HAC Test Report for Near Field Emissions IHDT56KC1

Date of test:	May-13-2009 to May-18-2009
Date of Report:	May-22-2009
Laboratory:	Motorola Mobile Devices Business Product Safety & Compliance Laboratory 600 N. US Highway 45 Room: MW113 Libertyville, Illinois 60048
Test Responsible:	Thomas Knipple Senior RF Engineer 
Statement of Compliance:	Motorola declares under its sole responsibility that portable cellular telephone FCC [IHDT56KC1] to which this declaration relates, complies with recommendations and guidelines FCC 47 CFR §20.19. The measurements were performed to ensure compliance to the ANSI C63.19-2007. It also declares that the product was tested in accordance with the appropriate measurement standards, guidelines and recommended practices. Any deviations from these standards, guidelines and recommended practices are noted below: (none)
Results Summary:	M Category = M3

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1. Introduction

The Motorola Mobile Devices Business Product Safety Laboratory has performed Hearing Aid Compatibility (HAC) measurements for the portable cellular phone (FCC ID [IHDT56KC1]). The portable cellular phone was tested in accordance with ANSI PC63.19-2007 standard. The test results presented herein clearly demonstrate compliance FCC 47 CFR § 20.19. This report demonstrates compliance for near-field emissions only and not for the Telecoil performance compliance.

2. Description of the Device Under Test

Table 1: Information for the Device Under Test

Serial number	**364VKH3V5F**		
Mode(s) of Operation	800 iDEN	900 iDEN	Bluetooth
Modulation Mode(s)	QAM	QAM	GFSK
Maximum Output Power Setting	28.06 dBm	28.06 dBm	4.0 dBm
Duty Cycle	1:6/2:6	1:6/2:6	1:1
Transmitting Frequency Range(s)	806.0125 – 824.9875 MHz	896.01875 – 900.98125 MHz	2400.0 - 2483.5 MHz
Production Unit or Identical Prototype (47 CFR §2..908)	Identical Prototype		
Device Category	Portable		

Note: No Bluetooth profile exists in this phone that will allow a Bluetooth link while in a cellular call that passes audio to the earpiece. If the user had Bluetooth enabled and a link established, they could not be listening to the phone through the earpiece.

3. Test Equipment Used

The Motorola Mobile Devices Business Product Safety & Compliance Laboratory utilizes a Dosimetric Assessment System (Dasy4™ v4.7) manufactured by Schmid & Partner Engineering AG (SPEAG™), of Zurich Switzerland. All the HAC measurements are taken within a shielded enclosure. The measurement uncertainty budget is given in Appendix 4. The list of calibrated equipment used for the measurements is shown below.

Table 2: Dosimetric System Equipment

Description	Serial Number	Cal Due Date
E-Field Probe ER3DV6R	2244	Sep-22-2009
DAE4	703	Sep-19-2009
H-Field Probe H3DV6	6078	Sep-22-2009
DAE4	639	Sep-22-2009
835 MHz Dipole CD835V3	1076	Mar-11-2010

Table 3: Additional Test Equipment

Description	Serial Number	Cal Due Date
Power Supply 6632B	US37360829	Sep-06-2009
Signal Generator E4438C	MY45090104	Sep-12-2009
Amplifier ZHL-42-SMA	1040	
3db Attenuator 8491A	50581	Sep-04-2009
Directional Coupler 778D	18621	Sep-05-2009
Power Meter E4417A	MY45100140	Dec-24-2009
Power Sensor #1 – E9323A	US40412053	Sep-04-2009
Power Sensor #2 - E9323A	US40412063	Sep-04-2009
10db attenuator 8491A	3929M50702	Oct-17-2009
Spectrum Analyzer E4403B	US39440471	Dec-09-2009

4. Validation

Validations of the DASY4 v4.7 test system were performed using the measurement equipment listed in Section 3.1. All validations occur in free space using the DASY4 test arch. Note that the 10 mm probe to dipole separation is measured from the top edge of the dipole to the calibration reference point of the probe. SPEAG uses the center point of the probe sensor(s) as the reference point when establishing targets for their dipoles. Therefore, because SPEAG's dipoles and targets are used, it is appropriate to measure the 10 mm separation distance to the center of the sensors as they do. This reference point was used for validation only. Validations were performed at 835 MHz and 898 MHz. The results obtained from the validations are displayed in the table below. The field contour plots are included in Appendix 2.

Validations were performed to verify that measured E-field and H-field values are within +/- 25% from the target reference values provided by the manufacturer (Ref: Appendix 7). Per Section 4.3.2.1 of the C63.19 standard, "Values within +/-25% are acceptable, of which 12% is deviation and 13% is measurement uncertainty." Therefore, the E- and H-Field dipole verification results, shown in Table 4, are in accordance with the acceptable parameters defined by the standard.

Table 4: Dipole Measurement Summary

Date	Dipole	F (MHz)	Protocol	Input Power (mW)	E-Field Results (V/m)	Target for Dipole (V/m)	% Deviation
May-13-2009	1076	835	CW	100	154.0	159.0	-3.1
		898	CW	100	142.15	151.4	-6.1

Date	Dipole	F (MHz)	Protocol	Input Power (mW)	H-Field Results (A/m)	Target for Dipole (A/m)	% Deviation
May-18-2009	1076	835	CW	100	0.445	0.445	0.0
		898	CW	100	0.404	0.416	-2.9

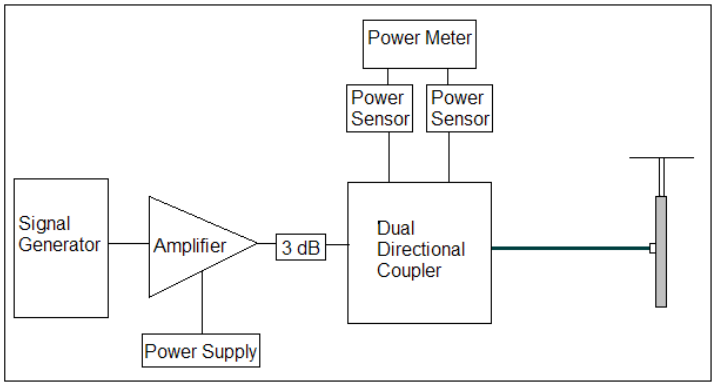


Figure 1: Setup for Validation

5. Probe Modulation Factor

After every probe calibration, the response of the probe to each applicable modulated signal (iDEN, etc) must be assessed at both 835 MHz and 898 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 applicable to this test document are shown in Tables 5.

RF Field Probe Modulation Response was measured with the field probe and associated measurement equipment. The PMF was measured 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.

Using dual directional coupler, the forward power and reverse power are measured and adjusted when connected to the dipole.

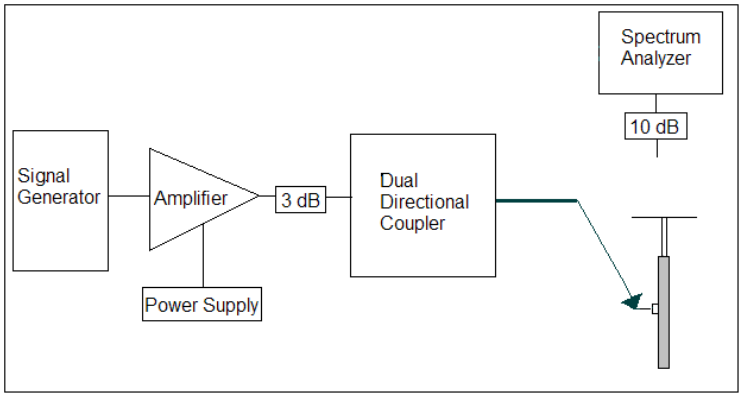


Figure 2a: Setup to Dipole

A spectrum analyzer is used to set the peak amplitude of the modulated signal equal to the amplitude of the CW signal. The procedure, used to ensure that the amplitude is the same, is shown in Appendix 1. The 0-span spectrum plots are also provided in Appendix 1.

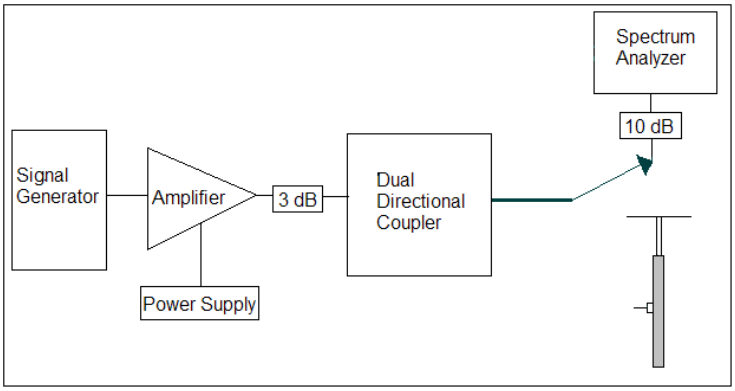


Figure 2b: Setup for Desired Peak Power using Spectrum Analyzer

When measuring PMFs, the signal is injected into the dipole. When peak power level produces the field strength less or around M3 limit, the peak power level is used. When peak power level produces the field strength much greater than M3 limit, the power level which gives the field strength around M3 limit is used.

Table 5: PMF Measurement Summary

f (MHz)	Protocol	E-Field Probe SN 2244		H-Field Probe SN 6078	
		E-Field (V/m)	E-Field Modulation Factor	H-Field (A/m)	H-Field Modulation Factor
813	CW	288.6		1.086	
	IDEN (2:6 Rate)	80.17	3.60	0.3418	3.18
	IDEN (1:6 Rate)	57.11	5.05	0.2458	4.42
898	CW	215.1		1.044	
	IDEN (2:6 Rate)	63.26	3.40	0.3309	3.16
	IDEN (1:6 Rate)	44.30	4.86	0.2341	4.46

f (MHz)	Protocol	E-Field Probe SN 2244		H-Field Probe SN 6078	
		E-Field (V/m)	E-Field Modulation Factor	H-Field (A/m)	H-Field Modulation Factor
813	CW	108.1		0.5050	
	80% AM	66.37	1.63	0.3244	1.56
898	CW	85.69		0.4184	
	80% AM	52.39	1.64	0.2616	1.60

6. Test Results

The phone was tested in normal configurations for the ear use. The slider phone was tested in the slide open position only, as this position represents the configuration of optimum performance. When applicable, configurations are tested with the antenna in its fully extended position. These test configurations are tested at the high, middle and low frequency channels of each applicable operating mode; for example, GSM, CDMA, and TDMA.

The test sample is capable of operation in a test mode that allows control of the transmitter without the need to place actual phone calls. This guarantees that the unit does not change its transmitter power, and that the resultant HAC field values will not be affected by external connections. For the purposes of this testing the unit is commanded to test mode and manually set to the proper channel, transmitter power level and transmit mode of operation. The phone is then placed in the HAC measurement system with a fully charged battery. At the end of each test the DASY™ system measures the drift of the field strength at a fixed reference point to ensure that the test sample has not changed in transmitter power. For the purposes of these tests, the transmitter was operated at the highest output level available.

The Cellular Phone model covered by this report has the following battery options:
Battery #1 – SNN5838A – 1600 mAH Battery
Battery #2 – SNN5837A – 1140 mAH Battery
Battery #3 – SNN5833A – 930 mAH Battery
Battery #3 – SNN5834A – 780 mAH Battery

The DASY4 v4.7 measurement system specified in section 3.1 was utilized within the intended operations as set by the SPEAG™ setup. The default settings for the grid spacing of the scan were set to 5 mm as shown in the Field plots included in Appendix 2 and 3. The 5 cm x 5 cm 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 pictures of the setup are included in Appendix 5. 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 center point of the probe sensor(s). The device is positioned such that the WD reference plane is located 15 mm from, and parallel to, the measurement plane. This is in accordance with section 4.4 of the standard, which states that “The WD reference plane is a plane parallel with the front "face" of the WD and containing the highest point on its contour in the area of the phone that normally rests against the user's ear.”

The HAC Rating results for E-Field and H-field are shown in Tables 6 through 9. Also shown are the measured conducted output powers, the measured drifts, excluded areas, and the peak fields. PMF measurements are taken from Section 5. The worst-case test conditions are indicated with **bold numbers** in the tables and are detailed in Appendix 3: HAC distribution plots for E-Field and H-Field.

Drift was measured using the typical DASY4 v4.7 measurement routines. The field is measured at the reference location (center of the ear piece) at the beginning of the test. Then after completion of the E or H field measurement, the probe returns to the same reference location and takes another measurement. The drift is the delta between these two values and is included in the test report scans.

Per SPEAG’s recommendation, the phone plots in Appendix 3 use the iDEN transmitter ratios of 2:6 and 1:6 as “Duty Cycle.” Per SPEAG’s recommendation, in order to account for probe modulation response, PMF is applied during the SEMCAD (post-processing) portion. PMF also appears in the phone plots in Appendix 3.

iDEN 800/900 Emissions Limits	
Rating	E-Field
M3	199.5 – 354.8 V/m
M4	< 199.5 V/m

Table 6: HAC E-Field measurement results for the portable cellular telephone at highest possible output power (2:6 Rate)

Frequency Band (MHz)	Frequency Setting	Conducted Output Power (dBm)	Measured PMF	Drift (dB)	Excluded Cells	Peak Field (V/m)	Rating
iDEN 800 MHz	806.0125	27.68	3.60	0.163	2,3	249.0	M3
	813.5125	27.81		-0.045	2,3	258.5	M3
	824.9875	27.80		0.064	2,3	244.7	M3
	with Battery 2			0.029	2,3	268.9	M3
	with Battery 3			**-0.144**	**2,3**	**274.4**	**M3**
	with Battery 4			-0.186	2,3	248.6	M3
iDEN 900 MHz	896.01875	27.81	3.40	-0.035	2,3	222.8	M3
	900.98125	27.76		-0.052	2,3	220.0	M3
	with Battery 2			**-0.223**	**2,3**	**233.0**	**M3**
	with Battery 3			-0.164	2,3	215.9	M3
	with Battery 4			-0.121	2,3	203.2	M3

Table 7: HAC E-Field measurement results for the portable cellular telephone at highest possible output power (1:6 Rate)

Frequency Band (MHz)	Frequency Setting	Conducted Output Power (dBm)	Measured PMF	Drift (dB)	Excluded Cells	Peak Field (V/m)	Rating
iDEN 800 MHz	806.0125	27.68	5.05	0.026	2,3	242.5	M3
	813.5125	27.81		-0.151	8,9	260.9	M3
	824.9875	27.80		-0.044	2,3	276.0	M3
	with Battery 2			-0.092	2,3	280.2	M3
	with Battery 3			**-0.004**	**2,3**	**285.6**	**M3**
	with Battery 4			0.069	2,3	258.8	M3
iDEN 900 MHz	896.01875	27.81	4.86	**-0.102**	**2,3**	**264.2**	**M3**
	900.98125	27.76		0.022	2,3	262.9	M3
	with Battery 2			-0.005	2,3	252.1	M3
	with Battery 3			-0.137	2,3	252.9	M3
	with Battery 4			0.007	8,9	250.0	M3

iDEN 800/900 Emissions Limits	
Rating	H-Field
M3	0.60 – 1.07 A/m
M4	< 0.60 A/m

Table 8: HAC H-Field measurement results for the portable cellular telephone at highest possible output power (2:6 Rate)

Frequency Band (MHz)	Frequency Setting	Conducted Output Power (dBm)	Measured PMF	Drift (dB)	Excluded Cells	Peak Field (A/m)	Rating
iDEN 800 MHz	806.0125	27.68	3.18	-0.059	1,4,7	0.291	M4
	813.5125	27.81		-0.024	1,4,7	0.295	M4
	824.9875	27.80		-0.208	1,4,7	0.288	M4
	with Battery 2			**-0.171**	**1,4,7**	**0.301**	**M4**
	with Battery 3			-0.007	1,4,7	0.283	M4
	with Battery 4			-0.108	1,4,7	0.294	M4
iDEN 900 MHz	896.01875	27.81	3.16	-0.132	1,4,7	0.318	M4
	900.98125	27.76		-0.239	1,4,7	0.316	M4
	with Battery 2			**-0.118**	**1,4,7**	**0.325**	**M4**
	with Battery 3			-0.003	1,4,7	0.312	M4
	with Battery 4			-0.245	1,4,7	0.313	M4

Table 9: HAC H-Field measurement results for the portable cellular telephone at highest possible output power (1:6 Rate)

Frequency Band (MHz)	Frequency Setting	Conducted Output Power (dBm)	Measured PMF	Drift (dB)	Excluded Cells	Peak Field (A/m)	Rating
iDEN 800 MHz	806.0125	27.68	4.42	0.215	1,4,7	0.280	M4
	813.5125	27.81		0.019	1,4,7	0.294	M4
	824.9875	27.80		-0.236	1,4,7	0.307	M4
	with Battery 2			**-0.071**	**1,4,7**	**0.309**	**M4**
	with Battery 3			-0.063	1,4,7	0.303	M4
	with Battery 4			-0.112	1,4,7	0.305	M4
iDEN 900 MHz	896.01875	27.81	4.46	-0.057	1,4,7	0.375	M4
	900.98125	27.76		0.040	1,4,7	0.382	M4
	with Battery 2			**0.104**	**1,4,7**	**0.385**	**M4**
	with Battery 3			-0.094	1,4,7	0.375	M4
	with Battery 4			-0.086	1,4,7	0.378	M4

Appendix 1

Details justifying the conversion to peak

A1.1 Procedure for PMF measurements

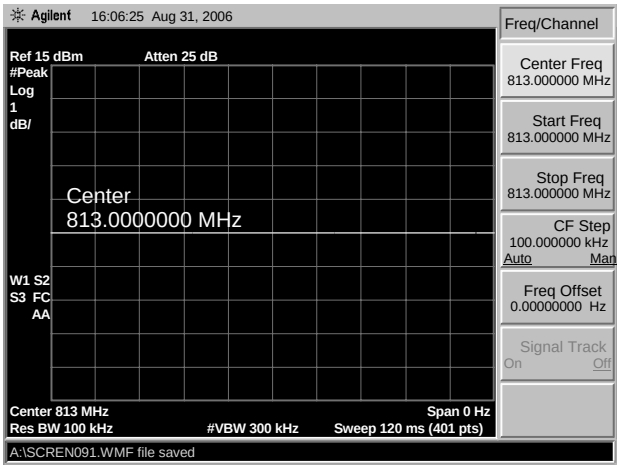
1. Setup the HAC validation rack as you would for a normal CW HAC validation with forward power = 100 mW
2. Setup the dipole and phantom as you would for a normal CW HAC validation.
3. Open the "HAC Probe Mod Factor" template and verify the following parameters:
Medium = "Air";
Communication System = "HAC – Dipole";
Ensure the proper probe & DAE are installed and laser aligned
4. **MEASURE CW:** Using the original CW signal, run the jobs in the "CW Measurement" procedure.
5. Do **not** turn off the signal generator power
6. **Setting the CW Reference Level on the Spectrum Analyzer:** To set the Reference level on the Spectrum Analyzer, remove the Validation Rack's Main Cable from the dipole and connect to the Spectrum Analyzer INPUT using a 10 dB attenuator and an adapter.
7. Set-Up the Spectrum Analyzer for the following Settings:

Frequency:	Freq. being tested (EX: 835/1880)
Span:	Zero Span
Res BW:	iDEN – 100 kHz; GSM – 300 kHz; CDMA – 3 MHz; WCDMA – 5 MHz;
Video BW:	iDEN – 300 kHz; GSM – 1MHz; CDMA and WCDMA – 30 kHz*;
Sweep Time:	20 ms; 120 ms for iDEN
Scale:	1dB
Detector:	PEAK / Manual

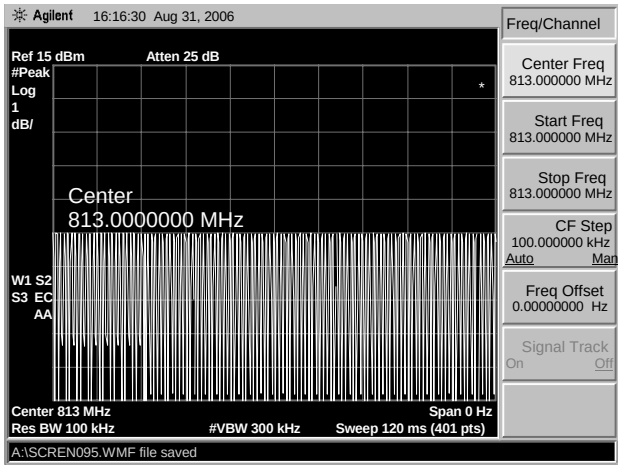
8. Adjust REF level until the CW signal is aligned with the Center Line (approx. 15 dB). NOTE: After this point, the Reference Line must remain fixed. Do not change it.
9. **MEASURE THE MODULATED SIGNAL(S):**
9.1. Change the signal generator to the desired modulation.
9.2. Set the Spectrum Analyzer Sweep Time to 20ms.
9.3. With the Main cable still connected to the Spectrum Analyzer, adjust the amplitude of the power on the signal generator so that the PEAK of the modulated signal is at the CW Reference Line**:**
9.3.1 On the Spectrum Analyzer, press the [View Trace] button and then select (Max Hold), this will show only the Peak output.
9.3.2 Press (Clear Write) and then (Max Hold) each time an amplitude adjustment is made.
9.4. Allow the Max Hold line to stabilize. Then check that the highest peak of the Max Hold line corresponds with the CW Reference Line (without going over). If not correct, repeat section 6.
9.5. Remove the validation main cable from the spectrum analyzer and re-connect it to the Dipole.
10. Repeat 9 until all remaining modulation(s) have been completed.

*The use of 30 kHz VBW is validated. The power measurements are verified using an average power meter.

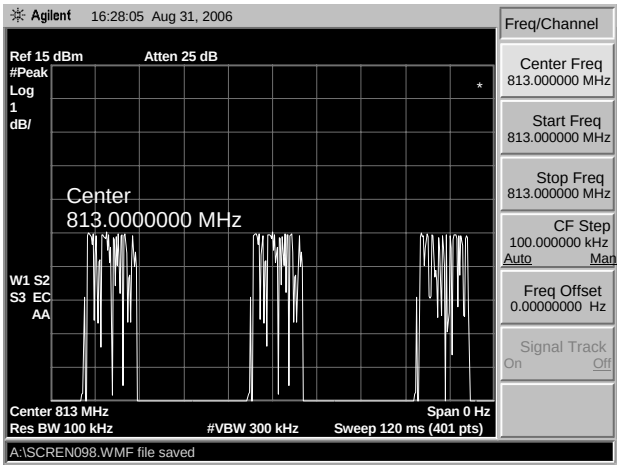
A1.2 0-span Spectrum Plots for PMF measurements



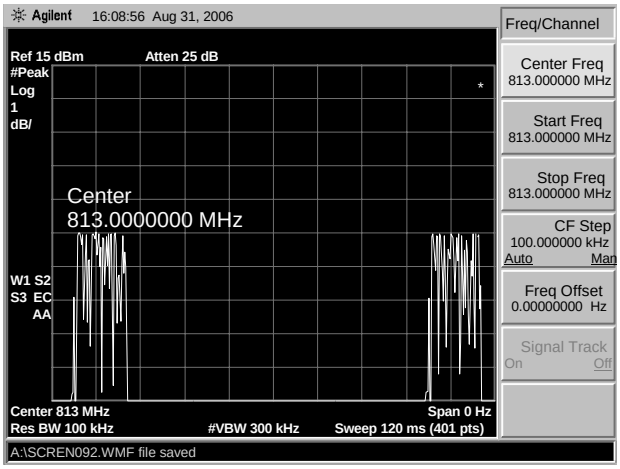
CW 813 MHz



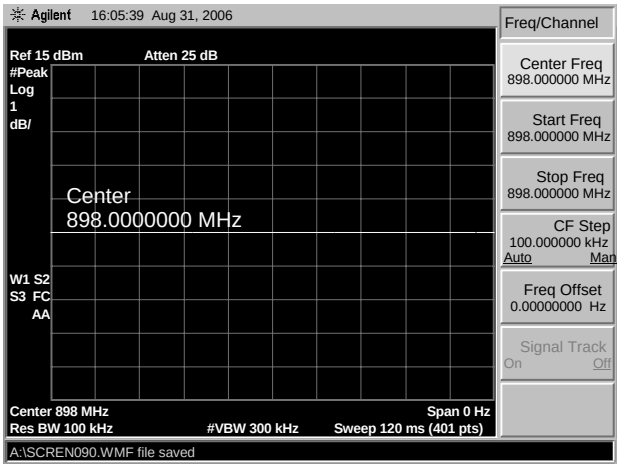
80% AM 813 MHz



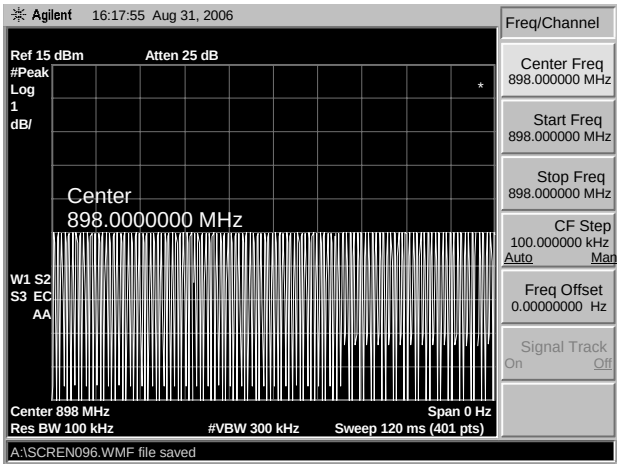
iDEN 813 MHz (2:6 rate)



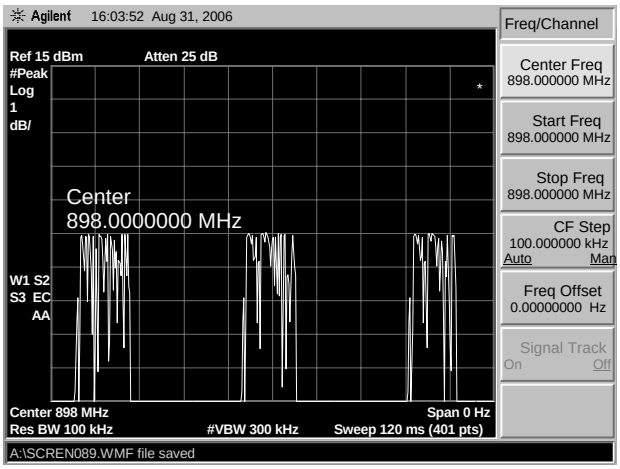
iDEN 813 MHz (1:6 rate)



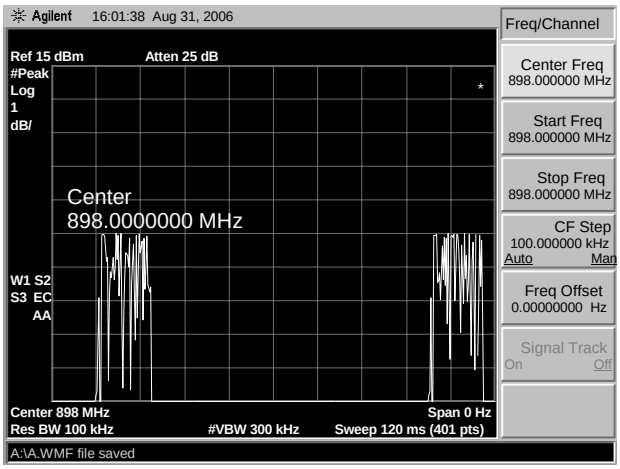
CW 898 MHz



80% AM 898 MHz



iDEN 898 MHz (2:6 rate)



iDEN 898 MHz (1:6 rate)

Appendix 2

HAC distribution plots for Validation

Date/Time: 5/13/2009 6:58:30 AM

Test Laboratory: Motorola - 051309, E - 835 CW

DUT: HAC-Dipole 835 MHz; Type: CD835V3; FCC ID: IHDT56KC1

Procedure Notes: 835 MHz HAC Validation; Dipole Sn# 1076; Input Power = 100 mW

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

Medium: Air; Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3

DASY4 Configuration:

- Probe: ER3DV6R - SN2244; ConvF(1, 1, 1); Calibrated: 9/22/2008
- Sensor-Surface: 0mm (Fix Surface)Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn703; Calibrated: 9/19/2008
- Phantom: R-3, HAC Test Arch (rev.2); Type: SD HAC P01 BA; Serial: 1071;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

E Scan - Probe center 10mm above Dipole/Hearing Aid Compatibility Test (41x361x1):

Measurement grid: dx=5mm, dy=5mm; Probe Modulation Factor = 1.00

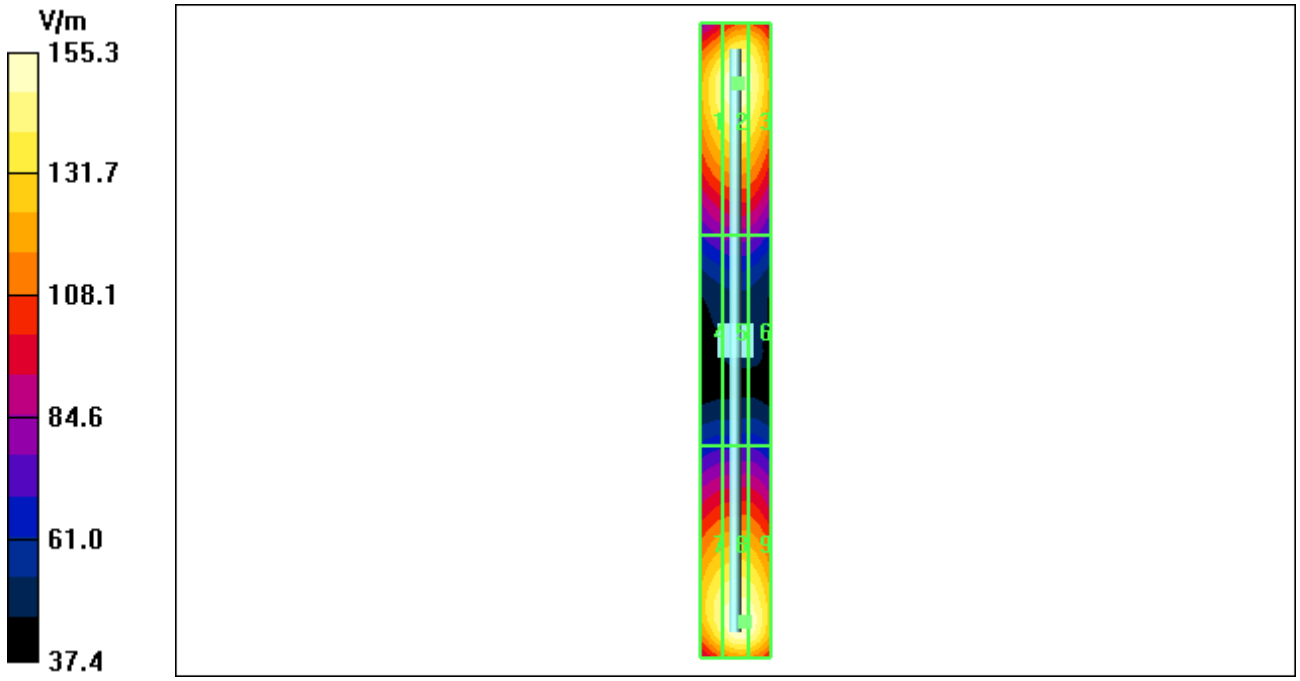
Device Reference Point: 0.000, 0.000, -6.30 mm; Reference Value = 97.5 V/m; Power Drift = 0.043 dB

Maximum value of Total (interpolated) = 155.3 V/m

Average value of Total (interpolated) = (152.7 + 155.3) / 2 = 154.0 V/m

Peak E-field in V/m

Grid 1 **147.3 M4**	Grid 2 **152.7 M4**	Grid 3 **150.6 M4**
Grid 4 **79.4 M4**	Grid 5 **81.6 M4**	Grid 6 **81.1 M4**
Grid 7 **148.2 M4**	Grid 8 **155.3 M4**	Grid 9 **154.7 M4**



Date/Time: 5/13/2009 8:01:09 AM

Test Laboratory: Motorola - 051309, E - 898 CW

DUT: HAC-Dipole 898 MHz; Type: CD835V3; FCC ID: IHDT56KC1

Procedure Notes: 898 MHz HAC Validation; Dipole Sn# 1076-898; Input Power = 100 mW

Communication System: CW - HAC; Frequency: 898 MHz; Duty Cycle: 1:1

Medium: Air; Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3

DASY4 Configuration:

- Probe: ER3DV6R - SN2244; ConvF(1, 1, 1); Calibrated: 9/22/2008
- Sensor-Surface: 0mm (Fix Surface)Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn703; Calibrated: 9/19/2008
- Phantom: R-3, HAC Test Arch (rev.2); Type: SD HAC P01 BA; Serial: 1071;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

E Scan - Probe center 10mm above Dipole/Hearing Aid Compatibility Test (41x361x1):

Measurement grid: dx=5mm, dy=5mm; Probe Modulation Factor = 1.00

Device Reference Point: 0.000, 0.000, -6.30 mm

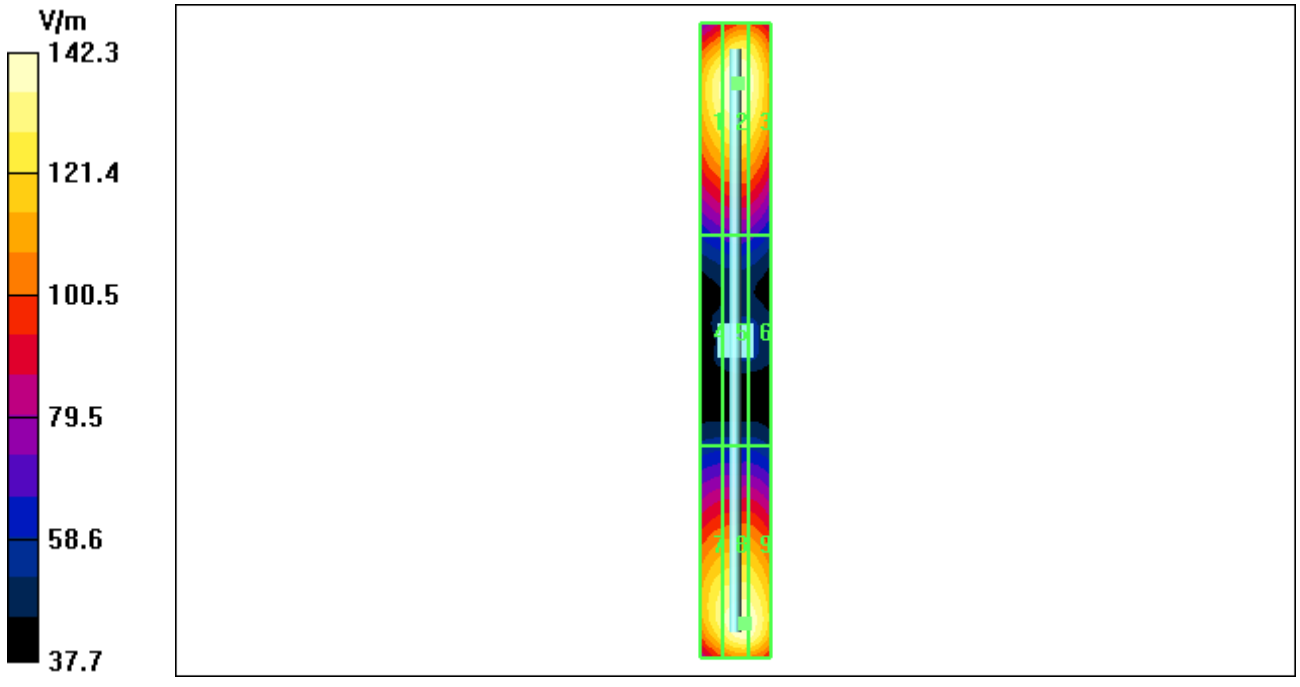
Reference Value = 85.3 V/m; Power Drift = -0.034 dB

Maximum value of Total (interpolated) = 142.3 V/m

Average value of Total (interpolated) = (142.3 + 142.0) / 2 = 142.15 V/m

Peak E-field in V/m

Grid 1 **138.1 M4**	Grid 2 **142.3 M4**	Grid 3 **140.0 M4**
Grid 4 **69.1 M4**	Grid 5 **71.1 M4**	Grid 6 **70.0 M4**
Grid 7 **134.8 M4**	Grid 8 **142.0 M4**	Grid 9 **141.5 M4**



Date/Time: 5/18/2009 7:13:39 AM

Test Laboratory: Motorola - 051809, H - 835 CW

DUT: HAC-Dipole 835 MHz; Type: CD835V3; FCC ID: IHDT56KC1

Procedure Notes: 835 MHz HAC Validation; Dipole Sn# 1076; Input Power = 100 mW

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

Medium: Air; Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3

DASY4 Configuration:

- Probe: H3DV6 - SN6078; ; Calibrated: 9/22/2008
- Sensor-Surface: 0mm (Fix Surface)Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn639; Calibrated: 9/22/2008
- Phantom: R-3, HAC Test Arch (rev.2); Type: SD HAC P01 BA; Serial: 1071;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

H Scan - Probe center 10mm above Dipole/Hearing Aid Compatibility Test (41x361x1):

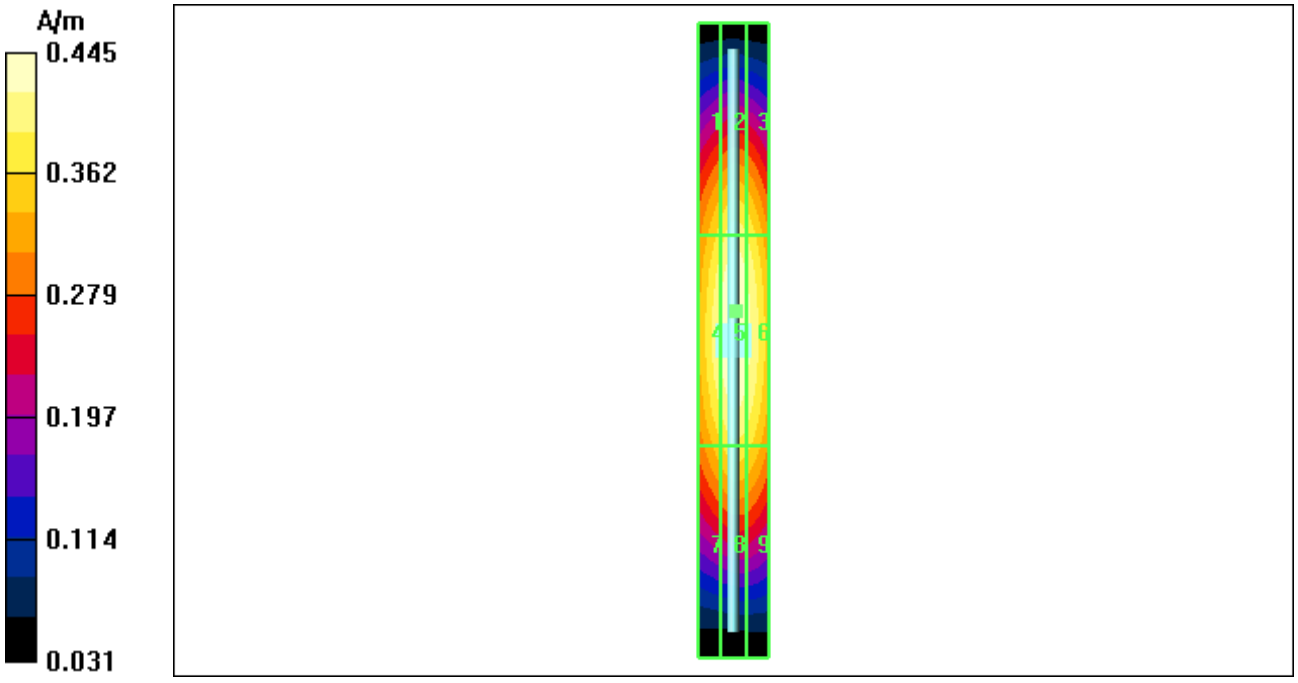
Measurement grid: dx=5mm, dy=5mm; Probe Modulation Factor = 1.00

Device Reference Point: 0.000, 0.000, -6.30 mm; Reference Value = 0.471 A/m; Power Drift = 0.142 dB

Maximum value of Total (interpolated) = 0.445 A/m

Peak H-field in A/m

Grid 1 **0.377 M4**	Grid 2 **0.405 M4**	Grid 3 **0.391 M4**
Grid 4 **0.422 M4**	Grid 5 **0.445 M4**	Grid 6 **0.430 M4**
Grid 7 **0.358 M4**	Grid 8 **0.382 M4**	Grid 9 **0.372 M4**



Date/Time: 5/18/2009 7:28:34 AM

Test Laboratory: Motorola - 051809, H - 898 CW

DUT: HAC-Dipole 898 MHz; Type: CD835V3; FCC ID: IHDT56KC1

Procedure Notes: 898 MHz HAC Validation; Dipole Sn# 1076-898; Input Power = 100 mW

Communication System: CW - HAC; Frequency: 898 MHz; Duty Cycle: 1:1

Medium: Air; Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3

DASY4 Configuration:

- Probe: H3DV6 - SN6078; ; Calibrated: 9/22/2008
- Sensor-Surface: 0mm (Fix Surface)Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn639; Calibrated: 9/22/2008
- Phantom: R-3, HAC Test Arch (rev.2); Type: SD HAC P01 BA; Serial: 1071;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

H Scan - Probe center 10mm above Dipole/Hearing Aid Compatibility Test (41x361x1):

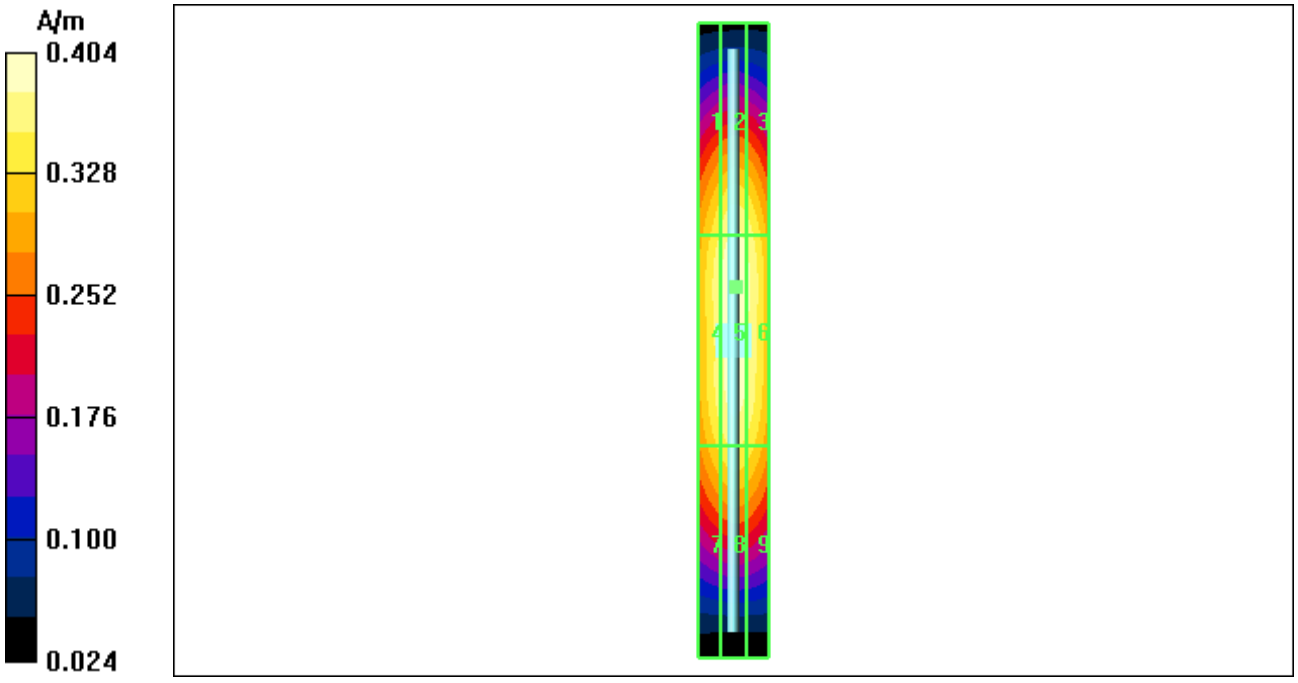
Measurement grid: dx=5mm, dy=5mm; Probe Modulation Factor = 1.00

Device Reference Point: 0.000, 0.000, -6.30 mm; Reference Value = 0.421 A/m; Power Drift = -0.035 dB

Maximum value of Total (interpolated) = 0.404 A/m

Peak H-field in A/m

Grid 1 **0.359 M4**	Grid 2 **0.383 M4**	Grid 3 **0.372 M4**
Grid 4 **0.380 M4**	Grid 5 **0.404 M4**	Grid 6 **0.390 M4**
Grid 7 **0.338 M4**	Grid 8 **0.356 M4**	Grid 9 **0.346 M4**



Appendix 3

HAC distribution plots for E-Field and H-Field

Date/Time: 5/14/2009 12:42:12 PM

Test Laboratory: Motorola - iDEN 800 E-Field, 2:6 Vocoder

Serial: 364VKH3V5F; FCC ID: IHDT56KC1

Procedure Notes: Pwr Step: 0 dB; Antenna Position: Internal; Accessory Model #: N/A
Battery Model #: SNN5833A; Vocoder Rate: 2:6; PMF Value: 3.6; Positioner: SPEAG Clamp
Communication System: iDEN 800; Frequency: 813.51 MHz; Channel Number: 2; Duty Cycle: 1:3
Medium: Air; Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3

DASY4 Configuration:

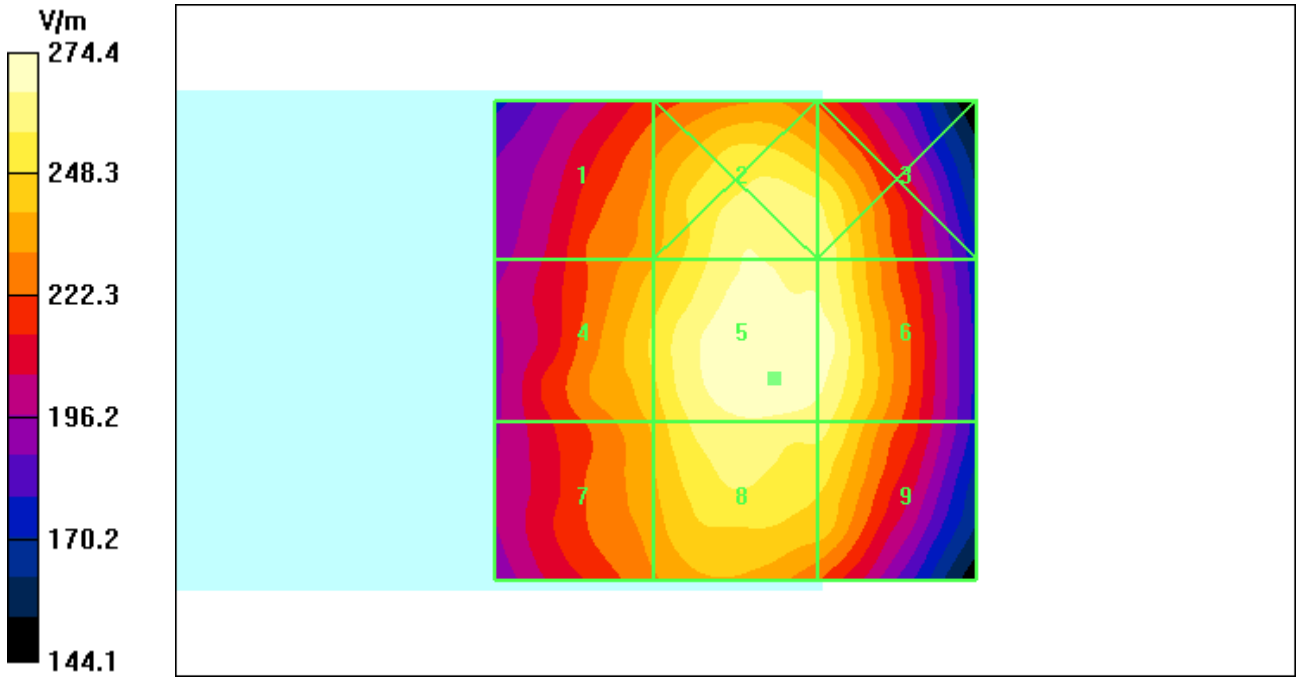
- Probe: ER3DV6R - SN2244; ConvF(1, 1, 1); Calibrated: 9/22/2008
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn703; Calibrated: 9/19/2008
- Phantom: R-3, HAC Test Arch (rev.2); Type: SD HAC P01 BA; Serial: 1071;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

E Scan - Sensor center 15mm above WD, Hearing Aid Compatibility Test (101x101x1):

Measurement grid: dx=5mm, dy=5mm
Maximum value of peak Total field = 274.4 V/m; Probe Modulation Factor = 3.60
Device Reference Point: 0.000, 0.000, -6.30 mm; Reference Value = 97.6 V/m; Power Drift = -0.144 dB
Hearing Aid Near-Field Category: M3 (AWF 0 dB)

Peak E-field in V/m

Grid 1 **238.7 M3**	Grid 2 **266.1 M3**	Grid 3 **263.3 M3**
Grid 4 **250.3 M3**	Grid 5 **274.4 M3**	Grid 6 **271.5 M3**
Grid 7 **242.3 M3**	Grid 8 **264.8 M3**	Grid 9 **260.8 M3**



Date/Time: 5/14/2009 10:38:54 AM

Test Laboratory: Motorola - iDEN 900 E-Field, 2:6 Vocoder

Serial: 364VKH3V5F; FCC ID: IHDT56KC1

Procedure Notes: Pwr Step: 0 dB; Antenna Position: Internal; Accessory Model #: N/A
Battery Model #: SNN5837A; Vocoder Rate: 2:6; PMF Value: 3.4; Positioner: SPEAG Clamp
Communication System: iDEN 900; Frequency: 896.02 MHz; Channel Number: 5; Duty Cycle: 1:3
Medium: Air; Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3

DASY4 Configuration:

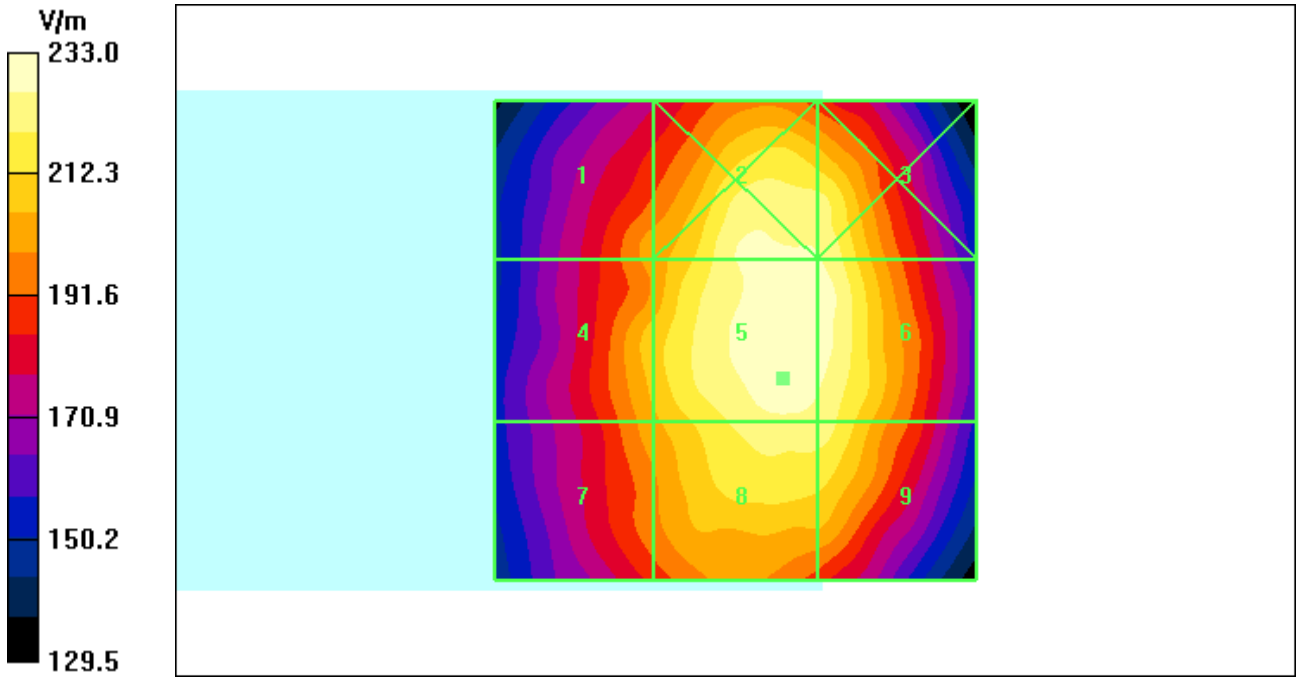
- Probe: ER3DV6R - SN2244; ConvF(1, 1, 1); Calibrated: 9/22/2008
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn703; Calibrated: 9/19/2008
- Phantom: R-3, HAC Test Arch (rev.2); Type: SD HAC P01 BA; Serial: 1071;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

E Scan - Sensor center 15mm above WD, Hearing Aid Compatibility Test (101x101x1):

Measurement grid: dx=5mm, dy=5mm
Maximum value of peak Total field = 233.0 V/m; Probe Modulation Factor = 3.40
Device Reference Point: 0.000, 0.000, -6.30 mm; Reference Value = 87.4 V/m; Power Drift = -0.223 dB
Hearing Aid Near-Field Category: M3 (AWF 0 dB)

Peak E-field in V/m

Grid 1 **202.4 M3**	Grid 2 **228.2 M3**	Grid 3 **226.8 M3**
Grid 4 **209.9 M3**	Grid 5 **233.0 M3**	Grid 6 **230.8 M3**
Grid 7 **203.7 M3**	Grid 8 **223.8 M3**	Grid 9 **223.2 M3**



Date/Time: 5/14/2009 12:54:34 PM

Test Laboratory: Motorola - iDEN 800 E-Field, 1:6 Vocoder

Serial: 364VKH3V5F; FCC ID: IHDT56KC1

Procedure Notes: Pwr Step: 0 dB; Antenna Position: Internal; Accessory Model #: N/A
Battery Model #: SNN5833A; Vocoder Rate: 1:6; PMF Value: 5.05; Positioner: SPEAG Clamp
Communication System: iDEN 800; Frequency: 824.98 MHz; Channel Number: 4; Duty Cycle: 1:6
Medium: Air; Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3

DASY4 Configuration:

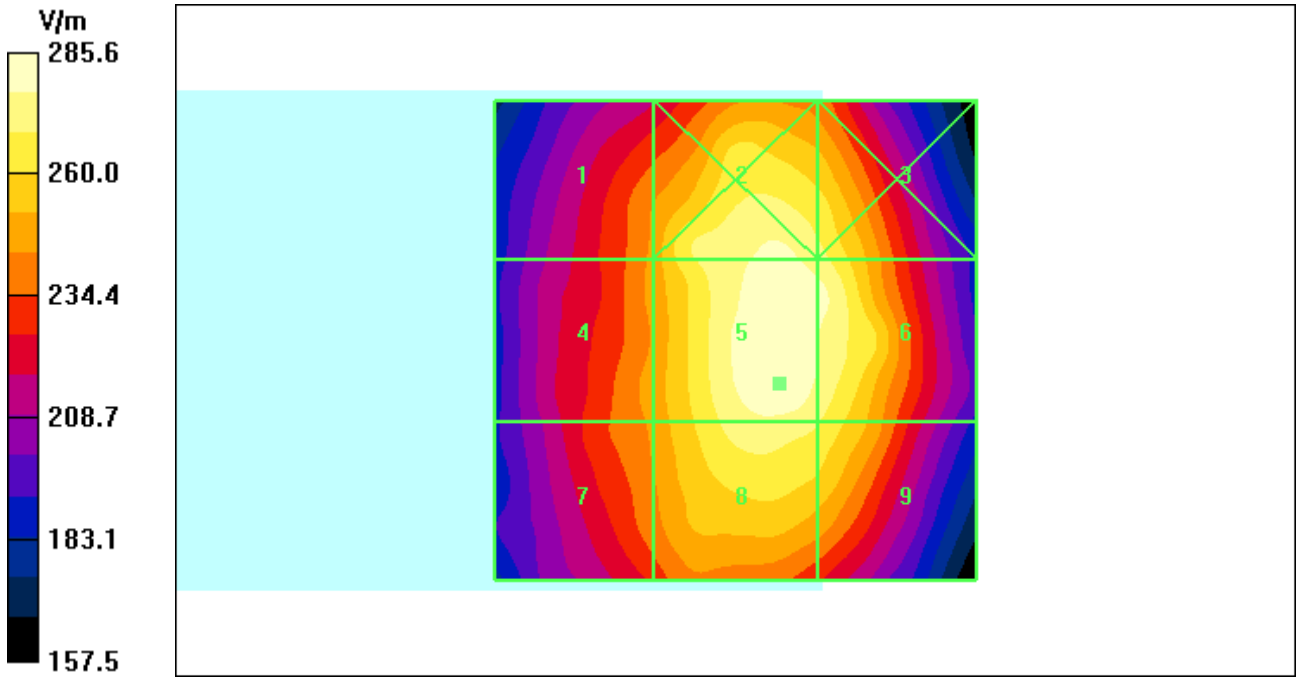
- Probe: ER3DV6R - SN2244; ConvF(1, 1, 1); Calibrated: 9/22/2008
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn703; Calibrated: 9/19/2008
- Phantom: R-3, HAC Test Arch (rev.2); Type: SD HAC P01 BA; Serial: 1071;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

E Scan - Sensor center 15mm above WD, Hearing Aid Compatibility Test (101x101x1):

Measurement grid: dx=5mm, dy=5mm
Maximum value of peak Total field = 285.6 V/m; Probe Modulation Factor = 5.05
Device Reference Point: 0.000, 0.000, -6.30 mm; Reference Value = 71.5 V/m; Power Drift = -0.004 dB
Hearing Aid Near-Field Category: M3 (AWF 0 dB)

Peak E-field in V/m

Grid 1 **246.6 M3**	Grid 2 **279.4 M3**	Grid 3 **272.7 M3**
Grid 4 **247.7 M3**	Grid 5 **285.6 M3**	Grid 6 **280.0 M3**
Grid 7 **245.9 M3**	Grid 8 **275.2 M3**	Grid 9 **269.2 M3**



Date/Time: 5/13/2009 11:07:29 AM

Test Laboratory: Motorola - iDEN 900 E-Field, 1:6 Vocoder

Serial: 364VKH3V5F; FCC ID: IHDT56KC1

Procedure Notes: Pwr Step: 0 dB; Antenna Position: Internal; Accessory Model #: N/A
Battery Model #: SNN5838A; Vocoder Rate: 1:6; PMF Value: 4.86; Positioner: SPEAG Clamp
Communication System: iDEN 900; Frequency: 896.02 MHz; Channel Number: 5; Duty Cycle: 1:6
Medium: Air; Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3

DASY4 Configuration:

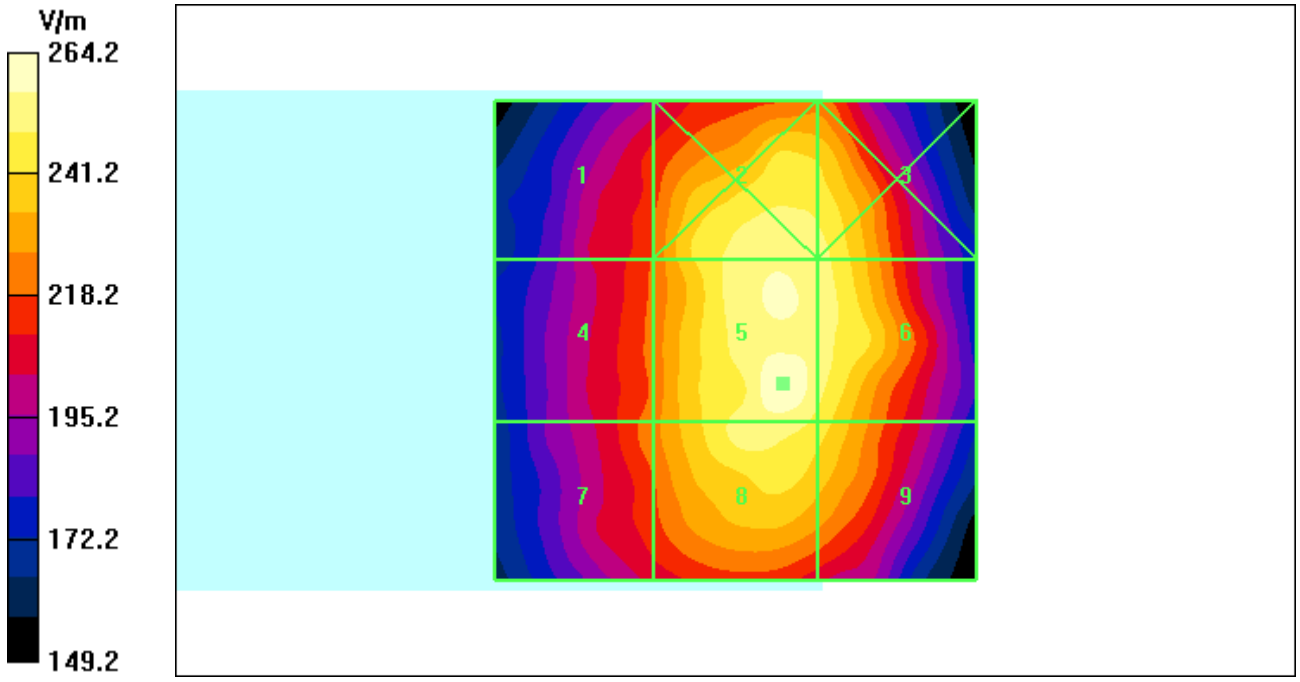
- Probe: ER3DV6R - SN2244; ConvF(1, 1, 1); Calibrated: 9/22/2008
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn703; Calibrated: 9/19/2008
- Phantom: R-3, HAC Test Arch (rev.2); Type: SD HAC P01 BA; Serial: 1071;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

E Scan - Sensor center 15mm above WD, Hearing Aid Compatibility Test (101x101x1):

Measurement grid: dx=5mm, dy=5mm
Maximum value of peak Total field = 264.2 V/m; Probe Modulation Factor = 4.86
Device Reference Point: 0.000, 0.000, -6.30 mm; Reference Value = 67.8 V/m; Power Drift = -0.102 dB
Hearing Aid Near-Field Category: M3 (AWF 0 dB)

Peak E-field in V/m

Grid 1 **219.7 M3**	Grid 2 **255.6 M3**	Grid 3 **252.5 M3**
Grid 4 **223.5 M3**	Grid 5 **264.2 M3**	Grid 6 **254.4 M3**
Grid 7 **223.7 M3**	Grid 8 **253.7 M3**	Grid 9 **246.2 M3**



Date/Time: 5/18/2009 10:22:55 AM

Test Laboratory: Motorola - iDEN 800 H-Field, 2:6 Vocoder

Serial: 364VKH3V5F; FCC ID: IHDT56KC1

Procedure Notes: Pwr Step: 0 dB; Antenna Position: Internal; Accessory Model #: N/A
Battery Model #: SNN5837A; Vocoder Rate: 2:6; PMF Value: 3.18; Positioner: SPEAG Clamp
Communication System: iDEN 800; Frequency: 813.51 MHz; Channel Number: 2; Duty Cycle: 1:3
Medium: Air; Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3

DASY4 Configuration:

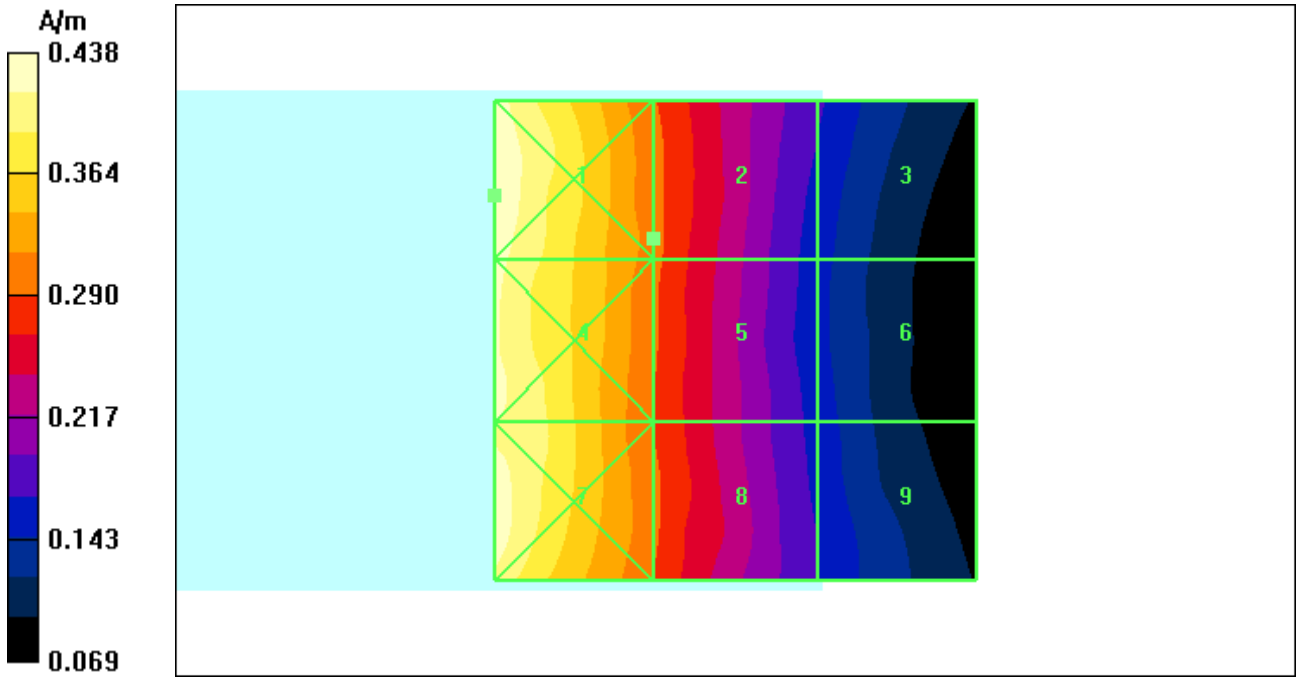
- Probe: H3DV6 - SN6078; ; Calibrated: 9/22/2008
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn639; Calibrated: 9/22/2008
- Phantom: R-3, HAC Test Arch (rev.2); Type: SD HAC P01 BA; Serial: 1071;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

H Scan - Sensor center 15mm above WD, Hearing Aid Compatibility Test (101x101x1):

Measurement grid: dx=5mm, dy=5mm
Maximum value of peak Total field = 0.301 A/m; Probe Modulation Factor = 3.18
Device Reference Point: 0.000, 0.000, -6.30 mm; Reference Value = 0.073 A/m; Power Drift = -0.171 dB
Hearing Aid Near-Field Category: M4 (AWF 0 dB)

Peak H-field in A/m

Grid 1 **0.438 M4**	Grid 2 **0.301 M4**	Grid 3 **0.174 M4**
Grid 4 **0.424 M4**	Grid 5 **0.300 M4**	Grid 6 **0.159 M4**
Grid 7 **0.430 M4**	Grid 8 **0.297 M4**	Grid 9 **0.169 M4**



Date/Time: 5/18/2009 1:25:22 PM

Test Laboratory: Motorola - iDEN 900 H-Field, 2:6 Vocoder

Serial: 364VKH3V5F; FCC ID: IHDT56KC1

Procedure Notes: Pwr Step: 0 dB; Antenna Position: Internal; Accessory Model #: N/A
Battery Model #: SNN5837A; Vocoder Rate: 2:6; PMF Value: 3.16; Positioner: SPEAG Clamp
Communication System: iDEN 900; Frequency: 896.02 MHz; Channel Number: 5; Duty Cycle: 1:3
Medium: Air; Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3

DASY4 Configuration:

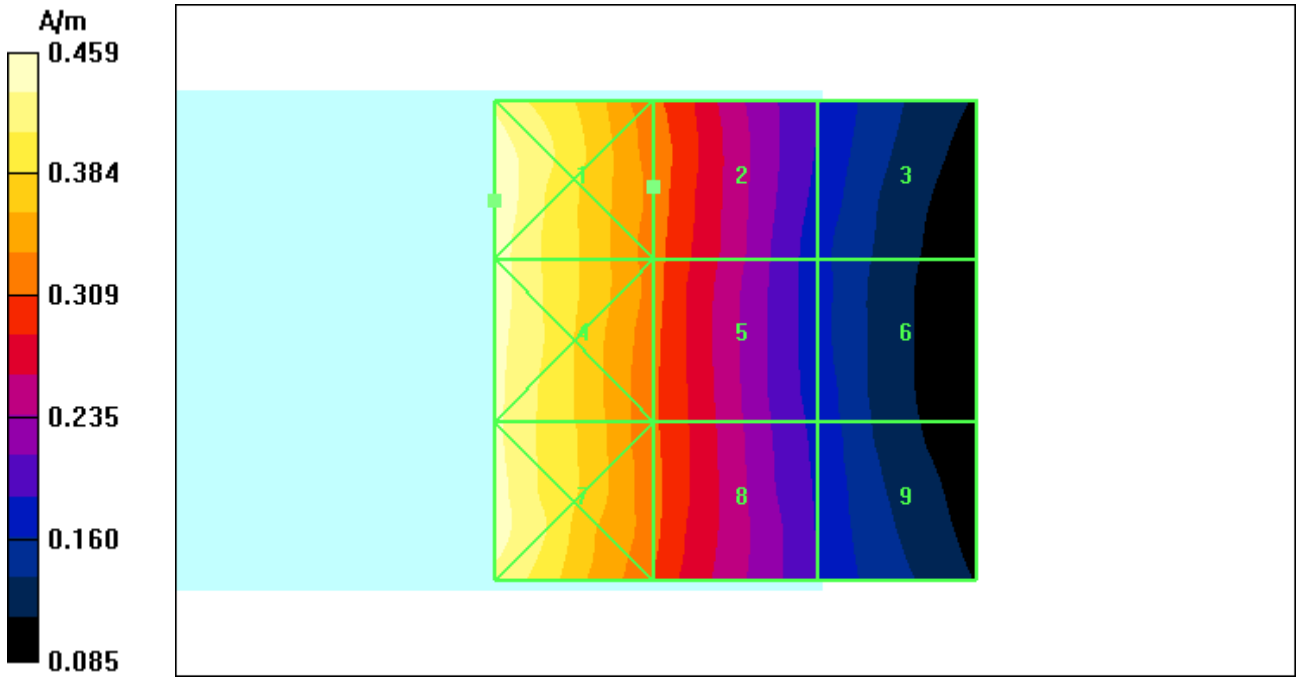
- Probe: H3DV6 - SN6078; ; Calibrated: 9/22/2008
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn639; Calibrated: 9/22/2008
- Phantom: R-3, HAC Test Arch (rev.2); Type: SD HAC P01 BA; Serial: 1071;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

H Scan - Sensor center 15mm above WD, Hearing Aid Compatibility Test (101x101x1):

Measurement grid: dx=5mm, dy=5mm
Maximum value of peak Total field = 0.325 A/m; Probe Modulation Factor = 3.16
Device Reference Point: 0.000, 0.000, -6.30 mm; Reference Value = 0.080 A/m; Power Drift = -0.118 dB
Hearing Aid Near-Field Category: M4 (AWF 0 dB)

Peak H-field in A/m

Grid 1 **0.459 M4**	Grid 2 **0.325 M4**	Grid 3 **0.188 M4**
Grid 4 **0.450 M4**	Grid 5 **0.321 M4**	Grid 6 **0.178 M4**
Grid 7 **0.446 M4**	Grid 8 **0.318 M4**	Grid 9 **0.187 M4**



Date/Time: 5/18/2009 10:38:24 AM

Test Laboratory: Motorola - iDEN 800 H-Field, 1:6 Vocoder

Serial: 364VKH3V5F; FCC ID: IHDT56KC1

Procedure Notes: Pwr Step: 0 dB; Antenna Position: Internal; Accessory Model #: N/A
Battery Model #: SNN5837A; Vocoder Rate: 1:6; PMF Value: 4.42; Positioner: SPEAG Clamp
Communication System: iDEN 800; Frequency: 824.98 MHz; Channel Number: 4; Duty Cycle: 1:6
Medium: Air; Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3

DASY4 Configuration:

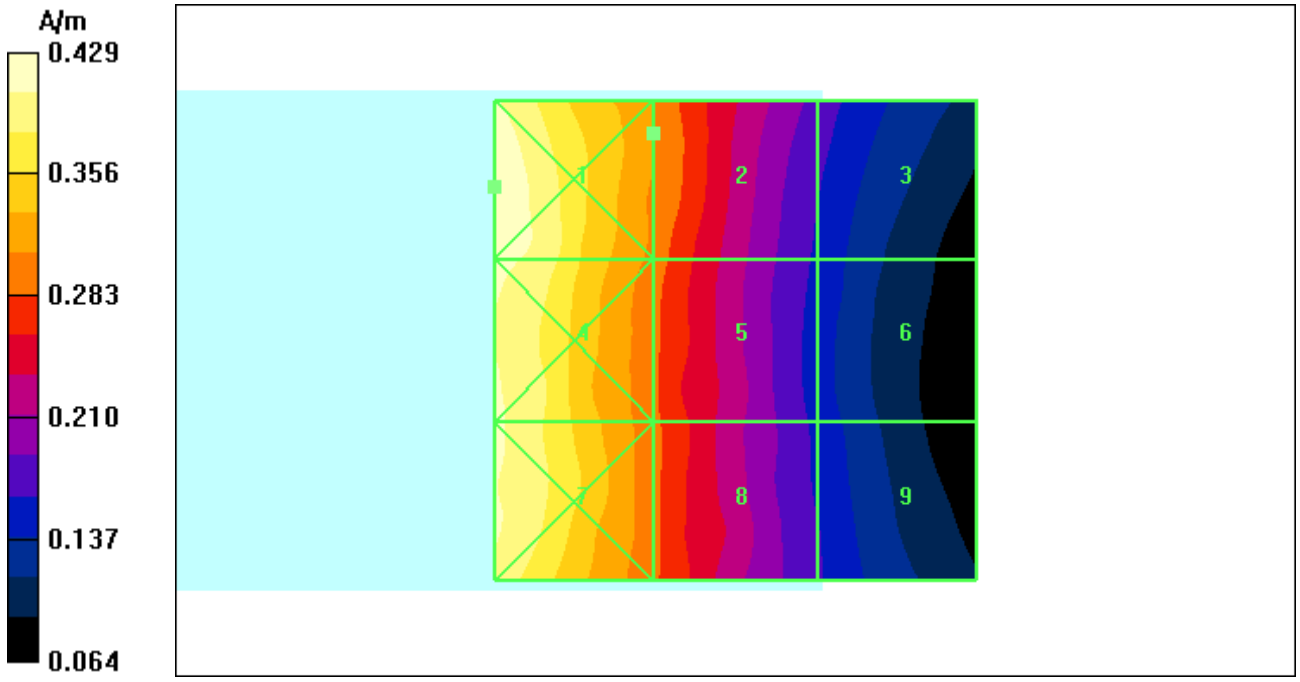
- Probe: H3DV6 - SN6078; ; Calibrated: 9/22/2008
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn639; Calibrated: 9/22/2008
- Phantom: R-3, HAC Test Arch (rev.2); Type: SD HAC P01 BA; Serial: 1071;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

H Scan - Sensor center 15mm above WD, Hearing Aid Compatibility Test (101x101x1):

Measurement grid: dx=5mm, dy=5mm
Maximum value of peak Total field = 0.309 A/m; Probe Modulation Factor = 4.42
Device Reference Point: 0.000, 0.000, -6.30 mm; Reference Value = 0.052 A/m; Power Drift = -0.071 dB
Hearing Aid Near-Field Category: M4 (AWF 0 dB)

Peak H-field in A/m

Grid 1 **0.429 M4**	Grid 2 **0.309 M4**	Grid 3 **0.177 M4**
Grid 4 **0.409 M4**	Grid 5 **0.298 M4**	Grid 6 **0.158 M4**
Grid 7 **0.409 M4**	Grid 8 **0.291 M4**	Grid 9 **0.166 M4**



Date/Time: 5/18/2009 1:34:29 PM

Test Laboratory: Motorola - iDEN 900 H-Field, 1:6 Vocoder

Serial: 364VKH3V5F; FCC ID: IHDT56KC1

Procedure Notes: Pwr Step: 0 dB; Antenna Position: Internal; Accessory Model #: N/A
Battery Model #: SNN5837A; Vocoder Rate: 1:6; PMF Value: 4.46; Positioner: SPEAG Clamp
Communication System: iDEN 900; Frequency: 900.98 MHz; Channel Number: 7; Duty Cycle: 1:6
Medium: Air; Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 0$ kg/m^3

DASY4 Configuration:

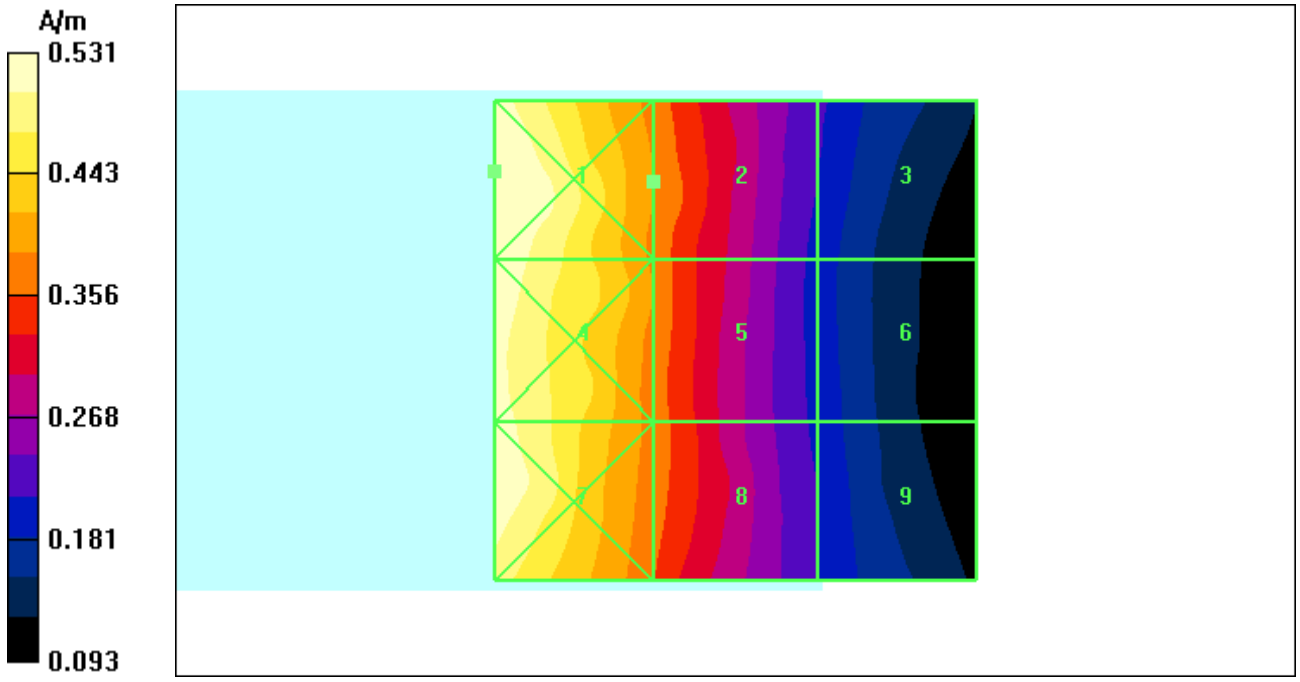
- Probe: H3DV6 - SN6078; ; Calibrated: 9/22/2008
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn639; Calibrated: 9/22/2008
- Phantom: R-3, HAC Test Arch (rev.2); Type: SD HAC P01 BA; Serial: 1071;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

H Scan - Sensor center 15mm above WD, Hearing Aid Compatibility Test (101x101x1):

Measurement grid: dx=5mm, dy=5mm
Maximum value of peak Total field = 0.385 A/m; Probe Modulation Factor = 4.46
Device Reference Point: 0.000, 0.000, -6.30 mm; Reference Value = 0.066 A/m; Power Drift = 0.104 dB
Hearing Aid Near-Field Category: M4 (AWF 0 dB)

Peak H-field in A/m

Grid 1 **0.531 M4**	Grid 2 **0.385 M4**	Grid 3 **0.218 M4**
Grid 4 **0.529 M4**	Grid 5 **0.385 M4**	Grid 6 **0.204 M4**
Grid 7 **0.518 M4**	Grid 8 **0.373 M4**	Grid 9 **0.211 M4**



Appendix 4

Measurement Uncertainty Budget

A4.1 Motorola Uncertainty Budget for RF HAC Testing

TABLE A4.1: Motorola Uncertainty Budget

UNCERTAINTY DESCRIPTION	Uncertainty Value (+/- %)	Prob. Dist.	Div.	(ci) E	(ci) H	Std. Unc. E	Std. Unc. H
MEASUREMENT SYSTEM							
Probe Calibration	5.1%	N	1.0000	1	1	5.1%	5.1%
Axial Isotropy	7.8%	R	1.7321	1	0.786	4.5%	3.5%
Sensor Displacement	16.5%	R	1.7321	1	0.145	9.5%	1.4%
Test Arch	7.2%	R	1.7321	1	0	4.2%	0.0%
Linearity	4.7%	R	1.7321	1	1	2.7%	2.7%
Scaling to Peak Envelope Power	2.0%	R	1.7321	1	1	1.2%	1.2%
System Detection Limit	1.0%	R	1.7321	1	1	0.6%	0.6%
Readout Electronics	0.3%	N	1.0000	1	1	0.3%	0.3%
Response Time	0.8%	R	1.7321	1	1	0.5%	0.5%
Integration Time	2.6%	R	1.7321	1	1	1.5%	1.5%
RF Reflections	5.6%	R	1.7321	1	1	3.2%	3.2%
Probe Positioner	1.2%	R	1.7321	1	0.67	0.7%	0.5%
Probe Positioning	4.7%	R	1.7321	1	0.67	2.7%	1.8%
Extrap. & Interpolation	1.0%	R	1.7321	1	1	0.6%	0.6%
TEST SAMPLE RELATED							
Total Device Positioning	3.2%	R	1.7321	1	1.306	1.8%	2.4%
Device Holder & Phantom	2.4%	R	1.7321	1	1	1.4%	1.4%
Power Drift	5.0%	R	1.7321	1	1	2.9%	2.9%
PHANTOM AND SETUP RELATED							
Phantom Thickness	2.4%	R	1.7321	1	0.67	1.4%	0.9%
Combined Std.Uncertainty on Power						14.1%	9.1%
Combined Std.Uncertainty on Field						7.1%	4.6%
Expanded Std. Uncertainty on Power						28.3%	18.2%
Expanded Std. Uncertainty on Field						14.1%	9.1%

A4.2 Probe Rotation Contributions to Isotropy Error

Probe rotation data was taken "for special focus on spherical isotropicity in measurement uncertainty and perturbation of EM fields." This data was taken at the interpolated maximum and directly accounted for in the uncertainty budget as "Axial Isotropy." Thirteen mobile devices were used to determine the probe isotropy uncertainty factors in section A4.1. Based on the resulting 82 E-Field probe rotations and 82 H-Field probe rotations, the upper 95% confidence interval value was calculated for each. These values represent a conservative assessment of the effect of the probe isotropy and have been appropriately included in the respective E- and H-uncertainty budgets.

TABLE A4.2: Probe Rotation Data Summary

	AVE	ST.DEV	Sample Size (n)	2σ	(ci)	Standard Uncertainty
E-field	4.4%	1.7%	82	7.8%	1	4.5%
H-field	3.8%	1.2%	82	6.1%	0.786	3.5%

Isotropy error measurements were taken for 13 products across the respective frequency bands. The +2σ values of all measurements was used as a worst case value for the uncertainty budget. Any significant differences between bands were also evaluated.

Appendix 5

Pictures of Test Setup

See Exhibit 7B

Appendix 6

Probe Calibration Certificates

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 Motorola MDb

Certificate No: ER3-2244_Sep08

CALIBRATION CERTIFICATE

Object	ER3DV6R - SN:2244
Calibration procedure(s)	QA CAL-02.v5 Calibration procedure for E-field probes optimized for close near field evaluations in air
Calibration date:	September 22, 2008
Condition of the calibrated item	In Tolerance

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-08 (No. 217-00788)	Apr-09
Power sensor E4412A	MY41495277	1-Apr-08 (No. 217-00788)	Apr-09
Power sensor E4412A	MY41498087	1-Apr-08 (No. 217-00788)	Apr-09
Reference 3 dB Attenuator	SN: S5054 (3c)	1-Jul-08 (No. 217-00865)	Jul-09
Reference 20 dB Attenuator	SN: S5086 (20b)	31-Mar-08 (No. 217-00787)	Apr-09
Reference 30 dB Attenuator	SN: S5129 (30b)	1-Jul-08 (No. 217-00866)	Jul-09
Reference Probe ER3DV6	SN: 2328	2-Oct-07 (No. ER3-2328_Oct07)	Oct-08
DAE4	SN: 789	5-Dec-07 (No. DAE4-789_Dec07)	Dec-08

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

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

Issued: September 22, 2008

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

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

Accreditation No.: SCS 108

Glossary:

NORMx,y,z	sensitivity in free space
DCP	diode compression point
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

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

Probe ER3DV6R

SN:2244

Manufactured:	February 1, 2000
Last calibrated:	July 12, 2007
Recalibrated:	September 22, 2008

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ER3DV6R SN:2244

Sensitivity in Free Space [$\mu V/(V/m)^2$]

NormX	**1.83** ± 10.1 % (k=2)
NormY	**1.85** ± 10.1 % (k=2)
NormZ	**2.04** ± 10.1 % (k=2)

Diode Compression[A]

DCP X	**95** mV
DCP Y	**94** mV
DCP Z	**97** mV

Frequency Correction

X	**0.0**
Y	**0.0**
Z	**0.0**

Sensor Offset (Probe Tip to Sensor Center)

X	**2.5** mm
Y	**2.5** mm
Z	**2.5** mm

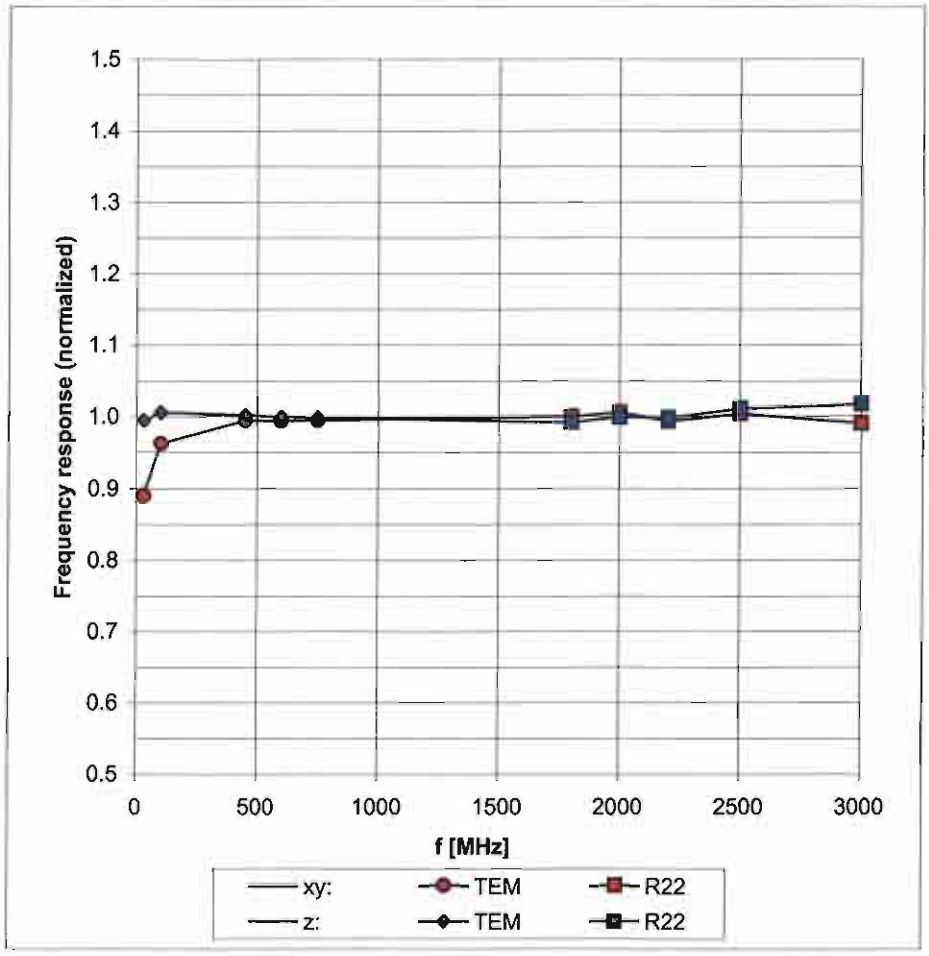
Connector Angle **25** °

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

[A] numerical linearization parameter: uncertainty not required

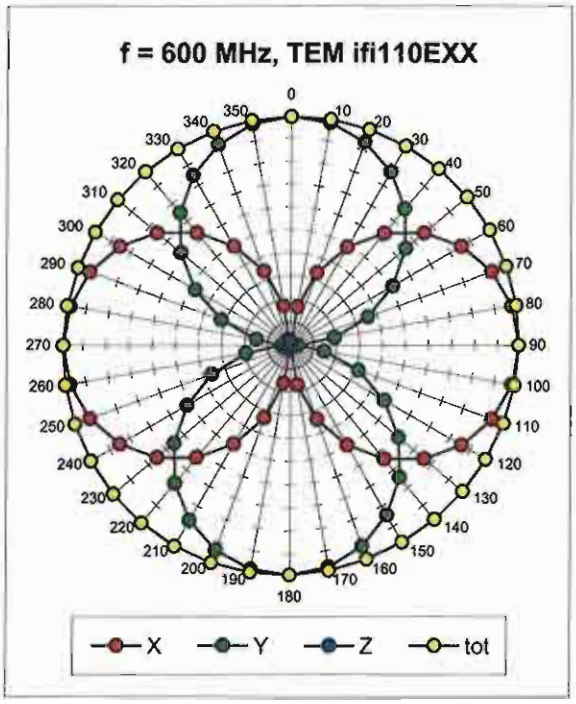
Frequency Response of E-Field

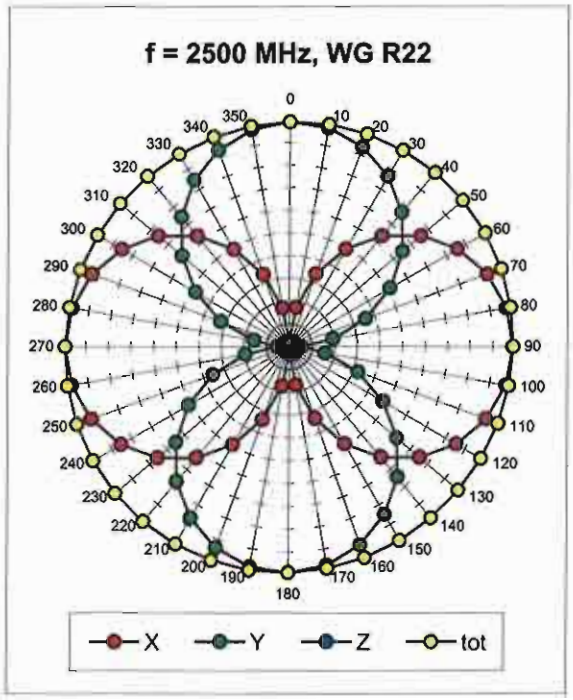
(TEM-Cell:ifi110 EXX, Waveguide R22)



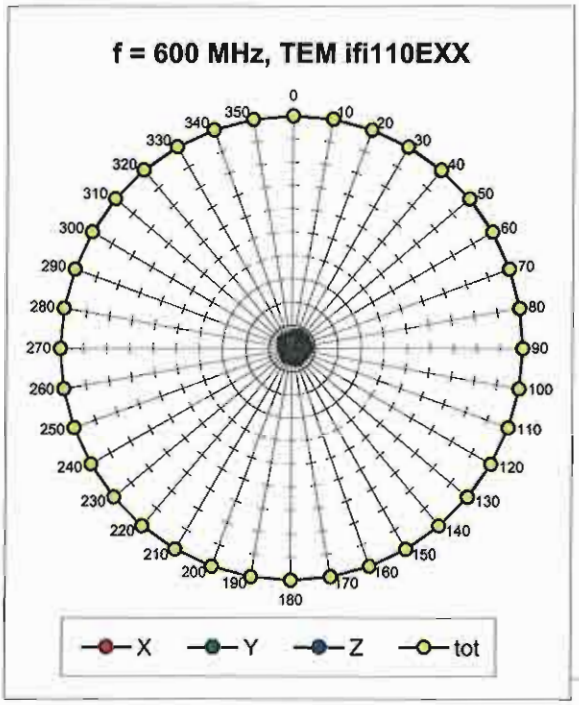
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

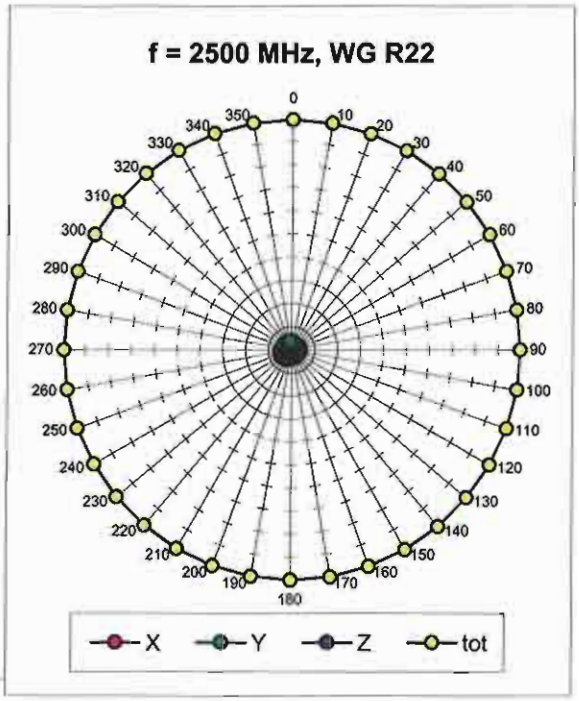
Receiving Pattern (ϕ), ϑ = 0°



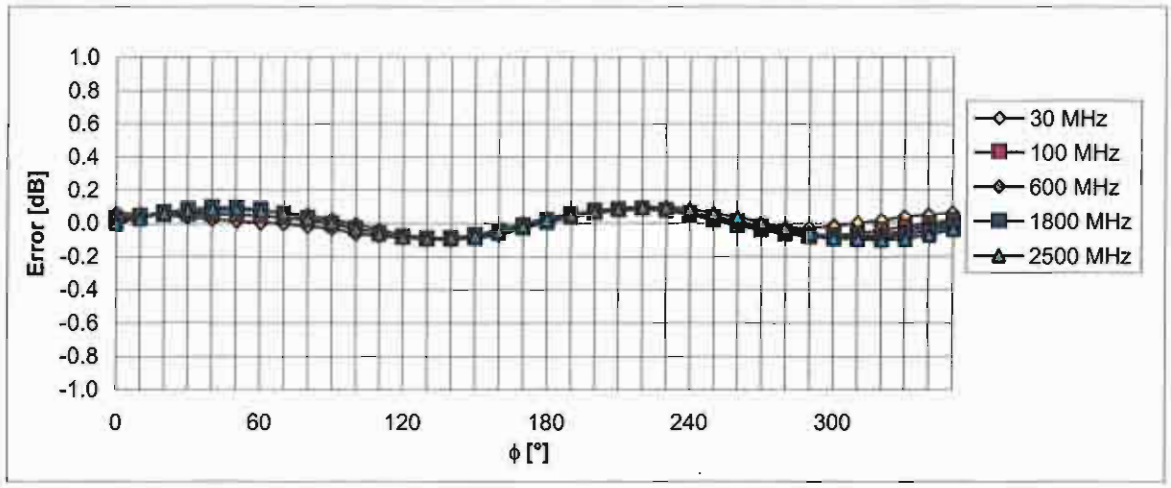


Receiving Pattern (ϕ), ϑ = 90°



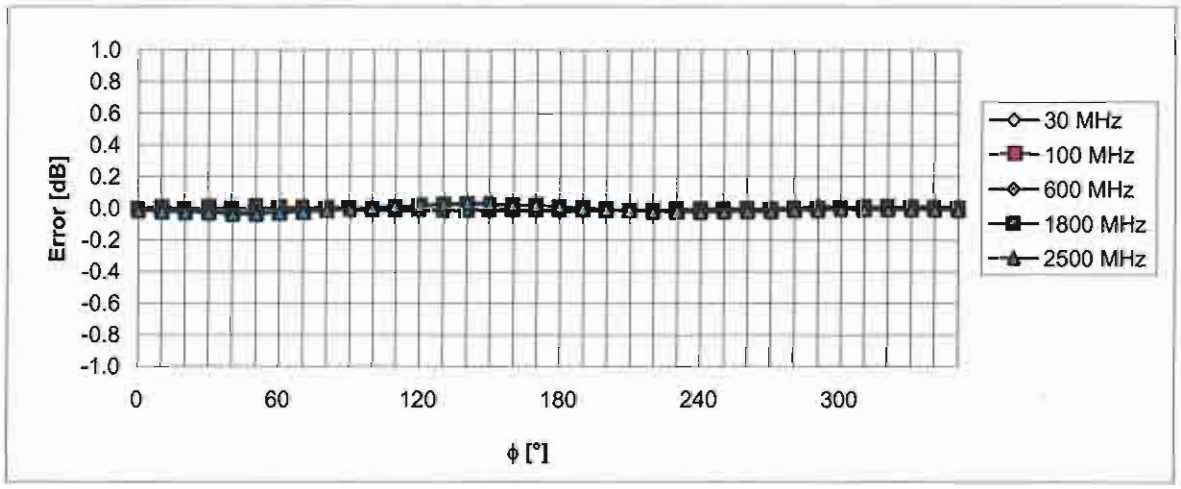


Receiving Pattern (ϕ), ϑ = 0°



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

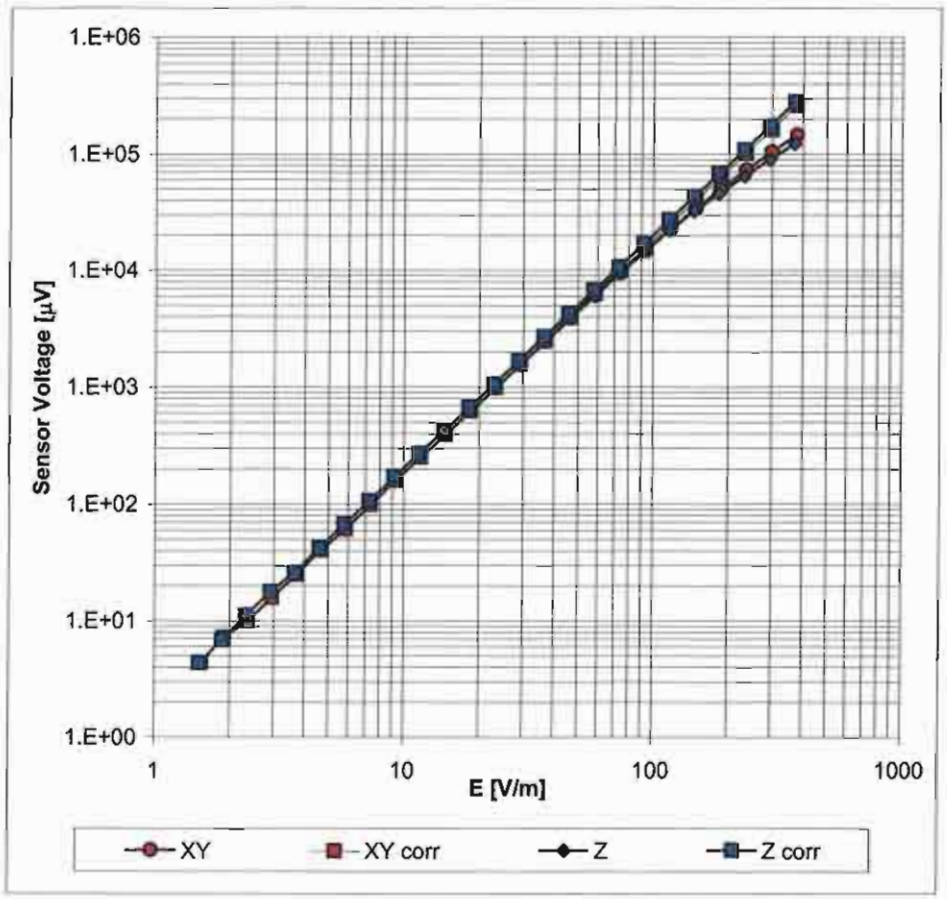
Receiving Pattern (ϕ), ϑ = 90°

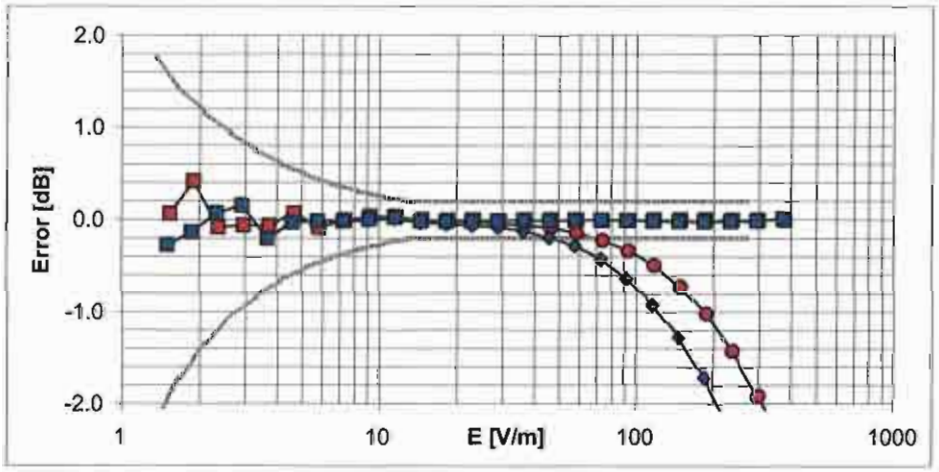


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(E-field)

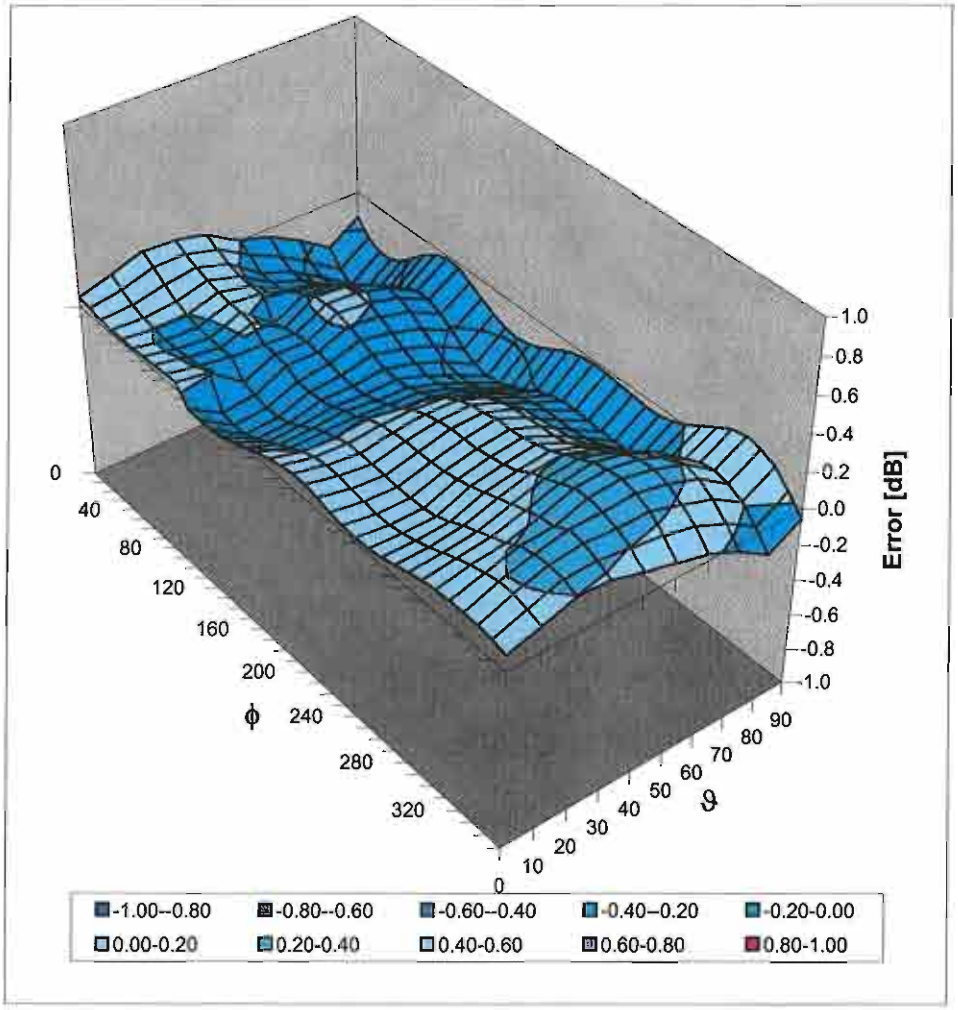
(Waveguide R22, f = 1800 MHz)





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)

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Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

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Accreditation No.: SCS 108

Client Motorola MDb

Certificate No: H3-6078_Sep08

CALIBRATION CERTIFICATE

Object	H3DV6 - SN:6078
Calibration procedure(s)	QA CAL-03.v5 Calibration procedure for H-field probes optimized for close near field evaluations in air
Calibration date:	September 22, 2008
Condition of the calibrated item	In Tolerance

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-08 (No. 217-00788)	Apr-09
Power sensor E4412A	MY41495277	1-Apr-08 (No. 217-00788)	Apr-09
Power sensor E4412A	MY41498087	1-Apr-08 (No. 217-00788)	Apr-09
Reference 3 dB Attenuator	SN: S5054 (3c)	1-Jul-08 (No. 217-00865)	Jul-09
Reference 20 dB Attenuator	SN: S5086 (20b)	31-Mar-08 (No. 217-00787)	Apr-09
Reference 30 dB Attenuator	SN: S5129 (30b)	1-Jul-08 (No. 217-00866)	Jul-09
Reference Probe H3DV6	SN: 6182	2-Oct-07 (No. H3-6182_Oct07)	Oct-08
DAE4	SN: 789	5-Dec-07 (No. DAE4-789_Dec07)	Dec-08

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

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

Issued: September 22, 2008

Calibration Laboratory of
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Accreditation No.: SCS 108

Glossary:

NORMx,y,z	sensitivity in free space
DCP	diode compression point
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., 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:

- *X,Y,Z_a0a1a2:* Assessed for E-field polarization ϑ = 90 for XY sensors and ϑ = 0 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 (no uncertainty required). DCP does not depend on frequency.
- *Spherical isotropy (3D deviation from isotropy)*: in a locally homogeneous field realized using an open waveguide setup.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- *Connector Angle*: The angle is assessed using the information gained by determining the *X_a0a1a2* (no uncertainty required).

Probe H3DV6

SN:6078

Manufactured:	October 2, 2000
Last calibrated:	July 12, 2007
Recalibrated:	September 22, 2008

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: H3DV6 SN:6078

Sensitivity in Free Space [A/m / √(μV)]

	a0	a1	a2	
X	**2.834E-03**	**-2.604E-4**	**4.575E-5**	± 5.1 % (k=2)
Y	**2.736E-03**	**-1.824E-4**	**2.098E-5**	± 5.1 % (k=2)
Z	**3.107E-03**	**-2.976E-4**	**8.980E-6**	± 5.1 % (k=2)

Diode Compression[1]

DCP X	**83** mV
DCP Y	**89** mV
DCP Z	**82** mV

Sensor Offset (Probe Tip to Sensor Center)

X	**3.0** mm
Y	**3.0** mm
Z	**3.0** mm

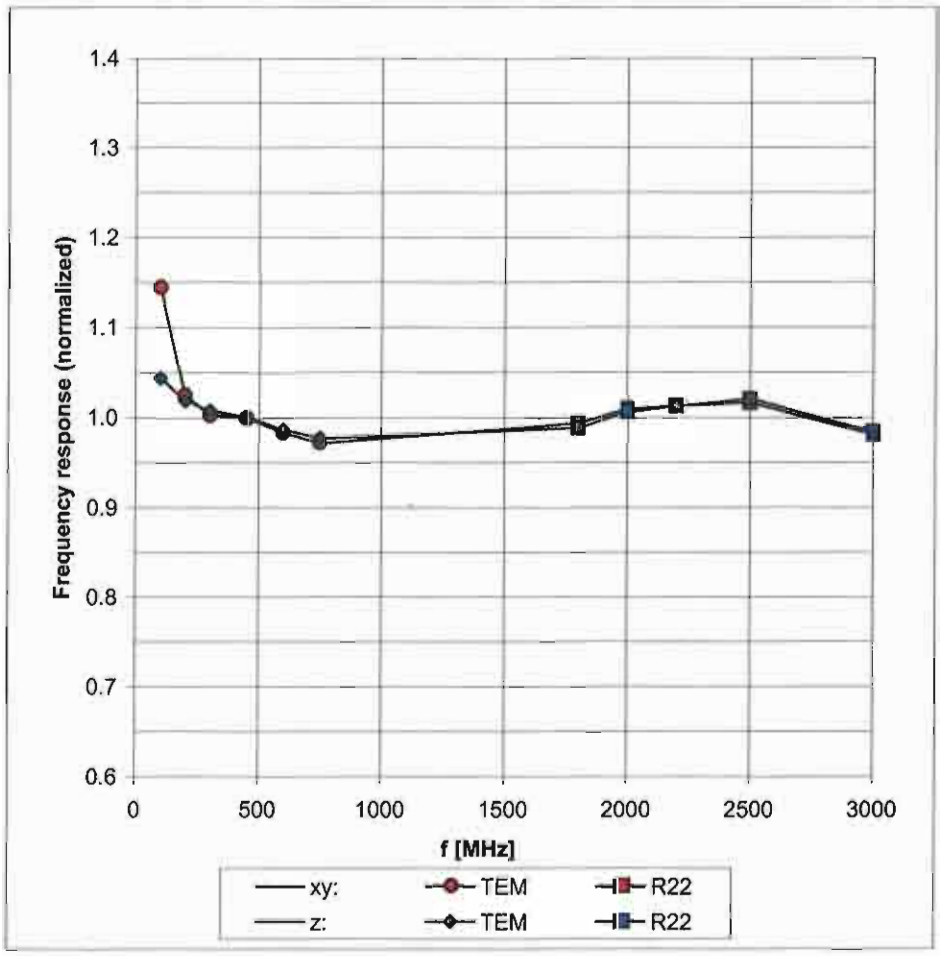
Connector Angle **-220** °

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

[1] numerical linearization parameter: uncertainty not required

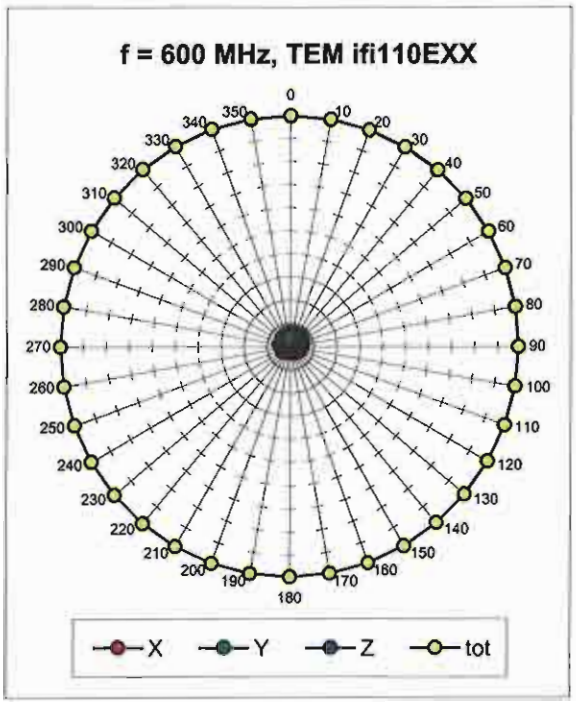
Frequency Response of H-Field

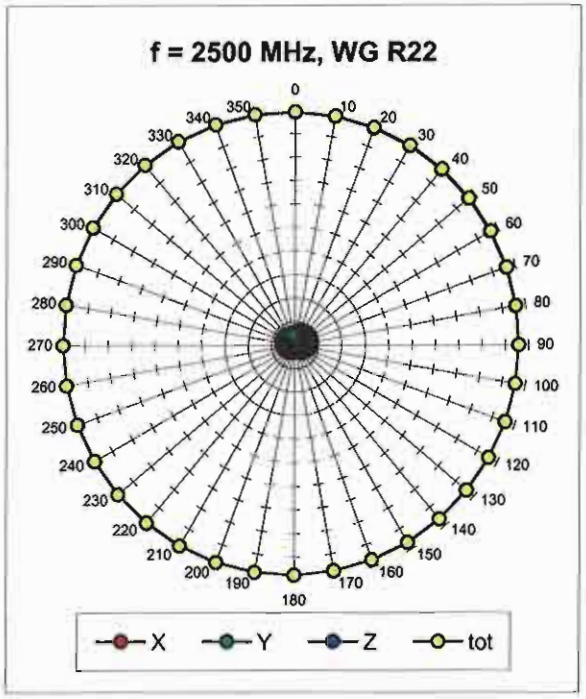
(TEM-Cell:ifi110 EXX, Waveguide R22)



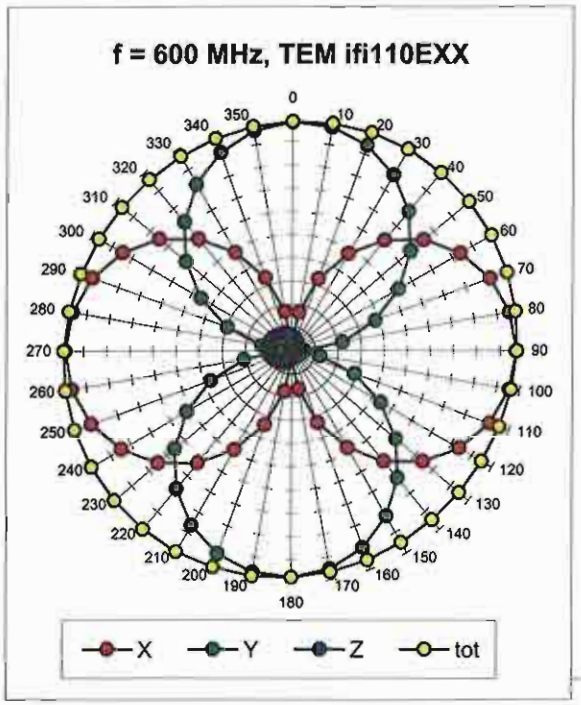
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

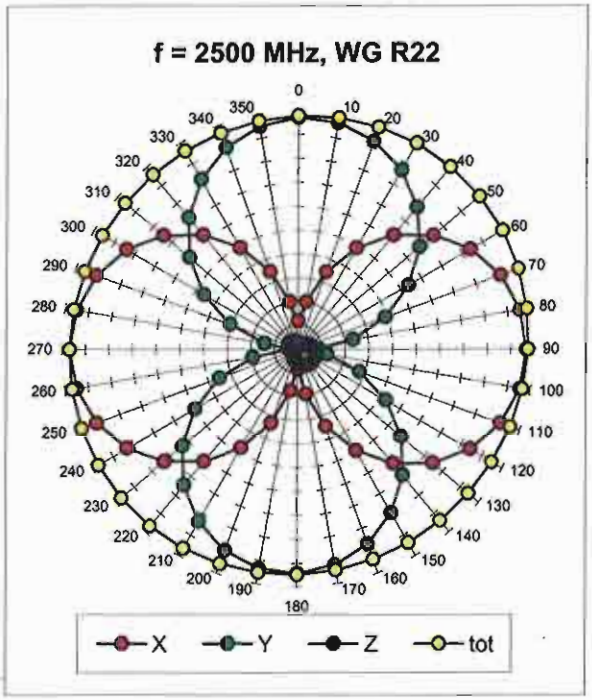
Receiving Pattern (ϕ), ϑ = 90°



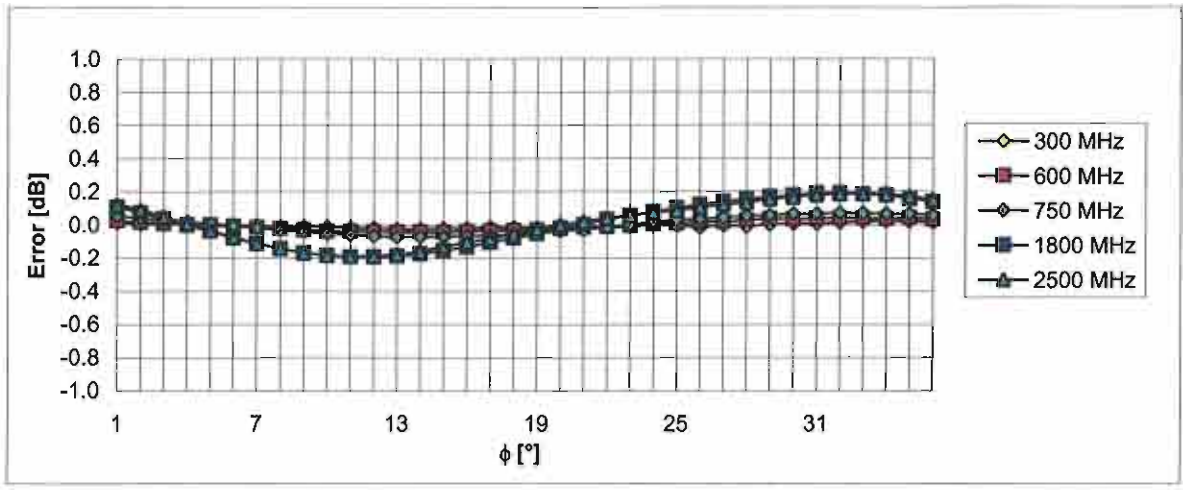


Receiving Pattern (ϕ), ϑ = 0°



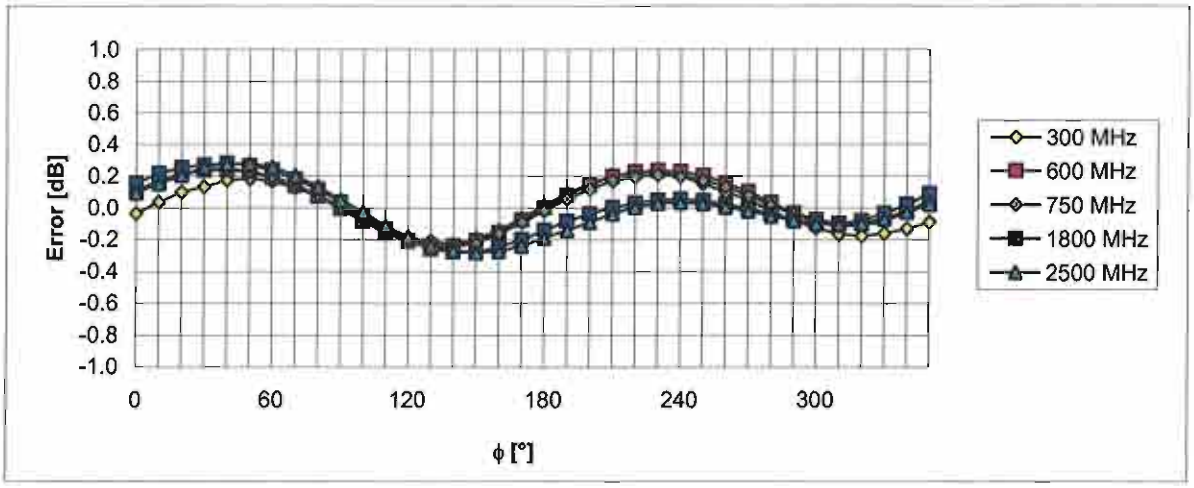


Receiving Pattern (ϕ), ϑ = 90°



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

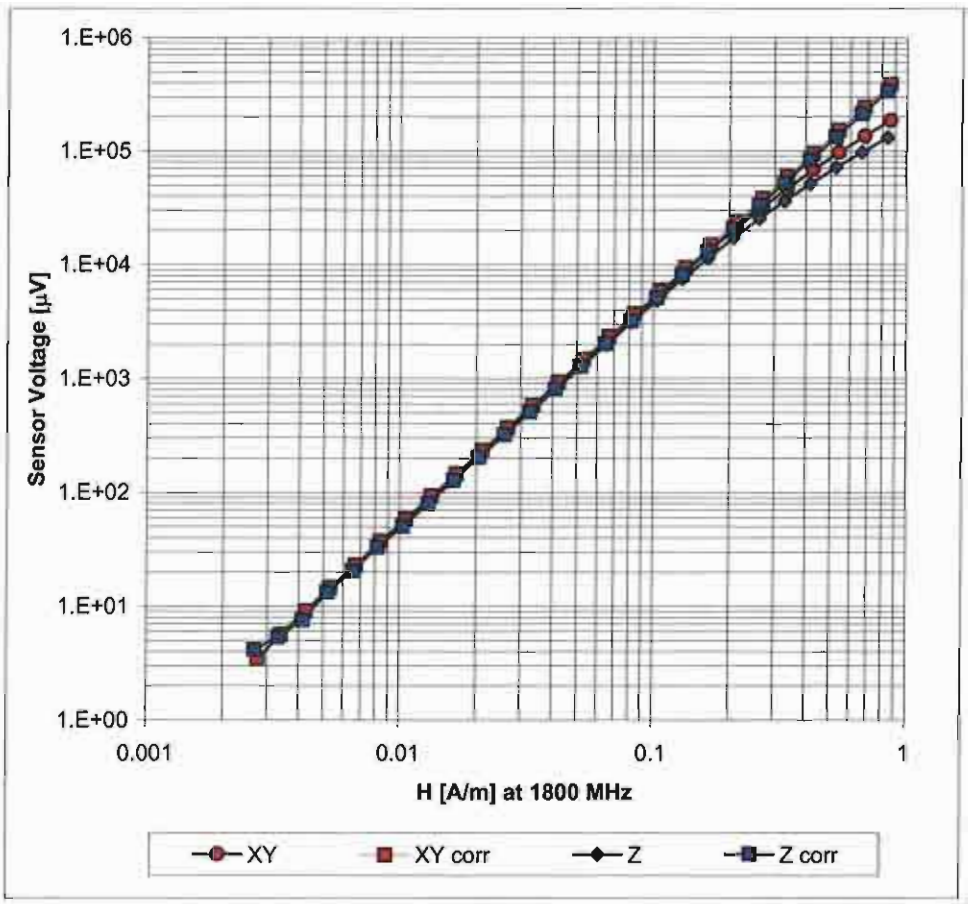
Receiving Pattern (ϕ), ϑ = 0°

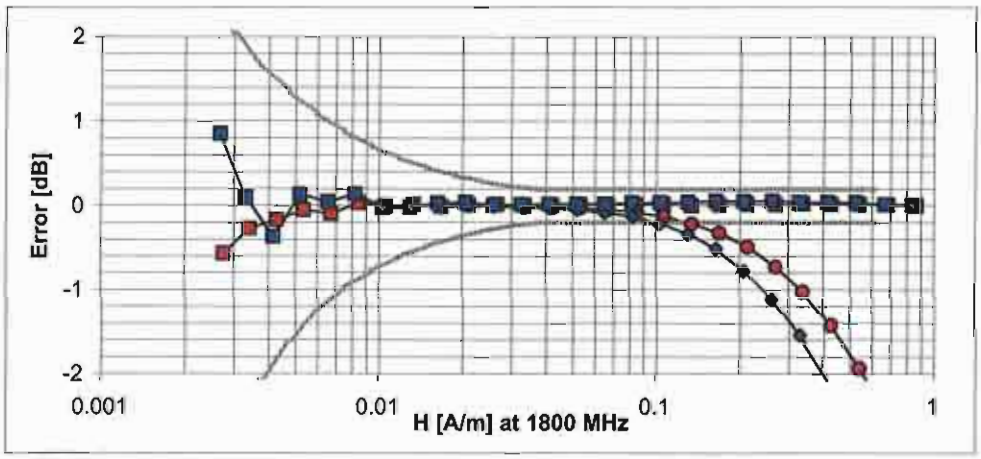


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(H-field)

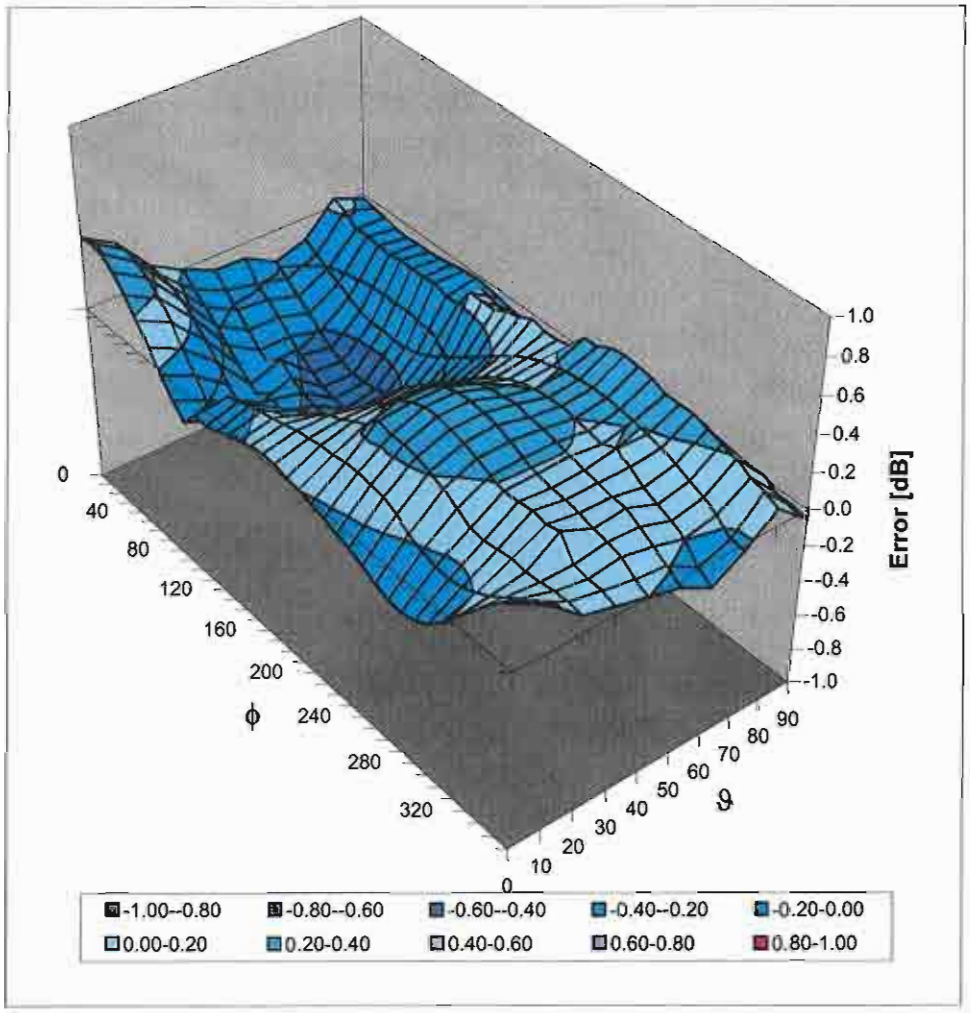
(Waveguide R22, f = 1800 MHz)





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)

Appendix 7

Dipole Characterization Certificate

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

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S Swiss Calibration Service

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

Accreditation No.: SCS 108

Client Motorola MDb

Certificate No: CD835V3-1076_Mar08

CALIBRATION CERTIFICATE

Object	CD835V3 - SN: 1076
Calibration procedure(s)	QA CAL-20.v4 Calibration procedure for dipoles in air
Calibration date:	March 11, 2008
Condition of the calibrated item	In Tolerance

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	04-Oct-07 (METAS, No. 217-00736)	Oct-08
Power sensor HP 8481A	US37292783	04-Oct-07 (METAS, No. 217-00736)	Oct-08
Probe ER3DV6	SN: 2336	31-Dec-07 (SPEAG, No. ER3-2336_Dec07)	Dec-08
Probe H3DV6	SN: 6065	31-Dec-07 (SPEAG, No. H3-6065_-Dec07)	Dec-08
DAE4	SN: 781	2-Oct-07 (SPEAG, No. DAE4-781_Oct07)	Oct-08

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-4419B	GB42420191	11-May-05 (SPEAG, in house check Oct -07)	In house check: Nov-08
Power sensor HP 8482A	US37295597	11-May-05 (SPEAG, in house check Oct -07)	In house check: Nov-08
Power sensor HP 8482H	3318A09450	08-Jan-02 (SPEAG, in house check Oct -07)	In house check: Nov-08
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Oct-07)	In house check: Nov-09
RF generator E4433B	MY 41310391	22-Nov-04 (SPEAG, in house check Oct-07)	In house check: Nov-09

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

Issued: March 13, 2008

References

[1] ANSI-C63.19-2006
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 standard [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 DASY4 Surface Check job. Before the measurement, the distance between phantom surface and probe tip is verified. The proper measurement distance is selected by choosing the matching section of the HAC Test Arch phantom with the proper device reference point (upper surface of the dipole) and the matching grid reference point (tip of the probe) considering the probe sensor offset. The vertical distance to the probe is essential for the accuracy.
- *Feed Point Impedance and Return Loss:* These parameters are measured using a HP 8753E Vector Network Analyzer. The impedance is specified at the SMA connector of the dipole. The influence of reflections was eliminating by applying the averaging function while moving the dipole in the air, at least 70cm away from any obstacles.
- *E- field distribution:* E field is measured in the x-y-plane with an isotropic ER3D-field probe with 100 mW forward power to the antenna feed point. In accordance with [1], the scan area is 20mm wide, its length exceeds the dipole arm length (180 or 90mm). The sensor center is 10 mm (in z) above the top of the dipole arms. Two 3D maxima are available near the end of the dipole arms. Assuming the dipole arms are perfectly in one line, the average of these two maxima (in subgrid 2 and subgrid 8) is determined to compensate for any non-parallelity to the measurement plane as well as the sensor displacement. The E-field value stated as calibration value represents the maximum of the interpolated 3D-E-field, 10mm above the dipole surface.
- *H-field distribution:* H-field is measured with an isotropic H-field probe with 100mW forward power to the antenna feed point, in the x-y-plane. The scan area and sensor distance is equivalent to the E-field scan. The maximum of the field is available at the center (subgrid 5) above the feed point. The H-field value stated as calibration value represents the maximum of the interpolated H-field, 10mm above the dipole surface at the feed point.

1 Measurement Conditions

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

DASY Version	DASY4	V4.7 B61
DASY PP Version	SEMCAD	V1.8 B176
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	**0.445 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	160.4 V/m
Maximum measured above low end	100 mW forward power	157.6 V/m
Averaged maximum above arm	100 mW forward power	**159.0 V/m**

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

3 Appendix

3.1 Antenna Parameters

Frequency	**Return Loss**	**Impedance**
800 MHz	16.7 dB	(42.7 – j11.6) Ohm
835 MHz	**23.9 dB**	**(47.0 + j5.4) Ohm**
900 MHz	18.6 dB	(58.8 – j9.4) Ohm
950 MHz	19.2 dB	(51.4 + j11.1) Ohm
960 MHz	14.0 dB	(60.4 + j19.7) Ohm

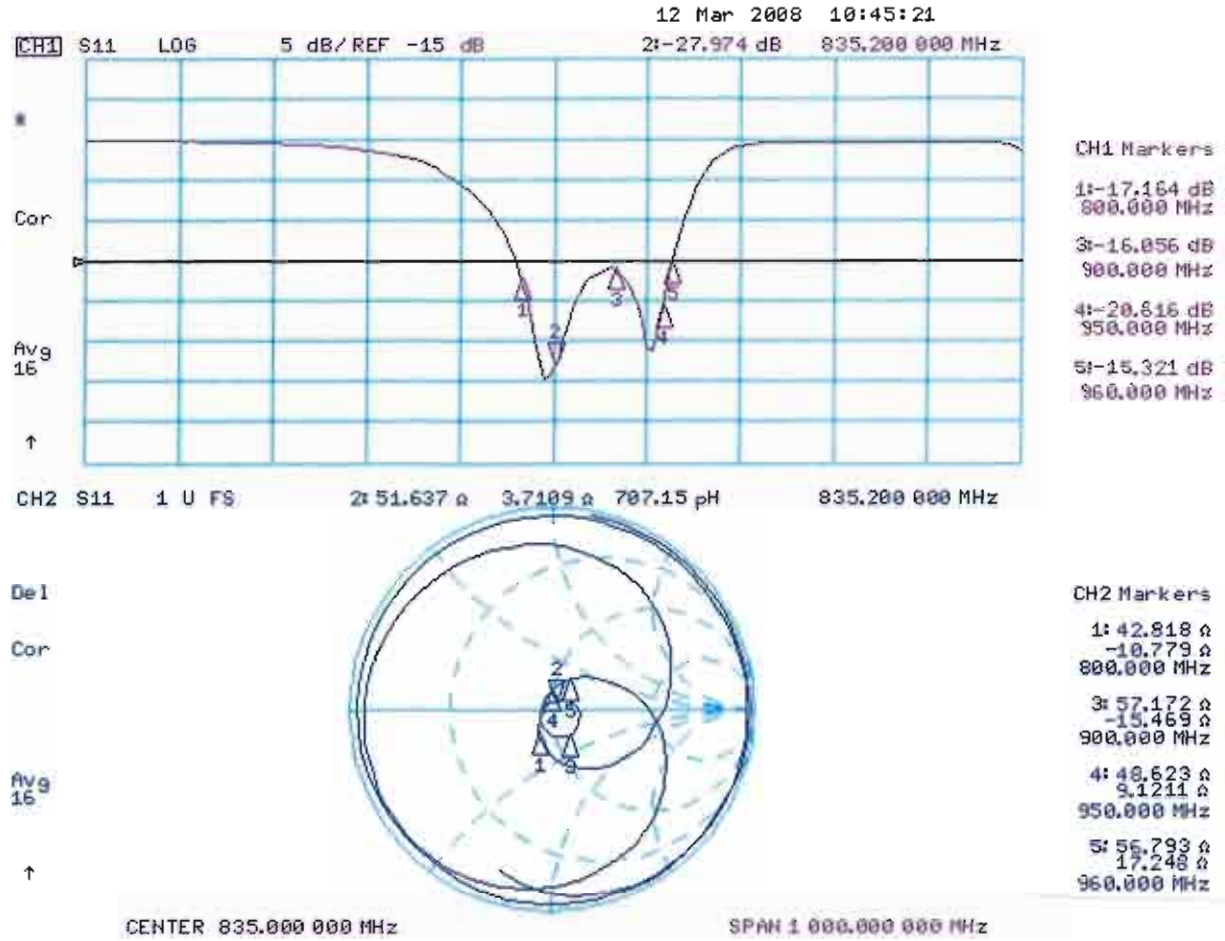
3.2 Antenna Design and Handling

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: 11.03.2008 11:59:27

Test Laboratory: SPEAG Lab 2

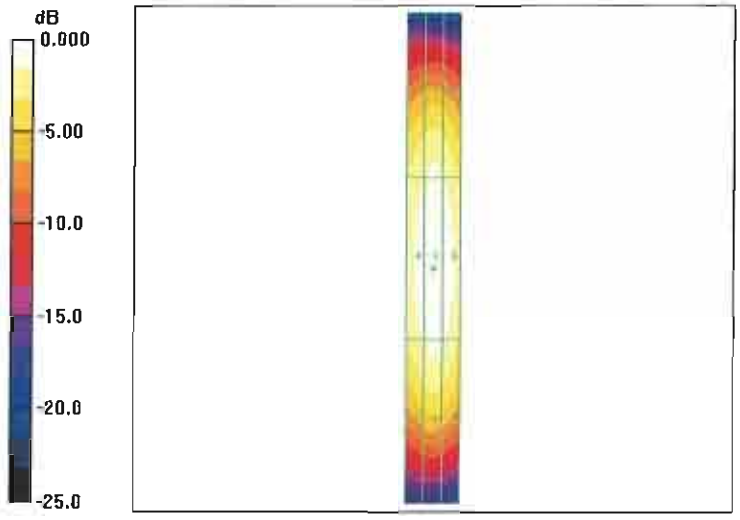
DUT: HAC-Dipole 835 MHz; Type: D835V3; Serial: 1076
Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1$ kg/m^3
Phantom section: H Dipole Section
Measurement Standard: DASY4 (High Precision Assessment)
DASY4 Configuration:

- Probe: H3DV6 - SN6065; Calibrated: 31.12.2007
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 02.10.2007
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 1070
- Measurement SW: DASY4, V4.7 Build 61; Postprocessing SW: SEMCAD, V1.8 Build 176

H Scan - Sensor Center 10mm above CD835 Dipole/Hearing Aid Compatibility Test (41x361x1):
Measurement grid: dx=5mm, dy=5mm
Maximum value of peak Total field = 0.443 A/m
Probe Modulation Factor = 1.00
Device Reference Point: 0.000, 0.000, 354.7 mm
Reference Value = 0.471 A/m; Power Drift = 0.002 dB
Hearing Aid Near-Field Category: M4 (AWF 0 dB)

Peak H-field in A/m

Grid 1 **0.371 M4**	Grid 2 **0.391 M4**	Grid 3 **0.370 M4**
Grid 4 **0.419 M4**	Grid 5 **0.443 M4**	Grid 6 **0.420 M4**
Grid 7 **0.367 M4**	Grid 8 **0.391 M4**	Grid 9 **0.370 M4**



0 dB = 0.443A/m

3.3.3 DASY4 E-Field result

Date/Time: 10.03.2008 13:12:08

Test Laboratory: SPEAG Lab 2

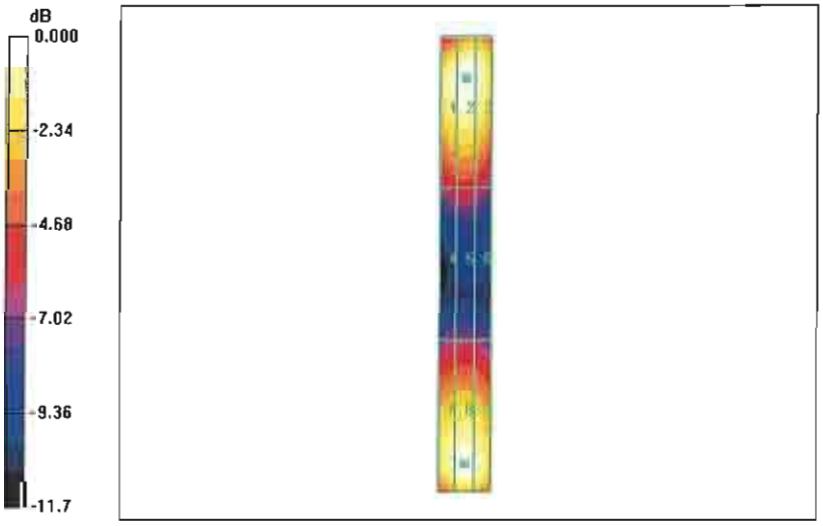
DUT: HAC-Dipole 835 MHz; Type: D835V3; Serial: 1076
Communication System: CW; Frequency: 835; Duty Cycle: 1:1
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Phantom section: E Dipole Section
Measurement Standard: DASY4 (High Precision Assessment)
DASY4 Configuration:

- Probe: ER3DV6 - SN2336; ConvF(1, 1, 1); Calibrated: 31.12.2007
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 02.10.2007
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 1070
- Measurement SW: DASY4, V4.7 Build 61; Postprocessing SW: SEMCAD, V1.8 Build 176

E Scan - Sensor Center 10mm above CD835 Dipole/Hearing Aid Compatibility Test (41x361x1):
Measurement grid: dx=5mm, dy=5mm
Maximum value of peak Total field = 157.2 V/m
Probe Modulation Factor = 1.00
Device Reference Point: 0.000, 0.000, 354.7 mm
Reference Value = 101.7 V/m; Power Drift = 0.009 dB
Hearing Aid Near-Field Category: M4 (AWF 0 dB)

Peak E-field in V/m

Grid 1 **152.8 M4**	Grid 2 **157.2 M4**	Grid 3 **152.8 M4**
Grid 4 **83.9 M4**	Grid 5 **85.8 M4**	Grid 6 **82.5 M4**
Grid 7 **149.0 M4**	Grid 8 **153.7 M4**	Grid 9 **149.6 M4**



0 dB = 157.2 V/m

4. Additional Measurements

4.1 Measurement Conditions

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

DASY Version	DASY4	V4.7 B53
DASY PP Version	SEMCAD	V1.8 B172
Phantom	HAC Test Arch	SD HAC P01 BA, #1002
Distance Dipole Top - Probe Center	10 mm	
Scan resolution	dx, dy = 5 mm	area = 20 x 180 mm
Frequency	**813 MHz** ± 1 MHz	
Forward power at dipole connector	20.0 dBm = 100mW	
Input power drift	< 0.05 dB	

4.1.1 Maximum Field values

H-field 10 mm above dipole surface	condition	**interpolated maximum**
Maximum measured	100 mW forward power	**0.448 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	172.5 V/m
Maximum measured above low end	100 mW forward power	163.8V/m
Averaged maximum above arm	100 mW forward power	**168.2 V/m**

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

4.1.2 DASY4 H-field result

Date/Time: 11.03.2008 11:59:27

Test Laboratory: SPEAG Lab 2

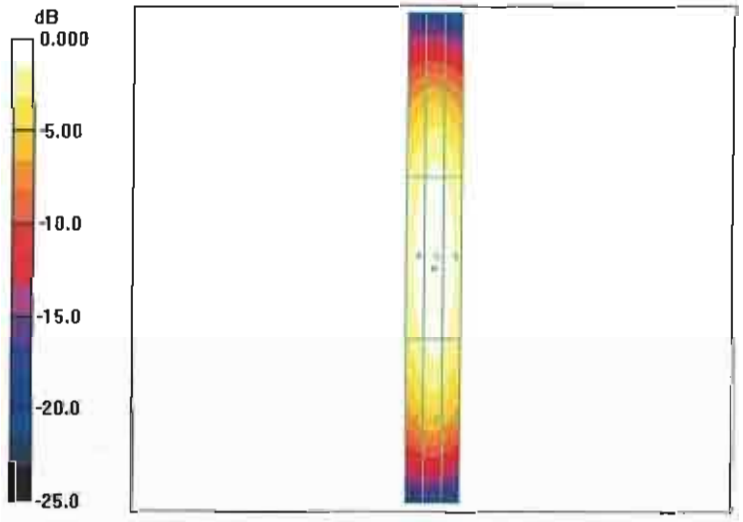
DUT: HAC-Dipole 835 MHz; Type: D835V3; Serial: 1076
Communication System: CW; Frequency: 813 MHz; Duty Cycle: 1:1
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1$ kg/m^3
Phantom section: H Dipole Section
Measurement Standard: DASY4 (High Precision Assessment)
DASY4 Configuration:

- Probe: H3DV6 - SN6065; Calibrated: 31.12.2007
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 02.10.2007
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 1070
- Measurement SW: DASY4, V4.7 Build 61; Postprocessing SW: SEMCAD, V1.8 Build 176

H Scan - Sensor Center 10mm above CD835 Dipole @ 813MHz/Hearing Aid Compatibility Test (41x361x1):
Measurement grid: dx=5mm, dy=5mm
Maximum value of peak Total field = 0.452 A/m
Probe Modulation Factor = 1.00
Reference Value = 0.481 A/m; Power Drift = -0.003 dB
Hearing Aid Near-Field Category: M4 (AWF 0 dB)

Peak H-field in A/m

Grid 1 **0.374 M4**	Grid 2 **0.395 M4**	Grid 3 **0.374 M4**
Grid 4 **0.427 M4**	Grid 5 **0.452 M4**	Grid 6 **0.429 M4**
Grid 7 **0.371 M4**	Grid 8 **0.395 M4**	Grid 9 **0.373 M4**



0 dB = 0.452 A/m

4.1.3 DASY4 E-field result

Date/Time: 10.03.2008 13:12:08

Test Laboratory: SPEAG Lab 2

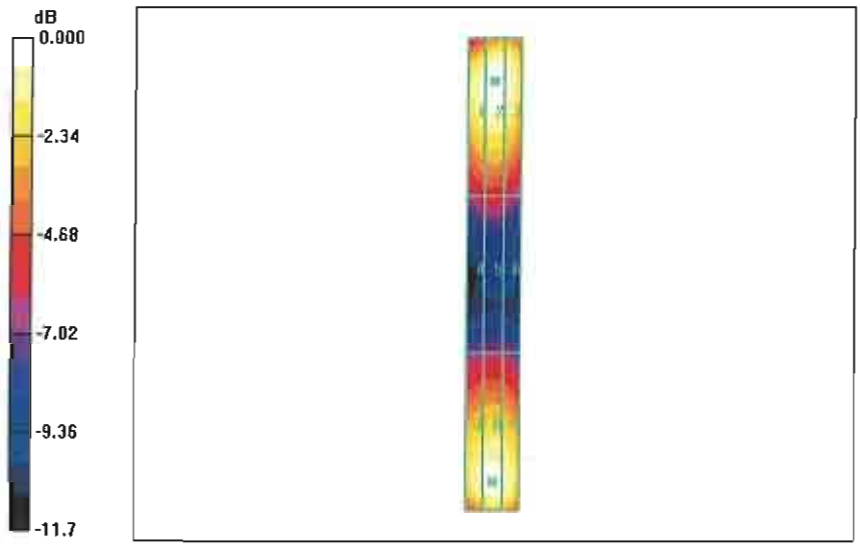
DUT: HAC-Dipole 835 MHz; Type: D835V3; Serial: 1076
Communication System: CW; Frequency: 813; Duty Cycle: 1:1
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Phantom section: E Dipole Section
Measurement Standard: DASY4 (High Precision Assessment)
DASY4 Configuration:

- Probe: ER3DV6 - SN2336; ConvF(1, 1, 1); Calibrated: 31.12.2007
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 02.10.2007
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 1070
- Measurement SW: DASY4, V4.7 Build 61; Postprocessing SW: SEMCAD, V1.8 Build 176

E Scan - Sensor Center 10mm above CD835 Dipole @ 813MHz/Hearing Aid Compatibility Test (41x361x1):
Measurement grid: dx=5mm, dy=5mm
Maximum value of peak Total field = 161.6 V/m
Probe Modulation Factor = 1.00
Reference Value = 104.9 V/m; Power Drift = 0.006 dB
Hearing Aid Near-Field Category: M4 (AWF 0 dB)

Peak E-field in V/m

Grid 1 **157.3 M4**	Grid 2 **161.6 M4**	Grid 3 **157.1 M4**
Grid 4 **86.3 M4**	Grid 5 **88.2 M4**	Grid 6 **85.2 M4**
Grid 7 **151.8 M4**	Grid 8 **156.5 M4**	Grid 9 **152.3 M4**



0 dB = 161.6 V/m

4.2 Measurement Conditions

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

DASY Version	DASY4	V4.7 B53
DASY PP Version	SEMCAD	V1.8 B172
Phantom	HAC Test Arch	SD HAC P01 BA, #1002
Distance Dipole Top - Probe Center	10 mm	
Scan resolution	dx, dy = 5 mm	area = 20 x 180 mm
Frequency	**898 MHz** ± 1 MHz	
Forward power at dipole connector	20.0 dBm = 100mW	
Input power drift	< 0.05 dB	

4.2.1 Maximum Field values

H-field 10 mm above dipole surface	condition	**Interpolated maximum**
Maximum measured	100 mW forward power	**0.416 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	158.8 V/m
Maximum measured above low end	100 mW forward power	143.9 V/m
Averaged maximum above arm	100 mW forward power	**151.4 V/m**

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

4.2.2 DASY4 H-field result

Date/Time: 11.03.2008 11:59:27

Test Laboratory: SPEAG Lab 2

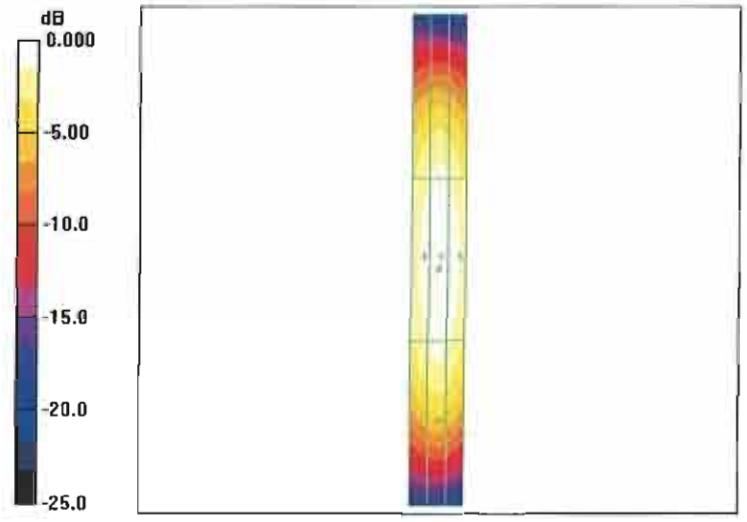
DUT: HAC-Dipole 835 MHz; Type: D835V3; Serial: 1076
Communication System: CW; Frequency: 898 MHz; Duty Cycle: 1:1
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1$ kg/m^3
Phantom section: H Dipole Section
Measurement Standard: DASY4 (High Precision Assessment)
DASY4 Configuration:

- Probe: H3DV6 - SN6065; Calibrated: 31.12.2007
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 02.10.2007
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 1070
- Measurement SW: DASY4, V4.7 Build 61; Postprocessing SW: SEMCAD, V1.8 Build 176

H Scan - Sensor Center 10mm above CD835 Dipole @ 898MHz/Hearing Aid Compatibility Test (41x361x1): Measurement grid: dx=5mm, dy=5mm
Maximum value of peak Total field = 0.425 A/m
Probe Modulation Factor = 1.00
Device Reference Point: 0.000, 0.000, 354.7 mm
Reference Value = 0.445 A/m; Power Drift = -0.036 dB
Hearing Aid Near-Field Category: M4 (AWF 0 dB)

Peak H-field in A/m

Grid 1 **0.373 M4**	Grid 2 **0.394 M4**	Grid 3 **0.372 M4**
Grid 4 **0.402 M4**	Grid 5 **0.425 M4**	Grid 6 **0.403 M4**
Grid 7 **0.372 M4**	Grid 8 **0.396 M4**	Grid 9 **0.375 M4**



0 dB = 0.425 A/m

4.2.3 DASY4 E-field result

Date/Time: 10.03.2008 13:12:08

Test Laboratory: SPEAG Lab 2

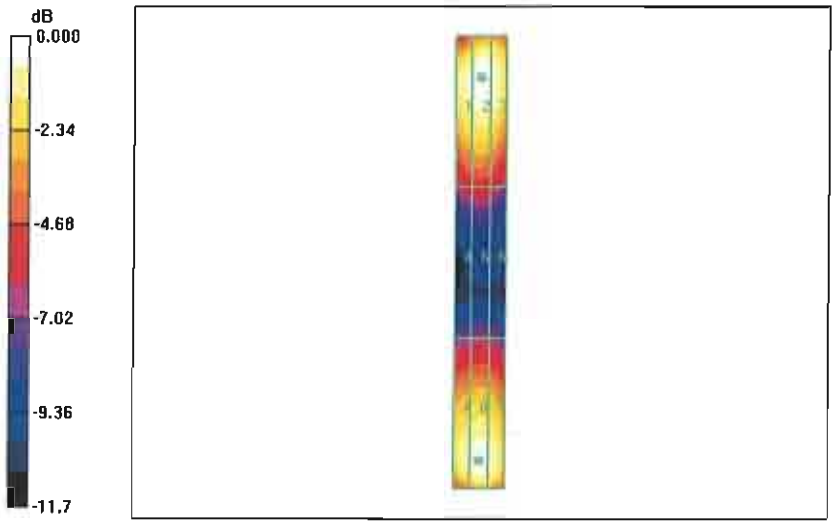
DUT: HAC-Dipole 835 MHz; Type: D835V3; Serial: 1076
Communication System: CW; Frequency: 898; Duty Cycle: 1:1
Medium parameters used: $\sigma = 0$ mho/m, $\varepsilon_r = 1$; $\rho = 1000$ kg/m^3
Phantom section: E Dipole Section
Measurement Standard: DASY4 (High Precision Assessment)
DASY4 Configuration:

- Probe: ER3DV6 - SN2336; ConvF(1, 1, 1); Calibrated: 31.12.2007
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 02.10.2007
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 1070
- Measurement SW: DASY4, V4.7 Build 61; Postprocessing SW: SEMCAD, V1.8 Build 176

E Scan - Sensor Center 10mm above CD835 Dipole @ 898MHz/Hearing Aid Compatibility Test (41x361x1):
Measurement grid: dx=5mm, dy=5mm
Maximum value of peak Total field = 154.8 V/m
Probe Modulation Factor = 1.00
Device Reference Point: 0.000, 0.000, 354.7 mm
Reference Value = 93.0 V/m; Power Drift = -0.013 dB
Hearing Aid Near-Field Category: M4 (AWF 0 dB)

Peak E-field in V/m

Grid 1 **150.5 M4**	Grid 2 **154.8 M4**	Grid 3 **150.5 M4**
Grid 4 **74.3 M4**	Grid 5 **76.0 M4**	Grid 6 **73.2 M4**
Grid 7 **148.9 M4**	Grid 8 **153.5 M4**	Grid 9 **149.5 M4**



0 dB = 154.8 V/m

END OF REPORT