Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Portable Data Collection Terminal
	GPRS Class 12 and GPRS mode class B(GPRS and GSM, but not simultaneously)
Liquid Temperature:	22.6 ℃
Ambient Temperature:	22.8 ℃
Test Date:	June 25, 2007

DUT: MC-6500S; Type: BAR; Serial: #1
Program Name: MC-6500S

Communication System: 2450MHz FCC; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2462 MHz; σ = 2 mho/m; ε_r = 52.5; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 159

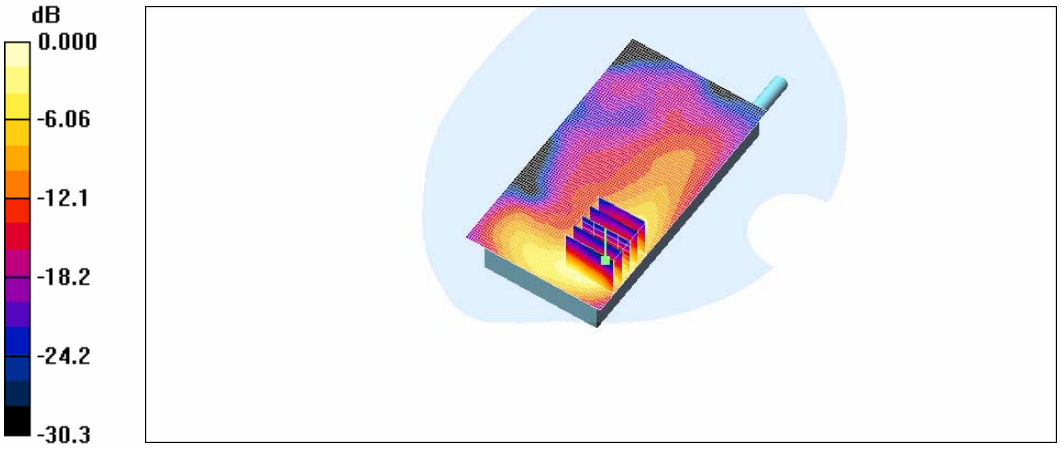
DASY4 Configuration:
- Probe: ET3DV6 - SN1607; ConvF(4.13, 4.13, 4.13); Calibrated: 2007-02-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn447; Calibrated: 2007-03-06
- Phantom: SAM 1800/1900 MHz; Type: SAM

802.11b WiFi Body 11ch/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.447 mW/g

802.11b WiFi Body 11ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.64 V/m; Power Drift = -0.079 dB
Peak SAR (extrapolated) = 1.05 W/kg
SAR(1 g) = 0.393 mW/g; SAR(10 g) = 0.166 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.402 mW/g



0 dB = 0.402mW/g

Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Portable Data Collection Terminal
	GPRS Class 12 and GPRS mode class B(GPRS and GSM, but not simultaneously)
Liquid Temperature:	22.6 ℃
Ambient Temperature:	22.8 ℃
Test Date:	June 25, 2007

DUT: MC-6500S; Type: BAR; Serial: #1
Program Name: MC-6500S

Communication System: 2450MHz FCC; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2412 MHz; σ = 1.92 mho/m; ε_r = 53.2; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 159

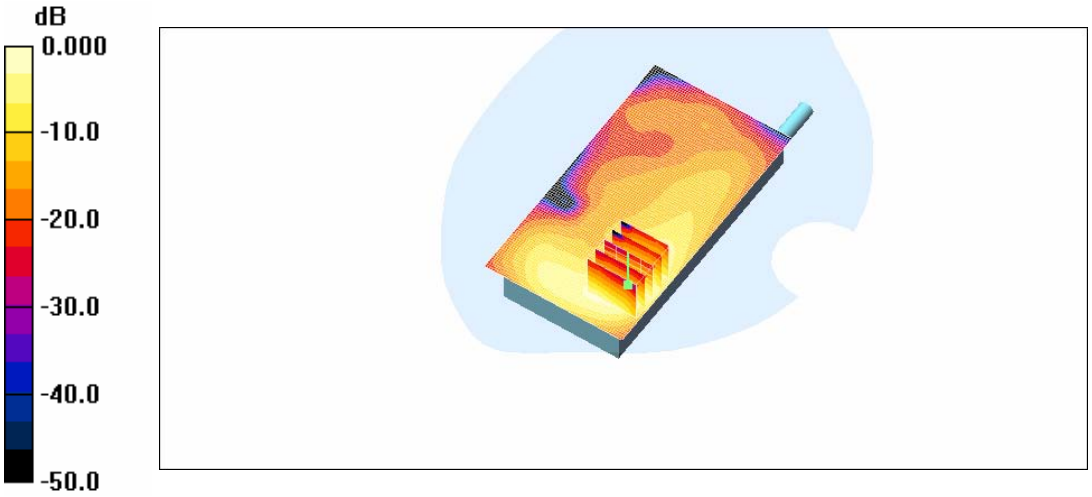
DASY4 Configuration:
- Probe: ET3DV6 - SN1607; ConvF(4.13, 4.13, 4.13); Calibrated: 2007-02-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn447; Calibrated: 2007-03-06
- Phantom: SAM 1800/1900 MHz; Type: SAM

802.11g WiFi Body 1ch/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.355 mW/g

802.11g WiFi Body 1ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.22 V/m; Power Drift = -0.178 dB
Peak SAR (extrapolated) = 0.824 W/kg
SAR(1 g) = 0.309 mW/g; SAR(10 g) = 0.131 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.318 mW/g



0 dB = 0.318mW/g

Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Portable Data Collection Terminal
	GPRS Class 12 and GPRS mode class B(GPRS and GSM, but not simultaneously)
Liquid Temperature:	22.6 ℃
Ambient Temperature:	22.8 ℃
Test Date:	June 25, 2007

DUT: MC-6500S; Type: BAR; Serial: #1
Program Name: MC-6500S

Communication System: 2450MHz FCC; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.96 mho/m; ε_r = 52.7; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 159

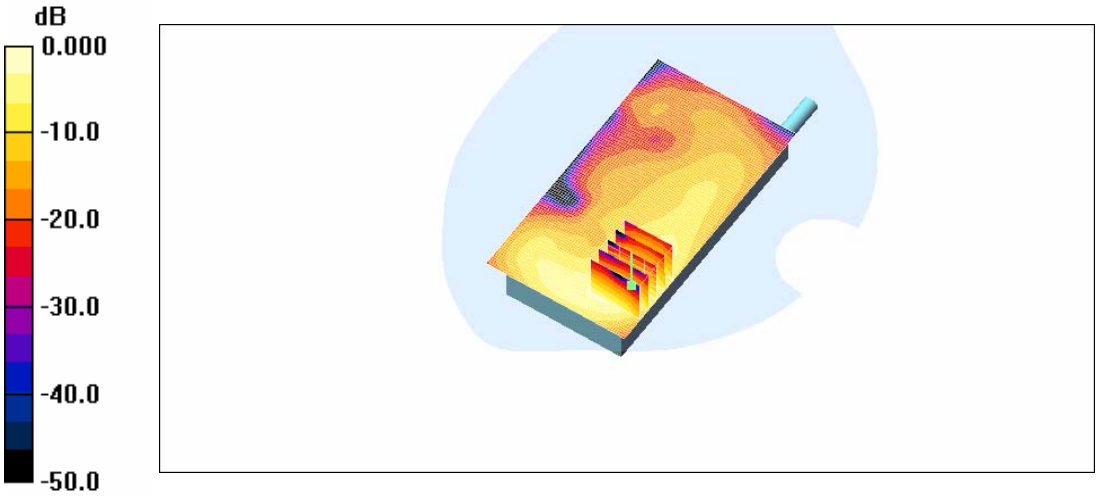
DASY4 Configuration:
- Probe: ET3DV6 - SN1607; ConvF(4.13, 4.13, 4.13); Calibrated: 2007-02-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn447; Calibrated: 2007-03-06
- Phantom: SAM 1800/1900 MHz; Type: SAM

802.11g WiFi Body 6ch/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.280 mW/g

802.11g WiFi Body 6ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.36 V/m; Power Drift = -0.216 dB
Peak SAR (extrapolated) = 0.592 W/kg
SAR(1 g) = 0.227 mW/g; SAR(10 g) = 0.095 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.264 mW/g



0 dB = 0.264mW/g

Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Portable Data Collection Terminal
	GPRS Class 12 and GPRS mode class B(GPRS and GSM, but not simultaneously)
Liquid Temperature:	22.6 ℃
Ambient Temperature:	22.8 ℃
Test Date:	June 25, 2007

DUT: MC-6500S; Type: BAR; Serial: #1
Program Name: MC-6500S

Communication System: 2450MHz FCC; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2462 MHz; σ = 2 mho/m; ε_r = 52.5; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 159

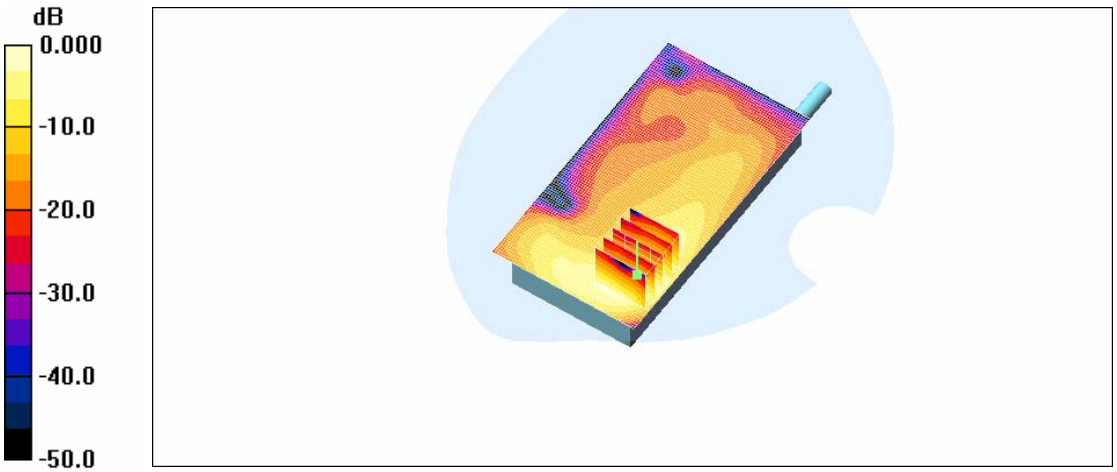
DASY4 Configuration:
- Probe: ET3DV6 - SN1607; ConvF(4.13, 4.13, 4.13); Calibrated: 2007-02-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn447; Calibrated: 2007-03-06
- Phantom: SAM 1800/1900 MHz; Type: SAM

802.11g WiFi Body 11ch/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.368 mW/g

802.11g WiFi Body 11ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.02 V/m; Power Drift = -0.133 dB
Peak SAR (extrapolated) = 0.812 W/kg
SAR(1 g) = 0.294 mW/g; SAR(10 g) = 0.122 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.296 mW/g



0 dB = 0.296mW/g

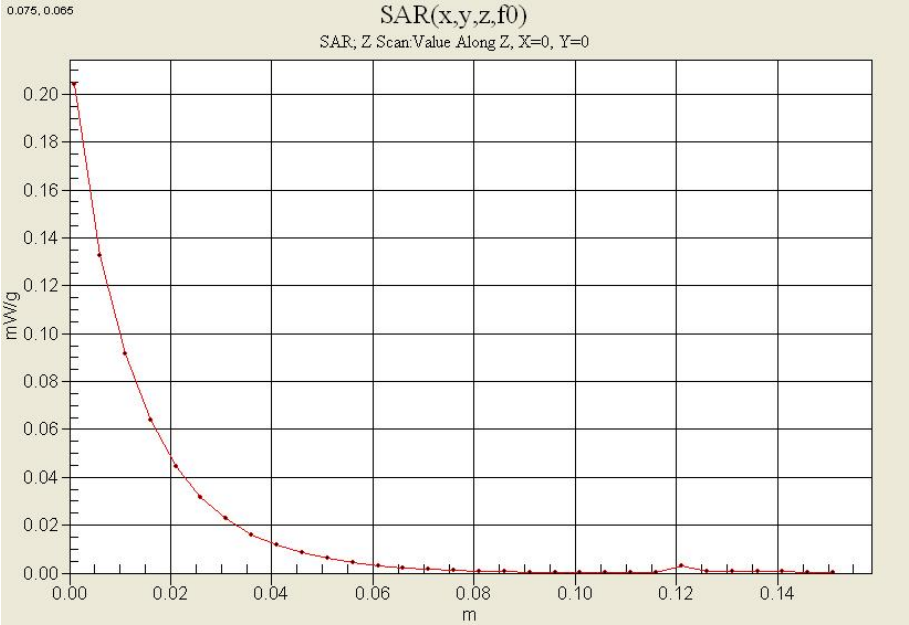
Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Portable Data Collection Terminal
	GPRS Class 12 and GPRS mode class B(GPRS and GSM, but not simultaneously)
Liquid Temperature:	22.0 ℃
Ambient Temperature:	22.2 ℃
Test Date:	June.22, 2007

DUT: MC-6500S; Type: BAR; Serial: #1
Program Name: MC-6500S

Communication System: GSM 850; Frequency: 848.8 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 850 MHz; σ = 0.891 mho/m; ε_r = 41; ρ = 1000 kg/m^3
Phantom section: Left Section ;Measurement SW: DASY4, V4.7 Build 53

DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(6.73, 6.73, 6.73); Calibrated: 2006-08-25
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn447; Calibrated: 2007-03-06
- Phantom: SAM 835/900 MHz; Type: SAM

Left touch251/Z Scan (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.204 mW/g



Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Portable Data Collection Terminal
	GPRS Class 12 and GPRS mode class B(GPRS and GSM, but not simultaneously)
Liquid Temperature:	22.0 ℃
Ambient Temperature:	22.2 ℃
Test Date:	June.22, 2007

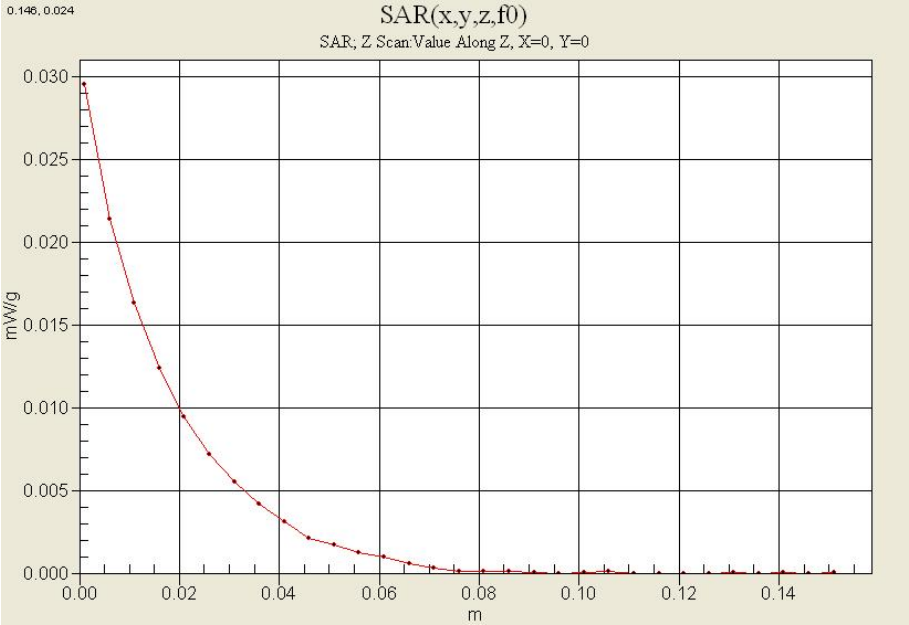
DUT: MC-6500S; Type: BAR (BODY); Serial: #1
Program Name: MC-6500S

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.989 mho/m; ε_r = 53.2; ρ = 1000 kg/m^3
Phantom section: Flat Section ;Measurement SW: DASY4, V4.7 Build 53

DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(6.71, 6.71, 6.71); Calibrated: 2006-08-25
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn447; Calibrated: 2007-03-06
- Phantom: SAM 835/900 MHz; Type: SAM

GSM850 body 190/Z Scan (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.030 mW/g



Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Portable Data Collection Terminal
	GPRS Class 12 and GPRS mode class B(GPRS and GSM, but not simultaneously)
Liquid Temperature:	22.0 ℃
Ambient Temperature:	22.2 ℃
Test Date:	June.23, 2007

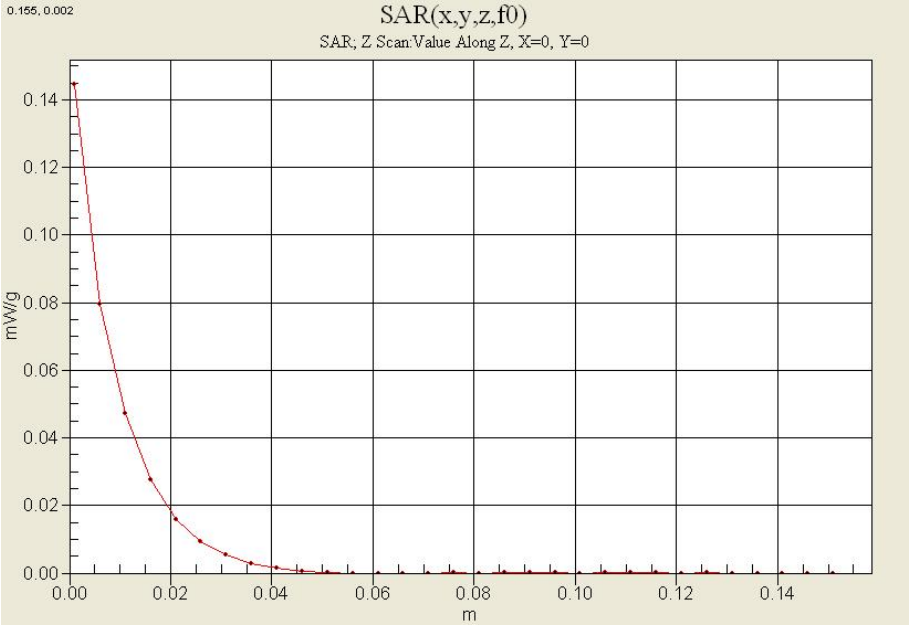
DUT: MC-6500S; Type: BAR; Serial: #1
Program Name: MC-6500S

Communication System: GSM 1900; Frequency: 1850.2 MHz;Duty Cycle: 1:8.3
Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.39 mho/m; ε_r = 38.7; ρ = 1000 kg/m^3
Phantom section: Left Section ;Measurement SW: DASY4, V4.7 Build 53

DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(5.6, 5.6, 5.6); Calibrated: 2006-08-25
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn447; Calibrated: 2007-03-06
- Phantom: SAM 1800/1900 MHz; Type: SAM

Left touch 512/Z Scan (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.145 mW/g



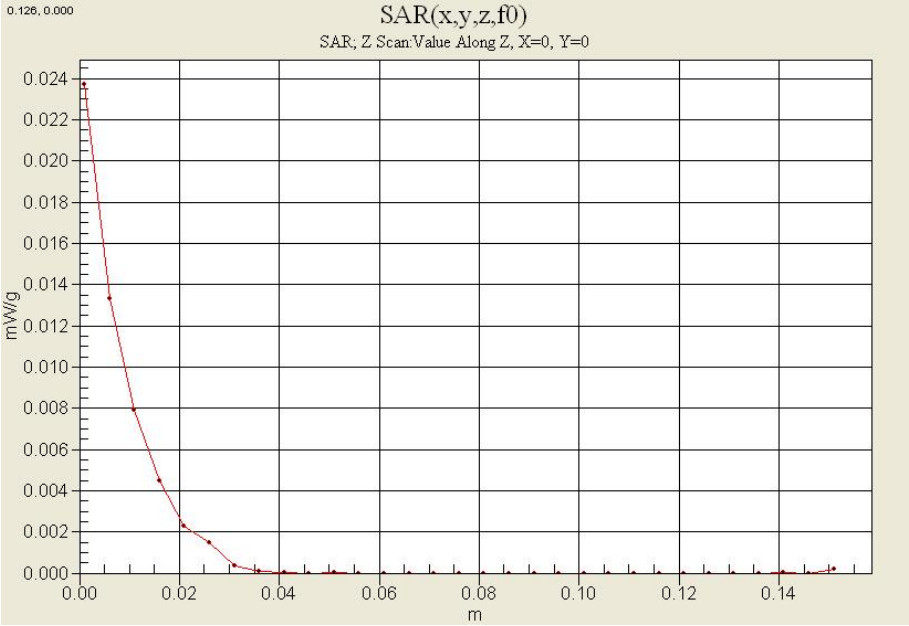
Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Portable Data Collection Terminal
	GPRS Class 12 and GPRS mode class B(GPRS and GSM, but not simultaneously)
Liquid Temperature:	22.0 ℃
Ambient Temperature:	22.2 ℃
Test Date:	June.23, 2007

DUT: MC-6500S; Type: BAR (BODY); Serial: #1
Program Name: MC-6500S

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.55 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3
Phantom section: Flat Section ;Measurement SW: DASY4, V4.7 Build 53

DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(4.8, 4.8, 4.8); Calibrated: 2006-08-25
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn447; Calibrated: 2007-03-06
- Phantom: SAM 1800/1900 MHz; Type: SAM

GSM1900 body 661/Z Scan (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.024 mW/g



Attachment 2. – Dipole Validation Plots

■ Validation Data (835 MHz Head)

Test Laboratory: HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD

Input Power 1W (30dBm)

Liquid Temp: 22.4 ℃

Test Date: June 22, 2007

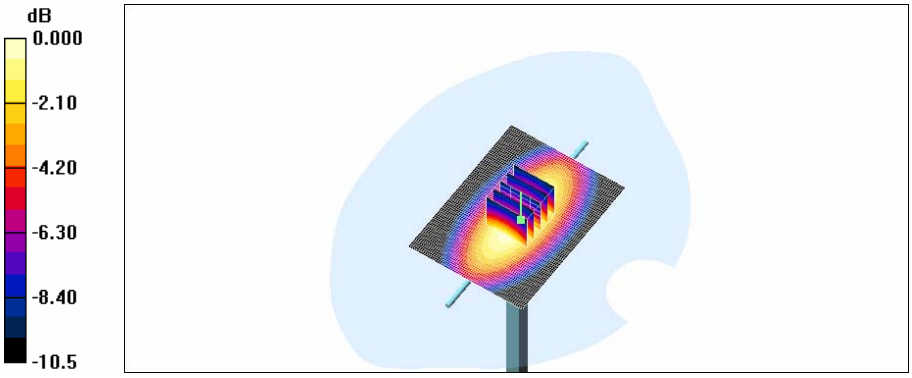
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1

Medium parameters used: f = 835 MHz; σ = 0.876 mho/m; ε_r = 41.1; ρ = 1000 kg/m^3
Phantom section: Flat Section ;Measurement SW: DASY4, V4.7 Build 53

DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(6.73, 6.73, 6.73); Calibrated: 2006-08-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn447; Calibrated: 2007-03-06
- Phantom: SAM 835/900 MHz; Type: SAM

Validation 835 MHz/Area Scan (61x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 10.4 mW/g

Validation 835 MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 112.1 V/m; Power Drift = -0.050 dB
Peak SAR (extrapolated) = 14.1 W/kg
SAR(1 g) = 9.58 mW/g; SAR(10 g) = 6.29 mW/g
Maximum value of SAR (measured) = 10.3 mW/g



0 dB = 10.3mW/g

■ Validation Data (1900 MHz Head)

Test Laboratory: HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD

Input Power 1W (30dBm)

Liquid Temp: 22.5 ℃

Test Date: June 23, 2007

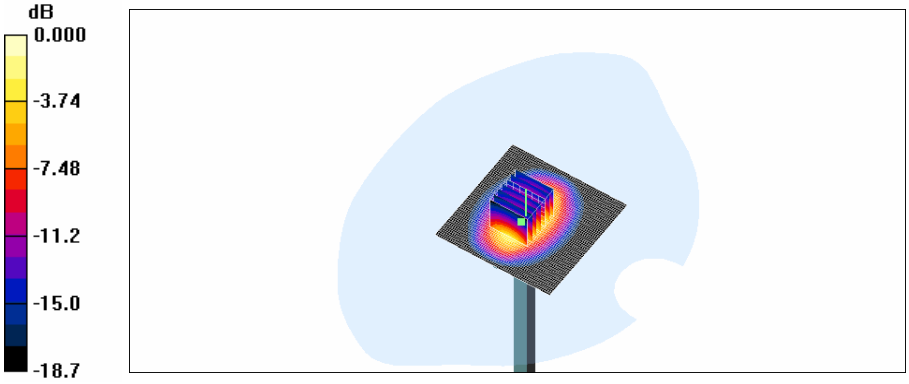
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d032
Program Name: System Performance Check at 1900 MHz

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.44 mho/m; ε_r = 38.5; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.6 Build 19

DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(5.6, 5.6, 5.6); Calibrated: 2006-08-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn447; Calibrated: 2007-03-06
- Phantom: SAM with CRP 1800MHz; Type: SAM

Validation1900 MHz/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 45.8 mW/g

Validation1900 MHz/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 182.7 V/m; Power Drift = -0.032 dB
Peak SAR (extrapolated) = 66.6 W/kg
SAR(1 g) = 37.8 mW/g; SAR(10 g) = 19.6 mW/g
Maximum value of SAR (measured) = 42.8 mW/g



0 dB = 42.8mW/g

■

■ Validation Data (2450 MHz Head)

Test Laboratory: HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD

Input Power 1W (30dBm)

Liquid Temp: 22.5 ℃

Test Date: June 25, 2007

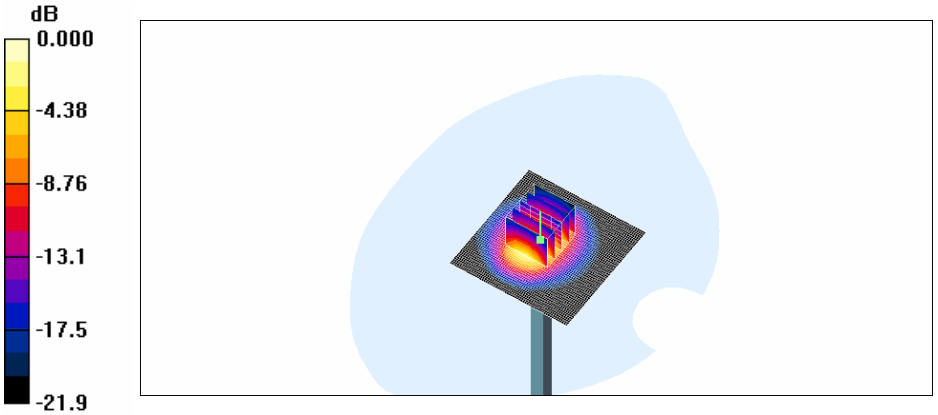
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:743
Program Name: Validation 2450 MHz

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.8 mho/m; ε_r = 38.8; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.6 Build 23

DASY4 Configuration:
- Probe: ET3DV6 - SN1607; ConvF(4.69, 4.69, 4.69); Calibrated: 2007-02-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn447; Calibrated: 2007-03-06
- Phantom: SAM 1800/1900 MHz; Type: SAM

Validation 2450MHz/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 68.9 mW/g

Validation 2450MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 184.5 V/m; Power Drift = 0.047 dB
Peak SAR (extrapolated) = 124.6 W/kg
SAR(1 g) = 55.6 mW/g; SAR(10 g) = 25.9 mW/g
Maximum value of SAR (measured) = 60.6 mW/g



0 dB = 60.6mW/g

■ Dielectric Parameter (835 MHz Head)

Title	MC-6500S
SubTitle	GSM850(Head)
Test Date	June.22, 2007

Frequency	e'	e''
800000000	41.5054	18.8515
805000000	41.4185	18.8495
810000000	41.3856	18.8440
815000000	41.3245	18.7714
820000000	41.2581	18.8127
825000000	41.1991	18.8570
830000000	41.1161	18.8288
835000000	41.1079	18.8589
840000000	41.0923	18.8594
845000000	41.0922	18.8763
850000000	41.0381	18.8460
855000000	40.9819	18.8785
860000000	40.9687	18.8780
865000000	40.9843	18.8693
870000000	40.9104	18.8659
875000000	40.8616	18.8757
880000000	40.7571	18.8463
885000000	40.7014	18.8084
890000000	40.6723	18.8080
895000000	40.5679	18.7852
900000000	40.5113	18.7192

■ Dielectric Parameter (835 MHz Body)

Title	MC-6500S
SubTitle	GSM850(Body)
Test Date	June.22, 2007

Frequency	e'	e''
800000000	53.5967	21.3622
805000000	53.5350	21.3602
810000000	53.4982	21.3608
815000000	53.4518	21.3311
820000000	53.3827	21.2818
825000000	53.3186	21.2592
830000000	53.3261	21.2943
835000000	53.2667	21.2482
840000000	53.2066	21.2578
845000000	53.2764	21.2310
850000000	53.2110	21.2206
855000000	53.1587	21.1841
860000000	53.1628	21.1809
865000000	53.1369	21.1242
870000000	53.1058	21.0806
875000000	53.0586	21.0913
880000000	53.0632	21.0399
885000000	52.9317	21.0459
890000000	52.9796	20.9942
895000000	52.9696	20.9962
900000000	52.8589	21.0055

■ Dielectric Parameter (1900 MHz Head)

Title	MC-6500S
SubTitle	GSM1900(Head)
Test Date	June.23, 2007

Frequency	e'	e''
1800000000	38.8638	13.3438
1810000000	38.8209	13.3635
1820000000	38.7679	13.3894
1830000000	38.7040	13.4250
1840000000	38.7001	13.4933
1850000000	38.6611	13.5259
1860000000	38.6268	13.5349
1870000000	38.5962	13.5773
1880000000	38.5678	13.5681
1890000000	38.4942	13.5751
1900000000	38.4608	13.5929
1910000000	38.4193	13.6101
1920000000	38.3300	13.5958
1930000000	38.2964	13.6407
1940000000	38.2664	13.6571
1950000000	38.2260	13.7151
1960000000	38.2084	13.7703
1970000000	38.1904	13.7909
1980000000	38.1772	13.8401
1990000000	38.1581	13.8468
2000000000	38.1059	13.8634

■ Dielectric Parameter (1900 MHz Body)

Title	MC-6500S
SubTitle	GSM1900(Body)
Test Date	June.23, 2007

Frequency	e'	e''
1800000000	52.3679	14.4758
181000000090.5085	52.2758	14.5186
182000000090.2105	52.2557	14.5799
183000000089.9645	52.2002	14.6394
184000000089.7069	52.2001	14.6767
185000000089.4492	52.1854	14.7447
186000000089.2243	52.1615	14.7377
187000000088.9154	52.1123	14.7821
188000000088.6582	52.0773	14.8035
189000000088.3845	52.0279	14.7986
190000000088.0787	51.9693	14.8419
191000000087.8275	51.8622	14.8610
192000000087.5336	51.8157	14.9054
193000000087.2954	51.7726	14.9474
194000000087.0588	51.7514	14.9876
195000000086.8323	51.7342	15.0066
196000000086.5863	51.6943	15.0575
197000000086.3708	51.6974	15.0868
198000000086.1514	51.7216	15.1252
199000000085.9538	51.6545	15.1523
200000000085.7095	51.6337	85.4544

■ Dielectric Parameter (2450 MHz Head)

Title	MC-6500S
SubTitle	2450 Head
Test Date	June 25, 2007

Frequency	e'	e''
2.400000000 GHz	39.0043	13.0642
2.405000000 GHz	38.9557	13.0661
2.410000000 GHz	38.9324	13.0415
2.415000000 GHz	38.8843	13.0600
2.420000000 GHz	38.8072	13.0501
2.425000000 GHz	38.8147	13.0749
2.430000000 GHz	38.8440	13.1091
2.435000000 GHz	38.8323	13.1500
2.440000000 GHz	38.8016	13.1516
2.445000000 GHz	38.7935	13.1895
2.450000000 GHz	38.7880	13.1976
2.455000000 GHz	38.7454	13.2234
2.460000000 GHz	38.7348	13.2607
2.465000000 GHz	38.7334	13.2628
2.470000000 GHz	38.6953	13.3125
2.475000000 GHz	38.6938	13.3368
2.480000000 GHz	38.6976	13.3345
2.485000000 GHz	38.6664	13.3621
2.490000000 GHz	38.6438	13.3962
2.495000000 GHz	38.6445	13.3994
2.500000000 GHz	38.6811	13.4021

■

■ Dielectric Parameter (2450 MHz Body)

Title	MC-6500S
SubTitle	2450 Body
Test Date	June 25, 2007

Frequency	e'	e''
2.400000000 GHz	53.3223	14.2840
2.405000000 GHz	53.2734	14.3047
2.410000000 GHz	53.1793	14.2990
2.415000000 GHz	53.1391	14.2780
2.420000000 GHz	53.1040	14.2934
2.425000000 GHz	53.0464	14.3150
2.430000000 GHz	52.9758	14.3887
2.435000000 GHz	52.7299	14.4398
2.440000000 GHz	52.7466	14.4196
2.445000000 GHz	52.7494	14.4685
2.450000000 GHz	52.7177	14.4967
2.455000000 GHz	52.6570	14.5169
2.460000000 GHz	52.5635	14.5648
2.465000000 GHz	52.4843	14.6291
2.470000000 GHz	52.4145	14.6620
2.475000000 GHz	52.3385	14.7074
2.480000000 GHz	52.3301	14.7454
2.485000000 GHz	52.3025	14.7743
2.490000000 GHz	52.2588	14.8170
2.495000000 GHz	52.2626	14.8281
2.500000000 GHz	52.2434	14.8390

Attachment 3. – Probe Calibration Data

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 Federal Office of Metrology and Accreditation
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 H-CT (Dymstec)

Certificate No: ET3-1798_Aug06

CALIBRATION CERTIFICATE

Object	ET3DV6 - SN:1798
Calibration procedure(s)	QA CAL-01.v5 and QA CAL-12.v4 Calibration procedure for dosimetric E-field probes
Calibration date:	August 25, 2006
Condition of the calibrated item	In Tolerance

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41495277	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41498087	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Reference 3 dB Attenuator	SN: S5054 (3c)	10-Aug-06 (METAS, No. 217-00592)	Aug-07
Reference 20 dB Attenuator	SN: S5086 (20b)	4-Apr-06 (METAS, No. 251-00558)	Apr-07
Reference 30 dB Attenuator	SN: S5129 (30b)	10-Aug-06 (METAS, No. 217-00593)	Aug-07
Reference Probe ES3DV2	SN: 3013	2-Jan-06 (SPEAG, No. ES3-3013_Jan06)	Jan-07
DAE4	SN: 654	21-Jun-06 (SPEAG, No. DAE4-654_Jun06)	Jun-07

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Nov-05)	In house check: Nov 06

	Name	Function	Signature
Calibrated by:	Katja Pokovic	Technical Manager	
Approved by:	Niels Kuster	Quality Manager	

Issued: August 26, 2006

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

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Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 0 is normal to probe axis

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) CENELEC EN 50361, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz), July 2001

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not effect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe ET3DV6

SN:1798

Manufactured:	August 14, 2003
Last calibrated:	April 14, 2005
Recalibrated:	August 25, 2006

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

ET3DV6 SN:1798 **August 25, 2006**

DASY - Parameters of Probe: ET3DV6 SN:1798

Sensitivity in Free Space[A] Diode Compression[B]

NormX	**1.97** ± 10.1%	$\mu V/(V/m)^2$	DCP X	**98** mV
NormY	**1.79** ± 10.1%	$\mu V/(V/m)^2$	DCP Y	**92** mV
NormZ	**2.05** ± 10.1%	$\mu V/(V/m)^2$	DCP Z	**95** mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect

TSL **900 MHz** **Typical SAR gradient: 5 % per mm**

Sensor Center to Phantom Surface Distance		**3.7 mm**	**4.7 mm**
SAR_{be} [%]	Without Correction Algorithm	7.5	3.9
SAR_{be} [%]	With Correction Algorithm	0.1	0.2

TSL **1810 MHz** **Typical SAR gradient: 10 % per mm**

Sensor Center to Phantom Surface Distance		**3.7 mm**	**4.7 mm**
SAR_{be} [%]	Without Correction Algorithm	11.6	6.6
SAR_{be} [%]	With Correction Algorithm	0.2	0.3

Sensor Offset

Probe Tip to Sensor Center	**2.7** mm

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

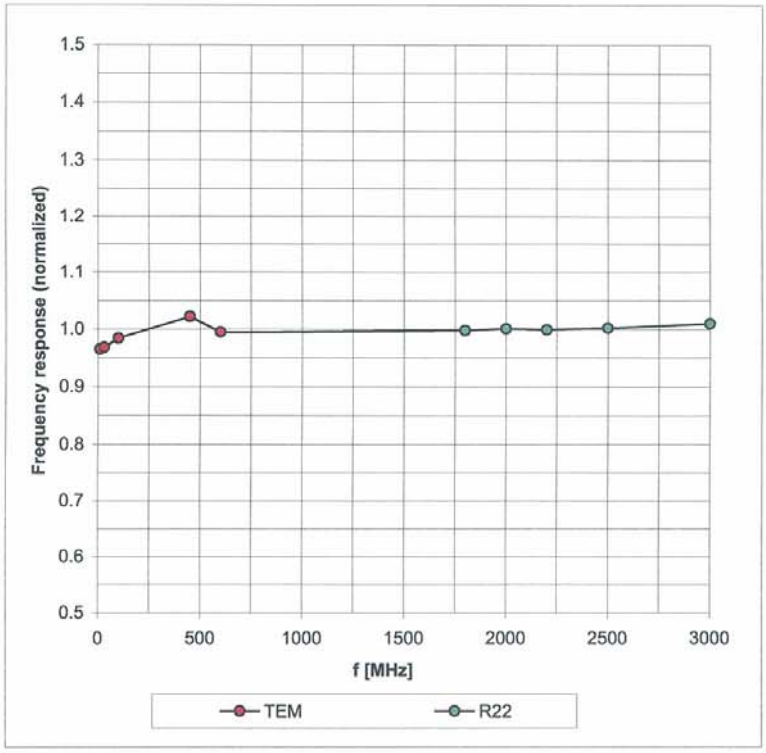
[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Page 8).

[B] Numerical linearization parameter: uncertainty not required.

ET3DV6 SN:1798 August 25, 2006

Frequency Response of E-Field

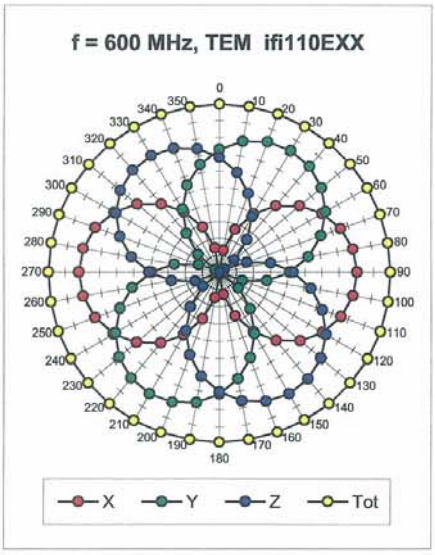
(TEM-Cell:ifi110 EXX, Waveguide: R22)

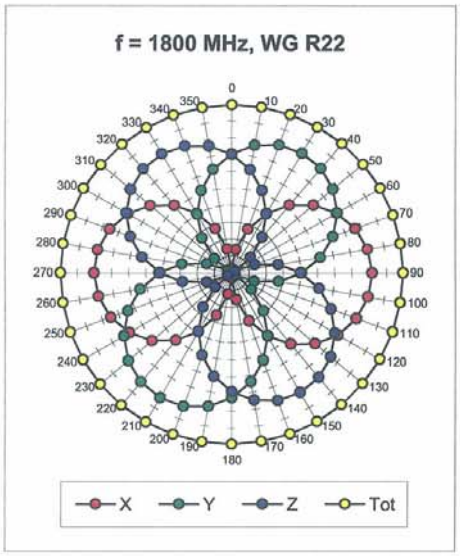


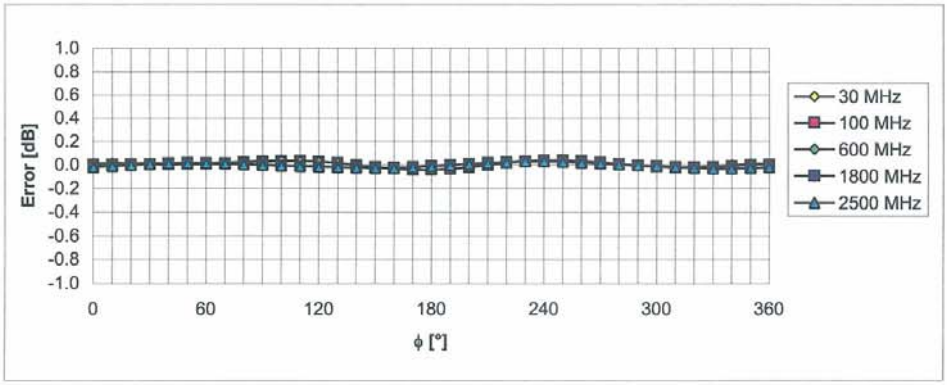
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

ET3DV6 SN:1798 August 25, 2006

Receiving Pattern (ϕ), ϑ = 0°







Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

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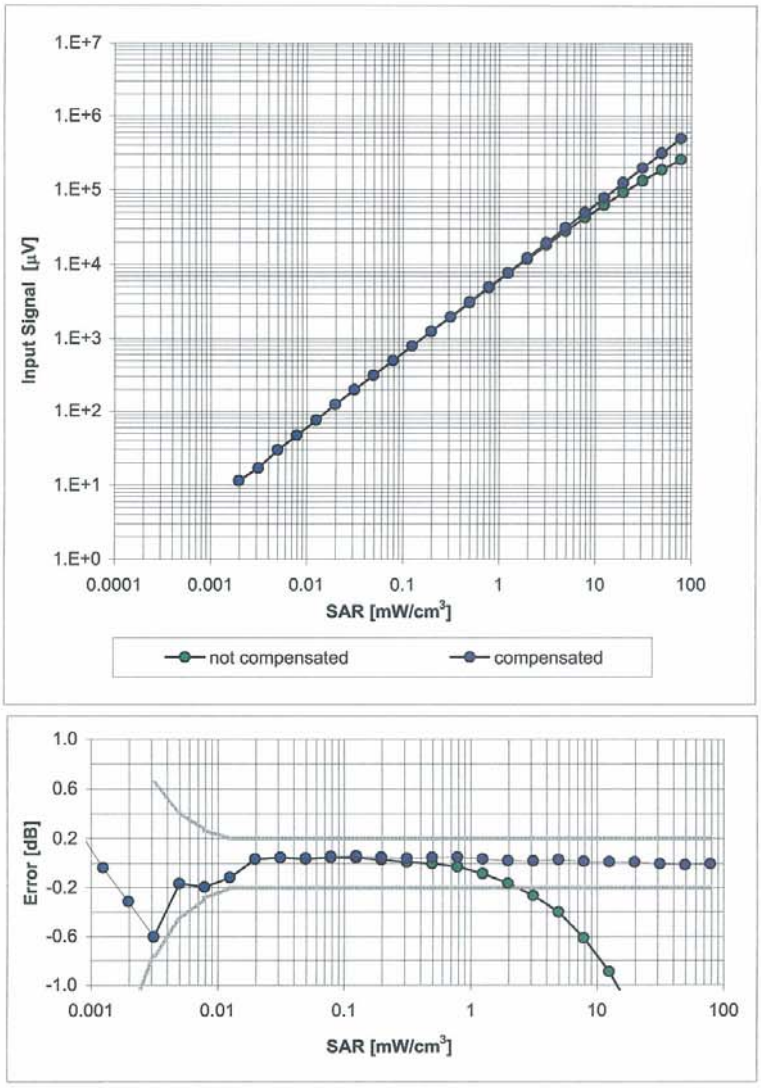
Dynamic Range f(SAR_{head})

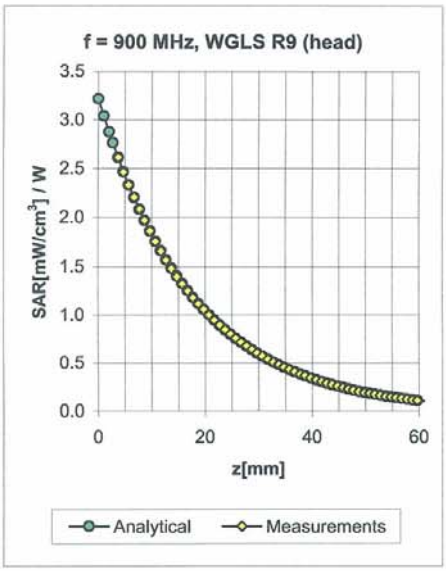
(Waveguide R22, f = 1800 MHz)

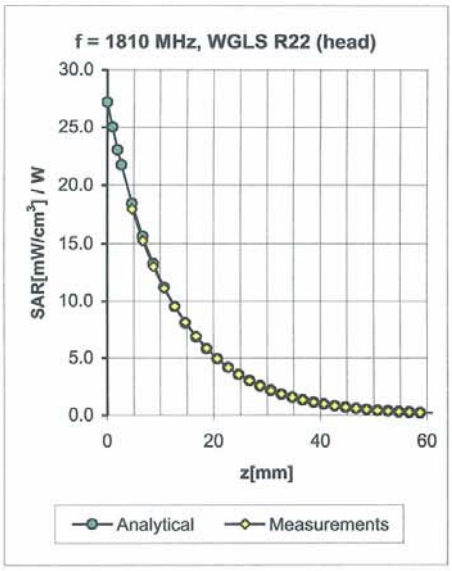


Uncertainty of Linearity Assessment: ± 0.6% (k=2)

ET3DV6 SN:1798 August 25, 2006

Conversion Factor Assessment





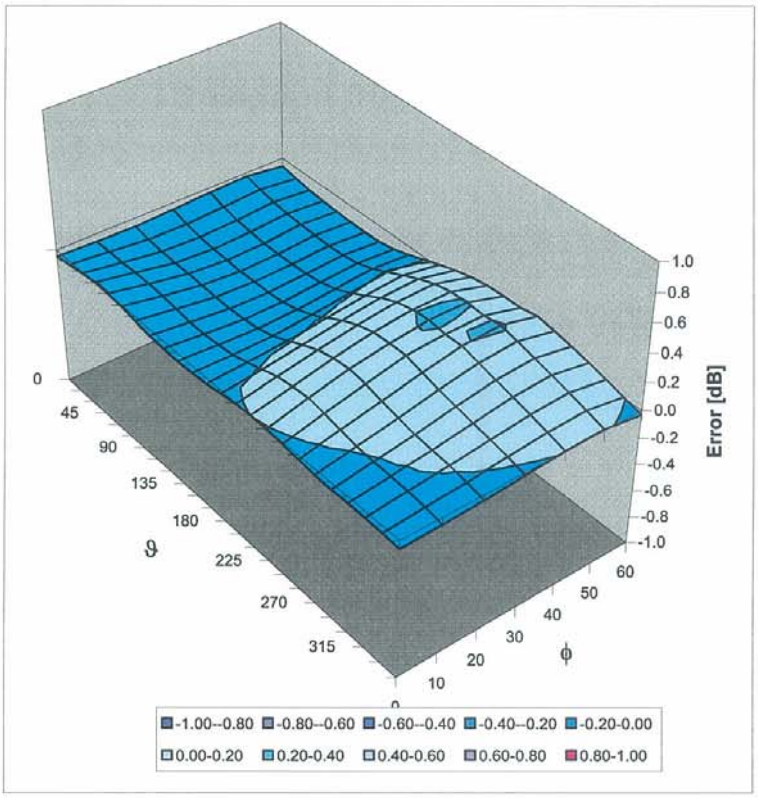
f [MHz]	Validity [MHz][C]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
450	± 50 / ± 100	Head	43.5 ± 5%	0.87 ± 5%	0.35	1.82	7.59 ± 13.3% (k=2)
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.54	1.80	6.73 ± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.48	2.78	5.60 ± 11.0% (k=2)
1950	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.52	2.77	5.25 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.55	2.23	4.73 ± 11.8% (k=2)
450	± 50 / ± 100	Body	56.7 ± 5%	0.94 ± 5%	0.24	1.85	7.86 ± 13.3% (k=2)
835	± 50 / ± 100	Body	55.2 ± 5%	0.97 ± 5%	0.46	2.02	6.71 ± 11.0% (k=2)
1900	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.64	2.69	4.80 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.45	1.82	4.37 ± 11.8% (k=2)

[C] The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

ET3DV6 SN:1798 August 25, 2006

Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)