A Test Lab Techno Corp.

Changan Lab：No. 140 -1, Changan Street, Bade City, Taoyuan County, Taiwan R.O.C.
Tel：886-3-271-0188 / Fax：886-3-271-0190

HAC EVALUATION REPORT

Test Report No.	:	1106FS15
Applicant	:	HTC Corporation
Trade Name	:	HTC
Model Number	:	PG76240
EUT Type	:	Smartphone
FCC ID	:	NM8PG76240
Dates of Test	:	Jun. 18, 2011
Issued Date	:	Jun. 20, 2011
Test Environment	:	Ambient Temperature： 22 ± 2 ℃
		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.
3. The measurement report has to be written approval of A Test Lab Techno Corp. It may only be reproduced or published in full. This report shall not be reproduced except in full, without the written approval of A Test Lab Techno Corp.
4. This document may be altered or revised by A Test Lab Techno. Corp. personnel only, and shall be noted

Approved By : Sam Chuang (Sam Chuang)

Tested By : Alex Wu (Alex Wu)

Contents

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	:	PG76240
FCC ID	:	NM8PG76240
IMIE No	:	004402260020882
Tx Frequency	:	824.2 - 848.8 MHz (GSM 850) 1850.2 - 1909.8 MHz (PCS 1900) 1712.4 - 1752.6 MHz (WCDMA Band IV)
RF Output Power	:	1.862 W (32.70 dBm) GSM 850 1.096 W (30.40 dBm) PCS 1900 0.211 W (23.24 dBm) WCDMA Band IV
Antenna Type	:	PIFA Type
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 C63.19-2007 standards.

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)：PG76240.** The test procedures, as described in ANSI C63.19-2007 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	ER3DV6R	2256	Aug. 23, 2010	Aug. 23, 2011
SPEAG	Dosimetric H-Filed Probe	H3DV6	6076	Aug. 23, 2010	Aug. 23, 2011
SPEAG	835 MHz System Validation Kit	CD835V3	1017	Jul. 13, 2010	Jul. 13, 2011
SPEAG	1880 MHz System Validation Kit	CD1880V3	1036	Jul. 13, 2010	Jul. 13, 2011
SPEAG	Data Acquisition Electronics	DAE4	779	Jan. 31, 2011	Jan. 31, 2012
SPEAG	Device Holder	N/A	N/A	N.C.R.	
SPEAG	Phantom	SAM V4.0	TP-1150	N.C.R.	
SPEAG	Robot	Staubli TX90XL	F07/564ZA1/C/01	N.C.R.	
SPEAG	Software	DASY5 V5.0 Build 91	N/A	N.C.R.	
SPEAG	Software	SEMCAD X V13.4 Build 125	N/A	N.C.R.	
SPEAG	Measurement Server	SE UMS 011 AA	1025	N.C.R.	
Agilent	Wireless Communication Test Set	CMU200	109369	Aug. 10, 2010	Aug. 10, 2011
Agilent	Spectrum Analyzer(ESA-L)	E4408B	MY45107753	Jun. 24, 2010	Jun. 24, 2011
R&S	Spectrum Analyzer(FSL)	FSL6	100410	N.C.R.	
Agilent	MXG Vector Signal Generator	N5182A	MY47420962	May 27, 2011	May 27, 2012
R&S	Power Sensor	NRP-Z22	100179	Jun. 19, 20010	Jun. 19, 2011
Agilent	Dual Directional Coupler	778D	50334	N.C.R.	
Mini-Circuits	Power Amplifier	ZVE-8G	D042005 671800514	N.C.R.	
Mini-Circuits	Power Amplifier	ZHL-42W-SMA	D111103#5	N.C.R.	

Table 1. Test Equipment List

4. Test Procedure

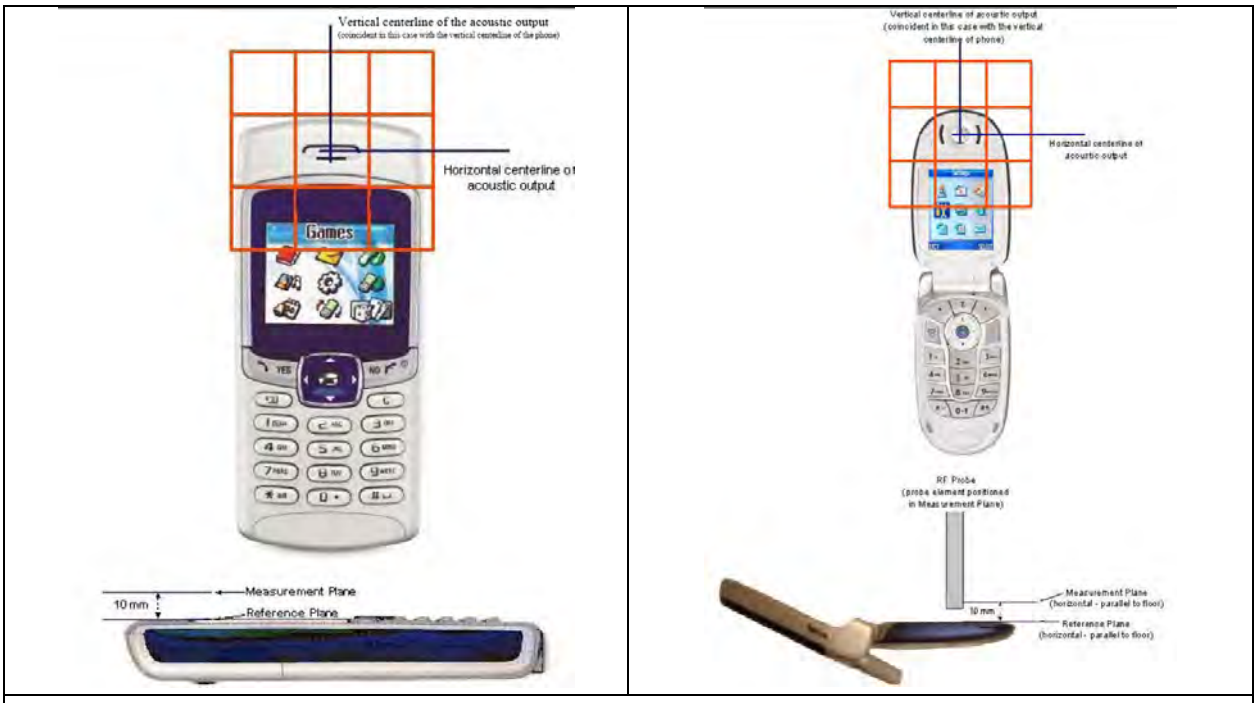


Figure 1. WD reference and plane for RF emission measurements

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

1. Proper operation of the field probe, probe measurement system, other instrumentation, and the positioning system was confirmed.

2. WD is positioned in its intended test position, acoustic output point of the device perpendicular to the field probe.

3. The WD operation for maximum rated RF output power was configured and confirmed with the base station simulator, at the test channel and other normal operating parameters as intended for the test. The battery was ensured to be fully charged before each test.

4. The center sub-grid was centered over the center of the acoustic output (also audio band magnetic output, if applicable). The WD audio output was positioned tangent (as physically possible) to the measurement plane.

5. A surface calibration was performed before each setup change to ensure repeatable spacing and proper maintenance of the measurement plane using the HAC Phantom.

6. The measurement system measured the field strength at the reference location.

7. Measurements at 2mm or 5mm increments in the 5 x 5 cm region were performed at a distance 15 mm from the center point of the probe measurement element to the WD. A 360o rotation about the azimuth axis at the maximum interpolated position was measured. For the worst-case condition, the peak reading from this rotation was used in re-evaluating the HAC category.

8. The system performed a drift evaluation by measuring the field at the reference location.

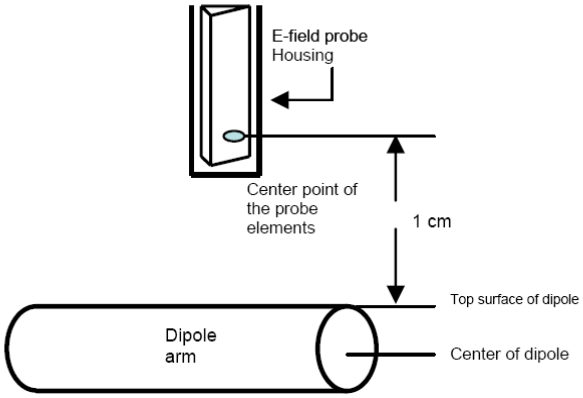
9. Steps 1-8 were done for both the E and H-Field measurements.

5. System Check

5.1 System check parameters

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

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



5.2 Validation Procedure

Place a dipole antenna meeting the requirements given in ANSI-PC63.19 in the position normally occupied by the WD. The dipole antenna serves as a known source for an electrical and magnetic output. Position the E-field and H-field probes so that:

- the probes and their cables are parallel to the coaxial feed of the dipole antenna
- the probe cables and the coaxial feed of the dipole antenna approach the measurement area from opposite directions; and
- the probes are 10 mm from the surface of the dipole elements.

Scan the length of the dipole with both E-field and H-field probes and record the maximum values for each. Compare the readings to expected values.

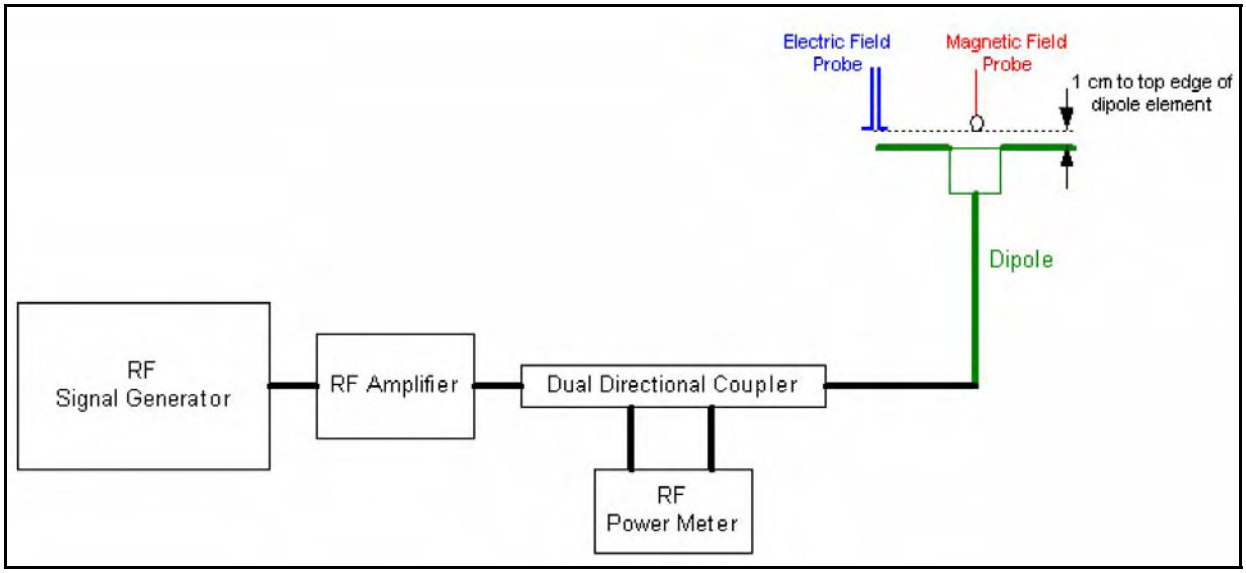


Figure 2. WD dipole calibration procedure

5.3 Illustrative dipole calculated and measured values

Baseband frequencies (MHz)	Frequency (MHz)	E-field calculated values (V/m)	E-field measured values (V/m)	E-field delta (calculated to measured) (V/m) & %	H-field calculated values (A/m)	H-field measured values (A/m)	H-field delta (calculated to measured A/m & %)
790–850	835	187			0.476		
806–821	813.5	190			0.481		
896–901	898.5	185			0.477		
1880–2000	1880	149			0.456		
		224.6–236.4			0.5139–0.5226		
		214.9–232.2			0.4954–0.5164		
		213.2–220.9			0.5032–0.5005		
		153.6–149.3			0.4478–0.4035		

NOTE 1— Numeric modeling results will vary based on several factors, including the size of the computational area, boundary conditions selected, grid resolution, accuracy of models for material properties, and other factors. Further, the results obtained by numeric modeling will vary from measured results based on many additional factors, including the degree to while the probe perturbs the field, the degree to which the probe averages the field strength over its dimensions, the linearity of the probe, the differences between the physical dipole and its modeled representation, and many other factors. Numeric computations provided to the committee showed significant variability between different results. Accordingly the values provided should be used judiciously and not interpreted to be absolutely correct. The calculated values provided for dipoles were developed using theoretical numerical computation.
NOTE 2— Delta % = 100 × (measured peak minus calculated) divided by calculated. Values within ± 25% are acceptable, of which 12% is deviation and 13% is measurement uncertainty. Values independently validated for the dipole actually used in the measurements should be used, when available.

5.4 Validation Results

Dipole	Freq. (MHz)	Protocol	Input Power (mW)	Target for Dipole (V/m)	E-Field Results (V/m)	Deviation	Date
SN:1017	835	CW	100	168.6	170.2	0.95 %	Jun. 18, 2011
SN:1036	1880	CW	100	139.2	140.5	0.93 %	Jun. 18, 2011

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	0.430	-5.91 %	Jun. 18, 2011
SN:1036	1880	CW	100	0.468	0.439	-6.20 %	Jun. 18, 2011

Table 3. Dipole H-Field Measurement Summary

6. 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 C63.19-2007 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 >= emission bandwidth
   - Video bandwidth >= 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.
8. CalculatetheProbeModulationFactorastheratiobetweentheCWmultimeterfieldreadingandthereadingfortheapplicablemodulation.I.e., $\mathrm{PMF} = \frac{E_{CW}}{E_{mod}}$ and similar for H.

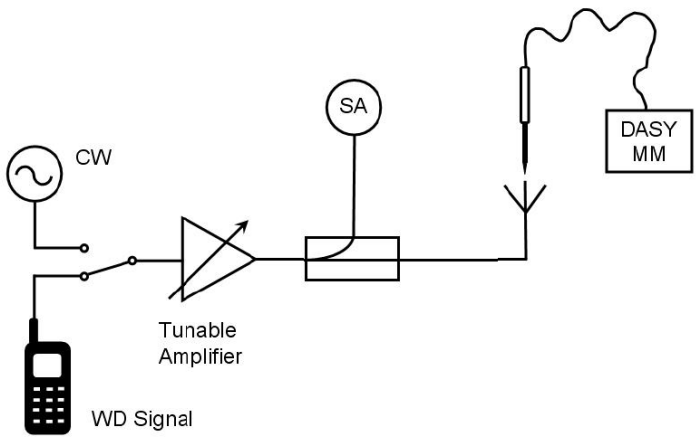


Figure 3. Probe Modulation Factor Measurement Diagram

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 V/m

Frequency (MHz)	Protocol	E-Field Probe SN:2256		H-Field Probe SN:6076	
		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:2256		H-Field Probe SN:6076	
		E-Field (V/m)	E-Field Modulation Factor	H-Field (A/m)	H-Field Modulation Factor
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.

7. HAC Testing with RF Transmitters

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 accoustic 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 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 (DPCCH & $DPDCH_n$) 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.

8. Test Results

8.1 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 IV	M3	47.3 to 84.1 V/m
	M4	< 47.3 V/m

Table 5. Emissions Limits

Band	Channel	Conducted Power (dBm)	Measured PMF	Drift (dB)	Excluded Cells	Peak Field (V/m)	Rating	Note
GSM 850	128	32.50	2.56	-0.066	6,8,9	156.5	M3	---
	190	32.60	2.56	-0.123	6,8,9	160.0	M3	---
	251	32.70	2.56	0.023	6,8,9	161.1	M3	---
PCS 1900	512	30.40	2.50	-0.030	7.8.9	77.6	M3	---
	661	30.20	2.50	0.030	7.8.9	69.7	M3	---
	810	29.90	2.50	-0.009	7.8.9	61.3	M3	---
WCDMA Band IV	1312	23.11	0.90	-0.036	7.8.9	36.0	M4	---
	1413	23.12	0.90	-0.024	7.8.9	35.6	M4	---
	1513	22.93	0.90	-0.037	7.8.9	33.4	M4	---

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

8.2 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 IV	M3	0.14 to 0.25 A/m
	M4	<0.14 A/m

Table 6. Emissions Limits

Band	Channel	Conducted Power (dBm)	Measured PMF	Drift (dB)	Excluded Cells	Peak Field (A/m)	Rating	Note
GSM 850	128	32.50	2.68	0.079	1,2,4	0.363	M4	---
	190	32.60	2.71	0.147	1,2,4	0.394	M4	---
	251	32.70	2.71	-0.003	1,2,4	0.403	M4	---
PCS 1900	512	30.40	2.32	0.065	7.8.9	0.241	M3	---
	661	30.20	2.44	0.084	7.8.9	0.231	M3	---
	810	29.90	2.54	0.044	7.8.9	0.197	M3	---
WCDMA Band IV	1312	23.11	0.81	0.016	1.4.7	0.084	M4	---
	1413	23.12	0.81	0.045	1.4.7	0.080	M4	---
	1513	22.93	0.81	-0.033	1.4.7	0.074	M4	---

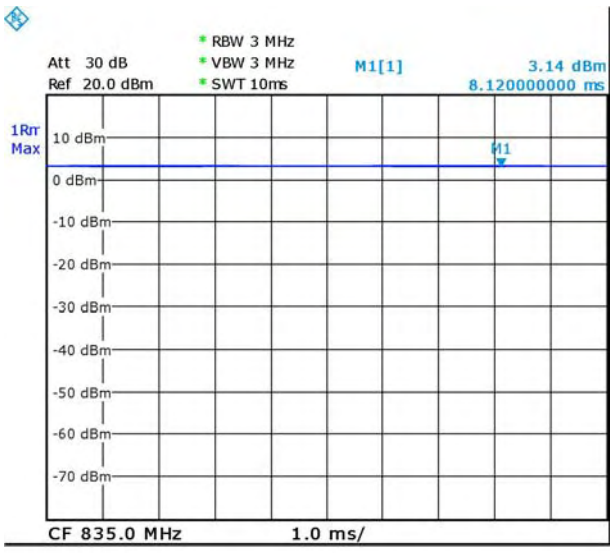
Note: HAC H-Field measurement results for the portable cellular telephone at highest possible output power.

8.3 Description of the Device under Test (DUT)

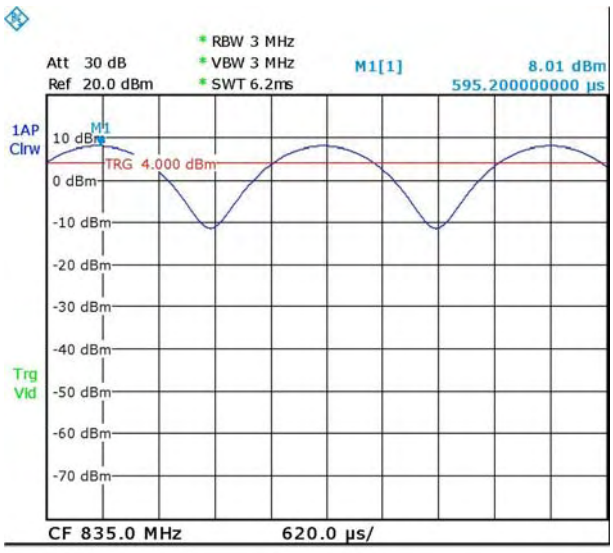
Modes and Bands of Operation	GSM 850	PCS 1900	WCDMA Band IV
Modulation Mode	GMSK	GMSK	QPSK
Duty Cycle	1/8.3	1/8.3	1/1
Transmitter Frequency Range (MHz)	824.2 - 848.8	1850.2 -1909.8	1712.4 - 1752.6

Appendix A - Details of WD signal

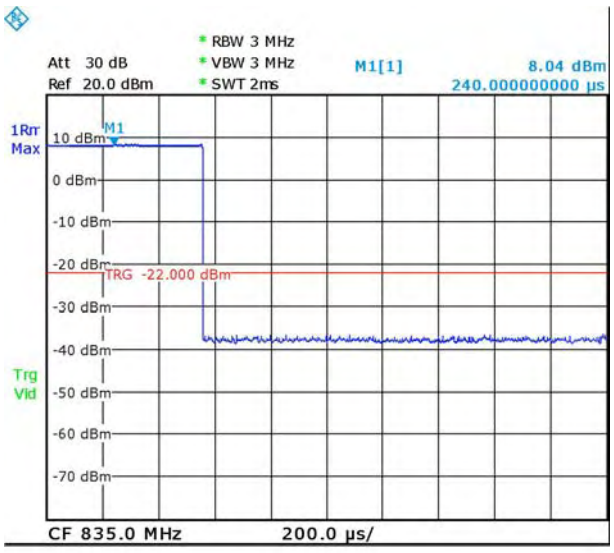
835 MHz



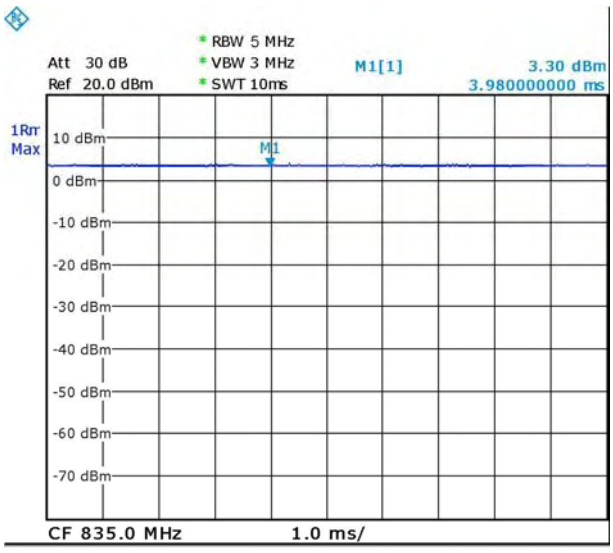
CW Signal



AM80%

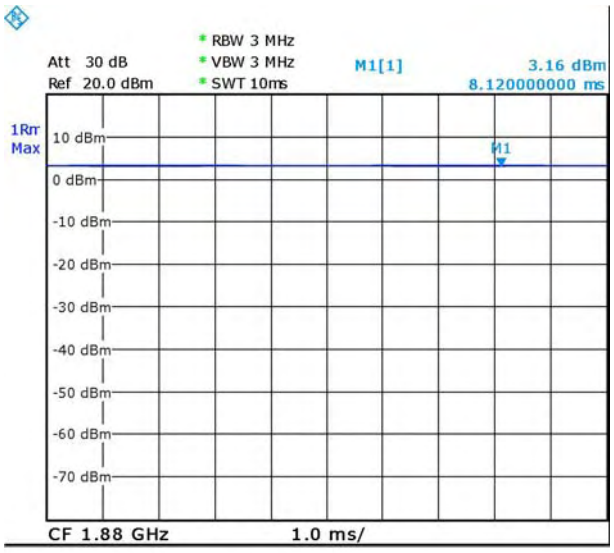
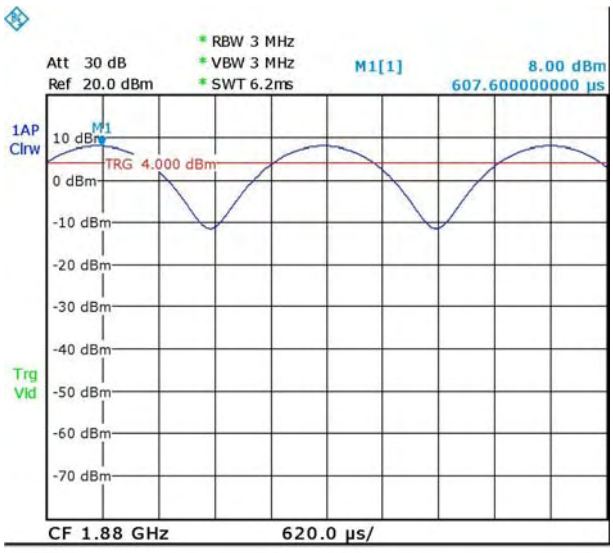


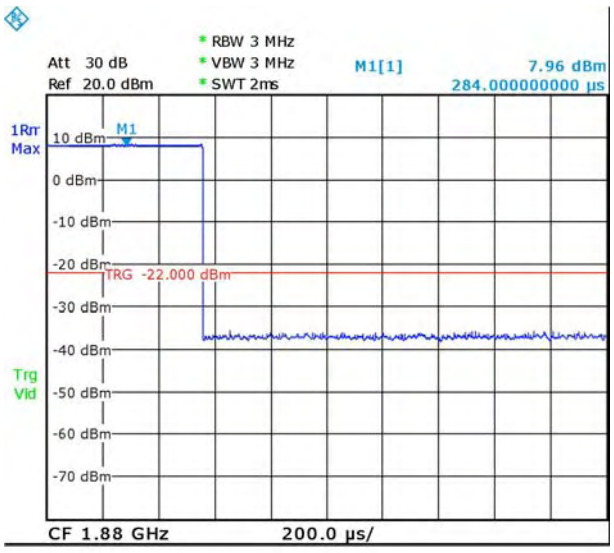
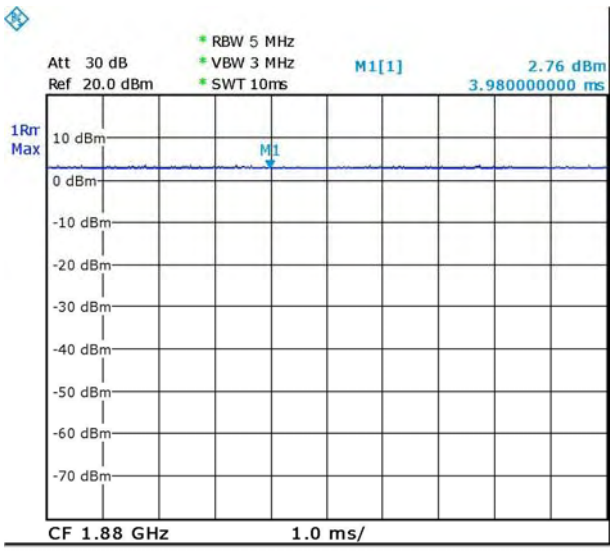
GSM Signal



WCDMA Signal

1880 MHz

	
CW Signal	**AM80%**

	
GSM Signal	**WCDMA Signal**

Appendix B - Validation

Date/Time: 6/18/2011 11:06:24 AM

Test Laboratory: A Test Lab Techno Corp.

HAC_System Performance Check at 835MHz_20110618_E

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

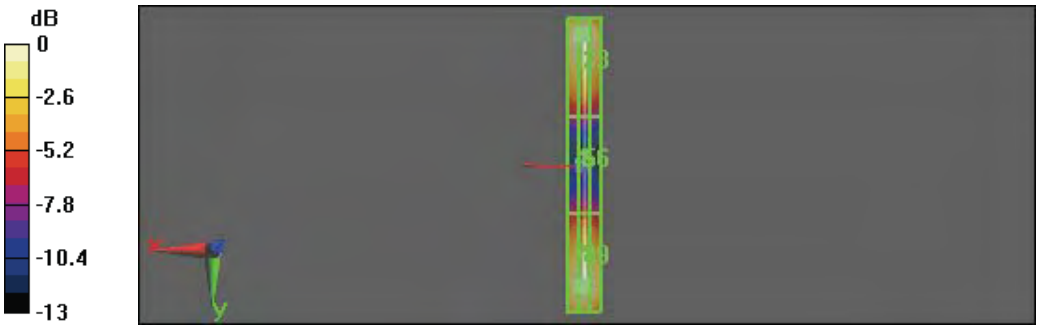
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Phantom section: E Dipole Section

DASY4 Configuration:

- Probe: ER3DV6R - SN2256; ConvF(1, 1, 1); Calibrated: 8/23/2010
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/31/2011
- 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 = 170.2 V/m
Probe Modulation Factor = 1
Device Reference Point: 0, 0, 354.7 mm
Reference Value = 120.7 V/m; Power Drift = 0.042 dB
Hearing Aid Near-Field Category: M4 (AWF 0 dB)
Cursor:
Total = 170.1 V/m
E Category: M4
Location: 1, -79, 364.7 mm
Peak E-field in V/m

Grid 1 **167.7 M4**	Grid 2 **170.2 M4**	Grid 3 **158.4 M4**
Grid 4 **86.1 M4**	Grid 5 **87.9 M4**	Grid 6 **84 M4**
Grid 7 **157.1 M4**	Grid 8 **161.1 M4**	Grid 9 **154.0 M4**



0 dB = 170.1V/m

Date/Time: 6/18/2011 11:19:54 AM

Test Laboratory: A Test Lab Techno Corp.

HAC_System Performance Check at 1880MHz_20110618_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, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Phantom section: E Dipole Section

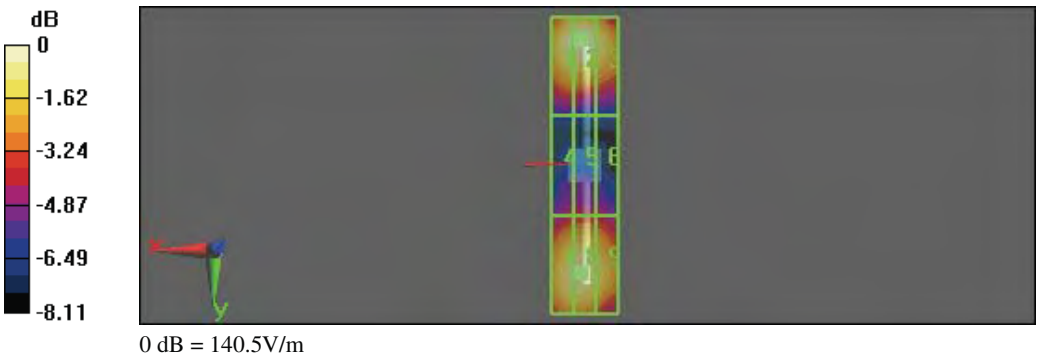
DASY4 Configuration:

- Probe: ER3DV6R - SN2256; ConvF(1, 1, 1); Calibrated: 8/23/2010
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/31/2011
- 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 = 140.5 V/m
Probe Modulation Factor = 1
Device Reference Point: 0, 0, 354.7 mm
Reference Value = 134.3 V/m; Power Drift = -0.00343 dB
Hearing Aid Near-Field Category: M2 (AWF 0 dB)
Cursor:
Total = 140.5 V/m
E Category: M2
Location: 1, -38, 364.7 mm

Peak E-field in V/m

Grid 1 **138.5 M2**	Grid 2 **140.5 M2**	Grid 3 **129.8 M2**
Grid 4 **88.3 M3**	Grid 5 **90.4 M3**	Grid 6 **86.6 M3**
Grid 7 **130.9 M2**	Grid 8 **132.5 M2**	Grid 9 **124.6 M2**



0 dB = 140.5V/m

Date/Time: 6/18/2011 10:45:27 AM

Test Laboratory: A Test Lab Techno Corp.

HAC_System Performance Check at 835MHz_20110618_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, $\varepsilon_r = 1$; $\rho = 1$ kg/m^3
Phantom section: H Dipole Section

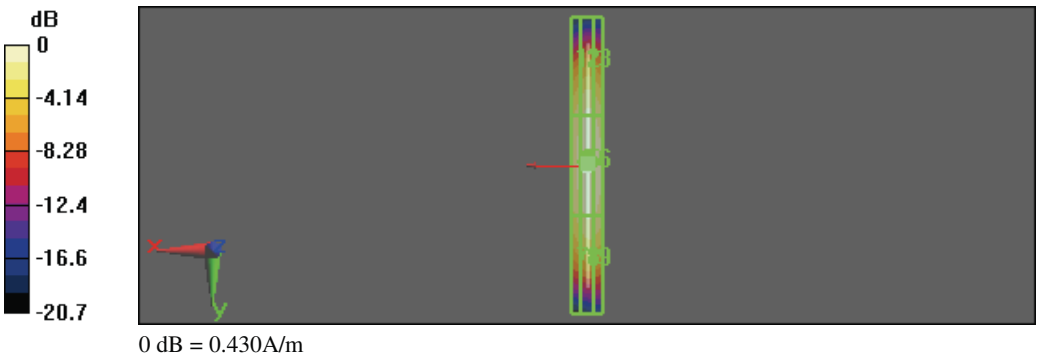
DASY4 Configuration:

- Probe: H3DV6 - SN6076; ; Calibrated: 8/23/2010
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/31/2011
- 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 = 0.430 A/m
Probe Modulation Factor = 1
Device Reference Point: 0, 0, 354.7 mm
Reference Value = 0.452 A/m; Power Drift = -0.028 dB
Hearing Aid Near-Field Category: M4 (AWF 0 dB)
Cursor:
Total = 0.430 A/m
H Category: M4
Location: -1, -1.5, 364.7 mm

Peak H-field in A/m

Grid 1 **0.359 M4**	Grid 2 **0.385 M4**	Grid 3 **0.377 M4**
Grid 4 **0.401 M4**	Grid 5 **0.430 M4**	Grid 6 **0.422 M4**
Grid 7 **0.349 M4**	Grid 8 **0.378 M4**	Grid 9 **0.373 M4**



0 dB = 0.430A/m

Date/Time: 6/18/2011 11:40:59 AM

Test Laboratory: A Test Lab Techno Corp.

HAC_System Performance Check at 1880MHz_20110618_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, $\varepsilon_r = 1$; $\rho = 1$ kg/m^3
Phantom section: H Dipole Section

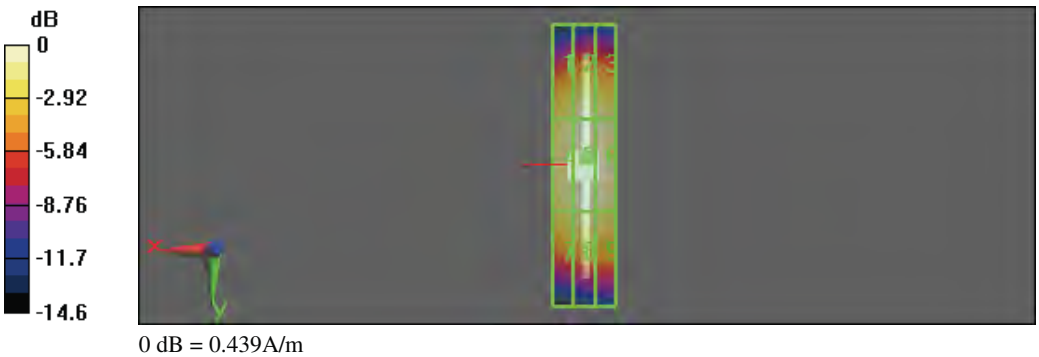
DASY4 Configuration:

- Probe: H3DV6 - SN6076; ; Calibrated: 8/23/2010
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/31/2011
- 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 = 0.439 A/m
Probe Modulation Factor = 1
Device Reference Point: 0, 0, 354.7 mm
Reference Value = 0.461 A/m; Power Drift = -0.018 dB
Hearing Aid Near-Field Category: M2 (AWF 0 dB)
Cursor:
Total = 0.439 A/m
H Category: M2
Location: -1, -2.5, 364.7 mm

Peak H-field in A/m

Grid 1 **0.382 M2**	Grid 2 **0.410 M2**	Grid 3 **0.399 M2**
Grid 4 **0.413 M2**	Grid 5 **0.439 M2**	Grid 6 **0.430 M2**
Grid 7 **0.367 M2**	Grid 8 **0.392 M2**	Grid 9 **0.387 M2**



0 dB = 0.439A/m

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

Date/Time: 6/18/2011 1:03:54 PM

Test Laboratory: A Test Lab Techno Corp.

HAC_GSM850 CH128_E

DUT: PG76240; Type: Smartphone; FCC ID: NM8PG76240

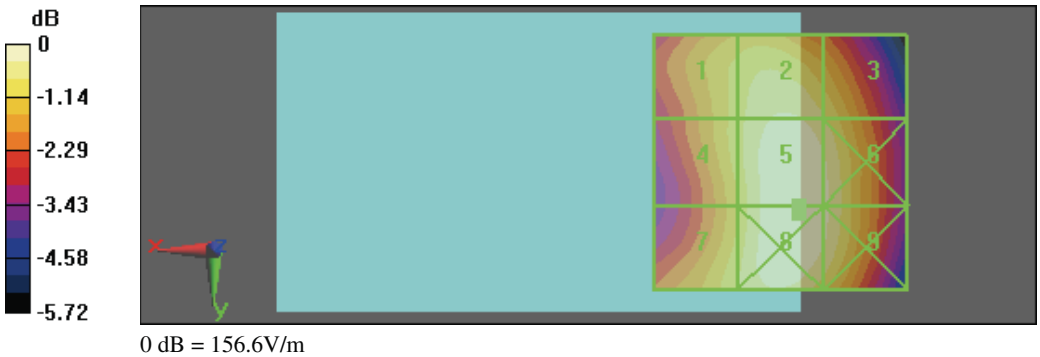
Communication System: GSM850; Frequency: 824.2 MHz;Duty Cycle: 1:8.3
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Phantom section: E Device Section

DASY4 Configuration:

- Probe: ER3DV6R - SN2256; ConvF(1, 1, 1); Calibrated: 8/23/2010
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/31/2011
- 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 = 156.5 V/m
Probe Modulation Factor = 2.56
Device Reference Point: 0, 0, 353.7 mm
Reference Value = 80 V/m; Power Drift = -0.066 dB
Hearing Aid Near-Field Category: M3 (AWF -5 dB)
Cursor:
Total = 156.6 V/m
E Category: M3
Location: -3.5, 10, 368.7 mm
Peak E-field in V/m

Grid 1 **140.5 M4**	Grid 2 **151.0 M3**	Grid 3 **144.5 M4**
Grid 4 **141.3 M4**	Grid 5 **156.5 M3**	Grid 6 **152.0 M3**
Grid 7 **142.9 M4**	Grid 8 **156.6 M3**	Grid 9 **152.0 M3**



0 dB = 156.6V/m

Date/Time: 6/18/2011 1:10:12 PM

Test Laboratory: A Test Lab Techno Corp.

HAC_GSM850 CH190_E

DUT: PG76240; Type: Smartphone; FCC ID: NM8PG76240

Communication System: GSM850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Phantom section: E Device Section

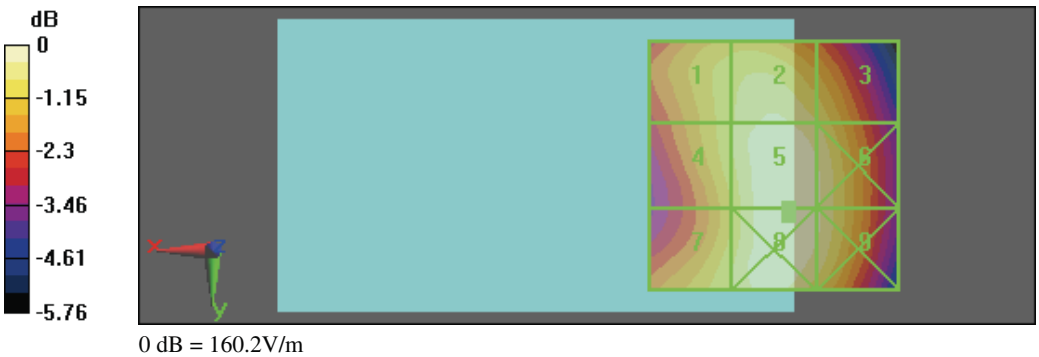
DASY4 Configuration:

- Probe: ER3DV6R - SN2256; ConvF(1, 1, 1); Calibrated: 8/23/2010
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/31/2011
- 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 = 160.0 V/m
Probe Modulation Factor = 2.56
Device Reference Point: 0, 0, 353.7 mm
Reference Value = 82.6 V/m; Power Drift = -0.123 dB
Hearing Aid Near-Field Category: M3 (AWF -5 dB)
Cursor:
Total = 160.2 V/m
E Category: M3
Location: -3, 10, 368.7 mm

Peak E-field in V/m

Grid 1 **145.9 M4**	Grid 2 **154.8 M3**	Grid 3 **147.1 M4**
Grid 4 **146.1 M4**	Grid 5 **160.0 M3**	Grid 6 **155.2 M3**
Grid 7 **147.6 M4**	Grid 8 **160.2 M3**	Grid 9 **155.2 M3**



0 dB = 160.2V/m

Date/Time: 6/18/2011 1:16:59 PM

Test Laboratory: A Test Lab Techno Corp.

HAC_GSM850 CH251_E

DUT: PG76240; Type: Smartphone; FCC ID: NM8PG76240

Communication System: GSM850; Frequency: 848.8 MHz;Duty Cycle: 1:8.3
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Phantom section: E Device Section

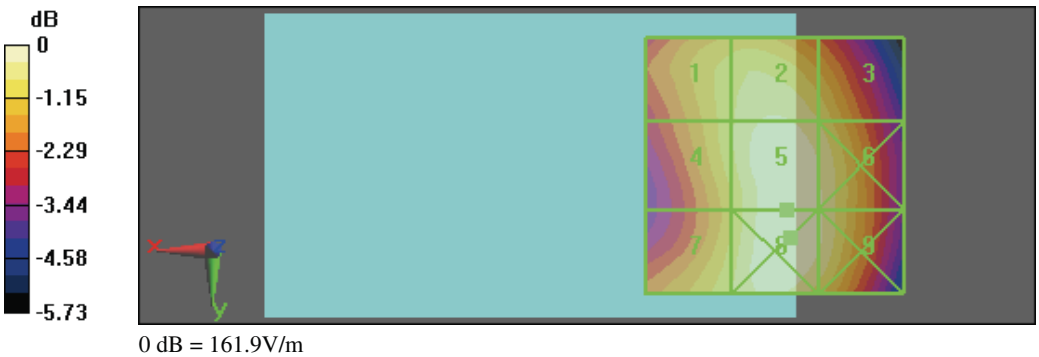
DASY4 Configuration:

- Probe: ER3DV6R - SN2256; ConvF(1, 1, 1); Calibrated: 8/23/2010
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/31/2011
- 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 = 161.1 V/m
Probe Modulation Factor = 2.56
Device Reference Point: 0, 0, 353.7 mm
Reference Value = 82.1 V/m; Power Drift = -0.023 dB
Hearing Aid Near-Field Category: M3 (AWF -5 dB)
Cursor:
Total = 161.9 V/m
E Category: M3
Location: -3, 14, 368.7 mm

Peak E-field in V/m

Grid 1 **147.1 M4**	Grid 2 **156.0 M3**	Grid 3 **148.5 M4**
Grid 4 **147.5 M4**	Grid 5 **161.1 M3**	Grid 6 **156.2 M3**
Grid 7 **148.0 M4**	Grid 8 **161.9 M3**	Grid 9 **156.4 M3**



0 dB = 161.9V/m

Date/Time: 6/18/2011 1:32:52 PM

Test Laboratory: A Test Lab Techno Corp.

HAC_PCS CH512_E

DUT: PG76240; Type: Smartphone; FCC ID: NM8PG76240

Communication System: PCS; Frequency: 1850.2 MHz;Duty Cycle: 1:8.3
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Phantom section: E Device Section

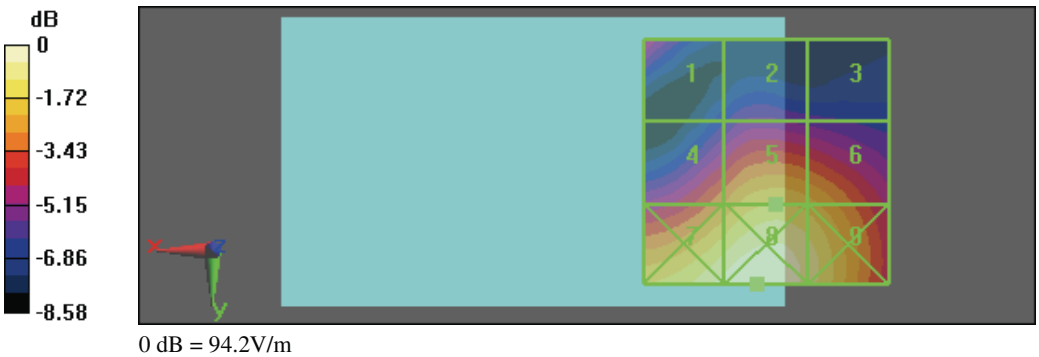
DASY4 Configuration:

- Probe: ER3DV6R - SN2256; ConvF(1, 1, 1); Calibrated: 8/23/2010
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/31/2011
- 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 = 77.6 V/m
Probe Modulation Factor = 2.5
Device Reference Point: 0, 0, 353.7 mm
Reference Value = 30.7 V/m; Power Drift = -0.030 dB
Hearing Aid Near-Field Category: M3 (AWF -5 dB)
Cursor:
Total = 94.2 V/m
E Category: M2
Location: 2, 25, 368.7 mm

Peak E-field in V/m

Grid 1 **56.6 M3**	Grid 2 **50 M3**	Grid 3 **47.3 M3**
Grid 4 **68.1 M3**	Grid 5 **77.6 M3**	Grid 6 **74.6 M3**
Grid 7 **90.5 M2**	Grid 8 **94.2 M2**	Grid 9 **86.1 M2**



0 dB = 94.2V/m

Date/Time: 6/18/2011 1:43:39 PM

Test Laboratory: A Test Lab Techno Corp.

HAC_PCS CH661_E

DUT: PG76240; Type: Smartphone; FCC ID: NM8PG76240

Communication System: PCS; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Phantom section: E Device Section

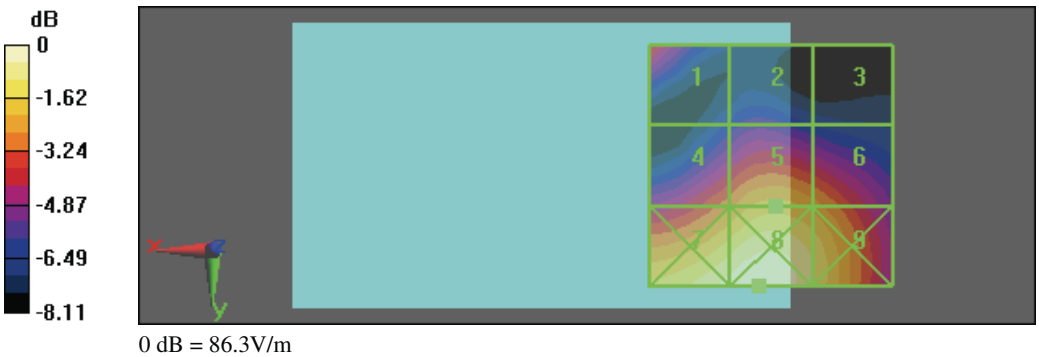
DASY4 Configuration:

- Probe: ER3DV6R - SN2256; ConvF(1, 1, 1); Calibrated: 8/23/2010
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/31/2011
- 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 = 69.7 V/m
Probe Modulation Factor = 2.5
Device Reference Point: 0, 0, 353.7 mm
Reference Value = 27.4 V/m; Power Drift = 0.030 dB
Hearing Aid Near-Field Category: M3 (AWF -5 dB)
Cursor:
Total = 86.3 V/m
E Category: M2
Location: 2.5, 25, 368.7 mm

Peak E-field in V/m

Grid 1 **56.7 M3**	Grid 2 **45.3 M4**	Grid 3 **40.7 M4**
Grid 4 **62.6 M3**	Grid 5 **69.7 M3**	Grid 6 **65.8 M3**
Grid 7 **83.5 M3**	Grid 8 **86.3 M2**	Grid 9 **76.7 M3**



0 dB = 86.3V/m

Date/Time: 6/18/2011 1:59:30 PM

Test Laboratory: A Test Lab Techno Corp.

HAC_PCS CH810_E

DUT: PG76240; Type: Smartphone; FCC ID: NM8PG76240

Communication System: PCS; Frequency: 1909.8 MHz;Duty Cycle: 1:8.3
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Phantom section: E Device Section

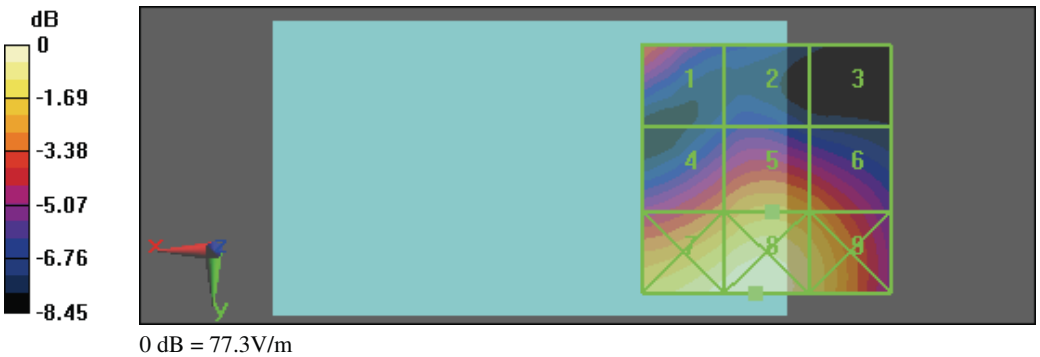
DASY4 Configuration:

- Probe: ER3DV6R - SN2256; ConvF(1, 1, 1); Calibrated: 8/23/2010
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/31/2011
- 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 = 61.3 V/m
Probe Modulation Factor = 2.5
Device Reference Point: 0, 0, 353.7 mm
Reference Value = 23.8 V/m; Power Drift = -0.0091 dB
Hearing Aid Near-Field Category: M3 (AWF -5 dB)
Cursor:
Total = 77.3 V/m
E Category: M3
Location: 2, 25, 368.7 mm

Peak E-field in V/m

Grid 1 **53.5 M3**	Grid 2 **38.1 M4**	Grid 3 **33.4 M4**
Grid 4 **55.1 M3**	Grid 5 **61.3 M3**	Grid 6 **57.8 M3**
Grid 7 **75.1 M3**	Grid 8 **77.3 M3**	Grid 9 **68.8 M3**



0 dB = 77.3V/m

Date/Time: 6/18/2011 2:22:51 PM

Test Laboratory: A Test Lab Techno Corp.

HAC_WCDMA Band IV CH1312_E

DUT: PG76240; Type: Smartphone; FCC ID: NM8PG76240

Communication System: WCDMA Band IV; Frequency: 1712.4 MHz;Duty Cycle: 1:1
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Phantom section: E Device Section

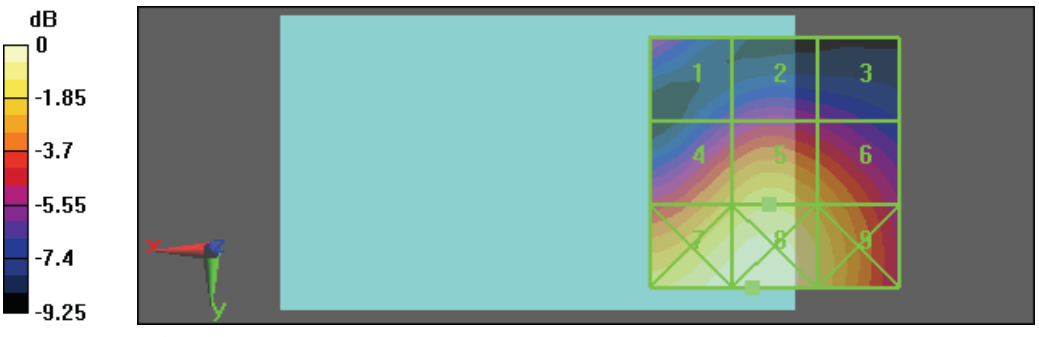
DASY4 Configuration:

- Probe: ER3DV6R - SN2256; ConvF(1, 1, 1); Calibrated: 8/23/2010
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/31/2011
- 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 = 36 V/m
Probe Modulation Factor = 0.900
Device Reference Point: 0, 0, 353.7 mm
Reference Value = 43 V/m; Power Drift = -0.036 dB
Hearing Aid Near-Field Category: M4 (AWF 0 dB)
Cursor:
Total = 41.9 V/m
E Category: M4
Location: 4.5, 25, 368.7 mm

Peak E-field in V/m

Grid 1 **22.8 M4**	Grid 2 **22.9 M4**	Grid 3 **21.5 M4**
Grid 4 **33.1 M4**	Grid 5 **36 M4**	Grid 6 **32.9 M4**
Grid 7 **41.2 M4**	Grid 8 **41.9 M4**	Grid 9 **36.7 M4**



0 dB = 41.9V/m

Date/Time: 6/18/2011 2:28:33 PM

Test Laboratory: A Test Lab Techno Corp.

HAC_WCDMA Band IV CH1413_E

DUT: PG76240; Type: Smartphone; FCC ID: NM8PG76240

Communication System: WCDMA Band IV; Frequency: 1732.6 MHz;Duty Cycle: 1:1
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Phantom section: E Device Section

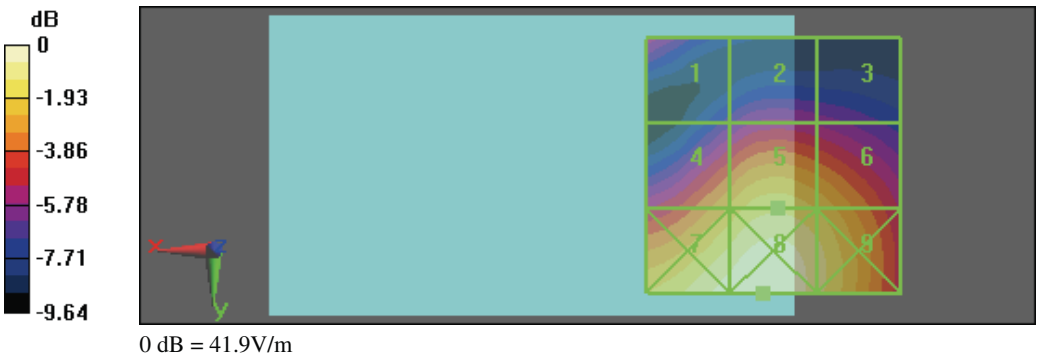
DASY4 Configuration:

- Probe: ER3DV6R - SN2256; ConvF(1, 1, 1); Calibrated: 8/23/2010
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/31/2011
- 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 = 35.6 V/m
Probe Modulation Factor = 0.900
Device Reference Point: 0, 0, 353.7 mm
Reference Value = 41.3 V/m; Power Drift = -0.024 dB
Hearing Aid Near-Field Category: M4 (AWF 0 dB)
Cursor:
Total = 41.9 V/m
E Category: M4
Location: 2, 25, 368.7 mm

Peak E-field in V/m

Grid 1 **22.8 M4**	Grid 2 **22.2 M4**	Grid 3 **21.2 M4**
Grid 4 **31.7 M4**	Grid 5 **35.6 M4**	Grid 6 **33.4 M4**
Grid 7 **40.6 M4**	Grid 8 **41.9 M4**	Grid 9 **37.7 M4**



0 dB = 41.9V/m

Date/Time: 6/18/2011 2:35:42 PM

Test Laboratory: A Test Lab Techno Corp.

HAC_WCDMA Band IV CH1513_E

DUT: PG76240; Type: Smartphone; FCC ID: NM8PG76240

Communication System: WCDMA Band IV; Frequency: 1752.6 MHz;Duty Cycle: 1:1
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Phantom section: E Device Section

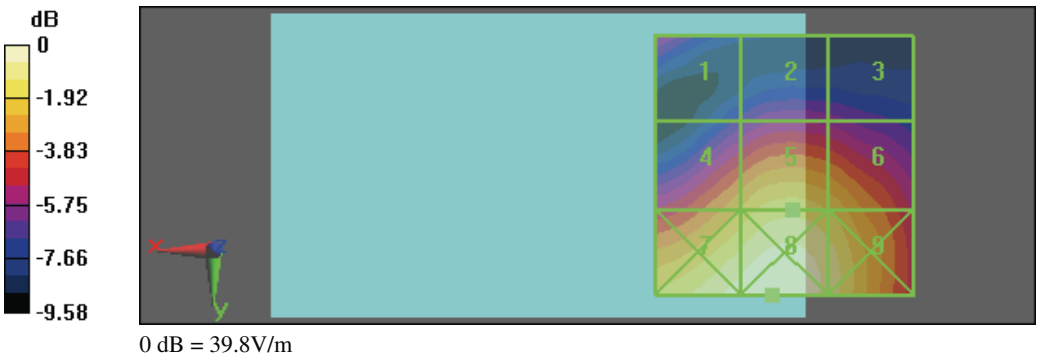
DASY4 Configuration:

- Probe: ER3DV6R - SN2256; ConvF(1, 1, 1); Calibrated: 8/23/2010
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/31/2011
- 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 = 33.4 V/m
Probe Modulation Factor = 0.900
Device Reference Point: 0, 0, 353.7 mm
Reference Value = 37.5 V/m; Power Drift = -0.037 dB
Hearing Aid Near-Field Category: M4 (AWF 0 dB)
Cursor:
Total = 39.8 V/m
E Category: M4
Location: 2.5, 25, 368.7 mm

Peak E-field in V/m

Grid 1 **21.4 M4**	Grid 2 **20.7 M4**	Grid 3 **20 M4**
Grid 4 **29.8 M4**	Grid 5 **33.4 M4**	Grid 6 **31.8 M4**
Grid 7 **38.5 M4**	Grid 8 **39.8 M4**	Grid 9 **36.1 M4**



0 dB = 39.8V/m

Date/Time: 6/18/2011 12:01:48 PM

Test Laboratory: A Test Lab Techno Corp.

HAC_GSM850 CH128_H

DUT: PG76240; Type: Smartphone; FCC ID: NM8PG76240

Communication System: GSM850; Frequency: 824.2 MHz;Duty Cycle: 1:8.3
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1$ kg/m^3
Phantom section: H Device Section

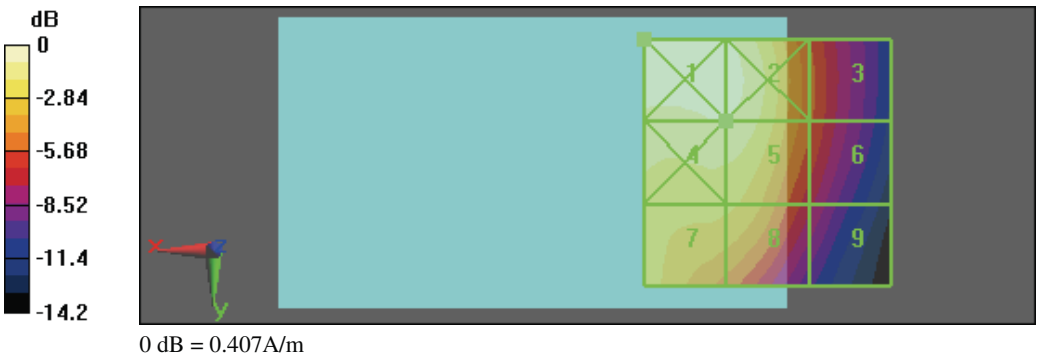
DASY4 Configuration:

- Probe: H3DV6 - SN6076; ; Calibrated: 8/23/2010
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/31/2011
- 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 discance 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 = 0.363 A/m
Probe Modulation Factor = 2.68
Device Reference Point: 0, 0, 353.7 mm
Reference Value = 0.149 A/m; Power Drift = 0.079 dB
Hearing Aid Near-Field Category: M4 (AWF -5 dB)
Cursor:
Total = 0.407 A/m
H Category: M4
Location: 25, -25, 368.7 mm

Peak H-field in A/m

Grid 1 **0.407 M4**	Grid 2 **0.384 M4**	Grid 3 **0.222 M4**
Grid 4 **0.365 M4**	Grid 5 **0.363 M4**	Grid 6 **0.218 M4**
Grid 7 **0.316 M4**	Grid 8 **0.302 M4**	Grid 9 **0.176 M4**



0 dB = 0.407A/m

Date/Time: 6/18/2011 12:09:53 PM

Test Laboratory: A Test Lab Techno Corp.

HAC_GSM850 CH190_H

DUT: PG76240; Type: Smartphone; FCC ID: NM8PG76240

Communication System: GSM850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1$ kg/m^3
Phantom section: H Device Section

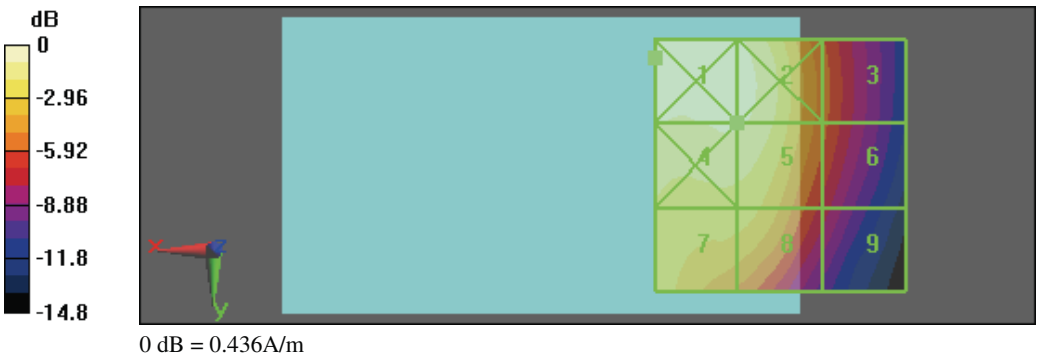
DASY4 Configuration:

- Probe: H3DV6 - SN6076; ; Calibrated: 8/23/2010
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/31/2011
- 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 discance 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 = 0.394 A/m
Probe Modulation Factor = 2.71
Device Reference Point: 0, 0, 353.7 mm
Reference Value = 0.162 A/m; Power Drift = 0.147 dB
Hearing Aid Near-Field Category: M4 (AWF -5 dB)
Cursor:
Total = 0.436 A/m
H Category: M4
Location: 25, -21.5, 368.7 mm

Peak H-field in A/m

Grid 1 **0.436 M4**	Grid 2 **0.412 M4**	Grid 3 **0.236 M4**
Grid 4 **0.398 M4**	Grid 5 **0.394 M4**	Grid 6 **0.230 M4**
Grid 7 **0.345 M4**	Grid 8 **0.331 M4**	Grid 9 **0.188 M4**



0 dB = 0.436A/m

Date/Time: 6/18/2011 12:26:08 PM

Test Laboratory: A Test Lab Techno Corp.

HAC_GSM850 CH251_H

DUT: PG76240; Type: Smartphone; FCC ID: NM8PG76240

Communication System: GSM850; Frequency: 848.8 MHz;Duty Cycle: 1:8.3
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1$ kg/m^3
Phantom section: H Device Section

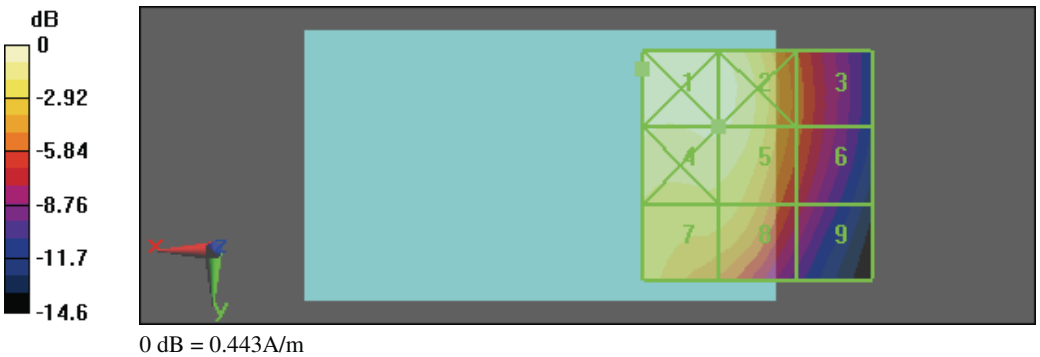
DASY4 Configuration:

- Probe: H3DV6 - SN6076; ; Calibrated: 8/23/2010
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/31/2011
- 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 discance 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 = 0.403 A/m
Probe Modulation Factor = 2.71
Device Reference Point: 0, 0, 353.7 mm
Reference Value = 0.169 A/m; Power Drift = -0.0031 dB
Hearing Aid Near-Field Category: M4 (AWF -5 dB)
Cursor:
Total = 0.443 A/m
H Category: M4
Location: 25, -21, 368.7 mm

Peak H-field in A/m

Grid 1 **0.443 M4**	Grid 2 **0.423 M4**	Grid 3 **0.244 M4**
Grid 4 **0.408 M4**	Grid 5 **0.403 M4**	Grid 6 **0.240 M4**
Grid 7 **0.354 M4**	Grid 8 **0.340 M4**	Grid 9 **0.196 M4**



0 dB = 0.443A/m

Date/Time: 6/18/2011 12:34:37 PM

Test Laboratory: A Test Lab Techno Corp.

HAC_PCS CH512_H

DUT: PG76240; Type: Smartphone; FCC ID: NM8PG76240

Communication System: PCS; Frequency: 1850.2 MHz;Duty Cycle: 1:8.3
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1$ kg/m^3
Phantom section: H Device Section

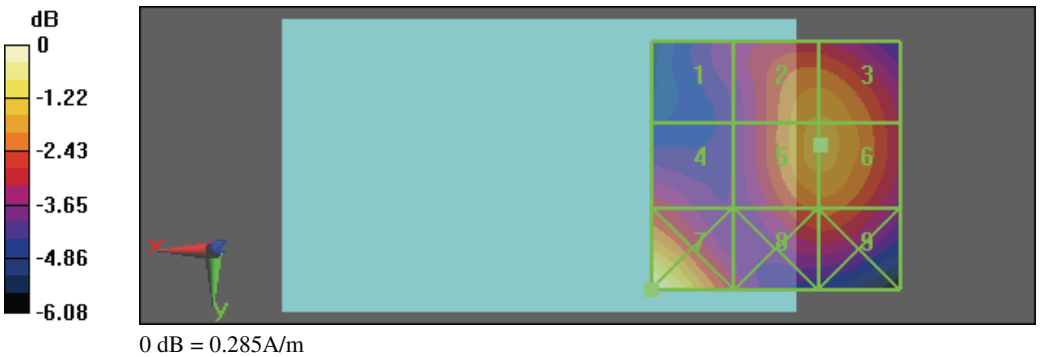
DASY4 Configuration:

- Probe: H3DV6 - SN6076; ; Calibrated: 8/23/2010
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/31/2011
- 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 discance 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 = 0.241 A/m
Probe Modulation Factor = 2.32
Device Reference Point: 0, 0, 353.7 mm
Reference Value = 0.114 A/m; Power Drift = 0.065 dB
Hearing Aid Near-Field Category: M3 (AWF -5 dB)
Cursor:
Total = 0.285 A/m
H Category: M2
Location: 25, 25, 368.7 mm

Peak H-field in A/m

Grid 1 **0.189 M3**	Grid 2 **0.239 M3**	Grid 3 **0.239 M3**
Grid 4 **0.204 M3**	Grid 5 **0.241 M3**	Grid 6 **0.241 M3**
Grid 7 **0.285 M2**	Grid 8 **0.220 M3**	Grid 9 **0.220 M3**



0 dB = 0.285A/m

Date/Time: 6/18/2011 12:41:42 PM

Test Laboratory: A Test Lab Techno Corp.

HAC_PCS CH661_H

DUT: PG76240; Type: Smartphone; FCC ID: NM8PG76240

Communication System: PCS; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1$ kg/m^3
Phantom section: H Device Section

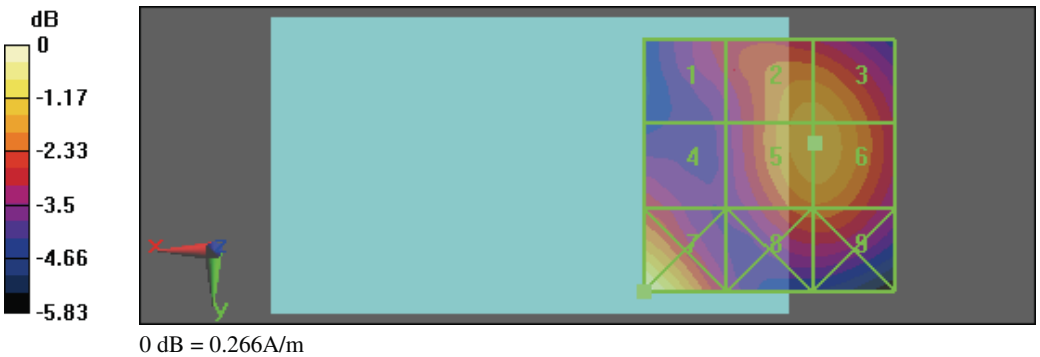
DASY4 Configuration:

- Probe: H3DV6 - SN6076; ; Calibrated: 8/23/2010
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/31/2011
- 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 discance 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 = 0.231 A/m
Probe Modulation Factor = 2.44
Device Reference Point: 0, 0, 353.7 mm
Reference Value = 0.105 A/m; Power Drift = 0.084 dB
Hearing Aid Near-Field Category: M3 (AWF -5 dB)
Cursor:
Total = 0.266 A/m
H Category: M2
Location: 25, 25, 368.7 mm

Peak H-field in A/m

Grid 1 **0.191 M3**	Grid 2 **0.229 M3**	Grid 3 **0.229 M3**
Grid 4 **0.195 M3**	Grid 5 **0.231 M3**	Grid 6 **0.231 M3**
Grid 7 **0.266 M2**	Grid 8 **0.210 M3**	Grid 9 **0.210 M3**



0 dB = 0.266A/m

Date/Time: 6/18/2011 12:48:59 PM

Test Laboratory: A Test Lab Techno Corp.

HAC_PCS CH810_H

DUT: PG76240; Type: Smartphone; FCC ID: NM8PG76240

Communication System: PCS; Frequency: 1909.8 MHz;Duty Cycle: 1:8.3
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1$ kg/m^3
Phantom section: H Device Section

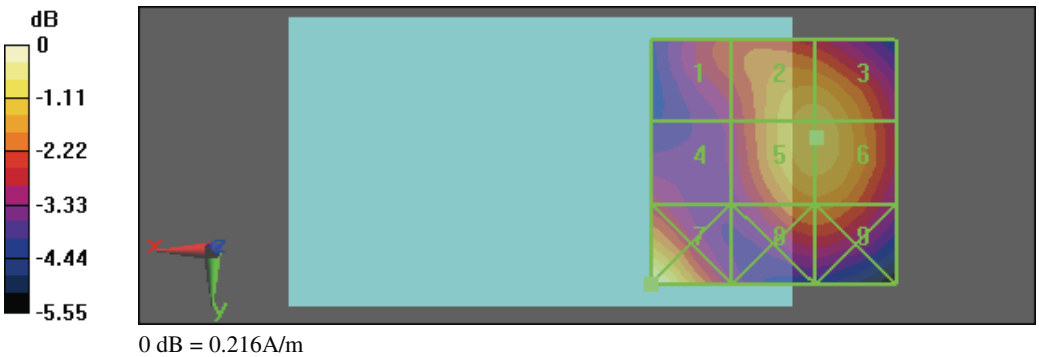
DASY4 Configuration:

- Probe: H3DV6 - SN6076; ; Calibrated: 8/23/2010
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/31/2011
- 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 discance 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 = 0.197 A/m
Probe Modulation Factor = 2.54
Device Reference Point: 0, 0, 353.7 mm
Reference Value = 0.089 A/m; Power Drift = 0.044 dB
Hearing Aid Near-Field Category: M3 (AWF -5 dB)
Cursor:
Total = 0.216 A/m
H Category: M3
Location: 25, 25, 368.7 mm

Peak H-field in A/m

Grid 1 **0.165 M3**	Grid 2 **0.195 M3**	Grid 3 **0.195 M3**
Grid 4 **0.157 M3**	Grid 5 **0.197 M3**	Grid 6 **0.197 M3**
Grid 7 **0.216 M3**	Grid 8 **0.179 M3**	Grid 9 **0.179 M3**



0 dB = 0.216A/m

Date/Time: 6/18/2011 3:02:03 PM

Test Laboratory: A Test Lab Techno Corp.

HAC_WCDMA Band IV CH1312_H

DUT: PG76240; Type: Smartphone; FCC ID: NM8PG76240

Communication System: WCDMA Band IV; Frequency: 1712.4 MHz;Duty Cycle: 1:1
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1$ kg/m^3
Phantom section: H Device Section

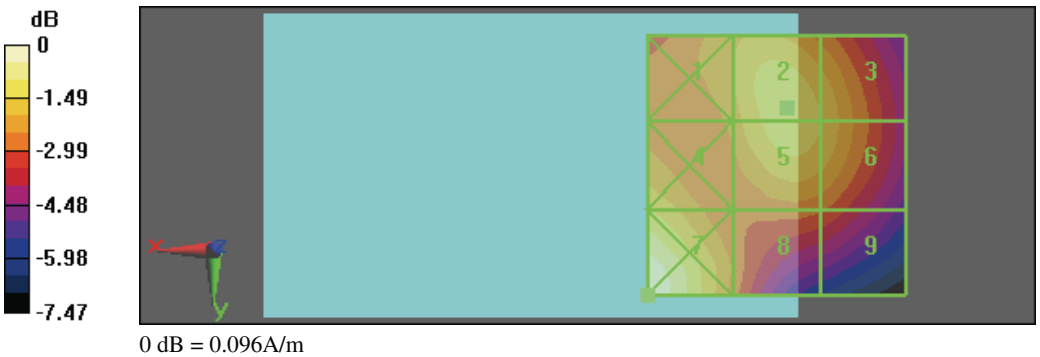
DASY4 Configuration:

- Probe: H3DV6 - SN6076; ; Calibrated: 8/23/2010
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/31/2011
- 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 discance 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 = 0.084 A/m
Probe Modulation Factor = 0.810
Device Reference Point: 0, 0, 353.7 mm
Reference Value = 0.120 A/m; Power Drift = 0.016 dB
Hearing Aid Near-Field Category: M4 (AWF 0 dB)
Cursor:
Total = 0.096 A/m
H Category: M4
Location: 25, 25, 368.7 mm

Peak H-field in A/m

Grid 1 **0.077 M4**	Grid 2 **0.084 M4**	Grid 3 **0.081 M4**
Grid 4 **0.081 M4**	Grid 5 **0.084 M4**	Grid 6 **0.081 M4**
Grid 7 **0.096 M4**	Grid 8 **0.072 M4**	Grid 9 **0.069 M4**



0 dB = 0.096A/m

Date/Time: 6/18/2011 3:10:16 PM

Test Laboratory: A Test Lab Techno Corp.

HAC_WCDMA Band IV CH1413_H

DUT: PG76240; Type: Smartphone; FCC ID: NM8PG76240

Communication System: WCDMA Band IV; Frequency: 1732.6 MHz;Duty Cycle: 1:1
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1$ kg/m^3
Phantom section: H Device Section

DASY4 Configuration:

- Probe: H3DV6 - SN6076; ; Calibrated: 8/23/2010
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/31/2011
- 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 discance 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 = 0.080 A/m
Probe Modulation Factor = 0.810
Device Reference Point: 0, 0, 353.7 mm
Reference Value = 0.114 A/m; Power Drift = 0.045 dB
Hearing Aid Near-Field Category: M4 (AWF 0 dB)
Cursor:
Total = 0.091 A/m
H Category: M4
Location: 25, 25, 368.7 mm

Peak H-field in A/m

Grid 1 **0.071 M4**	Grid 2 **0.080 M4**	Grid 3 **0.078 M4**
Grid 4 **0.074 M4**	Grid 5 **0.080 M4**	Grid 6 **0.078 M4**
Grid 7 **0.091 M4**	Grid 8 **0.067 M4**	Grid 9 **0.066 M4**

0 dB = 0.091A/m

Date/Time: 6/18/2011 3:16:51 PM

Test Laboratory: A Test Lab Techno Corp.

HAC_WCDMA Band IV CH1513_H

DUT: PG76240; Type: Smartphone; FCC ID: NM8PG76240

Communication System: WCDMA Band IV; Frequency: 1752.6 MHz;Duty Cycle: 1:1
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1$ kg/m^3
Phantom section: H Device Section

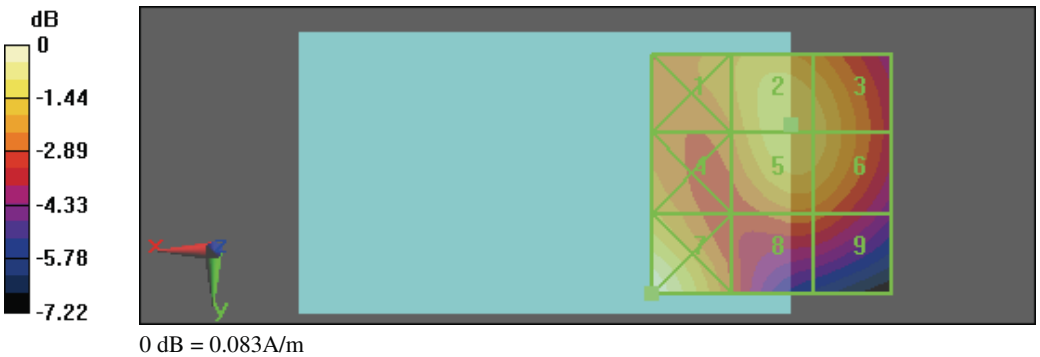
DASY4 Configuration:

- Probe: H3DV6 - SN6076; ; Calibrated: 8/23/2010
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn779; Calibrated: 1/31/2011
- 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 discance 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 = 0.074 A/m
Probe Modulation Factor = 0.810
Device Reference Point: 0, 0, 353.7 mm
Reference Value = 0.106 A/m; Power Drift = -0.033 dB
Hearing Aid Near-Field Category: M4 (AWF 0 dB)
Cursor:
Total = 0.083 A/m
H Category: M4
Location: 25, 25, 368.7 mm

Peak H-field in A/m

Grid 1 **0.066 M4**	Grid 2 **0.074 M4**	Grid 3 **0.073 M4**
Grid 4 **0.067 M4**	Grid 5 **0.074 M4**	Grid 6 **0.073 M4**
Grid 7 **0.083 M4**	Grid 8 **0.062 M4**	Grid 9 **0.061 M4**



0 dB = 0.083A/m

Appendix D - Calibration

All of the instruments Calibration information are listed below.

- Dipole _ CD835V3 SN:1017 Calibration No.CD835V3-1017_Jul10
- Dipole _ CD1880V3 SN:1036 Calibration No.CD1880V3-1036_Jul10
- Probe _ ER3DV6R SN: 2256 Calibration No. ER3-2256_Aug10
- Probe _ H3DV6 SN: 6076 Calibration No. H3-6076_ Aug10
- DAE _ DAE4 SN:779 Calibration No.DAE4-779_ Jan11

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_Jul10**

CALIBRATION CERTIFICATE

Object	CD835V3 - SN: 1017
Calibration procedure(s)	QA CAL-20.v5 Calibration procedure for dipoles in air
Calibration date:	July 13, 2010

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	06-Oct-09 (No. 217-01086)	Oct-10
Power sensor HP 8481A	US37292783	06-Oct-09 (No. 217-01086)	Oct-10
Probe ER3DV6	SN: 2336	30-Dec-09 (No. ER3-2336_Dec09)	Dec-10
Probe H3DV6	SN: 6065	30-Dec-09 (No. H3-6065_Dec09)	Dec-10
DAE4	SN: 781	22-Jan-10 (No. DAE4-781_Jan10)	Jan-11
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Power meter Agilent 4419B	SN: GB42420191	09-Oct-09 (in house check Oct-09)	In house check: Oct-10
Power sensor HP 8482H	SN: 3318A09450	09-Oct-09 (in house check Oct-09)	In house check: Oct-10
Power sensor HP 8482A	SN: US37295597	09-Oct-09 (in house check Oct-09)	In house check: Oct-10
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-09)	In house check: Oct-10
RF generator E4433B	MY 41000675	03-Nov-04 (in house check Oct-09)	In house check: Oct-11

	Name	Function	Signature
Calibrated by:	Mike Meili	Laboratory Technician	
Approved by:	Fin Bomholt	Technical Director	

Issued: July 15, 2010

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 DASY5 Surface Check job. Before the measurement, the distance between phantom surface and probe tip is verified. The proper measurement distance is selected by choosing the matching section of the HAC Test Arch phantom with the proper device reference point (upper surface of the dipole) and the matching grid reference point (tip of the probe) considering the probe sensor offset. The vertical distance to the probe is essential for the accuracy.
- *Feed Point Impedance and Return Loss:* These parameters are measured using a HP 8753E Vector Network Analyzer. The impedance is specified at the SMA connector of the dipole. The influence of reflections was eliminating by applying the averaging function while moving the dipole in the air, at least 70cm away from any obstacles.
- *E- field distribution:* E field is measured in the x-y-plane with an isotropic ER3D-field probe with 100 mW forward power to the antenna feed point. In accordance with [1, 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	DASY5	V52.2 B0
DASY PP Version	SEMCAD X	V14.2 B2
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** ± 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	168.6 V/m
Maximum measured above low end	100 mW forward power	155.7 V/m
Averaged maximum above arm	100 mW forward power	**162.2 V/m**

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

3 Appendix

3.1 Antenna Parameters

Frequency	**Return Loss**	**Impedance**
800 MHz	16.2 dB	(42.3 – j12.1) Ohm
835 MHz	**28.6 dB**	**(50.2 + j3.7) Ohm**
900 MHz	17.7 dB	(56.1 – j12.6) Ohm
950 MHz	20.8 dB	(45.5 + j7.5) Ohm
960 MHz	15.5 dB	(51.3 + j17.2) Ohm

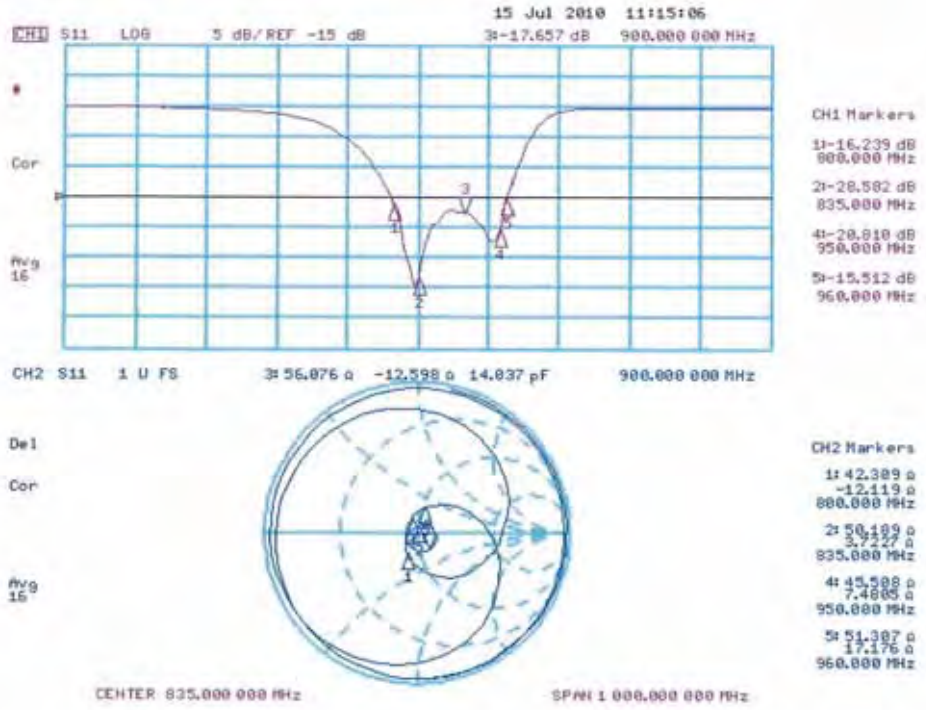
3.2 Antenna Design and Handling

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: 13.07.2010 18:17:07

Test Laboratory: SPEAG Lab2

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

Communication System: CW; Communication System Band: CD835 (835.0 MHz); Frequency: 835 MHz; Communication System PAR: 0 dB
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1$ kg/m^3
Phantom section: RF Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

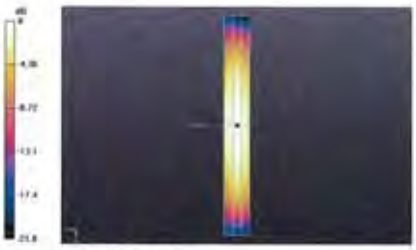
DASY5 Configuration:

- Probe: H3DV6 - SN6065; ; Calibrated: 30.12.2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 22.01.2010
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- Measurement SW: DASY52, V52.2 Build 0; Postprocessing SW: SEMCAD X, V14.2 Build 2Version 14.2.2 (1685)

Dipole H-Field measurement @ 835MHz/H Scan - measurement distance from the probe sensor center to CD835 Dipole = 10mm/Hearing Aid Compatibility Test (41x361x1):
Measurement grid: dx=5mm, dy=5mm
Maximum value of peak Total field = 0.457 A/m
Probe Modulation Factor = 1
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 0.486 A/m; Power Drift = -9.15e-005 dB
Hearing Aid Near-Field Category: M4 (AWF 0 dB)

Peak H-field in A/m

Grid 1 **0.381** **M4**	Grid 2 **0.397** **M4**	Grid 3 **0.373** **M4**
Grid 4 **0.431** **M4**	Grid 5 **0.457** **M4**	Grid 6 **0.435** **M4**
Grid 7 **0.377** **M4**	Grid 8 **0.403** **M4**	Grid 9 **0.387** **M4**



0 dB = 0.457A/m

3.3.3 DASY4 E-field Result

Date/Time: 13.07.2010 12:42:14

Test Laboratory: SPEAG Lab2

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

Communication System: CW; Communication System Band: CD835 (835.0 MHz); Frequency: 835 MHz; Communication System PAR: 0 dB
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Phantom section: RF Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

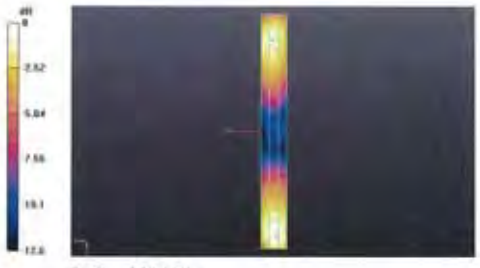
DASY5 Configuration:

- Probe: ER3DV6 - SN2336; ConvF(1, 1, 1); Calibrated: 30.12.2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 22.01.2010
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- Measurement SW: DASY52, V52.2 Build 0; Postprocessing SW: SEMCAD X, V14.2 Build 2Version 14.2.2 (1685)

Dipole E-Field measurement @ 835MHz/E Scan - measurement distance from the probe sensor center to CD835 Dipole = 10mm/Hearing Aid Compatibility Test (41x361x1): Measurement grid: dx=5mm, dy=5mm
Maximum value of peak Total field = 168.6 V/m
Probe Modulation Factor = 1
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 106.1 V/m; Power Drift = -0.050 dB
Hearing Aid Near-Field Category: M4 (AWF 0 dB)

Peak E-field in V/m

Grid 1 **154.5** **M4**	Grid 2 **155.7** **M4**	Grid 3 **147.4** **M4**
Grid 4 **87.8** **M4**	Grid 5 **89.1** **M4**	Grid 6 **85.4** **M4**
Grid 7 **157.6** **M4**	Grid 8 **168.6** **M4**	Grid 9 **166.9** **M4**



0 dB = 168.6V/m

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

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

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

Accreditation No.: SCS 108

Client ATL (Auden)

Certificate No: CD1880V3-1036_Jul10

CALIBRATION CERTIFICATE

Object CD1880V3 - SN: 1036

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

Calibration date: July 13, 2010

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	06-Oct-09 (No. 217-01086)	Oct-10
Power sensor HP 8481A	US37292783	06-Oct-09 (No. 217-01086)	Oct-10
Probe ER3DV6	SN: 2336	30-Dec-09 (No. ER3-2336_Dec09)	Dec-10
Probe H3DV6	SN: 6065	30-Dec-09 (No. H3-6065_Dec09)	Dec-10
DAE4	SN: 781	22-Jan-10 (No. DAE4-781_Jan10)	Jan-11

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter Agilent 4419B	SN: GB42420191	09-Oct-09 (in house check Oct-09)	In house check: Oct-10
Power sensor HP 8482H	SN: 3318A09450	09-Oct-09 (in house check Oct-09)	In house check: Oct-10
Power sensor HP 8482A	SN: US37295597	09-Oct-09 (in house check Oct-09)	In house check: Oct-10
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-09)	In house check: Oct-10
RF generator E4433B	MY 41000675	03-Nov-04 (in house check Oct-09)	In house check: Oct-11

	Name	Function	Signature
Calibrated by:	Mike Meili	Laboratory Technician	
Approved by:	Fin Bomholt	Technical Director	

Issued: July 15, 2010

References

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

Methods Applied and Interpretation of Parameters:

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

1. Measurement Conditions

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

DASY Version	DASY5	V52.2 B0
DASY PP Version	SEMCAD X	V14.2 B2
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** ± 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	**0.468 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	139.2 V/m
Maximum measured above low end	100 mW forward power	136.7 V/m
Averaged maximum above arm	100 mW forward power	**138.0 V/m**

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

3. Appendix

3.1 Antenna Parameters

Frequency	**Return Loss**	**Impedance**
1710 MHz	19.6 dB	(50.2 + j10.6) Ohm
1880 MHz	**22.4 dB**	**(52.1 + j7.5) Ohm**
1900 MHz	22.8 dB	(54.1 + j6.3) Ohm
1950 MHz	31.1 dB	(52.7 – j1.0) Ohm
2000 MHz	20.2 dB	(41.3 + j2.0) Ohm

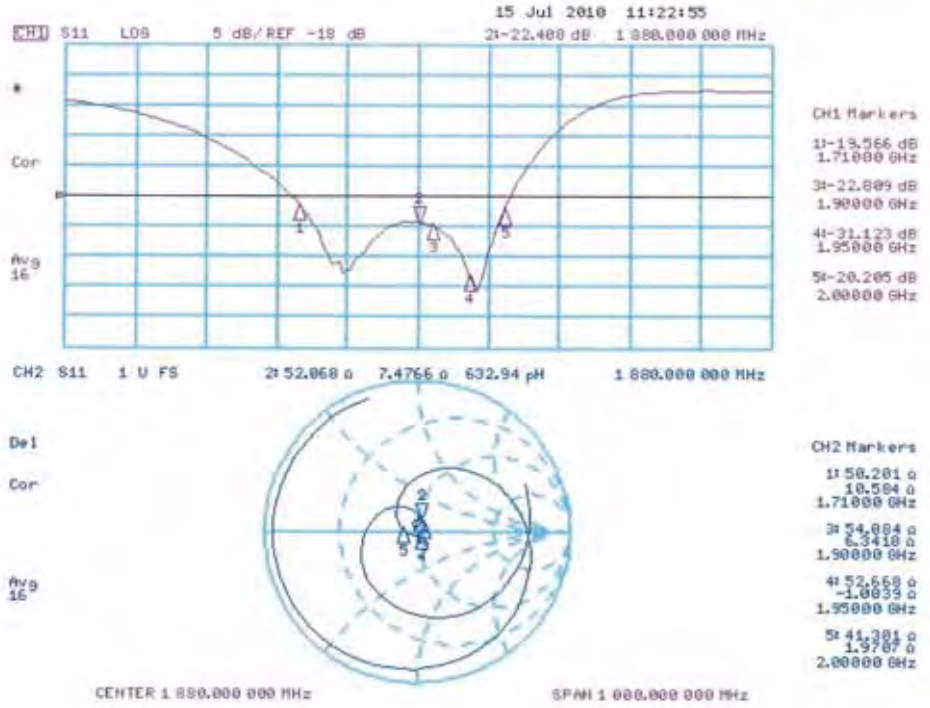
3.2 Antenna Design and Handling

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: 13.07.2010 17:49:33

Test Laboratory: SPEAG Lab2

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

Communication System: CW; Communication System Band: CD1880 (1880.0 MHz); Frequency: 1880 MHz;
Communication System PAR: 0 dB
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1$ kg/m^3
Phantom section: RF Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

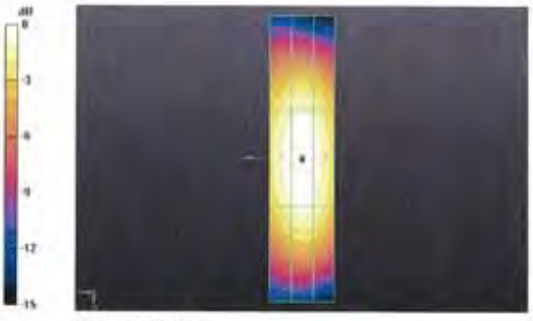
- Probe: H3DV6 - SN6065; ; Calibrated: 30.12.2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 22.01.2010
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- Measurement SW: DASY52, V52.2 Build 0; Postprocessing SW: SEMCAD X, V14.2 Build 2Version 14.2.2 (1685)

Dipole H-Field measurement @ 1880MHz/H Scan - measurement distance from the probe sensor center to CD1880 Dipole = 10mm/Hearing Aid Compatibility Test (41x181x1):

Measurement grid: dx=5mm, dy=5mm
Maximum value of peak Total field = 0.468 A/m
Probe Modulation Factor = 1
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 0.496 A/m; Power Drift = -0.00099 dB
Hearing Aid Near-Field Category: M2 (AWF 0 dB)

Peak H-field in A/m

Grid 1 **0.404** **M2**	Grid 2 **0.422** **M2**	Grid 3 **0.400** **M2**
Grid 4 **0.447** **M2**	Grid 5 **0.468** **M2**	Grid 6 **0.446** **M2**
Grid 7 **0.408** **M2**	Grid 8 **0.433** **M2**	Grid 9 **0.411** **M2**



0 dB = 0.468A/m

3.3.3 DASY4 E-Field Result

Date/Time: 13.07.2010 14:56:29

Test Laboratory: SPEAG Lab2

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

Communication System: CW; Communication System Band: CD1880 (1880.0 MHz); Frequency: 1880 MHz;
Communication System PAR: 0 dB
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Phantom section: RF Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

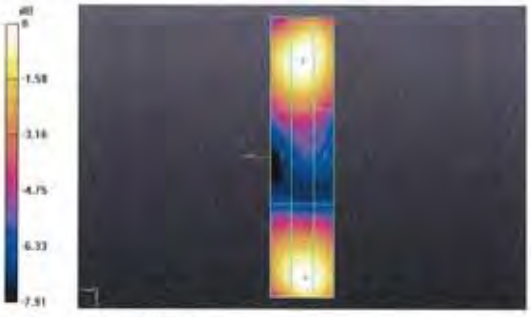
- Probe: ER3DV6 - SN2336; ConvF(1, 1, 1); Calibrated: 30.12.2009
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 22.01.2010
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- Measurement SW: DASY52, V52.2 Build 0; Postprocessing SW: SEMCAD X, V14.2 Build 2Version 14.2.2 (1685)

Dipole E-Field measurement @ 1880MHz/E Scan - measurement distance from the probe sensor center to CD1880 Dipole = 10mm/Hearing Aid Compatibility Test (41x181x1):

Measurement grid: dx=5mm, dy=5mm
Maximum value of peak Total field = 139.2 V/m
Probe Modulation Factor = 1
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 156.8 V/m; Power Drift = 0.043 dB
Hearing Aid Near-Field Category: M2 (AWF 0 dB)

Peak E-field in V/m

Grid 1 **132.8** **M2**	Grid 2 **136.7** **M2**	Grid 3 **133.9** **M2**
Grid 4 **92.6** **M3**	Grid 5 **95.1** **M3**	Grid 6 **91.8** **M3**
Grid 7 **130.6** **M2**	Grid 8 **139.2** **M2**	Grid 9 **137.4** **M2**



0 dB = 139.2V/m

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

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

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

Accreditation No.: SCS 108

Client ATL (Auden)

Certificate No: ER3-2256_Aug10

CALIBRATION CERTIFICATE

Object ER3DV6R - 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 23, 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 ± 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-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41495277	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41498087	1-Apr-10 (No. 217-01136)	Apr-11
Reference 3 dB Attenuator	SN: S5054 (3c)	30-Mar-10 (No. 217-01159)	Mar-11
Reference 20 dB Attenuator	SN: S5086 (20b)	30-Mar-10 (No. 217-01161)	Mar-11
Reference 30 dB Attenuator	SN: S5129 (30b)	30-Mar-10 (No. 217-01160)	Mar-11
Reference Probe ER3DV6	SN: 2328	3-Oct-09 (No. ER3-2328_Oct09)	Oct-10
DAE4	SN: 789	23-Dec-09 (No. DAE4-789_Dec09)	Dec-10

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-09)	In house check: Oct10

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: August 24, 2010

Glossary:

NORMx,y,z	sensitivity in free space
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 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:

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

Probe ER3DV6R

SN:2256

Manufactured:	March 15, 2001
Last calibrated:	August 21, 2009
Recalibrated:	August 23, 2010

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: ER3DV6R SN:2256

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)	2.21	1.59	1.68	± 10.1%
DCP (mV)[A]	94.2	93.8	101.1	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dBuV	C	VR mV	Unc[E] (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	300	± 1.5 %
			Y	0.00	0.00	1.00	300	
			Z	0.00	0.00	1.00	300	

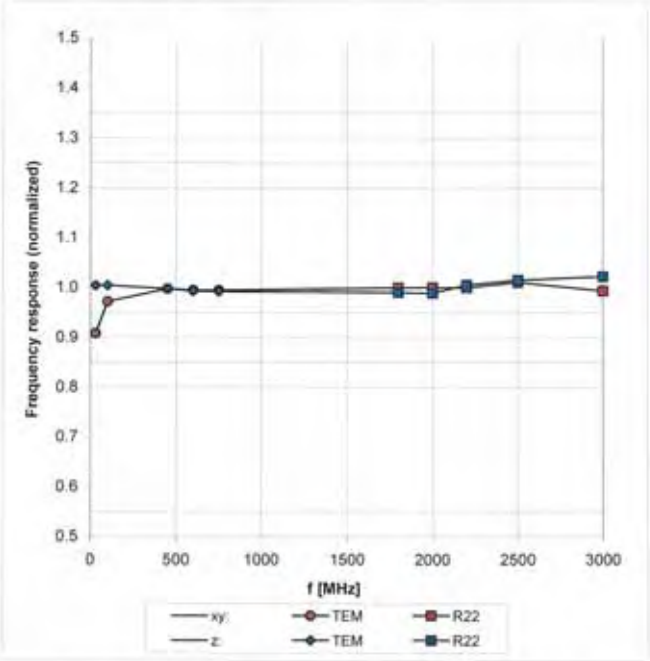
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

[A] numerical linearization parameter: uncertainty not required

[E] Uncertainty is determined using the maximum deviation from linear response applying recatangular distribution and is expressed for the square of the field value

Frequency Response of E-Field

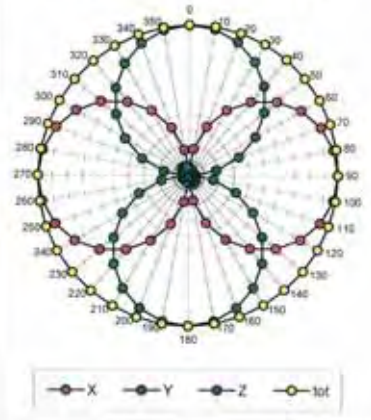
(TEM-Cell:ifi110 EXX, Waveguide R22)



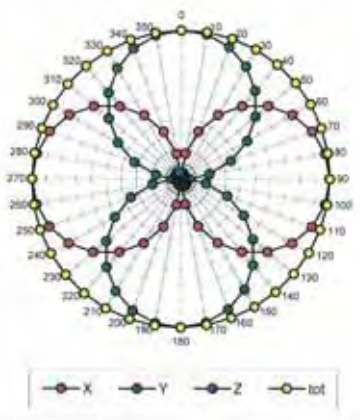
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Receiving Pattern (ϕ), ϑ = 0°

f = 600 MHz, TEM ifi110EXX

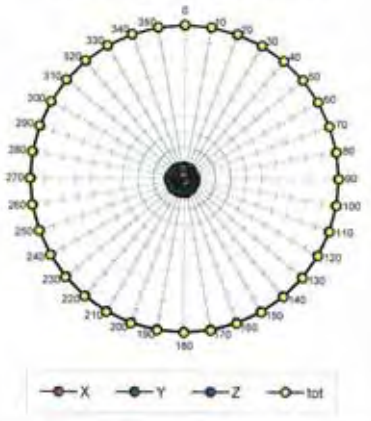


f = 2500 MHz, WG R22

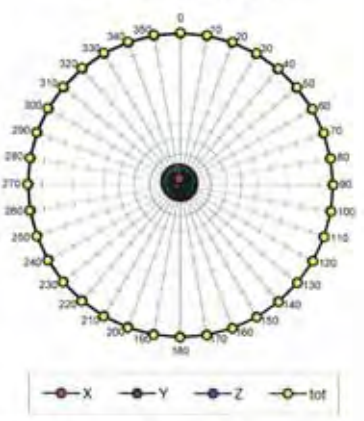


Receiving Pattern (ϕ), ϑ = 90°

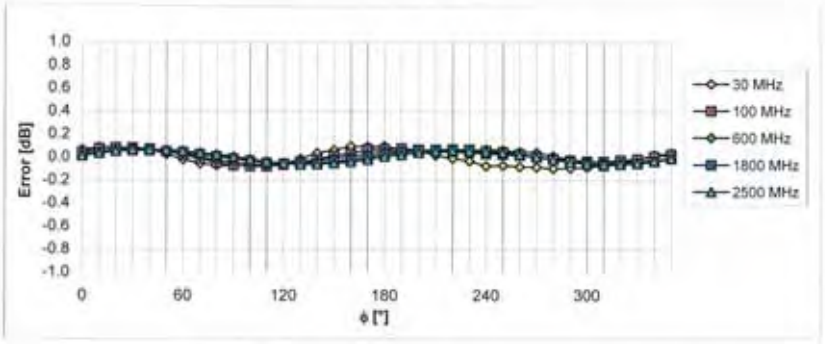
f = 600 MHz, TEM ifi110EXX



f = 2500 MHz, WG R22

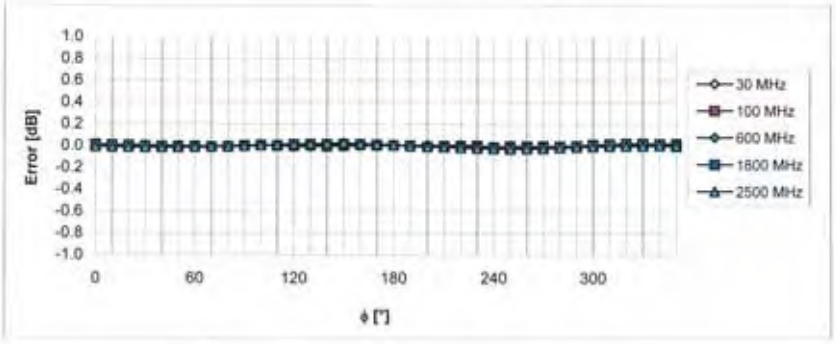


Receiving Pattern (ϕ), ϑ = 0°



Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

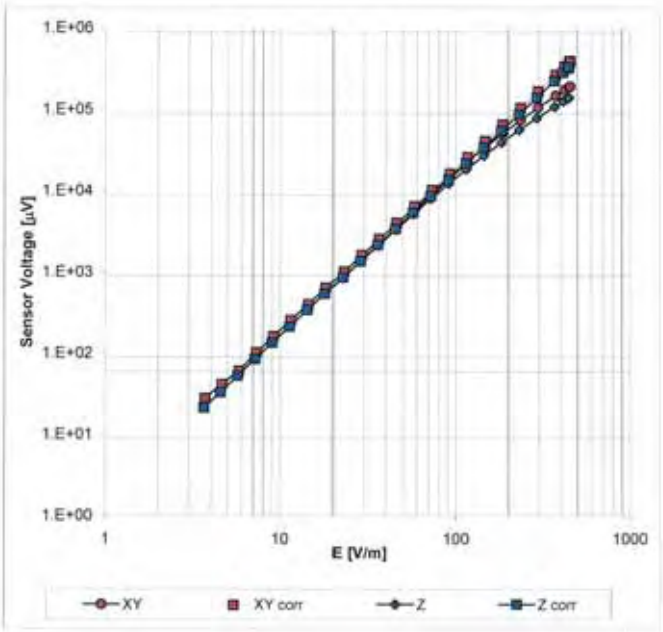
Receiving Pattern (ϕ), ϑ = 90°

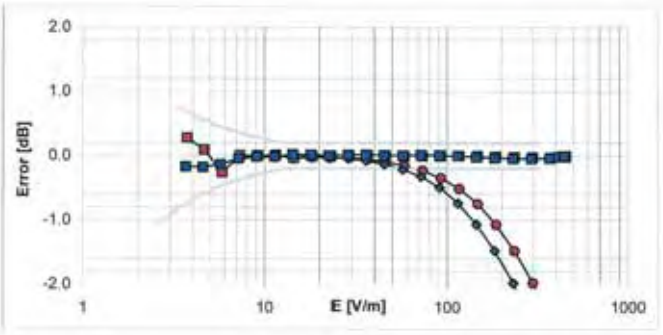


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(E-field)

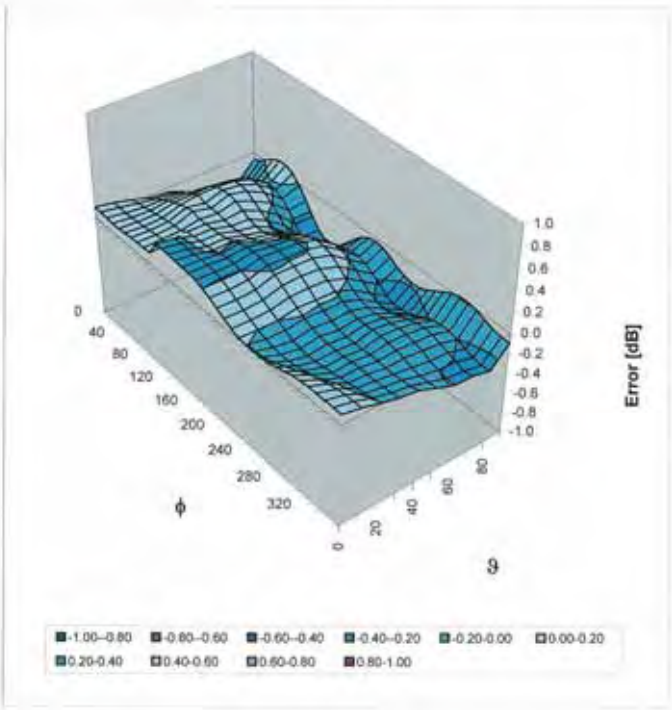
(Waveguide R22, f = 1800 MHz)





Uncertainty of Linearity Assessment: ± 0.6% (k=2)

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



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

Other Probe Parameters

Sensor Arrangement	Rectangular
Connector Angle (°)	-244.9
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	8.0 mm
Probe Tip to Sensor X Calibration Point	2.5 mm
Probe Tip to Sensor Y Calibration Point	2.5 mm
Probe Tip to Sensor Z Calibration Point	2.5 mm

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: **H3-6076_Aug10**

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 23, 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 ± 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-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41495277	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41498087	1-Apr-10 (No. 217-01136)	Apr-11
Reference 3 dB Attenuator	SN: S5054 (3c)	30-Mar-10 (No. 217-01159)	Mar-11
Reference 20 dB Attenuator	SN: S5086 (20b)	30-Mar-10 (No. 217-01161)	Mar-11
Reference 30 dB Attenuator	SN: S5129 (30b)	30-Mar-10 (No. 217-01160)	Mar-11
Reference Probe H3DV6	SN: 6182	3-Oct-09 (No. H3-6182_Oct09)	Oct-10
DAE4	SN: 789	23-Dec-09 (No. DAE4-789_Dec09)	Dec-10

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-09)	In house check: Oct10

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: August 24, 2010

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

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

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

Accreditation No.: SCS 108

Glossary:

NORMx,y,z	sensitivity in free space
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 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:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 for XY sensors and ϑ = 90 for Z sensor (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide).
- *X,Y,Z(f)_a0a1a2= X,Y,Z_a0a1a2* frequency_response* (see Frequency Response Chart).
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *Ax,y,z; Bx,y,z; Cx,y,z, VRx,y,z: A, B, C* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *Spherical isotropy (3D deviation from isotropy)*: in a locally homogeneous field realized using an open waveguide setup.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- *Connector Angle*: The angle is assessed using the information gained by determining the *X_a0a1a2* (no uncertainty required).

Probe H3DV6

SN:6076

Manufactured:	October 2, 2000
Last calibrated:	August 19, 2009
Recalibrated:	August 23, 2010

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: H3DV6 SN:6076

Basic Calibration Parameters

		Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm (A/m / √(μV))	a0	2.85E-3	2.72E-3	3.05E-3	± 5.1%
Norm (A/m / √(μV))	a1	-8.80E-5	-2.35E-4	-3.28E-5	± 5.1%
Norm (A/m / √(μV))	a2	3.38E-5	1.15E-5	-1.72E-4	± 5.1%
DCP (mV)[A]		92.1	81.7	78.1	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dBuV	C	VR mV	Unc[E] (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	300	± 1.5 %
			Y	0.00	0.00	1.00	300	
			Z	0.00	0.00	1.00	300	

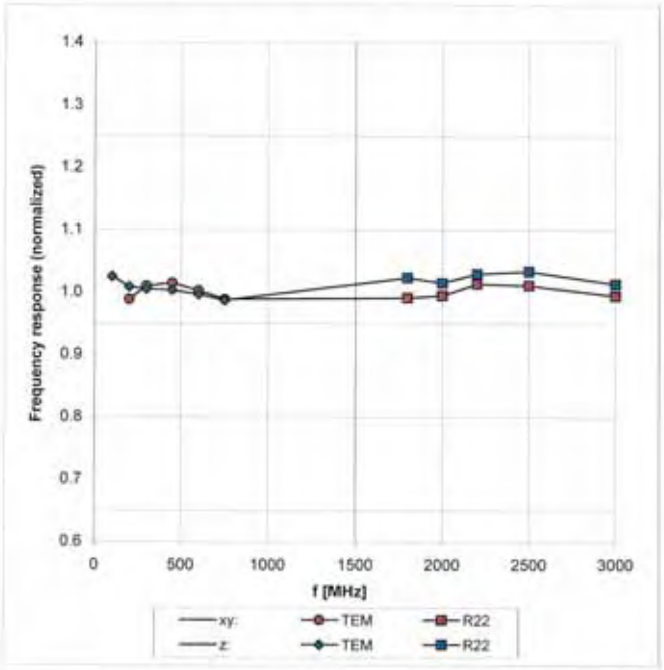
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

[A] numerical linearization parameter: uncertainty not required

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

Frequency Response of H-Field

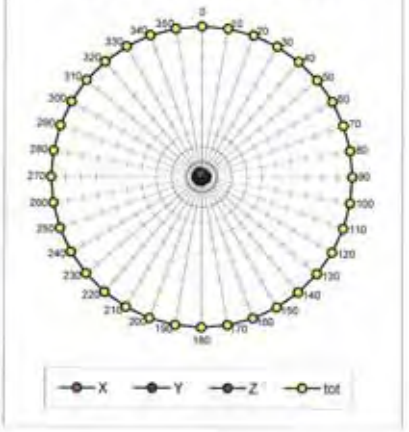
(TEM-Cell:ifi110 EXX, Waveguide R22)



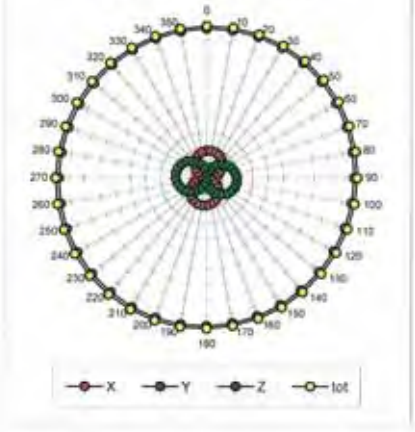
Uncertainty of Frequency Response of H-field: ± 6.3% (k=2)

Receiving Pattern (ϕ), ϑ = 90°

f = 600 MHz, TEM ifi110EXX

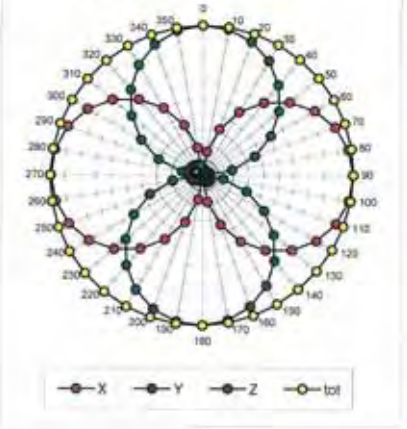


f = 2500 MHz, WG R22

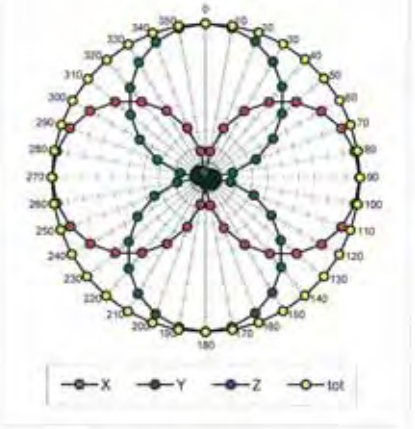


Receiving Pattern (ϕ), ϑ = 0°

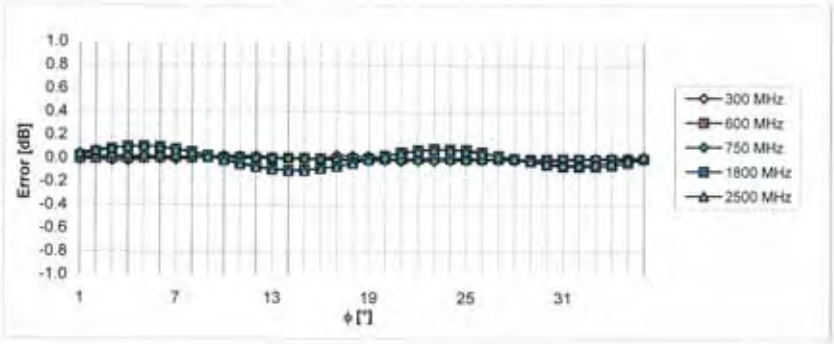
f = 600 MHz, TEM ifi110EXX



f = 2500 MHz, WG R22

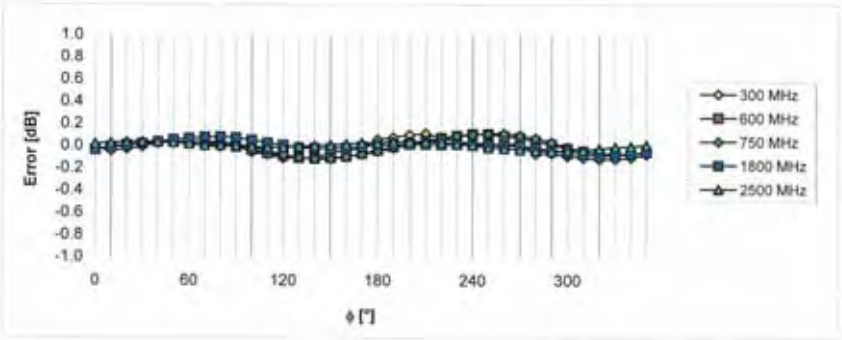


Receiving Pattern (ϕ), ϑ = 90°



Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

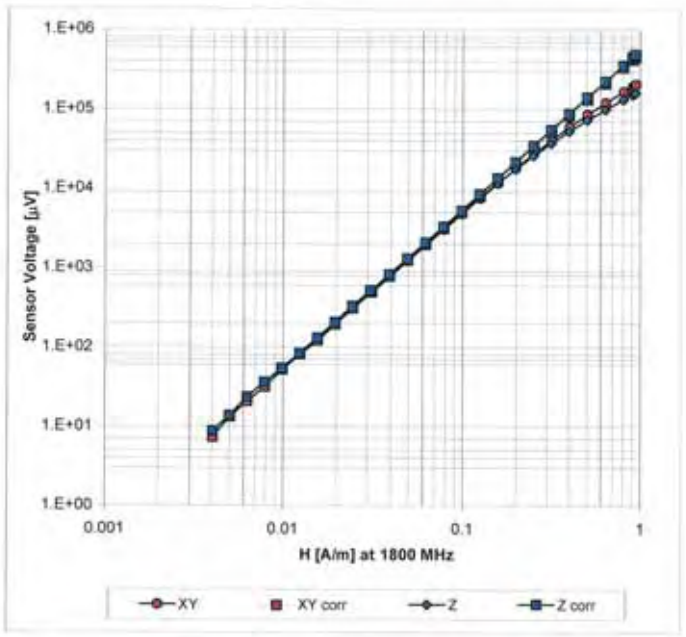
Receiving Pattern (ϕ), ϑ = 0°

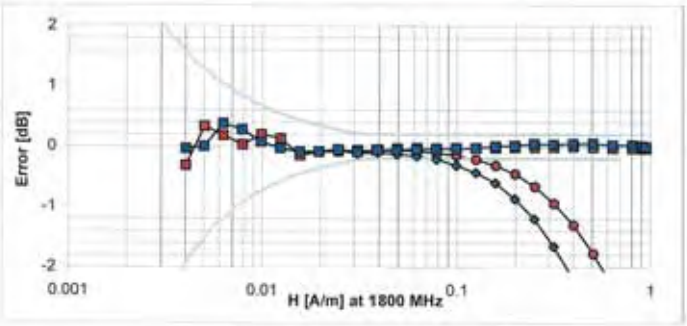


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(H-field)

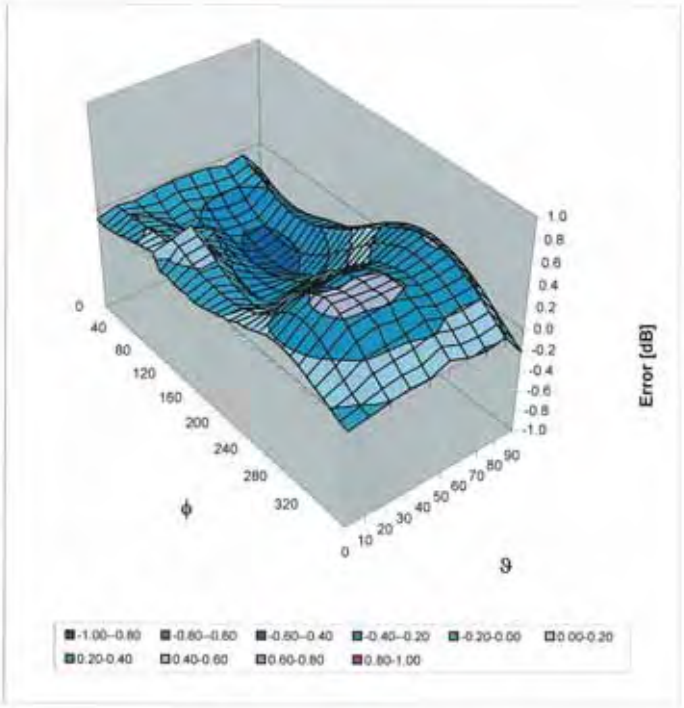
(Waveguide R22, f = 1800 MHz)





Uncertainty of Linearity Assessment: ± 0.6% (k=2)

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



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

Other Probe Parameters

Sensor Arrangement	Rectangular
Connector Angle (°)	81.5
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	20 mm
Tip Diameter	6.0 mm
Probe Tip to Sensor X Calibration Point	3 mm
Probe Tip to Sensor Y Calibration Point	3 mm
Probe Tip to Sensor Z Calibration Point	3 mm

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: DAE4-779_Jan11

CALIBRATION CERTIFICATE

Object	DAE4 - SD 000 D04 BJ - SN: 779
Calibration procedure(s)	QA CAL-06.v22 Calibration procedure for the data acquisition electronics (DAE)
Calibration date:	January 31, 2011

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Keithley Multimeter Type 2001	SN: 0810278	28-Sep-10 (No:10376)	Sep-11
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Calibrator Box V1.1	SE UMS 006 AB 1004	07-Jun-10 (in house check)	In house check: Jun-11

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

Issued: January 31, 2011

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

Glossary

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

Methods Applied and Interpretation of Parameters

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

DC Voltage Measurement

A/D - Converter Resolution nominal

High Range:	1LSB =	6.1μV ,	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	404.517 ± 0.1% (k=2)	403.748 ± 0.1% (k=2)	403.972 ± 0.1% (k=2)
Low Range	3.96927 ± 0.7% (k=2)	3.98585 ± 0.7% (k=2)	3.99915 ± 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	155.5 ° ± 1 °

Appendix

1. DC Voltage Linearity

High Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	200001.8	6.19	0.00
Channel X	+ Input	20003.75	4.25	0.02
Channel X	- Input	-19996.56	3.04	-0.02
Channel Y	+ Input	200005.0	0.90	0.00
Channel Y	+ Input	20000.78	1.38	0.01
Channel Y	- Input	-19996.43	2.97	-0.01
Channel Z	+ Input	200002.2	-1.15	-0.00
Channel Z	+ Input	19999.59	0.19	0.00
Channel Z	- Input	-19995.05	4.35	-0.02

Low Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	2000.4	0.25	0.01
Channel X	+ Input	200.27	0.37	0.18
Channel X	- Input	-199.08	1.12	-0.56
Channel Y	+ Input	2000.1	0.19	0.01
Channel Y	+ Input	199.01	-0.89	-0.45
Channel Y	- Input	-199.30	0.50	-0.25
Channel Z	+ Input	1999.6	-0.40	-0.02
Channel Z	+ Input	199.22	-0.88	-0.44
Channel Z	- Input	-200.27	-0.37	0.19

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	-3.66	-5.39
	- 200	5.82	4.90
Channel Y	200	13.39	13.58
	- 200	-14.98	-15.16
Channel Z	200	2.20	2.53
	- 200	-4.84	-4.61

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	-	1.33	-0.57
Channel Y	200	1.97	-	3.29
Channel Z	200	1.19	-0.28	-

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	15613	15134
Channel Y	15831	16218
Channel Z	16150	17743

5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec
Input 10MΩ

	Average (μV)	min. Offset (μV)	max. Offset (μV)	Std. Deviation (μV)
Channel X	-0.26	-1.03	0.79	0.42
Channel Y	0.52	-1.04	2.07	0.58
Channel Z	-2.22	-3.25	-0.85	0.44

6. Input Offset Current

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

7. Input Resistance (Typical values for information)

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

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

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

9. Power Consumption (Typical values for information)

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

Appendix E - Uncertainty

HAC Uncertainty Budget According to NSIC63.19 [1], [2]							
Error Description	Uncertainty value	Prob. Dist.	Div.	(ci) E	(ci) 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	±4.02%	±0.0%
Linearity	±4.7%	R	$\sqrt{3}$	1	1	±2.7%	±2.7%
Probe modulation Factor	±15.0%	R	$\sqrt{3}$	1	1	±8.7%	±8.7%
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		RSS				±17.5%	±13.8%
Expanded Std. Uncertainty on Power		K=2				±35.0%	±27.6%
Expanded Std. Uncertainty on Field						±17.5%	±13.8%