
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: **CD835V3-1004_Feb13**

CALIBRATION CERTIFICATE

Object **CD835V3 - SN: 1004**

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

Calibration date: **February 05, 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 EPM-442A	GB37480704	01-Nov-12 (No. 217-01640)	Oct-13
Power sensor HP 8481A	US37292783	01-Nov-12 (No. 217-01640)	Oct-13
Reference 10 dB Attenuator	SN: 5047.2 (10q)	27-Mar-12 (No. 217-01527)	Apr-13
Probe ER3DV6	SN: 2336	28-Dec-12 (No. ER3-2336_Dec12)	Dec-13
Probe H3DV6	SN: 6065	28-Dec-12 (No. H3-6065_Dec12)	Dec-13
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-12)	In house check: Oct-13
Power sensor HP E4412A	SN: MY41495277	01-Apr-08 (in house check Oct-12)	In house check: Oct-13
Power sensor HP 8482A	SN: US37295597	09-Oct-09 (in house check Oct-12)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-12)	In house check: Oct-13
RF generator R&S SMT-06	SN: 832283/011	27-Aug-12 (in house check Oct-12)	In house check: Oct-14

Calibrated by: **Dimce Iliev** **Function**
Laboratory Technician

Signature
D. Iliev

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

Katja Pokovic

Issued: February 6, 2013

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	V52.8.5
Extrapolation	Advanced Extrapolation	
Phantom	HAC Test Arch	
Distance Dipole Top - Probe Center	10mm 15mm	
Scan resolution	dx, dy = 5 mm	
Frequency	835 MHz \pm 1 MHz	
Input power drift	< 0.06 dB	

Maximum Field values at 835 MHz

H-field 10 mm above dipole surface	condition	interpolated maximum
Maximum measured	100 mW input power	0.460 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	161.7 V / m
Maximum measured above low end	100 mW input power	155.9 V / m
Averaged maximum above arm	100 mW input power	158.8 V / m \pm 12.8 % (k=2)

E-field 15 mm above dipole surface	condition	Interpolated maximum
Maximum measured above high end	100 mW input power	105.3 V / m
Maximum measured above low end	100 mW input power	103.7 V / m
Averaged maximum above arm	100 mW input power	104.5 V / m \pm 12.8 % (k=2)

DASY5 H-field Result

Date: 05.02.2013

Test Laboratory: SPEAG Lab2

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

Communication System: CW; Frequency: 835 MHz
 Medium parameters used: $\sigma = 0 \text{ S/m}$, $\epsilon_r = 1$; $\rho = 1 \text{ kg/m}^3$
 Phantom section: RF Section
 Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

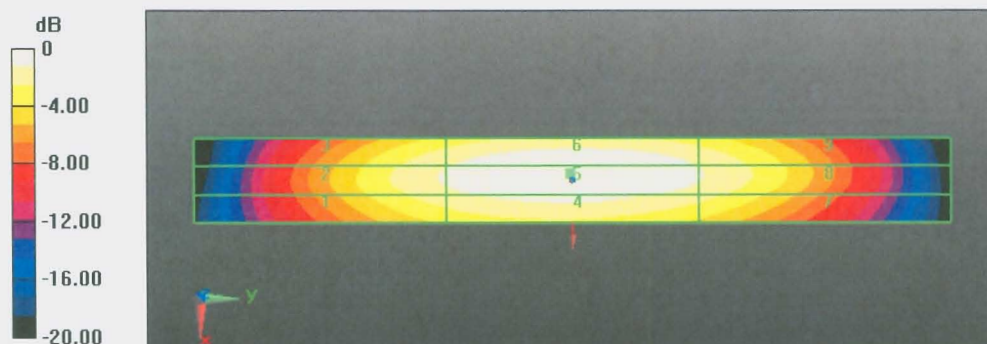
- Probe: H3DV6 - SN6065; ; Calibrated: 28.12.2012
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 29.05.2012
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- DASY52 52.8.5(1059); SEMCAD X 14.6.8(7028)

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 = 0.4900 A/m; Power Drift = -0.06 dB
 PMR not calibrated. PMF = 1.000 is applied.
 H-field emissions = 0.4595 A/m
Near-field category: M4 (AWF 0 dB)

PMF scaled H-field

Grid 1 M4 0.374 A/m	Grid 2 M4 0.403 A/m	Grid 3 M4 0.390 A/m
Grid 4 M4 0.419 A/m	Grid 5 M4 0.460 A/m	Grid 6 M4 0.450 A/m
Grid 7 M4 0.362 A/m	Grid 8 M4 0.400 A/m	Grid 9 M4 0.393 A/m



0 dB = 0.4595 A/m = -6.75 dBA/m

DASY5 E-field Result

Date: 05.02.2013

Test Laboratory: SPEAG Lab2

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

Communication System: CW; Frequency: 835 MHz

Medium parameters used: $\sigma = 0$ S/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: 28.12.2012;
- 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 52.8.5(1059); SEMCAD X 14.6.8(7028)

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 = 109.3 V/m; Power Drift = 0.01 dB

PMR not calibrated. PMF = 1.000 is applied.

E-field emissions = 161.7 V/m

Near-field category: M4 (AWF 0 dB)

PMF scaled E-field

Grid 1 M4 152.6 V/m	Grid 2 M4 155.9 V/m	Grid 3 M4 150.9 V/m
Grid 4 M4 84.24 V/m	Grid 5 M4 87.18 V/m	Grid 6 M4 85.36 V/m
Grid 7 M4 149.3 V/m	Grid 8 M4 161.7 V/m	Grid 9 M4 161.1 V/m

Dipole E-Field measurement @ 835MHz/E-Scan - 835MHz d=15mm/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 = 109.5 V/m; Power Drift = 0.01 dB

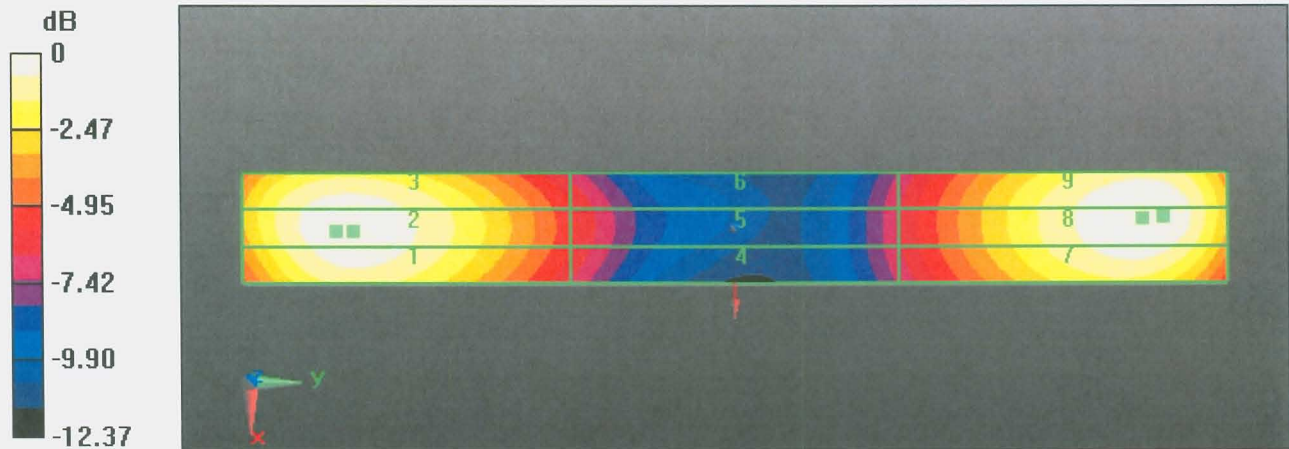
PMR not calibrated. PMF = 1.000 is applied.

E-field emissions = 105.3 V/m

Near-field category: M4 (AWF 0 dB)

PMF scaled E-field

Grid 1 M4 102.4 V/m	Grid 2 M4 103.7 V/m	Grid 3 M4 102.0 V/m
Grid 4 M4 61.90 V/m	Grid 5 M4 62.94 V/m	Grid 6 M4 62.15 V/m
Grid 7 M4 101.7 V/m	Grid 8 M4 105.3 V/m	Grid 9 M4 104.9 V/m



0 dB = 161.7 V/m = 44.17 dBV/m



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Accreditation No.: **SCS 108**

Client **Nokia Salo TCC**

Certificate No: **CD835V3-1064_Jun13**

CALIBRATION CERTIFICATE

Object **CD835V3 - SN: 1064**

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

Calibration date: **June 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 ± 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	01-Nov-12 (No. 217-01640)	Oct-13
Power sensor HP 8481A	US37292783	01-Nov-12 (No. 217-01640)	Oct-13
Reference 10 dB Attenuator	SN: 5047.2 (10q)	04-Apr-13 (No. 217-01731)	Apr-14
Probe ER3DV6	SN: 2336	28-Dec-12 (No. ER3-2336_Dec12)	Dec-13
Probe H3DV6	SN: 6065	28-Dec-12 (No. H3-6065_Dec12)	Dec-13
DAE4	SN: 781	03-Jun-13 (No. DAE4-781 Jun13)	Jun-14
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter Agilent 4419B	SN: GB42420191	09-Oct-09 (in house check Oct-12)	In house check: Oct-13
Power sensor HP E4412A	SN: MY41495277	01-Apr-08 (in house check Oct-12)	In house check: Oct-13
Power sensor HP 8482A	SN: US37295597	09-Oct-09 (in house check Oct-12)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-12)	In house check: Oct-13
RF generator R&S SMT-06	SN: 832283/011	27-Aug-12 (in house check Oct-12)	In house check: Oct-14

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

Approved by: **Fin Bomholt** Name: Fin Bomholt Function: Deputy Technical Manager

Signature

Issued: June 13, 2013

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Measurement Conditions

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

DASY Version	DASY5	V52.8.7
Phantom	HAC Test Arch	
Distance Dipole Top - Probe Center	15 mm	
Scan resolution	dx, dy = 5 mm	
Frequency	835 MHz \pm 1 MHz	
Input power drift	< 0.05 dB	

Maximum Field values at 835 MHz

E-field 15 mm above dipole surface	condition	Interpolated maximum
Maximum measured above high end	100 mW input power	108.0 V / m
Maximum measured above low end	100 mW input power	107.7 V / m
Averaged maximum above arm	100 mW input power	107.9 V / m \pm 12.8 % (k=2)

Appendix

Antenna Parameters

Frequency	Return Loss	Impedance
800 MHz	17.5 dB	42.4 Ω - 9.9 j Ω
835 MHz	25.4 dB	52.1 Ω + 5.1 j Ω
900 MHz	15.9 dB	59.4 Ω - 14.9 j Ω
950 MHz	19.2 dB	46.7 Ω + 10.1 j Ω
960 MHz	14.6 dB	54.5 Ω + 19.2 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.

DASY5 E-field Result

Date: 11.06.2013

Test Laboratory: SPEAG Lab2

DUT: HAC-Dipole 835 MHz; Type: CD835V3; Serial: CD835V3 - SN: 1064

Communication System: UID 0 - CW; Frequency: 835 MHz

Medium parameters used: $\sigma = 0$ S/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: 28.12.2012;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 03.06.2013
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Dipole E-Field measurement @ 835MHz/E-Scan - 835MHz d=15mm/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 = 107.7 V/m; Power Drift = -0.03 dB

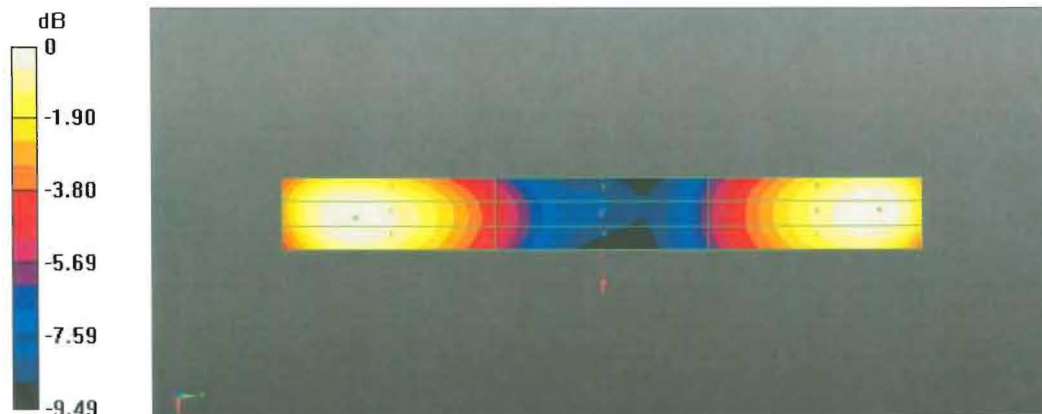
PMR not calibrated. PMF = 1.000 is applied.

E-field emissions = 108.0 V/m

Near-field category: M4 (AWF 0 dB)

PMF scaled E-field

Grid 1 M4	Grid 2 M4	Grid 3 M4
106.9 V/m	108.0 V/m	104.8 V/m
Grid 4 M4	Grid 5 M4	Grid 6 M4
64.33 V/m	64.83 V/m	63.31 V/m
Grid 7 M4	Grid 8 M4	Grid 9 M4
104.7 V/m	107.7 V/m	106.8 V/m



0 dB = 108.0 V/m = 40.67 dBV/m



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Accreditation No.: **SCS 108**

Client **Nokia Salo TCC**

Certificate No: **CD1880V3-1003_Feb13**

CALIBRATION CERTIFICATE

Object **CD1880V3 - SN: 1003**

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

Calibration date: **February 05, 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 EPM-442A	GB37480704	01-Nov-12 (No. 217-01640)	Oct-13
Power sensor HP 8481A	US37292783	01-Nov-12 (No. 217-01640)	Oct-13
Reference 10 dB Attenuator	SN: 5047.2 (10q)	27-Mar-12 (No. 217-01527)	Apr-13
Probe ER3DV6	SN: 2336	28-Dec-12 (No. ER3-2336_Dec12)	Dec-13
Probe H3DV6	SN: 6065	28-Dec-12 (No. H3-6065_Dec12)	Dec-13
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-12)	In house check: Oct-13
Power sensor HP E4412A	SN: MY41495277	01-Apr-08 (in house check Oct-12)	In house check: Oct-13
Power sensor HP 8482A	SN: US37295597	09-Oct-09 (in house check Oct-12)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-12)	In house check: Oct-13
RF generator R&S SMT-06	SN: 832283/011	27-Aug-12 (in house check Oct-12)	In house check: Oct-14

Calibrated by: **Dimce Iliev** Laboratory Technician

Signature
D. Iliev

Approved by: **Katja Pokovic** Technical Manager

Signature
Katja Pokovic

Issued: February 6, 2013

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	V52.8.5
Extrapolation	Advanced Extrapolation	
Phantom	HAC Test Arch	
Distance Dipole Top - Probe Center	10mm 15mm	
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	0.462 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	131.9 V / m
Maximum measured above low end	100 mW input power	130.5 V / m
Averaged maximum above arm	100 mW input power	131.2 V / m \pm 12.8 % (k=2)

E-field 15 mm above dipole surface	condition	Interpolated maximum
Maximum measured above high end	100 mW input power	88.1 V / m
Maximum measured above low end	100 mW input power	85.6 V / m
Averaged maximum above arm	100 mW input power	86.8 V / m \pm 12.8 % (k=2)

DASY5 H-field Result

Date: 05/02/2013

Test Laboratory: SPEAG Lab2

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

Communication System: CW; Frequency: 1880 MHz
 Medium parameters used: $\sigma = 0$ S/m, $\epsilon_r = 1$; $\rho = 1$ kg/m³
 Phantom section: RF Section
 Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

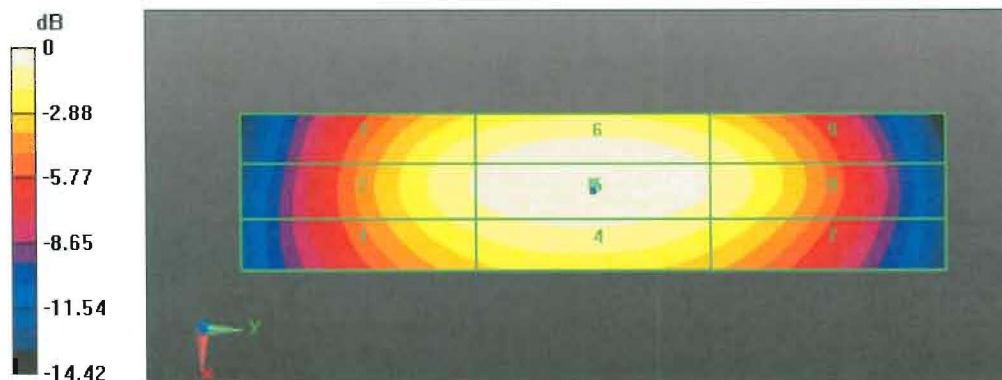
- Probe: H3DV6 - SN6065; ; Calibrated: 28/12/2012
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 29/05/2012
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- DASY52 52.8.5(1059); SEMCAD X 14.6.8(7028)

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 = 0.4870 A/m; Power Drift = 0.00 dB
 PMR not calibrated. PMF = 1.000 is applied.
 H-field emissions = 0.4620 A/m
Near-field category: M2 (AWF 0 dB)

PMF scaled H-field

Grid 1 M2 0.392 A/m	Grid 2 M2 0.420 A/m	Grid 3 M2 0.411 A/m
Grid 4 M2 0.427 A/m	Grid 5 M2 0.462 A/m	Grid 6 M2 0.453 A/m
Grid 7 M2 0.381 A/m	Grid 8 M2 0.417 A/m	Grid 9 M2 0.409 A/m



0 dB = 0.4620 A/m = -6.71 dBA/m

DASY5 E-field Result

Date: 05.02.2013

Test Laboratory: SPEAG Lab2

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

Communication System: CW; Frequency: 1880 MHz

Medium parameters used: $\sigma = 0$ S/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: 28.12.2012;
- 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 52.8.5(1059); SEMCAD X 14.6.8(7028)

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 = 140.4 V/m; Power Drift = -0.04 dB

PMR not calibrated. PMF = 1.000 is applied.

E-field emissions = 131.9 V/m

Near-field category: M2 (AWF 0 dB)

PMF scaled E-field

Grid 1 M2 124.3 V/m	Grid 2 M2 130.5 V/m	Grid 3 M2 129.0 V/m
Grid 4 M3 85.04 V/m	Grid 5 M3 88.15 V/m	Grid 6 M3 86.17 V/m
Grid 7 M2 121.1 V/m	Grid 8 M2 131.9 V/m	Grid 9 M2 131.5 V/m

Dipole E-Field measurement @ 1880MHz/E-Scan - 1880MHz d=15mm/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 = 140.0 V/m; Power Drift = 0.00 dB

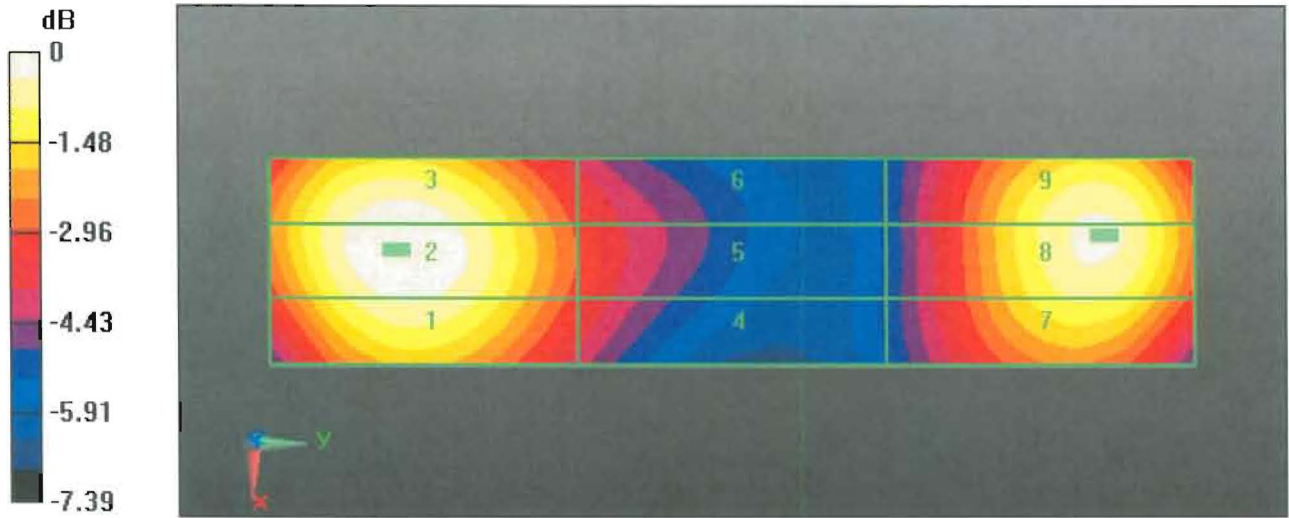
PMR not calibrated. PMF = 1.000 is applied.

E-field emissions = 88.06 V/m

Near-field category: M3 (AWF 0 dB)

PMF scaled E-field

Grid 1 M3 85.30 V/m	Grid 2 M3 88.06 V/m	Grid 3 M3 87.39 V/m
Grid 4 M3 68.48 V/m	Grid 5 M3 69.82 V/m	Grid 6 M3 69.19 V/m
Grid 7 M3 82.13 V/m	Grid 8 M3 85.63 V/m	Grid 9 M3 85.47 V/m



0 dB = 131.9 V/m = 42.40 dBV/m



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Accreditation No.: **SCS 108**

Client **Nokia Salo TCC**

Certificate No: **CD1880V3-1052_Jun13**

CALIBRATION CERTIFICATE

Object **CD1880V3 - SN: 1052**

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

Calibration date: **June 11, 2013**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
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Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
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Power sensor HP 8481A	US37292783	01-Nov-12 (No. 217-01640)	Oct-13
Reference 10 dB Attenuator	SN: 5047.2 (10q)	04-Apr-13 (No. 217-01731)	Apr-14
Probe ER3DV6	SN: 2336	28-Dec-12 (No. ER3-2336_Dec12)	Dec-13
Probe H3DV6	SN: 6065	28-Dec-12 (No. H3-6065_Dec12)	Dec-13
DAE4	SN: 781	03-Jun-13 (No. DAE4-781_Jun13)	Jun-14
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter Agilent 4419B	SN: GB42420191	09-Oct-09 (in house check Oct-12)	In house check: Oct-13
Power sensor HP E4412A	SN: MY41495277	01-Apr-08 (in house check Oct-12)	In house check: Oct-13
Power sensor HP 8482A	SN: US37295597	09-Oct-09 (in house check Oct-12)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-12)	In house check: Oct-13
RF generator R&S SMT-06	SN: 832283/011	27-Aug-12 (in house check Oct-12)	In house check: Oct-14

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

Approved by: **Fin Bomholt** Name: Fin Bomholt Function: Deputy Technical Manager

Signature

Issued: June 13, 2013

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Measurement Conditions

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

DASY Version	DASY5	V52.8.7
Phantom	HAC Test Arch	
Distance Dipole Top - Probe Center	15 mm	
Scan resolution	dx, dy = 5 mm	
Frequency	1880 MHz \pm 1 MHz	
Input power drift	< 0.05 dB	

Maximum Field values at 1880 MHz

E-field 15 mm above dipole surface	condition	Interpolated maximum
Maximum measured above high end	100 mW input power	93.3 V / m
Maximum measured above low end	100 mW input power	91.6 V / m
Averaged maximum above arm	100 mW input power	92.5 V / m \pm 12.8 % (k=2)

Appendix

Antenna Parameters

Frequency	Return Loss	Impedance
1730 MHz	21.6 dB	47.4 Ω + 7.6 j Ω
1880 MHz	20.6 dB	51.8 Ω + 9.4 j Ω
1900 MHz	21.4 dB	53.8 Ω + 8.0 j Ω
1950 MHz	26.3 dB	55.0 Ω - 0.6 j Ω
2000 MHz	21.0 dB	41.8 Ω + 0.0 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.

DASY5 E-field Result

Date: 11.06.2013

Test Laboratory: SPEAG Lab2

DUT: HAC Dipole 1880 MHz; Type: CD1880V3; Serial: CD1880V3 - SN: 1052

Communication System: UID 0 - CW; Frequency: 1880 MHz
 Medium parameters used: $\sigma = 0 \text{ S/m}$, $\epsilon_r = 1$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: RF Section
 Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

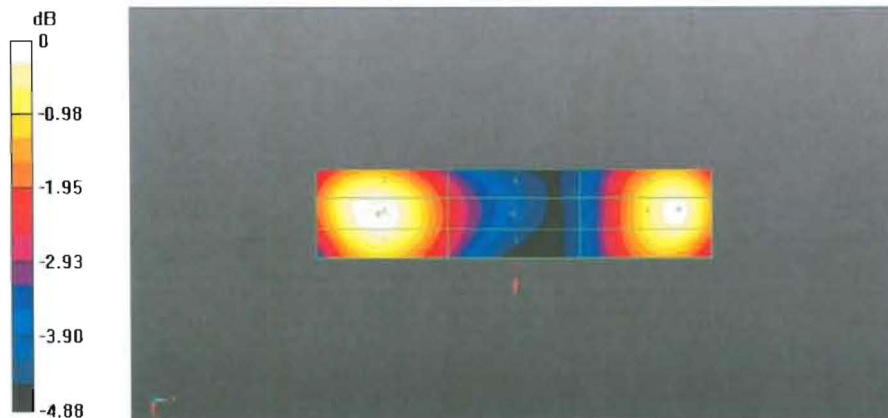
- Probe: ER3DV6 - SN2336; ConvF(1, 1, 1); Calibrated: 28.12.2012;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 03.06.2013
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Dipole E-Field measurement @ 1880MHz/E-Scan - 1880MHz d=15mm/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 = 164.8 V/m; Power Drift = -0.01 dB
 PMR not calibrated. PMF = 1.000 is applied.
 E-field emissions = 93.33 V/m
Near-field category: M3 (AWF 0 dB)

PMF scaled E-field

Grid 1 M3	Grid 2 M3	Grid 3 M3
91.35 V/m	93.33 V/m	91.77 V/m
Grid 4 M3	Grid 5 M3	Grid 6 M3
72.05 V/m	72.88 V/m	71.74 V/m
Grid 7 M3	Grid 8 M3	Grid 9 M3
89.28 V/m	91.58 V/m	90.69 V/m



0 dB = 93.33 V/m = 39.40 dBV/m