

HAC RF Emissions Test Report

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Measurements made by:	Ari Orte		
Tested devices:	RM-399 (Hearing aid mode active)		
FCC ID:	PPIRM-399	IC:	661U-RM399
Supplement reports:	Salo_HAC_0833_17, Salo_HAC_0833_18		
Testing has been carried out in accordance with:	ANSI C63.19-2007 American National Standard for Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids		
Documentation:	The documentation of the testing performed on the tested devices is archived for 15 years at TCC Nokia.		
Test results:	The tested device complies with the requirements in respect of all parameters subject to the test. The test results and statements relate only to the items tested. The test report shall not be reproduced except in full, without written approval of the laboratory.		
Date and signatures:			
For the contents:			

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1. SUMMARY OF HAC RF EMISSION TEST REPORT

1.1 Test Details

Period of test	2008-08-05 to 2008-08-07
SN, HW, SW and DUT numbers of tested device	SN: 004401/10/042927/9, HW: 0360, SW: jsu 2.51, DUT: 13058
Batteries used in testing	BL-5BT, DUT: 13056, 13057
State of sample	Prototype
Notes	AWF = -5 for GSM

1.2 Maximum Results

The maximum measured HAC RF emissions values and categories for electric and magnetic fields are given in section 1.2.1 and 1.2.2 respectively.

1.2.1 Electric field measurements

Band & Mode	Ch / Freq. [MHz]	Radiated power	Limit of E-field max. value in category M3 [V/m]	Maximum E-field value after exclusion [V/m]	Category
GSM850	251 / 848.8	29.6 dBm ERP	149.6 – 266.1	208.9	M3 (-5dB)
GSM1900	512 / 1850.2	30.2 dBm EIRP	47.3 – 84.1	77.3	M3 (-5dB)

1.2.2 Magnetic field measurements

Band & Mode	Ch / Freq. [MHz]	Radiated power	Limit of H-field max. value in category M3 [A/m]	Maximum H-field value after exclusion [A/m]	Category
GSM850	251 / 848.8	29.6 dBm ERP	0.45 – 0.80	0.315	M4 (-5dB)
GSM1900	661 / 1880.0	29.1 dBm EIRP	0.14 – 0.25	0.227	M3 (-5dB)

1.2.3 Overall RF emissions category of the tested device

Band & Mode	Combined category (E- and H-fields)	Pass / Fail
GSM850	M3	Pass
GSM1900	M3	Pass
Final Category	M3	Pass

1.2.4 Maximum Drift

Maximum drift during measurements	0.15 dB
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1.2.5 Measurement Uncertainty

Extended Uncertainty (k=2) 95%, E-field	14.7 %
Extended Uncertainty (k=2) 95%, H-field	10.9 %

2. DESCRIPTION OF THE DEVICE UNDER TEST (DUT)

Modes of Operation	Bands	Modulation Mode	Duty Cycle	Transmitter Frequency Range (MHz)
GSM	850	GMSK	1/8	824 – 849
GSM	1900	GMSK	1/8	1850 – 1910

Outside of USA the transmitter of the device is capable of operating also in 900MHz and 1800MHz bands, which are not part of this filing.

3. TEST CONDITIONS

3.1 Temperature and Humidity

Ambient temperature [°C]:	21.0 to 23.0
Ambient humidity [RH %]:	30 to 60

3.2 Test Signal, Frequencies, and Output Power

The transmitter of the device was put into operation by using a call tester. Communications between the device and the call tester were established by air link.

For all tests the device output power was set to maximum power level; a fully charged battery was used for every test sequence.

The measurements were performed on low, middle and high channels.

4. DESCRIPTION OF THE TEST EQUIPMENT

4.1 Measurement system and components

The measurements were performed using an automated near-field scanning system, DASY 4, manufactured by Schmid & Partner Engineering AG (SPEAG) in Switzerland.

The following table lists calibration dates of SPEAG components:

Test Equipment	Serial Number	Calibration interval	Calibration expiry
DAE 4	728	12 months	2009-04
E-field Probe ER3DV6	2333	12 months	2009-01
H-field Probe H3DV6	6053	12 months	2009-01
Dipole Validation Kit, CD835V3	1004	24 months	2009-02
Dipole Validation Kit, CD1880V3	1003	24 months	2009-02

Additional test equipment used in testing and validation:

Test Equipment	Model	Serial Number	Calibration interval	Calibration expiry
Signal Generator	SML03	101265	12 months	2009-07
Amplifier	ZHL-42 (SMA)	N072095-5	12 months	2009-07
Power Meter	NRVS	849305/028	12 months	2009-07
Power Sensor	NRV-Z32	839176/020	12 months	2009-07
Radio Communication Tester	CMU 200	101111	12 months	2009-07

4.1.1 Isotropic E-field probe ER3DV6

Construction	One dipole parallel, two dipoles normal to probe axis Built-in shielding against static charges PEEK enclosure material
Frequency	In air 100 MHz to >6 GHz; Linearity: ± 0.2 dB (100 MHz to 3 GHz)
Directivity	± 0.2 dB in air (rotation around probe axis) ± 0.4 dB in air (rotation normal to probe axis)
Dynamic Range	2 V/m to > 1000 V/m; Linearity: ± 0.2 dB
Dimensions	Overall length: 330 mm Tip length: 16 mm Body diameter: 12 mm Tip diameter: 8 mm
Application	Distance from probe tip to nearest point of dipole: 1.25 mm General near-field measurements up to 6 GHz Field component measurements Fast automatic scanning in phantoms

4.1.2 Isotropic H-field probe H3DV6

Construction	Three concentric loop sensors with 3.8 mm loop diameters Resistively loaded detector diodes for linear response Built-in shielding against static charges PEEK enclosure material
Frequency	200 MHz to 3 GHz; Output linearized (absolute accuracy $\pm 6.0\%$, $k=2$)
Directivity	± 0.25 dB (spherical isotropy error)
Dynamic Range	10 mA/m to 2 A/m at 1 GHz
Dimensions	Overall length: 330 mm Tip length: 40 mm Body diameter: 12 mm Tip diameter: 6 mm
Application	Distance from probe tip to nearest point of dipole: 1.1 mm General magnetic near-field measurements up to 3 GHz Field component measurements, surface current measurements Measurements in air or liquids, low interaction

4.1.3 Device Holder

The Device Holder and Test Arch are manufactured by Speag (<http://www.dasy4.com/hac>). Test arch is used for all tests i.e. for both validation testing and device testing. The holder and test arch conforms to the requirements of ANSI C63.19.

The SPEAG device holder (see Section 5.1) was used to position the test device in all tests.

4.2 Validation of the System

The manufacturer calibrates the probes annually. Validation measurements are made regularly using the dipole validation kit. The power level used by manufacturer in dipole calibration is supplied to the dipole antenna. The antenna is scanned at 1.0cm distance between top surface of the dipole and calibration point of the probe.

System Validation, H-field and E-field

f [MHz]	Description	E-field [V/m]	H-field [A/m]
835	Reference result	160.0	0.452
	± 10% window	144.0 – 176.0	0.406 – 0.497
	2008-08-05	152.2	0.461
1880	Reference result	128.8	0.452
	± 10% window	115.9 – 141.7	0.406 – 0.497
	2008-08-05	127.2	0.478

Plots of the system validation scans are given in Appendix A.

5. DESCRIPTION OF THE TEST PROCEDURE

5.1 Test Arch and Device Holder

The test device was placed in the Device Holder (illustrated below) that is supplied by SPEAG. Using this positioner the tested device is positioned under Test Arch.



Device holder and Test Arch supplied by SPEAG

5.2 Scan Procedures

Near field scans of 5cm x 5cm were used for determination of the field distribution. Measurement plane distance from WD reference plane is 1.5cm. Scans were performed for both E- and H-field using appropriate probe. DASY software divides detected values into 3 x 3 sub grids as described in the C63.19 standard.

5.3 Scan area centered at the maximum magnetic T-coil coupling

Scanning centered at the maximum magnetic T-coil coupling was not applicable for the tested device.

5.4 Probe Modulation Factor

All raw measurements in DASY4 system are presented as RMS values. The measurement software then applies Probe Modulation Factor (PMF) to convert readings to “slot averaged” peak values as required by C63.19 standard.

Therefore PMF was assessed as described in C63.19 standard along with Speag's Application Note (AN_Hearing_Aid_Compatibility.pdf, section 28.8, "Definition / Determination of the Probe Modulation Factor") and 061117a_TN_HAC_PMF_Predefined_Files.pdf.

Modulation factors, GSM

<i>f</i> [MHz]	E-field [V/m] Probe SN: 2333		H-field [A/m] Probe SN: 6053		PMF E-field	PMF H-field
	CW	GSM	CW	GSM		
835.0	266	98.2	0.800	0.277	2.71	2.88
1880.0	84	30.2	0.250	0.098	2.78	2.55

Observed Modulation Factor:

$$\text{PMF}_{(E)} = \text{E-field}_{(CW)} / \text{E-field}_{(Modulated)}$$

$$\text{PMF}_{(H)} = \text{H-field}_{(CW)} / \text{H-field}_{(Modulated)}$$

Observed Crest Factor:

$$\text{CF}_{(E)} = (\text{PMF}_{(E)})^2$$

$$\text{CF}_{(H)} = (\text{PMF}_{(H)})^2$$

5.5 Slot Averaged Calculation Method

The slot-averaged values for the every measured signal type were calculated using observed duty cycles.

5.6 Sub-grid Exclusion

The measurement grid defined in C63.19 consists of 9 evenly sized blocks, which are used to define permissible exclusion areas. For both E- and H-field measurements three contiguous blocks may be excluded from the measurements except center block may never be excluded. There must be 4 blocks left that are common for both E- and H-field measurements, so maximum of 5 different blocks can be excluded (e.g. 3 blocks excluded from E-field and 2 blocks from H-field).

5.7 Category Limits

From remaining maximum values after exclusion process, Hearing Aid M-category is defined according to the category limits of C63.19 – 2007

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

6. MEASUREMENT UNCERTAINTY

Source of Uncertainty	Tolerance ±%	Probability Distribution	Div.	ci E	ci H	Standard Uncertainty ±%, E	Standard Uncertainty ±%, H	Remark
MEASUREMENT SYSTEM								
Probe Calibration	5.1	N	1	1	1	5.1	5.1	
Axial Isotropy	4.7	R	√3	1	1	2.7	2.7	
Sensor Displacement	16.5	R	√3	1	0.145	9.5	1.4	
Boundary Effect	2.4	R	√3	1	1	1.4	1.4	
Linearity	4.7	R	√3	1	1	2.7	2.7	SAR
Scaling to Peak Envelope Power	2.0	R	√3	1	1	1.2	1.2	
System Detection Limit	1.0	R	√3	1	1	0.6	0.6	
Readout Electronics	0.3	N	1	1	1	0.3	0.3	SAR
Response Time	0.8	R	√3	1	1	0.5	0.5	
Integration Time	2.6	R	√3	1	1	1.5	1.5	SAR
RF Ambient Conditions	3.0	R	√3	1	1	1.7	1.7	SAR
RF Reflections	12.0	R	√3	1	1	6.9	6.9	
Probe Positioner	1.2	R	√3	1	0.67	0.7	0.5	
Probe Positioning	4.7	R	√3	1	0.67	2.7	1.8	
Extrapolation and Interpolation	1.0	R	√3	1	1	0.6	0.6	SAR
TEST SAMPLE RELATED								
Device Positioning Vertical	4.7	R	√3	1	0.67	2.7	1.8	
Device Positioning Lateral	1.0	R	√3	1	1	0.6	0.6	
Device Holder and Test Arch	2.4	R	√3	1	1	1.4	1.4	
Power Drift	5.0	R	√3	1	1	2.9	2.9	SAR
TEST ARCH AND SETUP RELATED								
Test Arch Thickness	2.4	R	√3	1	0.67	1.4	0.9	
COMBINED STANDARD UNCERTAINTY						14.7	10.9	
Expanded Uncertainty on Power						29.4	21.8	
Expanded Uncertainty on Field						14.7	10.9	

7. RESULTS

The calculated maximum field values for the test device are tabulated below:

GSM850, E and H RF emissions results

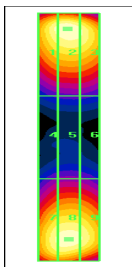
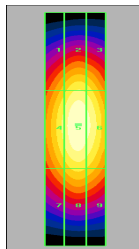
Option used	Test configuration	Ch 128 824.2MHz	Ch 190 836.6MHz	Ch 251 848.8MHz
GSM850	Power	31.1 dBm	32.3 dBm	29.6 dBm
Flip open	E-field [V/M]	177.5	203.3	208.9
	H-field [A/m]	0.269	0.301	0.315
	Category	M3 (-5dB)	M3 (-5dB)	M3 (-5dB)

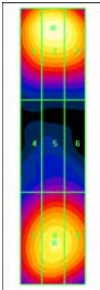
GSM1900, E and H RF emissions results

Option used	Test configuration	Ch 512 1850.2MHz	Ch 661 1880.0MHz	Ch 810 1909.8MHz
GSM1900	Power	30.2 dBm	29.1 dBm	27.9 dBm
Flip open	E-field [V/M]	77.3	76.1	73.7
	H-field [A/m]	0.218	0.227	0.201
	Category	M3 (-5dB)	M3 (-5dB)	M3 (-5dB)

Plots of the measurement scans are shown in **Appendix B**. Excluded cells are colored orange.

APPENDIX A: SYSTEM VALIDATION SCANS

SYSTEM VALIDATION DATA 850MHZ																				
Date/Time: 2008-08-05 10:49:01 Test Laboratory: TCC Nokia Type: D835V3; Serial: 1004		Date/Time: 2008-08-05 09:43:31 Test Laboratory: TCC Nokia Type: D835V3; Serial: 1004																		
Communication System: CW835 Frequency: 835 MHz; Duty Cycle: 1:1 Medium: Air; Medium Notes: Not Specified Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m ³ Phantom section: E Dipole Section		Communication System: CW835 Frequency: 835 MHz; Duty Cycle: 1:1 Medium: Air; Medium Notes: Not Specified Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1$ kg/m ³ Phantom section: H Dipole Section																		
DASY4 Configuration: - Probe: ER3DV6 - SN2333; Probe Notes: - ConvF(1, 1, 1); Calibrated: 2008-01-21 - Sensor-Surface: (Fix Surface) - Electronics: DAE4 Sn728; Calibrated: 2008-04-23 - Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: Not Specified - Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176		DASY4 Configuration: - Probe: H3DV6 - SN6053; Probe Notes: - ; Calibrated: 2008-01-21 - Sensor-Surface: (Fix Surface) - Electronics: DAE4 Sn728; Calibrated: 2008-04-23 - Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: Not Specified - Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176																		
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 = 153.4 V/m Probe Modulation Factor = 1.00 Device Reference Point: 0.000, 0.000, 354.7 mm Reference Value = 112.8 V/m; Power Drift = -0.006 dB Hearing Aid Near-Field Category: M4 (AWF 0 dB)		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 = 0.461 A/m Probe Modulation Factor = 1.00 Device Reference Point: 0.000, 0.000, 354.7 mm Reference Value = 0.489 A/m; Power Drift = -0.039 dB Hearing Aid Near-Field Category: M4 (AWF 0 dB)																		
																				
<table><tr><td>Grid 1 150.0 M4</td><td>Grid 2 153.4 M4</td><td>Grid 3 148.2 M4</td></tr><tr><td>Grid 4 81.3 M4</td><td>Grid 5 82.6 M4</td><td>Grid 6 81.6 M4</td></tr><tr><td>Grid 7 148.1 M4</td><td>Grid 8 150.9 M4</td><td>Grid 9 147.8 M4</td></tr></table>		Grid 1 150.0 M4	Grid 2 153.4 M4	Grid 3 148.2 M4	Grid 4 81.3 M4	Grid 5 82.6 M4	Grid 6 81.6 M4	Grid 7 148.1 M4	Grid 8 150.9 M4	Grid 9 147.8 M4	<table><tr><td>Grid 1 0.367 M4</td><td>Grid 2 0.407 M4</td><td>Grid 3 0.397 M4</td></tr><tr><td>Grid 4 0.419 M4</td><td>Grid 5 0.461 M4</td><td>Grid 6 0.448 M4</td></tr><tr><td>Grid 7 0.357 M4</td><td>Grid 8 0.387 M4</td><td>Grid 9 0.377 M4</td></tr></table>	Grid 1 0.367 M4	Grid 2 0.407 M4	Grid 3 0.397 M4	Grid 4 0.419 M4	Grid 5 0.461 M4	Grid 6 0.448 M4	Grid 7 0.357 M4	Grid 8 0.387 M4	Grid 9 0.377 M4
Grid 1 150.0 M4	Grid 2 153.4 M4	Grid 3 148.2 M4																		
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Grid 1 0.367 M4	Grid 2 0.407 M4	Grid 3 0.397 M4																		
Grid 4 0.419 M4	Grid 5 0.461 M4	Grid 6 0.448 M4																		
Grid 7 0.357 M4	Grid 8 0.387 M4	Grid 9 0.377 M4																		

SYSTEM VALIDATION DATA 1900MHz																				
Date/Time: 2008-08-05 10:13:25 Test Laboratory: TCC Nokia Type: CD1880V3; Serial: 1003		Date/Time: 2008-08-05 09:58:44 Test Laboratory: TCC Nokia Type: CD1880V3; Serial: 1003																		
Communication System: CW1880 Frequency: 1880 MHz; Duty Cycle: 1:1 Medium: Air; Medium Notes: Not Specified Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m ³ Phantom section: E Dipole Section		Communication System: CW1880 Frequency: 1880 MHz; Duty Cycle: 1:1 Medium: Air; Medium Notes: Not Specified Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1$ kg/m ³ Phantom section: H Dipole Section																		
DASY4 Configuration: - Probe: ER3DV6 - SN2333; Probe Notes: - ConvF(1, 1, 1); Calibrated: 2008-01-21 - Sensor-Surface: (Fix Surface) - Electronics: DAE4 Sn728; Calibrated: 2008-04-23 - Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: Not Specified - Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176		DASY4 Configuration: - Probe: H3DV6 - SN6053; Probe Notes: - ; Calibrated: 2008-01-21 - Sensor-Surface: (Fix Surface) - Electronics: DAE4 Sn728; Calibrated: 2008-04-23 - Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: Not Specified - Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176																		
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 = 131.6 V/m Probe Modulation Factor = 1.00 Device Reference Point: 0.000, 0.000, 354.7 mm Reference Value = 124.1 V/m; Power Drift = 0.009 dB Hearing Aid Near-Field Category: M2 (AWF 0 dB)		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 = 0.478 A/m Probe Modulation Factor = 1.00 Device Reference Point: 0.000, 0.000, 354.7 mm Reference Value = 0.498 A/m; Power Drift = 0.035 dB Hearing Aid Near-Field Category: M2 (AWF 0 dB)																		
																				
<table><tr><td>Grid 1 127.3 M2</td><td>Grid 2 131.6 M2</td><td>Grid 3 128.5 M2</td></tr><tr><td>Grid 4 83.8 M3</td><td>Grid 5 88.2 M3</td><td>Grid 6 87.1 M3</td></tr><tr><td>Grid 7 118.4 M2</td><td>Grid 8 122.7 M2</td><td>Grid 9 121.0 M2</td></tr></table>		Grid 1 127.3 M2	Grid 2 131.6 M2	Grid 3 128.5 M2	Grid 4 83.8 M3	Grid 5 88.2 M3	Grid 6 87.1 M3	Grid 7 118.4 M2	Grid 8 122.7 M2	Grid 9 121.0 M2	<table><tr><td>Grid 1 0.408 M2</td><td>Grid 2 0.443 M2</td><td>Grid 3 0.431 M2</td></tr><tr><td>Grid 4 0.440 M2</td><td>Grid 5 0.478 M2</td><td>Grid 6 0.466 M2</td></tr><tr><td>Grid 7 0.388 M2</td><td>Grid 8 0.420 M2</td><td>Grid 9 0.408 M2</td></tr></table>	Grid 1 0.408 M2	Grid 2 0.443 M2	Grid 3 0.431 M2	Grid 4 0.440 M2	Grid 5 0.478 M2	Grid 6 0.466 M2	Grid 7 0.388 M2	Grid 8 0.420 M2	Grid 9 0.408 M2
Grid 1 127.3 M2	Grid 2 131.6 M2	Grid 3 128.5 M2																		
Grid 4 83.8 M3	Grid 5 88.2 M3	Grid 6 87.1 M3																		
Grid 7 118.4 M2	Grid 8 122.7 M2	Grid 9 121.0 M2																		
Grid 1 0.408 M2	Grid 2 0.443 M2	Grid 3 0.431 M2																		
Grid 4 0.440 M2	Grid 5 0.478 M2	Grid 6 0.466 M2																		
Grid 7 0.388 M2	Grid 8 0.420 M2	Grid 9 0.408 M2																		

APPENDIX B: MEASUREMENT SCANS

MEASUREMENT DATA GSM850, CHANNEL LOW (824.2 MHz)

Date/Time: 2008-08-07 11:20:10
Test Laboratory: TCC Nokia
Type: RM-399; Serial: 004401/10/042927/9

Date/Time: 2008-08-07 15:37:54
Test Laboratory: TCC Nokia
Type: RM-399; Serial: 004401/10/042927/9

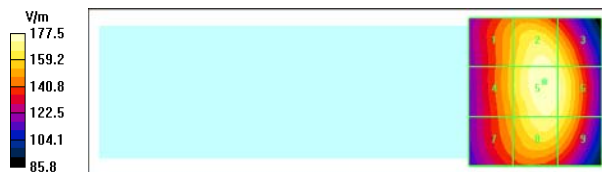
Communication System: GSM850 (ER3DV6)
Frequency: 824.2 MHz; Duty Cycle: 1:7.34
Medium: Air; Medium Notes: Not Specified
Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³
Phantom section: E Device Section

Communication System: GSM850 (H3DV6)
Frequency: 824.2 MHz; Duty Cycle: 1:8.29
Medium: Air; Medium Notes: Not Specified
Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1$ kg/m³
Phantom section: H Device Section

DASY4 Configuration:
- Probe: ER3DV6 - SN2333
- ConvF(1, 1, 1); Calibrated: 2008-01-21
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn728; Calibrated: 2008-04-23
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

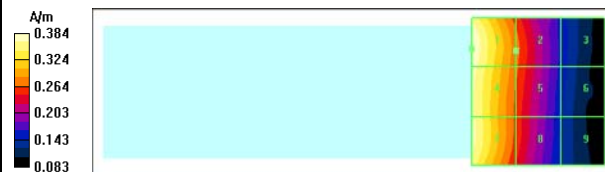
DASY4 Configuration:
- Probe: H3DV6 - SN6053
- ; Calibrated: 2008-01-21
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn728; Calibrated: 2008-04-23
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

E Scan - ER3DV6 - measurement distance, sensor center to the Device = 15mm, Low/Hearing Aid Compatibility Test (101x101x1):
Measurement grid: dx=5mm, dy=5mm
Maximum value of peak Total field = 177.5 V/m
Probe Modulation Factor = 2.71
Device Reference Point: 0.000, 0.000, 353.7 mm
Reference Value = 85.1 V/m; Power Drift = 0.007 dB
Hearing Aid Near-Field Category: M3 (AWF -5 dB)



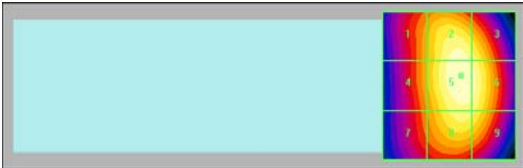
Grid 1	Grid 2	Grid 3
157.1 M3	175.1 M3	168.3 M3
Grid 4	Grid 5	Grid 6
158.0 M3	177.5 M3	173.4 M3
Grid 7	Grid 8	Grid 9
153.3 M3	171.3 M3	167.3 M3

H Scan - H3DV6 - measurement distance, sensor center to the Device = 15mm, Low/Hearing Aid Compatibility Test (101x101x1):
Measurement grid: dx=5mm, dy=5mm
Maximum value of peak Total field = 0.384 A/m
Probe Modulation Factor = 2.88
Device Reference Point: 0.000, 0.000, 353.7 mm
Reference Value = 0.077 A/m; Power Drift = -0.011 dB
Hearing Aid Near-Field Category: M4 (AWF -5 dB)



Grid 1	Grid 2	Grid 3
0.384 M4	0.273 M4	0.159 M4
Grid 4	Grid 5	Grid 6
0.377 M4	0.269 M4	0.157 M4
Grid 7	Grid 8	Grid 9
0.374 M4	0.259 M4	0.149 M4

MEASUREMENT DATA GSM850, CHANNEL MIDDLE (836.6 MHz)																																					
Date/Time: 2008-08-07 11:09:55 Test Laboratory: TCC Nokia Type: RM-399; Serial: 004401/10/042927/9	Date/Time: 2008-08-07 15:27:02 Test Laboratory: TCC Nokia Type: RM-399; Serial: 004401/10/042927/9																																				
Communication System: GSM850 (ER3DV6) Frequency: 836.6 MHz; Duty Cycle: 1:7.34 Medium: Air; Medium Notes: Not Specified Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³ Phantom section: E Device Section	Communication System: GSM850 (H3DV6) Frequency: 836.6 MHz; Duty Cycle: 1:8.29 Medium: Air; Medium Notes: Not Specified Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1$ kg/m³ Phantom section: H Device Section																																				
DASY4 Configuration: - Probe: ER3DV6 - SN2333 - ConvF(1, 1, 1); Calibrated: 2008-01-21 - Sensor-Surface: (Fix Surface) - Electronics: DAE4 Sn728; Calibrated: 2008-04-23 - Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: Not Specified - Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176	DASY4 Configuration: - Probe: H3DV6 - SN6053 - ; Calibrated: 2008-01-21 - Sensor-Surface: (Fix Surface) - Electronics: DAE4 Sn728; Calibrated: 2008-04-23 - Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: Not Specified - Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176																																				
E Scan - ER3DV6 - measurement distance, sensor center to the Device = 15mm, Mid/Hearing Aid Compatibility Test (101x101x1): Measurement grid: dx=5mm, dy=5mm Maximum value of peak Total field = 203.3 V/m Probe Modulation Factor = 2.71 Device Reference Point: 0.000, 0.000, 353.7 mm Reference Value = 97.9 V/m; Power Drift = -0.014 dB Hearing Aid Near-Field Category: M3 (AWF -5 dB) V/m <table><tr><td>Grid 1</td><td>Grid 2</td><td>Grid 3</td></tr><tr><td>180.8 M3</td><td>201.4 M3</td><td>194.0 M3</td></tr><tr><td>Grid 4</td><td>Grid 5</td><td>Grid 6</td></tr><tr><td>182.1 M3</td><td>203.3 M3</td><td>198.6 M3</td></tr><tr><td>Grid 7</td><td>Grid 8</td><td>Grid 9</td></tr><tr><td>174.1 M3</td><td>193.9 M3</td><td>190.6 M3</td></tr></table>	Grid 1	Grid 2	Grid 3	180.8 M3	201.4 M3	194.0 M3	Grid 4	Grid 5	Grid 6	182.1 M3	203.3 M3	198.6 M3	Grid 7	Grid 8	Grid 9	174.1 M3	193.9 M3	190.6 M3	H Scan - H3DV6 - measurement distance, sensor center to the Device = 15mm, mid/Hearing Aid Compatibility Test (101x101x1): Measurement grid: dx=5mm, dy=5mm Maximum value of peak Total field = 0.433 A/m Probe Modulation Factor = 2.88 Device Reference Point: 0.000, 0.000, 353.7 mm Reference Value = 0.084 A/m; Power Drift = -0.023 dB Hearing Aid Near-Field Category: M4 (AWF -5 dB) A/m <table><tr><td>Grid 1</td><td>Grid 2</td><td>Grid 3</td></tr><tr><td>0.433 M4</td><td>0.308 M4</td><td>0.182 M4</td></tr><tr><td>Grid 4</td><td>Grid 5</td><td>Grid 6</td></tr><tr><td>0.421 M4</td><td>0.301 M4</td><td>0.177 M4</td></tr><tr><td>Grid 7</td><td>Grid 8</td><td>Grid 9</td></tr><tr><td>0.403 M4</td><td>0.281 M4</td><td>0.160 M4</td></tr></table>	Grid 1	Grid 2	Grid 3	0.433 M4	0.308 M4	0.182 M4	Grid 4	Grid 5	Grid 6	0.421 M4	0.301 M4	0.177 M4	Grid 7	Grid 8	Grid 9	0.403 M4	0.281 M4	0.160 M4
Grid 1	Grid 2	Grid 3																																			
180.8 M3	201.4 M3	194.0 M3																																			
Grid 4	Grid 5	Grid 6																																			
182.1 M3	203.3 M3	198.6 M3																																			
Grid 7	Grid 8	Grid 9																																			
174.1 M3	193.9 M3	190.6 M3																																			
Grid 1	Grid 2	Grid 3																																			
0.433 M4	0.308 M4	0.182 M4																																			
Grid 4	Grid 5	Grid 6																																			
0.421 M4	0.301 M4	0.177 M4																																			
Grid 7	Grid 8	Grid 9																																			
0.403 M4	0.281 M4	0.160 M4																																			

MEASUREMENT DATA GSM850, CHANNEL HIGH (848.8 MHz)																																					
Date/Time: 2008-08-07 11:14:55 Test Laboratory: TCC Nokia Type: RM-399; Serial: 004401/10/042927/9	Date/Time: 2008-08-07 15:32:27 Test Laboratory: TCC Nokia Type: RM-399; Serial: 004401/10/042927/9																																				
Communication System: GSM850 (ER3DV6) Frequency: 848.8 MHz; Duty Cycle: 1:7.34 Medium: Air; Medium Notes: Not Specified Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³ Phantom section: E Device Section	Communication System: GSM850 (H3DV6) Frequency: 848.8 MHz; Duty Cycle: 1:8.29 Medium: Air; Medium Notes: Not Specified Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1$ kg/m³ Phantom section: H Device Section																																				
DASY4 Configuration: - Probe: ER3DV6 - SN2333 - ConvF(1, 1, 1); Calibrated: 2008-01-21 - Sensor-Surface: (Fix Surface) - Electronics: DAE4 Sn728; Calibrated: 2008-04-23 - Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: Not Specified - Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176	DASY4 Configuration: - Probe: H3DV6 - SN6053 - ; Calibrated: 2008-01-21 - Sensor-Surface: (Fix Surface) - Electronics: DAE4 Sn728; Calibrated: 2008-04-23 - Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: Not Specified - Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176																																				
E Scan - ER3DV6 - measurement distance, sensor center to the Device = 15mm, High/Hearing Aid Compatibility Test (101x101x1): Measurement grid: dx=5mm, dy=5mm Maximum value of peak Total field = 208.9 V/m Probe Modulation Factor = 2.71 Device Reference Point: 0.000, 0.000, 353.7 mm Reference Value = 99.8 V/m; Power Drift = -0.016 dB Hearing Aid Near-Field Category: M3 (AWF -5 dB) V/m 208.9 188.2 167.5 146.9 126.2 105.5 <table><tr><td>Grid 1</td><td>Grid 2</td><td>Grid 3</td></tr><tr><td>180.0 M3</td><td>206.6 M3</td><td>200.9 M3</td></tr><tr><td>Grid 4</td><td>Grid 5</td><td>Grid 6</td></tr><tr><td>180.6 M3</td><td>208.9 M3</td><td>205.2 M3</td></tr><tr><td>Grid 7</td><td>Grid 8</td><td>Grid 9</td></tr><tr><td>174.2 M3</td><td>200.4 M3</td><td>198.1 M3</td></tr></table> <td> H Scan - H3DV6 - measurement distance, sensor center to the Device = 15mm, high/Hearing Aid Compatibility Test (101x101x1): Measurement grid: dx=5mm, dy=5mm Maximum value of peak Total field = 0.453 A/m Probe Modulation Factor = 2.88 Device Reference Point: 0.000, 0.000, 353.7 mm Reference Value = 0.088 A/m; Power Drift = 0.039 dB Hearing Aid Near-Field Category: M3 (AWF -5 dB) A/m 0.453 0.382 0.311 0.239 0.168 0.097 <table><tr><td>Grid 1</td><td>Grid 2</td><td>Grid 3</td></tr><tr><td>0.453 M3</td><td>0.325 M4</td><td>0.195 M4</td></tr><tr><td>Grid 4</td><td>Grid 5</td><td>Grid 6</td></tr><tr><td>0.436 M4</td><td>0.315 M4</td><td>0.188 M4</td></tr><tr><td>Grid 7</td><td>Grid 8</td><td>Grid 9</td></tr><tr><td>0.418 M4</td><td>0.292 M4</td><td>0.168 M4</td></tr></table> </td>	Grid 1	Grid 2	Grid 3	180.0 M3	206.6 M3	200.9 M3	Grid 4	Grid 5	Grid 6	180.6 M3	208.9 M3	205.2 M3	Grid 7	Grid 8	Grid 9	174.2 M3	200.4 M3	198.1 M3	H Scan - H3DV6 - measurement distance, sensor center to the Device = 15mm, high/Hearing Aid Compatibility Test (101x101x1): Measurement grid: dx=5mm, dy=5mm Maximum value of peak Total field = 0.453 A/m Probe Modulation Factor = 2.88 Device Reference Point: 0.000, 0.000, 353.7 mm Reference Value = 0.088 A/m; Power Drift = 0.039 dB Hearing Aid Near-Field Category: M3 (AWF -5 dB) A/m 0.453 0.382 0.311 0.239 0.168 0.097 <table><tr><td>Grid 1</td><td>Grid 2</td><td>Grid 3</td></tr><tr><td>0.453 M3</td><td>0.325 M4</td><td>0.195 M4</td></tr><tr><td>Grid 4</td><td>Grid 5</td><td>Grid 6</td></tr><tr><td>0.436 M4</td><td>0.315 M4</td><td>0.188 M4</td></tr><tr><td>Grid 7</td><td>Grid 8</td><td>Grid 9</td></tr><tr><td>0.418 M4</td><td>0.292 M4</td><td>0.168 M4</td></tr></table>	Grid 1	Grid 2	Grid 3	0.453 M3	0.325 M4	0.195 M4	Grid 4	Grid 5	Grid 6	0.436 M4	0.315 M4	0.188 M4	Grid 7	Grid 8	Grid 9	0.418 M4	0.292 M4	0.168 M4
Grid 1	Grid 2	Grid 3																																			
180.0 M3	206.6 M3	200.9 M3																																			
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0.436 M4	0.315 M4	0.188 M4																																			
Grid 7	Grid 8	Grid 9																																			
0.418 M4	0.292 M4	0.168 M4																																			

MEASUREMENT DATA GSM1900, CHANNEL LOW (1850.2 MHz)

Date/Time: 2008-08-07 10:50:17
Test Laboratory: TCC Nokia
Type: RM-399; Serial: 004401/10/042927/9

Date/Time: 2008-08-07 15:00:26
Test Laboratory: TCC Nokia
Type: RM-399; Serial: 004401/10/042927/9

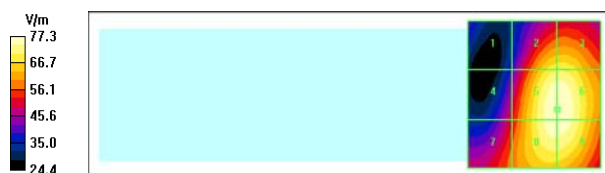
Communication System: GSM1900 (ER3DV6)
Frequency: 1850.2 MHz; Duty Cycle: 1:7.73
Medium: Air; Medium Notes: Not Specified
Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³
Phantom section: E Device Section

Communication System: GSM1900 (H3DV6)
Frequency: 1850.2 MHz; Duty Cycle: 1:6.50
Medium: Air; Medium Notes: Not Specified
Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1$ kg/m³
Phantom section: H Device Section

DASY4 Configuration:
- Probe: ER3DV6 - SN2333
- ConvF(1, 1, 1); Calibrated: 2008-01-21
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn728; Calibrated: 2008-04-23
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

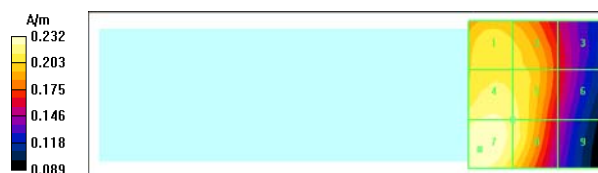
DASY4 Configuration:
- Probe: H3DV6 - SN6053
- ; Calibrated: 2008-01-21
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn728; Calibrated: 2008-04-23
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

E Scan - ER3DV6 - measurement distance, sensor center to the Device = 15mm, Low/Hearing Aid Compatibility Test (101x101x1):
Measurement grid: dx=5mm, dy=5mm
Maximum value of peak Total field = 77.3 V/m
Probe Modulation Factor = 2.78
Device Reference Point: 0.000, 0.000, 353.7 mm
Reference Value = 32.7 V/m; Power Drift = -0.146 dB
Hearing Aid Near-Field Category: M3 (AWF -5 dB)



Grid 1	Grid 2	Grid 3
41.9 M4	69.5 M3	69.7 M3
Grid 4	Grid 5	Grid 6
51.7 M3	77.2 M3	77.3 M3
Grid 7	Grid 8	Grid 9
57.9 M3	76.7 M3	76.7 M3

H Scan - H3DV6 - measurement distance, sensor center to the Device = 15mm, Low/Hearing Aid Compatibility Test (101x101x1):
Measurement grid: dx=5mm, dy=5mm
Maximum value of peak Total field = 0.232 A/m
Probe Modulation Factor = 2.55
Device Reference Point: 0.000, 0.000, 353.7 mm
Reference Value = 0.091 A/m; Power Drift = -0.028 dB
Hearing Aid Near-Field Category: M3 (AWF -5 dB)



Grid 1	Grid 2	Grid 3
0.211 M3	0.208 M3	0.168 M3
Grid 4	Grid 5	Grid 6
0.225 M3	0.218 M3	0.168 M3
Grid 7	Grid 8	Grid 9
0.232 M3	0.219 M3	0.154 M3

MEASUREMENT DATA GSM1900, CHANNEL MIDDLE (1880 MHz)																																					
Date/Time: 2008-08-07 10:36:44 Test Laboratory: TCC Nokia Type: RM-399; Serial: 004401/10/042927/9	Date/Time: 2008-08-07 14:49:41 Test Laboratory: TCC Nokia Type: RM-399; Serial: 004401/10/042927/9																																				
Communication System: GSM1900 (ER3DV6) Frequency: 1880 MHz; Duty Cycle: 1:7.73 Medium: Air; Medium Notes: Not Specified Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m ³ Phantom section: E Device Section	Communication System: GSM1900 (H3DV6) Frequency: 1880 MHz; Duty Cycle: 1:6.50 Medium: Air; Medium Notes: Not Specified Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1$ kg/m ³ Phantom section: H Device Section																																				
DASY4 Configuration: - Probe: ER3DV6 - SN2333 - ConvF(1, 1, 1); Calibrated: 2008-01-21 - Sensor-Surface: (Fix Surface) - Electronics: DAE4 Sn728; Calibrated: 2008-04-23 - Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: Not Specified - Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176	DASY4 Configuration: - Probe: H3DV6 - SN6053 - ; Calibrated: 2008-01-21 - Sensor-Surface: (Fix Surface) - Electronics: DAE4 Sn728; Calibrated: 2008-04-23 - Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: Not Specified - Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176																																				
E Scan - ER3DV6 - measurement distance, sensor center to the Device = 15mm, Mid/Hearing Aid Compatibility Test (101x101x1): Measurement grid: dx=5mm, dy=5mm Maximum value of peak Total field = 76.7 V/m Probe Modulation Factor = 2.78 Device Reference Point: 0.000, 0.000, 353.7 mm Reference Value = 31.1 V/m; Power Drift = -0.070 dB Hearing Aid Near-Field Category: M3 (AWF -5 dB)	H Scan - H3DV6 - measurement distance, sensor center to the Device = 15mm, mid/Hearing Aid Compatibility Test (101x101x1): Measurement grid: dx=5mm, dy=5mm Maximum value of peak Total field = 0.247 A/m Probe Modulation Factor = 2.55 Device Reference Point: 0.000, 0.000, 353.7 mm Reference Value = 0.088 A/m; Power Drift = -0.054 dB Hearing Aid Near-Field Category: M3 (AWF -5 dB)																																				
V/m 76.7 66.1 55.5 44.8 34.2 23.6 <table><tr><td>Grid 1</td><td>Grid 2</td><td>Grid 3</td></tr><tr><td>48.0 M3</td><td>62.8 M3</td><td>63.4 M3</td></tr><tr><td>Grid 4</td><td>Grid 5</td><td>Grid 6</td></tr><tr><td>56.9 M3</td><td>76.1 M3</td><td>76.1 M3</td></tr><tr><td>Grid 7</td><td>Grid 8</td><td>Grid 9</td></tr><tr><td>67.8 M3</td><td>76.7 M3</td><td>76.4 M3</td></tr></table>	Grid 1	Grid 2	Grid 3	48.0 M3	62.8 M3	63.4 M3	Grid 4	Grid 5	Grid 6	56.9 M3	76.1 M3	76.1 M3	Grid 7	Grid 8	Grid 9	67.8 M3	76.7 M3	76.4 M3	A/m 0.247 0.218 0.189 0.161 0.132 0.103 <table><tr><td>Grid 1</td><td>Grid 2</td><td>Grid 3</td></tr><tr><td>0.213 M3</td><td>0.206 M3</td><td>0.170 M3</td></tr><tr><td>Grid 4</td><td>Grid 5</td><td>Grid 6</td></tr><tr><td>0.235 M3</td><td>0.227 M3</td><td>0.166 M3</td></tr><tr><td>Grid 7</td><td>Grid 8</td><td>Grid 9</td></tr><tr><td>0.247 M3</td><td>0.232 M3</td><td>0.167 M3</td></tr></table>	Grid 1	Grid 2	Grid 3	0.213 M3	0.206 M3	0.170 M3	Grid 4	Grid 5	Grid 6	0.235 M3	0.227 M3	0.166 M3	Grid 7	Grid 8	Grid 9	0.247 M3	0.232 M3	0.167 M3
Grid 1	Grid 2	Grid 3																																			
48.0 M3	62.8 M3	63.4 M3																																			
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0.235 M3	0.227 M3	0.166 M3																																			
Grid 7	Grid 8	Grid 9																																			
0.247 M3	0.232 M3	0.167 M3																																			

MEASUREMENT DATA GSM1900, CHANNEL HIGH (1909.8 MHz)																																					
Date/Time: 2008-08-07 10:42:00 Test Laboratory: TCC Nokia Type: RM-399; Serial: 004401/10/042927/9	Date/Time: 2008-08-07 14:54:36 Test Laboratory: TCC Nokia Type: RM-399; Serial: 004401/10/042927/9																																				
Communication System: GSM1900 (ER3DV6) Frequency: 1909.8 MHz; Duty Cycle: 1:7.73 Medium: Air; Medium Notes: Not Specified Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³ Phantom section: E Device Section	Communication System: GSM1900 (H3DV6) Frequency: 1909.8 MHz; Duty Cycle: 1:6.50 Medium: Air; Medium Notes: Not Specified Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1$ kg/m³ Phantom section: H Device Section																																				
DASY4 Configuration: - Probe: ER3DV6 - SN2333 - ConvF(1, 1, 1); Calibrated: 2008-01-21 - Sensor-Surface: (Fix Surface) - Electronics: DAE4 Sn728; Calibrated: 2008-04-23 - Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: Not Specified - Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176	DASY4 Configuration: - Probe: H3DV6 - SN6053 - ; Calibrated: 2008-01-21 - Sensor-Surface: (Fix Surface) - Electronics: DAE4 Sn728; Calibrated: 2008-04-23 - Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: Not Specified - Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176																																				
E Scan - ER3DV6 - measurement distance, sensor center to the Device = 15mm, High/Hearing Aid Compatibility Test (101x101x1): Measurement grid: dx=5mm, dy=5mm Maximum value of peak Total field = 74.5 V/m Probe Modulation Factor = 2.78 Device Reference Point: 0.000, 0.000, 353.7 mm Reference Value = 29.3 V/m; Power Drift = -0.066 dB Hearing Aid Near-Field Category: M3 (AWF -5 dB) V/m <table><tr><td>Grid 1</td><td>Grid 2</td><td>Grid 3</td></tr><tr><td>46.7 M4</td><td>63.1 M3</td><td>63.7 M3</td></tr><tr><td>Grid 4</td><td>Grid 5</td><td>Grid 6</td></tr><tr><td>54.2 M3</td><td>73.7 M3</td><td>73.5 M3</td></tr><tr><td>Grid 7</td><td>Grid 8</td><td>Grid 9</td></tr><tr><td>63.9 M3</td><td>74.5 M3</td><td>73.7 M3</td></tr></table>	Grid 1	Grid 2	Grid 3	46.7 M4	63.1 M3	63.7 M3	Grid 4	Grid 5	Grid 6	54.2 M3	73.7 M3	73.5 M3	Grid 7	Grid 8	Grid 9	63.9 M3	74.5 M3	73.7 M3	H Scan - H3DV6 - measurement distance, sensor center to the Device = 15mm, high/Hearing Aid Compatibility Test (101x101x1): Measurement grid: dx=5mm, dy=5mm Maximum value of peak Total field = 0.227 A/m Probe Modulation Factor = 2.55 Device Reference Point: 0.000, 0.000, 353.7 mm Reference Value = 0.074 A/m; Power Drift = -0.035 dB Hearing Aid Near-Field Category: M3 (AWF -5 dB) A/m <table><tr><td>Grid 1</td><td>Grid 2</td><td>Grid 3</td></tr><tr><td>0.203 M3</td><td>0.195 M3</td><td>0.159 M3</td></tr><tr><td>Grid 4</td><td>Grid 5</td><td>Grid 6</td></tr><tr><td>0.216 M3</td><td>0.201 M3</td><td>0.145 M3</td></tr><tr><td>Grid 7</td><td>Grid 8</td><td>Grid 9</td></tr><tr><td>0.227 M3</td><td>0.204 M3</td><td>0.142 M3</td></tr></table>	Grid 1	Grid 2	Grid 3	0.203 M3	0.195 M3	0.159 M3	Grid 4	Grid 5	Grid 6	0.216 M3	0.201 M3	0.145 M3	Grid 7	Grid 8	Grid 9	0.227 M3	0.204 M3	0.142 M3
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Grid 7	Grid 8	Grid 9																																			
0.227 M3	0.204 M3	0.142 M3																																			

APPENDIX C: RELEVANT PAGES FROM PROBE CALIBRATION REPORT(S)



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 **Nokia Salo TCC**

Certificate No: ER3-2333_Jan08

CALIBRATION CERTIFICATE

Object **ER3DV6 - SN:2333**

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

Calibration date: **January 21, 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 (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Power sensor E4412A	MY41495277	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Power sensor E4412A	MY41498087	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Reference 3 dB Attenuator	SN: S5054 (3c)	8-Aug-07 (METAS, No. 217-00719)	Aug-08
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-07 (METAS, No. 217-00671)	Mar-08
Reference 30 dB Attenuator	SN: S5129 (30b)	8-Aug-07 (METAS, No. 217-00720)	Aug-08
Reference Probe ER3DV6	SN: 2328	2-Oct-07 (SPEAG, No. ER3-2328_Oct07)	Oct-08
DAE4	SN: 654	20-Apr-07 (SPEAG, No. DAE4-654_Apr07)	Apr-08

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

Calibrated by:	Name	Function	Signature
	Katja Pokovic	Technical Manager	

Approved by:	Name	Function	Signature
	Niels Kuster	Quality Manager	

Issued: January 21, 2008

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



Accredited by the Swiss Accreditation Service (SAS)
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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client **Nokia Salo TCC**

Certificate No: **H3-6053_Jan08**

CALIBRATION CERTIFICATE

Object	H3DV6 - SN:6053
Calibration procedure(s)	QA CAL-03.v5 Calibration procedure for H-field probes optimized for close near field evaluations in air
Calibration date:	January 21, 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 (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Power sensor E4412A	MY41495277	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Power sensor E4412A	MY41498087	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Reference 3 dB Attenuator	SN: S5054 (3c)	8-Aug-07 (METAS, No. 217-00719)	Aug-08
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-07 (METAS, No. 217-00671)	Mar-08
Reference 30 dB Attenuator	SN: S5129 (30b)	8-Aug-07 (METAS, No. 217-00720)	Aug-08
Reference Probe H3DV6	SN: 6182	2-Oct-07 (SPEAG, No. H3-6182_Oct07)	Oct-08
DAE4	SN: 654	20-Apr-07 (SPEAG, No. DAE4-654_Apr07)	Apr-08

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (SPEAG, in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, 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: January 21, 2008

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

APPENDIX D: RELEVANT PAGES FROM DIPOLE VALIDATION KIT REPORT(S)



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client Nokia Salo TCC

Certificate No: CD835V3-1004_Feb07

CALIBRATION CERTIFICATE

Object CD835V3 - SN: 1004

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

Calibration date: February 13, 2007

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
DAE4	SN: 660	1-Mar-06 (SPEAG, No. DAE4-660_Mar06)	Calibration, Mar-07
Probe ER3DV6	SN: 2336	27-Dec-06 (SPEAG, No. ER3-2336_Dec06)	Calibration, Dec-07
Probe H3DV6	SN: 6065	27-Dec-06 (SPEAG, No. H3-6065-Dec06)	Calibration, Dec-07
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-4419B	GB43310788	12-Aug-03 (SPEAG, in house check Oct-06)	In house check: Oct-07
Power sensor HP 8481A	MY41093312	10-Aug-03 (SPEAG, in house check Oct-06)	In house check: Oct-08
Power sensor HP 8481A	MY41093315	10-Aug-03 (SPEAG, in house check Oct-06)	In house check: Oct-08
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Oct-06)	In house check: Oct-07
RF generator R&S SMT06	SN: 100005	26-Jul-04 (SPEAG, in house check Nov-05)	In house check: Nov-07

Calibrated by:	Name Claudio Leubler	Function Laboratory Technician	Signature
Approved by:	Fin Bomholt	Technical Director	

Issued: March 6, 2007

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

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	835 MHz ± 1 MHz	
Forward power at dipole connector	20.0 dBm = 100mW	
Input power drift	< 0.07 dB	

2 Maximum Field values

H-field 10 mm above dipole surface	condition	interpolated maximum
Maximum measured	100 mW forward power	0.452 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	161.7 V/m
Maximum measured above low end	100 mW forward power	158.3 V/m
Averaged maximum above arm	100 mW forward power	160.0 V/m

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

3 Appendix

3.1 Antenna Parameters

Frequency	Return Loss	Impedance
800 MHz	16.8 dB	(42.5 – j11.2) Ohm
835 MHz	26.1 dB	(52.9 + j4.2) Ohm
900 MHz	15.6 dB	(57.3 – j16.4) Ohm
950 MHz	24.7 dB	(45.3 + j2.9) Ohm
960 MHz	19.1 dB	(51.7 + j11.2) 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.

3.3.2 DASY4 H-Field Result

Date/Time: 2/13/2007 10:40:13 AM

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: HAC-Dipole 835 MHz; Type: CD835V3; Serial: 1004

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

Medium: Air

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

Phantom section: H Dipole Section

DASY4 Configuration:

- Probe: H3DV6 - SN6065; ; Calibrated: 12/27/2006
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn660: Calibrated: 3/1/2006
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1002
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

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 = 0.452 A/m

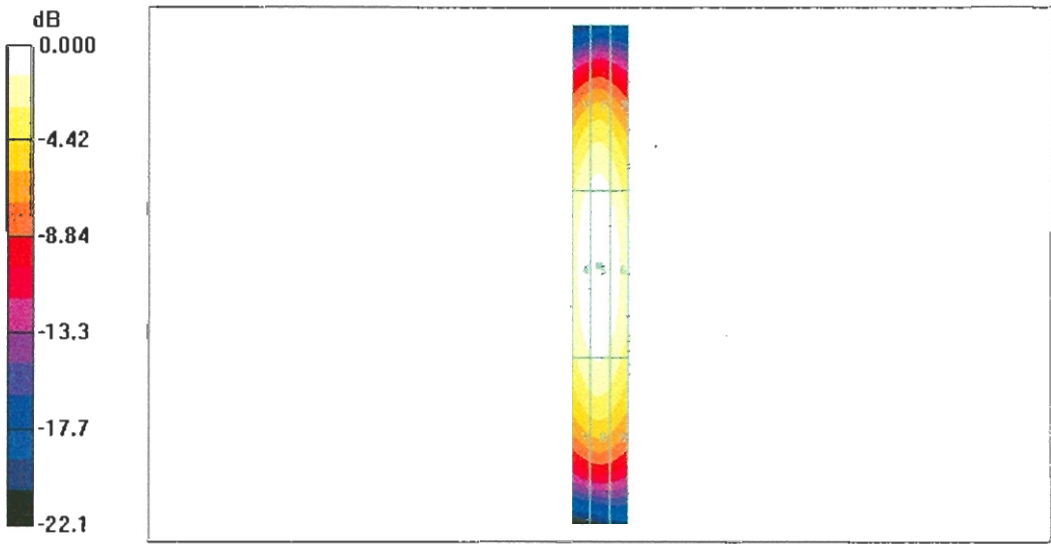
Probe Modulation Factor = 1.00

Reference Value = 0.479 A/m; Power Drift = 0.012 dB

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

Peak H-field in A/m

Grid 1	Grid 2	Grid 3
0.393	0.408	0.380
Grid 4	Grid 5	Grid 6
0.436	0.452	0.425
Grid 7	Grid 8	Grid 9
0.374	0.387	0.365



3.3.3 DASY4 E-Field Result

Date/Time: 2/13/2007 2:25:30 PM

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: HAC-Dipole 835 MHz; Type: D835V3; Serial: 1004

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

Medium: Air

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

Phantom section: E Dipole Section

DASY4 Configuration:

- Probe: ER3DV6 - SN2336; ConvF(1, 1, 1); Calibrated: 12/27/2006
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn660; Calibrated: 3/1/2006
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1002
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

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 = 161.7 V/m

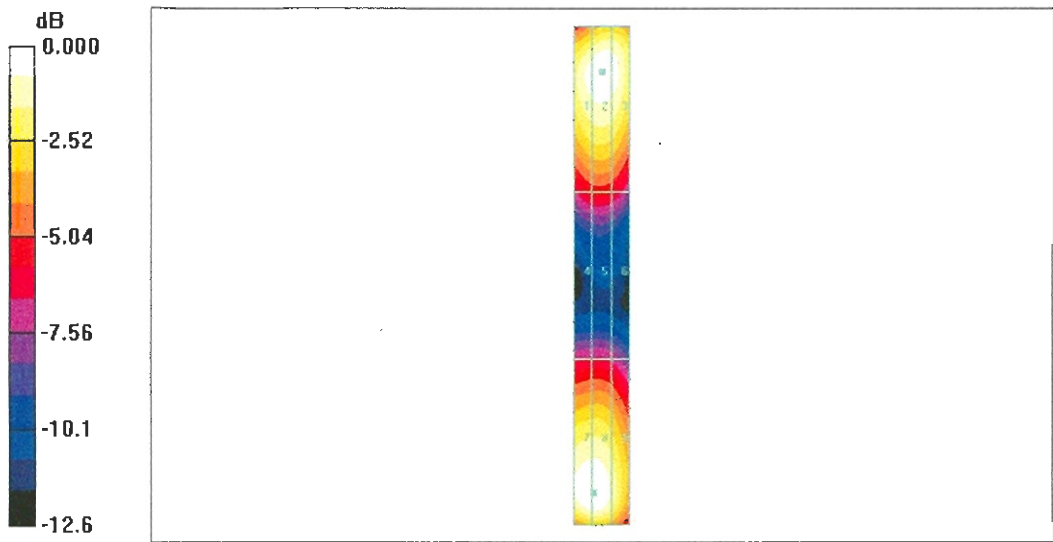
Probe Modulation Factor = 1.00

Reference Value = 107.2 V/m; Power Drift = 0.001 dB

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

Peak E-field in V/m

Grid 1	Grid 2	Grid 3
153.2	158.3	154.4
Grid 4	Grid 5	Grid 6
84.7	85.8	82.6
Grid 7	Grid 8	Grid 9
161.6	161.7	143.5



0 dB = 161.7V/m



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client **Nokia Salo TCC**

Certificate No: **CD1880V3-1003_Feb07**

CALIBRATION CERTIFICATE

Object	CD1880V3 - SN: 1003
Calibration procedure(s)	QA CAL-20.v4 Calibration procedure for dipoles in air
Calibration date:	February 12, 2007
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
DAE4	SN: 660	1-Mar-06 (SPEAG, No. DAE4-660_Mar06)	Calibration, Mar-07
Probe ER3DV6	SN: 2336	27-Dec-06 (SPEAG, No. ER3-2336_Dec06)	Calibration, Dec-07
Probe H3DV6	SN: 6065	27-Dec-06 (SPEAG, No. H3-6065-Dec06)	Calibration, Dec-07
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-4419B	GB43310788	12-Aug-03 (SPEAG, in house check Oct-06)	In house check: Oct-07
Power sensor HP 8481A	MY41093312	10-Aug-03 (SPEAG, in house check Oct-06)	In house check: Oct-08
Power sensor HP 8481A	MY41093315	10-Aug-03 (SPEAG, in house check Oct-06)	In house check: Oct-08
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Oct-06)	In house check: Oct-07
RF generator R&S SMT06	SN: 100005	26-Jul-04 (SPEAG, in house check Nov-05)	In house check: Nov-07

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

Issued: February 14, 2007

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

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 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	0.452 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	130.9 V/m
Maximum measured above low end	100 mW forward power	126.7 V/m
Averaged maximum above arm	100 mW forward power	128.8 V/m

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

3 Appendix

3.1 Antenna Parameters

Frequency	Return Loss	Impedance
1710 MHz	19.0 dB	(49.8 + j11.3) Ohm
1880 MHz	19.9 dB	(53.7 + j9.9) Ohm
1900 MHz	19.8 dB	(56.3 + j9.0) Ohm
1950 MHz	23.7 dB	(57.0 – j0.7) Ohm
2000 MHz	26.2 dB	(45.4 + j0.7) 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.

3.3.2 DASY4 H-Field Result

Date/Time: 2/12/2007 4:55:48 PM

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: HAC Dipole 1880 MHz; Type: CD1880V3; Serial: 1003

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

Medium: Air

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

Phantom section: H Dipole Section

DASY4 Configuration:

- Probe: H3DV6 - SN6065; ; Calibrated: 12/27/2006
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn660; Calibrated: 3/1/2006
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1002
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

H Scan - Sensor Center 10mm above CD1880V3 Dipole/Hearing Aid Compatibility Test (41x181x1):

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

Maximum value of peak Total field = 0.452 A/m

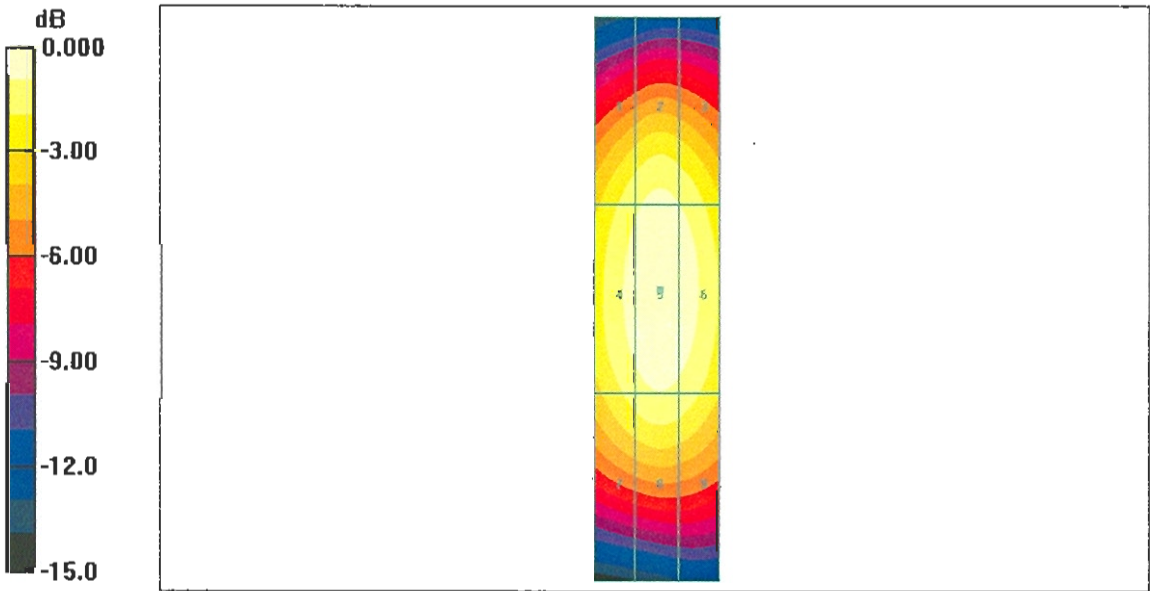
Probe Modulation Factor = 1.00

Reference Value = 0.476 A/m; Power Drift = 0.007 dB

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

Peak H-field in A/m

Grid 1	Grid 2	Grid 3
0.392	0.419	0.404
Grid 4	Grid 5	Grid 6
0.425	0.452	0.437
Grid 7	Grid 8	Grid 9
0.378	0.401	0.388



0 dB = 0.452A/m

3.3.3 DASY4 E-Field Result

Date/Time: 2/12/2007 2:59:33 PM

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: HAC Dipole 1880 MHz; Type: CD1880V3; Serial: 1003

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

Medium: Air

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

Phantom section: E Dipole Section

DASY4 Configuration:

- Probe: ER3DV6 - SN2336; ConvF(1, 1, 1); Calibrated: 12/27/2006
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn660; Calibrated: 3/1/2006
- Phantom: HAC Test Arch 4.6; Type: SD HAC P01 BA; Serial: 1002
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

E Scan - Sensor Center 10mm above CD1880V3 Dipole/Hearing Aid Compatibility Test (41x181x1):

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

Maximum value of peak Total field = 130.9 V/m

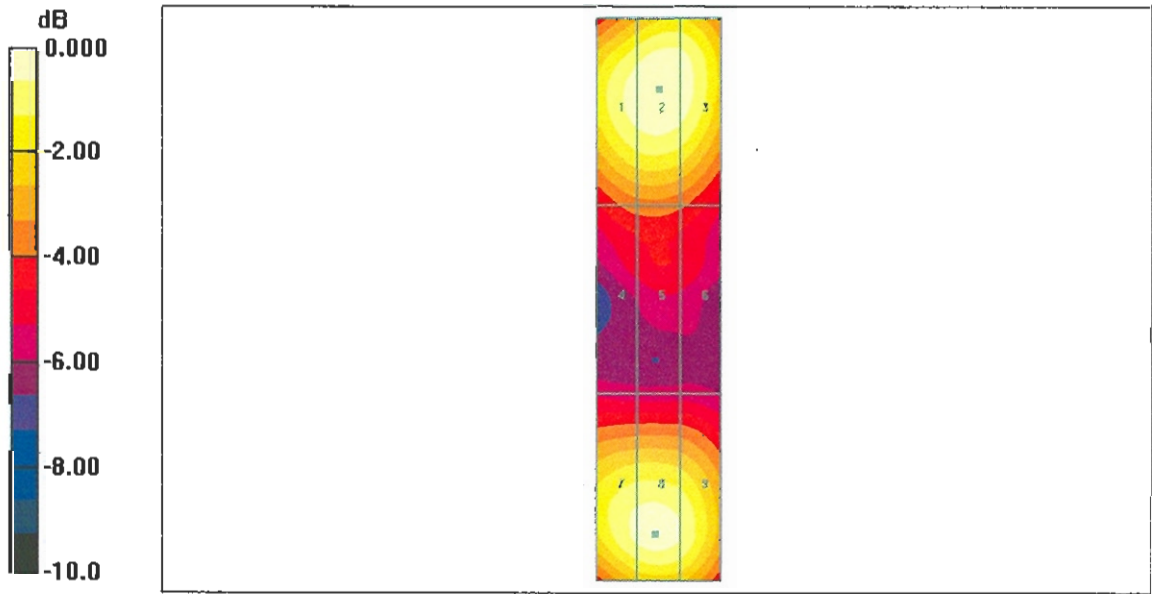
Probe Modulation Factor = 1.00

Reference Value = 139.0 V/m; Power Drift = 0.015 dB

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

Peak E-field in V/m

Grid 1	Grid 2	Grid 3
126.8	130.9	127.9
Grid 4	Grid 5	Grid 6
86.2	87.1	84.0
Grid 7	Grid 8	Grid 9
123.9	126.7	121.4



0 dB = 130.9V/m