

HAC RF Emissions Test Report

Test report no.:	RF_RM-927_01	Date of report:	2013-09-10
Template version:	12.0	Number of pages:	36
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Measurements made by:	Janne Hirsimäki, Sami Savela		
Tested devices:	RM-927		
FCC ID:	QMND	IC:	661X-D
Supplement reports:	T-Coil_RM-927_02, HAC_Photo_RM-927_03, 101237626LEX-001, 101237626LEX-002		
Testing has been carried out in accordance with:	ANSI C63.19-2011 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:			

CONTENTS

1. SUMMARY OF HAC RF EMISSION TEST REPORT	3
1.1 TEST DETAILS.....	3
1.2 MAXIMUM RESULTS.....	3
1.2.1 <i>Electric field measurements</i>	3
1.2.2 <i>Overall RF emissions category of the tested device</i>	4
1.2.3 <i>Maximum Drift</i>	4
1.2.4 <i>Measurement Uncertainty</i>	4
2. DESCRIPTION OF THE DEVICE UNDER TEST	5
2.1 PICTURE OF DEVICE	6
3. TEST CONDITIONS	6
3.1 TEMPERATURE AND HUMIDITY.....	6
3.2 TEST SIGNAL, FREQUENCIES, AND OUTPUT POWER.....	6
4. DESCRIPTION OF THE TEST EQUIPMENT	7
4.1 MEASUREMENT SYSTEM AND COMPONENTS	7
4.1.1 <i>Isotropic E-field probe ER3DV6</i>	9
4.1.2 <i>Device Holder</i>	9
4.2 VALIDATION OF THE SYSTEM.....	10
5. DESCRIPTION OF THE TEST PROCEDURE	11
5.1 TEST ARCH AND DEVICE HOLDER	11
5.2 TEST POSITIONS.....	11
5.2.1 <i>Scan area centered at the acoustic output</i>	11
5.3 SCAN PROCEDURES.....	12
5.4 MODULATION INTERFERENCE FACTOR.....	12
5.5 SUB-GRID EXCLUSION.....	13
5.6 CATEGORY LIMITS.....	13
6. MEASUREMENT UNCERTAINTY.....	14
7. RESULTS	15
APPENDIX A: SYSTEM VALIDATION SCANS	16
APPENDIX B: MEASUREMENT SCANS.....	22
APPENDIX C: RELEVANT PAGES FROM PROBE CALIBRATION REPORT(S)	35
APPENDIX D: RELEVANT PAGES FROM DIPOLE VALIDATION KIT REPORT(S)	36

1. SUMMARY OF HAC RF EMISSION TEST REPORT

1.1 Test Details

Period of test	2013-08-08 to 2013-08-20
SN, HW, SW and DUT numbers of tested device	SN: 355906/05/001259/9, HW: 0106, SW: 1028.0305.1329.2000, DUT: 17615
Batteries used in testing	-
State of sample	Prototype unit
Notes	-

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]	Conducted power	Limit of E-field max. value in category M3 [dB V/m]	Maximum E-field value after exclusion [dB V/m]	Category
GSM850	190 / 836.6	32.14 dBm	40 - 45	36.89	M4
WCDMA850	4233 / 846.6	23.23 dBm	40 - 45	4.90	M4
GSM1900	661 / 1880.0	29.68 dBm	30 - 35	29.08	M4
WCDMA1900	9262 / 1852.4	23.30 dBm	30 - 35	-0.62	M4

1.2.2 Overall RF emissions category of the tested device

Mode	E-field Category	Pass / Fail
GSM850	M4	Pass
WCDMA850	M4	Pass
GSM1900	M4	Pass
WCDMA1900	M4	Pass
Final Category	M4	Pass

1.2.3 Maximum Drift

Maximum drift during measurements	0.16 dB
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1.2.4 Measurement Uncertainty

Extended Uncertainty (k=2) 95%, E-field	16.3 %
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2. DESCRIPTION OF THE DEVICE UNDER TEST

Air-interface	Band (MHz)	Type	C63.19/ tested	Simultaneous Transmissions	Reduced power	Voice Over Digital Transport OTT Capability	HAC report number
GSM	850	VO	Yes	Yes BT, WLAN	N/A	NA	RF_RM-927_01
	1900				N/A	NA	RF_RM-927_01
	GPRS/EDGE	DT	NA	Yes BT, WLAN	N/A	YES*	-
CDMA	800 1900	V/D	Yes	Yes BT, LTE, WLAN	N/A	YES	101237626LEX-001
WCDMA	850 1900	V/D	Yes	Yes BT, WLAN	N/A	YES	RF_RM-927_01
LTE	750 1700/2100	DT	NA	Yes CDMA, BT, WLAN	N/A	YES*	-
BT	2450	DT	NA	Yes GSM, GPRS/EDGE, CDMA, WCDMA, LTE	N/A	YES*	-
WLAN	2450 5000	DT	NA	Yes GSM, GPRS/EDGE, CDMA, WCDMA, LTE	N/A	YES*	-

VO Voice CMRS/PSTN Service Only
V/D Voice CMRS/PSTN and Data Service
DT Digital Transport

*supports only non CMRS voice (OTT).

HAC rating was evaluated for voice mode only in GSM and WCDMA air interfaces in this report.
HAC rating for CDMA was evaluated in separate test report 101237626LEX-001.

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.

2.1 Picture of Device

See separate report HAC_Photo_RM-927_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 conducted output power of the device was measured by a separate test laboratory on the same unit as used for HAC testing. The results are given in the HAC result tables.

4. DESCRIPTION OF THE TEST EQUIPMENT

4.1 Measurement system and components

The measurements were performed using an automated near-field scanning system, DASYS, 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	555	12 months	2014-01
DAE 4	1213	12 months	2014-01
E-field Probe ER3DV6	2309	12 months	2014-02
Dipole Validation Kit, CD835V3	1004	24 months	2015-02
Dipole Validation Kit, CD835V3	1064	24 months	2015-06
Dipole Validation Kit, CD1880V3	1003	24 months	2015-02
Dipole Validation Kit, CD1880V3	1052	24 months	2015-06
DASY52 software	Version 52.8	-	-

Additional test equipment used in testing and validation:

Test Equipment	Model	Serial Number	Calibration interval	Calibration expiry
Signal Generator	E4436B	US39260114	12 months	2013-08
Signal Generator	SME 06	836407/007	12 months	2013-08
Amplifier	5S1G4	25583	-	-
Amplifier	ZHL-48 (SMA)	022488	-	-
Power Meter	NRVS	849305/005	12 months	2013-08
Power Meter	NRVD	840297/032	24 months	2014-05
Power Sensor	NRV-Z32	825600/002	12 months	2013-08
Power Sensor	NRV-Z53	848532/001	24 months	2014-08
Call Tester	CMU 200	101111	-	-
Call Tester	CMU-200	835734/097	-	-

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 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 15mm distance between top surface of the dipole and calibration point of the probe.

System Validation, E-field

f [MHz]	Dipole SN	Description	E-field [V/m]
835	1004	Reference result ± 10% window	105.3 94.8 – 115.8
		2013-08-08	111.3
835	1064	Reference result ± 10% window	108.0 97.2 – 118.8
		2013-08-12	111.3
1880	1003	Reference result ± 10% window	88.06 79.3 – 96.9
		2013-08-08	89.95
1880	1052	Reference result ± 10% window	93.33 84.0 – 102.7
		2013-08-12	88.35
		2013-08-20	91.47

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 E-field using appropriate probe. DASY software divides detected values into 3 x 3 sub grids as described in the C63.19 standard.

5.4 Modulation Interference Factor

The HAC Standard ANSI C63.19-2011 defines a new scaling using the Modulation Interference Factor (MIF) which replaces the need for the Articulation Weighting Factor (AWF) during the evaluation and is applicable to any modulation scheme.

The Modulation Interference Factor (MIF, in dB) is added to the measured average E-field (in dBV/m) and converts it to the RF Audio Interference Potential (RFAIP, in dBV/m). This level considers the audible amplitude modulation components in the RF E-field. CW fields without amplitude modulation are assumed to not interfere with the hearing aid electronics. Modulations without time slots and low fluctuations at low frequencies have low MIF values, TDMA modulations with narrow transmission slots and repetition rates of few 100 Hz have high MIF values and give similar classification as ANSI C63.19-2007.

DASY52 is using the indirect measurement method according to ANSI C63.19-2011 and near field probe read the averaged E-field. Especially for the new high peak-to-average (PAR) signal types, the probes shall be linearized by PMR calibration in order to not overestimate the field reading.

DASY52 uses well-defined signals for PMR calibration. The MIF of these signals has been determined numerically. It allows a precise scaling and is therefore automatically applied. The following table lists the MIF values evaluated by SPEAG and the detailed parameters for E-field probe can be found in the probe calibration report in the appendix C.

UID	UID Version Date	Communication system	MIF (dB)
10021-CAA	2013-05-31	GSM-FDD (TDMA, GMSK)	3.63
10011-CAA	2013-05-31	UMTS-FDD (WCDMA)	-27.23

The MIF measurement uncertainty is estimated by SPEAG:

MIF (dB)	MIF Measurement Uncertainty (dB)
-7 to +5	0.2
-13 to +11	0.5
> -20	1.0

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 E-field measurements three contiguous blocks may be excluded from the measurements except the center block may never 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 – 2011.

Category	Limits for E-Field Emissions	
	E-field <960 MHz [dB V/m]	E-field >960 MHz [dB V/m]
M1	50 – 55	40 – 45
M2	45 – 50	35 – 40
M3	40 – 45	30 – 35
M4	< 40	< 30

6. MEASUREMENT UNCERTAINTY

Source of Uncertainty	Tolerance ±%	Prob. Dist.	Div.	ci E	ci H	Standard Uncertainty ±%, E
MEASUREMENT SYSTEM						
Probe Calibration	5.1	N	1	1	1	5.1
Axial Isotropy	4.7	R	√3	1	1	2.7
Sensor Displacement	16.5	R	√3	1	0.145	9.5
Boundary Effects	2.4	R	√3	1	1	1.4
Phantom Boundary Effect	7.2	R	√3	1	0	4.1
Linearity	4.7	R	√3	1	1	2.7
Scaling with PMR calibration	10.0	R	√3	1	1	5.8
System Detection Limit	1.0	R	√3	1	1	0.6
Readout Electronics	0.3	N	1	1	1	0.3
Response Time	0.8	R	√3	1	1	0.5
Integration Time	2.6	R	√3	1	1	1.5
RF Ambient Conditions	3.0	R	√3	1	1	1.7
RF Reflections	12.0	R	√3	1	1	6.9
Probe Positioner	1.2	R	√3	1	0.67	0.7
Probe Positioning	4.7	R	√3	1	0.67	2.7
Extrapolation and Interpolation	1.0	R	√3	1	1	0.6
TEST SAMPLE RELATED						
Device Positioning Vertical	4.7	R	√3	1	0.67	2.7
Device Positioning Lateral	1.0	R	√3	1	1	0.6
Device Holder and Phantom	2.4	R	√3	1	1	1.4
Power Drift	5.0	R	√3	1	1	2.9
PHANTOM AND SETUP RELATED						
Phantom Thickness	2.4	R	√3	1	0.67	1.4
Combined Standard Uncertainty						16.3
Expanded Uncertainty on Power						32.6
Expanded Uncertainty on Field						16.3

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	Conducted Power	32.12 dBm	32.14 dBm	32.15 dBm
	E-field [dB V/m]	35.84	36.89	35.90
	Category	M4	M4	M4

WCDMA850, RF emissions results

Mode	Test configuration	Ch 4132 826.4 MHz	Ch 4175 835.0 MHz	Ch 4233 846.6 MHz
WCDMA850	Conducted Power	23.17 dBm	23.29 dBm	23.23 dBm
	E-field [dB V/m]	3.90	4.61	4.90
	Category	M4	M4	M4

GSM1900, RF emissions results

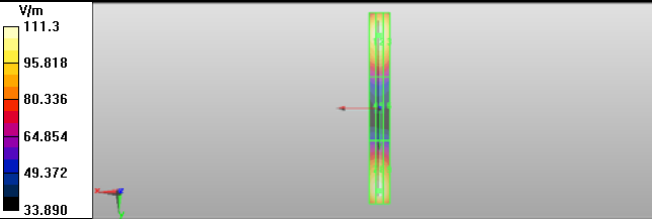
Mode	Test configuration	Ch 512 1850.2MHz	Ch 661 1880.0MHz	Ch 810 1909.8MHz
GSM1900	Conducted Power	29.75 dBm	29.68 dBm	29.75 dBm
	E-field [dB V/m]	28.74	29.08	28.36
	Category	M4	M4	M4

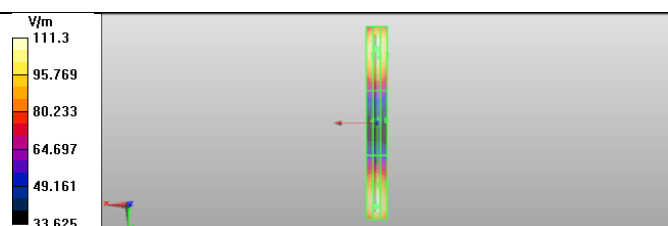
WCDMA1900, RF emissions results

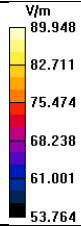
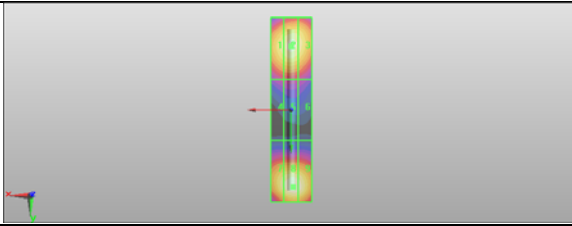
Mode	Test configuration	Ch 9262 1852.4MHz	Ch 9400 1880.0MHz	Ch 9538 1907.6MHz
WCDMA1900	Conducted Power	23.30 dBm	23.27 dBm	23.21 dBm
	E-field [dB V/m]	-0.62	-1.30	-2.33
	Category	M4	M4	M4

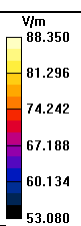
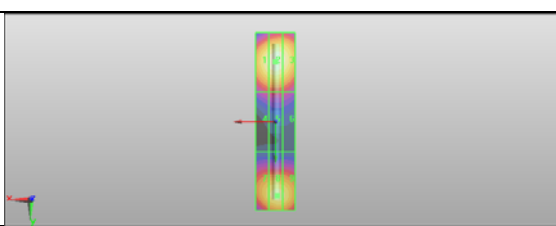
Plots of the measurement scans are shown in **Appendix B**. Excluded cells are colored orange.

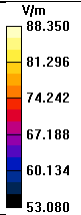
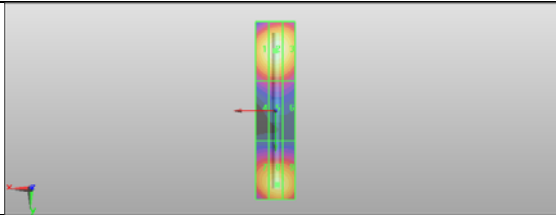
APPENDIX A: SYSTEM VALIDATION SCANS

SYSTEM VALIDATION DATA 850MHz											
Date/Time: 2013-08-08 10:04:51 Test Laboratory: TCC Nokia Type: CD835V3; Serial: 1004											
Communication System: CW Frequency: 835 MHz; Duty Cycle: 1:1 Medium: Air; Medium Notes: - Medium parameters used: $\sigma = 0$ S/m, $\epsilon_r = 1$; $\rho = 0$ 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 Sn555; Calibrated: 2013-01-11 - Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: - - Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.10 (7164)											
Dipole E-Field measurement 835MHz/E Scan - measurement distance from the probe sensor center to CD835 Dipole = 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 = 106.9 V/m; Power Drift = 0.01 dB PMR not calibrated. PMF = 1.000 is applied. E-field emissions = 111.3 V/m											
											
<table border="1"> <tbody> <tr> <td>Grid 1 M4 110.3 V/m</td> <td>Grid 2 M4 111.3 V/m</td> <td>Grid 3 M4 109.1 V/m</td> </tr> <tr> <td>Grid 4 M4 65.34 V/m</td> <td>Grid 5 M4 66.86 V/m</td> <td>Grid 6 M4 65.58 V/m</td> </tr> <tr> <td>Grid 7 M4 109.2 V/m</td> <td>Grid 8 M4 110.5 V/m</td> <td>Grid 9 M4 107.9 V/m</td> </tr> </tbody> </table>			Grid 1 M4 110.3 V/m	Grid 2 M4 111.3 V/m	Grid 3 M4 109.1 V/m	Grid 4 M4 65.34 V/m	Grid 5 M4 66.86 V/m	Grid 6 M4 65.58 V/m	Grid 7 M4 109.2 V/m	Grid 8 M4 110.5 V/m	Grid 9 M4 107.9 V/m
Grid 1 M4 110.3 V/m	Grid 2 M4 111.3 V/m	Grid 3 M4 109.1 V/m									
Grid 4 M4 65.34 V/m	Grid 5 M4 66.86 V/m	Grid 6 M4 65.58 V/m									
Grid 7 M4 109.2 V/m	Grid 8 M4 110.5 V/m	Grid 9 M4 107.9 V/m									

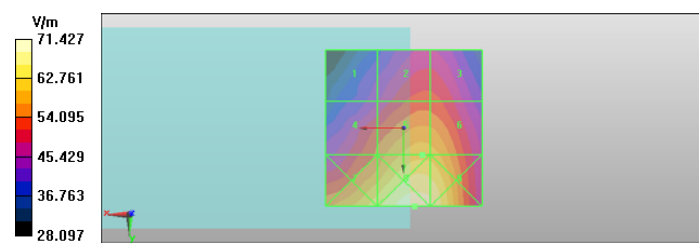
SYSTEM VALIDATION DATA 850MHz										
Date/Time: 2013-08-12 12:27:04 Test Laboratory: TCC Nokia Type: CD835V3; Serial: 1064										
Communication System: CW Frequency: 835 MHz; Duty Cycle: 1:1 Medium: Air; Medium Notes: Not Specified Medium parameters used: $\sigma = 0$ S/m, $\epsilon_r = 1$; $\rho = 0$ 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 Sn1213; Calibrated: 2013-01-11 - Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: - - Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.10 (7164)										
Dipole E-Field measurement 835MHz/E Scan - measurement distance from the probe sensor center to CD835 Dipole = 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 = 108.2 V/m; Power Drift = 0.07 dB PMR not calibrated. PMF = 1.000 is applied. E-field emissions = 111.3 V/m										
										
<table border="1"> <tbody> <tr> <td>Grid 1 M4 109.5 V/m</td> <td>Grid 2 M4 111.3 V/m</td> <td>Grid 3 M4 109.6 V/m</td> </tr> <tr> <td>Grid 4 M4 65.50 V/m</td> <td>Grid 5 M4 66.35 V/m</td> <td>Grid 6 M4 65.09 V/m</td> </tr> <tr> <td>Grid 7 M4 108.8 V/m</td> <td>Grid 8 M4 110.8 V/m</td> <td>Grid 9 M4 109.0 V/m</td> </tr> </tbody> </table>		Grid 1 M4 109.5 V/m	Grid 2 M4 111.3 V/m	Grid 3 M4 109.6 V/m	Grid 4 M4 65.50 V/m	Grid 5 M4 66.35 V/m	Grid 6 M4 65.09 V/m	Grid 7 M4 108.8 V/m	Grid 8 M4 110.8 V/m	Grid 9 M4 109.0 V/m
Grid 1 M4 109.5 V/m	Grid 2 M4 111.3 V/m	Grid 3 M4 109.6 V/m								
Grid 4 M4 65.50 V/m	Grid 5 M4 66.35 V/m	Grid 6 M4 65.09 V/m								
Grid 7 M4 108.8 V/m	Grid 8 M4 110.8 V/m	Grid 9 M4 109.0 V/m								

SYSTEM VALIDATION DATA 1900MHZ											
Date/Time: 2013-08-08 08:17:05 Test Laboratory: TCC Nokia Type: CD1880V3; Serial: 1003											
Communication System: CW Frequency: 1880 MHz; Duty Cycle: 1:1 Medium: Air; Medium Notes: - Medium parameters used: $\sigma = 0$ S/m, $\epsilon_r = 1$; $\rho = 0$ 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 Sn555; Calibrated: 2013-01-11 - Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: - - Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.10 (7164)											
Dipole E-Field measurement 1880MHz/E Scan - measurement distance from the probe sensor center to CD1880 Dipole = 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 = 157.9 V/m; Power Drift = 0.01 dB PMR not calibrated. PMF = 1.000 is applied. E-field emissions = 89.95 V/m											
 <p>V/m 89.948 82.711 75.474 68.238 61.001 53.764</p>											
<table border="1"> <tbody> <tr> <td>Grid 1 M3 87.00 V/m</td> <td>Grid 2 M3 88.43 V/m</td> <td>Grid 3 M3 87.16 V/m</td> </tr> <tr> <td>Grid 4 M3 70.72 V/m</td> <td>Grid 5 M3 71.35 V/m</td> <td>Grid 6 M3 70.07 V/m</td> </tr> <tr> <td>Grid 7 M3 87.44 V/m</td> <td>Grid 8 M3 89.95 V/m</td> <td>Grid 9 M3 89.25 V/m</td> </tr> </tbody> </table>			Grid 1 M3 87.00 V/m	Grid 2 M3 88.43 V/m	Grid 3 M3 87.16 V/m	Grid 4 M3 70.72 V/m	Grid 5 M3 71.35 V/m	Grid 6 M3 70.07 V/m	Grid 7 M3 87.44 V/m	Grid 8 M3 89.95 V/m	Grid 9 M3 89.25 V/m
Grid 1 M3 87.00 V/m	Grid 2 M3 88.43 V/m	Grid 3 M3 87.16 V/m									
Grid 4 M3 70.72 V/m	Grid 5 M3 71.35 V/m	Grid 6 M3 70.07 V/m									
Grid 7 M3 87.44 V/m	Grid 8 M3 89.95 V/m	Grid 9 M3 89.25 V/m									

SYSTEM VALIDATION DATA 1900MHz											
Date/Time: 2013-08-12 12:52:33 Test Laboratory: TCC Nokia Type: CD1880V3; Serial: 1052											
Communication System: CW Frequency: 1880 MHz; Duty Cycle: 1:1 Medium: Air; Medium Notes: - 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 Sn1213; Calibrated: 2013-01-11 - Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: - - Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.10 (7164)											
Dipole E-Field measurement 1880MHz/E Scan - measurement distance from the probe sensor center to CD1880 Dipole = 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 = 147.2 V/m; Power Drift = 0.00 dB PMR not calibrated. PMF = 1.000 is applied. E-field emissions = 88.35 V/m											
											
<table border="1"> <tr> <td>Grid 1 M3 86.76 V/m</td> <td>Grid 2 M3 88.35 V/m</td> <td>Grid 3 M3 87.22 V/m</td> </tr> <tr> <td>Grid 4 M3 70.58 V/m</td> <td>Grid 5 M3 71.44 V/m</td> <td>Grid 6 M3 70.47 V/m</td> </tr> <tr> <td>Grid 7 M3 82.99 V/m</td> <td>Grid 8 M3 85.20 V/m</td> <td>Grid 9 M3 84.61 V/m</td> </tr> </table>			Grid 1 M3 86.76 V/m	Grid 2 M3 88.35 V/m	Grid 3 M3 87.22 V/m	Grid 4 M3 70.58 V/m	Grid 5 M3 71.44 V/m	Grid 6 M3 70.47 V/m	Grid 7 M3 82.99 V/m	Grid 8 M3 85.20 V/m	Grid 9 M3 84.61 V/m
Grid 1 M3 86.76 V/m	Grid 2 M3 88.35 V/m	Grid 3 M3 87.22 V/m									
Grid 4 M3 70.58 V/m	Grid 5 M3 71.44 V/m	Grid 6 M3 70.47 V/m									
Grid 7 M3 82.99 V/m	Grid 8 M3 85.20 V/m	Grid 9 M3 84.61 V/m									

SYSTEM VALIDATION DATA 1900MHZ																				
Date/Time: 2013-08-20 09:55:33 Test Laboratory: TCC Nokia Type: CD1880V3; Serial: 1052																				
Communication System: CW Frequency: 1880 MHz; Duty Cycle: 1:1 Medium: Air; Medium Notes: Not Specified Medium parameters used: $\sigma = 0$ S/m, $\epsilon_r = 1$; $\rho = 0$ 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 Sn1213; Calibrated: 2013-01-11 - Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: - - Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.10 (7164)																				
Dipole E-Field measurement 1880MHz/E Scan - measurement distance from the probe sensor center to CD1880 Dipole = 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 = 150.8 V/m; Power Drift = 0.03 dB PMR not calibrated. PMF = 1.000 is applied. E-field emissions = 91.47 V/m																				
																				
<table border="1" style="margin-left: auto; margin-right: auto;"> <tbody> <tr> <td>Grid 1 M3</td> <td>Grid 2 M3</td> <td>Grid 3 M3</td> </tr> <tr> <td>89.87 V/m</td> <td>91.47 V/m</td> <td>90.03 V/m</td> </tr> <tr> <td>Grid 4 M3</td> <td>Grid 5 M3</td> <td>Grid 6 M3</td> </tr> <tr> <td>71.63 V/m</td> <td>72.53 V/m</td> <td>71.20 V/m</td> </tr> <tr> <td>Grid 7 M3</td> <td>Grid 8 M3</td> <td>Grid 9 M3</td> </tr> <tr> <td>84.64 V/m</td> <td>86.95 V/m</td> <td>86.19 V/m</td> </tr> </tbody> </table>			Grid 1 M3	Grid 2 M3	Grid 3 M3	89.87 V/m	91.47 V/m	90.03 V/m	Grid 4 M3	Grid 5 M3	Grid 6 M3	71.63 V/m	72.53 V/m	71.20 V/m	Grid 7 M3	Grid 8 M3	Grid 9 M3	84.64 V/m	86.95 V/m	86.19 V/m
Grid 1 M3	Grid 2 M3	Grid 3 M3																		
89.87 V/m	91.47 V/m	90.03 V/m																		
Grid 4 M3	Grid 5 M3	Grid 6 M3																		
71.63 V/m	72.53 V/m	71.20 V/m																		
Grid 7 M3	Grid 8 M3	Grid 9 M3																		
84.64 V/m	86.95 V/m	86.19 V/m																		

APPENDIX B: MEASUREMENT SCANS

MEASUREMENT DATA GSM850, CHANNEL LOW (824.2 MHz)																		
<p>Date/Time: 2013-08-09 09:37:15 Test Laboratory: TCC Nokia Type: RM-927; Serial: 355906/05/001259/9 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</p>																		
<p>DASY Configuration: - Probe: ER3DV6 - SN2309 - ConvF(1, 1, 1); Calibrated: 2013-02-11; - Sensor-Surface: (Fix Surface) - Electronics: DAE4 Sn555; Calibrated: 2013-01-11 - Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: - - Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.10 (7164)</p>																		
<p>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 = 45.44 V/m; Power Drift = -0.07 dB Applied MIF = 3.63 dB RF audio interference level = 35.84 dBV/m Emission category: M4</p>																		
<p>MIF scaled E-field</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Grid 1 M4</td> <td>Grid 2 M4</td> <td>Grid 3 M4</td> </tr> <tr> <td>33.12 dBV/m</td> <td>34.45 dBV/m</td> <td>34.44 dBV/m</td> </tr> <tr> <td>Grid 4 M4</td> <td>Grid 5 M4</td> <td>Grid 6 M4</td> </tr> <tr> <td>34.79 dBV/m</td> <td>35.84 dBV/m</td> <td>35.8 dBV/m</td> </tr> <tr> <td>Grid 7 M4</td> <td>Grid 8 M4</td> <td>Grid 9 M4</td> </tr> <tr> <td>36.25 dBV/m</td> <td>37.08 dBV/m</td> <td>36.82 dBV/m</td> </tr> </table>	Grid 1 M4	Grid 2 M4	Grid 3 M4	33.12 dBV/m	34.45 dBV/m	34.44 dBV/m	Grid 4 M4	Grid 5 M4	Grid 6 M4	34.79 dBV/m	35.84 dBV/m	35.8 dBV/m	Grid 7 M4	Grid 8 M4	Grid 9 M4	36.25 dBV/m	37.08 dBV/m	36.82 dBV/m
Grid 1 M4	Grid 2 M4	Grid 3 M4																
33.12 dBV/m	34.45 dBV/m	34.44 dBV/m																
Grid 4 M4	Grid 5 M4	Grid 6 M4																
34.79 dBV/m	35.84 dBV/m	35.8 dBV/m																
Grid 7 M4	Grid 8 M4	Grid 9 M4																
36.25 dBV/m	37.08 dBV/m	36.82 dBV/m																
																		

MEASUREMENT DATA GSM850, CHANNEL MIDDLE (836.6 MHZ)

Date/Time: 2013-08-09 09:28:38
 Test Laboratory: TCC Nokia
Type: RM-927; Serial: 355906/05/001259/9
 Communication System: GSM-FDD (TDMA, GMSK)
 Frequency: 836.6 MHz; Duty Cycle: 1:8.6896
 Medium: Air; Medium Notes: -
 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 Sn555; Calibrated: 2013-01-11
 - Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: -
 - Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.10 (7164)

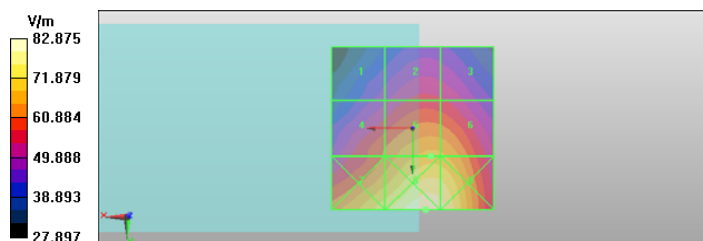
Device E-Field measurement with ER probe/E Scan - GSM850 - Middle/Hearing Aid Compatibility Test (101x101x1):

Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
 Device Reference Point: 0, 0, -6.3 mm
 Reference Value = 50.35 V/m; Power Drift = -0.04 dB
 Applied MIF = 3.63 dB
 RF audio interference level = 36.89 dBV/m

Emission category: M4

MIF scaled E-field

Grid 1 M4 33.84 dBV/m	Grid 2 M4 34.84 dBV/m	Grid 3 M4 34.72 dBV/m
Grid 4 M4 35.81 dBV/m	Grid 5 M4 36.89 dBV/m	Grid 6 M4 36.82 dBV/m
Grid 7 M4 37.48 dBV/m	Grid 8 M4 38.37 dBV/m	Grid 9 M4 38.16 dBV/m



MEASUREMENT DATA GSM850, CHANNEL HIGH (848.8 MHz)

Date/Time: 2013-08-09 09:43:44
 Test Laboratory: TCC Nokia
Type: RM-927; Serial: 355906/05/001259/9
 Communication System: GSM-FDD (TDMA, GMSK)
 Frequency: 848.8 MHz; Duty Cycle: 1:8.6896
 Medium: Air; Medium Notes: -
 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 Sn555; Calibrated: 2013-01-11
 - Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: -
 - Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.10 (7164)

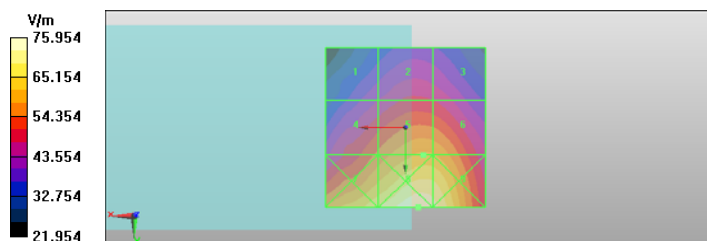
Device E-Field measurement with ER probe/E Scan - GSM850 - High/Hearing Aid Compatibility Test (101x101x1):

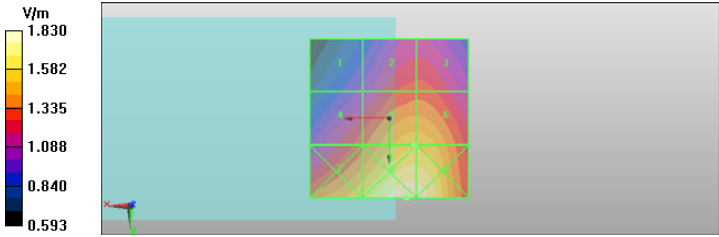
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
 Device Reference Point: 0, 0, -6.3 mm
 Reference Value = 44.55 V/m; Power Drift = -0.01 dB
 Applied MIF = 3.63 dB
 RF audio interference level = 35.90 dBV/m

Emission category: M4

MIF scaled E-field

Grid 1 M4 32.82 dBV/m	Grid 2 M4 33.66 dBV/m	Grid 3 M4 33.49 dBV/m
Grid 4 M4 34.89 dBV/m	Grid 5 M4 35.9 dBV/m	Grid 6 M4 35.84 dBV/m
Grid 7 M4 36.79 dBV/m	Grid 8 M4 37.61 dBV/m	Grid 9 M4 37.38 dBV/m



MEASUREMENT DATA WCDMA850, CHANNEL LOW (826.4 MHZ)										
<p>Date/Time: 2013-08-13 09:22:14 Test Laboratory: TCC Nokia Type: RM-927; Serial: 355906/05/001259/9 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</p>										
<p>DASY Configuration: - Probe: ER3DV6 - SN2309 - ConvF(1, 1, 1); Calibrated: 2013-02-11; - Sensor-Surface: (Fix Surface) - Electronics: DAE4 Sn1213; Calibrated: 2013-01-11 - Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: - - Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)</p>										
<p>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 = 37.89 V/m; Power Drift = 0.00 dB Applied MIF = -27.23 dB RF audio interference level = 3.90 dBV/m Emission category: M4</p>										
<p>MIF scaled E-field</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Grid 1 M4 0.4 dBV/m</td> <td>Grid 2 M4 2.29 dBV/m</td> <td>Grid 3 M4 2.3 dBV/m</td> </tr> <tr> <td>Grid 4 M4 2.37 dBV/m</td> <td>Grid 5 M4 3.9 dBV/m</td> <td>Grid 6 M4 3.9 dBV/m</td> </tr> <tr> <td>Grid 7 M4 4.12 dBV/m</td> <td>Grid 8 M4 5.25 dBV/m</td> <td>Grid 9 M4 5.19 dBV/m</td> </tr> </table>		Grid 1 M4 0.4 dBV/m	Grid 2 M4 2.29 dBV/m	Grid 3 M4 2.3 dBV/m	Grid 4 M4 2.37 dBV/m	Grid 5 M4 3.9 dBV/m	Grid 6 M4 3.9 dBV/m	Grid 7 M4 4.12 dBV/m	Grid 8 M4 5.25 dBV/m	Grid 9 M4 5.19 dBV/m
Grid 1 M4 0.4 dBV/m	Grid 2 M4 2.29 dBV/m	Grid 3 M4 2.3 dBV/m								
Grid 4 M4 2.37 dBV/m	Grid 5 M4 3.9 dBV/m	Grid 6 M4 3.9 dBV/m								
Grid 7 M4 4.12 dBV/m	Grid 8 M4 5.25 dBV/m	Grid 9 M4 5.19 dBV/m								
										

MEASUREMENT DATA WCDMA850, CHANNEL MIDDLE (835 MHZ)

Date/Time: 2013-08-13 09:48:57
 Test Laboratory: TCC Nokia
Type: RM-927; Serial: 355906/05/001259/9
 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 Sn1213; Calibrated: 2013-01-11
 - Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: -
 - Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

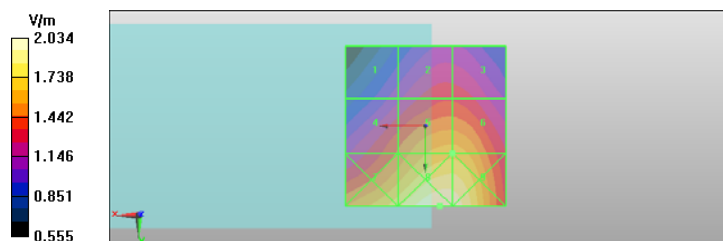
Device E-Field measurement with ER probe/E Scan - WCDMA5 - Middle/Hearing Aid Compatibility Test (101x101x1):

Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
 Device Reference Point: 0, 0, -6.3 mm
 Reference Value = 41.15 V/m; Power Drift = -0.06 dB
 Applied MIF = -27.23 dB
 RF audio interference level = 4.61 dBV/m

Emission category: M4

MIF scaled E-field

Grid 1 M4 1.05 dBV/m	Grid 2 M4 2.51 dBV/m	Grid 3 M4 2.48 dBV/m
Grid 4 M4 3.31 dBV/m	Grid 5 M4 4.61 dBV/m	Grid 6 M4 4.61 dBV/m
Grid 7 M4 5.17 dBV/m	Grid 8 M4 6.17 dBV/m	Grid 9 M4 6.06 dBV/m



MEASUREMENT DATA WCDMA850, CHANNEL HIGH (846.6 MHz)

Date/Time: 2013-08-13 09:56:46
 Test Laboratory: TCC Nokia
Type: RM-927; Serial: 355906/05/001259/9
 Communication System UMTS-FDD (WCDMA)
 Frequency: 846.6 MHz; Duty Cycle: 1:1.95434
 Medium: Air; Medium Notes: -
 Medium parameters used: $\sigma = 0$ S/m, $\epsilon_r = 1$; $\rho = 0$ kg/m³
 Phantom section: RF Section

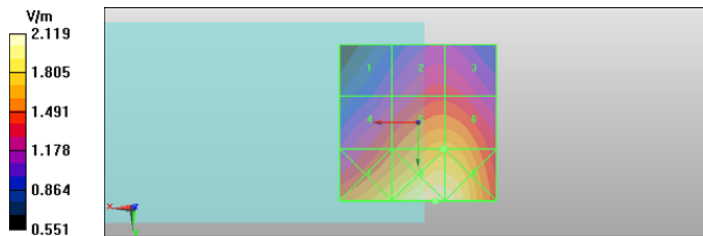
DASY Configuration:
 - Probe: ER3DV6 - SN2309
 - ConvF(1, 1, 1); Calibrated: 2013-02-11;
 - Sensor-Surface: (Fix Surface)
 - Electronics: DAE4 Sn1213; Calibrated: 2013-01-11
 - Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: -
 - Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

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 = 42.11 V/m; Power Drift = 0.03 dB
 Applied MIF = -27.23 dB
 RF audio interference level = 4.90 dBV/m
Emission category: M4

MIF scaled E-field

Grid 1 M4 1.06 dBV/m	Grid 2 M4 2.66 dBV/m	Grid 3 M4 2.64 dBV/m
Grid 4 M4 3.34 dBV/m	Grid 5 M4 4.9 dBV/m	Grid 6 M4 4.9 dBV/m
Grid 7 M4 5.37 dBV/m	Grid 8 M4 6.52 dBV/m	Grid 9 M4 6.45 dBV/m



MEASUREMENT DATA GSM1900, CHANNEL LOW (1850.2 MHZ)

Date/Time: 2013-08-09 09:02:47
 Test Laboratory: TCC Nokia
Type: RM-927; Serial: 355906/05/001259/9
 Communication System: GSM-FDD (TDMA, GMSK)
 Frequency: 1850.2 MHz; Duty Cycle: 1:8.6896
 Medium: Air; Medium Notes: -
 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 Sn555; Calibrated: 2013-01-11
 - Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: -
 - Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.10 (7164)

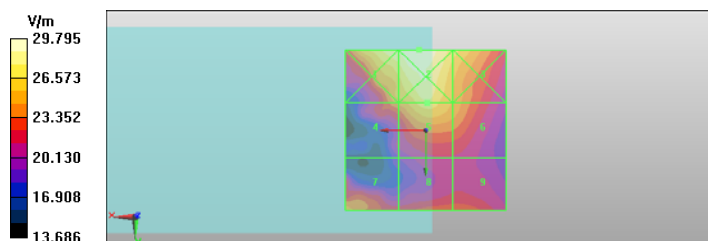
Device E-Field measurement with ER probe/E Scan - GSM1900 - Low/Hearing Aid Compatibility Test (101x101x1):

Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
 Device Reference Point: 0, 0, -6.3 mm
 Reference Value = 19.02 V/m; Power Drift = 0.04 dB
 Applied MIF = 3.63 dB
 RF audio interference level = 28.74 dBV/m

Emission category: M4

MIF scaled E-field

Grid 1 M4 29.28 dBV/m	Grid 2 M4 29.48 dBV/m	Grid 3 M4 28.69 dBV/m
Grid 4 M4 27.86 dBV/m	Grid 5 M4 28.74 dBV/m	Grid 6 M4 28.07 dBV/m
Grid 7 M4 28.05 dBV/m	Grid 8 M4 27.41 dBV/m	Grid 9 M4 27.41 dBV/m



MEASUREMENT DATA GSM1900, CHANNEL MIDDLE (1880 MHz)

Date/Time: 2013-08-09 08:55:23
 Test Laboratory: TCC Nokia
Type: RM-927; Serial: 355906/05/001259/9
 Communication System: GSM-FDD (TDMA, GMSK)
 Frequency: 1880 MHz; Duty Cycle: 1:8.6896
 Medium: Air; Medium Notes: -
 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 Sn555; Calibrated: 2013-01-11
 - Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: -
 - Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.10 (7164)

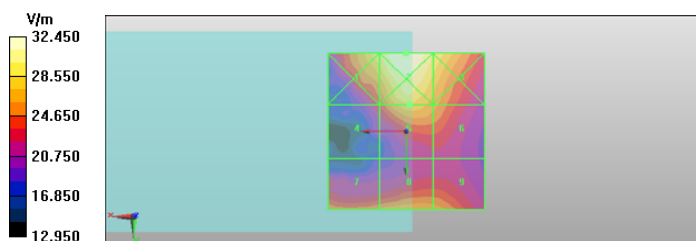
Device E-Field measurement with ER probe/E Scan - GSM1900 - Middle/Hearing Aid Compatibility Test (101x101x1):

Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
 Device Reference Point: 0, 0, -6.3 mm
 Reference Value = 17.70 V/m; Power Drift = 0.16 dB
 Applied MIF = 3.63 dB
 RF audio interference level = 29.08 dBV/m

Emission category: M4

MIF scaled E-field

Grid 1 M4 29.52 dBV/m	Grid 2 M3 30.22 dBV/m	Grid 3 M4 29.57 dBV/m
Grid 4 M4 27.42 dBV/m	Grid 5 M4 29.08 dBV/m	Grid 6 M4 28.49 dBV/m
Grid 7 M4 28.5 dBV/m	Grid 8 M4 28.81 dBV/m	Grid 9 M4 28.69 dBV/m



MEASUREMENT DATA GSM1900, CHANNEL HIGH (1909.8 MHz)

Date/Time: 2013-08-09 09:11:06
 Test Laboratory: TCC Nokia
Type: RM-927; Serial: 355906/05/001259/9
 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 Sn555; Calibrated: 2013-01-11
 - Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: -
 - Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.10 (7164)

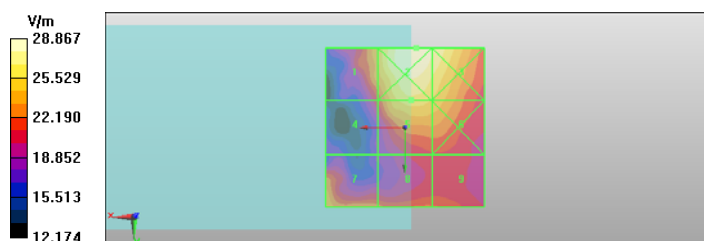
Device E-Field measurement with ER probe/E Scan - GSM1900 - High/Hearing Aid Compatibility Test (101x101x1):

Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
 Device Reference Point: 0, 0, -6.3 mm
 Reference Value = 17.84 V/m; Power Drift = 0.00 dB
 Applied MIF = 3.63 dB
 RF audio interference level = 28.36 dBV/m

Emission category: M4

MIF scaled E-field

Grid 1 M4 27.8 dBV/m	Grid 2 M4 29.21 dBV/m	Grid 3 M4 28.95 dBV/m
Grid 4 M4 26.49 dBV/m	Grid 5 M4 28.36 dBV/m	Grid 6 M4 28.11 dBV/m
Grid 7 M4 27.87 dBV/m	Grid 8 M4 27.26 dBV/m	Grid 9 M4 27.07 dBV/m



MEASUREMENT DATA WCDMA1900, CHANNEL LOW (1852.4MHZ)

Date/Time: 2013-08-12 15:40:47
 Test Laboratory: TCC Nokia
Type: RM-927; Serial: 355906/05/001259/9
 Communication System: UMTS-FDD (WCDMA)
 Frequency: 1852.4 MHz; Duty Cycle: 1:1.95434
 Medium: Air; Medium Notes: -
 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 Sn1213; Calibrated: 2013-01-11
 - Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: -
 - Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.10 (7164)

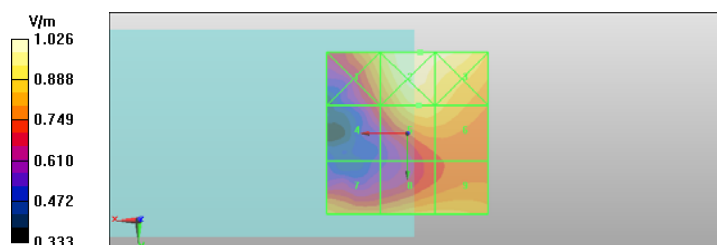
Device E-Field measurement with ER probe/E Scan - WCDMA2 - Low/Hearing Aid Compatibility Test (101x101x1):

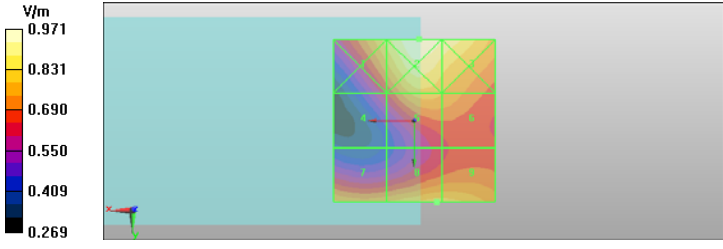
Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
 Device Reference Point: 0, 0, -6.3 mm
 Reference Value = 20.67 V/m; Power Drift = -0.16 dB
 Applied MIF = -27.23 dB
 RF audio interference level = -0.62 dBV/m

Emission category: M4

MIF scaled E-field

Grid 1 M4 -0.82 dBV/m	Grid 2 M4 0.22 dBV/m	Grid 3 M4 0.1 dBV/m
Grid 4 M4 -2.57 dBV/m	Grid 5 M4 -0.62 dBV/m	Grid 6 M4 -0.83 dBV/m
Grid 7 M4 -1.08 dBV/m	Grid 8 M4 -0.71 dBV/m	Grid 9 M4 -0.71 dBV/m



MEASUREMENT DATA WCDMA1900, CHANNEL MIDDLE (1880MHZ)																			
<p>Date/Time: 2013-08-12 15:49:57 Test Laboratory: - Type: RM-927; Serial: 355906/05/001259/9 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</p>																			
<p>DASY Configuration: - Probe: ER3DV6 - SN2309 - ConvF(1, 1, 1); Calibrated: 2013-02-11; - Sensor-Surface: (Fix Surface) - Electronics: DAE4 Sn1213; Calibrated: 2013-01-11 - Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: - - Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.10 (7164)</p>																			
<p>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 = 17.35 V/m; Power Drift = -0.12 dB Applied MIF = -27.23 dB RF audio interference level = -1.30 dBV/m Emission category: M4</p>																			
<p>MIF scaled E-field</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Grid 1 M4</td> <td>Grid 2 M4</td> <td>Grid 3 M4</td> </tr> <tr> <td>-1.36 dBV/m</td> <td>-0.25 dBV/m</td> <td>-0.62 dBV/m</td> </tr> <tr> <td>Grid 4 M4</td> <td>Grid 5 M4</td> <td>Grid 6 M4</td> </tr> <tr> <td>-3.87 dBV/m</td> <td>-1.8 dBV/m</td> <td>-2.08 dBV/m</td> </tr> <tr> <td>Grid 7 M4</td> <td>Grid 8 M4</td> <td>Grid 9 M4</td> </tr> <tr> <td>-1.9 dBV/m</td> <td>-1.3 dBV/m</td> <td>-1.32 dBV/m</td> </tr> </table>		Grid 1 M4	Grid 2 M4	Grid 3 M4	-1.36 dBV/m	-0.25 dBV/m	-0.62 dBV/m	Grid 4 M4	Grid 5 M4	Grid 6 M4	-3.87 dBV/m	-1.8 dBV/m	-2.08 dBV/m	Grid 7 M4	Grid 8 M4	Grid 9 M4	-1.9 dBV/m	-1.3 dBV/m	-1.32 dBV/m
Grid 1 M4	Grid 2 M4	Grid 3 M4																	
-1.36 dBV/m	-0.25 dBV/m	-0.62 dBV/m																	
Grid 4 M4	Grid 5 M4	Grid 6 M4																	
-3.87 dBV/m	-1.8 dBV/m	-2.08 dBV/m																	
Grid 7 M4	Grid 8 M4	Grid 9 M4																	
-1.9 dBV/m	-1.3 dBV/m	-1.32 dBV/m																	
 <p>The figure shows a color scale for E-field strength in V/m, ranging from 0.269 (dark blue) to 0.971 (yellow). A 3x3 grid is overlaid on a device model, with each grid cell corresponding to the values in the table above. The highest field strength is observed at Grid 4 M4.</p>																			

MEASUREMENT DATA WCDMA1900, CHANNEL HIGH (1907.6MHZ)

Date/Time: 2013-08-20 10:27:08
 Test Laboratory: TCC Nokia
Type: RM-927; Serial: 355906/05/001259/9
 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 Sn1213; Calibrated: 2013-01-11
 - Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: -
 - Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.10 (7164)

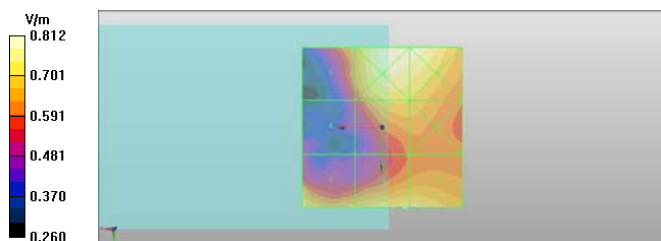
Device E-Field measurement with ER probe/E Scan - WCDMA2 - High/Hearing Aid Compatibility Test (101x101x1):

Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
 Device Reference Point: 0, 0, -6.3 mm
 Reference Value = 16.32 V/m; Power Drift = -0.14 dB
 Applied MIF = -27.23 dB
 RF audio interference level = -2.33 dBV/m

Emission category: M4

MIF scaled E-field

Grid 1 M4 -3.37 dBV/m	Grid 2 M4 -1.81 dBV/m	Grid 3 M4 -1.85 dBV/m
Grid 4 M4 -5.45 dBV/m	Grid 5 M4 -2.96 dBV/m	Grid 6 M4 -3.07 dBV/m
Grid 7 M4 -2.89 dBV/m	Grid 8 M4 -2.33 dBV/m	Grid 9 M4 -2.34 dBV/m



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



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

Accreditation No.: **SCS 108**

Client **Nokia Salo TCC**

Certificate No: **ER3-2309_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 ± 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 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

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
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.