 M4	Grid 2 0.083 M4	Grid 3 0.078 M4
Grid 4 0.092 M4	Grid 5 0.097 M4	Grid 6 0.096 M4
Grid 7 0.119 M4	Grid 8 0.105 M4	Grid 9 0.097 M4



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 2/23/2010 9:39:36 PM

HAC_WCDMA Band II CH9538_H_main

DUT: PB92110_main; Type: Smartphone; FCC ID:NM8PB92110

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

Phantom section: H Device Section

Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

- Probe: H3DV6 - SN6076; ; Calibrated: 8/19/2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/21/2010
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1038
- Measurement SW: DASYS, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

H Scan - H3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1): Measurement grid:

dx=5mm, dy=5mm

Maximum value of peak Total field = 0.105 A/m

Probe Modulation Factor = 0.810

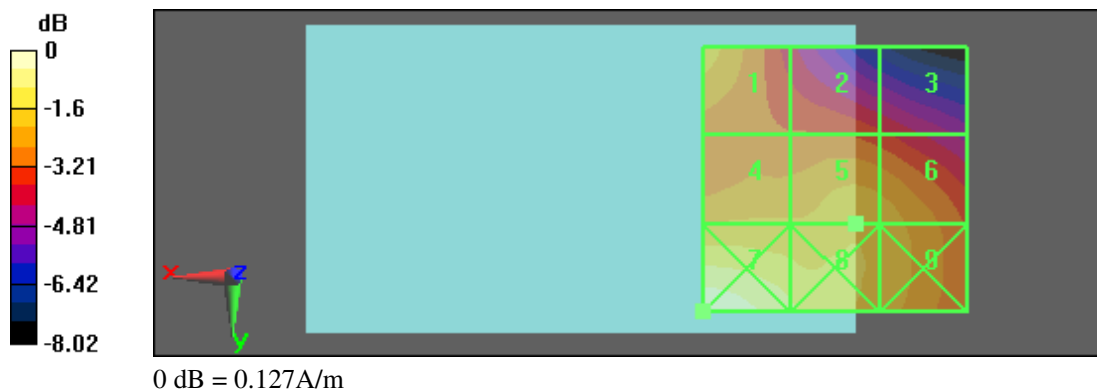
Device Reference Point: 0, 0, 353.7 mm

Reference Value = 0.139 A/m; Power Drift = -0.078 dB

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

Peak H-field in A/m

Grid 1 0.104 M4	Grid 2 0.088 M4	Grid 3 0.084 M4
Grid 4 0.100 M4	Grid 5 0.105 M4	Grid 6 0.103 M4
Grid 7 0.127 M4	Grid 8 0.114 M4	Grid 9 0.104 M4



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 2/23/2010 9:47:07 PM

HAC_WCDMA Band V CH4132_H_main

DUT: PB92110_main; Type: Smartphone; FCC ID:NM8PB92110

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

Phantom section: H Device Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: H3DV6 - SN6076; ; Calibrated: 8/19/2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/21/2010
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1038
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

H Scan - H3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1): Measurement grid:

dx=5mm, dy=5mm

Maximum value of peak Total field = 0.111 A/m

Probe Modulation Factor = 0.860

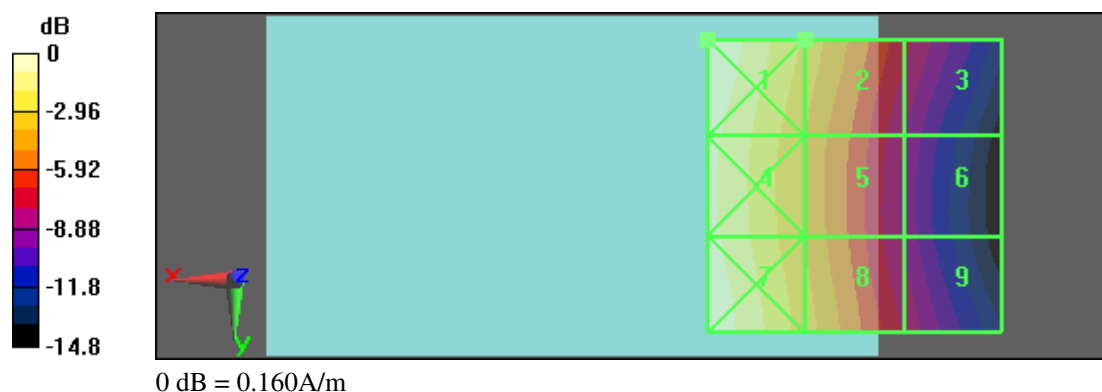
Device Reference Point: 0, 0, 353.7 mm

Reference Value = 0.090 A/m; Power Drift = -0.00379 dB

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

Peak H-field in A/m

Grid 1 0.160 M4	Grid 2 0.111 M4	Grid 3 0.067 M4
Grid 4 0.148 M4	Grid 5 0.102 M4	Grid 6 0.058 M4
Grid 7 0.157 M4	Grid 8 0.108 M4	Grid 9 0.063 M4



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 3/1/2010 8:24:18 PM

HAC_WCDMA Band V CH4132_H

DUT: PB92110_2nd; Type: Smartphone; FCC ID:NM8PB92110

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

Phantom section: H Device Section

Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

- Probe: H3DV6 - SN6076; ; Calibrated: 8/19/2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/21/2010
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1038
- Measurement SW: DASYS, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

H Scan - H3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1): Measurement grid:

dx=5mm, dy=5mm

Maximum value of peak Total field = 0.106 A/m

Probe Modulation Factor = 0.860

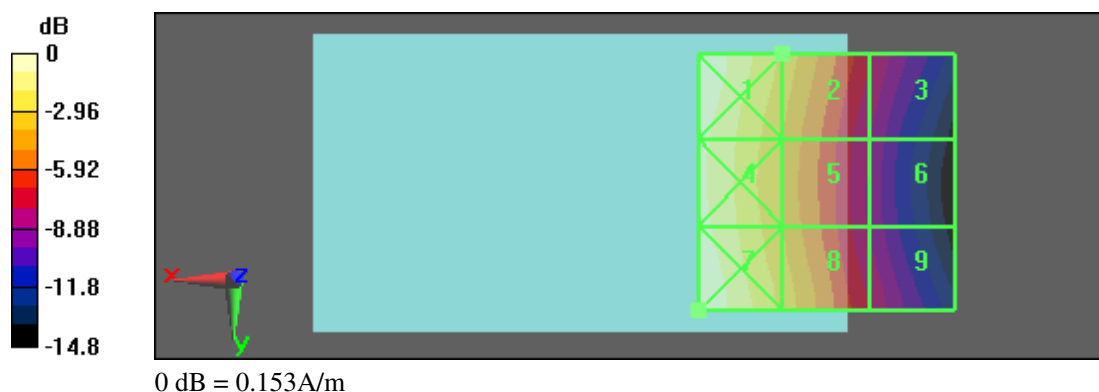
Device Reference Point: 0, 0, 353.7 mm

Reference Value = 0.085 A/m; Power Drift = -0.039 dB

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

Peak H-field in A/m

Grid 1 0.152 M4	Grid 2 0.106 M4	Grid 3 0.063 M4
Grid 4 0.143 M4	Grid 5 0.097 M4	Grid 6 0.055 M4
Grid 7 0.153 M4	Grid 8 0.105 M4	Grid 9 0.062 M4



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 2/23/2010 9:52:29 PM

HAC_WCDMA Band V CH4183_H_main

DUT: PB92110_main; Type: Smartphone; FCC ID:NM8PB92110

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

Phantom section: H Device Section

Measurement Standard: DASYS (IEEE/IEC)

DASY5 Configuration:

- Probe: H3DV6 - SN6076; ; Calibrated: 8/19/2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/21/2010
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1038
- Measurement SW: DASYS, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

H Scan - H3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1): Measurement grid:

dx=5mm, dy=5mm

Maximum value of peak Total field = 0.099 A/m

Probe Modulation Factor = 0.860

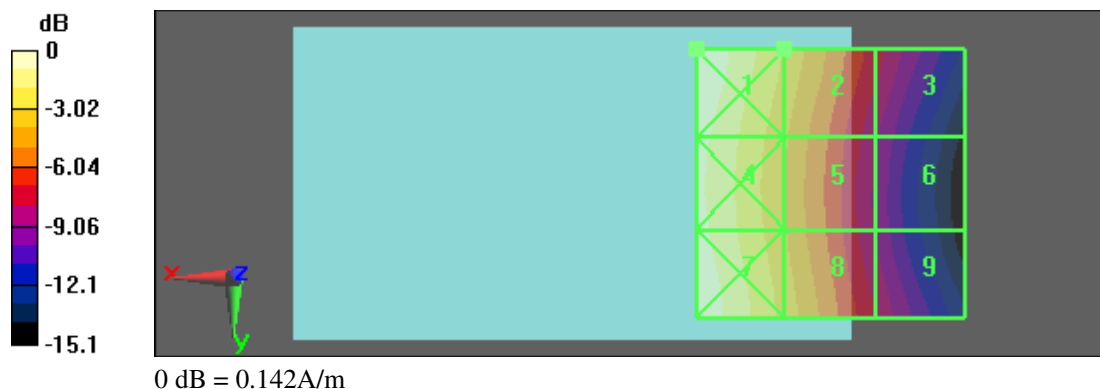
Device Reference Point: 0, 0, 353.7 mm

Reference Value = 0.079 A/m; Power Drift = -0.00181 dB

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

Peak H-field in A/m

Grid 1 0.142 M4	Grid 2 0.099 M4	Grid 3 0.059 M4
Grid 4 0.132 M4	Grid 5 0.091 M4	Grid 6 0.051 M4
Grid 7 0.140 M4	Grid 8 0.096 M4	Grid 9 0.056 M4



Test Laboratory: A Test Lab Techno Corp.

Date/Time: 2/23/2010 9:57:45 PM

HAC_WCDMA Band V CH4233_H_main

DUT: PB92110_main; Type: Smartphone; FCC ID:NM8PB92110

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

Phantom section: H Device Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: H3DV6 - SN6076; ; Calibrated: 8/19/2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/21/2010
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1038
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

H Scan - H3DV6 - measurement distance from the probe sensor center to the Device = 15mm/Hearing Aid Compatibility Test (101x101x1): Measurement grid:

dx=5mm, dy=5mm

Maximum value of peak Total field = 0.109 A/m

Probe Modulation Factor = 0.860

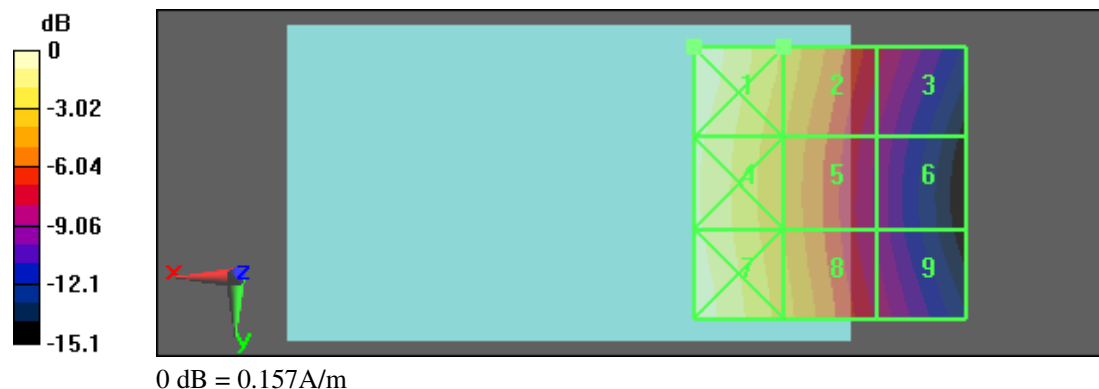
Device Reference Point: 0, 0, 353.7 mm

Reference Value = 0.087 A/m; Power Drift = -0.023 dB

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

Peak H-field in A/m

Grid 1 0.157 M4	Grid 2 0.109 M4	Grid 3 0.066 M4
Grid 4 0.145 M4	Grid 5 0.100 M4	Grid 6 0.056 M4
Grid 7 0.151 M4	Grid 8 0.105 M4	Grid 9 0.061 M4





Appendix D - Calibration

All of the instruments Calibration information are listed below.

- Dipole _ CD835V3 SN:1017 Calibration No.CD835V3-1017_Jul09
- Dipole _ CD1880V3 SN:1036 Calibration No.CD1880V3-1036_Jul09
- Probe _ ER3DV6 SN: 2256 Calibration No. ER3-2256_Aug09
- Probe _ H3DV6 SN: 6076 Calibration No. H3-6076_Aug09
- DAE _ DAE4 SN:797 Calibration No.DAE4-797_Jan09



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 **ATL (Auden)**

Certificate No: **CD835V3-1017_Jul09**

CALIBRATION CERTIFICATE

Object **CD835V3 - SN: 1017**

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

Calibration date: **July 14, 2009**

Condition of the calibrated item **In Tolerance**

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	08-Oct-08 (No. 217-00898)	Oct-09
Power sensor HP 8481A	US37292783	08-Oct-08 (No. 217-00898)	Oct-09
Probe ER3DV6	SN: 2336	22-Dec-08 (No. ER3-2336_Dec08)	Dec-09
Probe H3DV6	SN: 6065	22-Dec-08 (No. H3-6065_Dec08)	Dec-09
DAE4	SN: 781	20-Feb-09 (No. DAE4-781_Feb09)	Feb-10
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter R&S NRP	SN: 101748	23-Sep-08 (in house check Dec-08)	In house check: Dec-10
Power sensor R&S NRP-Z91	SN: 100711	25-Aug-08 (in house check Dec-08)	In house check: Dec-10
Power sensor R&S NRP-Z91	SN: 100712	25-Aug-08 (in house check Dec-08)	In house check: Dec-10
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-08)	In house check: Oct-09
RF generator E4433B	MY 41310391	03-Nov-04 (in house check Oct-07)	In house check: Oct-09

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

Signature

Approved by: **Name** Katja Pokovic **Function** Technical Manager

Issued: July 15, 2009

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

Certificate No: CD835V3-1017_Jul09

Page 1 of 6

**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-C63.19-2006
American National Standard for Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids.
- [2] 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, 2], 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 DASY4 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, 2], the scan area is 20mm wide, its length exceeds the dipole arm length (180 or 90mm). The sensor center is 10 mm (in z) above the top of the dipole arms. Two 3D maxima are available near the end of the dipole arms. Assuming the dipole arms are perfectly in one line, the average of these two maxima (in subgrid 2 and subgrid 8) is determined to compensate for any non-parallelity to the measurement plane as well as the sensor displacement. The E-field value stated as calibration value represents the maximum of the interpolated 3D-E-field, 10mm above the dipole surface.
- *H-field distribution:* H-field is measured with an isotropic H-field probe with 100mW forward power to the antenna feed point, in the x-y-plane. The scan area and sensor distance is equivalent to the E-field scan. The maximum of the field is available at the center (subgrid 5) above the feed point. The H-field value stated as calibration value represents the maximum of the interpolated H-field, 10mm above the dipole surface at the feed point.

1 Measurement Conditions

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

DASY Version	DASY4	V4.7 B80
DASY PP Version	SEMCAD	V1.8 B186
Phantom	HAC Test Arch	SD HAC P01 BA, #1070
Distance Dipole Top - Probe Center	10 mm	
Scan resolution	dx, dy = 5 mm	area = 20 x 180 mm
Frequency	835 MHz $\pm$ 1 MHz	
Forward power at dipole connector	20.0 dBm = 100mW	
Input power drift	< 0.05 dB	

2 Maximum Field values

H-field 10 mm above dipole surface	condition	interpolated maximum
Maximum measured	100 mW forward power	0.457 A/m

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

E-field 10 mm above dipole surface	condition	Interpolated maximum
Maximum measured above high end-	100 mW forward power	159.6 V/m
Maximum measured above low end	100 mW forward power	157.0 V/m
Averaged maximum above arm	100 mW forward power	158.3 V/m

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

3 Appendix

3.1 Antenna Parameters

Frequency	Return Loss	Impedance
800 MHz	16.5 dB	(43.3 – j12.3) Ohm
835 MHz	28.4 dB	(49.2 + j3.7) Ohm
900 MHz	17.1 dB	(55.5 – j13.7) Ohm
950 MHz	20.7 dB	(45.5 + j7.6) Ohm
960 MHz	16.0 dB	(51.6 + j16.2) Ohm

3.2 Antenna Design and Handling

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

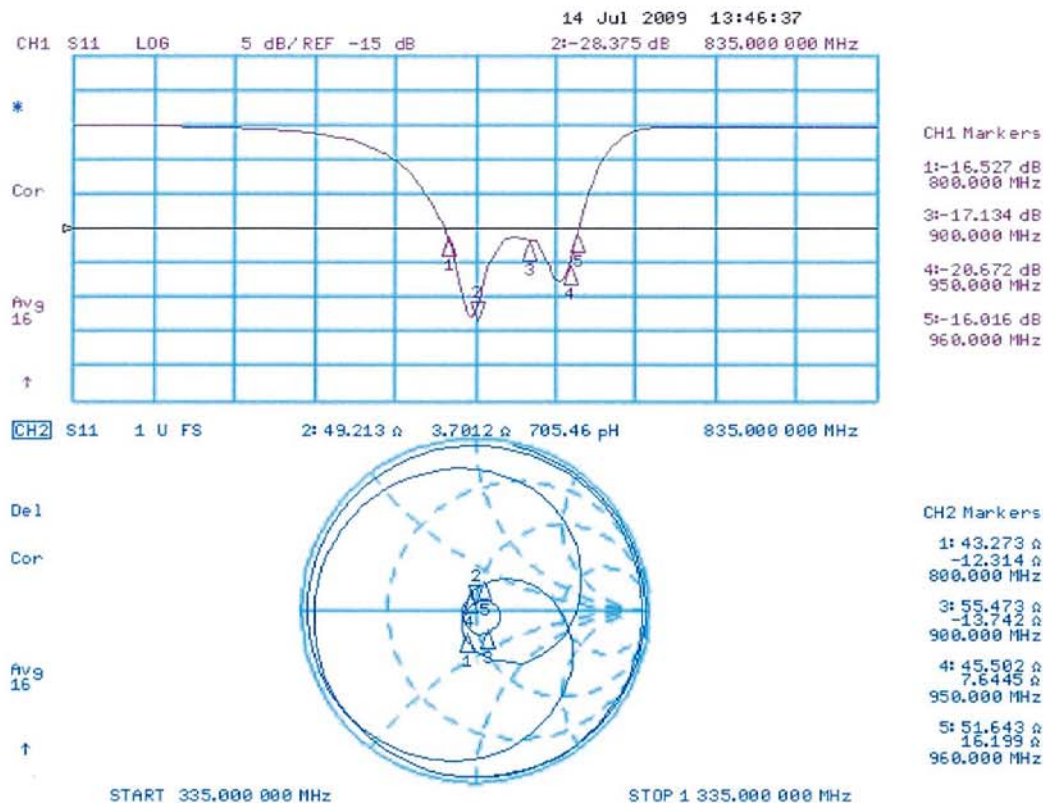
The dipole is built of standard semirigid coaxial cable. The internal matching line is open ended. The antenna is therefore open for DC signals.

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

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

3.3 Measurement Sheets

3.3.1 Return Loss and Smith Chart



3.3.2 DASY4 H-field Result

Date/Time: 14.07.2009 11:05:09

Test Laboratory: SPEAG Lab 2

H_CD835_1017_090714

DUT: HAC-Dipole 835 MHz; Type: D835V3; Serial: 1017

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

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

Phantom section: RF Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: H3DV6 - SN6065; ; Calibrated: 22.12.2008
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 20.02.2009
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- 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 = 0.457 A/m

Probe Modulation Factor = 1.00

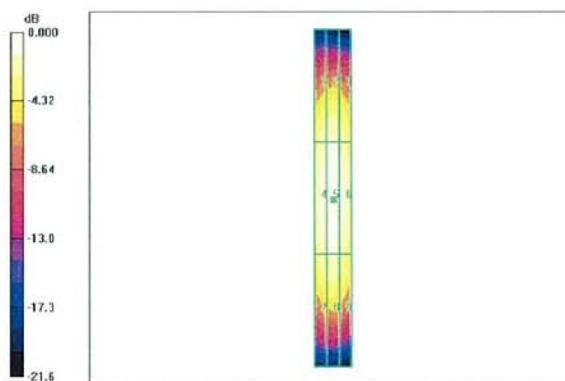
Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 0.489 A/m; Power Drift = -0.003 dB

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

Peak H-field in A/m

Grid 1 0.374 M4	Grid 2 0.397 M4	Grid 3 0.374 M4
Grid 4 0.430 M4	Grid 5 0.457 M4	Grid 6 0.429 M4
Grid 7 0.379 M4	Grid 8 0.400 M4	Grid 9 0.371 M4



0 dB = 0.457 A/m

3.3.3 DASY4 E-field Result

Date/Time: 14.07.2009 16:07:18

Test Laboratory: SPEAG Lab 2

E_CD835_1017_090714

DUT: HAC-Dipole 835 MHz; Type: D835V3; Serial: 1017

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

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

Phantom section: RF Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ER3DV6 - SN2336; ConvF(1, 1, 1); Calibrated: 22.12.2008
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 20.02.2009
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- 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 = 159.6 V/m

Probe Modulation Factor = 1.00

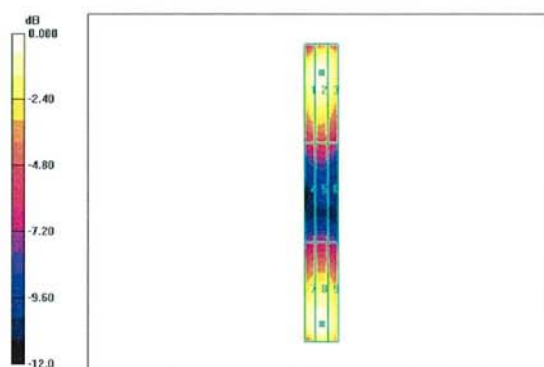
Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 103.6 V/m; Power Drift = -0.032 dB

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

Peak E-field in V/m

Grid 1 153.4 M4	Grid 2 157.0 M4	Grid 3 152.7 M4
Grid 4 85.7 M4	Grid 5 87.5 M4	Grid 6 84.0 M4
Grid 7 154.9 M4	Grid 8 159.6 M4	Grid 9 153.9 M4



0 dB = 159.6V/m



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Accreditation No.: **SCS 108**

Client **ATL (Auden)**

Certificate No: **CD1880V3-1036_Jul09**

CALIBRATION CERTIFICATE

Object **CD1880V3 - SN: 1036**

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

Calibration date: **July 15, 2009**

Condition of the calibrated item **In Tolerance**

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	08-Oct-08 (No. 217-00898)	Oct-09
Power sensor HP 8481A	US37292783	08-Oct-08 (No. 217-00898)	Oct-09
Probe ER3DV6	SN: 2336	22-Dec-08 (No. ER3-2336_Dec08)	Dec-09
Probe H3DV6	SN: 6065	22-Dec-08 (No. H3-6065_Dec08)	Dec-09
DAE4	SN 781	20-Feb-09 (No. DAE4-781_Feb09)	Feb-10

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter R&S NRP	SN: 101748	23-Sep-08 (in house check Dec-08)	In house check: Dec-10
Power sensor R&S NRP-Z91	SN: 100711	25-Aug-08 (in house check Dec-08)	In house check: Dec-10
Power sensor R&S NRP-Z91	SN: 100712	25-Aug-08 (in house check Dec-08)	In house check: Dec-10
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-08)	In house check: Oct-09
RF generator E4433B	MY 41310391	22-Nov-04 (in house check Oct-07)	In house check: Oct-09

Calibrated by:

Name	Function
Mike Meili	Laboratory Technician

Signature

Approved by:

Fin Bornholt	Technical Director
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Issued: July 16, 2009

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

Certificate No: CD1880V3-1036_Jul09

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Accreditation No.: **SCS 108**

References

- [1] ANSI-C63.19-2006
 American National Standard for Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids.
- [2] 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, 2], 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 DASY4 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, 2], the scan area is 20mm wide, its length exceeds the dipole arm length (180 or 90mm). The sensor center is 10 mm (in z) above the top of the dipole arms. Two 3D maxima are available near the end of the dipole arms. Assuming the dipole arms are perfectly in one line, the average of these two maxima (in subgrid 2 and subgrid 8) is determined to compensate for any non-parallelity to the measurement plane as well as the sensor displacement. The E-field value stated as calibration value represents the maximum of the interpolated 3D-E-field, 10mm above the dipole surface.
- *H-field distribution:* H-field is measured with an isotropic H-field probe with 100mW forward power to the antenna feed point, in the x-y-plane. The scan area and sensor distance is equivalent to the E-field scan. The maximum of the field is available at the center (subgrid 5) above the feed point. The H-field value stated as calibration value represents the maximum of the interpolated H-field, 10mm above the dipole surface at the feed point.

1. Measurement Conditions

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

DASY Version	DASY4	V4.7 B80
DASY PP Version	SEMCAD	V1.8 B186
Phantom	HAC Test Arch	SD HAC P01 BA, #1070
Distance Dipole Top - Probe Center	10 mm	
Scan resolution	dx, dy = 5 mm	area = 20 x 90 mm
Frequency	1880 MHz $\pm$ 1 MHz	
Forward power at dipole connector	20.0 dBm = 100mW	
Input power drift	< 0.05 dB	

2. Maximum Field values

H-field 10 mm above dipole surface	condition	Interpolated maximum
Maximum measured	100 mW forward power	0.474 A/m

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

E-field 10 mm above dipole surface	condition	Interpolated maximum
Maximum measured above high end	100 mW forward power	137.5 V/m
Maximum measured above low end	100 mW forward power	136.8 V/m
Averaged maximum above arm	100 mW forward power	137.2 V/m

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

3. Appendix

3.1 Antenna Parameters

Frequency	Return Loss	Impedance
1710 MHz	20.0 dB	(50.0 + j10.1) Ohm
1880 MHz	22.0 dB	(52.5 + j7.8) Ohm
1900 MHz	22.1 dB	(54.9 + j6.6) Ohm
1950 MHz	32.1 dB	(52.4 - j0.8) Ohm
2000 MHz	20.3 dB	(41.4 + j2.1) Ohm

3.2 Antenna Design and Handling

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

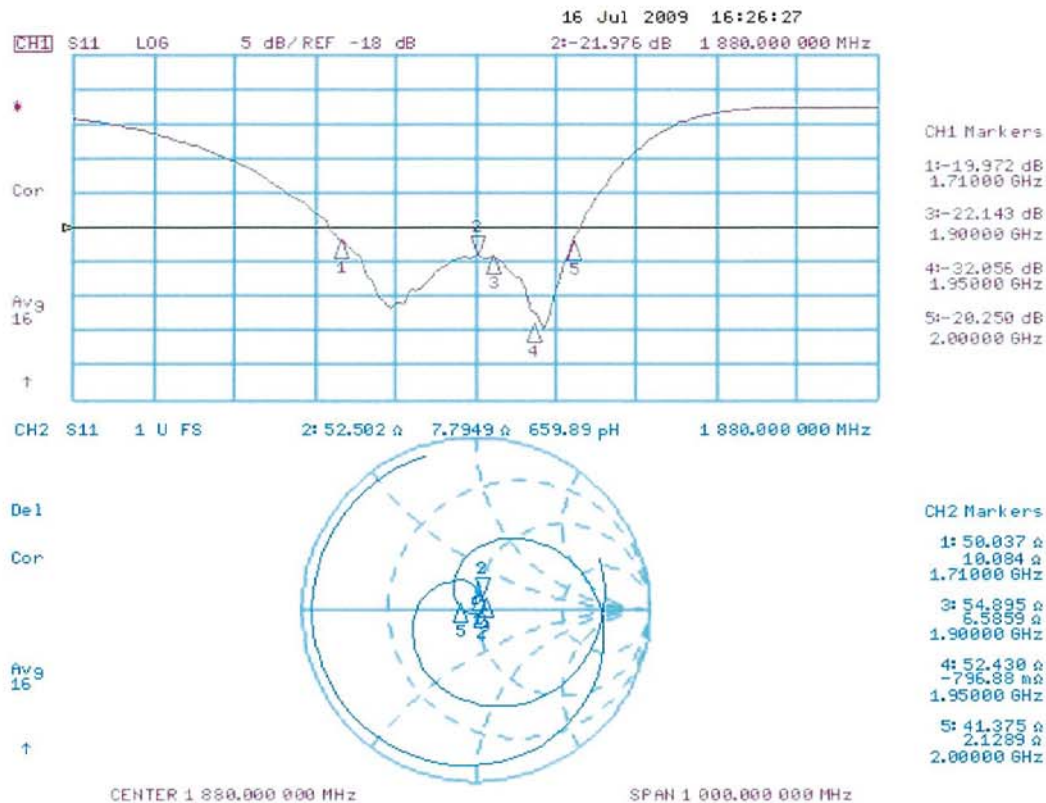
The dipole is built of standard semirigid coaxial cable. The internal matching line is open ended. The antenna is therefore open for DC signals.

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

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

3.3 Measurement Sheets

3.3.1 Return Loss and Smith Chart



3.3.2 DASY4 H-Field Result

Date/Time: 15.07.2009 13:38:53

Test Laboratory: SPEAG Lab 2

DUT: HAC Dipole 1880 MHz; Type: CD1880V3; Serial: 1036

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

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

Phantom section: RF Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: H3DV6 - SN6065; ; Calibrated: 22.12.2008
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 20.02.2009
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

H Scan - measurement distance from the probe sensor center to CD1880 Dipole = 10mm/Hearing Aid Compatibility Test (41x181x1):

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

Maximum value of peak Total field = 0.474 A/m

Probe Modulation Factor = 1.00

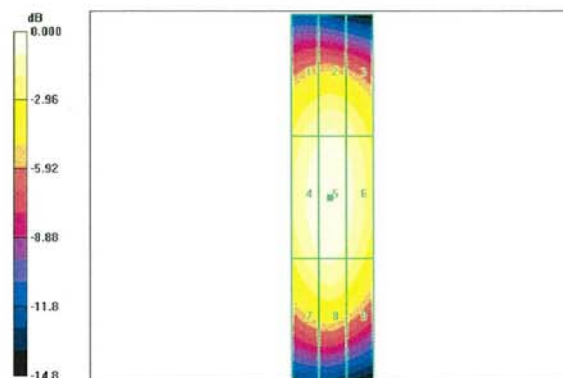
Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 0.503 A/m; Power Drift = -0.028 dB

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

Peak H-field in A/m

Grid 1	Grid 2	Grid 3
0.417	0.435	0.410
M2	M2	M2
Grid 4	Grid 5	Grid 6
0.456	0.474	0.445
M2	M2	M2
Grid 7	Grid 8	Grid 9
0.417	0.433	0.401
M2	M2	M2



0 dB = 0.474A/m

3.3.3 DASY4 E-Field Result

Date/Time: 15.07.2009 11:02:06

Test Laboratory: SPEAG Lab 2

DUT: HAC Dipole 1880 MHz; Type: CD1880V3; Serial: 1036

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

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

Phantom section: RF Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ER3DV6 - SN2336; ConvF(1, 1, 1); Calibrated: 22.12.2008
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 20.02.2009
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- 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 = 137.5 V/m

Probe Modulation Factor = 1.00

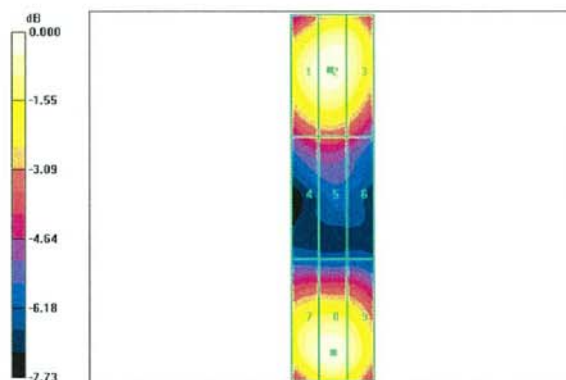
Device Reference Point: 0.000, 0.000, -6.30 mm

Reference Value = 154.7 V/m; Power Drift = -0.013 dB

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

Peak E-field in V/m

Grid 1 133.3 M2	Grid 2 136.8 M2	Grid 3 131.9 M2
Grid 4 90.2 M3	Grid 5 91.9 M3	Grid 6 87.1 M3
Grid 7 132.6 M2	Grid 8 137.5 M2	Grid 9 131.3 M2



0 dB = 137.5V/m



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Accreditation No.: **SCS 108**

Client **ATL (Auden)**

Certificate No: **ER3-2256_Aug09**

CALIBRATION CERTIFICATE

Object **ER3DV6 - SN:2256**

Calibration procedure(s) **QA CAL-02.v5 and QA CAL-25.v2**
Calibration procedure for E-field probes optimized for close near field evaluations in air

Calibration date: **August 21, 2009**

Condition of the calibrated item **In Tolerance**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-09 (No. 217-01030)	Apr-10
Power sensor E4412A	MY41495277	1-Apr-09 (No. 217-01030)	Apr-10
Power sensor E4412A	MY41498087	1-Apr-09 (No. 217-01030)	Apr-10
Reference 3 dB Attenuator	SN: S5054 (3c)	31-Mar-09 (No. 217-01026)	Mar-10
Reference 20 dB Attenuator	SN: S5086 (20b)	31-Mar-09 (No. 217-01028)	Mar-10
Reference 30 dB Attenuator	SN: S5129 (30b)	31-Mar-09 (No. 217-01027)	Mar-10
Reference Probe ER3DV6	SN: 2328	1-Oct-08 (No. ER3-2328_Oct08)	Oct-09
DAE4	SN: 789	19-Dec-08 (No. DAE4-789_Dec08)	Dec-09

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-08)	In house check: Oct-09

	Name	Function	Signature
Calibrated by:	Katja Pokovic	Technical Manager	
Approved by:	Niels Kuster	Quality Manager	

Issued: August 22, 2009

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Certificate No: ER3-2256_Aug09

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Accreditation No.: **SCS 108**

Glossary:

NORM _{x,y,z}	sensitivity in free space
DCP	diode compression point
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., $\vartheta = 0$ is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}*: Assessed for E-field polarization $\vartheta = 0$ for XY sensors and $\vartheta = 90$ for Z sensor ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide).
- NORM(f)_{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 (no uncertainty required). DCP does not depend on frequency.
- Spherical isotropy (3D deviation from isotropy)*: in a locally homogeneous field realized using an open waveguide setup.
- Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- Connector Angle*: The angle is assessed using the information gained by determining the *NORM_x* (no uncertainty required).



ER3DV6 SN:2256

August 21, 2009

Probe ER3DV6

SN:2256

Manufactured:	March 15, 2001
Last calibrated:	August 22, 2008
Recalibrated:	August 21, 2009

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)



ER3DV6 SN:2256

August 21, 2009

DASY - Parameters of Probe: ER3DV6 SN:2256

Sensitivity in Free Space [$\mu\text{V}/(\text{V}/\text{m})^2$] Diode Compression^A

NormX	2.22 $\pm$ 10.1 % (k=2)	DCP X	94 mV
NormY	1.60 $\pm$ 10.1 % (k=2)	DCP Y	96 mV
NormZ	1.68 $\pm$ 10.1 % (k=2)	DCP Z	99 mV

Frequency Correction

X	0.0
Y	0.0
Z	0.0

Sensor Offset (Probe Tip to Sensor Center)

X	2.5 mm
Y	2.5 mm
Z	2.5 mm

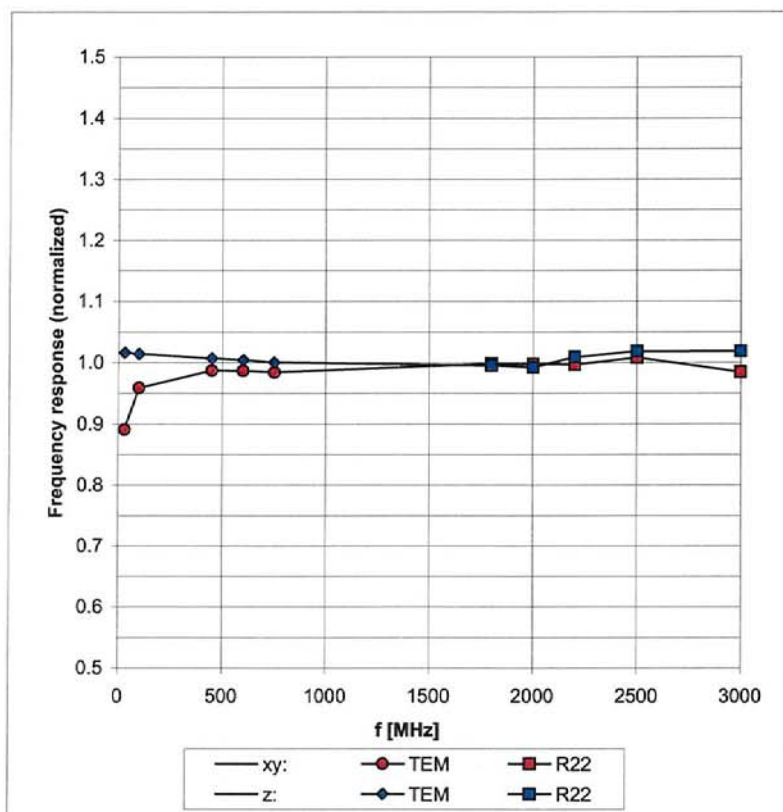
Connector Angle **-247** °

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

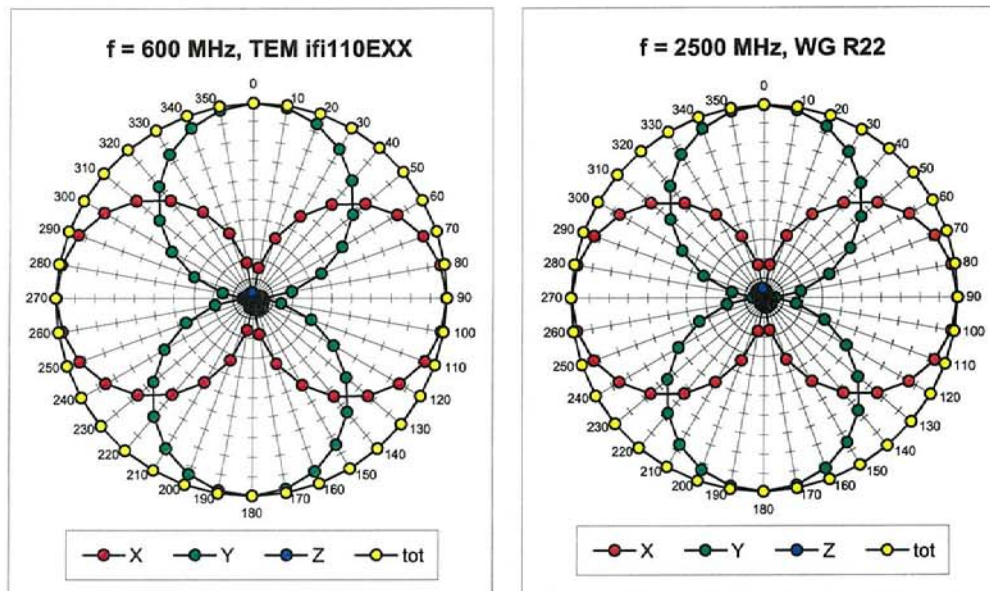
Frequency Response of E-Field

(TEM-Cell:ifi110 EXX, Waveguide R22)

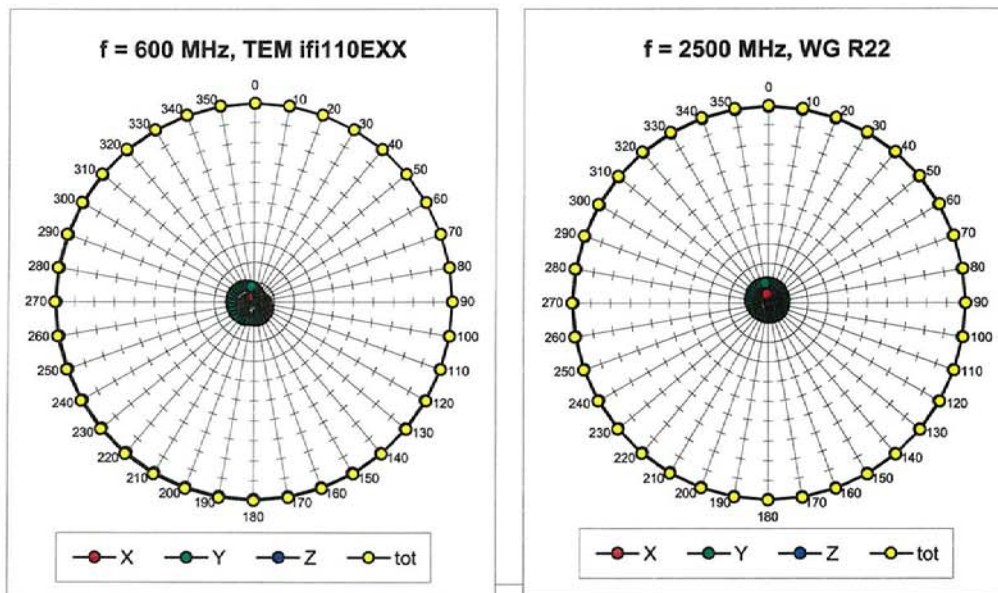


Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

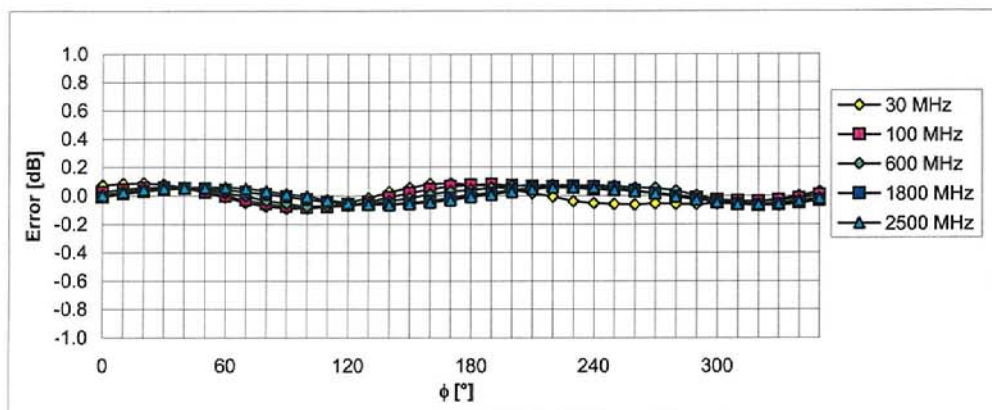
Receiving Pattern (ϕ), $\vartheta = 0^\circ$



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

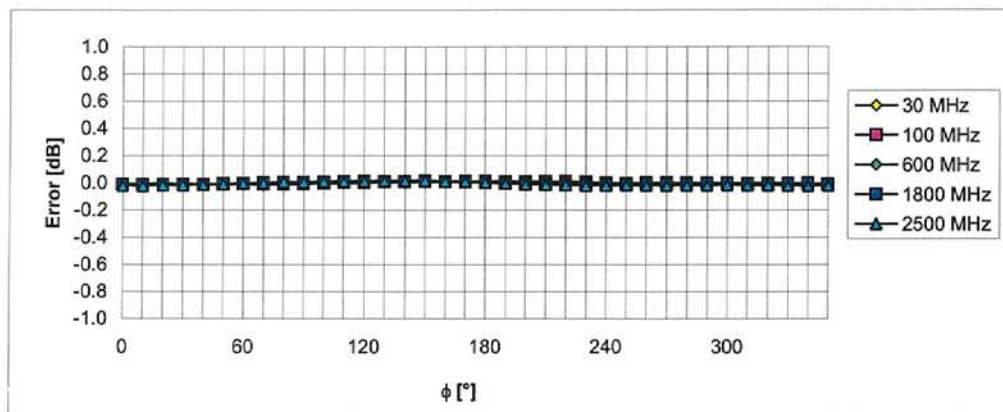


Receiving Pattern (ϕ), $\vartheta = 0^\circ$



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

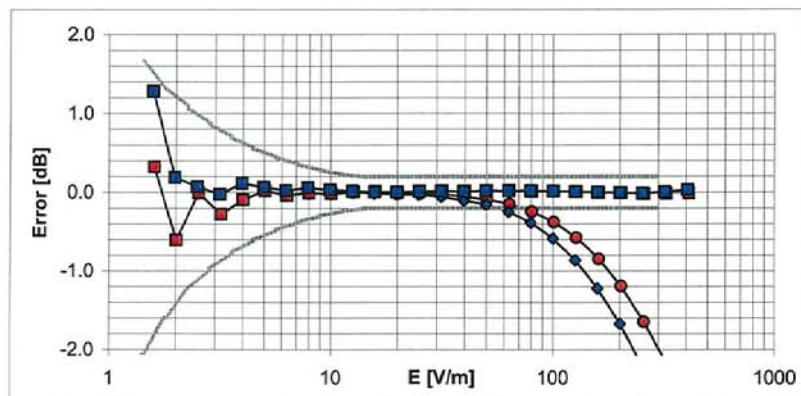
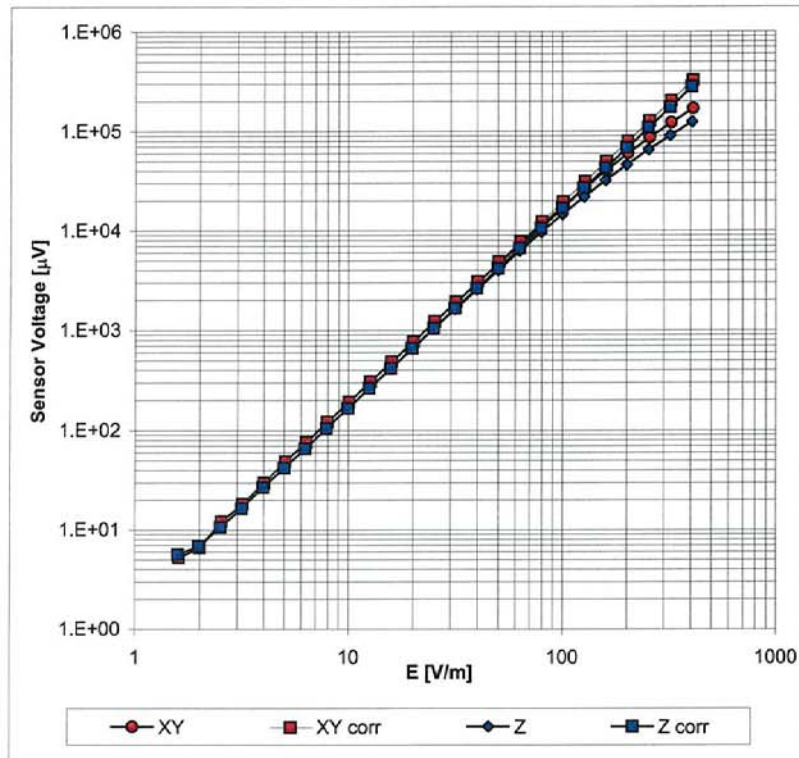
Receiving Pattern (ϕ), $\vartheta = 90^\circ$



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

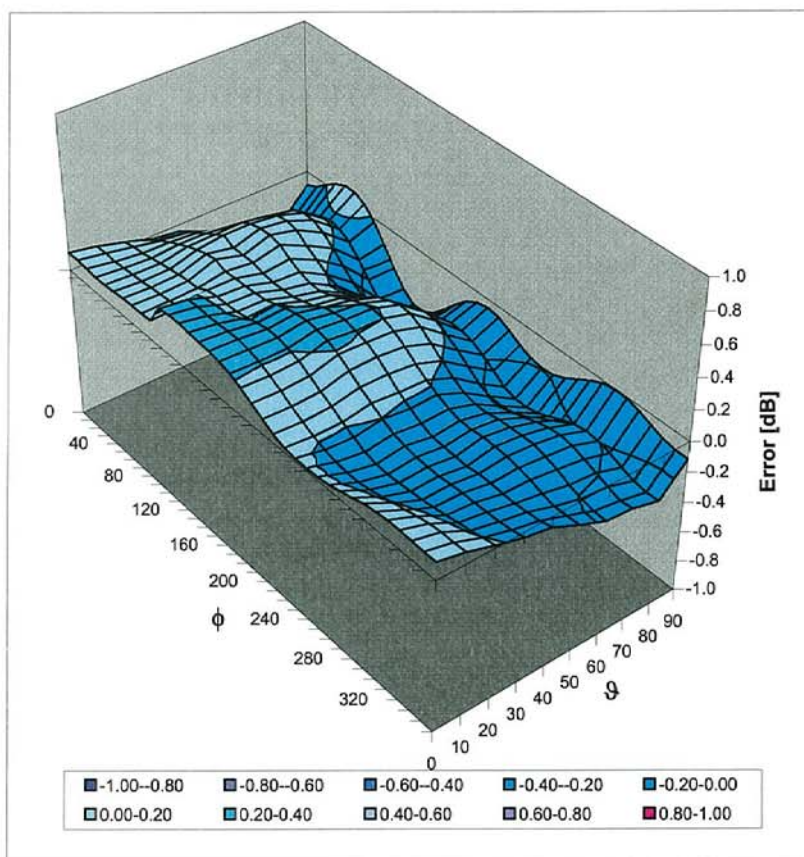
Dynamic Range f(E-field)

(Waveguide R22, f = 1800 MHz)



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

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



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



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **ATL (Auden)**

Certificate No: **H3-6076_Aug09**

CALIBRATION CERTIFICATE

Object **H3DV6 - SN:6076**

Calibration procedure(s) **QA CAL-03.v5 and QA CAL-25.v2**
Calibration procedure for H-field probes optimized for close near field
evaluations in air

Calibration date: **August 19, 2009**

Condition of the calibrated item **In Tolerance**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-09 (No. 217-01030)	Apr-10
Power sensor E4412A	MY41495277	1-Apr-09 (No. 217-01030)	Apr-10
Power sensor E4412A	MY41498087	1-Apr-09 (No. 217-01030)	Apr-10
Reference 3 dB Attenuator	SN: S5054 (3c)	31-Mar-09 (No. 217-01026)	Mar-10
Reference 20 dB Attenuator	SN: S5086 (20b)	31-Mar-09 (No. 217-01028)	Mar-10
Reference 30 dB Attenuator	SN: S5129 (30b)	31-Mar-09 (No. 217-01027)	Mar-10
Reference Probe H3DV6	SN: 6182	1-Oct-08 (No. H3-6182_Oct08)	Oct-09
DAE4	SN: 789	19-Dec-08 (No. DAE4-789_Dec08)	Dec-09

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-08)	In house check: Oct-09

	Name	Function	Signature
Calibrated by:	Katja Pokovic	Technical Manager	
Approved by:	Niels Kuster	Quality Manager	

Issued: August 20, 2009

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Certificate No: H3-6076_Aug09

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Accreditation No.: **SCS 108**

Glossary:

NORM _{x,y,z}	sensitivity in free space
DCP	diode compression point
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., $\vartheta = 0$ is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

- X, Y, Z_{a0a1a2} : Assessed for E-field polarization $\vartheta = 90$ for XY sensors and $\vartheta = 0$ for Z sensor ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide).
- $X, Y, Z(f)_{a0a1a2} = X, Y, Z_{a0a1a2} \cdot \text{frequency_response}$ (see Frequency Response Chart).
- $DCP_{x,y,z}$: DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency.
- *Spherical isotropy (3D deviation from isotropy)*: in a locally homogeneous field realized using an open waveguide setup.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- *Connector Angle*: The angle is assessed using the information gained by determining the X_{a0a1a2} (no uncertainty required).



H3DV6 SN:6076

August 19, 2009

Probe H3DV6

SN:6076

Manufactured:	October 2, 2000
Last calibrated:	August 22, 2008
Recalibrated:	August 19, 2009

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)



H3DV6 SN:6076

August 19, 2009

DASY - Parameters of Probe: H3DV6 SN:6076

Sensitivity in Free Space [A/m / $\sqrt{\mu\text{V}}$]

	a0	a1	a2
X	2.949E-03	-2.301E-4	7.283E-5 $\pm$ 5.1 % (k=2)
Y	2.775E-03	-3.061E-4	3.202E-5 $\pm$ 5.1 % (k=2)
Z	3.090E-03	-7.826E-5	-1.605E-4 $\pm$ 5.1 % (k=2)

Diode Compression¹

DCP X	92 mV
DCP Y	83 mV
DCP Z	78 mV

Sensor Offset (Probe Tip to Sensor Center)

X	3.0 mm
Y	3.0 mm
Z	3.0 mm

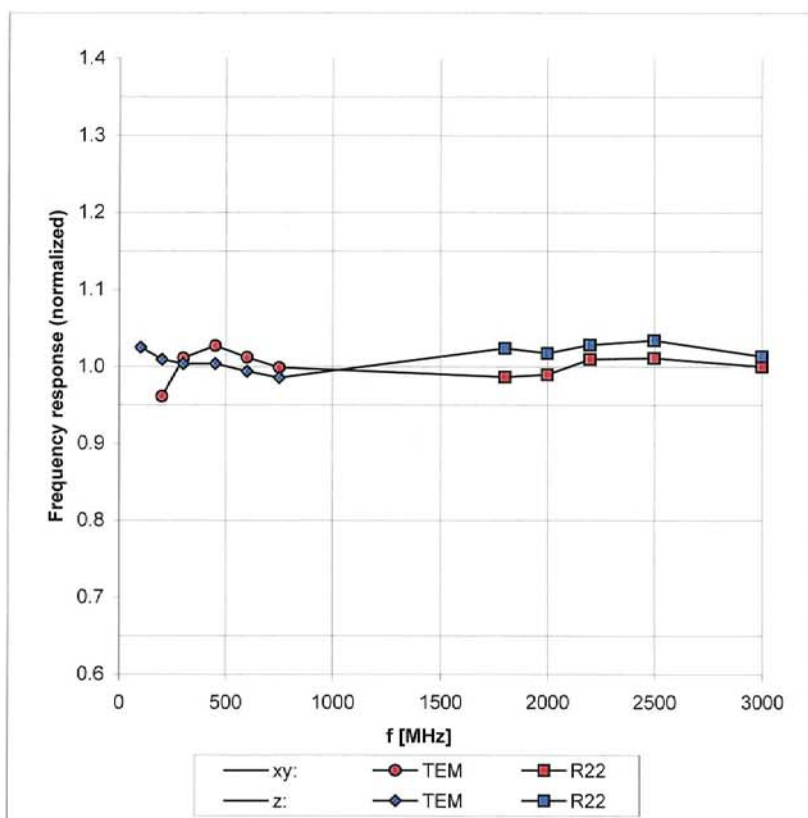
Connector Angle -146 °

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%.

¹ numerical linearization parameter: uncertainty not required

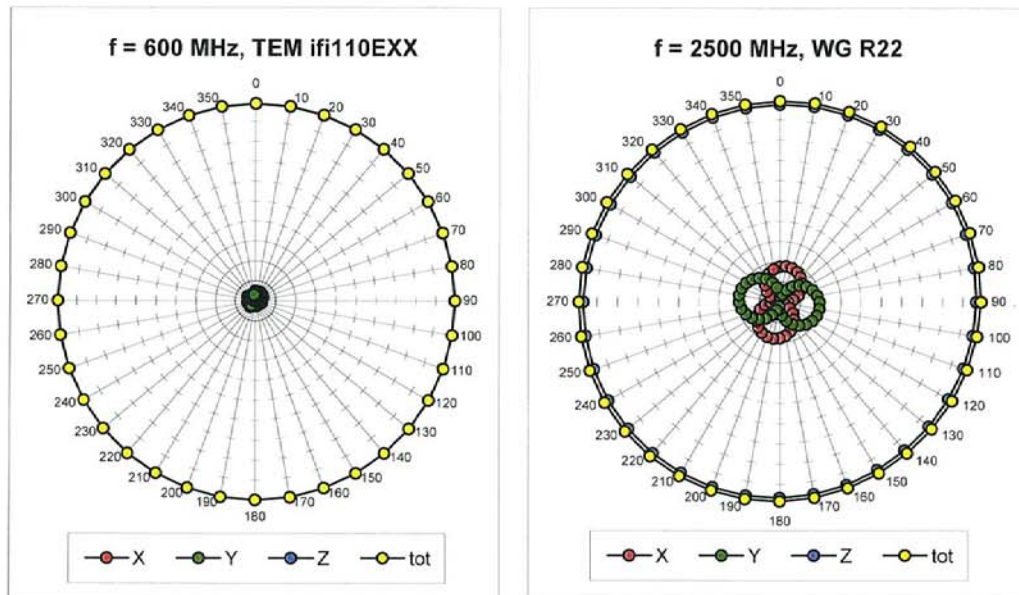
Frequency Response of H-Field

(TEM-Cell:ifi110 EXX, Waveguide R22)

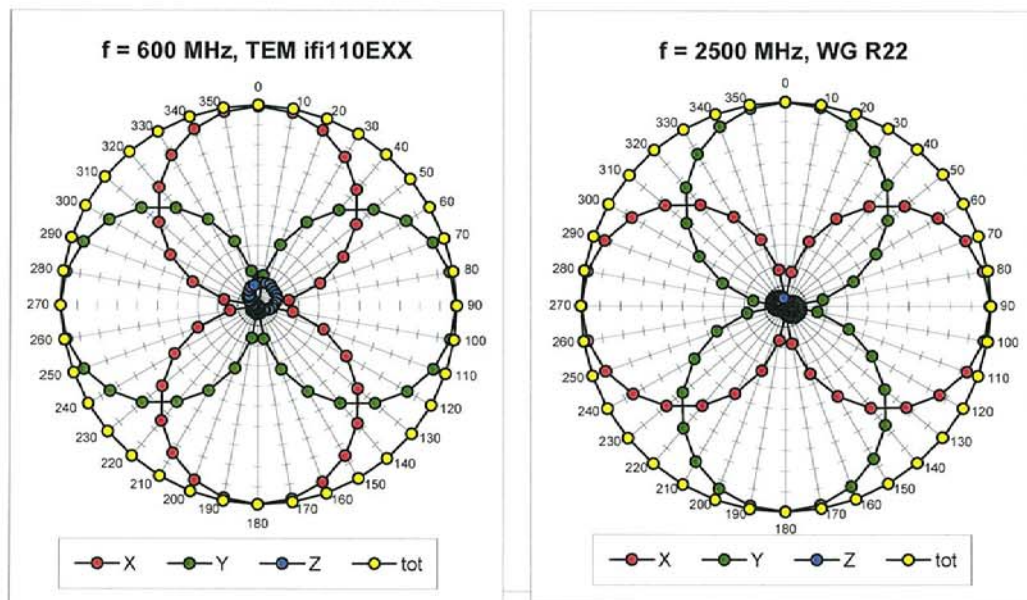


Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ (k=2)

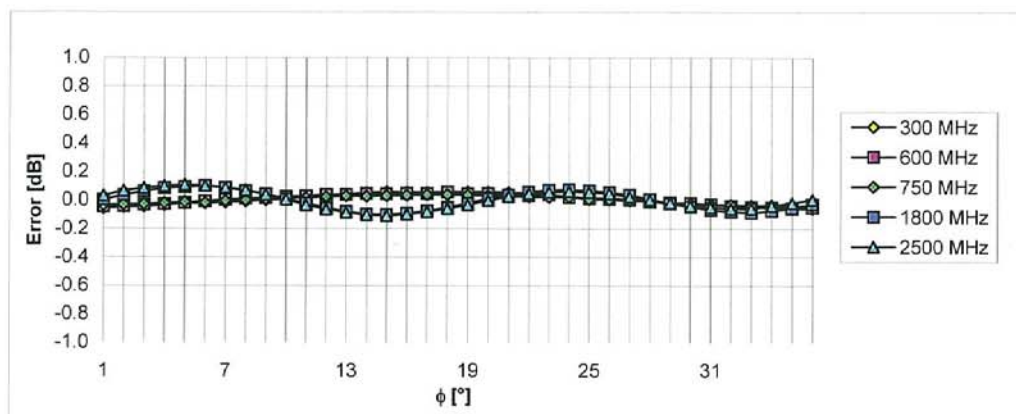
Receiving Pattern (ϕ), $\vartheta = 90^\circ$



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

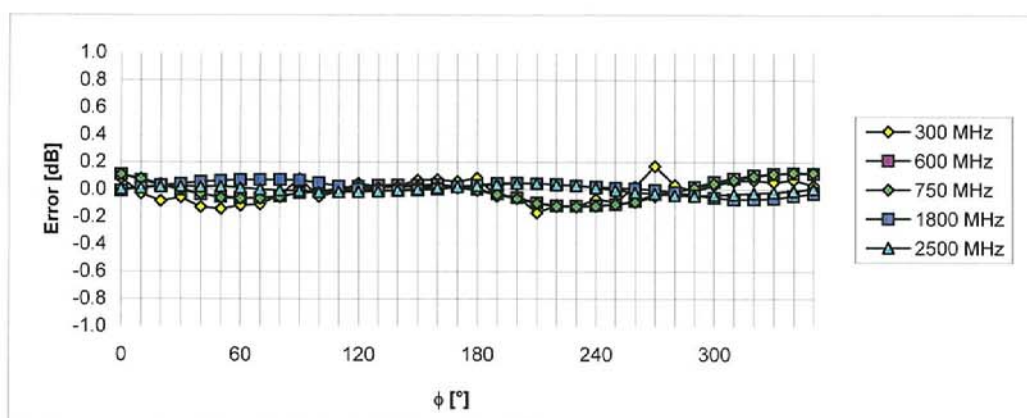


Receiving Pattern (ϕ), $\vartheta = 90^\circ$



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

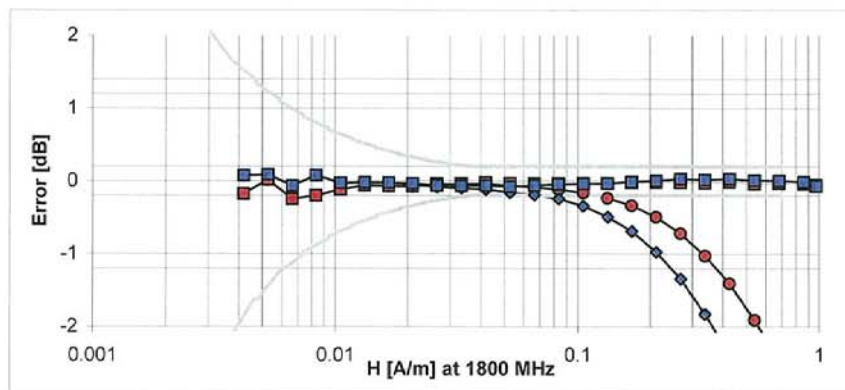
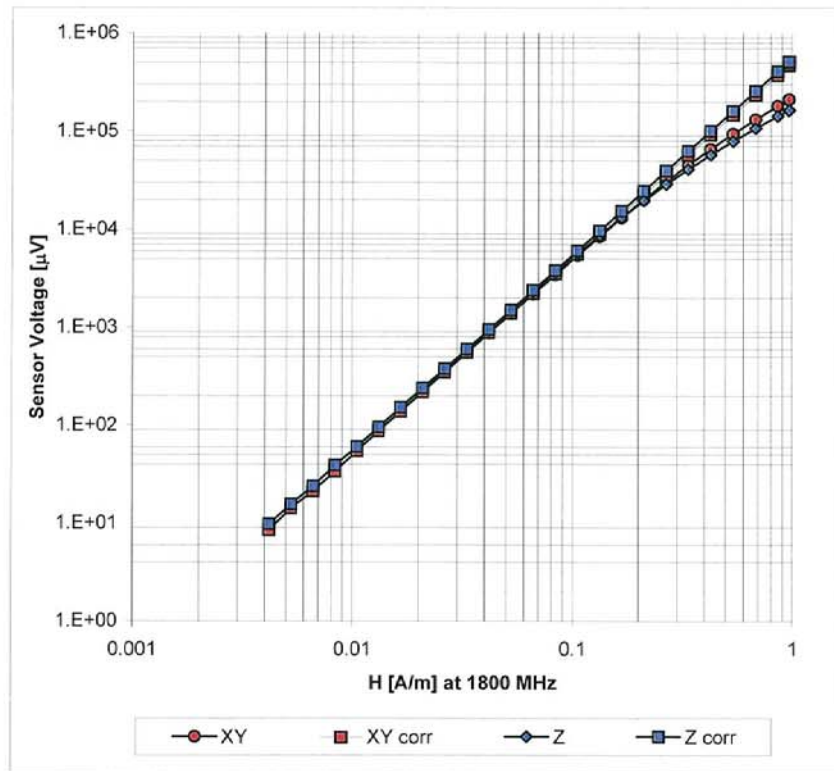
Receiving Pattern (ϕ), $\vartheta = 0^\circ$



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

Dynamic Range f(H-field)

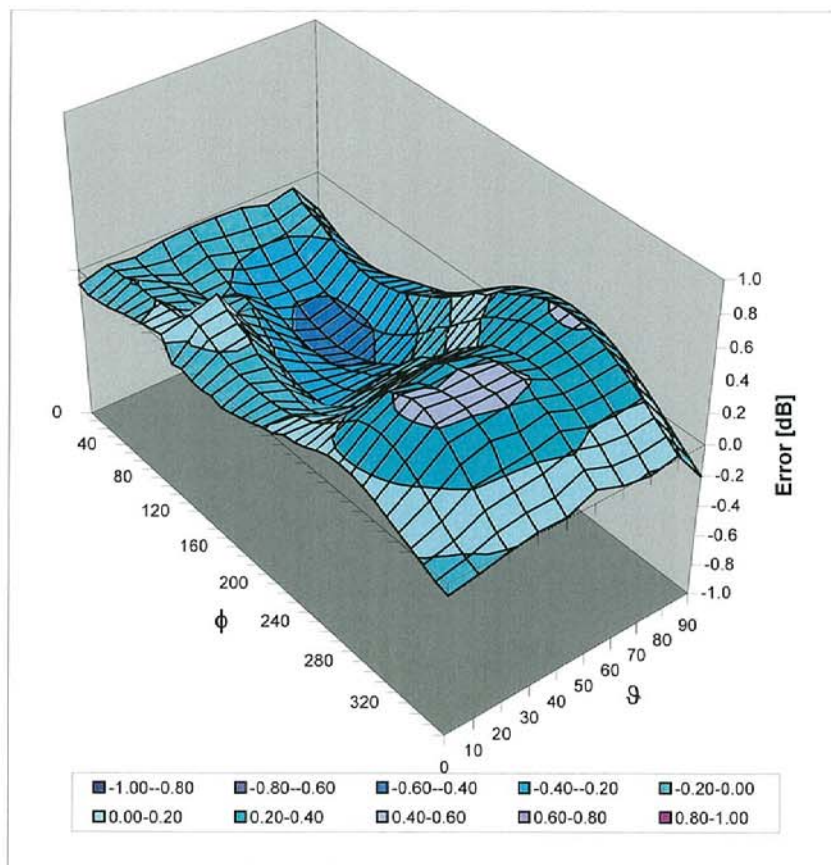
(Waveguide R22, $f = 1800$ MHz)



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

Deviation from Isotropy in Air

Error (ϕ, θ), $f = 900$ MHz



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



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Accreditation No.: **SCS 108**

Client **ATL (Auden)**

Certificate No: **DAE4-779_Jan10**

CALIBRATION CERTIFICATE

Object **DAE4 - SD 000 D04 BJ - SN: 779**

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

Calibration date: **January 21, 2010**

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
Keithley Multimeter Type 2001	SN: 0810278	1-Oct-09 (No: 9055)	Oct-10
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Calibrator Box V1.1	SE UMS 006 AB 1004	05-Jun-09 (in house check)	In house check: Jun-10

Calibrated by:	Name Andrea Guntli	Function Technician	Signature 
Approved by:	Name Fin Bomholt	Function R&D Director	Signature 

Issued: January 21, 2010

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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*: 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.



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	404.487 $\pm$ 0.1% (k=2)	403.723 $\pm$ 0.1% (k=2)	403.948 $\pm$ 0.1% (k=2)
Low Range	3.97046 $\pm$ 0.7% (k=2)	3.98719 $\pm$ 0.7% (k=2)	4.00014 $\pm$ 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	84.5 ° $\pm$ 1 °
---	------------------

Appendix

1. DC Voltage Linearity

High Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	200010.5	1.14	0.00
Channel X	+ Input	20003.28	3.68	0.02
Channel X	- Input	-19997.24	3.06	-0.02
Channel Y	+ Input	200009.6	0.87	0.00
Channel Y	+ Input	19999.83	0.43	0.00
Channel Y	- Input	-19998.10	2.10	-0.01
Channel Z	+ Input	199998.4	0.15	0.00
Channel Z	+ Input	20000.44	1.04	0.01
Channel Z	- Input	-19997.62	-0.01	-0.01

Low Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	1999.6	-0.33	-0.02
Channel X	+ Input	199.84	-0.16	-0.08
Channel X	- Input	-200.02	-0.22	0.11
Channel Y	+ Input	2000.1	0.05	0.00
Channel Y	+ Input	198.87	-1.13	-0.56
Channel Y	- Input	-201.72	-1.62	0.81
Channel Z	+ Input	2000.2	0.14	0.01
Channel Z	+ Input	199.12	-1.18	-0.59
Channel Z	- Input	-200.60	-0.60	0.30

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	-3.75	-5.42
	- 200	6.52	4.96
Channel Y	200	14.47	13.94
	- 200	-14.47	-14.52
Channel Z	200	3.70	3.28
	- 200	-3.73	-3.84

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	-	2.60	0.09
Channel Y	200	1.31	-	3.04
Channel Z	200	2.43	-2.04	-

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	15621	15863
Channel Y	15831	16095
Channel Z	16132	15816

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	-0.14	-1.27	1.10	0.43
Channel Y	-0.91	-2.36	0.81	0.61
Channel Z	-1.02	-1.92	0.28	0.44

6. Input Offset Current

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

7. Input Resistance

	Zeroing (MOhm)	Measuring (MOhm)
Channel X	0.1999	202.7
Channel Y	0.1999	202.5
Channel Z	0.2000	202.7

8. Low Battery Alarm Voltage (verified during pre test)

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

9. Power Consumption (verified during pre test)

Typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)
Supply (+ Vcc)	+0.0	+6	+14
Supply (- Vcc)	-0.01	-8	-9

IMPORTANT NOTICE

USAGE OF THE DAE 4

The DAE unit is a delicate, high precision instrument and requires careful treatment by the user. There are no serviceable parts inside the DAE. Special attention shall be given to the following points:

Battery Exchange: The battery cover of the DAE4 unit is closed using a screw, over tightening the screw may cause the threads inside the DAE to wear out.

Shipping of the DAE: Before shipping the DAE to SPEAG for calibration, remove the batteries and pack the DAE in an antistatic bag. This antistatic bag shall then be packed into a larger box or container which protects the DAE from impacts during transportation. The package shall be marked to indicate that a fragile instrument is inside.

E-Stop Failures: Touch detection may be malfunctioning due to broken magnets in the E-stop. Rough handling of the E-stop may lead to damage of these magnets. Touch and collision errors are often caused by dust and dirt accumulated in the E-stop. To prevent E-stop failure, the customer shall always mount the probe to the DAE carefully and keep the DAE unit in a non-dusty environment if not used for measurements.

Repair: Minor repairs are performed at no extra cost during the annual calibration. However, SPEAG reserves the right to charge for any repair especially if rough unprofessional handling caused the defect.

DASY Configuration Files: Since the exact values of the DAE input resistances, as measured during the calibration procedure of a DAE unit, are not used by the DASY software, a nominal value of 200 MOhm is given in the corresponding configuration file.

Important Note:

Warranty and calibration is void if the DAE unit is disassembled partly or fully by the Customer.

Important Note:

Never attempt to grease or oil the E-stop assembly. Cleaning and readjusting of the E-stop assembly is allowed by certified SPEAG personnel only and is part of the annual calibration procedure.

Important Note:

To prevent damage of the DAE probe connector pins, use great care when installing the probe to the DAE. Carefully connect the probe with the connector notch oriented in the mating position. Avoid any rotational movement of the probe body versus the DAE while turning the locking nut of the connector. The same care shall be used when disconnecting the probe from the DAE.

Appendix E - Uncertainty

HAC Uncertainty Budget According to ANSI C63.19 [1], [2]							
Error Description	Uncertainty value	Prob. Dist.	Div.	(c_i) E	(c_i) H	Std. Unc. E	Std. Unc. H
Measurement System							
Probe Calibration	±5.1 %	N	1	1	1	±5.1 %	±5.1 %
Axial Isotropy	±4.7 %	R	$\sqrt{3}$	1	1	±2.7 %	±2.7 %
Sensor Displacement	±16.5 %	R	$\sqrt{3}$	1	0.145	±9.5 %	±1.4 %
Test Arch	±7.2 %	R	$\sqrt{3}$	1	0	±4.1 %	±0.0 %
Linearity	±4.7 %	R	$\sqrt{3}$	1	1	±2.7 %	±2.7 %
Scaling to Peak Envelope Power	±0.0 %	R	$\sqrt{3}$	1	1	±0.0 %	±0.0 %
System Detection Limit	±1.0 %	R	$\sqrt{3}$	1	1	±0.6 %	±0.6 %
Readout Electronics	±0.3 %	N	1	1	1	±0.3 %	±0.3 %
Response Time	±0.8 %	R	$\sqrt{3}$	1	1	±0.5 %	±0.5 %
Integration Time	±2.6 %	R	$\sqrt{3}$	1	1	±1.5 %	±1.5 %
RF Ambient Conditions	±3.0 %	R	$\sqrt{3}$	1	1	±1.7 %	±1.7 %
RF Reflections	±12.0 %	R	$\sqrt{3}$	1	1	±6.9 %	±6.9 %
Probe Positioner	±1.2 %	R	$\sqrt{3}$	1	0.67	±0.7 %	±0.5 %
Probe Positioning	±4.7 %	R	$\sqrt{3}$	1	0.67	±2.7 %	±1.8 %
Extrap. and Interpolation	±1.0 %	R	$\sqrt{3}$	1	1	±0.6 %	±0.6 %
Test Sample Related							
Device Positioning Vertical	±4.7 %	R	$\sqrt{3}$	1	0.67	±2.7 %	±1.8 %
Device Positioning Lateral	±1.0 %	R	$\sqrt{3}$	1	1	±0.6 %	±0.6 %
Device Holder and Phantom	±2.4 %	R	$\sqrt{3}$	1	1	±1.4 %	±1.4 %
Power Drift	±5.0 %	R	$\sqrt{3}$	1	1	±2.9 %	±2.9 %
Phantom and Setup Related							
Phantom Thickness	±2.4 %	R	$\sqrt{3}$	1	0.67	±1.4 %	±0.9 %
Combined Std. Uncertainty						±15.2 %	±10.8 %
Expanded Std. Uncertainty on Power						±30.4 %	±21.6 %
Expanded Std. Uncertainty on Field						±15.2 %	±10.8 %

Table 24.2: Worst-Case uncertainty budget for HAC free field assessment according to ANSI C63.19 [1], [2]. The budget is valid for the frequency range 800 MHz - 3 GHz and represents a worst-case analysis. For specific tests and configurations, the uncertainty could be considerably smaller. Some of the parameters are dependent on the user situations and need adjustment according to the actual laboratory conditions.