APPENDIX E: RELEVANT PAGES FROM PROBE CALIBRATION REPORTS

Copyright © 2012 TCC Nokia

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

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

Accreditation No.: SCS 108

Client Nokia Salo TCC

Certificate No: ES3-3131_Sep11

CALIBRATION CERTIFICATE

Object: ES3DV3 - SN:3131

Calibration procedure(s): QA CAL-01.v8, QA CAL-23.v4, QA CAL-25.v4
Calibration procedure for dosimetric E-field probes

Calibration date: September 14, 2011

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	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41498087	31-Mar-11 (No. 217-01372)	Apr-12
Reference 3 dB Attenuator	SN: S5054 (3c)	29-Mar-11 (No. 217-01369)	Apr-12
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Reference 30 dB Attenuator	SN: S5129 (30b)	29-Mar-11 (No. 217-01370)	Apr-12
Reference Probe ES3DV2	SN: 3013	29-Dec-10 (No. ES3-3013_Dec10)	Dec-11
DAE4	SN: 654	3-May-11 (No. DAE4-654_May11)	May-12
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

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

Issued: September 15, 2011

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

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3131

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	41.9	0.89	6.10	6.10	6.10	0.80	1.00	± 12.0 %
835	41.5	0.90	5.88	5.88	5.88	0.80	1.31	± 12.0 %
1750	40.1	1.37	5.14	5.14	5.14	0.80	1.25	± 12.0 %
1900	40.0	1.40	4.92	4.92	4.92	0.80	1.25	± 12.0 %
2450	39.2	1.80	4.32	4.32	4.32	0.79	1.25	± 12.0 %
2600	39.0	1.96	4.21	4.21	4.21	0.76	1.30	± 12.0 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

DASY/EASY - Parameters of Probe: ES3DV3- SN:3131

Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	5.97	5.97	5.97	0.80	1.00	± 12.0 %
835	55.2	0.97	5.92	5.92	5.92	0.80	1.34	± 12.0 %
1750	53.4	1.49	4.64	4.64	4.64	0.80	1.35	± 12.0 %
1900	53.3	1.52	4.44	4.44	4.44	0.80	1.28	± 12.0 %
2450	52.7	1.95	4.07	4.07	4.07	0.80	1.17	± 12.0 %
2600	52.5	2.16	3.97	3.97	3.97	0.80	1.00	± 12.0 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

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

Accreditation No.: SCS 108

Client **Nokia Salo TCC** **Certificate No: ES3-3165_Feb12**

CALIBRATION CERTIFICATE

Object ES3DV3 - SN:3165

Calibration procedure(s) QA CAL-01.v8, QA CAL-23.v4, QA CAL-25.v4
Calibration procedure for dosimetric E-field probes

Calibration date: February 21, 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 E4419B	GB41293874	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41498087	31-Mar-11 (No. 217-01372)	Apr-12
Reference 3 dB Attenuator	SN: S5054 (3c)	29-Mar-11 (No. 217-01369)	Apr-12
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Reference 30 dB Attenuator	SN: S5129 (30b)	29-Mar-11 (No. 217-01370)	Apr-12
Reference Probe ES3DV2	SN: 3013	29-Dec-11 (No. ES3-3013_Dec11)	Dec-12
DAE4	SN: 654	3-May-11 (No. DAE4-654_May11)	May-12
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-11)	In house check: Oct-12

	Name	Function	Signature
Calibrated by:	Claudio Leubler	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: February 23, 2012

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

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3165

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	41.9	0.89	6.13	6.13	6.13	0.29	1.78	± 12.0 %
835	41.5	0.90	5.88	5.88	5.88	0.21	2.26	± 12.0 %
1750	40.1	1.37	5.51	5.51	5.51	0.49	1.46	± 12.0 %
1900	40.0	1.40	5.24	5.24	5.24	0.54	1.44	± 12.0 %
2450	39.2	1.80	4.37	4.37	4.37	0.70	1.37	± 12.0 %
2600	39.0	1.96	4.20	4.20	4.20	0.80	1.28	± 12.0 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3165

Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	6.06	6.06	6.06	0.37	1.66	± 12.0 %
835	55.2	0.97	5.97	5.97	5.97	0.59	1.30	± 12.0 %
1750	53.4	1.49	4.84	4.84	4.84	0.52	1.61	± 12.0 %
1900	53.3	1.52	4.57	4.57	4.57	0.42	1.93	± 12.0 %
2450	52.7	1.95	4.14	4.14	4.14	0.73	1.08	± 12.0 %
2600	52.5	2.16	3.96	3.96	3.96	0.80	1.03	± 12.0 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
Swiss Calibration Service

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

Accreditation No.: SCS 108

Client Nokia Salo TCC

Certificate No: EX3-3573_Feb12

CALIBRATION CERTIFICATE

Object: EX3DV4 - SN:3573

Calibration procedure(s): QA CAL-01.v8, QA CAL-14.v3, QA CAL-23.v4, QA CAL-25.v4
Calibration procedure for dosimetric E-field probes

Calibration date: February 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 E4419B	GB41293874	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41498087	31-Mar-11 (No. 217-01372)	Apr-12
Reference 3 dB Attenuator	SN: S5054 (3c)	29-Mar-11 (No. 217-01369)	Apr-12
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Reference 30 dB Attenuator	SN: S5129 (30b)	29-Mar-11 (No. 217-01370)	Apr-12
Reference Probe ES3DV2	SN: 3013	29-Dec-11 (No. ES3-3013_Dec11)	Dec-12
DAE4	SN: 654	3-May-11 (No. DAE4-654_May11)	May-12
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-11)	In house check: Oct-12

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

Issued: February 23, 2012

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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3573

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	41.9	0.89	8.71	8.71	8.71	0.20	1.24	± 12.0 %
835	41.5	0.90	8.33	8.33	8.33	0.14	1.71	± 12.0 %
1750	40.1	1.37	7.67	7.67	7.67	0.75	0.59	± 12.0 %
1900	40.0	1.40	7.43	7.43	7.43	0.80	0.59	± 12.0 %
2450	39.2	1.80	6.52	6.52	6.52	0.38	0.93	± 12.0 %
2600	39.0	1.96	6.30	6.30	6.30	0.37	0.89	± 12.0 %
5200	36.0	4.66	4.63	4.63	4.63	0.39	1.80	± 13.1 %
5300	35.9	4.76	4.46	4.46	4.46	0.35	1.80	± 13.1 %
5500	35.6	4.96	4.23	4.23	4.23	0.40	1.80	± 13.1 %
5600	35.5	5.07	3.96	3.96	3.96	0.45	1.80	± 13.1 %
5800	35.3	5.27	3.99	3.99	3.99	0.50	1.80	± 13.1 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3573

Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	8.71	8.71	8.71	0.44	0.87	± 12.0 %
835	55.2	0.97	8.54	8.54	8.54	0.35	0.94	± 12.0 %
1750	53.4	1.49	7.07	7.07	7.07	0.38	0.93	± 12.0 %
1900	53.3	1.52	6.69	6.69	6.69	0.52	0.77	± 12.0 %
2450	52.7	1.95	6.45	6.45	6.45	0.80	0.57	± 12.0 %
2600	52.5	2.16	6.24	6.24	6.24	0.80	0.50	± 12.0 %
5200	49.0	5.30	3.99	3.99	3.99	0.50	1.90	± 13.1 %
5300	48.9	5.42	3.84	3.84	3.84	0.50	1.90	± 13.1 %
5500	48.6	5.65	3.64	3.64	3.64	0.50	1.90	± 13.1 %
5600	48.5	5.77	3.05	3.05	3.05	0.75	1.90	± 13.1 %
5800	48.2	6.00	3.71	3.71	3.71	0.55	1.90	± 13.1 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

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

Accreditation No.: SCS 108

Client Nokia Salo TCC

Certificate No: EX3-3834_Feb12

CALIBRATION CERTIFICATE

Object: EX3DV4 - SN:3834

Calibration procedure(s): QA CAL-01.v8, QA CAL-14.v3, QA CAL-23.v4, QA CAL-25.v4
Calibration procedure for dosimetric E-field probes

Calibration date: February 7, 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 E4419B	GB41293874	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41498087	31-Mar-11 (No. 217-01372)	Apr-12
Reference 3 dB Attenuator	SN: S5054 (3c)	29-Mar-11 (No. 217-01369)	Apr-12
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Reference 30 dB Attenuator	SN: S5129 (30b)	29-Mar-11 (No. 217-01370)	Apr-12
Reference Probe ES3DV2	SN: 3013	29-Dec-11 (No. ES3-3013_Dec11)	Dec-12
DAE4	SN: 654	3-May-11 (No. DAE4-654_May11)	May-12
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-11)	In house check: Oct-12

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

Issued: February 7, 2012

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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3834

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	41.9	0.89	9.17	9.17	9.17	0.38	0.90	± 12.0 %
835	41.5	0.90	8.69	8.69	8.69	0.34	0.97	± 12.0 %
900	41.5	0.97	8.59	8.59	8.59	0.23	1.26	± 12.0 %
1750	40.1	1.37	7.84	7.84	7.84	0.51	0.70	± 12.0 %
1900	40.0	1.40	7.61	7.61	7.61	0.80	0.58	± 12.0 %
2450	39.2	1.80	6.82	6.82	6.82	0.45	0.78	± 12.0 %
2600	39.0	1.96	6.65	6.65	6.65	0.48	0.77	± 12.0 %
5200	36.0	4.66	4.81	4.81	4.81	0.40	1.80	± 13.1 %
5300	35.9	4.76	4.57	4.57	4.57	0.40	1.80	± 13.1 %
5500	35.6	4.96	4.60	4.60	4.60	0.38	1.80	± 13.1 %
5600	35.5	5.07	4.37	4.37	4.37	0.40	1.80	± 13.1 %
5800	35.3	5.27	4.14	4.14	4.14	0.50	1.80	± 13.1 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3834

Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	9.03	9.03	9.03	0.26	1.22	± 12.0 %
835	55.2	0.97	8.75	8.75	8.75	0.21	1.58	± 12.0 %
900	55.0	1.05	8.72	8.72	8.72	0.46	0.83	± 12.0 %
1750	53.4	1.49	7.54	7.54	7.54	0.80	0.62	± 12.0 %
1900	53.3	1.52	7.17	7.17	7.17	0.52	0.77	± 12.0 %
2450	52.7	1.95	6.93	6.93	6.93	0.80	0.50	± 12.0 %
2600	52.5	2.16	6.65	6.65	6.65	0.80	0.50	± 12.0 %
5200	49.0	5.30	3.99	3.99	3.99	0.55	1.90	± 13.1 %
5300	48.9	5.42	3.75	3.75	3.75	0.60	1.90	± 13.1 %
5500	48.6	5.65	3.50	3.50	3.50	0.58	1.90	± 13.1 %
5600	48.5	5.77	3.28	3.28	3.28	0.60	1.90	± 13.1 %
5800	48.2	6.00	3.78	3.78	3.78	0.58	1.90	± 13.1 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
Swiss Calibration Service

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

Accreditation No.: SCS 108

Client Nokia Salo TCC

Certificate No: EX3-3790_Apr12

CALIBRATION CERTIFICATE

Object: EX3DV4 - SN:3790

Calibration procedure(s): QA CAL-01.v8, QA CAL-14.v3, QA CAL-23.v4, QA CAL-25.v4
Calibration procedure for dosimetric E-field probes

Calibration date: April 27, 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 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 ES3DV2	SN: 3013	29-Dec-11 (No. ES3-3013_Dec11)	Dec-12
DAE4	SN: 660	10-Jan-12 (No. DAE4-660_Jan12)	Jan-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-11)	In house check: Oct-12

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

Issued: April 28, 2012

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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3790

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	41.9	0.89	8.87	8.87	8.87	0.19	1.38	± 12.0 %
835	41.5	0.90	8.44	8.44	8.44	0.16	1.49	± 12.0 %
1750	40.1	1.37	7.35	7.35	7.35	0.21	1.18	± 12.0 %
1900	40.0	1.40	7.12	7.12	7.12	0.31	0.89	± 12.0 %
2450	39.2	1.80	6.45	6.45	6.45	0.21	1.30	± 12.0 %
2600	39.0	1.96	6.27	6.27	6.27	0.32	0.97	± 12.0 %
5200	36.0	4.66	4.71	4.71	4.71	0.38	1.80	± 13.1 %
5300	35.9	4.76	4.57	4.57	4.57	0.40	1.80	± 13.1 %
5500	35.6	4.96	4.15	4.15	4.15	0.40	1.80	± 13.1 %
5600	35.5	5.07	3.99	3.99	3.99	0.48	1.80	± 13.1 %
5800	35.3	5.27	4.52	4.52	4.52	0.48	1.80	± 13.1 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3790

Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	8.75	8.75	8.75	0.19	1.32	± 12.0 %
835	55.2	0.97	8.54	8.54	8.54	0.15	1.69	± 12.0 %
1750	53.4	1.49	7.11	7.11	7.11	0.12	2.14	± 12.0 %
1900	53.3	1.52	6.82	6.82	6.82	0.14	3.00	± 12.0 %
2450	52.7	1.95	6.56	6.56	6.56	0.80	0.52	± 12.0 %
2600	52.5	2.16	6.39	6.39	6.39	0.80	0.57	± 12.0 %
5200	49.0	5.30	3.85	3.85	3.85	0.50	1.80	± 13.1 %
5300	48.9	5.42	3.66	3.66	3.66	0.50	1.80	± 13.1 %
5500	48.6	5.65	3.49	3.49	3.49	0.55	1.80	± 13.1 %
5600	48.5	5.77	3.22	3.22	3.22	0.60	1.80	± 13.1 %
5800	48.2	6.00	3.50	3.50	3.50	0.55	1.80	± 13.1 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

APPENDIX F: RELEVANT PAGES FROM DIPOLE VALIDATION KIT REPORTS

Copyright © 2012 TCC Nokia

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

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

Accreditation No.: SCS 108

Client Nokia Salo TCC

Certificate No: D750V3-1034_Jul11

CALIBRATION CERTIFICATE

Object	D750V3 - SN:1034
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	July 07, 2011

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	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	29-Apr-11 (No. ES3-3205_Apr11)	Apr-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

	Name	Function	Signature
Calibrated by:	Claudio Leubler	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: July 11, 2011

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

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

Measurement Conditions

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

DASY Version	DASY5	V52.6.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.7 ± 6 %	0.91 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.12 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**8.33 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.39 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**5.48 mW / g ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	55.5	0.96 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	55.2 ± 6 %	0.96 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.20 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**8.79 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.45 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**5.80 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.8 Ω - 1.6 jΩ
Return Loss	- 28.0 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.1 Ω - 3.5 jΩ
Return Loss	- 28.7 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.033 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	July 06, 2011

Date: 07.07.2011

Test Laboratory: SPEAG, Zurich, Switzerland

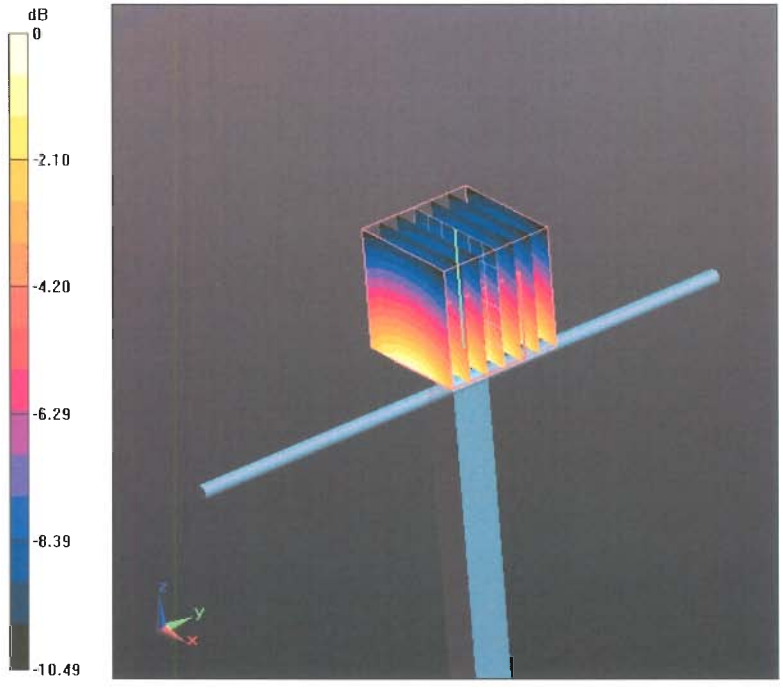
DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1034

Communication System: CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.91 mho/m; ε_r = 41.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

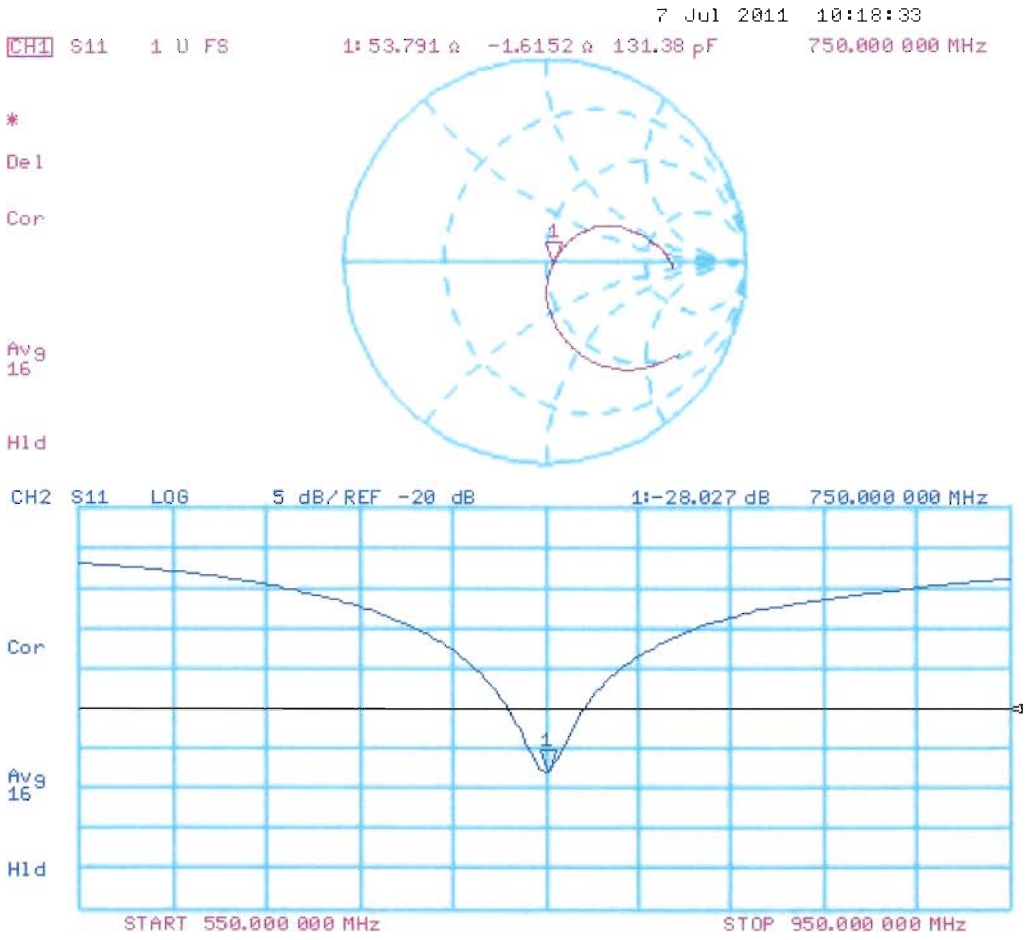
- Probe: ES3DV3 - SN3205; ConvF(6.33, 6.33, 6.33); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

Dipole Calibration for Head Tissue/Pin=250mW; dip=15mm; dist=3.0mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 53.065 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 3.205 W/kg
SAR(1 g) = 2.12 mW/g; SAR(10 g) = 1.39 mW/g
Maximum value of SAR (measured) = 2.487 mW/g



0 dB = 2.490mW/g

Impedance Measurement Plot for Head TSL



Date: 07.07.2011

Test Laboratory: SPEAG, Zurich, Switzerland

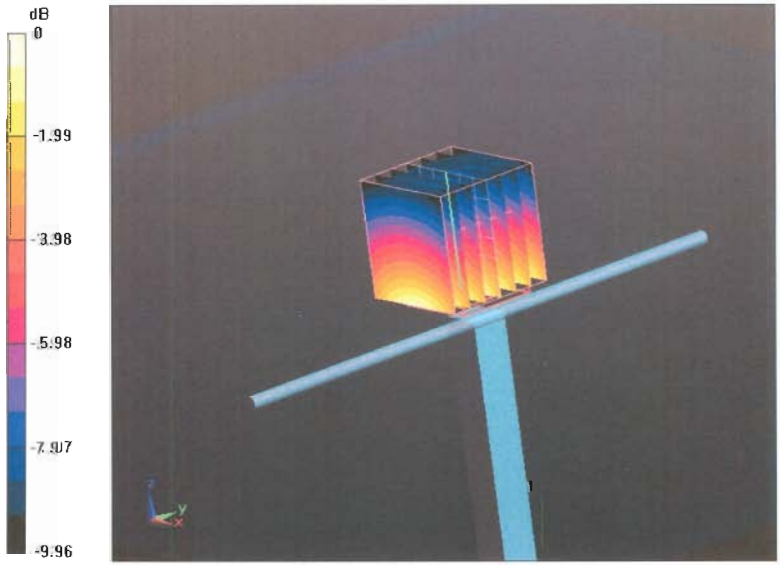
DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1034

Communication System: CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.96 mho/m; ε_r = 55.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

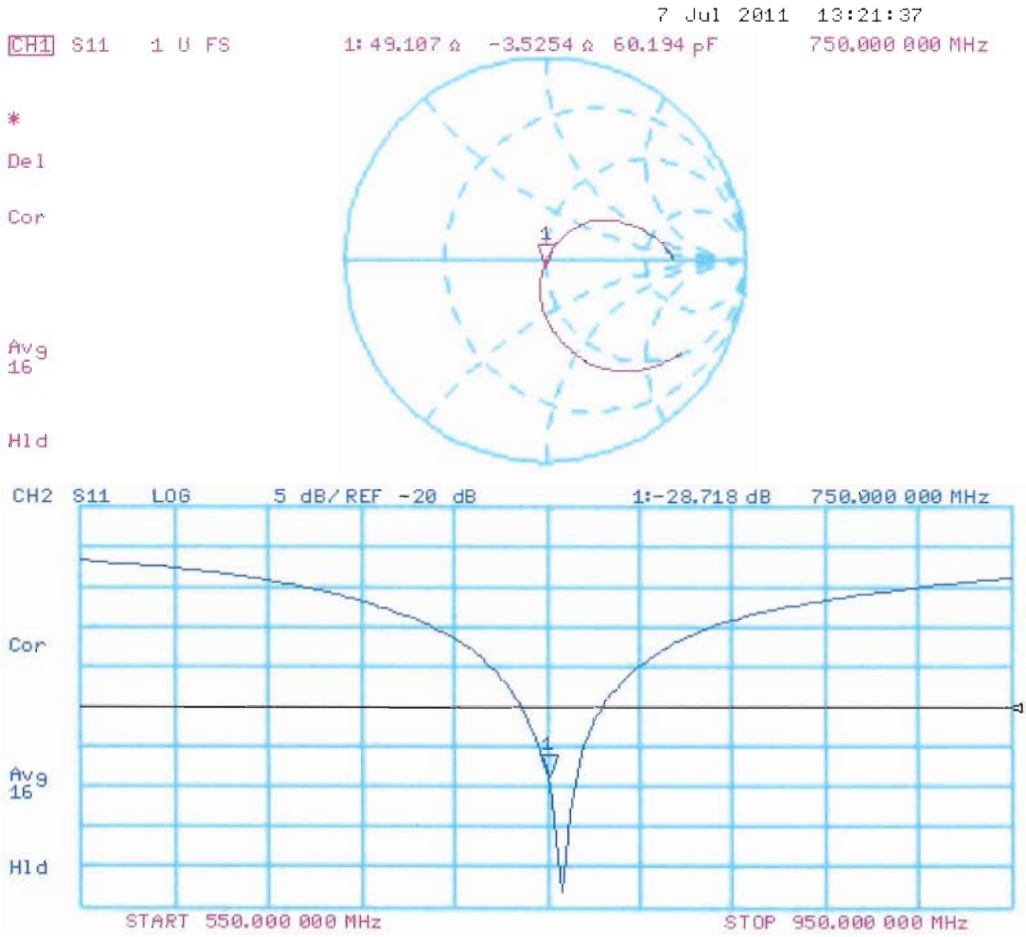
- Probe: ES3DV3 - SN3205; ConvF(6.12, 6.12, 6.12); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

Dipole Calibration for Body Tissue/Pin=250mW; dip=15mm; dist=3.0mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 51.234 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 3.265 W/kg
SAR(1 g) = 2.2 mW/g; SAR(10 g) = 1.45 mW/g
Maximum value of SAR (measured) = 2.566 mW/g



0 dB = 2.570mW/g

Impedance Measurement Plot for Body TSL



Dipole D750V3 – SN: 1034 Antenna Parameters measured: 2012-05-07.

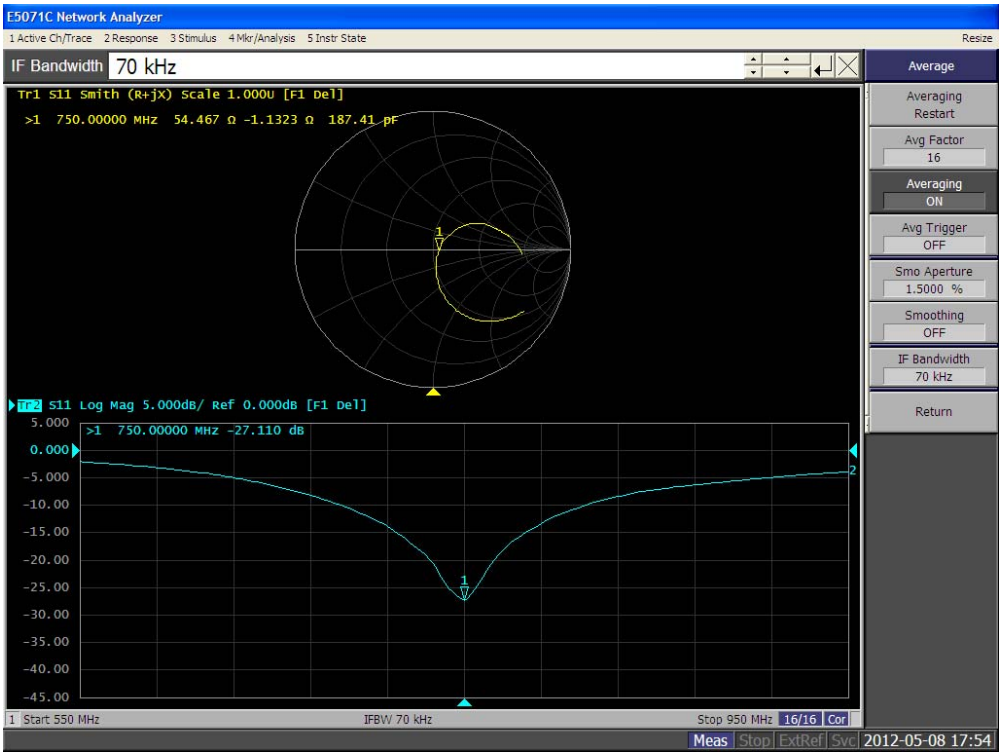
Antenna Parameters with Head TSL

	Calibration certificate	Annual measurement
Impedance, transformed to feed point	53.8 Ω - 1.6 jΩ	54.5 Ω - 1.1 jΩ
Return loss	-28.0 dB	-27.1 dB

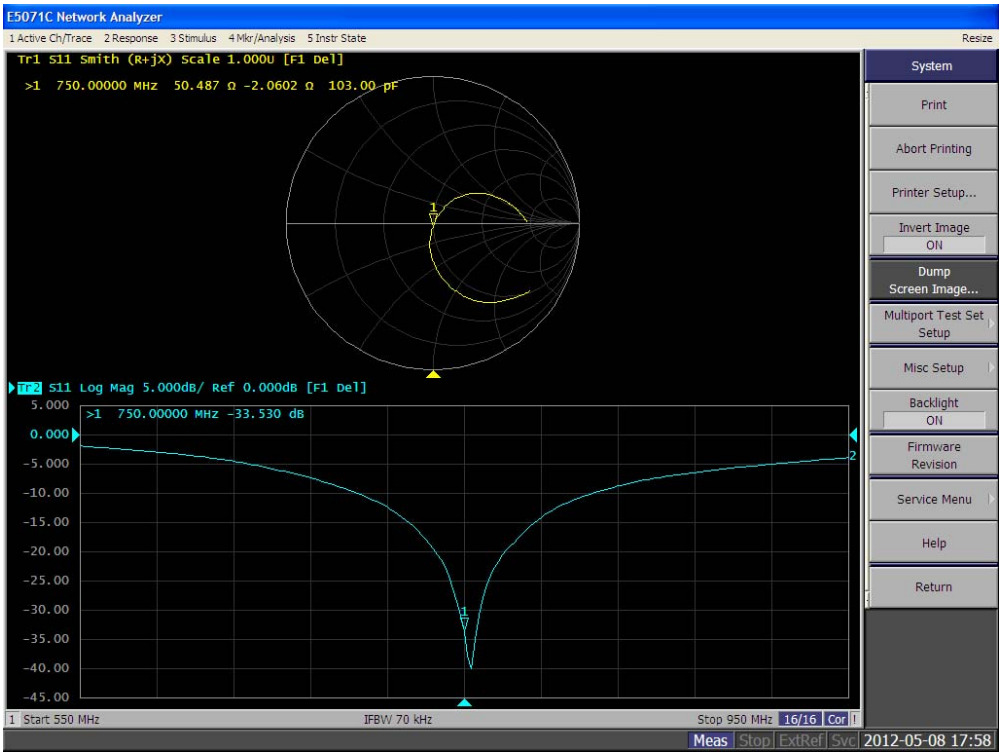
Antenna Parameters with Body TSL

	Calibration certificate	Annual measurement
Impedance, transformed to feed point	49.1 Ω - 3.5 jΩ	50.5 Ω - 2.1 jΩ
Return loss	-28.7 dB	-33.5 dB

Impedance Measurement Plot for Head TSL 750



Impedance Measurement Plot for Body TSL 750



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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
Swiss Calibration Service

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

Accreditation No.: SCS 108

Client Nokia Salo TCC

Certificate No: D835V2-462_Jan08

CALIBRATION CERTIFICATE

Object	D835V2 - SN: 462
Calibration procedure(s)	QA CAL-05.v7 Calibration procedure for dipole validation kits
Calibration date:	January 21, 2008
Condition of the calibrated item	In Tolerance

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	04-Oct-07 (METAS, No. 217-00736)	Oct-08
Power sensor HP 8481A	US37292783	04-Oct-07 (METAS, No. 217-00736)	Oct-08
Reference 20 dB Attenuator	SN: 5086 (20g)	07-Aug-07 (METAS, No 217-00718)	Aug-08
Reference 10 dB Attenuator	SN: 5047.2 (10r)	07-Aug-07 (METAS, No 217-00718)	Aug-08
Reference Probe ET3DV6 (HF)	SN 1507	26-Oct-07 (SPEAG, No. ET3-1507_Oct07)	Oct-08
DAE4	SN 601	03-Jan-08 (SPEAG, No. DAE4-601_Jan08)	Jan-09

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (SPEAG, in house check Oct-07)	In house check: Oct-09
RF generator R&S SMT-06	100005	04-Aug-99 (SPEAG, in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (SPEAG, in house check Oct-07)	In house check: Oct-08

	Name	Function	Signature
Calibrated by:	Mike Meili	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: January 22, 2008

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

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.

Measurement Conditions

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

DASY Version	DASY4	V4.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V4.9	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	43.1 ± 6 %	0.92 mho/m ± 6 %
Head TSL temperature during test	(21.7 ± 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.42 mW / g
SAR normalized	normalized to 1W	9.68 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**9.76 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.58 mW / g
SAR normalized	normalized to 1W	6.32 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**6.38 mW / g ± 16.5 % (k=2)**

[1] Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.2 ± 6 %	0.99 mho/m ± 6 %
Body TSL temperature during test	(22.0 ± 0.2) °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.41 mW / g
SAR normalized	normalized to 1W	9.64 mW / g
SAR for nominal Body TSL parameters [2]	normalized to 1W	**9.41 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.58 mW / g
SAR normalized	normalized to 1W	6.32 mW / g
SAR for nominal Body TSL parameters [2]	normalized to 1W	**6.21 mW / g ± 16.5 % (k=2)**

[2] Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.7 Ω - 2.8 jΩ
Return Loss	- 30.7 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.4 Ω - 3.8 jΩ
Return Loss	- 26.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.391 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	March 27, 2002

DASY4 Validation Report for Head TSL

Date/Time: 17.01.2008 15:39:50

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:462

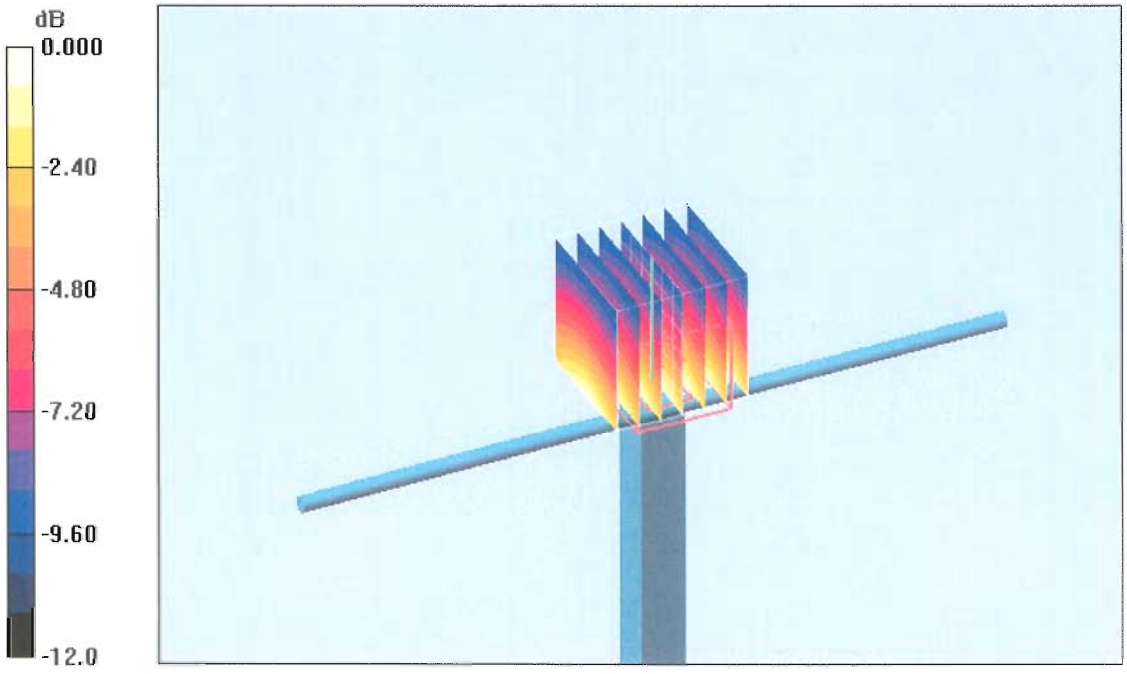
Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: HSL 900 MHz;
Medium parameters used: f = 835 MHz; σ = 0.92 mho/m; ε_r = 43; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507 (HF); ConvF(6.01, 6.01, 6.01); Calibrated: 26.10.2007
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 03.01.2008
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 172

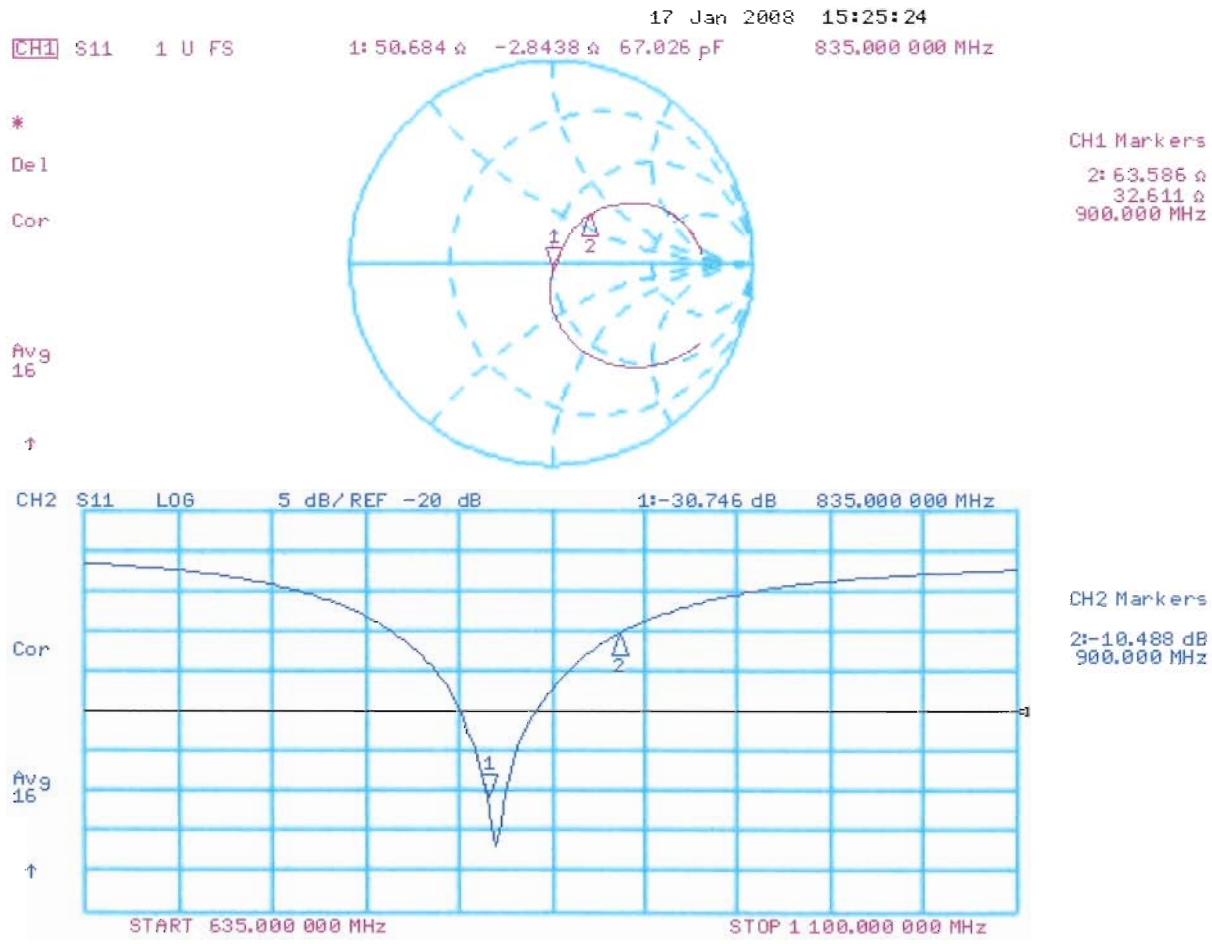
Pin = 250 mW; d = 15 mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.2 V/m; Power Drift = 0.036 dB
Peak SAR (extrapolated) = 3.53 W/kg
SAR(1 g) = 2.42 mW/g; SAR(10 g) = 1.58 mW/g
Maximum value of SAR (measured) = 2.63 mW/g



0 dB = 2.63mW/g

Impedance Measurement Plot for Head TSL



Date/Time: 21.01.2008 12:34:02

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:462

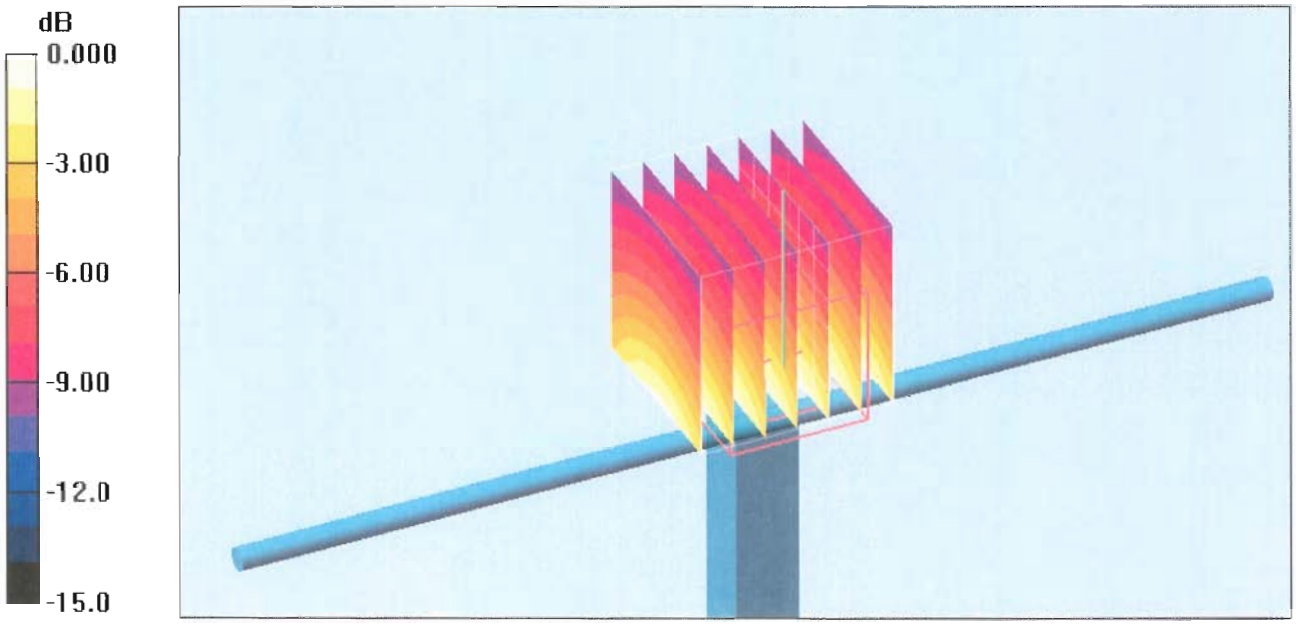
Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: MSL900;
Medium parameters used: f = 835 MHz; σ = 0.99 mho/m; ε_r = 54.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507 (HF); ConvF(5.83, 5.83, 5.83); Calibrated: 26.10.2007
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 03.01.2008
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 172

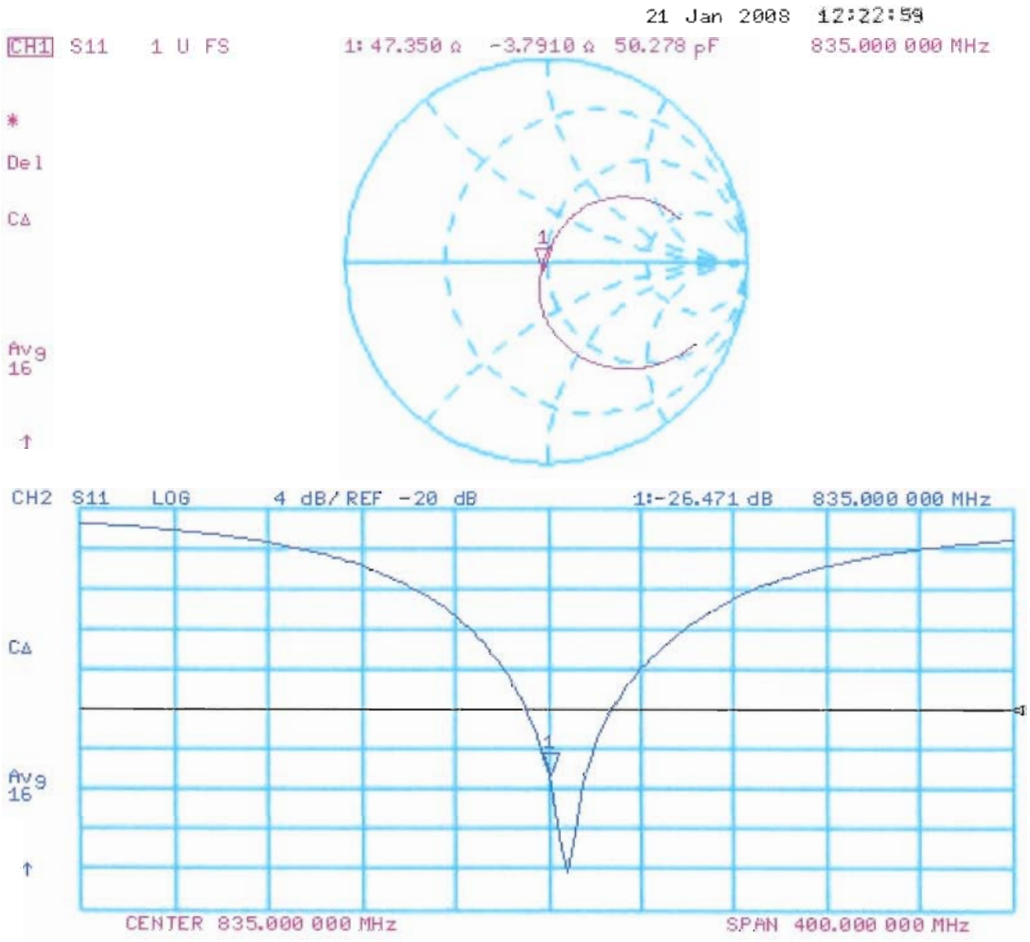
Pin = 250mW, d = 15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 53.4 V/m; Power Drift = -0.002 dB
Peak SAR (extrapolated) = 3.46 W/kg
SAR(1 g) = 2.41 mW/g; SAR(10 g) = 1.58 mW/g
Maximum value of SAR (measured) = 2.60 mW/g



0 dB = 2.60mW/g

Impedance Measurement Plot for Body TSL



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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

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

Accreditation No.: SCS 108

Client Nokia Salo TCC

Certificate No: D1800V2-2d065_Sep11

CALIBRATION CERTIFICATE

Object	D1800V2 - SN: 2d065
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	September 15, 2011

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	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	29-Apr-11 (No. ES3-3205_Apr11)	Apr-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

	Name	Function	Signature
Calibrated by:	Dimce Iliev	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: September 15, 2011

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

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

Measurement Conditions

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

DASY Version	DASY5	V52.6.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1800 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.7 ± 6 %	1.37 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.43 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**38.1 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.98 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**20.0 mW /g ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.3 ± 6 %	1.52 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.86 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**39.6 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.25 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**21.0 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.0 Ω - 3.4 jΩ
Return Loss	- 28.8 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	44.4 Ω - 3.3 jΩ
Return Loss	- 23.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.206 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	January 28, 2003

Date: 15.09.2011

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN: 2d065

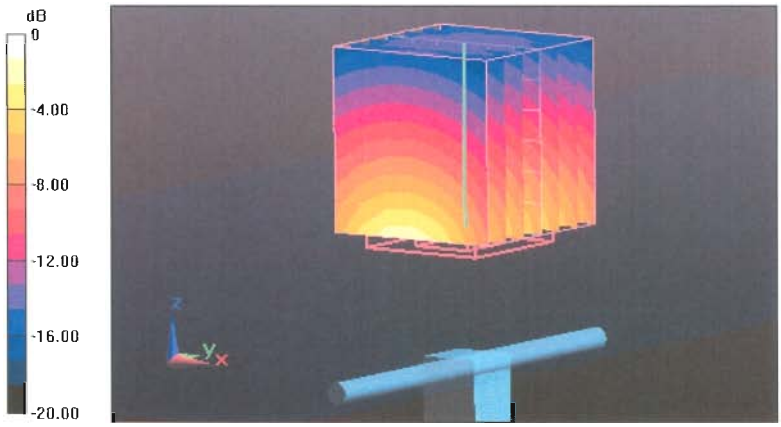
Communication System: CW; Frequency: 1800 MHz
Medium parameters used: f = 1800 MHz; σ = 1.37 mho/m; ε_r = 39.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.07, 5.07, 5.07); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

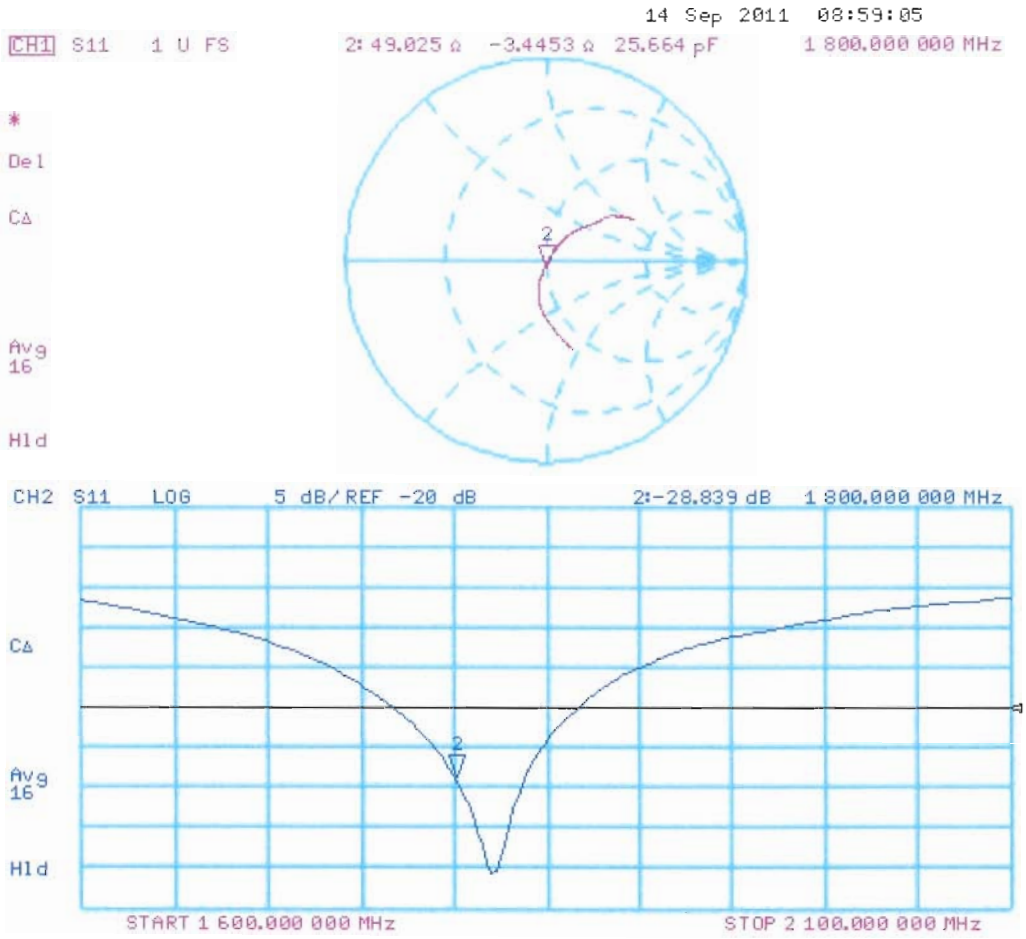
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.966 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 16.764 W/kg
SAR(1 g) = 9.43 mW/g; SAR(10 g) = 4.98 mW/g
Maximum value of SAR (measured) = 11.819 mW/g



0 dB = 11.820mW/g

Impedance Measurement Plot for Head TSL



Date: 14.09.2011

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN: 2d065

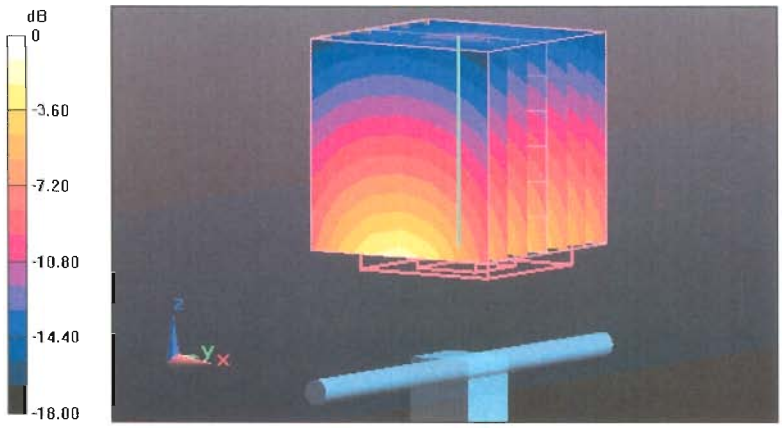
Communication System: CW; Frequency: 1800 MHz
Medium parameters used: f = 1800 MHz; σ = 1.52 mho/m; ε_r = 54.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.74, 4.74, 4.74); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

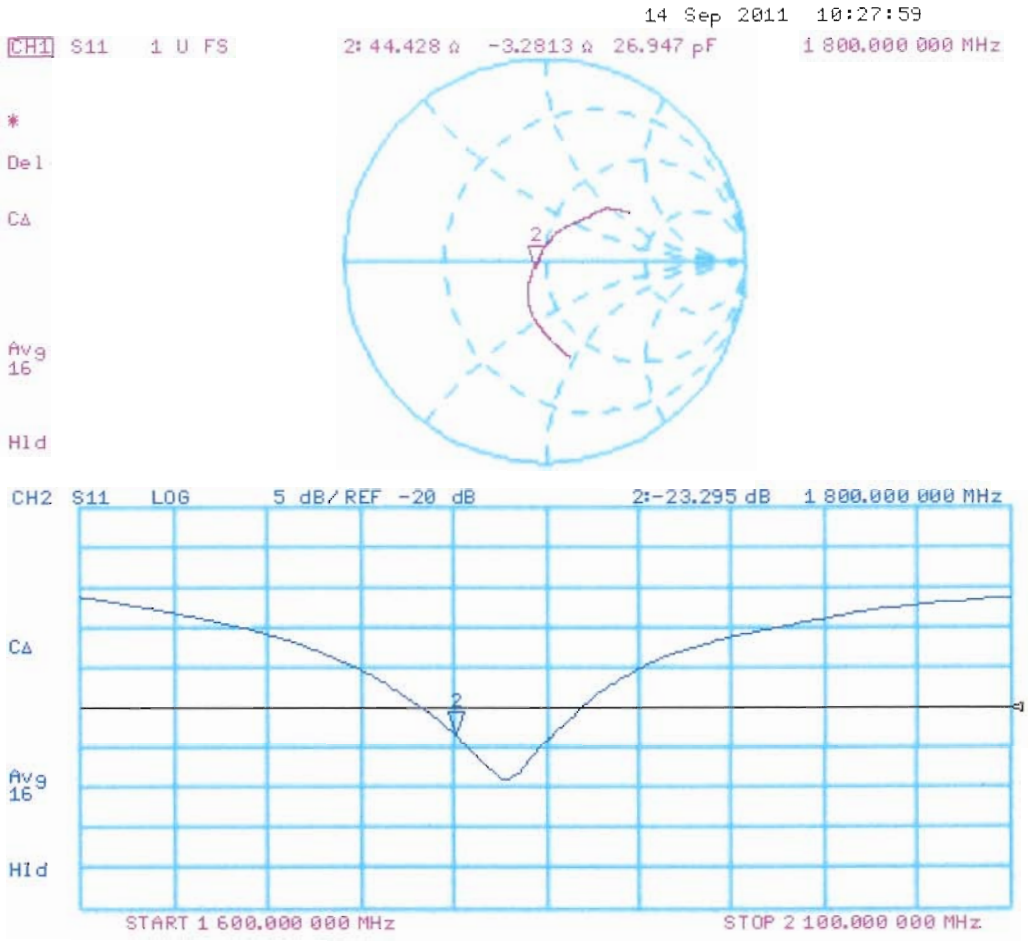
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 94.166 V/m; Power Drift = -0.004 dB
Peak SAR (extrapolated) = 17.264 W/kg
SAR(1 g) = 9.86 mW/g; SAR(10 g) = 5.25 mW/g
Maximum value of SAR (measured) = 12.449 mW/g



0 dB = 12.450mW/g

Impedance Measurement Plot for Body TSL



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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

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

Accreditation No.: SCS 108

Client Nokia Salo TCC

Certificate No: D1900V2-5d030_Feb12

CALIBRATION CERTIFICATE

Object: D1900V2 - SN: 5d030

Calibration procedure(s): QA CAL-05.v8
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: February 22, 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
Reference 20 dB Attenuator	SN: 5086 (20g)	29-Mar-11 (No. 217-01368)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	30-Dec-11 (No. ES3-3205_Dec11)	Dec-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

	Name	Function	Signature
Calibrated by:	Israe El-Naouq	Laboratory Technician	Israe El-Naouq
Approved by:	Katja Pokovic	Technical Manager	

Issued: February 22, 2012

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

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.0 Ω + 5.3 jΩ
Return Loss	- 25.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.6 Ω + 5.4 jΩ
Return Loss	- 24.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.192 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	December 17, 2002

Date: 22.02.2012

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d030

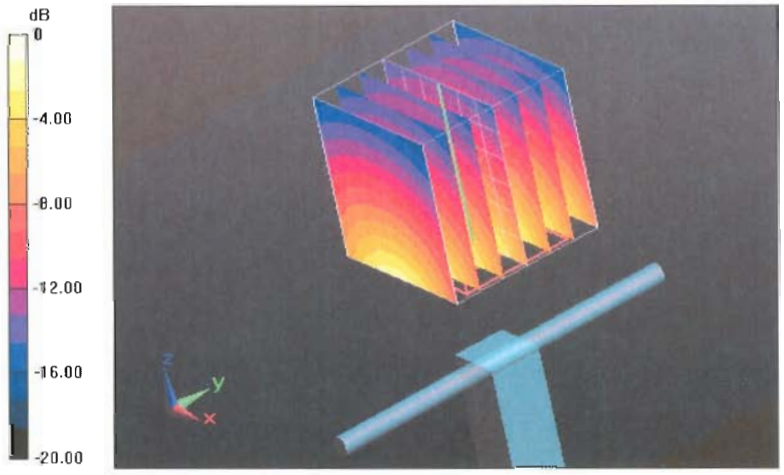
Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.4 mho/m; ε_r = 40.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.01, 5.01, 5.01); Calibrated: 30.12.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

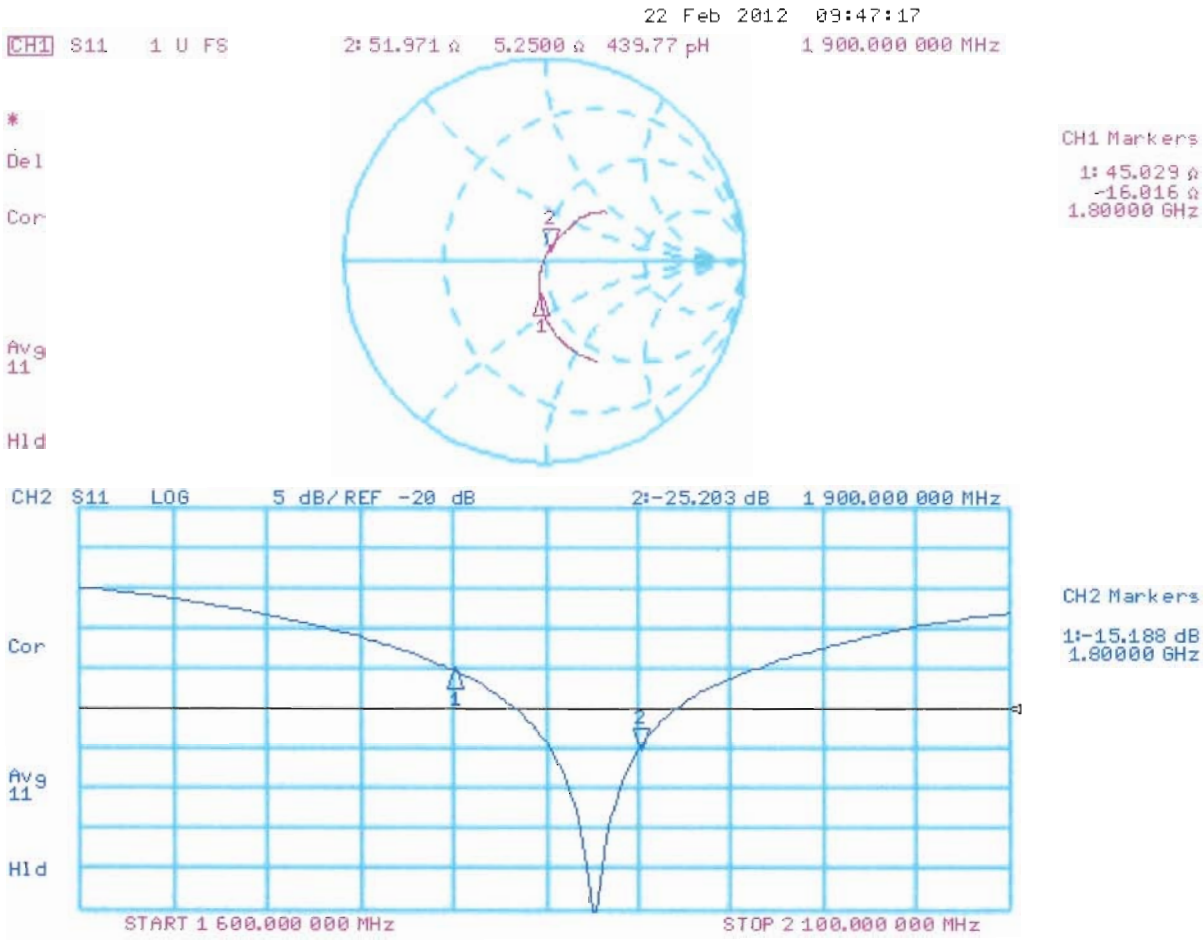
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.565 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 17.4270
SAR(1 g) = 9.79 mW/g; SAR(10 g) = 5.18 mW/g
Maximum value of SAR (measured) = 12.117 mW/g



0 dB = 12.120mW/g = 21.67 dB mW/g

Impedance Measurement Plot for Head TSL



Date: 22.02.2012

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d030

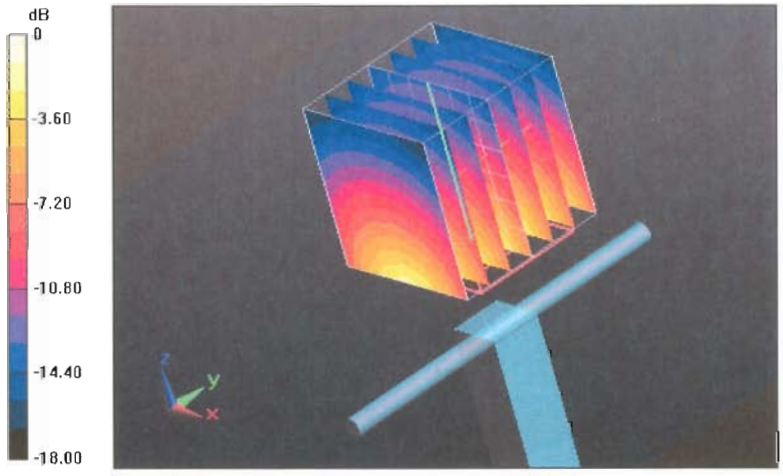
Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.56 mho/m; ε_r = 53; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.62, 4.62, 4.62); Calibrated: 30.12.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

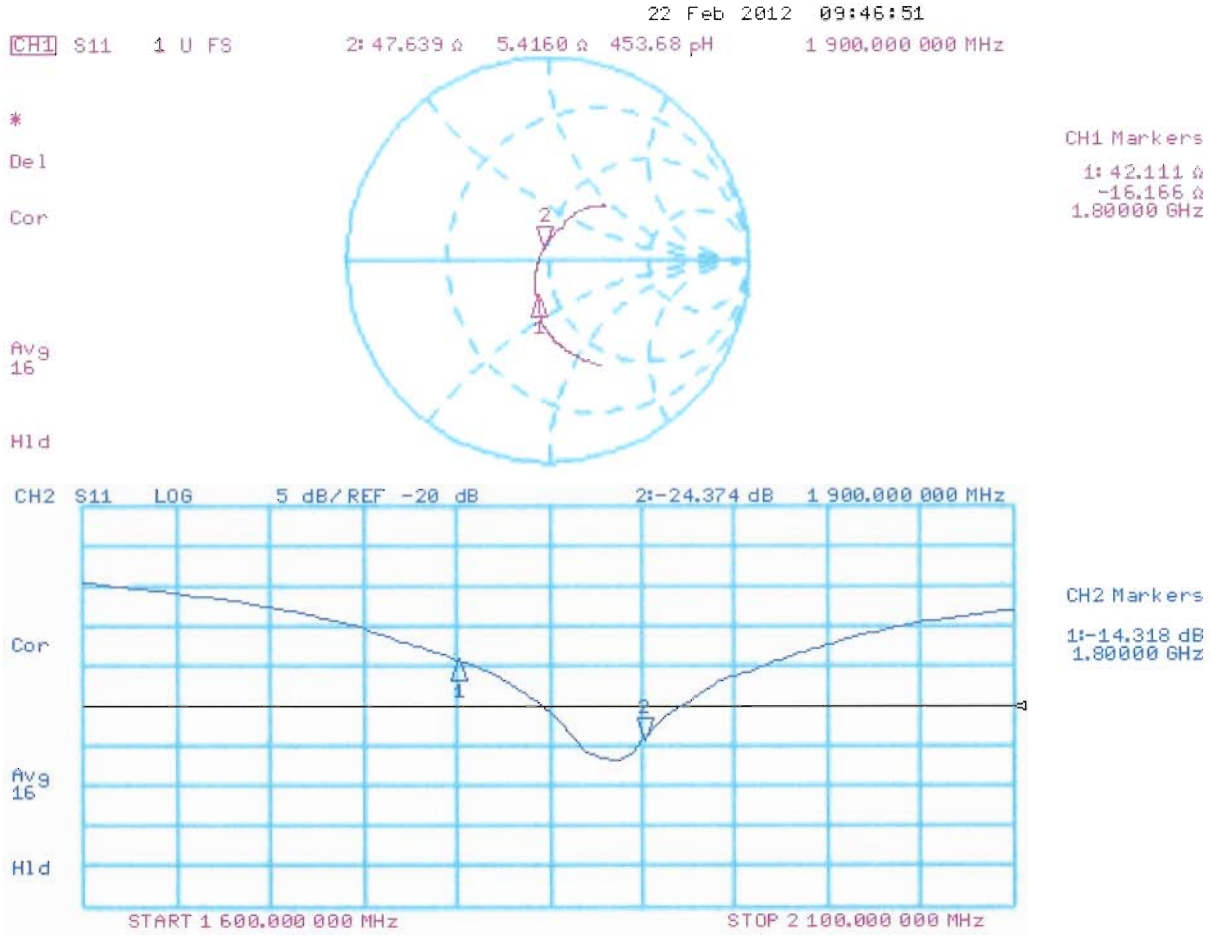
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 93.541 V/m; Power Drift = -0.0095 dB
Peak SAR (extrapolated) = 17.4260
SAR(1 g) = 9.87 mW/g; SAR(10 g) = 5.17 mW/g
Maximum value of SAR (measured) = 12.485 mW/g



0 dB = 12.480mW/g = 21.92 dB mW/g

Impedance Measurement Plot for Body TSL



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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
Swiss Calibration Service

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

Accreditation No.: SCS 108

Client Nokia Salo TCC

Certificate No: D2450V2-729_Sep11

CALIBRATION CERTIFICATE

Object	D2450V2 - SN: 729
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	September 13, 2011

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	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	29-Apr-11 (No. ES3-3205_Apr11)	Apr-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

	Name	Function	Signature
Calibrated by:	Dimce Iliev	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: September 13, 2011

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

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

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

Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

Measurement Conditions

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

DASY Version	DASY5	V52.6.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.3 ± 6 %	1.85 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.9 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**54.6 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.45 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**25.6 mW /g ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	51.7 ± 6 %	2.04 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	13.3 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**51.8 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.18 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**24.4 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.8 Ω - 0.6 jΩ
Return Loss	- 34.7 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.7 Ω + 1.1 jΩ
Return Loss	- 35.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.148 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	January 09, 2003

Date: 13.09.2011

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 729

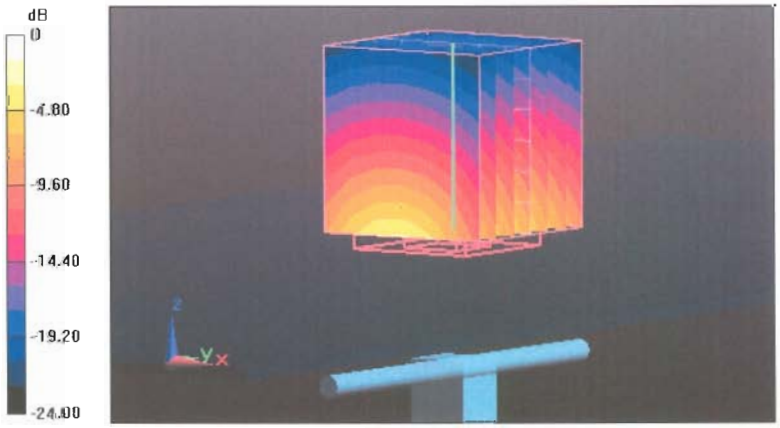
Communication System: CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.85 mho/m; ε_r = 38.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.45, 4.45, 4.45); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

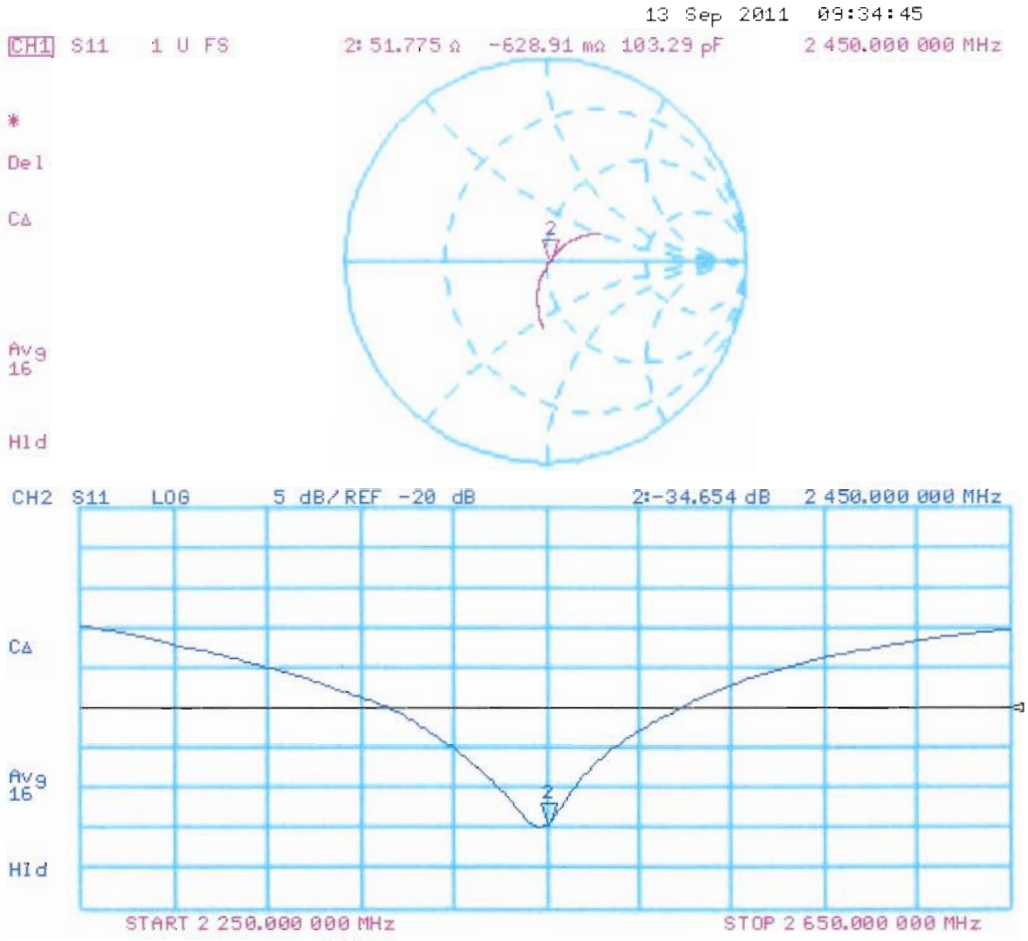
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 102.5 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 28.852 W/kg
SAR(1 g) = 13.9 mW/g; SAR(10 g) = 6.45 mW/g
Maximum value of SAR (measured) = 18.134 mW/g



0 dB = 18.130mW/g

Impedance Measurement Plot for Head TSL



Date: 12.09.2011

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 729

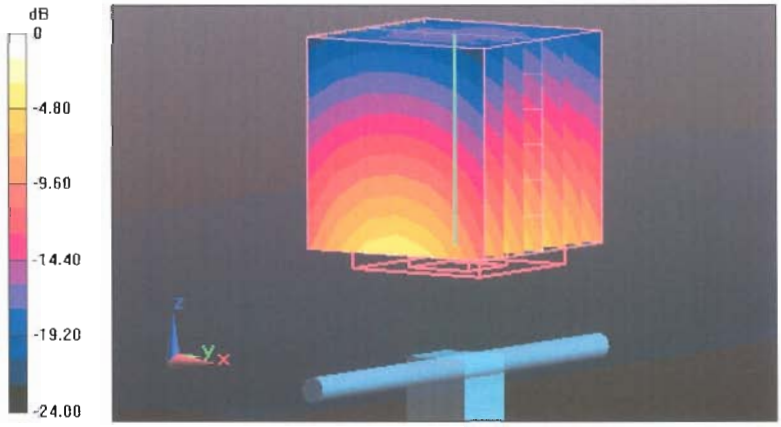
Communication System: CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 2.04 mho/m; ε_r = 51.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.26, 4.26, 4.26); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

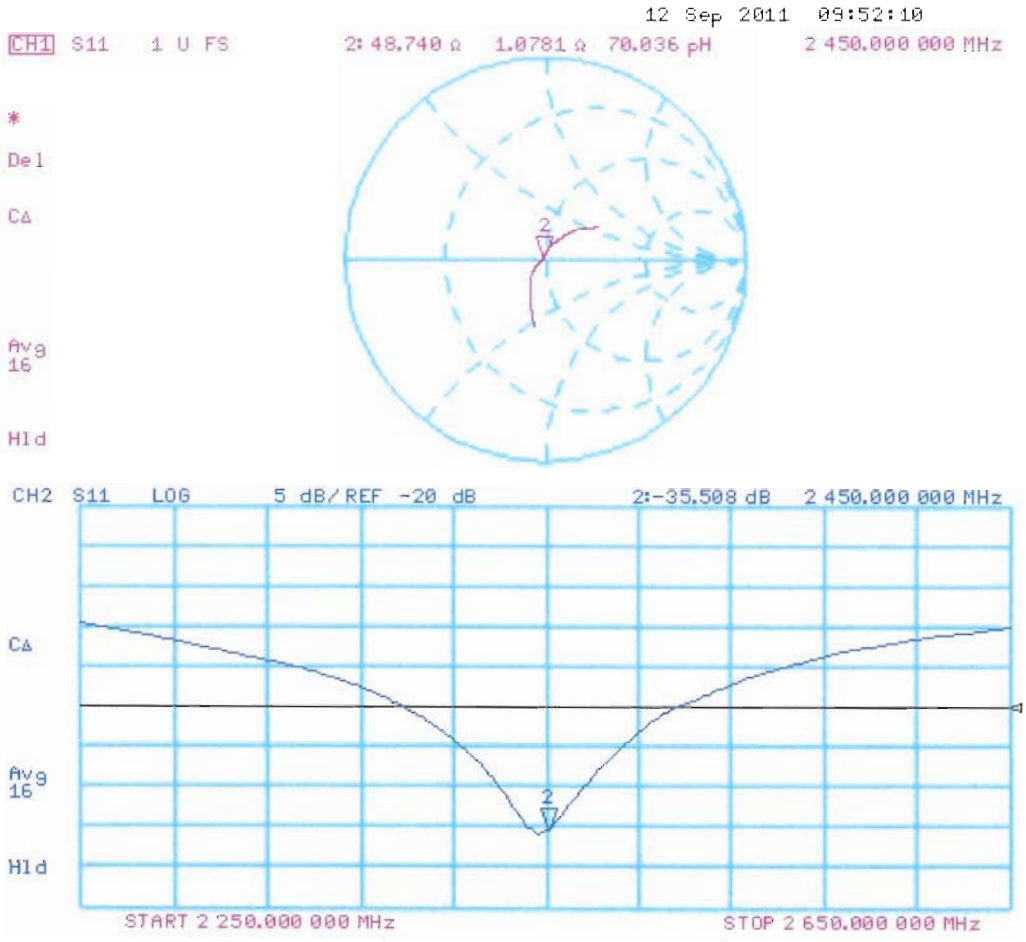
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.035 V/m; Power Drift = -0.0016 dB
Peak SAR (extrapolated) = 27.393 W/kg
SAR(1 g) = 13.3 mW/g; SAR(10 g) = 6.18 mW/g
Maximum value of SAR (measured) = 17.569 mW/g



0 dB = 17.570mW/g

Impedance Measurement Plot for Body TSL



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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

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

Accreditation No.: SCS 108

Client Nokia Salo TCC

Certificate No: D5GHzV2-1032_Feb12

CALIBRATION CERTIFICATE

Object: D5GHzV2 - SN: 1032

Calibration procedure(s): QA CAL-22.v1
Calibration procedure for dipole validation kits between 3-6 GHz

Calibration date: February 14, 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
Reference 20 dB Attenuator	SN: 5086 (20g)	29-Mar-11 (No. 217-01368)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe EX3DV4	SN: 3503	30-Dec-11 (No. EX3-3503_Dec11)	Dec-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

	Name	Function	Signature
Calibrated by:	Israe El-Naouq	Laboratory Technician	Israe El-Naouq
Approved by:	Katja Pokovic	Technical Manager	

Issued: February 14, 2012

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

Appendix

Antenna Parameters with Head TSL at 5200 MHz

Impedance, transformed to feed point	49.6 Ω - 8.3 jΩ
Return Loss	- 21.6 dB

Antenna Parameters with Head TSL at 5500 MHz

Impedance, transformed to feed point	52.0 Ω - 1.9 jΩ
Return Loss	- 31.3 dB

Antenna Parameters with Head TSL at 5800 MHz

Impedance, transformed to feed point	58.9 Ω - 3.2 jΩ
Return Loss	- 21.2 dB

Antenna Parameters with Body TSL at 5200 MHz

Impedance, transformed to feed point	49.2 Ω - 7.7 jΩ
Return Loss	- 22.1 dB

Antenna Parameters with Body TSL at 5500 MHz

Impedance, transformed to feed point	52.6 Ω - 1.0 jΩ
Return Loss	- 31.3 dB

Antenna Parameters with Body TSL at 5800 MHz

Impedance, transformed to feed point	59.8 Ω - 2.9 jΩ
Return Loss	- 20.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.201 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	July 09, 2004

DASY5 Validation Report for Head TSL

Date: 14.02.2012

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1032

Communication System: CW; Frequency: 5200 MHz, Frequency: 5500 MHz, Frequency: 5800 MHz
Medium parameters used: f = 5200 MHz; σ = 4.6 mho/m; ε_r = 35.3; ρ = 1000 kg/m^3 , Medium parameters used: f = 5500 MHz; σ = 4.89 mho/m; ε_r = 34.9; ρ = 1000 kg/m^3 , Medium parameters used: f = 5800 MHz; σ = 5.19 mho/m; ε_r = 34.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

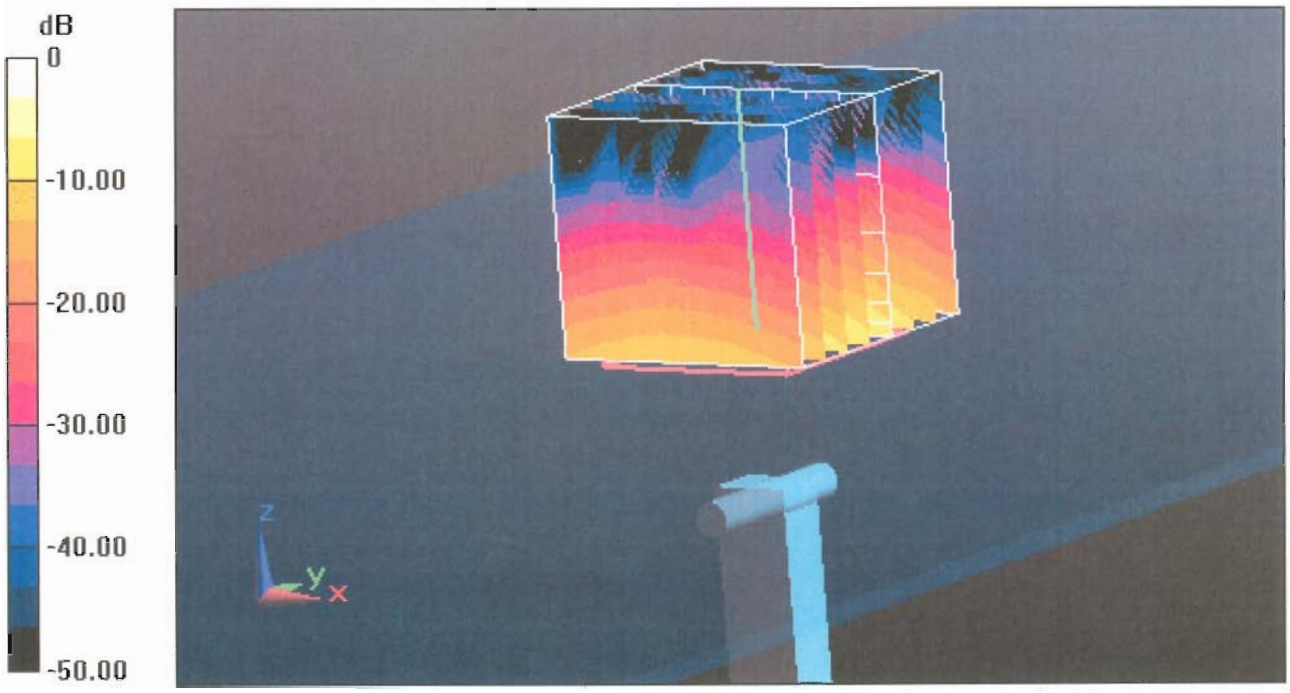
DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.41, 5.41, 5.41), ConvF(4.91, 4.91, 4.91), ConvF(4.81, 4.81, 4.81); Calibrated: 30.12.2011
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 65.348 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 30.0130
SAR(1 g) = 7.98 mW/g; SAR(10 g) = 2.28 mW/g
Maximum value of SAR (measured) = 19.030 mW/g

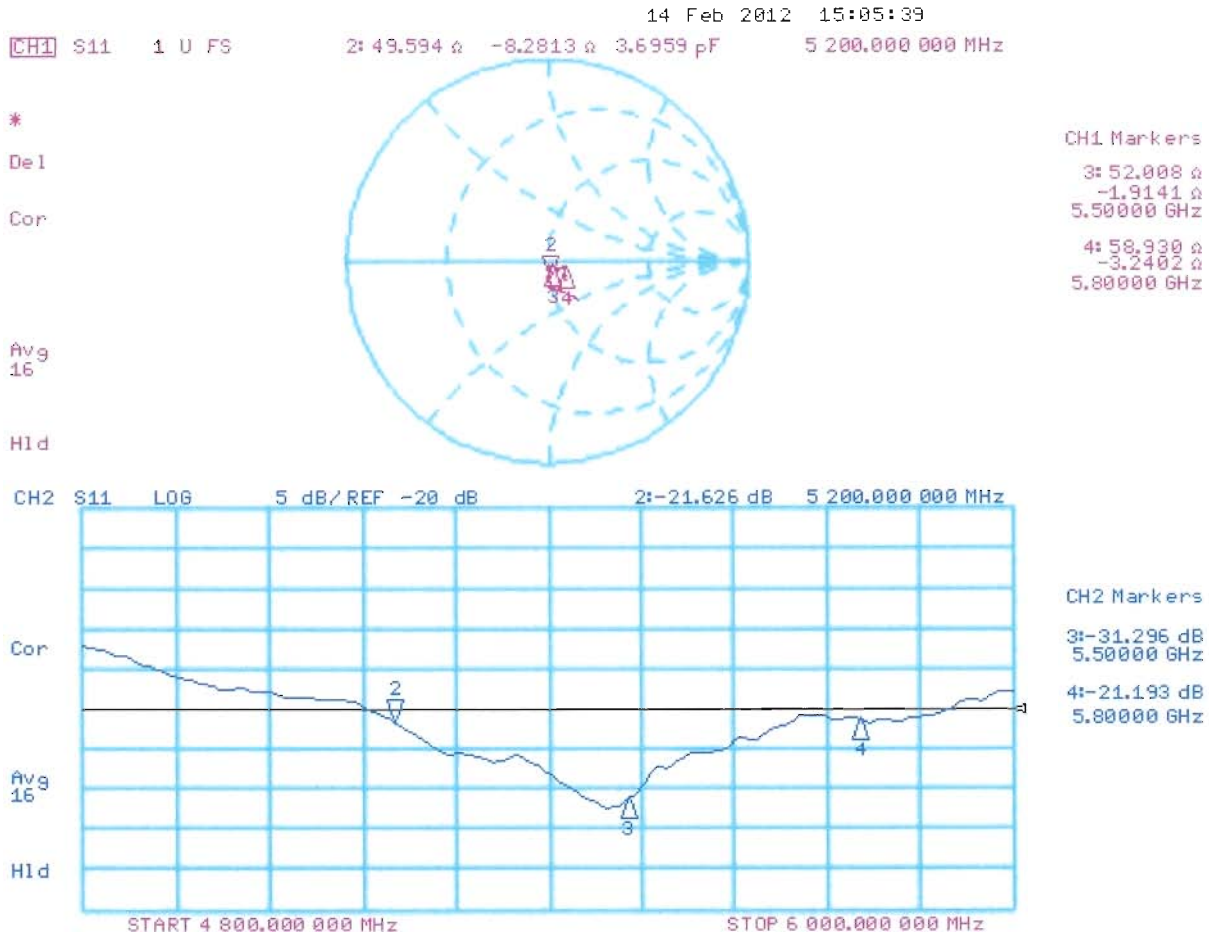
Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 64.801 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 34.8980
SAR(1 g) = 8.65 mW/g; SAR(10 g) = 2.45 mW/g
Maximum value of SAR (measured) = 21.094 mW/g

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 60.873 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 33.7370
SAR(1 g) = 7.92 mW/g; SAR(10 g) = 2.25 mW/g
Maximum value of SAR (measured) = 19.840 mW/g



0 dB = 19.840mW/g = 25.95 dB mW/g

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 13.02.2012

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1032

Communication System: CW; Frequency: 5200 MHz, Frequency: 5500 MHz, Frequency: 5800 MHz
Medium parameters used: f = 5200 MHz; σ = 5.48 mho/m; ε_r = 48.6; ρ = 1000 kg/m^3 , Medium parameters used: f = 5500 MHz; σ = 5.87 mho/m; ε_r = 48.1; ρ = 1000 kg/m^3 , Medium parameters used: f = 5800 MHz; σ = 6.28 mho/m; ε_r = 48.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

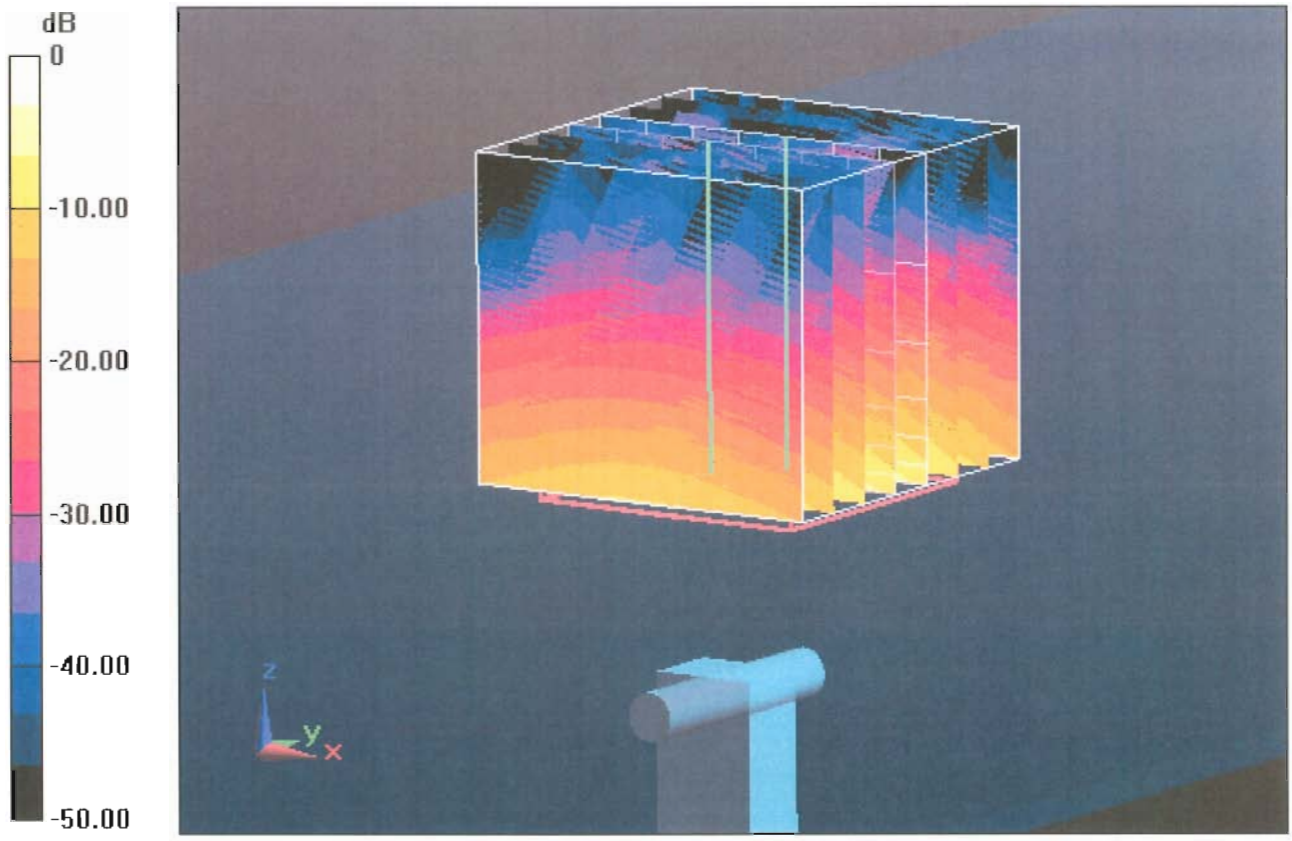
DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(4.91, 4.91, 4.91), ConvF(4.43, 4.43, 4.43), ConvF(4.38, 4.38, 4.38); Calibrated: 30.12.2011
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 57.401 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 28.2500
SAR(1 g) = 7.23 mW/g; SAR(10 g) = 2.03 mW/g
Maximum value of SAR (measured) = 16.493 mW/g

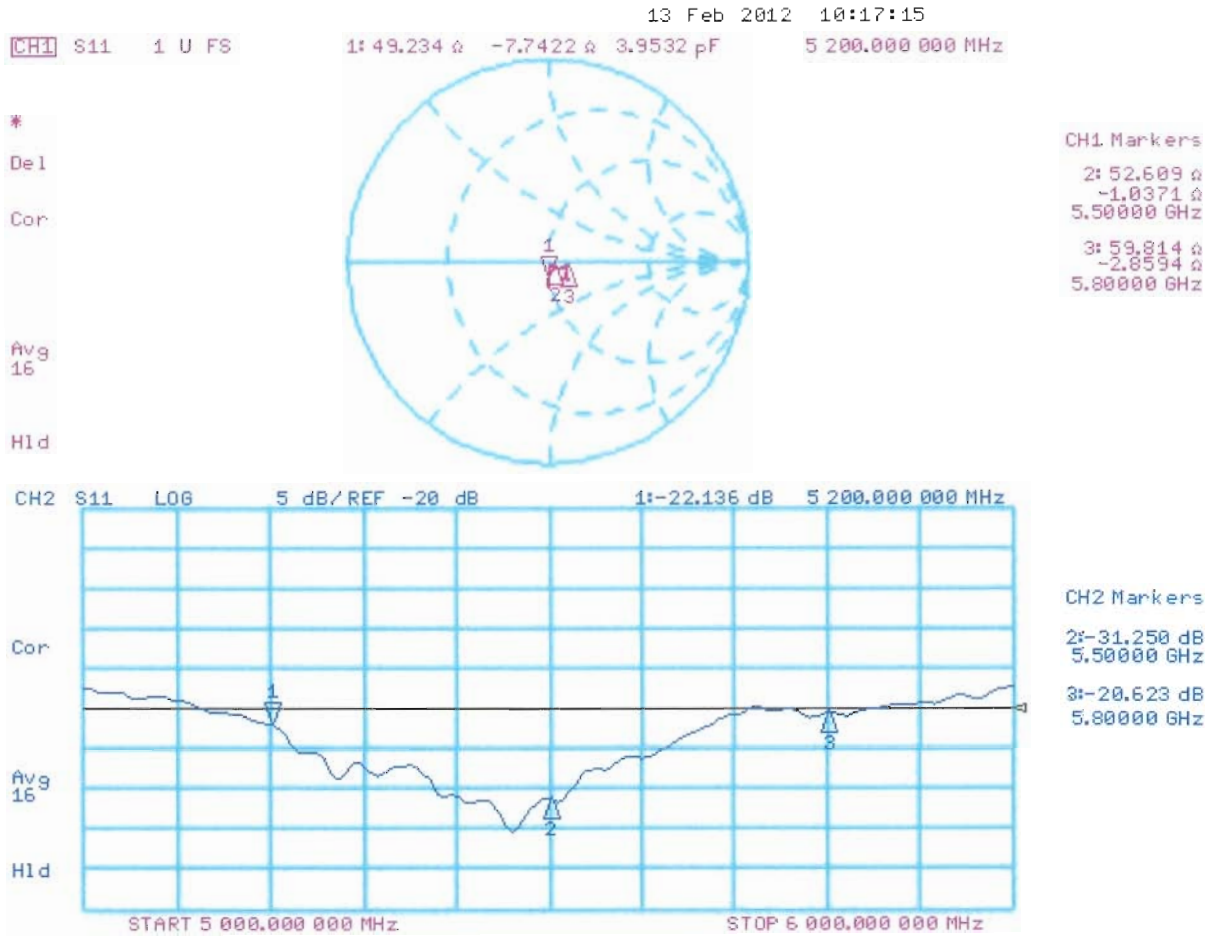
Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 57.876 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 33.4980
SAR(1 g) = 7.78 mW/g; SAR(10 g) = 2.16 mW/g
Maximum value of SAR (measured) = 18.246 mW/g

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 54.089 V/m; Power Drift = -0.0018 dB
Peak SAR (extrapolated) = 33.8810
SAR(1 g) = 7.21 mW/g; SAR(10 g) = 1.99 mW/g
Maximum value of SAR (measured) = 17.435 mW/g



0 dB = 17.440mW/g = 24.83 dB mW/g

Impedance Measurement Plot for Body TSL



APPENDIX G: CONDUCTED POWER MEASUREMENTS FOR SUPPORTED LTE TRANSMISSION MODES

G.1 Power Tuning Targets

Tuning targets LTE			
Slot configuration	Low channel	Mid channel	High channel
LTE700 (Band 17)	-	23.0	-
LTE850 (Band 5)	-	23.0	-
LTE1700/2100 (Band 4)	-	23.0	-
LTE1900 (Band 2)	-	23.0	-

Copyright © 2012 TCC Nokia

G.2 Conducted Power from the Samples used in the Testing

Type: RM-824; Serial number: 004402/13/976065/0 used for LTE700 (Band17) for SAR Head, Body-worn and Wireless Router measurements.

"Max Average Power (dBm)" column lists measured powers with MPR active. The "Reduced Power" column lists measured powers with MPR and A-MPR active (as defined by 3GPP TS 36.101). A-MPR is not specified for LTE700 (Band 17) in this specification (Table 6.2.4-1).

Frequency (MHz)	Channel Number	Bandwidth (MHz)	RB Number	RB Offset	Modulation	Max Average Power (dBm)	Reduced Power (dBm)
706.5	23755	5	1	0	QPSK	23.31	-
706.5	23755	5	1	24	QPSK	23.24	-
706.5	23755	5	1	12	QPSK	23.32	-
706.5	23755	5	12	6	QPSK	22.50	-
706.5	23755	5	25	0	QPSK	22.45	-
706.5	23755	5	1	0	16QAM	22.12	-
706.5	23755	5	1	24	16QAM	22.54	-
706.5	23755	5	1	12	16QAM	22.50	-
706.5	23755	5	12	6	16QAM	21.49	-
706.5	23755	5	25	0	16QAM	21.75	-
710.0	23790	5	1	0	QPSK	23.21	-
710.0	23790	5	1	24	QPSK	23.08	-
710.0	23790	5	1	12	QPSK	23.03	-
710.0	23790	5	12	6	QPSK	22.46	-
710.0	23790	5	25	0	QPSK	22.38	-
710.0	23790	5	1	0	16QAM	22.38	-
710.0	23790	5	1	24	16QAM	22.22	-
710.0	23790	5	1	12	16QAM	22.28	-
710.0	23790	5	12	6	16QAM	21.49	-
710.0	23790	5	25	0	16QAM	21.37	-
713.5	23825	5	1	0	QPSK	22.94	-
713.5	23825	5	1	24	QPSK	22.89	-
713.5	23825	5	1	12	QPSK	22.97	-
713.5	23825	5	12	6	QPSK	22.34	-
713.5	23825	5	25	0	QPSK	22.47	-
713.5	23825	5	1	0	16QAM	22.33	-
713.5	23825	5	1	24	16QAM	22.35	-
713.5	23825	5	1	12	16QAM	22.04	-
713.5	23825	5	12	6	16QAM	21.39	-
713.5	23825	5	25	0	16QAM	21.28	-

Copyright © 2012 TCC Nokia

Frequency (MHz)	Channel Number	Bandwidth (MHz)	RB Number	RB Offset	Modulation	Max Average Power (dBm)	Reduced Power(dBm)
709.0	23780	10	1	0	QPSK	23.30	-
709.0	23780	10	1	49	QPSK	23.31	-
709.0	23780	10	1	24	QPSK	23.19	-
709.0	23780	10	25	12	QPSK	22.32	-
709.0	23780	10	50	0	QPSK	22.07	-
709.0	23780	10	1	0	16QAM	22.28	-
709.0	23780	10	1	49	16QAM	22.42	-
709.0	23780	10	1	24	16QAM	22.43	-
709.0	23780	10	25	12	16QAM	21.15	-
709.0	23780	10	50	0	16QAM	21.00	-
710.0	23790	10	1	0	QPSK	23.05	-
710.0	23790	10	1	49	QPSK	22.96	-
710.0	23790	10	1	24	QPSK	23.11	-
710.0	23790	10	25	12	QPSK	22.31	-
710.0	23790	10	50	0	QPSK	21.99	-
710.0	23790	10	1	0	16QAM	22.33	-
710.0	23790	10	1	49	16QAM	22.23	-
710.0	23790	10	1	24	16QAM	22.33	-
710.0	23790	10	25	12	16QAM	21.56	-
710.0	23790	10	50	0	16QAM	21.03	-
711.0	23800	10	1	0	QPSK	23.02	-
711.0	23800	10	1	49	QPSK	22.93	-
711.0	23800	10	1	24	QPSK	22.94	-
711.0	23800	10	25	12	QPSK	22.32	-
711.0	23800	10	50	0	QPSK	22.06	-
711.0	23800	10	1	0	16QAM	22.19	-
711.0	23800	10	1	49	16QAM	22.23	-
711.0	23800	10	1	24	16QAM	22.40	-
711.0	23800	10	25	12	16QAM	21.50	-
711.0	23800	10	50	0	16QAM	21.03	-

Copyright © 2012 TCC Nokia

Type: RM-824; Serial number: 004402/13/976156/7 used for LTE850 (Band 5) for SAR Head, Body-worn and Wireless Router measurements.

"Max Average Power (dBm)" column lists measured powers with MPR active. The "Reduced Power" column lists measured powers with MPR and A-MPR active (as defined by 3GPP TS 36.101). A-MPR is not specified for LTE850 (Band 5) in this specification (Table 6.2.4-1).

Frequency (MHz)	Channel Number	Bandwidth (MHz)	RB Number	RB Offset	Modulation	Max Average Power (dBm)	Reduced Power(dBm)
824.7	20407	1.4	1	0	QPSK	22.71	-
824.7	20407	1.4	1	5	QPSK	22.77	-
824.7	20407	1.4	1	2	QPSK	22.67	-
824.7	20407	1.4	3	2	QPSK	22.71	-
824.7	20407	1.4	6	0	QPSK	21.90	-
824.7	20407	1.4	1	0	16QAM	22.06	-
824.7	20407	1.4	1	5	16QAM	21.94	-
824.7	20407	1.4	1	2	16QAM	22.23	-
824.7	20407	1.4	3	2	16QAM	21.98	-
824.7	20407	1.4	6	0	16QAM	20.85	-
836.5	20525	1.4	1	0	QPSK	22.55	-
836.5	20525	1.4	1	5	QPSK	22.46	-
836.5	20525	1.4	1	2	QPSK	22.44	-
836.5	20525	1.4	3	2	QPSK	22.82	-
836.5	20525	1.4	6	0	QPSK	21.73	-
836.5	20525	1.4	1	0	16QAM	21.92	-
836.5	20525	1.4	1	5	16QAM	21.95	-
836.5	20525	1.4	1	2	16QAM	22.18	-
836.5	20525	1.4	3	2	16QAM	22.05	-
836.5	20525	1.4	6	0	16QAM	20.79	-
848.3	20643	1.4	1	0	QPSK	22.26	-
848.3	20643	1.4	1	5	QPSK	22.35	-
848.3	20643	1.4	1	2	QPSK	22.31	-
848.3	20643	1.4	3	2	QPSK	22.48	-
848.3	20643	1.4	6	0	QPSK	21.40	-
848.3	20643	1.4	1	0	16QAM	21.60	-
848.3	20643	1.4	1	5	16QAM	21.69	-
848.3	20643	1.4	1	2	16QAM	21.94	-
848.3	20643	1.4	3	2	16QAM	21.60	-
848.3	20643	1.4	6	0	16QAM	20.62	-

Copyright © 2012 TCC Nokia

Frequency (MHz)	Channel Number	Bandwidth (MHz)	RB Number	RB Offset	Modulation	Max Average Power (dBm)	Reduced Power(dBm)
825.5	20415	3	1	0	QPSK	22.73	-
825.5	20415	3	1	14	QPSK	22.71	-
825.5	20415	3	1	7	QPSK	22.82	-
825.5	20415	3	8	3	QPSK	21.93	-
825.5	20415	3	15	0	QPSK	21.95	-
825.5	20415	3	1	0	16QAM	21.90	-
825.5	20415	3	1	14	16QAM	21.90	-
825.5	20415	3	1	7	16QAM	22.20	-
825.5	20415	3	8	3	16QAM	21.24	-
825.5	20415	3	15	0	16QAM	20.73	-
836.5	20525	3	1	0	QPSK	22.41	-
836.5	20525	3	1	14	QPSK	22.12	-
836.5	20525	3	1	7	QPSK	22.45	-
836.5	20525	3	8	3	QPSK	21.76	-
836.5	20525	3	15	0	QPSK	21.81	-
836.5	20525	3	1	0	16QAM	21.62	-
836.5	20525	3	1	14	16QAM	21.50	-
836.5	20525	3	1	7	16QAM	22.12	-
836.5	20525	3	8	3	16QAM	20.94	-
836.5	20525	3	15	0	16QAM	20.55	-
847.5	20635	3	1	0	QPSK	22.33	-
847.5	20635	3	1	14	QPSK	22.29	-
847.5	20635	3	1	7	QPSK	22.23	-
847.5	20635	3	8	3	QPSK	21.59	-
847.5	20635	3	15	0	QPSK	21.57	-
847.5	20635	3	1	0	16QAM	21.69	-
847.5	20635	3	1	14	16QAM	21.38	-
847.5	20635	3	1	7	16QAM	21.78	-
847.5	20635	3	8	3	16QAM	21.04	-
847.5	20635	3	15	0	16QAM	20.53	-

Copyright © 2012 TCC Nokia

Frequency (MHz)	Channel Number	Bandwidth (MHz)	RB Number	RB Offset	Modulation	Max Average Power (dBm)	Reduced Power(dBm)
826.5	20425	5	1	0	QPSK	22.79	-
826.5	20425	5	1	24	QPSK	22.69	-
826.5	20425	5	1	12	QPSK	22.69	-
826.5	20425	5	12	6	QPSK	21.89	-
826.5	20425	5	25	0	QPSK	22.02	-
826.5	20425	5	1	0	16QAM	21.55	-
826.5	20425	5	1	24	16QAM	22.19	-
826.5	20425	5	1	12	16QAM	21.57	-
826.5	20425	5	12	6	16QAM	20.80	-
826.5	20425	5	25	0	16QAM	20.78	-
836.5	20525	5	1	0	QPSK	22.51	-
836.5	20525	5	1	24	QPSK	22.39	-
836.5	20525	5	1	12	QPSK	22.54	-
836.5	20525	5	12	6	QPSK	21.75	-
836.5	20525	5	25	0	QPSK	21.73	-
836.5	20525	5	1	0	16QAM	21.86	-
836.5	20525	5	1	24	16QAM	21.84	-
836.5	20525	5	1	12	16QAM	22.10	-
836.5	20525	5	12	6	16QAM	20.76	-
836.5	20525	5	25	0	16QAM	20.82	-
846.5	20625	5	1	0	QPSK	22.48	-
846.5	20625	5	1	24	QPSK	22.15	-
846.5	20625	5	1	12	QPSK	22.39	-
846.5	20625	5	12	6	QPSK	21.89	-
846.5	20625	5	25	0	QPSK	21.91	-
846.5	20625	5	1	0	16QAM	21.91	-
846.5	20625	5	1	24	16QAM	21.93	-
846.5	20625	5	1	12	16QAM	21.57	-
846.5	20625	5	12	6	16QAM	21.10	-
846.5	20625	5	25	0	16QAM	20.79	-

Copyright © 2012 TCC Nokia

Frequency (MHz)	Channel Number	Bandwidth (MHz)	RB Number	RB Offset	Modulation	Max Average Power (dBm)	Reduced Power(dBm)
829.0	20450	10	1	0	QPSK	22.62	-
829.0	20450	10	1	49	QPSK	22.52	-
829.0	20450	10	1	24	QPSK	22.62	-
829.0	20450	10	25	12	QPSK	21.74	-
829.0	20450	10	50	0	QPSK	21.80	-
829.0	20450	10	1	0	16QAM	21.70	-
829.0	20450	10	1	49	16QAM	21.67	-
829.0	20450	10	1	24	16QAM	22.04	-
829.0	20450	10	25	12	16QAM	20.69	-
829.0	20450	10	50	0	16QAM	20.80	-
836.5	20525	10	1	0	QPSK	22.38	-
836.5	20525	10	1	49	QPSK	22.45	-
836.5	20525	10	1	24	QPSK	22.62	-
836.5	20525	10	25	12	QPSK	21.69	-
836.5	20525	10	50	0	QPSK	21.80	-
836.5	20525	10	1	0	16QAM	22.04	-
836.5	20525	10	1	49	16QAM	21.81	-
836.5	20525	10	1	24	16QAM	21.68	-
836.5	20525	10	25	12	16QAM	20.64	-
836.5	20525	10	50	0	16QAM	20.82	-
844.0	20600	10	1	0	QPSK	22.38	-
844.0	20600	10	1	49	QPSK	22.19	-
844.0	20600	10	1	24	QPSK	22.55	-
844.0	20600	10	25	12	QPSK	21.83	-
844.0	20600	10	50	0	QPSK	21.76	-
844.0	20600	10	1	0	16QAM	21.98	-
844.0	20600	10	1	49	16QAM	21.37	-
844.0	20600	10	1	24	16QAM	22.10	-
844.0	20600	10	25	12	16QAM	20.60	-
844.0	20600	10	50	0	16QAM	20.78	-

Copyright © 2012 TCC Nokia

Type: RM-824; Serial number: 004402/13/976065/0 used for LTE1700/2100 (Band 4) for SAR Head, Body-worn and Wireless Router measurements.

"Max Average Power (dBm)" column lists measured powers with MPR active. The "Reduced Power" column lists measured powers with MPR and A-MPR active (as defined by 3GPP TS 36.101). A-MPR is not specified for LTE1700/2100 (Band 4) in 1.4MHz Channel BW in this specification (Table 6.2.4-1).

Frequency (MHz)	Channel Number	Bandwidth (MHz)	RB Number	RB Offset	Modulation	Max Average Power (dBm)	Reduced Power (dBm)
1710.7	19957	1.4	1	0	QPSK	23.30	-
1710.7	19957	1.4	1	5	QPSK	23.26	-
1710.7	19957	1.4	1	2	QPSK	23.22	-
1710.7	19957	1.4	3	2	QPSK	23.25	-
1710.7	19957	1.4	6	0	QPSK	22.46	-
1710.7	19957	1.4	1	0	16QAM	22.37	-
1710.7	19957	1.4	1	5	16QAM	22.31	-
1710.7	19957	1.4	1	2	16QAM	22.33	-
1710.7	19957	1.4	3	2	16QAM	22.56	-
1710.7	19957	1.4	6	0	16QAM	21.28	-
1732.5	20175	1.4	1	0	QPSK	23.39	-
1732.5	20175	1.4	1	5	QPSK	23.16	-
1732.5	20175	1.4	1	2	QPSK	23.25	-
1732.5	20175	1.4	3	2	QPSK	23.50	-
1732.5	20175	1.4	6	0	QPSK	22.47	-
1732.5	20175	1.4	1	0	16QAM	22.31	-
1732.5	20175	1.4	1	5	16QAM	22.39	-
1732.5	20175	1.4	1	2	16QAM	22.49	-
1732.5	20175	1.4	3	2	16QAM	22.82	-
1732.5	20175	1.4	6	0	16QAM	21.38	-
1754.3	20393	1.4	1	0	QPSK	23.12	-
1754.3	20393	1.4	1	5	QPSK	23.03	-
1754.3	20393	1.4	1	2	QPSK	23.06	-
1754.3	20393	1.4	3	2	QPSK	23.24	-
1754.3	20393	1.4	6	0	QPSK	22.23	-
1754.3	20393	1.4	1	0	16QAM	22.26	-
1754.3	20393	1.4	1	5	16QAM	22.30	-
1754.3	20393	1.4	1	2	16QAM	22.22	-
1754.3	20393	1.4	3	2	16QAM	22.55	-
1754.3	20393	1.4	6	0	16QAM	21.19	-

Copyright © 2012 TCC Nokia

Frequency (MHz)	Channel Number	Bandwidth (MHz)	RB Number	RB Offset	Modulation	Max Average Power (dBm)	Reduced Power (dBm)
1711.5	19965	3	1	0	QPSK	23.24	23.35
1711.5	19965	3	1	14	QPSK	23.27	23.42
1711.5	19965	3	1	7	QPSK	23.29	23.35
1711.5	19965	3	8	3	QPSK	22.31	21.46
1711.5	19965	3	15	0	QPSK	22.59	21.53
1711.5	19965	3	1	0	16QAM	22.66	22.68
1711.5	19965	3	1	14	16QAM	22.41	22.65
1711.5	19965	3	1	7	16QAM	22.17	22.85
1711.5	19965	3	8	3	16QAM	21.68	20.68
1711.5	19965	3	15	0	16QAM	21.38	20.43
1732.5	20175	3	1	0	QPSK	23.31	23.33
1732.5	20175	3	1	14	QPSK	23.13	23.32
1732.5	20175	3	1	7	QPSK	23.25	23.35
1732.5	20175	3	8	3	QPSK	22.54	21.58
1732.5	20175	3	15	0	QPSK	22.59	21.65
1732.5	20175	3	1	0	16QAM	22.55	22.60
1732.5	20175	3	1	14	16QAM	22.65	22.63
1732.5	20175	3	1	7	16QAM	22.31	22.62
1732.5	20175	3	8	3	16QAM	21.86	20.87
1732.5	20175	3	15	0	16QAM	21.49	20.62
1753.5	20385	3	1	0	QPSK	23.17	23.31
1753.5	20385	3	1	14	QPSK	22.99	23.21
1753.5	20385	3	1	7	QPSK	23.11	23.24
1753.5	20385	3	8	3	QPSK	22.36	21.47
1753.5	20385	3	15	0	QPSK	22.40	21.47
1753.5	20385	3	1	0	16QAM	22.53	22.37
1753.5	20385	3	1	14	16QAM	21.91	22.19
1753.5	20385	3	1	7	16QAM	22.46	22.35
1753.5	20385	3	8	3	16QAM	21.62	20.77
1753.5	20385	3	15	0	16QAM	21.29	20.45

Copyright © 2012 TCC Nokia

Frequency (MHz)	Channel Number	Bandwidth (MHz)	RB Number	RB Offset	Modulation	Max Average Power (dBm)	Reduced Power (dBm)
1712.5	19975	5	1	0	QPSK	23.32	23.39
1712.5	19975	5	1	24	QPSK	23.31	23.39
1712.5	19975	5	1	12	QPSK	23.30	23.32
1712.5	19975	5	12	6	QPSK	22.48	21.48
1712.5	19975	5	25	0	QPSK	22.57	21.51
1712.5	19975	5	1	0	16QAM	22.74	22.40
1712.5	19975	5	1	24	16QAM	22.37	22.41
1712.5	19975	5	1	12	16QAM	22.78	22.35
1712.5	19975	5	12	6	16QAM	21.47	20.54
1712.5	19975	5	25	0	16QAM	21.57	20.59
1732.5	20175	5	1	0	QPSK	23.28	23.30
1732.5	20175	5	1	24	QPSK	23.10	23.22
1732.5	20175	5	1	12	QPSK	23.22	23.29
1732.5	20175	5	12	6	QPSK	22.59	21.65
1732.5	20175	5	25	0	QPSK	22.55	21.57
1732.5	20175	5	1	0	16QAM	22.63	22.49
1732.5	20175	5	1	24	16QAM	22.49	22.44
1732.5	20175	5	1	12	16QAM	22.85	22.49
1732.5	20175	5	12	6	16QAM	21.49	20.69
1732.5	20175	5	25	0	16QAM	21.54	20.62
1752.5	20375	5	1	0	QPSK	23.08	23.21
1752.5	20375	5	1	24	QPSK	23.08	23.15
1752.5	20375	5	1	12	QPSK	23.17	23.23
1752.5	20375	5	12	6	QPSK	22.45	21.58
1752.5	20375	5	25	0	QPSK	22.61	21.63
1752.5	20375	5	1	0	16QAM	22.34	22.54
1752.5	20375	5	1	24	16QAM	22.43	22.46
1752.5	20375	5	1	12	16QAM	22.72	22.52
1752.5	20375	5	12	6	16QAM	21.50	20.54
1752.5	20375	5	25	0	16QAM	21.40	20.55

Copyright © 2012 TCC Nokia

Frequency (MHz)	Channel Number	Bandwidth (MHz)	RB Number	RB Offset	Modulation	Max Average Power (dBm)	Reduced Power (dBm)
1715.0	20000	10	1	0	QPSK	23.33	23.33
1715.0	20000	10	1	49	QPSK	23.19	23.43
1715.0	20000	10	1	24	QPSK	23.38	23.39
1715.0	20000	10	25	12	QPSK	22.57	21.58
1715.0	20000	10	50	0	QPSK	22.73	21.57
1715.0	20000	10	1	0	16QAM	22.30	22.53
1715.0	20000	10	1	49	16QAM	22.46	22.66
1715.0	20000	10	1	24	16QAM	22.53	22.70
1715.0	20000	10	25	12	16QAM	21.64	20.65
1715.0	20000	10	50	0	16QAM	21.61	20.62
1732.5	20175	10	1	0	QPSK	23.42	23.33
1732.5	20175	10	1	49	QPSK	23.04	23.15
1732.5	20175	10	1	24	QPSK	23.23	23.31
1732.5	20175	10	25	12	QPSK	22.53	21.64
1732.5	20175	10	50	0	QPSK	22.53	21.62
1732.5	20175	10	1	0	16QAM	22.76	22.62
1732.5	20175	10	1	49	16QAM	22.47	22.43
1732.5	20175	10	1	24	16QAM	22.68	22.72
1732.5	20175	10	25	12	16QAM	21.41	20.58
1732.5	20175	10	50	0	16QAM	21.54	20.63
1750.0	20350	10	1	0	QPSK	22.89	23.12
1750.0	20350	10	1	49	QPSK	22.97	23.06
1750.0	20350	10	1	24	QPSK	23.14	23.17
1750.0	20350	10	25	12	QPSK	22.37	21.50
1750.0	20350	10	50	0	QPSK	22.53	21.45
1750.0	20350	10	1	0	16QAM	22.46	22.51
1750.0	20350	10	1	49	16QAM	21.84	22.42
1750.0	20350	10	1	24	16QAM	22.54	22.52
1750.0	20350	10	25	12	16QAM	21.37	20.47
1750.0	20350	10	50	0	16QAM	21.43	20.49

Copyright © 2012 TCC Nokia

Frequency (MHz)	Channel Number	Bandwidth (MHz)	RB Number	RB Offset	Modulation	Max Average Power (dBm)	Reduced Power (dBm)
1717.5	20025	15	1	0	QPSK	23.27	23.43
1717.5	20025	15	1	74	QPSK	23.23	23.37
1717.5	20025	15	1	36	QPSK	23.22	23.36
1717.5	20025	15	37	18	QPSK	22.43	21.66
1717.5	20025	15	75	0	QPSK	22.54	21.50
1717.5	20025	15	1	0	16QAM	22.57	22.64
1717.5	20025	15	1	74	16QAM	22.78	22.58
1717.5	20025	15	1	36	16QAM	22.39	22.50
1717.5	20025	15	37	18	16QAM	21.61	20.63
1717.5	20025	15	75	0	16QAM	21.52	20.61
1732.5	20175	15	1	0	QPSK	23.44	23.39
1732.5	20175	15	1	74	QPSK	22.95	23.06
1732.5	20175	15	1	36	QPSK	23.24	23.26
1732.5	20175	15	37	18	QPSK	22.54	21.65
1732.5	20175	15	75	0	QPSK	22.46	21.61
1732.5	20175	15	1	0	16QAM	22.51	22.85
1732.5	20175	15	1	74	16QAM	22.68	22.41
1732.5	20175	15	1	36	16QAM	22.97	22.61
1732.5	20175	15	37	18	16QAM	21.59	20.66
1732.5	20175	15	75	0	16QAM	21.54	20.67
1747.5	20325	15	1	0	QPSK	23.00	23.22
1747.5	20325	15	1	74	QPSK	23.04	23.01
1747.5	20325	15	1	36	QPSK	23.18	23.24
1747.5	20325	15	37	18	QPSK	22.58	21.51
1747.5	20325	15	75	0	QPSK	22.40	21.46
1747.5	20325	15	1	0	16QAM	22.75	22.76
1747.5	20325	15	1	74	16QAM	22.58	22.38
1747.5	20325	15	1	36	16QAM	22.87	22.65
1747.5	20325	15	37	18	16QAM	21.66	20.57
1747.5	20325	15	75	0	16QAM	21.40	20.45

Copyright © 2012 TCC Nokia

Frequency (MHz)	Channel Number	Bandwidth (MHz)	RB Number	RB Offset	Modulation	Max Average Power (dBm)	Reduced Power (dBm)
1720.0	20050	20	1	0	QPSK	23.53	23.42
1720.0	20050	20	1	99	QPSK	23.07	23.22
1720.0	20050	20	1	49	QPSK	23.44	23.48
1720.0	20050	20	50	24	QPSK	22.53	21.66
1720.0	20050	20	100	0	QPSK	22.75	21.59
1720.0	20050	20	1	0	16QAM	22.63	22.71
1720.0	20050	20	1	99	16QAM	22.62	22.55
1720.0	20050	20	1	49	16QAM	22.68	22.61
1720.0	20050	20	50	24	16QAM	21.61	20.68
1720.0	20050	20	100	0	16QAM	21.52	20.66
1732.5	20175	20	1	0	QPSK	23.45	23.43
1732.5	20175	20	1	99	QPSK	22.86	23.10
1732.5	20175	20	1	49	QPSK	23.31	23.26
1732.5	20175	20	50	24	QPSK	22.50	21.59
1732.5	20175	20	100	0	QPSK	22.48	21.66
1732.5	20175	20	1	0	16QAM	22.34	22.76
1732.5	20175	20	1	99	16QAM	22.51	22.47
1732.5	20175	20	1	49	16QAM	22.65	22.75
1732.5	20175	20	50	24	16QAM	21.55	20.66
1732.5	20175	20	100	0	16QAM	21.53	20.65
1745.0	20300	20	1	0	QPSK	23.10	23.29
1745.0	20300	20	1	99	QPSK	23.01	23.00
1745.0	20300	20	1	49	QPSK	23.19	23.17
1745.0	20300	20	50	24	QPSK	22.54	21.47
1745.0	20300	20	100	0	QPSK	22.53	21.41
1745.0	20300	20	1	0	16QAM	22.72	22.66
1745.0	20300	20	1	99	16QAM	22.65	22.42
1745.0	20300	20	1	49	16QAM	22.56	22.63
1745.0	20300	20	50	24	16QAM	21.49	20.53
1745.0	20300	20	100	0	16QAM	21.41	20.49

Copyright © 2012 TCC Nokia

Type: RM-824; Serial number: 004402/13/976171/6 used for LTE1900 (Band 2) for SAR Head, Body-worn and Wireless Router measurements.

"Max Average Power (dBm)" column lists measured powers with MPR active. The "Reduced Power" column lists measured powers with MPR and A-MPR active (as defined by 3GPP TS 36.101). A-MPR is not specified for LTE1900 (Band 2) in 1.4MHz Channel BW in this specification (Table 6.2.4-1).

Frequency (MHz)	Channel Number	Bandwidth (MHz)	RB Number	RB Offset	Modulation	Max Average Power (dBm)	Reduced Power (dBm)
1850.7	18607	1.4	1	0	QPSK	23.03	-
1850.7	18607	1.4	1	5	QPSK	22.96	-
1850.7	18607	1.4	1	2	QPSK	22.83	-
1850.7	18607	1.4	3	2	QPSK	22.81	-
1850.7	18607	1.4	6	0	QPSK	22.07	-
1850.7	18607	1.4	1	0	16QAM	22.29	-
1850.7	18607	1.4	1	5	16QAM	21.89	-
1850.7	18607	1.4	1	2	16QAM	21.93	-
1850.7	18607	1.4	3	2	16QAM	21.98	-
1850.7	18607	1.4	6	0	16QAM	21.00	-
1880.0	18900	1.4	1	0	QPSK	22.53	-
1880.0	18900	1.4	1	5	QPSK	22.56	-
1880.0	18900	1.4	1	2	QPSK	22.51	-
1880.0	18900	1.4	3	2	QPSK	22.76	-
1880.0	18900	1.4	6	0	QPSK	21.81	-
1880.0	18900	1.4	1	0	16QAM	22.02	-
1880.0	18900	1.4	1	5	16QAM	21.87	-
1880.0	18900	1.4	1	2	16QAM	22.00	-
1880.0	18900	1.4	3	2	16QAM	22.00	-
1880.0	18900	1.4	6	0	16QAM	20.90	-
1909.3	19193	1.4	1	0	QPSK	22.52	-
1909.3	19193	1.4	1	5	QPSK	22.78	-
1909.3	19193	1.4	1	2	QPSK	22.52	-
1909.3	19193	1.4	3	2	QPSK	22.87	-
1909.3	19193	1.4	6	0	QPSK	21.72	-
1909.3	19193	1.4	1	0	16QAM	21.87	-
1909.3	19193	1.4	1	5	16QAM	22.10	-
1909.3	19193	1.4	1	2	16QAM	22.07	-
1909.3	19193	1.4	3	2	16QAM	21.84	-
1909.3	19193	1.4	6	0	16QAM	21.04	-

Copyright © 2012 TCC Nokia

Frequency (MHz)	Channel Number	Bandwidth (MHz)	RB Number	RB Offset	Modulation	Max Average Power (dBm)	Reduced Power (dBm)
1851.5	18615	3	1	0	QPSK	23.15	22.89
1851.5	18615	3	1	14	QPSK	22.91	22.91
1851.5	18615	3	1	7	QPSK	22.87	22.93
1851.5	18615	3	8	3	QPSK	22.09	21.10
1851.5	18615	3	15	0	QPSK	22.37	21.16
1851.5	18615	3	1	0	16QAM	21.83	22.34
1851.5	18615	3	1	14	16QAM	22.53	22.24
1851.5	18615	3	1	7	16QAM	22.29	22.14
1851.5	18615	3	8	3	16QAM	21.52	20.27
1851.5	18615	3	15	0	16QAM	20.99	19.90
1880.0	18900	3	1	0	QPSK	22.71	22.72
1880.0	18900	3	1	14	QPSK	22.45	22.47
1880.0	18900	3	1	7	QPSK	22.57	22.57
1880.0	18900	3	8	3	QPSK	21.89	20.93
1880.0	18900	3	15	0	QPSK	21.95	20.91
1880.0	18900	3	1	0	16QAM	21.91	22.31
1880.0	18900	3	1	14	16QAM	21.97	22.04
1880.0	18900	3	1	7	16QAM	21.88	22.08
1880.0	18900	3	8	3	16QAM	21.25	20.18
1880.0	18900	3	15	0	16QAM	20.91	19.85
1908.5	19185	3	1	0	QPSK	22.73	22.73
1908.5	19185	3	1	14	QPSK	22.69	22.61
1908.5	19185	3	1	7	QPSK	22.56	22.60
1908.5	19185	3	8	3	QPSK	21.92	21.01
1908.5	19185	3	15	0	QPSK	21.97	21.00
1908.5	19185	3	1	0	16QAM	21.70	22.08
1908.5	19185	3	1	14	16QAM	22.09	21.91
1908.5	19185	3	1	7	16QAM	22.15	22.01
1908.5	19185	3	8	3	16QAM	21.34	20.30
1908.5	19185	3	15	0	16QAM	20.95	20.02

Copyright © 2012 TCC Nokia

Frequency (MHz)	Channel Number	Bandwidth (MHz)	RB Number	RB Offset	Modulation	Max Average Power (dBm)	Reduced Power (dBm)
1852.5	18625	5	1	0	QPSK	23.12	22.88
1852.5	18625	5	1	24	QPSK	22.95	23.00
1852.5	18625	5	1	12	QPSK	22.92	22.91
1852.5	18625	5	12	6	QPSK	22.14	21.15
1852.5	18625	5	25	0	QPSK	22.29	21.12
1852.5	18625	5	1	0	16QAM	22.08	21.98
1852.5	18625	5	1	24	16QAM	22.06	21.92
1852.5	18625	5	1	12	16QAM	22.10	22.01
1852.5	18625	5	12	6	16QAM	21.00	20.10
1852.5	18625	5	25	0	16QAM	20.93	20.06
1880.0	18900	5	1	0	QPSK	22.72	22.76
1880.0	18900	5	1	24	QPSK	22.73	22.80
1880.0	18900	5	1	12	QPSK	22.49	22.49
1880.0	18900	5	12	6	QPSK	21.94	20.90
1880.0	18900	5	25	0	QPSK	21.96	20.96
1880.0	18900	5	1	0	16QAM	22.01	21.98
1880.0	18900	5	1	24	16QAM	21.84	22.00
1880.0	18900	5	1	12	16QAM	22.01	21.76
1880.0	18900	5	12	6	16QAM	21.16	19.91
1880.0	18900	5	25	0	16QAM	20.99	19.94
1907.5	19175	5	1	0	QPSK	22.65	22.67
1907.5	19175	5	1	24	QPSK	22.52	22.59
1907.5	19175	5	1	12	QPSK	22.68	22.70
1907.5	19175	5	12	6	QPSK	22.02	21.00
1907.5	19175	5	25	0	QPSK	22.09	20.99
1907.5	19175	5	1	0	16QAM	21.87	21.88
1907.5	19175	5	1	24	16QAM	21.65	21.78
1907.5	19175	5	1	12	16QAM	22.09	21.90
1907.5	19175	5	12	6	16QAM	20.85	20.02
1907.5	19175	5	25	0	16QAM	21.02	19.95

Copyright © 2012 TCC Nokia

Frequency (MHz)	Channel Number	Bandwidth (MHz)	RB Number	RB Offset	Modulation	Max Average Power (dBm)	Reduced Power (dBm)
1855.0	18650	10	1	0	QPSK	22.99	22.88
1855.0	18650	10	1	49	QPSK	22.72	22.72
1855.0	18650	10	1	24	QPSK	22.93	22.95
1855.0	18650	10	25	12	QPSK	22.21	21.17
1855.0	18650	10	50	0	QPSK	22.28	21.16
1855.0	18650	10	1	0	16QAM	22.03	22.22
1855.0	18650	10	1	49	16QAM	21.57	21.96
1855.0	18650	10	1	24	16QAM	22.38	22.27
1855.0	18650	10	25	12	16QAM	21.02	20.18
1855.0	18650	10	50	0	16QAM	21.02	20.10
1880.0	18900	10	1	0	QPSK	22.61	22.60
1880.0	18900	10	1	49	QPSK	23.01	22.92
1880.0	18900	10	1	24	QPSK	22.58	22.52
1880.0	18900	10	25	12	QPSK	22.01	20.99
1880.0	18900	10	50	0	QPSK	22.22	21.13
1880.0	18900	10	1	0	16QAM	22.19	22.13
1880.0	18900	10	1	49	16QAM	21.98	22.33
1880.0	18900	10	1	24	16QAM	22.10	22.00
1880.0	18900	10	25	12	16QAM	20.98	19.93
1880.0	18900	10	50	0	16QAM	20.95	20.13
1905.0	19150	10	1	0	QPSK	22.68	22.70
1905.0	19150	10	1	49	QPSK	22.46	22.51
1905.0	19150	10	1	24	QPSK	22.58	22.65
1905.0	19150	10	25	12	QPSK	22.17	21.04
1905.0	19150	10	50	0	QPSK	22.14	20.98
1905.0	19150	10	1	0	16QAM	21.89	22.08
1905.0	19150	10	1	49	16QAM	21.98	22.02
1905.0	19150	10	1	24	16QAM	22.21	22.02
1905.0	19150	10	25	12	16QAM	21.13	20.10
1905.0	19150	10	50	0	16QAM	20.98	20.06

Copyright © 2012 TCC Nokia

Frequency (MHz)	Channel Number	Bandwidth (MHz)	RB Number	RB Offset	Modulation	Max Average Power (dBm)	Reduced Power (dBm)
1857.5	18675	15	1	0	QPSK	23.03	22.92
1857.5	18675	15	1	74	QPSK	22.74	22.70
1857.5	18675	15	1	36	QPSK	22.86	22.84
1857.5	18675	15	37	18	QPSK	21.96	21.00
1857.5	18675	15	75	0	QPSK	22.06	20.94
1857.5	18675	15	1	0	16QAM	22.27	22.20
1857.5	18675	15	1	74	16QAM	22.05	21.99
1857.5	18675	15	1	36	16QAM	21.67	22.05
1857.5	18675	15	37	18	16QAM	21.17	20.04
1857.5	18675	15	75	0	16QAM	21.00	20.01
1880.0	18900	15	1	0	QPSK	22.63	22.64
1880.0	18900	15	1	74	QPSK	22.77	22.77
1880.0	18900	15	1	36	QPSK	22.63	22.56
1880.0	18900	15	37	18	QPSK	22.11	21.05
1880.0	18900	15	75	0	QPSK	22.13	21.17
1880.0	18900	15	1	0	16QAM	22.02	22.03
1880.0	18900	15	1	74	16QAM	22.37	22.25
1880.0	18900	15	1	36	16QAM	22.10	21.87
1880.0	18900	15	37	18	16QAM	21.09	20.10
1880.0	18900	15	75	0	16QAM	21.05	20.19
1902.5	19125	15	1	0	QPSK	22.71	22.77
1902.5	19125	15	1	74	QPSK	22.72	22.58
1902.5	19125	15	1	36	QPSK	22.74	22.67
1902.5	19125	15	37	18	QPSK	21.96	21.08
1902.5	19125	15	75	0	QPSK	22.00	21.11
1902.5	19125	15	1	0	16QAM	22.23	22.26
1902.5	19125	15	1	74	16QAM	22.06	22.05
1902.5	19125	15	1	36	16QAM	22.17	22.08
1902.5	19125	15	37	18	16QAM	21.19	20.15
1902.5	19125	15	75	0	16QAM	20.86	20.13

Copyright © 2012 TCC Nokia

Frequency (MHz)	Channel Number	Bandwidth (MHz)	RB Number	RB Offset	Modulation	Max Average Power (dBm)	Reduced Power (dBm)
1860.0	18700	20	1	0	QPSK	22.91	22.90
1860.0	18700	20	1	99	QPSK	22.97	22.80
1860.0	18700	20	1	49	QPSK	22.87	22.84
1860.0	18700	20	50	24	QPSK	21.97	21.06
1860.0	18700	20	100	0	QPSK	22.17	21.05
1860.0	18700	20	1	0	16QAM	22.05	22.15
1860.0	18700	20	1	99	16QAM	21.98	22.08
1860.0	18700	20	1	49	16QAM	21.72	22.07
1860.0	18700	20	50	24	16QAM	20.86	20.00
1860.0	18700	20	100	0	16QAM	21.00	20.05
1880.0	18900	20	1	0	QPSK	22.68	22.70
1880.0	18900	20	1	99	QPSK	22.82	22.81
1880.0	18900	20	1	49	QPSK	22.63	22.51
1880.0	18900	20	50	24	QPSK	22.15	21.14
1880.0	18900	20	100	0	QPSK	22.20	21.23
1880.0	18900	20	1	0	16QAM	21.86	22.11
1880.0	18900	20	1	99	16QAM	22.02	22.21
1880.0	18900	20	1	49	16QAM	21.94	21.91
1880.0	18900	20	50	24	16QAM	21.05	20.19
1880.0	18900	20	100	0	16QAM	21.16	20.22
1900.0	19100	20	1	0	QPSK	22.76	22.85
1900.0	19100	20	1	99	QPSK	22.65	22.57
1900.0	19100	20	1	49	QPSK	22.91	22.76
1900.0	19100	20	50	24	QPSK	22.06	21.12
1900.0	19100	20	100	0	QPSK	22.21	21.19
1900.0	19100	20	1	0	16QAM	22.38	22.23
1900.0	19100	20	1	99	16QAM	22.18	22.01
1900.0	19100	20	1	49	16QAM	22.00	22.26
1900.0	19100	20	50	24	16QAM	21.11	20.19
1900.0	19100	20	100	0	16QAM	21.18	20.27

Copyright © 2012 TCC Nokia

APPENDIX H: CONDUCTED POWER MEASUREMENTS FOR SUPPORTED GSM/GPRS/EGPRS TRANSMISSION MODES

H.1 Power Tuning Targets

Tuning targets GSM850			
Slot configuration	Low channel	Mid channel	High channel
GSM 1-slot	-	32.0	-
GPRS 2-slot	-	32.0	-
EGRPS 1-slot	-	26.5	-
EGPRS 2-slot	-	26.5	-

Tuning targets GSM1900			
Slot configuration	Low channel	Mid channel	High channel
GSM 1-slot	-	29.5	-
GPRS 2-slot	-	29.5	-
EGRPS 1-slot	-	25.5	-
EGPRS 2-slot	-	25.5	-

Copyright © 2012 TCC Nokia

H.2 Conducted Power from the Samples used in the Testing

Type: RM-824; Serial number: 004402/13/976081/7 used for GSM/GPRS/EGPRS850 for SAR Head, Body-worn and Wireless Router measurements.

Type: RM-824; Serial number: 004402/13/976059/3 used for GSM/GPRS/EGPRS1900 for SAR Head, Body-worn and Wireless Router measurements.

GSM850			
Slot configuration	Low channel	Mid channel	High channel
GSM 1-slot	32.13	32.20	32.38
GPRS 2-slot	31.96	32.19	32.30
EGRPS 1-slot	26.87	27.11	27.27
EGPRS 2-slot	26.76	26.98	27.16

GSM1900			
Slot configuration	Low channel	Mid channel	High channel
GSM 1-slot	30.04	30.14	30.05
GPRS 2-slot	30.01	30.10	29.99
EGRPS 1-slot	26.31	26.52	26.45
EGPRS 2-slot	26.26	26.38	26.38

Copyright © 2012 TCC Nokia

APPENDIX I: CONDUCTED POWER MEASUREMENTS FOR SUPPORTED WCDMA TRANSMISSION MODES

I.1 Power Tuning Targets

Tuning targets			
Mode	Low channel	Mid channel	High channel
WCDMA850	-	23.5	-
WCDMA1700/2100	-	23.5	-
WCDMA1900	-	23.5	-

I.2 Conducted Power from the Samples used in the Testing

Type: RM-824; Serial number: 004402/13/976081/7 used for WCDMA850 for SAR Head, Body-worn and Wireless Router measurements.

Type: RM-824; Serial number: 004402/13/976165/8 used for WCDMA1700/2100 for SAR Head, Body-worn and Wireless Router measurements.

Type: RM-824; Serial number: 004402/13/976059/3 used for WCDMA1900 for SAR Head, Body-worn and Wireless Router measurements.

WCDMA850 (Band 5)			
Mode	Low channel	Mid channel	High channel
WCDMA	23.01	22.84	23.16

WCDMA1700/2100 (Band 4)			
Mode	Low channel	Mid channel	High channel
WCDMA	23.10	23.20	23.20

WCDMA1900 (Band 2)			
Mode	Low channel	Mid channel	High channel
WCDMA	22.64	22.71	23.20

WCDMA and HSUPA Subtest mode conducted powers, measured from as separate, fully representative sample are presented in Appendix D.

Copyright © 2012 TCC Nokia

APPENDIX J: CONDUCTED POWER RESULTS FOR WLAN2450 AND WLAN5000

J.1 Power Tuning Targets

Tuning targets for WLAN 2.4 GHz					
Modulation mode	Ch 1	Ch 2	Ch 6	Ch 10	Ch 11
b-mode WLAN DSSS 1 Mbps	16	16	16	16	16
b-mode WLAN DSSS 2 Mbps	16	16	16	16	16
b-mode WLAN DSSS 5.5 Mbps	16	16	16	16	16
b-mode WLAN DSSS 11 Mbps	16	16	16	16	16
g-mode WLAN OFDM 6 Mbps	13	13	13	13	13
g-mode WLAN OFDM 9 Mbps	13	13	13	13	13
g-mode WLAN OFDM 12 Mbps	13	13	13	13	13
g-mode WLAN OFDM 18 Mbps	13	13	13	13	13
g-mode WLAN OFDM 24 Mbps	13	13	13	13	13
g-mode WLAN OFDM 36 Mbps	13	13	13	13	13
g-mode WLAN OFDM 48 Mbps	12	12	12	12	12
g-mode WLAN OFDM 54 Mbps	12	12	12	12	12
n-mode MCS 0: OFDM 6.5 / 7.25 Mbps	13	13	13	13	13
n-mode MCS 1: OFDM 13.0 / 14.4 Mbps	13	13	13	13	13
n-mode MCS 2: OFDM 19.5 / 21.7 Mbps	13	13	13	13	13
n-mode MCS 3: OFDM 26.0 / 28.9 Mbps	13	13	13	13	13
n-mode MCS 4: OFDM 39.0 / 43.3 Mbps	12	12	12	12	12
n-mode MCS 5: OFDM 52.0 / 57.8 Mbps	11	11	11	11	11
n-mode MCS 6: OFDM 58.5 / 65.0 Mbps	11	11	11	11	11
n-mode MCS 7: OFDM 65.0 / 72.2 Mbps	11	11	11	11	11

Copyright © 2012 TCC Nokia

WLAN 5 GHz	
Mode	Channel
	All channels
WLAN OFDM 6 Mbps	13
WLAN OFDM 9 Mbps	13
WLAN OFDM 12 Mbps	13
WLAN OFDM 18 Mbps	13
WLAN OFDM 24 Mbps	12
WLAN OFDM 36 Mbps	12
WLAN OFDM 48 Mbps	11
WLAN OFDM 54 Mbps	11
MCS 0: OFDM 6.5 / 7.25 Mbps	13
MCS 1: OFDM 13.0 / 14.4 Mbps	13
MCS 2: OFDM 19.5 / 21.7 Mbps	12
MCS 3: OFDM 26.0 / 28.9 Mbps	12
MCS 4: OFDM 39.0 / 43.3 Mbps	11
MCS 5: OFDM 52.0 / 57.8 Mbps	11
MCS 6: OFDM 58.5 / 65.0 Mbps	10
MCS 7: OFDM 65.0 / 72.2 Mbps	10
MCS 0: OFDM13.5 / 15.0 Mbps	12
MCS 1: OFDM 27.0 / 30.0 Mbps	12
MCS 2: OFDM 40.5 / 45.0 Mbps	12
MCS 3: OFDM 54.0 / 60.0 Mbps	12
MCS 4: OFDM 81.0 / 90.0 Mbps	11
MCS 5: OFDM 108.0 / 120.0 Mbps	10
MCS 6: OFDM 121.5 / 135.0 Mbps	10
MCS 7: OFDM 135.0 / 150.0 Mbps	10

Copyright © 2012 TCC Nokia

J.2 Conducted Power from the Samples used in the Testing

Type: RM-824; Serial number: 004402/13/976064/3 used for WLAN2450 for SAR Head, Body-worn and Wireless Router measurements.

WLAN 2.4 GHz					
Modulation mode	Ch 1	Ch 2	Ch 6	Ch 10	Ch 11
b-mode WLAN DSSS 1 Mbps	15.52	-	16.15	-	15.70
b-mode WLAN DSSS 2 Mbps	15.62	-	16.20	-	15.67
b-mode WLAN DSSS 5.5 Mbps	15.57	-	16.07	-	15.70
b-mode WLAN DSSS 11 Mbps	15.60	-	16.22	-	15.54
g-mode WLAN OFDM 6 Mbps	12.46	-	13.19	-	12.65
g-mode WLAN OFDM 9 Mbps	12.51	-	13.06	-	12.52
g-mode WLAN OFDM 12 Mbps	12.55	-	13.24	-	12.73
g-mode WLAN OFDM 18 Mbps	12.43	-	13.12	-	12.68
g-mode WLAN OFDM 24 Mbps	12.56	-	13.13	-	12.65
g-mode WLAN OFDM 36 Mbps	12.52	-	13.07	-	12.52
g-mode WLAN OFDM 48 Mbps	11.45	-	12.01	-	11.60
g-mode WLAN OFDM 54 Mbps	11.44	-	12.22	-	11.69
n-mode MCS 0: OFDM 6.5 / 7.25 Mbps	12.63	-	13.08	-	12.64
n-mode MCS 1: OFDM 13.0 / 14.4 Mbps	12.56	-	13.14	-	12.69
n-mode MCS 2: OFDM 19.5 / 21.7 Mbps	12.54	-	13.03	-	12.57
n-mode MCS 3: OFDM 26.0 / 28.9 Mbps	12.58	-	13.15	-	12.55
n-mode MCS 4: OFDM 39.0 / 43.3 Mbps	11.61	-	12.17	-	11.60
n-mode MCS 5: OFDM 52.0 / 57.8 Mbps	10.64	-	11.09	-	10.67
n-mode MCS 6: OFDM 58.5 / 65.0 Mbps	10.55	-	11.06	-	10.64
n-mode MCS 7: OFDM 65.0 / 72.2 Mbps	10.47	-	11.19	-	10.54
n-mode MCS 0: OFDM 13.5 / 15.0 Mbps	12.62	-	13.00	-	12.60
n-mode MCS 1: OFDM 27.0 / 30.0 Mbps	12.59	-	13.07	-	12.51
n-mode MCS 2: OFDM 40.5 / 45.0 Mbps	12.46	-	13.19	-	12.74
n-mode MCS 3: OFDM 54.0 / 60.0 Mbps	11.42	-	12.02	-	11.69
n-mode MCS 4: OFDM 81.0 / 90.0 Mbps	10.54	-	11.04	-	10.68
n-mode MCS 5: OFDM 108.0 / 120.0 Mbps	10.62	-	11.17	-	10.57
n-mode MCS 6: OFDM 121.5 / 135.0 Mbps	9.59	-	10.04	-	9.50
n-mode MCS 7: OFDM 135.0 / 150.0 Mbps	9.47	-	10.05	-	9.58

Copyright © 2012 TCC Nokia

Type: RM-824; Serial number: 004402/13/976060/1 used for WLAN5000 for SAR Head and Body-worn measurements.

WLAN 5 GHz						
Mode	Channel					
	36	40	44	48	52	56
WLAN OFDM 6 Mbps	13.07	12.92	13.00	13.12	12.91	12.82
WLAN OFDM 9 Mbps	13.22	13.13	13.06	13.02	13.01	12.89
WLAN OFDM 12 Mbps	13.00	13.14	12.96	13.09	12.90	12.91
WLAN OFDM 18 Mbps	13.10	12.96	12.96	13.07	12.99	12.90
WLAN OFDM 24 Mbps	12.19	12.14	11.97	12.10	11.83	11.99
WLAN OFDM 36 Mbps	12.18	12.05	12.08	12.11	11.94	11.89
WLAN OFDM 48 Mbps	11.19	10.96	11.09	11.02	10.90	10.98
WLAN OFDM 54 Mbps	11.16	11.08	11.02	10.99	11.04	10.88
MCS 0: OFDM 6.5 / 7.25 Mbps	13.05	13.08	13.05	12.93	12.89	12.97
MCS 1: OFDM 13.0 / 14.4 Mbps	13.22	13.11	12.94	13.04	12.87	12.90
MCS 2: OFDM 19.5 / 21.7 Mbps	12.19	12.09	12.05	11.98	11.84	12.04
MCS 3: OFDM 26.0 / 28.9 Mbps	12.20	11.96	12.00	11.97	11.81	11.90
MCS 4: OFDM 39.0 / 43.3 Mbps	11.00	10.98	11.09	11.13	10.92	10.96
MCS 5: OFDM 52.0 / 57.8 Mbps	11.02	11.04	11.06	11.00	11.04	10.80
MCS 6: OFDM 58.5 / 65.0 Mbps	10.19	9.94	9.90	9.90	9.90	9.87
MCS 7: OFDM 65.0 / 72.2 Mbps	10.02	10.12	10.13	10.05	10.00	10.00
MCS 0: OFDM13.5 / 15.0 Mbps	12.20	12.05	12.10	12.04	11.84	11.81
MCS 1: OFDM 27.0 / 30.0 Mbps	12.07	12.07	11.96	12.09	11.87	11.90
MCS 2: OFDM 40.5 / 45.0 Mbps	12.04	12.14	11.95	11.99	11.81	11.80
MCS 3: OFDM 54.0 / 60.0 Mbps	12.11	12.10	12.05	12.13	11.83	11.96
MCS 4: OFDM 81.0 / 90.0 Mbps	11.13	10.97	10.98	10.90	10.86	10.99
MCS 5: OFDM 108.0 / 120.0 Mbps	10.01	10.08	9.96	9.95	9.94	9.90
MCS 6: OFDM 121.5 / 135.0 Mbps	10.22	9.94	9.92	10.13	9.98	9.90
MCS 7: OFDM 135.0 / 150.0 Mbps	10.00	9.96	10.00	9.92	9.81	10.02

(5GHz Table continues)

Copyright © 2012 TCC Nokia

(5GHz Table continues)

WLAN 5 GHz						
Mode						
	60	64	100	104	108	112
WLAN OFDM 6 Mbps	12.96	13.00	12.94	12.87	12.85	12.87
WLAN OFDM 9 Mbps	12.84	12.85	12.93	12.91	13.02	12.89
WLAN OFDM 12 Mbps	12.86	13.02	12.95	13.04	12.88	12.85
WLAN OFDM 18 Mbps	12.80	13.00	12.80	12.98	13.02	13.01
WLAN OFDM 24 Mbps	12.04	11.86	12.04	11.93	11.99	12.00
WLAN OFDM 36 Mbps	11.99	11.82	11.82	11.83	11.82	11.85
WLAN OFDM 48 Mbps	10.96	10.82	10.96	10.85	10.90	11.01
WLAN OFDM 54 Mbps	10.88	10.89	10.84	11.02	10.82	11.04
MCS 0: OFDM 6.5 / 7.25 Mbps	12.88	12.91	13.02	12.92	12.93	12.90
MCS 1: OFDM 13.0 / 14.4 Mbps	12.86	12.87	12.92	12.80	12.99	12.98
MCS 2: OFDM 19.5 / 21.7 Mbps	11.84	11.97	11.80	11.98	11.94	11.98
MCS 3: OFDM 26.0 / 28.9 Mbps	11.90	12.02	12.02	11.90	11.84	11.84
MCS 4: OFDM 39.0 / 43.3 Mbps	11.03	10.80	10.96	10.80	11.01	10.83
MCS 5: OFDM 52.0 / 57.8 Mbps	10.95	11.01	10.92	10.92	11.02	10.94
MCS 6: OFDM 58.5 / 65.0 Mbps	9.94	9.85	9.82	9.83	9.96	10.03
MCS 7: OFDM 65.0 / 72.2 Mbps	10.00	9.90	9.99	9.97	9.90	10.02
MCS 0: OFDM13.5 / 15.0 Mbps	11.96	11.98	12.01	11.81	11.86	12.01
MCS 1: OFDM 27.0 / 30.0 Mbps	11.96	12.03	11.95	11.82	11.83	11.83
MCS 2: OFDM 40.5 / 45.0 Mbps	11.93	11.95	11.99	11.80	11.88	11.96
MCS 3: OFDM 54.0 / 60.0 Mbps	11.93	11.98	12.00	11.99	11.85	11.96
MCS 4: OFDM 81.0 / 90.0 Mbps	10.82	10.99	10.87	10.96	10.91	10.88
MCS 5: OFDM 108.0 / 120.0 Mbps	9.97	9.92	9.82	9.81	10.02	9.87
MCS 6: OFDM 121.5 / 135.0 Mbps	9.98	10.02	9.97	9.87	9.88	9.83
MCS 7: OFDM 135.0 / 150.0 Mbps	9.96	9.87	9.91	9.96	9.89	9.89

(5GHz Table continues)

Copyright © 2012 TCC Nokia

(5GHz Table continues)

WLAN 5 GHz						
Mode	116	120	124	128	132	136
WLAN OFDM 6 Mbps	12.88	12.98	12.88	12.92	12.87	12.70
WLAN OFDM 9 Mbps	12.78	12.86	12.85	12.74	12.76	12.78
WLAN OFDM 12 Mbps	12.70	12.80	12.71	12.89	12.70	12.93
WLAN OFDM 18 Mbps	12.79	12.87	12.89	12.93	12.77	12.89
WLAN OFDM 24 Mbps	11.81	11.94	11.92	11.73	11.73	11.77
WLAN OFDM 36 Mbps	11.91	11.81	11.84	11.88	11.84	11.91
WLAN OFDM 48 Mbps	10.85	10.81	10.92	10.87	10.80	10.94
WLAN OFDM 54 Mbps	10.93	10.95	10.73	10.94	10.76	10.75
MCS 0: OFDM 6.5 / 7.25 Mbps	12.86	12.94	12.74	12.89	12.76	12.92
MCS 1: OFDM 13.0 / 14.4 Mbps	12.93	13.03	12.89	12.85	12.75	12.85
MCS 2: OFDM 19.5 / 21.7 Mbps	11.76	11.85	11.73	11.78	11.81	11.82
MCS 3: OFDM 26.0 / 28.9 Mbps	11.72	11.89	11.89	11.76	11.76	11.72
MCS 4: OFDM 39.0 / 43.3 Mbps	10.80	10.89	10.75	10.92	10.86	10.89
MCS 5: OFDM 52.0 / 57.8 Mbps	10.74	10.97	10.70	10.80	10.93	10.89
MCS 6: OFDM 58.5 / 65.0 Mbps	9.85	9.94	9.82	9.72	9.91	9.85
MCS 7: OFDM 65.0 / 72.2 Mbps	9.91	9.87	9.72	9.78	9.87	9.90
MCS 0: OFDM13.5 / 15.0 Mbps	11.73	11.90	11.83	11.77	11.81	11.71
MCS 1: OFDM 27.0 / 30.0 Mbps	11.89	11.98	11.88	11.89	11.73	11.77
MCS 2: OFDM 40.5 / 45.0 Mbps	11.86	12.02	11.78	11.92	11.86	11.77
MCS 3: OFDM 54.0 / 60.0 Mbps	11.78	11.86	11.85	11.88	11.83	11.84
MCS 4: OFDM 81.0 / 90.0 Mbps	10.87	10.85	10.77	10.74	10.86	10.89
MCS 5: OFDM 108.0 / 120.0 Mbps	9.88	9.87	9.77	9.70	9.87	9.76
MCS 6: OFDM 121.5 / 135.0 Mbps	9.86	9.84	9.80	9.84	9.80	9.76
MCS 7: OFDM 135.0 / 150.0 Mbps	9.83	10.02	9.82	9.72	9.92	9.70

(5GHz Table continues)

Copyright © 2012 TCC Nokia

(5GHz Table continues)

WLAN 5 GHz						
Mode						
	140	149	153	157	161	165
WLAN OFDM 6 Mbps	12.64	12.70	12.60	12.81	12.77	12.77
WLAN OFDM 9 Mbps	12.61	12.61	12.72	12.77	12.62	12.64
WLAN OFDM 12 Mbps	12.67	12.63	12.64	12.68	12.72	12.61
WLAN OFDM 18 Mbps	12.75	12.69	12.81	12.66	12.69	12.83
WLAN OFDM 24 Mbps	11.82	11.66	11.60	11.72	11.75	11.76
WLAN OFDM 36 Mbps	11.73	11.70	11.81	11.60	11.75	11.70
WLAN OFDM 48 Mbps	10.84	10.70	10.68	10.74	10.76	10.61
WLAN OFDM 54 Mbps	10.66	10.65	10.62	10.74	10.62	10.69
MCS 0: OFDM 6.5 / 7.25 Mbps	12.68	12.82	12.83	12.83	12.65	12.78
MCS 1: OFDM 13.0 / 14.4 Mbps	12.60	12.60	12.73	12.67	12.73	12.64
MCS 2: OFDM 19.5 / 21.7 Mbps	11.65	11.79	11.69	11.64	11.80	11.75
MCS 3: OFDM 26.0 / 28.9 Mbps	11.80	11.65	11.68	11.84	11.62	11.78
MCS 4: OFDM 39.0 / 43.3 Mbps	10.84	10.72	10.60	10.63	10.84	10.61
MCS 5: OFDM 52.0 / 57.8 Mbps	10.78	10.72	10.82	10.78	10.82	10.67
MCS 6: OFDM 58.5 / 65.0 Mbps	9.75	9.83	9.81	9.72	9.67	9.65
MCS 7: OFDM 65.0 / 72.2 Mbps	9.84	9.76	9.79	9.75	9.71	9.67
MCS 0: OFDM13.5 / 15.0 Mbps	11.67	11.82	11.71	11.71	11.63	11.73
MCS 1: OFDM 27.0 / 30.0 Mbps	11.68	11.62	11.71	11.63	11.81	11.84
MCS 2: OFDM 40.5 / 45.0 Mbps	11.77	11.74	11.76	11.77	11.81	11.71
MCS 3: OFDM 54.0 / 60.0 Mbps	11.76	11.76	11.66	11.69	11.67	11.62
MCS 4: OFDM 81.0 / 90.0 Mbps	10.75	10.66	10.64	10.61	10.76	10.65
MCS 5: OFDM 108.0 / 120.0 Mbps	9.82	9.69	9.81	9.71	9.68	9.74
MCS 6: OFDM 121.5 / 135.0 Mbps	9.73	9.68	9.83	9.68	9.62	9.73
MCS 7: OFDM 135.0 / 150.0 Mbps	9.81	9.79	9.84	9.69	9.81	9.62

Copyright © 2012 TCC Nokia