

HAC RF Emissions Test Report

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Testing laboratory:	TCC Nokia Salo Laboratory P.O.Box 86 Joensuunkatu 7H / Kiila 1B FIN-24101 SALO, FINLAND Tel. +358 (0) 7180 08000 Fax. +358 (0) 7180 45220	Client:	Nokia Corporation P.O. Box 68 Sinitaival 5 FIN-33721 TAMPERE, FINLAND Tel. +358 (0) 7180 08000 Fax. +358 (0) 7180 46880
Responsible test engineer:	Janne Hirsimäki	Product contact person:	Tero Huhtala
Measurements made by:	Janne Hirsimäki		
Tested devices:	RM-877		
FCC ID:	PDNB	IC:	661R-B
Supplement reports:	T-Coil_RM-877_02, HAC_Photo_RM-877_03		
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	2013-03-14 to 2013-03-16
SN, HW, SW and DUT numbers of tested device	SN: 004402/47/126334/7, HW: 1000, SW: 3012.0000.1304.10019, DUT: 17282
Batteries used in testing	-
State of sample	Prototype unit
Notes	AWF = -5 for GSM, 0 for WCDMA

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

Mode	Ch / Freq [MHz]	Power	Limit of E-field max. value in category M3 [V/m]	Maximum E-field value after exclusion [V/m]	Category
GSM850	190 / 836.6	32.0 dBm	149.6 – 266.1	163.2	M3 (-5dB)
WCDMA850	1475 / 835.0	23.5 dBm	199.5 – 354.8	60.2	M4 (0dB)
GSM1900	661 / 1880.0	30.0 dBm	47.3 – 84.1	76.8	M3 (-5dB)
WCDMA1900	9400 / 1880.0	23.5 dBm	63.1 – 112.2	37.0	M4 (0dB)

1.2.2 Magnetic field measurements

Mode	Ch / Freq [MHz]	Power	Limit of H-field max. value in category M3 [A/m]	Maximum H-field value after exclusion [A/m]	Category
GSM850	190 / 836.6	32.0 dBm	0.45 – 0.80	0.262	M4 (-5dB)
WCDMA850	4175 / 835.0	23.5 dBm	0.60 – 1.07	0.096	M4 (0dB)
GSM1900	661 / 1880.0	30.0 dBm	0.14 – 0.25	0.211	M3 (-5dB)
WCDMA1900	9400 / 1880.0	23.5 dBm	0.19 – 0.34	0.096	M4 (0dB)

1.2.3 Overall RF emissions category of the tested device

Mode	Combined category (E- and H-fields)	Pass / Fail
GSM850	M3	Pass
WCDMA850	M4	Pass
GSM1900	M3	Pass
WCDMA1900	M4	Pass
Final Category	M3	Pass

1.2.4 Maximum Drift

Maximum drift during measurements	0.22 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

Air-interface	Band (MHz)	Type	C63.19/ tested	Simultaneous Transmissions Note: not to be tested	Concurrent single transmission	Reduced power 20.19 (c) (1)	Voice Over Digital Transport (Data)
GSM	850	VO	Yes	Yes BT, WLAN	Yes: WCDMA Rated	No	NA
	1900				GPRS/EDGE, BT, WLAN Not rated	No	NA
	GPRS/EDGE	DT	NA	Yes BT, WLAN	Yes: * see note	NA*	YES
WCDMA	850 1900	V/D	Yes	Yes BT, WLAN	Yes: GSM Rated	No	YES
LTE	700 850 1700/2100 1900	DT	NA	Yes BT, WLAN	Yes: GSM, WCDMA Rated	NA*	YES
BT	2450	DT	NA	Yes GSM, GPRS/EDGE, WCDMA, LTE	NA*	NA*	NO
WLAN	2450 5000	DT	NA	Yes GSM, GPRS/EDGE, WCDMA, LTE	NA*	NA*	YES

VO Voice CMRS/PSTN Service Only

V/D Voice CMRS/PSTN and Data Service

DT Digital Transport

*HAC Rating was not based on concurrent voice and data modes, Non current mode was found to represent worst case rating for both M and T rating.

Outside of USA the transmitter of the device is capable of operating also in 900MHz, 1800MHz and 2100MHz bands, which are not part of this filing.

This device also has the capability of operation in WCDMA1700/2100, but this mode has been disabled in this variant of the product.

2.1 Picture of Device

See separate report HAC_Photo_RM-877_03.

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.

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

The transmission mode of the device in WCDMA HAC RF emission tests was configured to 12.2kbps RMC with all TPC bits set as “1”.

The measurements were performed on lowest, middle and highest channels.

The radiated output power of the device was measured by a separate test laboratory. The results are given in the EMC report supporting this application.

4. DESCRIPTION OF THE TEST EQUIPMENT

4.1 Measurement system and components

The measurements were performed using an automated near-field scanning system, DASY5, 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	1309	12 months	2014-01
E-field Probe ER3DV6	2309	12 months	2014-02
H-field Probe H3DV6	6143	12 months	2014-02
Dipole Validation Kit, CD835V3	1005	24 months	2014-08
Dipole Validation Kit, CD1880V3	1004	24 months	2014-08
DASY52 software	Version 52.8	-	-

Additional test equipment used in testing and validation:

Test Equipment	Model	Serial Number	Calibration interval	Calibration expiry
Signal Generator	SMB100A	105735	12 months	2013-08
Power Meter	NRP	100714	12 months	2013-08
Power Sensor	NRP-Z92	100085	12 months	2013-08
Call Tester	CMU 200	101111	-	-

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 (www.speag.com). 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 10mm 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	160.5	0.448
	± 10% window	144.5 – 176.6	0.403 – 0.493
	2013-03-14	169.1	0.483
1880	Reference result	137.0	0.454
	± 10% window	123.3 – 150.7	0.409 – 0.499
	2013-03-14	140.1	0.485

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 Test Positions

5.2.1 Scan area centered at the acoustic output

The device was positioned such that Device Reference plane was touching the bottom of the Test Arch. The scan is centered at the acoustic output by aligning the acoustic output with the intersection of the Test Arch's middle bar and dielectric wire.

5.3 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 15mm. 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.

5.4 Probe Modulation Factor

All raw measurements in DASY52 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. Modulation specific PMF values are included in the probe calibration parameters.

5.5 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 the 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.

5.6 Category Limits

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

		Limits for RF-parameters <960MHz	
Category	AWF [dB]	E-field [V/m]	H-field [A/m]
M1	0	631.0 to 1122.0	1.91 to 3.39
	-5	473.2 to 841.4	1.43 to 2.54
M2	0	354.8 to 631.0	1.07 to 1.91
	-5	266.1 to 473.2	0.80 to 1.43
M3	0	199.5 to 354.8	0.60 to 1.07
	-5	149.6 to 266.1	0.45 to 0.80
M4	0	<199.5	<0.60
	-5	<149.6	<0.45

		Limits for RF-parameters >960MHz	
Category	AWF [dB]	E-field [V/m]	H-field [A/m]
M1	0	199.5 to 354.8	0.60 to 1.07
	-5	149.6 to 266.1	0.45 to 0.80
M2	0	112.2 to 199.5	0.34 to 0.60
	-5	84.1 to 149.6	0.25 to 0.45
M3	0	63.1 to 112.2	0.19 to 0.34
	-5	47.3 to 84.1	0.14 to 0.25
M4	0	<63.1	<0.19
	-5	<47.3	<0.14

6. MEASUREMENT UNCERTAINTY

Source of Uncertainty	Tolerance ±%	Prob. Dist.	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, RF emissions results

Mode	Test configuration	Ch 128 824.2 MHz	Ch 190 836.6 MHz	Ch 251 848.8 MHz
GSM850	Power	32.0 dBm	32.0 dBm	32.0 dBm
	E-field [V/m]	134.0	163.2	134.8
	H-field [A/m]	0.227	0.262	0.215
	Category	M4 (-5 dB)	M3 (-5 dB)	M4 (-5 dB)

WCDMA850, RF emissions results

Mode	Test configuration	Ch 4132 826.4 MHz	Ch 4175 835.0 MHz	Ch 4233 846.6 MHz
WCDMA850	Power	23.5 dBm	23.5 dBm	23.5 dBm
	E-field [V/m]	54.6	60.2	46.0
	H-field [A/m]	0.094	0.096	0.076
	Category	M4 (0 dB)	M4 (0 dB)	M4 (0 dB)

GSM1900, RF emissions results

Mode	Test configuration	Ch 512 1850.2MHz	Ch 661 1880.0MHz	Ch 810 1909.8MHz
GSM1900	Power	30.0 dBm	30.0 dBm	30.0 dBm
	E-field [V/m]	76.4	76.8	68.7
	H-field [A/m]	0.192	0.211	0.170
	Category	M3 (-5 dB)	M3 (-5 dB)	M3 (-5 dB)

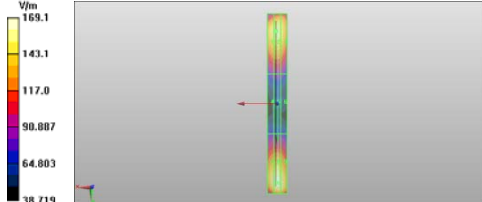
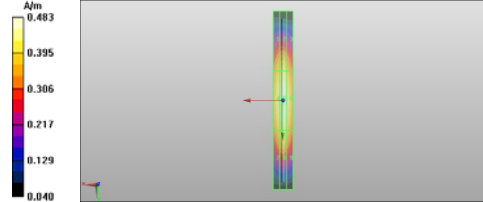
WCDMA1900, RF emissions results

Mode	Test configuration	Ch 9262 1852.4MHz	Ch 9400 1880.0MHz	Ch 9538 1907.6MHz
WCDMA1900	Power	23.5 dBm	23.5 dBm	23.5 dBm
	E-field [V/m]	33.9	37.0	35.6
	H-field [A/m]	0.087	0.096	0.087
	Category	M4 (0 dB)	M4 (0 dB)	M4 (0 dB)

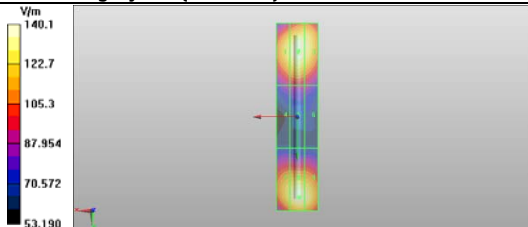
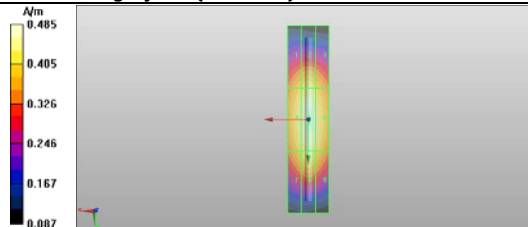
Plots of the measurement scans are shown in **Appendix B**. Excluded cells are colored orange.

APPENDIX A: SYSTEM VALIDATION SCANS

SYSTEM VALIDATION DATA 850MHz

Date/Time: 2013-03-14 14:36:22 Test Laboratory: TCC Nokia Type: CD835V3; Serial: 1005				Date/Time: 2013-03-14 15:15:44 Test Laboratory: TCC Nokia Type: CD835V3; Serial: 1005					
Communication System: CW Frequency: 835 MHz; Duty Cycle: 1:1 Medium: Air; Medium Notes: Not Specified Medium parameters used: $\sigma = 0 \text{ S/m}$, $\epsilon_r = 1$; $\rho = 0 \text{ kg/m}^3$ Phantom section: RF Section DASY Configuration: - Probe: ER3DV6 - SN2309 - ConvF(1, 1, 1); Calibrated: 2013-02-11; - Sensor-Surface: (Fix Surface) - Electronics: DAE4 Sn1309; Calibrated: 2013-01-11 - Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; - Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)				Communication System: CW Frequency: 835 MHz; Duty Cycle: 1:1 Medium: Air; Medium Notes: Not Specified Medium parameters used: $\sigma = 0 \text{ S/m}$, $\epsilon_r = 1$; $\rho = 0 \text{ kg/m}^3$ Phantom section: RF Section DASY Configuration: - Probe: H3DV6 - SN6143 - ; Calibrated: 2013-02-07 - Sensor-Surface: (Fix Surface) - Electronics: DAE4 Sn1309; Calibrated: 2013-01-11 - Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; - Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)					
Dipole E-Field measurement 835MHz/E Scan - measurement distance from the probe sensor center to CD835 Dipole = 10mm/Hearing Aid Compatibility Test (41x361x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm Device Reference Point: 0, 0, -6.3 mm Reference Value = 109.4 V/m; Power Drift = -0.02 dB PMR not calibrated. PMF = 1.000 is applied. E-field emissions = 169.1 V/m Near-field category: M4 (AWF 0 dB)				Dipole H-Field measurement 835MHz/H Scan - measurement distance from the probe sensor center to CD835 Dipole = 10mm/Hearing Aid Compatibility Test (41x361x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm Device Reference Point: 0, 0, -6.3 mm Reference Value = 0.5170 A/m; Power Drift = -0.05 dB PMR not calibrated. PMF = 1.000 is applied. H-field emissions = 0.4834 A/m Near-field category: M4 (AWF 0 dB)					
									
	Grid 1 157.4 V/m	Grid 2 160.1 V/m	Grid 3 154.7 V/m			Grid 1 0.397 A/m	Grid 2 0.421 A/m	Grid 3 0.395 A/m	
	Grid 4 85.40 V/m	Grid 5 88.27 V/m	Grid 6 85.70 V/m			Grid 4 0.456 A/m	Grid 5 0.483 A/m	Grid 6 0.455 A/m	
	Grid 7 162.0 V/m	Grid 8 169.1 V/m	Grid 9 165.8 V/m			Grid 7 0.406 A/m	Grid 8 0.433 A/m	Grid 9 0.408 A/m	

SYSTEM VALIDATION DATA 1900MHz

Date/Time: 2013-03-14 14:05:36 Test Laboratory: TCC Nokia Type: CD1880V3; Serial: 1004 Communication System: CW Frequency: 1880 MHz; Duty Cycle: 1:1 Medium: Air; Medium Notes: Not Specified Medium parameters used: $\sigma = 0 \text{ S/m}$, $\epsilon_r = 1$; $\rho = 0 \text{ kg/m}^3$ Phantom section: RF Section DASY Configuration: - Probe: ER3DV6 - SN2309 - ConvF(1, 1, 1); Calibrated: 2013-02-11; - Sensor-Surface: (Fix Surface) - Electronics: DAE4 Sn1309; Calibrated: 2013-01-11 - Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; - Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028) Dipole E-Field measurement 1880MHz/E Scan - measurement distance from the probe sensor center to CD1880 Dipole = 10mm/Hearing Aid Compatibility Test (41x181x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm Device Reference Point: 0, 0, -6.3 mm Reference Value = 158.0 V/m; Power Drift = 0.05 dB PMR not calibrated. PMF = 1.000 is applied. E-field emissions = 140.1 V/m Near-field category: M2 (AWF 0 dB)					Date/Time: 2013-03-14 15:36:09 Test Laboratory: TCC Nokia Type: CD1880V3; Serial: 1004 Communication System: CW Frequency: 1880 MHz; Duty Cycle: 1:1 Medium: Air; Medium Notes: Not Specified Medium parameters used: $\sigma = 0 \text{ S/m}$, $\epsilon_r = 1$; $\rho = 0 \text{ kg/m}^3$ Phantom section: RF Section DASY Configuration: - Probe: H3DV6 - SN6143 - ; Calibrated: 2013-02-07 - Sensor-Surface: (Fix Surface) - Electronics: DAE4 Sn1309; Calibrated: 2013-01-11 - Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; - Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028) Dipole H-Field measurement 1880MHz/H Scan - measurement distance from the probe sensor center to CD1880 Dipole = 10mm/Hearing Aid Compatibility Test (41x181x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm Device Reference Point: 0, 0, -6.3 mm Reference Value = 0.5170 A/m; Power Drift = -0.02 dB PMR not calibrated. PMF = 1.000 is applied. H-field emissions = 0.4849 A/m Near-field category: M2 (AWF 0 dB)				
									
	Grid 1 133.5 V/m	Grid 2 139.4 V/m	Grid 3 137.1 V/m			Grid 1 0.413 A/m	Grid 2 0.433 A/m	Grid 3 0.411 A/m	
	Grid 4 90.07 V/m	Grid 5 93.09 V/m	Grid 6 90.40 V/m			Grid 4 0.461 A/m	Grid 5 0.485 A/m	Grid 6 0.460 A/m	
	Grid 7 131.9 V/m	Grid 8 140.1 V/m	Grid 9 137.5 V/m			Grid 7 0.424 A/m	Grid 8 0.450 A/m	Grid 9 0.425 A/m	

APPENDIX B: MEASUREMENT SCANS

MEASUREMENT DATA GSM850, CHANNEL LOW (824.2 MHz)

Date/Time: 2013-03-14 19:14:43
Test Laboratory: TCC Nokia
Type: RM-877; Serial: 004402/47/126334/7
Communication System: GSM-FDD (TDMA, GMSK)
Frequency: 824.2 MHz; Duty Cycle: 1:8.6896
Medium: Air; Medium Notes: Not Specified
Medium parameters used: $\sigma = 0$ S/m, $\epsilon_r = 1$; $\rho = 0$ kg/m³
Phantom section: RF Section

DASY Configuration:
- Probe: ER3DV6 - SN2309
- ConvF(1, 1, 1); Calibrated: 2013-02-11;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn1309; Calibrated: 2013-01-11
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

Device E-Field measurement with ER probe/E Scan - GSM850 - Low/Hearing Aid Compatibility Test (101x101x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 58.42 V/m; Power Drift = -0.02 dB
PMR calibrated. Calibrated PMF = 2.948 is applied.
E-field emissions = 134.0 V/m
Near-field category: M4 (AWF -5 dB)

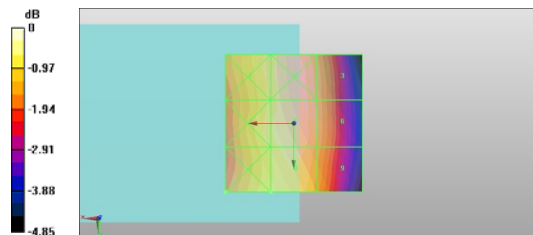
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Test Laboratory: TCC Nokia
Type: RM-877; Serial: 004402/47/126334/7
Communication System: GSM-FDD (TDMA, GMSK)
Frequency: 824.2 MHz; Duty Cycle: 1:8.6896
Medium: Air; Medium Notes: Not Specified
Medium parameters used: $\sigma = 0$ S/m, $\epsilon_r = 1$; $\rho = 0$ kg/m³
Phantom section: RF Section

DASY Configuration:
- Probe: H3DV6 - SN6143
- ; Calibrated: 2013-02-07
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn1309; Calibrated: 2013-01-11
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

Device H-Field measurement with H3DV6 probe/H Scan - GSM850 - Low/Hearing Aid Compatibility Test (101x101x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 0.04900 A/m; Power Drift = -0.03 dB
PMR calibrated. Calibrated PMF = 2.948 is applied.
H-field emissions = 0.2266 A/m
Near-field category: M4 (AWF -5 dB)

Grid 1 M4	Grid 2 M4	Grid 3 M4
127.6 V/m	132.8 V/m	123.2 V/m
Grid 4 M4	Grid 5 M4	Grid 6 M4
128.2 V/m	134.0 V/m	124.0 V/m
Grid 7 M4	Grid 8 M4	Grid 9 M4
125.7 V/m	131.3 V/m	122.4 V/m

Grid 1 M4	Grid 2 M4	Grid 3 M4
0.243 A/m	0.169 A/m	0.103 A/m
Grid 4 M4	Grid 5 M4	Grid 6 M4
0.260 A/m	0.191 A/m	0.127 A/m
Grid 7 M4	Grid 8 M4	Grid 9 M4
0.304 A/m	0.227 A/m	0.152 A/m



MEASUREMENT DATA GSM850, CHANNEL MIDDLE (836.6 MHz)

Date/Time: 2013-03-14 19:04:34
Test Laboratory: TCC Nokia
Type: RM-877; Serial: 004402/47/126334/7
Communication System: GSM-FDD (TDMA, GMSK)
Frequency: 836.6 MHz; Duty Cycle: 1:8.6896
Medium: Air; Medium Notes: Not Specified
Medium parameters used: $\sigma = 0$ S/m, $\epsilon_r = 1$; $\rho = 0$ kg/m³
Phantom section: RF Section

Date/Time: 2013-03-14 18:11:41
Test Laboratory: TCC Nokia
Type: RM-877; Serial: 004402/47/126334/7
Communication System: GSM-FDD (TDMA, GMSK)
Frequency: 836.6 MHz; Duty Cycle: 1:8.6896
Medium: Air; Medium Notes: Not Specified
Medium parameters used: $\sigma = 0$ S/m, $\epsilon_r = 1$; $\rho = 0$ kg/m³
Phantom section: RF Section

DASY Configuration:
- Probe: ER3DV6 - SN2309
- ConvF(1, 1, 1); Calibrated: 2013-02-11;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn1309; Calibrated: 2013-01-11
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

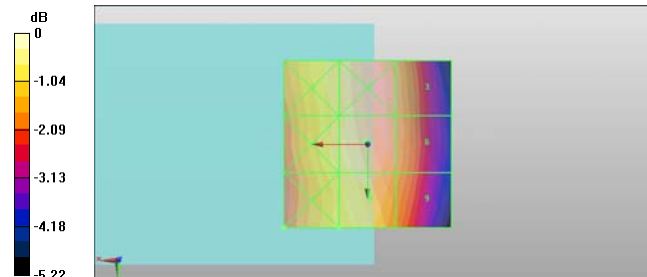
DASY Configuration:
- Probe: H3DV6 - SN6143
- ; Calibrated: 2013-02-07
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn1309; Calibrated: 2013-01-11
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

Device E-Field measurement with ER probe/E Scan - GSM850 - Middle/Hearing Aid Compatibility Test (101x101x1):
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 71.39 V/m; Power Drift = -0.12 dB
PMR calibrated. Calibrated PMF = 2.948 is applied.
E-field emissions = 163.2 V/m
Near-field category: M3 (AWF -5 dB)

Device H-Field measurement with H3DV6 probe/H Scan - GSM850 - Middle/Hearing Aid Compatibility Test (101x101x1):
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 0.06100 A/m; Power Drift = -0.01 dB
PMR calibrated. Calibrated PMF = 2.948 is applied.
H-field emissions = 0.2621 A/m
Near-field category: M4 (AWF -5 dB)

Grid 1 M3	Grid 2 M3	Grid 3 M3
156.2 V/m	162.7 V/m	150.9 V/m
Grid 4 M3	Grid 5 M3	Grid 6 M3
155.5 V/m	163.2 V/m	151.2 V/m
Grid 7 M3	Grid 8 M3	Grid 9 M4
151.4 V/m	158.9 V/m	148.0 V/m

Grid 1 M4	Grid 2 M4	Grid 3 M4
0.308 A/m	0.212 A/m	0.132 A/m
Grid 4 M4	Grid 5 M4	Grid 6 M4
0.311 A/m	0.230 A/m	0.155 A/m
Grid 7 M4	Grid 8 M4	Grid 9 M4
0.350 A/m	0.262 A/m	0.176 A/m



MEASUREMENT DATA GSM850, CHANNEL HIGH (848.8 MHz)

Date/Time: 2013-03-14 19:28:24
Test Laboratory: TCC Nokia
Type: RM-877; Serial: 004402/47/126334/7
Communication System: GSM-FDD (TDMA, GMSK)
Frequency: 848.8 MHz; Duty Cycle: 1:8.6896
Medium: Air; Medium Notes: Not Specified
Medium parameters used: $\sigma = 0$ S/m, $\epsilon_r = 1$; $\rho = 0$ kg/m³
Phantom section: RF Section

DASY Configuration:
- Probe: ER3DV6 - SN2309
- ConvF(1, 1, 1); Calibrated: 2013-02-11;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn1309; Calibrated: 2013-01-11
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

Device E-Field measurement with ER probe/E Scan - GSM850 - High/Hearing Aid Compatibility Test (101x101x1):
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 58.85 V/m; Power Drift = -0.01 dB
PMR calibrated. Calibrated PMF = 2.948 is applied.
E-field emissions = 134.8 V/m
Near-field category: M4 (AWF -5 dB)

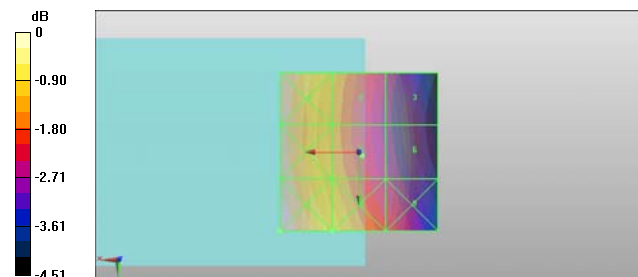
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Test Laboratory: TCC Nokia
Type: RM-877; Serial: 004402/47/126334/7
Communication System: GSM-FDD (TDMA, GMSK)
Frequency: 848.8 MHz; Duty Cycle: 1:8.6896
Medium: Air; Medium Notes: Not Specified
Medium parameters used: $\sigma = 0$ S/m, $\epsilon_r = 1$; $\rho = 0$ kg/m³
Phantom section: RF Section

DASY Configuration:
- Probe: H3DV6 - SN6143
- ; Calibrated: 2013-02-07
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn1309; Calibrated: 2013-01-11
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

Device H-Field measurement with H3DV6 probe/H Scan - GSM850 - High/Hearing Aid Compatibility Test (101x101x1):
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 0.04900 A/m; Power Drift = 0.02 dB
PMR calibrated. Calibrated PMF = 2.948 is applied.
H-field emissions = 0.2149 A/m
Near-field category: M4 (AWF -5 dB)

Grid 1 M4 122.7 V/m	Grid 2 M4 131.9 V/m	Grid 3 M4 125.9 V/m
Grid 4 M4 125.1 V/m	Grid 5 M4 134.8 V/m	Grid 6 M4 128.1 V/m
Grid 7 M4 123.1 V/m	Grid 8 M4 133.2 V/m	Grid 9 M4 127.3 V/m

Grid 1 M4 0.270 A/m	Grid 2 M4 0.191 A/m	Grid 3 M4 0.119 A/m
Grid 4 M4 0.257 A/m	Grid 5 M4 0.189 A/m	Grid 6 M4 0.122 A/m
Grid 7 M4 0.289 A/m	Grid 8 M4 0.215 A/m	Grid 9 M4 0.143 A/m



MEASUREMENT DATA WCDMA850, CHANNEL LOW (826.4 MHz)

Date/Time: 2013-03-16 09:53:57
Test Laboratory: TCC Nokia
Type: RM-877; Serial: 004402/47/126334/7
Communication System: UMTS-FDD (WCDMA)
Frequency: 826.4 MHz; Duty Cycle: 1:1.95434
Medium: Air; Medium Notes: Not Specified
Medium parameters used: $\sigma = 0$ S/m, $\epsilon_r = 1$; $\rho = 0$ kg/m³
Phantom section: RF Section

Date/Time: 2013-03-16 13:05:54
Test Laboratory: TCC Nokia
Type: RM-877; Serial: 004402/47/126334/7
Communication System: UMTS-FDD (WCDMA)
Frequency: 826.4 MHz; Duty Cycle: 1:1.95434
Medium: Air; Medium Notes: Not Specified
Medium parameters used: $\sigma = 0$ S/m, $\epsilon_r = 1$; $\rho = 0$ kg/m³
Phantom section: RF Section

DASY Configuration:
- Probe: ER3DV6 - SN2309
- ConvF(1, 1, 1); Calibrated: 2013-02-11;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn1309; Calibrated: 2013-01-11
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

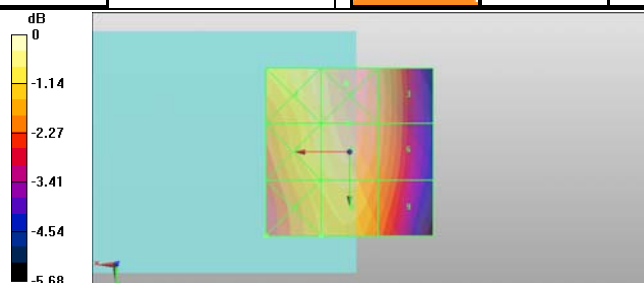
DASY Configuration:
- Probe: H3DV6 - SN6143
- ; Calibrated: 2013-02-07
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn1309; Calibrated: 2013-01-11
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

Device E-Field measurement with ER probe/E Scan - WCDMA5 - Low/Hearing Aid Compatibility Test (101x101x1):
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 69.57 V/m; Power Drift = 0.06 dB
PMR calibrated. Calibrated PMF = 1.002 is applied.
E-field emissions = 54.62 V/m
Near-field category: M4 (AWF 0 dB)

Device H-Field measurement with H3DV6 probe/H Scan - WCDMA5 - Low/Hearing Aid Compatibility Test (101x101x1):
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 0.06400 A/m; Power Drift = 0.01 dB
PMR calibrated. Calibrated PMF = 1.002 is applied.
H-field emissions = 0.09420 A/m
Near-field category: M4 (AWF 0 dB)

Grid 1 M4 54.70 V/m	Grid 2 M4 55.78 V/m	Grid 3 M4 51.10 V/m
Grid 4 M4 52.65 V/m	Grid 5 M4 54.62 V/m	Grid 6 M4 50.60 V/m
Grid 7 M4 49.94 V/m	Grid 8 M4 51.94 V/m	Grid 9 M4 48.29 V/m

Grid 1 M4 0.103 A/m	Grid 2 M4 0.072 A/m	Grid 3 M4 0.046 A/m
Grid 4 M4 0.108 A/m	Grid 5 M4 0.081 A/m	Grid 6 M4 0.057 A/m
Grid 7 M4 0.122 A/m	Grid 8 M4 0.094 A/m	Grid 9 M4 0.066 A/m



MEASUREMENT DATA WCDMA850, CHANNEL MIDDLE (835 MHz)

Date/Time: 2013-03-16 09:46:38
Test Laboratory: TCC Nokia
Type: RM-877; Serial: 004402/47/126334/7
Communication System: UMTS-FDD (WCDMA)
Frequency: 835 MHz; Duty Cycle: 1:1.95434
Medium: Air; Medium Notes: Not Specified
Medium parameters used: $\sigma = 0$ S/m, $\epsilon_r = 1$; $\rho = 0$ kg/m³
Phantom section: RF Section

DASY Configuration:
- Probe: ER3DV6 - SN2309
- ConvF(1, 1, 1); Calibrated: 2013-02-11;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn1309; Calibrated: 2013-01-11
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

Device E-Field measurement with ER probe/E Scan - WCDMA5 - Middle/Hearing Aid Compatibility Test (101x101x1):
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 77.21 V/m; Power Drift = -0.01 dB
PMR calibrated. Calibrated PMF = 1.002 is applied.
E-field emissions = 60.18 V/m
Near-field category: M4 (AWF 0 dB)

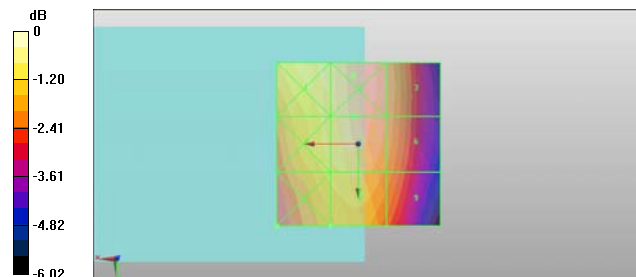
Date/Time: 2013-03-16 12:54:24
Test Laboratory: TCC Nokia
Type: RM-877; Serial: 004402/47/126334/7
Communication System: UMTS-FDD (WCDMA)
Frequency: 835 MHz; Duty Cycle: 1:1.95434
Medium: Air; Medium Notes: Not Specified
Medium parameters used: $\sigma = 0$ S/m, $\epsilon_r = 1$; $\rho = 0$ kg/m³
Phantom section: RF Section

DASY Configuration:
- Probe: H3DV6 - SN6143
- ; Calibrated: 2013-02-07
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn1309; Calibrated: 2013-01-11
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

Device H-Field measurement with H3DV6 probe/H Scan - WCDMA5 - Middle/Hearing Aid Compatibility Test (101x101x1):
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 0.06700 A/m; Power Drift = 0.11 dB
PMR calibrated. Calibrated PMF = 1.002 is applied.
H-field emissions = 0.09641 A/m
Near-field category: M4 (AWF 0 dB)

Grid 1 M4 60.67 V/m	Grid 2 M4 61.99 V/m	Grid 3 M4 56.86 V/m
Grid 4 M4 58.34 V/m	Grid 5 M4 60.18 V/m	Grid 6 M4 56.32 V/m
Grid 7 M4 55.19 V/m	Grid 8 M4 57.09 V/m	Grid 9 M4 53.40 V/m

Grid 1 M4 0.124 A/m	Grid 2 M4 0.081 A/m	Grid 3 M4 0.050 A/m
Grid 4 M4 0.119 A/m	Grid 5 M4 0.087 A/m	Grid 6 M4 0.058 A/m
Grid 7 M4 0.129 A/m	Grid 8 M4 0.096 A/m	Grid 9 M4 0.066 A/m



MEASUREMENT DATA WCDMA850, CHANNEL HIGH (846.6 MHz)

Date/Time: 2013-03-16 10:01:57
Test Laboratory: TCC Nokia
Type: RM-877; Serial: 004402/47/126334/7
Communication System: UMTS-FDD (WCDMA)
Frequency: 846.6 MHz; Duty Cycle: 1:1.95434
Medium: Air; Medium Notes: Not Specified
Medium parameters used: $\sigma = 0$ S/m, $\epsilon_r = 1$; $\rho = 0$ kg/m³
Phantom section: RF Section

Date/Time: 2013-03-16 13:00:15
Test Laboratory: TCC Nokia
Type: RM-877; Serial: 004402/47/126334/7
Communication System: UMTS-FDD (WCDMA)
Frequency: 846.6 MHz; Duty Cycle: 1:1.95434
Medium: Air; Medium Notes: Not Specified
Medium parameters used: $\sigma = 0$ S/m, $\epsilon_r = 1$; $\rho = 0$ kg/m³
Phantom section: RF Section

DASY Configuration:
- Probe: ER3DV6 - SN2309
- ConvF(1, 1, 1); Calibrated: 2013-02-11;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn1309; Calibrated: 2013-01-11
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

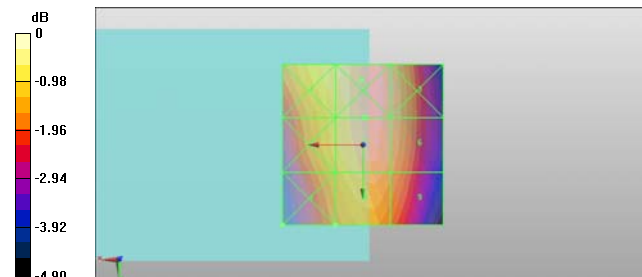
DASY Configuration:
- Probe: H3DV6 - SN6143
- ; Calibrated: 2013-02-07
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn1309; Calibrated: 2013-01-11
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

Device E-Field measurement with ER probe/E Scan - WCDMA5 - High/Hearing Aid Compatibility Test (101x101x1):
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 59.39 V/m; Power Drift = -0.04 dB
PMR calibrated. Calibrated PMF = 1.002 is applied.
E-field emissions = 45.96 V/m
Near-field category: M4 (AWF 0 dB)

Device H-Field measurement with H3DV6 probe/H Scan - WCDMA5 - High/Hearing Aid Compatibility Test (101x101x1):
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 0.05300 A/m; Power Drift = -0.07 dB
PMR calibrated. Calibrated PMF = 1.002 is applied.
H-field emissions = 0.07629 A/m
Near-field category: M4 (AWF 0 dB)

Grid 1 M4 44.90 V/m	Grid 2 M4 46.59 V/m	Grid 3 M4 44.03 V/m
Grid 4 M4 43.09 V/m	Grid 5 M4 45.96 V/m	Grid 6 M4 43.86 V/m
Grid 7 M4 40.71 V/m	Grid 8 M4 44.08 V/m	Grid 9 M4 42.19 V/m

Grid 1 M4 0.097 A/m	Grid 2 M4 0.065 A/m	Grid 3 M4 0.039 A/m
Grid 4 M4 0.091 A/m	Grid 5 M4 0.068 A/m	Grid 6 M4 0.046 A/m
Grid 7 M4 0.100 A/m	Grid 8 M4 0.076 A/m	Grid 9 M4 0.053 A/m



MEASUREMENT DATA GSM1900, CHANNEL LOW (1850.2 MHz)

Date/Time: 2013-03-14 19:44:22
Test Laboratory: TCC Nokia
Type: RM-877; Serial: 004402/47/126334/7
Communication System: GSM-FDD (TDMA, GMSK)
Frequency: 1850.2 MHz; Duty Cycle: 1:8.6896
Medium: Air; Medium Notes: Not Specified
Medium parameters used: $\sigma = 0$ S/m, $\epsilon_r = 1$; $\rho = 0$ kg/m³
Phantom section: RF Section

Date/Time: 2013-03-14 17:50:06
Test Laboratory: TCC Nokia
Type: RM-877; Serial: 004402/47/126334/7
Communication System: GSM-FDD (TDMA, GMSK)
Frequency: 1850.2 MHz; Duty Cycle: 1:8.6896
Medium: Air; Medium Notes: Not Specified
Medium parameters used: $\sigma = 0$ S/m, $\epsilon_r = 1$; $\rho = 0$ kg/m³
Phantom section: RF Section

DASY Configuration:
- Probe: ER3DV6 - SN2309
- ConvF(1, 1, 1); Calibrated: 2013-02-11;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn1309; Calibrated: 2013-01-11
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

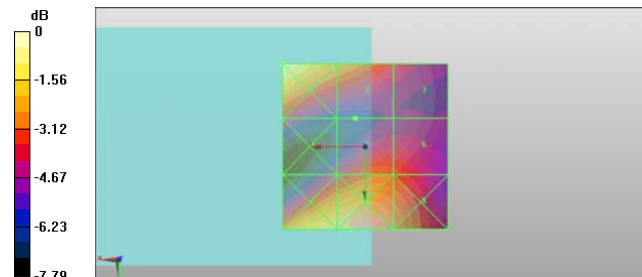
DASY Configuration:
- Probe: H3DV6 - SN6143
- ; Calibrated: 2013-02-07
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn1309; Calibrated: 2013-01-11
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

Device E-Field measurement with ER probe/E Scan - GSM1900 - Low/Hearing Aid Compatibility Test (101x101x1):
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 16.37 V/m; Power Drift = -0.02 dB
PMR calibrated. Calibrated PMF = 2.948 is applied.
E-field emissions = 76.38 V/m
Near-field category: M3 (AWF -5 dB)

Device H-Field measurement with H3DV6 probe/H Scan - GSM1900 - Low/Hearing Aid Compatibility Test (101x101x1):
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 0.06800 A/m; Power Drift = -0.06 dB
PMR calibrated. Calibrated PMF = 2.948 is applied.
H-field emissions = 0.1920 A/m
Near-field category: M3 (AWF -5 dB)

Grid 1 M3 76.38 V/m	Grid 2 M3 59.95 V/m	Grid 3 M3 48.30 V/m
Grid 4 M3 47.82 V/m	Grid 5 M3 54.89 V/m	Grid 6 M3 53.83 V/m
Grid 7 M3 76.81 V/m	Grid 8 M3 78.47 V/m	Grid 9 M3 66.97 V/m

Grid 1 M3 0.211 A/m	Grid 2 M3 0.192 A/m	Grid 3 M3 0.181 A/m
Grid 4 M3 0.191 A/m	Grid 5 M3 0.192 A/m	Grid 6 M3 0.181 A/m
Grid 7 M3 0.201 A/m	Grid 8 M3 0.178 A/m	Grid 9 M3 0.156 A/m



MEASUREMENT DATA GSM1900, CHANNEL MIDDLE (1880 MHz)

Date/Time: 2013-03-14 19:38:41
Test Laboratory: TCC Nokia
Type: RM-877; Serial: 004402/47/126334/7
Communication System: GSM-FDD (TDMA, GMSK)
Frequency: 1880 MHz; Duty Cycle: 1:8.6896
Medium: Air; Medium Notes: Not Specified
Medium parameters used: $\sigma = 0$ S/m, $\epsilon_r = 1$; $\rho = 0$ kg/m³
Phantom section: RF Section

DASY Configuration:
- Probe: ER3DV6 - SN2309
- ConvF(1, 1, 1); Calibrated: 2013-02-11;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn1309; Calibrated: 2013-01-11
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

Device E-Field measurement with ER probe/E Scan - GSM1900 - Middle/Hearing Aid Compatibility Test (101x101x1):
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 15.83 V/m; Power Drift = -0.07 dB
PMR calibrated. Calibrated PMF = 2.948 is applied.
E-field emissions = 76.77 V/m
Near-field category: M3 (AWF -5 dB)

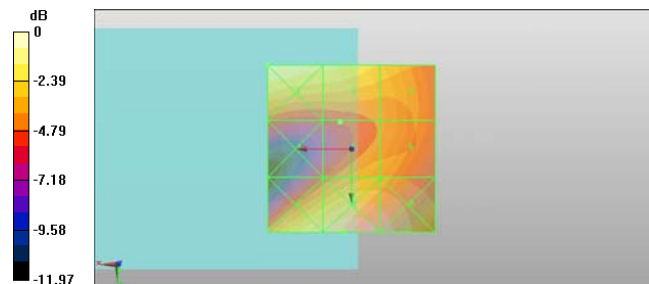
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Test Laboratory: TCC Nokia
Type: RM-877; Serial: 004402/47/126334/7
Communication System: GSM-FDD (TDMA, GMSK)
Frequency: 1880 MHz; Duty Cycle: 1:8.6896
Medium: Air; Medium Notes: Not Specified
Medium parameters used: $\sigma = 0$ S/m, $\epsilon_r = 1$; $\rho = 0$ kg/m³
Phantom section: RF Section

DASY Configuration:
- Probe: H3DV6 - SN6143
- ; Calibrated: 2013-02-07
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn1309; Calibrated: 2013-01-11
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: Not Specified
- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

Device H-Field measurement with H3DV6 probe/H Scan - GSM1900 - Middle/Hearing Aid Compatibility Test (101x101x1):
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 0.07800 A/m; Power Drift = -0.01 dB
PMR calibrated. Calibrated PMF = 2.948 is applied.
H-field emissions = 0.2114 A/m
Near-field category: M3 (AWF -5 dB)

Grid 1 M3 76.77 V/m	Grid 2 M3 70.06 V/m	Grid 3 M3 60.93 V/m
Grid 4 M4 44.18 V/m	Grid 5 M3 56.44 V/m	Grid 6 M3 56.46 V/m
Grid 7 M3 77.78 V/m	Grid 8 M3 80.81 V/m	Grid 9 M3 72.10 V/m

Grid 1 M3 0.226 A/m	Grid 2 M3 0.211 A/m	Grid 3 M3 0.192 A/m
Grid 4 M3 0.209 A/m	Grid 5 M3 0.211 A/m	Grid 6 M3 0.192 A/m
Grid 7 M3 0.203 A/m	Grid 8 M3 0.195 A/m	Grid 9 M3 0.166 A/m



MEASUREMENT DATA GSM1900, CHANNEL HIGH (1909.8 MHz)

Date/Time: 2013-03-14 19:49:49
Test Laboratory: TCC Nokia
Type: RM-877; Serial: 004402/47/126334/7
Communication System: GSM-FDD (TDMA, GMSK)
Frequency: 1909.8 MHz; Duty Cycle: 1:8.6896
Medium: Air; Medium Notes: Not Specified
Medium parameters used: $\sigma = 0$ S/m, $\epsilon_r = 1$; $\rho = 0$ kg/m³
Phantom section: RF Section

DASY Configuration:
- Probe: ER3DV6 - SN2309
- ConvF(1, 1, 1); Calibrated: 2013-02-11;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn1309; Calibrated: 2013-01-11
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

Device E-Field measurement with ER probe/E Scan - GSM1900 - High/Hearing Aid Compatibility Test (101x101x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 19.11 V/m; Power Drift = 0.00 dB
PMR calibrated. Calibrated PMF = 2.948 is applied.
E-field emissions = 68.69 V/m
Near-field category: M3 (AWF -5 dB)

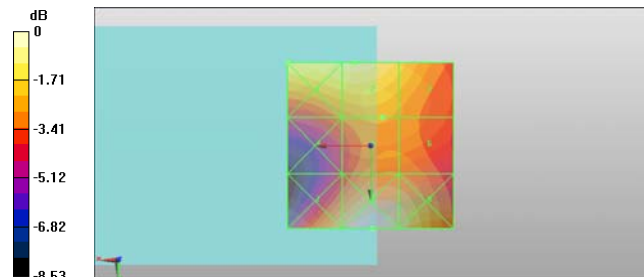
Date/Time: 2013-03-14 18:00:01
Test Laboratory: TCC Nokia
Type: RM-877; Serial: 004402/47/126334/7
Communication System: GSM-FDD (TDMA, GMSK)
Frequency: 1909.8 MHz; Duty Cycle: 1:8.6896
Medium: Air; Medium Notes: Not Specified
Medium parameters used: $\sigma = 0$ S/m, $\epsilon_r = 1$; $\rho = 0$ kg/m³
Phantom section: RF Section

DASY Configuration:
- Probe: H3DV6 - SN6143
- ; Calibrated: 2013-02-07
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn1309; Calibrated: 2013-01-11
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

Device H-Field measurement with H3DV6 probe/H Scan - GSM1900 - High/Hearing Aid Compatibility Test (101x101x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 0.06000 A/m; Power Drift = -0.00 dB
PMR calibrated. Calibrated PMF = 2.948 is applied.
H-field emissions = 0.1704 A/m
Near-field category: M3 (AWF -5 dB)

Grid 1 M3 68.04 V/m	Grid 2 M3 68.69 V/m	Grid 3 M3 60.39 V/m
Grid 4 M3 48.29 V/m	Grid 5 M3 54.78 V/m	Grid 6 M3 54.36 V/m
Grid 7 M3 63.93 V/m	Grid 8 M3 70.20 V/m	Grid 9 M3 65.58 V/m

Grid 1 M3 0.204 A/m	Grid 2 M3 0.170 A/m	Grid 3 M3 0.167 A/m
Grid 4 M3 0.161 A/m	Grid 5 M3 0.168 A/m	Grid 6 M3 0.167 A/m
Grid 7 M3 0.167 A/m	Grid 8 M3 0.142 A/m	Grid 9 M4 0.138 A/m



MEASUREMENT DATA WCDMA1900, CHANNEL LOW (1852.4MHz)

Date/Time: 2013-03-16 09:28:41
Test Laboratory: TCC Nokia
Type: RM-877; Serial: 004402/47/126334/7
Communication System: UMTS-FDD (WCDMA)
Frequency: 1852.4 MHz; Duty Cycle: 1:1.95434
Medium: Air; Medium Notes: Not Specified
Medium parameters used: $\sigma = 0$ S/m, $\epsilon_r = 1$; $\rho = 0$ kg/m³
Phantom section: RF Section

Date/Time: 2013-03-16 13:28:12
Test Laboratory: TCC Nokia
Type: RM-877; Serial: 004402/47/126334/7
Communication System: UMTS-FDD (WCDMA)
Frequency: 1852.4 MHz; Duty Cycle: 1:1.95434
Medium: Air; Medium Notes: Not Specified
Medium parameters used: $\sigma = 0$ S/m, $\epsilon_r = 1$; $\rho = 0$ kg/m³
Phantom section: RF Section

DASY Configuration:
- Probe: ER3DV6 - SN2309
- ConvF(1, 1, 1); Calibrated: 2013-02-11;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn1309; Calibrated: 2013-01-11
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

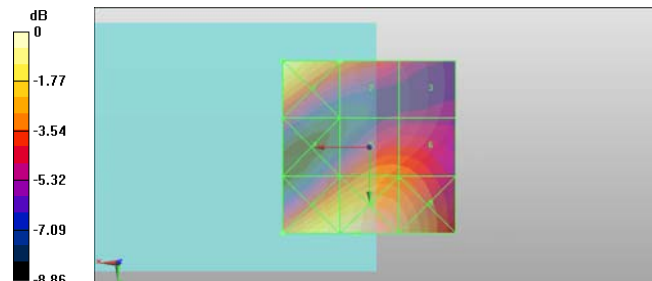
DASY Configuration:
- Probe: H3DV6 - SN6143
- ; Calibrated: 2013-02-07
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn1309; Calibrated: 2013-01-11
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

Device E-Field measurement with ER probe/E Scan - WCDMA2 - Low/Hearing Aid Compatibility Test (101x101x1):
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 22.78 V/m; Power Drift = 0.03 dB
PMR calibrated. Calibrated PMF = 1.002 is applied.
E-field emissions = 33.94 V/m
Near-field category: M4 (AWF 0 dB)

Device H-Field measurement with H3DV6 probe/H Scan - WCDMA2 - Low/Hearing Aid Compatibility Test (101x101x1):
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 0.08500 A/m; Power Drift = 0.16 dB
PMR calibrated. Calibrated PMF = 1.002 is applied.
H-field emissions = 0.08657 A/m
Near-field category: M4 (AWF 0 dB)

Grid 1 M4 33.94 V/m	Grid 2 M4 24.96 V/m	Grid 3 M4 19.89 V/m
Grid 4 M4 21.27 V/m	Grid 5 M4 26.42 V/m	Grid 6 M4 26.06 V/m
Grid 7 M4 35.61 V/m	Grid 8 M4 36.51 V/m	Grid 9 M4 31.66 V/m

Grid 1 M4 0.098 A/m	Grid 2 M4 0.087 A/m	Grid 3 M4 0.081 A/m
Grid 4 M4 0.086 A/m	Grid 5 M4 0.084 A/m	Grid 6 M4 0.080 A/m
Grid 7 M4 0.099 A/m	Grid 8 M4 0.081 A/m	Grid 9 M4 0.068 A/m



MEASUREMENT DATA WCDMA1900, CHANNEL MIDDLE (1880MHz)

Date/Time: 2013-03-16 09:19:22
Test Laboratory: TCC Nokia
Type: RM-877; Serial: 004402/47/126334/7
Communication System: UMTS-FDD (WCDMA)
Frequency: 1880 MHz; Duty Cycle: 1:1.95434
Medium: Air; Medium Notes: Not Specified
Medium parameters used: $\sigma = 0$ S/m, $\epsilon_r = 1$; $\rho = 0$ kg/m³
Phantom section: RF Section

DASY Configuration:
- Probe: ER3DV6 - SN2309
- ConvF(1, 1, 1); Calibrated: 2013-02-11;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn1309; Calibrated: 2013-01-11
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

Device E-Field measurement with ER probe/E Scan - WCDMA2 - Middle/Hearing Aid Compatibility Test (101x101x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 21.27 V/m; Power Drift = -0.07 dB
PMR calibrated. Calibrated PMF = 1.002 is applied.
E-field emissions = 36.96 V/m
Near-field category: M4 (AWF 0 dB)

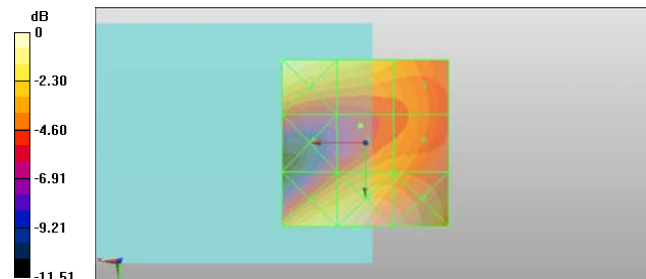
Date/Time: 2013-03-16 13:22:29
Test Laboratory: TCC Nokia
Type: RM-877; Serial: 004402/47/126334/7
Communication System: UMTS-FDD (WCDMA)
Frequency: 1880 MHz; Duty Cycle: 1:1.95434
Medium: Air; Medium Notes: Not Specified
Medium parameters used: $\sigma = 0$ S/m, $\epsilon_r = 1$; $\rho = 0$ kg/m³
Phantom section: RF Section

DASY Configuration:
- Probe: H3DV6 - SN6143
- ; Calibrated: 2013-02-07
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn1309; Calibrated: 2013-01-11
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

Device H-Field measurement with H3DV6 probe/H Scan - WCDMA2 - Middle/Hearing Aid Compatibility Test (101x101x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 0.1050 A/m; Power Drift = 0.04 dB
PMR calibrated. Calibrated PMF = 1.002 is applied.
H-field emissions = 0.09613 A/m
Near-field category: M4 (AWF 0 dB)

Grid 1 M4 36.96 V/m	Grid 2 M4 32.08 V/m	Grid 3 M4 27.66 V/m
Grid 4 M4 21.55 V/m	Grid 5 M4 27.04 V/m	Grid 6 M4 27.03 V/m
Grid 7 M4 37.29 V/m	Grid 8 M4 38.53 V/m	Grid 9 M4 34.40 V/m

Grid 1 M4 0.105 A/m	Grid 2 M4 0.096 A/m	Grid 3 M4 0.088 A/m
Grid 4 M4 0.095 A/m	Grid 5 M4 0.096 A/m	Grid 6 M4 0.088 A/m
Grid 7 M4 0.100 A/m	Grid 8 M4 0.091 A/m	Grid 9 M4 0.079 A/m



MEASUREMENT DATA WCDMA1900, CHANNEL HIGH (1907.6MHz)

Date/Time: 2013-03-16 09:34:22
Test Laboratory: TCC Nokia
Type: RM-877; Serial: 004402/47/126334/7
Communication System: UMTS-FDD (WCDMA)
Frequency: 1907.6 MHz; Duty Cycle: 1:1.95434
Medium: Air; Medium Notes: Not Specified
Medium parameters used: $\sigma = 0$ S/m, $\epsilon_r = 1$; $\rho = 0$ kg/m³
Phantom section: RF Section

Date/Time: 2013-03-16 13:34:40
Test Laboratory: TCC Nokia
Type: RM-877; Serial: 004402/47/126334/7
Communication System: UMTS-FDD (WCDMA)
Frequency: 1907.6 MHz; Duty Cycle: 1:1.95434
Medium: Air; Medium Notes: Not Specified
Medium parameters used: $\sigma = 0$ S/m, $\epsilon_r = 1$; $\rho = 0$ kg/m³
Phantom section: RF Section

DASY Configuration:
- Probe: ER3DV6 - SN2309
- ConvF(1, 1, 1); Calibrated: 2013-02-11;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn1309; Calibrated: 2013-01-11
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

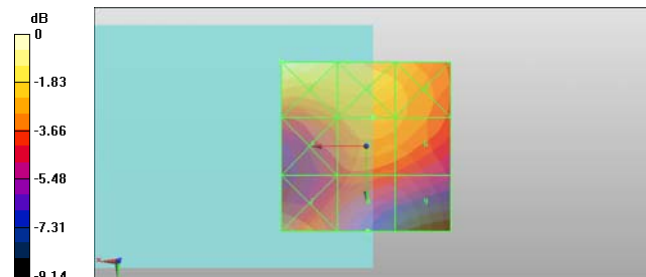
DASY Configuration:
- Probe: H3DV6 - SN6143
- ; Calibrated: 2013-02-07
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn1309; Calibrated: 2013-01-11
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA;
- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

Device E-Field measurement with ER probe/E Scan - WCDMA2 - High/Hearing Aid Compatibility Test (101x101x1):
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 27.84 V/m; Power Drift = -0.03 dB
PMR calibrated. Calibrated PMF = 1.002 is applied.
E-field emissions = 35.63 V/m
Near-field category: M4 (AWF 0 dB)

Device H-Field measurement with H3DV6 probe/H Scan - WCDMA2 - High/Hearing Aid Compatibility Test (101x101x1):
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 0.09100 A/m; Power Drift = 0.07 dB
PMR calibrated. Calibrated PMF = 1.002 is applied.
H-field emissions = 0.08658 A/m
Near-field category: M4 (AWF 0 dB)

Grid 1 M4 34.89 V/m	Grid 2 M4 35.17 V/m	Grid 3 M4 30.99 V/m
Grid 4 M4 23.68 V/m	Grid 5 M4 27.66 V/m	Grid 6 M4 27.50 V/m
Grid 7 M4 32.42 V/m	Grid 8 M4 35.63 V/m	Grid 9 M4 33.25 V/m

Grid 1 M4 0.103 A/m	Grid 2 M4 0.088 A/m	Grid 3 M4 0.086 A/m
Grid 4 M4 0.083 A/m	Grid 5 M4 0.087 A/m	Grid 6 M4 0.085 A/m
Grid 7 M4 0.084 A/m	Grid 8 M4 0.074 A/m	Grid 9 M4 0.070 A/m



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



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

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

Client **Nokia Salo TCC**

Certificate No: **ER3-2309_Feb13**

CALIBRATION CERTIFICATE

Object **ER3DV6 - SN:2309**

Calibration procedure(s) **QA CAL-02.v6, QA CAL-25.v4**
 Calibration procedure for E-field probes optimized for close near field
 evaluations in air

Calibration date: **February 11, 2013**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S5129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe ER3DV6	SN: 2328	12-Oct-12 (No. ER3-2328_Oct12)	Oct-13
DAE4	SN: 789	18-Sep-12 (No. DAE4-789_Sep12)	Sep-13
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

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

Issued: February 11, 2013

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

DASY/EASY - Parameters of Probe: ER3DV6 - SN:2309

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$)	1.66	1.47	1.83	$\pm 10.1\%$
DCP (mV) ^B	98.2	101.2	99.1	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB $\sqrt{\mu\text{V}}$	C	D dB	VR mV	Unc ^E (k=2)
0	CW	X	0.0	0.0	1.0	0.00	148.7	$\pm 2.7\%$
		Y	0.0	0.0	1.0		148.9	
		Z	0.0	0.0	1.0		196.4	
10011	UMTS-FDD (WCDMA)	X	3.14	65.6	18.1	2.91	118.8	$\pm 0.5\%$
		Y	3.21	66.8	18.9		119.3	
		Z	3.19	66.2	18.4		116.0	
10012	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps)	X	2.94	67.8	18.5	1.87	121.5	$\pm 0.7\%$
		Y	3.03	70.1	20.1		121.1	
		Z	2.98	68.6	18.9		118.2	
10013	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps)	X	12.66	73.9	25.6	9.46	123.8	$\pm 3.8\%$
		Y	11.15	71.4	24.4		112.6	
		Z	11.60	71.3	23.8		116.4	
10021	GSM-FDD (TDMA, GMSK)	X	24.63	99.6	29.3	9.39	102.0	$\pm 1.7\%$
		Y	16.47	99.6	28.7		112.3	
		Z	26.20	100.0	28.7		146.3	
10023	GPRS-FDD (TDMA, GMSK, TN 0)	X	24.06	99.6	29.6	9.57	97.5	$\pm 2.5\%$
		Y	17.17	99.9	28.7		104.9	
		Z	23.65	99.3	29.0		133.7	
10024	GPRS-FDD (TDMA, GMSK, TN 0-1)	X	37.00	99.8	26.3	6.56	124.1	$\pm 2.2\%$
		Y	23.23	99.4	25.7		137.6	
		Z	35.23	99.7	26.1		113.9	
10025	EDGE-FDD (TDMA, 8PSK, TN 0)	X	15.92	98.9	39.1	12.62	101.7	$\pm 5.5\%$
		Y	11.26	99.2	41.3		105.9	
		Z	16.91	99.7	38.3		139.8	
10026	EDGE-FDD (TDMA, 8PSK, TN 0-1)	X	19.07	99.2	35.2	9.55	129.0	$\pm 2.7\%$
		Y	13.01	99.9	37.4		138.0	
		Z	17.95	99.2	35.3		117.2	
10027	GPRS-FDD (TDMA, GMSK, TN 0-1-2)	X	43.40	99.7	24.8	4.80	136.8	$\pm 1.9\%$
		Y	28.40	99.8	24.3		111.2	
		Z	44.02	99.7	24.4		125.2	
10028	GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)	X	44.73	100.0	24.1	3.55	141.5	$\pm 2.7\%$
		Y	22.63	99.3	23.7		120.2	
		Z	49.66	99.7	23.3		133.5	
10029	EDGE-FDD (TDMA, 8PSK, TN 0-1-2)	X	19.86	99.1	33.6	7.78	146.1	$\pm 2.5\%$
		Y	7.31	83.3	28.9		112.4	
		Z	20.00	99.7	33.5		134.0	
10058	EDGE-FDD (TDMA, 8PSK, TN 0-1-2-3)	X	9.78	83.4	27.0	6.52	102.0	$\pm 2.2\%$
		Y	5.15	75.0	24.0		122.7	
		Z	16.81	95.3	30.9		142.2	

10059	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps)	X	3.55	70.5	19.8	2.12	121.5	±0.7 %
		Y	2.99	69.4	19.8		116.9	
		Z	3.51	70.8	19.9		116.3	
10060	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps)	X	10.04	90.8	27.3	2.83	112.7	±0.7 %
		Y	9.69	96.8	30.8		147.4	
		Z	9.04	89.5	26.9		107.1	
10061	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps)	X	8.90	83.6	24.9	3.60	116.9	±1.2 %
		Y	7.45	86.3	27.2		149.2	
		Z	8.42	83.6	24.9		110.2	
10071	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 9 Mbps)	X	13.07	74.7	26.4	9.83	123.2	±4.4 %
		Y	11.21	71.4	24.6		109.0	
		Z	11.82	71.7	24.3		113.1	
10072	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 12 Mbps)	X	12.87	74.9	26.3	9.62	119.6	±3.8 %
		Y	10.77	71.2	24.5		105.9	
		Z	11.56	71.8	24.3		110.8	
10073	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 18 Mbps)	X	13.27	75.9	27.1	9.94	118.3	±3.8 %
		Y	10.77	71.3	24.8		102.6	
		Z	11.75	72.3	24.8		108.8	
10074	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 24 Mbps)	X	13.70	76.9	28.0	10.30	116.2	±4.1 %
		Y	10.83	71.5	25.2		99.7	
		Z	11.96	72.7	25.3		107.1	
10075	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 36 Mbps)	X	14.44	78.6	29.4	10.77	115.7	±4.9 %
		Y	11.01	72.0	25.9		96.8	
		Z	12.36	73.7	26.3		105.3	
10076	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 48 Mbps)	X	14.70	79.2	29.8	10.94	115.2	±4.6 %
		Y	11.06	72.3	26.3		95.7	
		Z	12.53	74.1	26.6		104.6	
10077	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 54 Mbps)	X	14.76	79.4	30.0	11.00	115.0	±4.9 %
		Y	12.26	76.2	28.9		139.3	
		Z	12.56	74.2	26.7		104.0	
10090	GPRS-FDD (TDMA, GMSK, TN 0-4)	X	35.33	99.7	26.4	6.56	126.7	±2.7 %
		Y	24.64	99.3	25.2		141.3	
		Z	34.24	99.6	26.1		117.1	
10099	EDGE-FDD (TDMA, 8PSK, TN 0-4)	X	18.36	99.0	35.4	9.55	133.1	±4.1 %
		Y	12.44	98.9	37.2		142.3	
		Z	17.64	99.1	35.4		120.6	

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

^B Numerical linearization parameter: uncertainty not required.

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



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: **H3-6143_Feb13**

CALIBRATION CERTIFICATE

Object **H3DV6 - SN:6143**

Calibration procedure(s) **QA CAL-03.v6, QA CAL-25.v4**
 Calibration procedure for H-field probes optimized for close near field
 evaluations in air

Calibration date: **February 7, 2013**

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	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S5129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe H3DV6	SN: 6182	12-Oct-12 (No. H3-6182_Oct12)	Oct-13
DAE4	SN: 789	18-Sep-12 (No. DAE4-789_Sep12)	Sep-13
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

Calibrated by:	Name Claudio Leubler	Function Laboratory Technician	Signature
Approved by:	Katja Pokovic	Technical Manager	
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			Issued: February 11, 2013

DASY/EASY - Parameters of Probe: H3DV6 - SN:6143

Basic Calibration Parameters

		Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm (A/m / $\sqrt{(mV)}$)	a0	2.64E-003	2.68E-003	3.04E-003	$\pm 5.1 \%$
Norm (A/m / $\sqrt{(mV)}$)	a1	-4.13E-005	-1.17E-004	-1.68E-004	$\pm 5.1 \%$
Norm (A/m / $\sqrt{(mV)}$)	a2	-3.71E-005	2.40E-005	2.03E-005	$\pm 5.1 \%$
DCP (mV) ^B		92.8	91.6	91.3	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB $\sqrt{\mu V}$	C	D dB	VR mV	Unc ^E (k=2)
0	CW	X	0.0	0.0	1.0	0.00	135.9	$\pm 2.2 \%$
		Y	0.0	0.0	1.0		179.5	
		Z	0.0	0.0	1.0		178.1	
10011	UMTS-FDD (WCDMA)	X	3.35	66.1	18.2	2.91	148.8	$\pm 0.7 \%$
		Y	3.35	66.0	18.1		148.3	
		Z	3.28	65.3	17.6		147.2	
10021	GSM-FDD (TDMA, GMSK)	X	11.64	76.4	25.1	9.39	121.3	$\pm 3.0 \%$
		Y	13.42	79.0	26.6		135.4	
		Z	6.38	78.2	23.2		113.8	

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

^B Numerical linearization parameter: uncertainty not required.

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

APPENDIX D: RELEVANT PAGES FROM DIPOLE VALIDATION KIT 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: **CD835V3-1005_Aug12**

CALIBRATION CERTIFICATE

Object **CD835V3 - SN: 1005**

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

Calibration date: **August 23, 2012**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	05-Oct-11 (No. 217-01451)	Oct-12
Power sensor HP 8481A	US37292783	05-Oct-11 (No. 217-01451)	Oct-12
Probe ER3DV6	SN: 2336	29-Dec-11 (No. ER3-2336_Dec11)	Dec-12
Probe H3DV6	SN: 6065	29-Dec-11 (No. H3-6065_Dec11)	Dec-12
DAE4	SN: 781	29-May-12 (No. DAE4-781_May12)	May-13

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter Agilent 4419B	SN: GB42420191	09-Oct-09 (in house check Oct-11)	In house check: Oct-12
Power sensor HP 8482H	SN: 3318A09450	09-Oct-09 (in house check Oct-11)	In house check: Oct-12
Power sensor HP 8482A	SN: US37295597	09-Oct-09 (in house check Oct-11)	In house check: Oct-12
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-11)	In house check: Oct-12
RF generator E4433B	MY 41000675	03-Nov-04 (in house check Oct-11)	In house check: Oct-13

Calibrated by: **Dimce Iliev** Laboratory Technician

D. Iliev

Approved by: **Fin Bomholt** R&D Director

F. Bomholt

Issued: August 24, 2012

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.2
Extrapolation	Advanced Extrapolation	
Phantom	HAC Test Arch	
Distance Dipole Top - Probe Center	10mm	
Scan resolution	dx, dy = 5 mm	
Frequency	835 MHz $\pm$ 1 MHz	
Input power drift	< 0.05 dB	

Maximum Field values at 835 MHz

H-field 10 mm above dipole surface	condition	interpolated maximum
Maximum measured	100 mW input power	0.448 A / m $\pm$ 8.2 % (k=2)

E-field 10 mm above dipole surface	condition	Interpolated maximum
Maximum measured above high end	100 mW input power	160.5 V / m
Maximum measured above low end	100 mW input power	157.1 V / m
Averaged maximum above arm	100 mW input power	158.8 V / m $\pm$ 12.8 % (k=2)

Appendix

Antenna Parameters

Frequency	Return Loss	Impedance
800 MHz	17.9 dB	44.1 Ω - 10.5 j Ω
835 MHz	23.1 dB	50.7 Ω + 7.0 j Ω
900 MHz	16.4 dB	57.8 Ω - 14.6 j Ω
950 MHz	20.1 dB	48.7 Ω + 9.7 j Ω
960 MHz	15.6 dB	58.9 Ω + 16.0 j Ω

3.2 Antenna Design and Handling

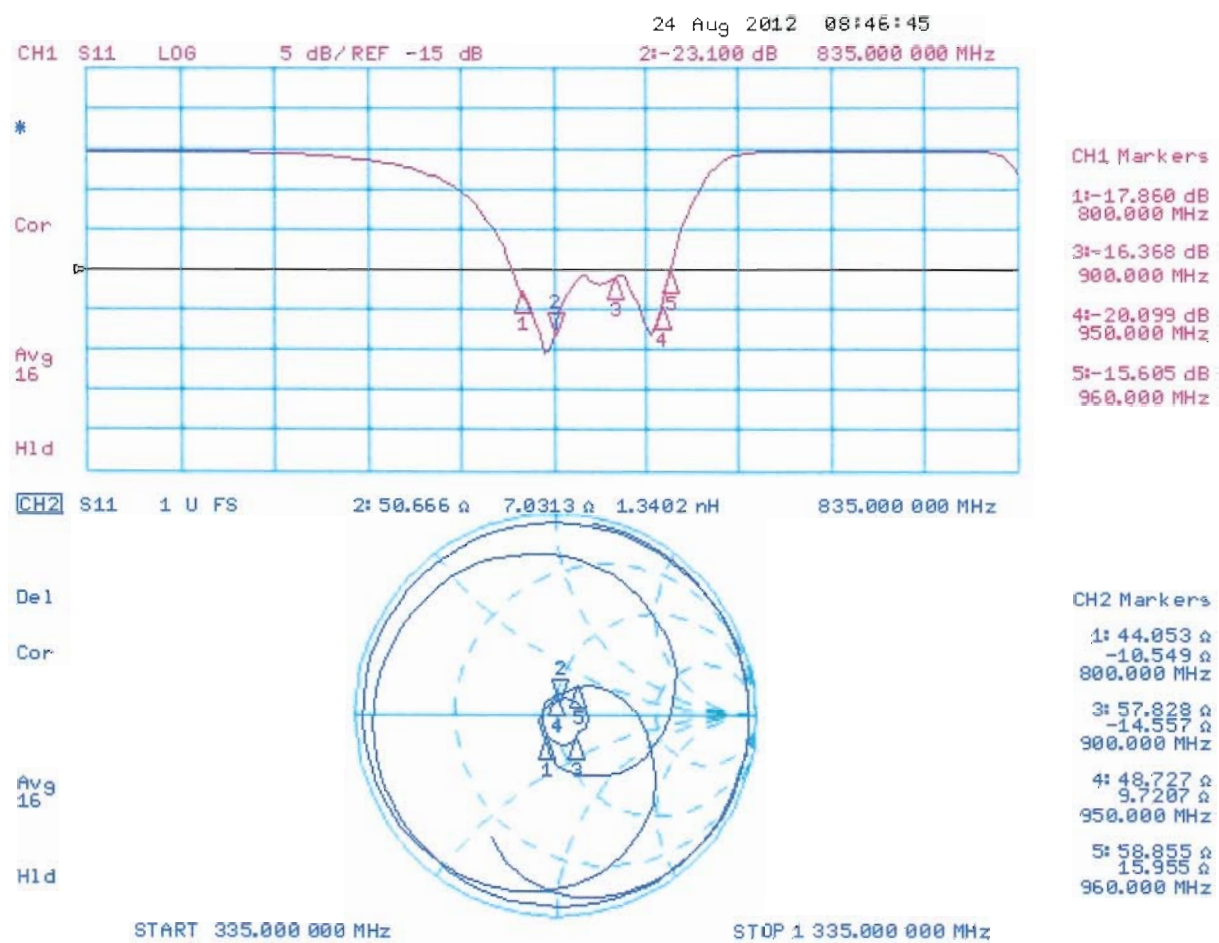
The calibration dipole has a symmetric geometry with a built-in two stub matching network, which leads to the enhanced bandwidth.

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

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

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

Impedance Measurement Plot



DASY5 H-field Result

Date: 23.08.2012

Test Laboratory: SPEAG Lab2

DUT: HAC-Dipole 835 MHz; Type: CD835V3; Serial: CD835V3 - SN: 1005

Communication System: CW; Frequency: 835 MHz

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

Phantom section: RF Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: H3DV6 - SN6065; ; Calibrated: 29.12.2011
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 29.05.2012
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- DASY52 52.8.2(969); SEMCAD X 14.6.6(6824)

Dipole H-Field measurement @ 835MHz/H-Scan - 835MHz d=10mm/Hearing Aid Compatibility Test (41x361x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.4760 A/m; Power Drift = -0.02 dB

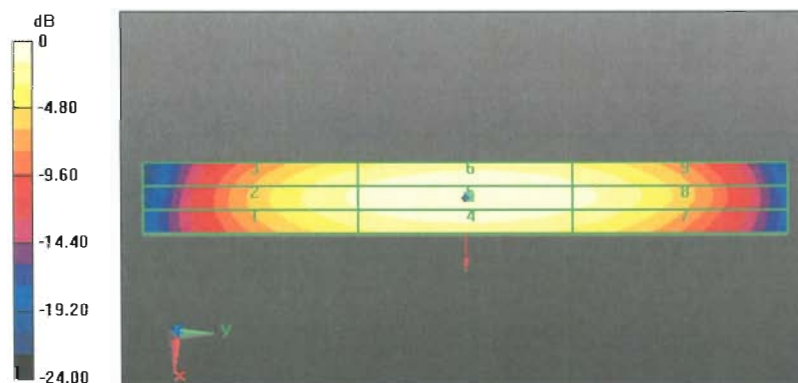
PMR not calibrated. PMF = 1.000 is applied.

H-field emissions = 0.4481 A/m

Near-field category: M4 (AWF 0 dB)

PMF scaled H-field

Grid 1 M4 0.366 A/m	Grid 2 M4 0.387 A/m	Grid 3 M4 0.370 A/m
Grid 4 M4 0.418 A/m	Grid 5 M4 0.448 A/m	Grid 6 M4 0.431 A/m
Grid 7 M4 0.372 A/m	Grid 8 M4 0.400 A/m	Grid 9 M4 0.384 A/m



0 dB = 0.4481 A/m = -6.97 dB A/m

DASY5 E-field Result

Date: 23.08.2012

Test Laboratory: SPEAG Lab2

DUT: HAC-Dipole 835 MHz; Type: CD835V3; Serial: CD835V3 - SN: 1005

Communication System: CW; Frequency: 835 MHz

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

Phantom section: RF Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ER3DV6 - SN2336; ConvF(1, 1, 1); Calibrated: 29.12.2011;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 29.05.2012
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- DASY52 52.8.2(969); SEMCAD X 14.6.6(6824)

Dipole E-Field measurement @ 835MHz/E-Scan - 835MHz d=10mm/Hearing Aid Compatibility Test (41x361x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 102.6 V/m; Power Drift = -0.02 dB

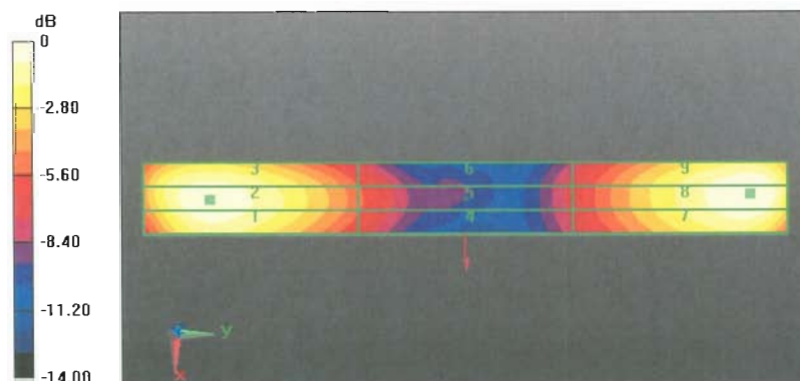
PMR not calibrated. PMF = 1.000 is applied.

E-field emissions = 160.5 V/m

Near-field category: M4 (AWF 0 dB)

PMF scaled E-field

Grid 1 M4	Grid 2 M4	Grid 3 M4
153.8 V/m	157.1 V/m	150.3 V/m
Grid 4 M4	Grid 5 M4	Grid 6 M4
85.80 V/m	87.71 V/m	84.79 V/m
Grid 7 M4	Grid 8 M4	Grid 9 M4
152.6 V/m	160.5 V/m	158.4 V/m



$$0 \text{ dB} = 160.5 \text{ V/m} = 44.11 \text{ dB V/m}$$



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

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

Client **Nokia Salo TCC**

Certificate No: **CD1880V3-1004_Aug12**

CALIBRATION CERTIFICATE

Object **CD1880V3 - SN: 1004**

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

Calibration date: **August 23, 2012**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	05-Oct-11 (No. 217-01451)	Oct-12
Power sensor HP 8481A	US37292783	05-Oct-11 (No. 217-01451)	Oct-12
Probe ER3DV6	SN: 2336	29-Dec-11 (No. ER3-2336_Dec11)	Dec-12
Probe H3DV6	SN: 6065	29-Dec-11 (No. H3-6065_Dec11)	Dec-12
DAE4	SN: 781	29-May-12 (No. DAE4-781_May12)	May-13

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter Agilent 4419B	SN: GB42420191	09-Oct-09 (in house check Oct-11)	In house check: Oct-12
Power sensor HP 8482H	SN: 3318A09450	09-Oct-09 (in house check Oct-11)	In house check: Oct-12
Power sensor HP 8482A	SN: US37295597	09-Oct-09 (in house check Oct-11)	In house check: Oct-12
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-11)	In house check: Oct-12
RF generator E4433B	MY 41000675	03-Nov-04 (in house check Oct-11)	In house check: Oct-13

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

Issued: August 24, 2012

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.2
Extrapolation	Advanced Extrapolation	
Phantom	HAC Test Arch	
Distance Dipole Top - Probe Center	10mm	
Scan resolution	dx, dy = 5 mm	
Frequency	1880 MHz $\pm$ 1 MHz	
Input power drift	< 0.05 dB	

Maximum Field values at 1880 MHz

H-field 10 mm above dipole surface	condition	interpolated maximum
Maximum measured	100 mW input power	0.454 A / m $\pm$ 8.2 % (k=2)

E-field 10 mm above dipole surface	condition	Interpolated maximum
Maximum measured above high end	100 mW input power	137.0 V / m
Maximum measured above low end	100 mW input power	133.7 V / m
Averaged maximum above arm	100 mW input power	135.4 V / m $\pm$ 12.8 % (k=2)

Appendix

Antenna Parameters

Frequency	Return Loss	Impedance
1730 MHz	29.3 dB	51.6 Ω + 3.1 j Ω
1880 MHz	19.9 dB	52.9 Ω + 10.0 j Ω
1900 MHz	19.7 dB	56.0 Ω + 9.3 j Ω
1950 MHz	26.5 dB	54.7 Ω + 1.5 j Ω
2000 MHz	22.8 dB	46.0 Ω + 5.7 j Ω

3.2 Antenna Design and Handling

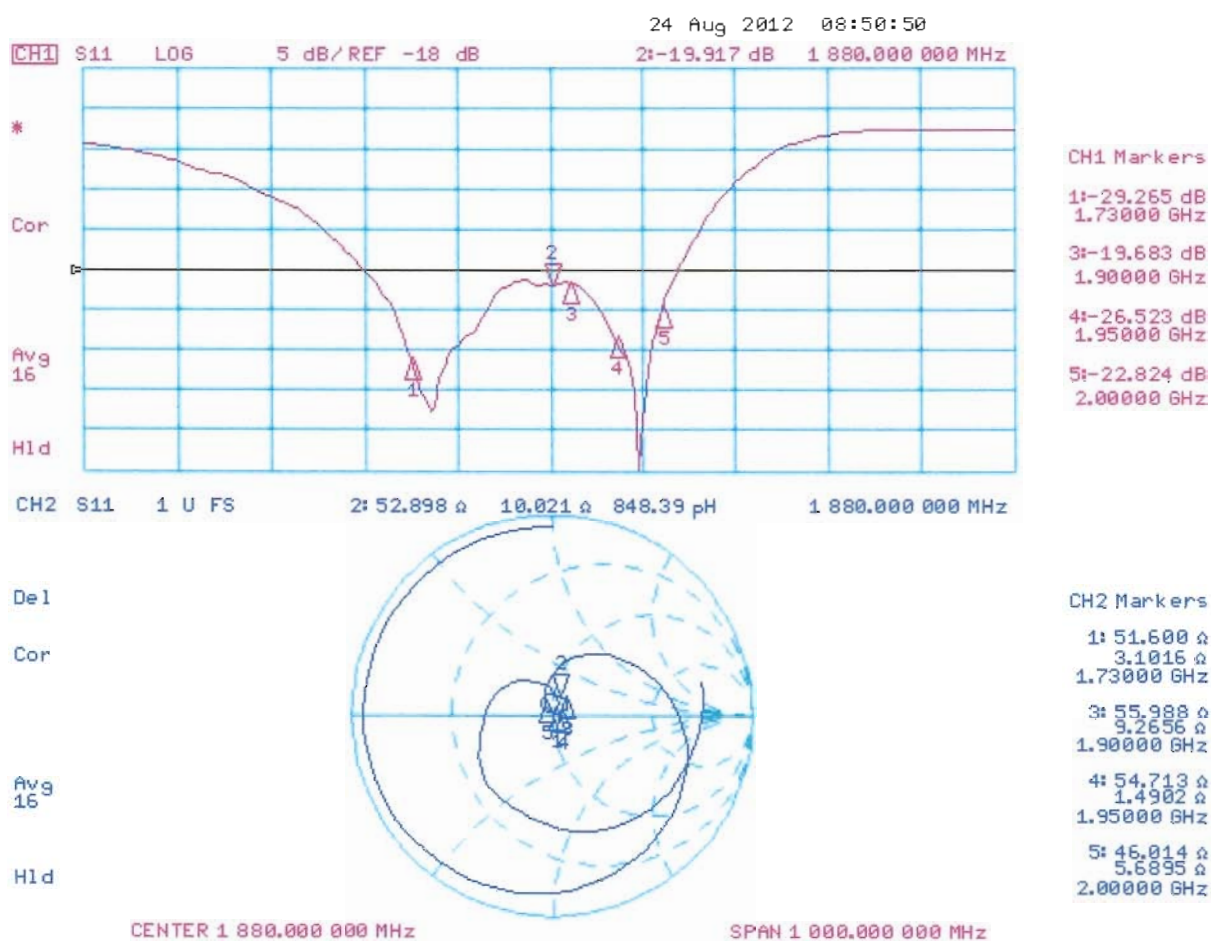
The calibration dipole has a symmetric geometry with a built-in two stub matching network, which leads to the enhanced bandwidth.

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

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

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

Impedance Measurement Plot



DASY5 H-field Result

Date: 23.08.2012

Test Laboratory: SPEAG Lab2

DUT: HAC Dipole 1880 MHz; Type: CD1880V3; Serial: CD1880V3 - SN: 1004

Communication System: CW; Frequency: 1880 MHz

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

Phantom section: RF Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: H3DV6 - SN6065; ; Calibrated: 29.12.2011
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 29.05.2012
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- DASY52 52.8.2(969); SEMCAD X 14.6.6(6824)

Dipole H-Field measurement @ 1880MHz/H-Scan - 1880MHz d=10mm/Hearing Aid Compatibility Test

(41x181x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 0.4800 A/m; Power Drift = -0.02 dB

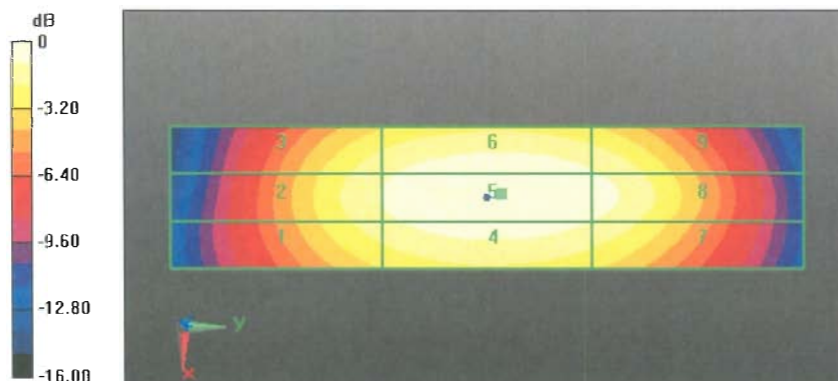
PMR not calibrated. PMF = 1.000 is applied.

H-field emissions = 0.4543 A/m

Near-field category: M2 (AWF 0 dB)

PMF scaled H-field

Grid 1 M2 0.386 A/m	Grid 2 M2 0.405 A/m	Grid 3 M2 0.389 A/m
Grid 4 M2 0.430 A/m	Grid 5 M2 0.454 A/m	Grid 6 M2 0.437 A/m
Grid 7 M2 0.399 A/m	Grid 8 M2 0.425 A/m	Grid 9 M2 0.407 A/m



$$0 \text{ dB} = 0.4543 \text{ A/m} = -6.85 \text{ dB A/m}$$

DASY5 E-field Result

Date: 23.08.2012

Test Laboratory: SPEAG Lab2

DUT: HAC Dipole 1880 MHz; Type: CD1880V3; Serial: CD1880V3 - SN: 1004

Communication System: CW; Frequency: 1880 MHz

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

Phantom section: RF Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ER3DV6 - SN2336; ConvF{1, 1, 1}; Calibrated: 29.12.2011;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 29.05.2012
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- DASY52 52.8.2(969); SEMCAD X 14.6.6(6824)

Dipole E-Field measurement @ 1880MHz/E-Scan - 1880MHz d=10mm/Hearing Aid Compatibility Test (41x181x1): Interpolated grid: dx=0.5000 mm, dy=0.5000 mm

Device Reference Point: 0, 0, -6.3 mm

Reference Value = 155.0 V/m; Power Drift = -0.00 dB

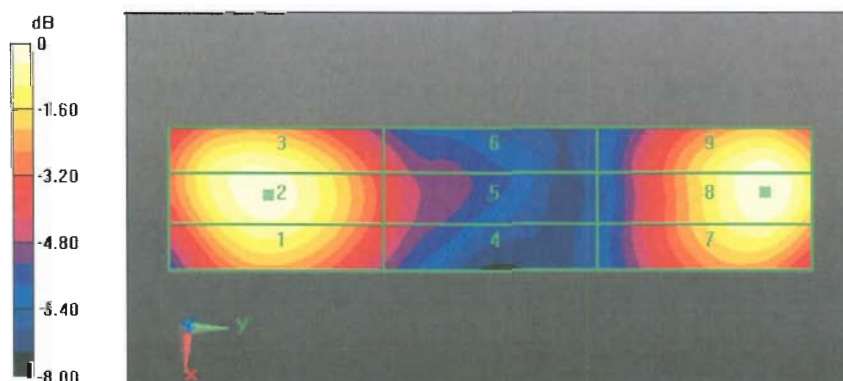
PMR not calibrated. PMF = 1.000 is applied.

E-field emissions = 137.0 V/m

Near-field category: M2 (AWF 0 dB)

PMF scaled E-field

Grid 1 M2 128.0 V/m	Grid 2 M2 133.7 V/m	Grid 3 M2 131.5 V/m
Grid 4 M3 89.30 V/m	Grid 5 M3 92.22 V/m	Grid 6 M3 89.30 V/m
Grid 7 M2 128.4 V/m	Grid 8 M2 137.0 V/m	Grid 9 M2 135.1 V/m



0 dB = 137.0 V/m = 42.73 dB V/m