



**FCC OET BULLETIN 65 SUPPLEMENT C
IC RSS-102 ISSUE 2**

SAR EVALUATION REPORT

FOR

**Cellular/PCS GSM/EDGE/WCDMA Mini PCI Transmitter Card
(Tested inside of Samsung NP-NC10)**

MODEL NUMBER: Y3100

FCC ID: A3LSWDY3100

IC ID: 649E-SWDY3100

REPORT NUMBER: 09I12418-3

ISSUE DATE: MARCH 12, 2009

Prepared for

**SAMSUNG ELECTRONICS CO., LTD.
416 MAETAN 3-DONG,
YEONGTONG-GU, SUWON-CITY, GYEONGGI-DO
443-742 KOREA**

Prepared by

**COMPLIANCE CERTIFICATION SERVICES
47173 BENICIA STREET
FREMONT, CA 94538, USA**



NVLAP LAB CODE 200065-0

Revision History

Rev.	Issued date	Revisions	Revised By
--	March 12, 2009	Initial issue	--

TABLE OF CONTENTS

1	ATTESTATION OF TEST RESULTS.....	4
2	TEST METHODOLOGY.....	5
3	FACILITIES AND ACCREDITATION	5
4	CALIBRATION AND UNCERTAINTY	5
4.1	MEASURING INSTRUMENT CALIBRATION	5
5	MEASUREMENT UNCERTAINTY.....	5
6	DEVICE UNDER TEST (DUT) DESCRIPTION	6
7	SYSTEM DESCRIPTION.....	7
7.1	COMPOSITION OF INGREDIENTS FOR TISSUE SIMULATING LIQUIDS	8
8	SIMULATING LIQUID CHECK.....	9
8.1	SIMULATING LIQUID PARAMETER CHECK RESULT	10
9	SYSTEM PERFORMANCE CHECK.....	12
9.1	SYSTEM PERFORMANCE CHECK RESULTS.....	13
10	SAR MEASUREMENT PROCEDURE	14
10.1	DASY4 SAR MEASUREMENT PROCEDURE.....	15
11	OUTPUT POWER VERIFICATION.....	16
11.1	GSM	16
11.2	UMTS REL 99	17
11.3	UMTS REL 6 HSDPA.....	18
11.4	UMTS REL 6 HSPA (HSUPA & HSUPA).....	19
12	KDB 941225 TEST REDUCTION CONSIDERATION	20
13	SAR MEASUREMENT RESULTS.....	21
13.1	CELL BAND.....	21
13.1.1	GSM850	21
13.2	PCS BAND	21
13.2.1	UMTS1900	21
13.2.2	GSM1900	21
14	ATTACHMENTS	28
15	SETUP PHOTOS	29
16	HOST DEVICE PHOTOS.....	30

1 ATTESTATION OF TEST RESULTS

COMPANY NAME:	SAMSUNG ELECTRONICS CO., LTD. 416 MAETAN 3-DONG, YEONGTONG-GU, SUWON-CITY, GYEONGGI-DO 443-742 KOREA
EUT DESCRIPTION:	Cellular/PCS GSM/EDGE/WCDMA Mini PCI Transmitter Card (Tested inside of Samsung NP-NC10)
MODEL:	Y3100
DEVICE CATEGORY:	Portable
EXPOSURE CATEGORY:	General Population/Uncontrolled Exposure
DATE TESTED:	March 9-10, 2009
THE HIGHEST SAR VALUES:	See Table below

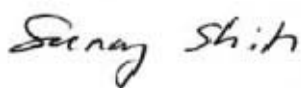
FCC / IC Rule Parts	Frequency Range [MHz]	The Highest SAR Values (1g_mW/g)	Limit (mW/g)
22H / RSS-132	824 – 849	0.051	1.6
24E / RSS-133	1850 – 1910	0.032	1.6

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC OET BULLETIN 65 SUPPLEMENT C	Pass
RSS-102 ISSUE 2	Pass

Compliance Certification Services, Inc. (CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by CCS based on interpretations and/or observations of test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by CCS will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

Approved & Released For CCS By:



SUNNY SHIH
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

2 TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC OET Bulletin 65 Supplement C, FCC specific procedure KDB941225 and IC RSS 102 Issue 2: NOVEMBER 2005.

3 FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://www.ccsemc.com>.

4 CALIBRATION AND UNCERTAINTY

4.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

5 MEASUREMENT UNCERTAINTY

Measurement uncertainty for 300 MHz – 3000 MHz

Uncertainty component	Tol. (±%)	Probe Dist.	Div.	Ci (1g)	Ci (10g)	Std. Unc.(±%)	
						Ui (1g)	Ui(10g)
Measurement System							
Probe Calibration	4.80	N	1	1	1	4.80	4.80
Axial Isotropy	4.70	R	1.732	0.707	0.707	1.92	1.92
Hemispherical Isotropy	9.60	R	1.732	0.707	0.707	3.92	3.92
Boundary Effects	1.00	R	1.732	1	1	0.58	0.58
Linearity	4.70	R	1.732	1	1	2.71	2.71
System Detection Limits	1.00	R	1.732	1	1	0.58	0.58
Readout Electronics	1.00	N	1	1	1	1.00	1.00
Response Time	0.80	R	1.732	1	1	0.46	0.46
Integration Time	2.60	R	1.732	1	1	1.50	1.50
RF Ambient Conditions - Noise	1.59	R	1.732	1	1	0.92	0.92
RF Ambient Conditions - Reflections	0.00	R	1.732	1	1	0.00	0.00
Probe Positioner Mechanical Tolerance	0.40	R	1.732	1	1	0.23	0.23
Probe Positioning With Respect to Phantom Shell	2.90	R	1.732	1	1	1.67	1.67
Extrapolation, interpolation, and integration algorithms for max. SAR evaluation	3.90	R	1.732	1	1	2.25	2.25
Test sample Related							
Test Sample Positioning	1.10	N	1	1	1	1.10	1.10
Device Holder Uncertainty	3.60	N	1	1	1	3.60	3.60
Power and SAR Drift Measurement	5.00	R	1.732	1	1	2.89	2.89
Phantom and Tissue Parameters							
Phantom Uncertainty	4.00	R	1.732	1	1	2.31	2.31
Liquid Conductivity - Target	5.00	R	1.732	0.64	0.43	1.85	1.24
Liquid Conductivity - Meas.	8.60	N	1	0.64	0.43	5.50	3.70
Liquid Permittivity - Target	5.00	R	1.732	0.6	0.49	1.73	1.41
Liquid Permittivity - Meas.	3.30	N	1	0.6	0.49	1.98	1.62
Combined Standard Uncertainty	RSS					11.44	10.49
Expanded Uncertainty (95% Confidence Interval)	K=2					22.87	20.98

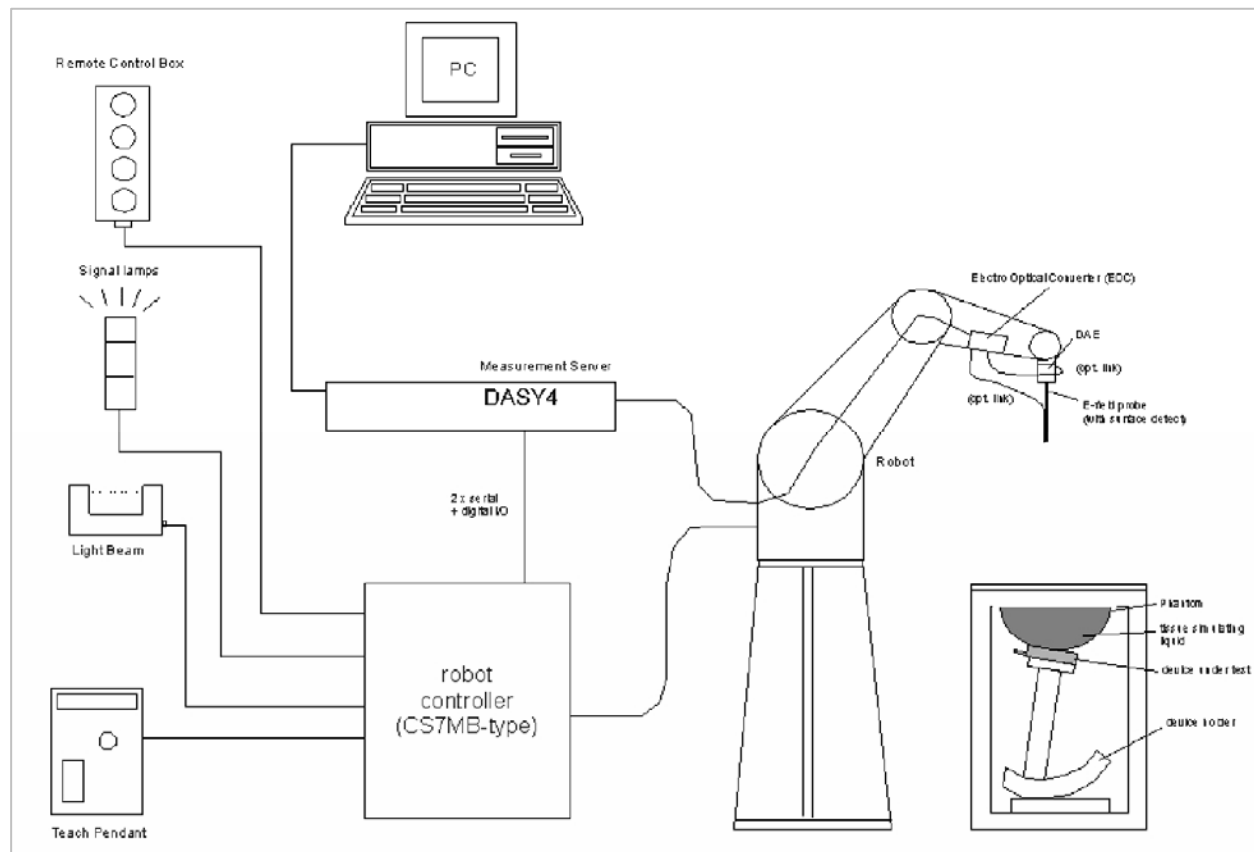
Notes for table

1. Tol. - tolerance in influence quantity
2. N - Nomal
3. R - Rectangular
4. Div. - Divisor used to obtain standard uncertainty
5. Ci - is te sensitivity coefficient

6 DEVICE UNDER TEST (DUT) DESCRIPTION

Cellular/PCS GSM/EDGE/WCDMA Mini PCI Transmitter Card (Tested inside of Samsung NP-NC10)	
Normal operation:	Lap-held
Duty cycle:	12.5% for GPRS & EGPRS, single slot 25% for GPRS & EGPRS, 2 slots 37.5% for GPRS & EGPRS, 3 slots 50% for GPRS & EGPRS, 4 slots 100% for WCDMA and HSPA
Host Device	Samsung NP-NC10
Power supply:	Power supplied through laptop computer (host device)
Antenna to antenna separation distances:	• 12 cm between WiFi main antenna and WWAN Main antenna. • 8.2 cm between WiFi Aux antenna and WWAN Main antenna.

7 SYSTEM DESCRIPTION



The DASY4 system for performing compliance tests consists of the following items:

- A standard high precision 6-axis robot (Stäubli RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- A computer operating Windows 2000 or Windows XP.
- DASY4 software.
- Remote controls with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom enabling testing left-hand and right-hand usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- Validation dipole kits allowing to validate the proper functioning of the system.

7.1 COMPOSITION OF INGREDIENTS FOR TISSUE SIMULATING LIQUIDS

The following tissue formulations are provided for reference only as some of the parameters have not been thoroughly verified. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation.

Ingredients (% by weight)	Frequency (MHz)									
	450		835		915		1900		2450	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	41.45	52.4	41.05	56.0	54.9	40.4	62.7	73.2
Salt (NaCl)	3.95	1.49	1.45	1.4	1.35	0.76	0.18	0.5	0.5	0.04
Sugar	56.32	46.78	56.0	45.0	56.5	41.76	0.0	58.0	0.0	0.0
HEC	0.98	0.52	1.0	1.0	1.0	1.21	0.0	1.0	0.0	0.0
Bactericide	0.19	0.05	0.1	0.1	0.1	0.27	0.0	0.1	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.8	0.0
DGBE	0.0	0.0	0.0	0.0	0.0	0.0	44.92	0.0	0.0	26.7
Dielectric Constant	43.42	58.0	42.54	56.1	42.0	56.8	39.9	54.0	39.8	52.5
Conductivity (S/m)	0.85	0.83	0.91	0.95	1.0	1.07	1.42	1.45	1.88	1.78

Salt: 99+% Pure Sodium Chloride

Sugar: 98+% Pure Sucrose

Water: De-ionized, 16 MΩ+ resistivity

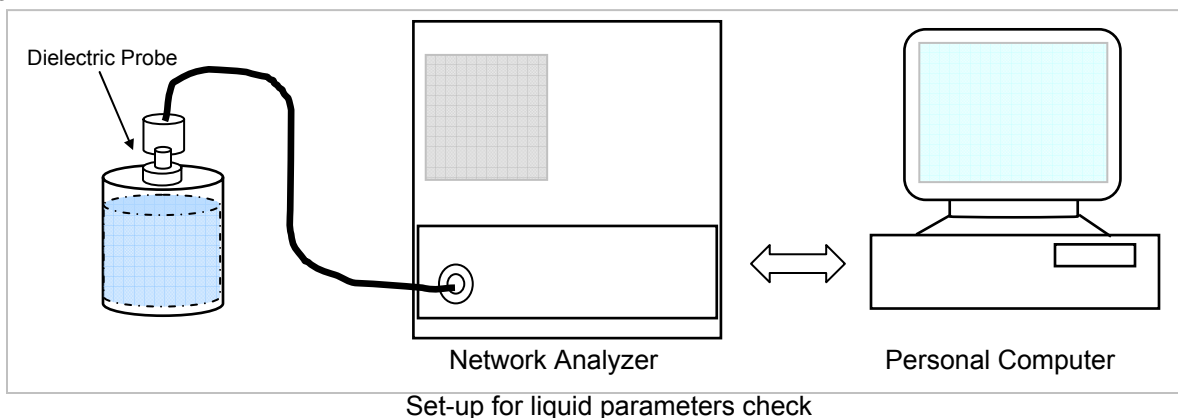
HEC: Hydroxyethyl Cellulose

DGBE: 99+% Di(ethylene glycol) butyl ether, [2-(2-butoxyethoxy)ethanol]

Triton X-100 (ultra pure): Polyethylene glycol mono [4-(1,1, 3, 3-tetramethylbutyl)phenyl]ether

8 SIMULATING LIQUID CHECK

The simulating liquids should be checked at the beginning of a series of SAR measurements to determine if the dielectric parameters are within the tolerances of the specified target values. The relative permittivity and conductivity of the tissue material should be within $\pm 5\%$ of the values given in the table below.



Reference Values of Tissue Dielectric Parameters for Head and Body Phantom (for 150 – 3000 MHz and 5800 MHz)

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in IEEE Standard 1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in a human head. Other head and body tissue parameters that have not been specified in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations and extrapolated according to the head parameters specified in IEEE Standard 1528.

Target Frequency (MHz)	Head		Body	
	ϵ_r	σ (S/m)	ϵ_r	σ (S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800 – 2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95
3000	38.5	2.40	52.0	2.73
5800	35.3	5.27	48.2	6.00

(ϵ_r = relative permittivity, σ = conductivity and $\rho = 1000 \text{ kg/m}^3$)

8.1 SIMULATING LIQUID PARAMETER CHECK RESULT

Simulating Liquid Dielectric Parameters Check Result @ Muscle 1900 MHz

Room Ambient Temperature = 23°C; Relative humidity = 35%

Measured by: Sunny Shih

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
1880	22	15	e'	52.836	Relative Permittivity (ϵ_r):	52.8360	53.3	-0.87	± 5
			e"	14.8992	Conductivity (σ):	1.55826	1.52	2.52	± 5
1900	22	15	e'	52.8683	Relative Permittivity (ϵ_r):	52.8683	53.3	-0.81	± 5
			e"	14.8997	Conductivity (σ):	1.57489	1.52	3.61	± 5

Liquid Check

Ambient temperature: 23 deg. C; Liquid temperature: 22 deg. C

March 09, 2009 11:48 AM

Frequency	e'	e"
1710000000.	53.7383	14.1211
1720000000.	53.7176	14.1612
1730000000.	53.6928	14.2158
1740000000.	53.6674	14.3152
1750000000.	53.6564	14.4284
1760000000.	53.5488	14.5200
1770000000.	53.4489	14.5652
1780000000.	53.3674	14.5514
1790000000.	53.3146	14.5434
1800000000.	53.2781	14.5438
1810000000.	53.2196	14.5380
1820000000.	53.1655	14.5144
1830000000.	53.1695	14.5426
1840000000.	53.1550	14.6677
1850000000.	53.1066	14.8009
1860000000.	52.9762	14.9126
1870000000.	52.8643	14.9356
1880000000.	52.8360	14.8992
1890000000.	52.8304	14.8864
1900000000.	52.8683	14.8997
1910000000.	52.8345	14.9127

The conductivity (σ) can be given as:

$$\sigma = \omega \epsilon_0 e'' = 2 \pi f \epsilon_0 e''$$

where $f = \text{target } f * 10^6$

$$\epsilon_0 = 8.854 * 10^{-12}$$

Simulating Liquid Dielectric Parameters Check Result @ Muscle 835 MHz

Room Ambient Temperature = 23°C; Relative humidity = 35%

Measured by: Sunny Shih

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
835	22	15	e'	54.9504	Relative Permittivity (ε _r):	54.9504	55.2	-0.45	± 5
			e"	21.1723	Conductivity (σ):	0.98350	0.97	1.39	± 5

Liquid Check
Ambient temperature: 23 deg. C; Liquid temperature: 22 deg. C
March 09, 2009 03:25 PM

Frequency	e'	e"
750000000.	55.9961	21.5007
755000000.	55.9544	21.5193
760000000.	55.9205	21.4873
765000000.	55.9192	21.4443
770000000.	55.8592	21.4336
775000000.	55.8145	21.4294
780000000.	55.7399	21.4358
785000000.	55.6983	21.4655
790000000.	55.6543	21.4842
795000000.	55.5634	21.4965
800000000.	55.4603	21.5020
805000000.	55.3380	21.4806
810000000.	55.2329	21.4706
815000000.	55.1703	21.4175
820000000.	55.1001	21.3566
825000000.	55.0127	21.2916
830000000.	54.9540	21.2558
835000000.	54.9504	21.1723
840000000.	54.9062	21.1265
845000000.	54.8820	21.0736
850000000.	54.8442	21.0699
855000000.	54.8382	21.0323
860000000.	54.8290	20.9852
865000000.	54.7828	20.9526
870000000.	54.7571	20.9983
875000000.	54.7106	20.9874
880000000.	54.6650	20.9763
885000000.	54.5854	21.0106
890000000.	54.5364	21.0116
895000000.	54.4503	20.9959
900000000.	54.3782	20.9855

The conductivity (σ) can be given as:

$$\sigma = \omega \epsilon_0 e'' = 2 \pi f \epsilon_0 e''$$

where $f = target f * 10^6$
 $\epsilon_0 = 8.854 * 10^{-12}$

9 SYSTEM PERFORMANCE CHECK

The system performance check is performed prior to any usage of the system in order to guarantee reproducible results. The system performance check verifies that the system operates within its specifications of $\pm 10\%$.

System Performance Check Measurement Conditions

- The measurements were performed in the flat section of the SAM twin phantom filled with Body simulating liquid of the following parameters.
- The DASY4 system with an Isotropic E-Field Probe EX3DV3-SN: 3531 was used for the measurements.
- The dipole was mounted on the small tripod so that the dipole feed point was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10 mm (above 1 GHz) and 15 mm (below 1 GHz) from dipole center to the simulating liquid surface.
- The coarse grid with a grid spacing of 15 mm was aligned with the dipole.
For 5 GHz band - The coarse grid with a grid spacing of 10 mm was aligned with the dipole.
- Special 7 x 7 x 7 fine cube was chosen for cube integration(dx=dy=5mm; dz=5mm).
For 5 GHz band - Special 7 x 7 x 7 fine cube was chosen for cube integration (dx=dy=4.3mm; dz=3mm)
- Distance between probe sensors and phantom surface was set to 3.0 mm.
- The dipole input power (forward power) was 250 mW $\pm 3\%$.
- The results are normalized to 1 W input power.

Reference SAR Values for body-tissue

In the table below, the numerical reference SAR values of a SPEAG validation dipoles placed below the flat phantom filled with body-tissue simulating liquid are given. The reference SAR values were calculated using the finite-difference time-domain method and the geometry parameters.

Dipole Type	Distance (mm)	Frequency (MHz)	SAR (1g) [W/kg]	SAR (10g) [W/kg]	SAR (peak) [W/kg]
D450V2	15	450	5.01	3.36	7.22
D835V2	15	835	9.71	6.38	14.1
D900V2	15	900	11.1	7.17	16.3
D1450V2	10	1450	29.6	16.6	49.8
D1800V2	10	1800	38.5	20.3	67.5
D1900V2	10	1900	39.8	20.8	69.6
D2000V2	10	2000	40.9	21.2	71.5
D2450V2	10	2450	51.2	23.7	97.6

Note: All SAR values normalized to 1 W forward power.

9.1 SYSTEM PERFORMANCE CHECK RESULTS**System Validation Dipole: D1900V2 SN:5d043****The dipole input power (forward power): 250 mW****Results**

Date: March 9, 2009

Ambient Temperature = 23°C; Relative humidity = 39%

Measured by: Sunny Shih

Body Simulating Liquid			Normalized to 1 W		Target	Deviation (%)	Lim it (%)
f (MHz)	Temp. (°C)	Depth (cm)					
1900	22	15	1g	37.1	39.8	-6.78	± 10
			10g	19.5	20.8	-6.25	± 10

System Validation Dipole: D835V2 SN:4d002**The dipole input power (forward power): 250 mW****Results**

Date: March 9, 2009

Ambient Temperature = 23°C; Relative humidity = 39%

Measured by: Sunny Shih

Body Simulating Liquid			Normalized to 1 W		Target	Deviation (%)	Lim it (%)
f (MHz)	Temp. (°C)	Depth (cm)					
835	22	15	1g	10.5	9.71	8.14	± 10
			10g	6.92	6.38	8.46	± 10

10 SAR MEASUREMENT PROCEDURE

A summary of the procedure follows:

- a) A measurement of the SAR value at a fixed location is used as a reference value for assessing the power drop of the DUT. The SAR at this point is measured at the start of the test, and then again at the end of the test.
- b) The SAR distribution at the exposed flat section of the flat phantom is measured at a distance of 3 mm from the inner surface of the shell. The area covers the entire dimension of the DUT and the horizontal grid spacing is 15 mm x 15 mm. Based on this data, the area of the maximum absorption is determined by Spline interpolation. The first Area Scan covers the entire dimension of the DUT to ensure that the hotspot was correctly identified.

For 5 GHz band - The SAR distribution at the exposed flat section of the flat phantom is measured at a distance of 2.0 mm from the inner surface of the shell. The area covers the entire dimension of the DUT and the horizontal grid spacing is 10 mm x 10 mm. Based on this data, the area of the maximum absorption is determined by Spline interpolation. The first Area Scan covers the entire dimension of the DUT to ensure that the hotspot was correctly identified.

- c) Around this point, a volume of X=Y= 30 and Z=21 mm is assessed by measuring 7 x 7 x 9 mm points. On the basis of this data set, the spatial peak SAR value is evaluated with the following procedure:

For 5 GHz band - Around this point, a volume of X=Y=24 and Z=20 mm is assessed by measuring 7 x 7 x 9 mm points. On the basis of this data set, the spatial peak SAR value is evaluated with the following procedure:

- (i) The data at the surface are extrapolated, since the centre of the dipoles is 1.2 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.3 mm. The extrapolation is based on a least square algorithm. A polynomial of the fourth order is calculated through the points in z-axes. This polynomial is then used to evaluate the points between the surface and the probe tip.
- (ii) The maximum interpolated value is searched with a straightforward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1 g and 10 g) are computed using the 3D-Spline interpolation algorithm. The 3D-Spline is composed of three one-dimensional splines with the "Not a knot"- condition (in x, y and z-direction). The volume is integrated with the trapezoidal – algorithm. One thousand points (10 x 10 x 10) are interpolated to calculate the averages.
- (iii) All neighbouring volumes are evaluated until no neighbouring volume with a higher average value is found.
- (iv) The SAR value at the same location as in Step (a) is again measured to evaluate the actual power drift.

10.1 DASY4 SAR MEASUREMENT PROCEDURE

Step 1: Power Reference Measurement

The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The Minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. The minimum distance of probe sensors to surface is 2.1 mm. This distance cannot be smaller than the Distance of sensor calibration points to probe tip as defined in the probe properties (for example, 1.2 mm for an EX3DV3 probe type).

Step 2: Area Scan

The Area Scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASY4 software can find the maximum locations even in relatively coarse grids. When an Area Scan has measured all reachable points, it computes the field maximal found in the scanned area, within a range of the global maximum. The range (in dB) is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE Standard 1528, EN 50361 and IEC 62209 standards, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan). If only one Zoom Scan follows the Area Scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of Zoom Scans has to be increased accordingly.

Step 3: Zoom Scan

Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The Zoom Scan measures 7 x 7 x 9 points within a cube whose base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the Zoom Scan evaluates the averaged SAR for 1 g and 10 g and displays these values next to the job's label.

For 5 GHz band – Same as above except the Zoom Scan measures 7 x 7 x 9 points.

Step 4: Power drift measurement

The Power Drift Measurement measures the field at the same location as the most recent power reference measurement within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the last Power Reference Measurement. This allows a user to monitor the power drift of the device under test within a batch process. The measurement procedure is the same as Step 1.

Step 5: Z-Scan

The Z Scan measures points along a vertical straight line. The line runs along the Z-axis of a one-dimensional grid. In order to get a reasonable extrapolation, the extrapolated distance should not be larger than the step size in Z-direction.

11 OUTPUT POWER VERIFICATION

11.1 GSM

GPRS (GMSK) - Coding Scheme: MCS4

Band	Ch. No.	f (MHz)	Conducted output power (dBm)			
			1 slot	2 slot	3 slot	4 slot
GSM850	128	824.2	32.3	32.2	29.1	27.9
	190	836.6	32.3	32.3	29.2	27.9
	251	848.8	32.3	32.2	29.2	27.9
GSM1900	512	1850.2	28.0	27.9	25.8	24.5
	661	1880	28.0	28.0	25.9	24.6
	810	1909.8	28.0	27.9	25.8	24.6

EGPRS (8PSK) - Coding scheme: MCS9

Band	Ch. No.	f (MHz)	Conducted output power (dBm)			
			1 slot	2 slot	3 slot	4 slot
GSM850	128	824.2	27.1	27.0	23.5	22.5
	190	836.6	27.4	27.0	23.8	22.9
	251	848.8	27.5	27.0	23.5	22.6
GSM1900	512	1850.2	26.1	26.0	22.0	20.9
	661	1880	26.1	26.0	21.8	20.7
	810	1909.8	26.1	26.0	21.8	20.7

11.2 UMTS REL 99

The following 4 Sub-tests were completed according to procedures in section 5.2 of 3GPP TS34.121. A summary of these settings are illustrated below:

	Mode	Rel99
	Subtest	-
WCDMA General Settings	Loopback Mode	Test Mode 1
	Rel99 RMC	12.2kbps RMC
	HSDPA FRC	Not Applicable
	HSUPA Test	Not Applicable
	Power Control Algorithm	Algorithm2
	β_c	Not Applicable
	β_d	Not Applicable
	β_{ec}	Not Applicable
	β_c/β_d	8/15
	β_{hs}	Not Applicable
	β_{ed}	Not Applicable

Results**Rel 99 (12.2kps RMC)**

Band	Mode	UL Ch No.	DL Ch No.	f (MHz)	O/P Power (dBm)
UMTS1900 (Band II)	Rel 99 12.2kps RMC	9262	9662	1852.4	22.9
		9400	9800	1880.0	22.8
		9538	9938	1907.6	22.8

11.3 UMTS REL 6 HSDPA

The following 4 Sub-tests were completed according to Release 6 procedures in section 5.2 of 3GPP TS34.121. A summary of these settings are illustrated below:

	Mode	Rel6 HSDPA	Rel6 HSDPA	Rel6 HSDPA	Rel6 HSDPA
	Subtest	1	2	3	4
WCDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set1			
	HSUPA Test	Not Applicable			
	Power Control Algorithm	Algorithm 2			
	β_c	2/15	12/15	15/15	15/15
	β_d	15/15	15/15	8/15	4/15
	Bd (SF)	64			
	β_{ec}	-	-	-	-
	β_c/β_d	2/15	12/15	15/8	15/4
	β_{hs}	4/15	24/15	30/15	30/15
	β_{ed}	Not Applicable			
	CM (dB)	0	1	1.5	1.5
	MPR (dB)	0	0	0.5	0.5
HSDPA Specific Settings	DACK	8			
	DNAK	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback (Table 5.2B.4)	4ms			
	CQI Repetition Factor (Table 5.2B.4)	2			
	Ahs = β_{hs}/β_c	30/15			

Results

Rel 6 HSDPA

Band	Mode	UL Ch No.	DL Ch No.	f (MHz)	O/P Power (dBm)
UMTS1900 (Band II)	Subtest 1	9262	9662	1852.4	21.5
		9400	9800	1880.0	21.5
		9538	9938	1907.6	21.3
	Subtest 2	9262	9662	1852.4	21.6
		9400	9800	1880.0	21.5
		9538	9938	1907.6	21.5
	Subtest 3	9262	9662	1852.4	21.2
		9400	9800	1880.0	21.1
		9538	9938	1907.6	20.9
	Subtest 4	9262	9662	1852.4	21.3
		9400	9800	1880.0	21.2
		9538	9938	1907.6	21.1

11.4 UMTS REL 6 HSPA (HSUPA & HSUPA)

The following 5 Sub-tests were completed according to Release 6 procedures in section 5.2 of 3GPP TS34.121, using the appropriate RMC, FRC and E-DCH configurations. A summary of these settings are illustrated below:

	Mode	Rel6 HSUPA	Rel6 HSUPA	Rel6 HSUPA	Rel6 HSUPA	Rel6 HSUPA
	Subtest	1	2	3	4	5
WCDMA General Settings	Loopback Mode	Test Mode 1				
	Rel99 RMC	12.2kbps RMC				
	HSDPA FRC	H-Set1				
	HSUPA Test	HSUPA Loopback				
	Power Control Algorithm	Algorithm2				
	β_c	11/15	6/15	15/15	2/15	15/15
	β_d	15/15	15/15	9/15	15/15	15/15
	Bd (SF)	64				
	β_{ec}	209/225	12/15	30/15	2/15	24/15
	β_c/β_d	11/15	6/15	15/9	2/15	15/15
	β_{hs}	22/15	12/15	30/15	4/15	30/15
	β_{ed}	1309/225	94/75	47/15	56/75	134/15
	β_{ed} (SF)	4				
	β_{ed} (codes)	1	1	2	1	1
	CM (dB)	1	3	2	3	1
HSDPA Specific Settings	MPR (dB)	0	2	1	2	0
	DACK	8				
	DNAK	8				
	DCQI	8				
	Ack-Nack repetition factor	3				
	CQI Feedback (Table 5.2B.4)	4ms				
	CQI Repetition Factor (Table 5.2B.4)	2				
HSUPA Specific Settings	$A_{hs} = \beta_{hs}/\beta_c$	30/15				
	D E-DPCCH	6	8	8	5	7
	DHARQ	0	0	0	0	0
	AG Index	20	12	15	17	21
	ETFCI (from 34.121 Table C.11.1.3)	75	67	92	71	81
	Associated Max UL Data Rate kbps	242.1	174.9	482.8	205.8	308.9
	Reference E_TFCIs	E-TFCI 11 E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO 23 E-TFCI 75 E-TFCI PO 26 E-TFCI 81 E-TFCI PO 27		E-TFCI 11 E-TFCI PO 4 E-TFCI 92 E-TFCI PO 18		E-TFCI 11 E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO 23 E-TFCI 75 E-TFCI PO 26 E-TFCI 81 E-TFCI PO 27

Results

Rel 6 HSPA (HSDPA & HSUPA)

Band	Mode	UL Ch No.	DL Ch No.	f (MHz)	O/P Power (dBm)
UMTS1900 (Band II)	Subtest 1	9262	9662	1852.4	21.7
		9400	9800	1880.0	21.4
		9538	9938	1907.6	21.6
	Subtest 2	9262	9662	1852.4	19.9
		9400	9800	1880.0	19.8
		9538	9938	1907.6	19.8
	Subtest 3	9262	9662	1852.4	20.7
		9400	9800	1880.0	20.6
		9538	9938	1907.6	20.5
	Subtest 4	9262	9662	1852.4	20.1
		9400	9800	1880.0	20.0
		9538	9938	1907.6	19.9
	Subtest 5	9262	9662	1852.4	21.6
		9400	9800	1880.0	21.6
		9538	9938	1907.6	21.5

12 KDB 941225 TEST REDUCTION CONSIDERATION

Based upon the power measurement in section 11, Body SAR for HSPA is not required due to the output power is not ¼ dB higher than 12.2 kbps RCM (Rel 99) and the maximum SAR for 12.2 kbps RCM is less than 75% of the SAR limit.

13 SAR MEASUREMENT RESULTS

If the SAR measured at the middle channel for each test configuration (left, right, Cheek/Touch, Tile/Ear, extended and retracted) is at least 3.0 dB (0.8 mW/g) lower than the SAR limit (1.6 mW/g), testing at the high and low channels is optional for such test configuration(s).

13.1 CELL BAND

13.1.1 GSM850

Test Position	Operation mode	Channel	f (MHz)	1g_SAR (mW/g)	
				Measured	Limit
Lap-held	GPRS (2 slots)	128	824.2		1.6
		190	836.6	0.051	
		251	848.8		
Lap-held	GPRS (3 slots)	128	824.2		1.6
		190	836.6	0.028	
		251	848.8		
Note:					

13.2 PCS BAND

13.2.1 UMTS1900

Test Position	Operation mode	UL Channel	f (MHz)	1g_SAR (mW/g)	
				Measured	Limit
Lap-held	Rel 99 RCM 12.2 kbps	9262	1852.4		1.6
		9400	1880.0	0.032	
		9538	1907.6		
Note:					

13.2.2 GSM1900

Test Position	Operation mode	Channel	f (MHz)	1g_SAR (mW/g)	
				Measured	Limit
Lap-held	GPRS (2 slots)	512	1850.2		1.6
		661	1880	0.026	
		810	1909.8		
Lap-held	GPRS (3 slots)	512	1850.2		1.6
		661	1880	0.020	
		810	1909.8		
Note:					

The SAR Plot for GSM850 GPRS 2 Slots

Date/Time: 3/9/2009 6:54:31 PM

Test Laboratory: Compliance Certification Services

GSM835

DUT: Samsung; Type: NP-NC10; Serial: EY1793AS200118P

Communication System: GSM850; Frequency: 836.6 MHz; Duty Cycle: 1:4

Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.985$ mho/m; $\epsilon_r = 54.9$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Room Ambient Temperature: 23.0 deg. C; Liquid Temperature: 22.0 deg. C

DASY4 Configuration:

- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(10.22, 10.22, 10.22); Calibrated: 4/23/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 10/20/2008
- Phantom: SAM 2 (Twin); Type: SAM 2; Serial: 1050
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

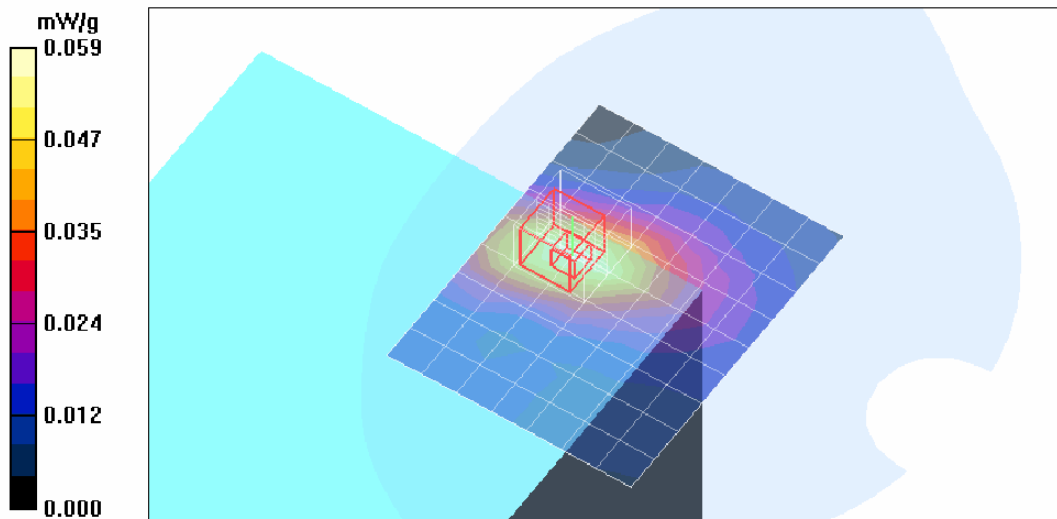
Lapheld - Mid-ch GPRS 2 slots/Area Scan (8x10x1): Measurement grid: dx=15mm, dy=15mm[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.059 mW/g

Lapheld - Mid-ch GPRS 2 slots/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm

Reference Value = 5.06 V/m; Power Drift = 0.138 dB

Peak SAR (extrapolated) = 0.100 W/kg

SAR(1 g) = 0.051 mW/g; SAR(10 g) = 0.035 mW/g[Info: Interpolated medium parameters used for SAR evaluation.](#)

Z-Plot for GSM850 GPRS 2 Slots

Date/Time: 3/9/2009 7:42:47 PM

Test Laboratory: Compliance Certification Services

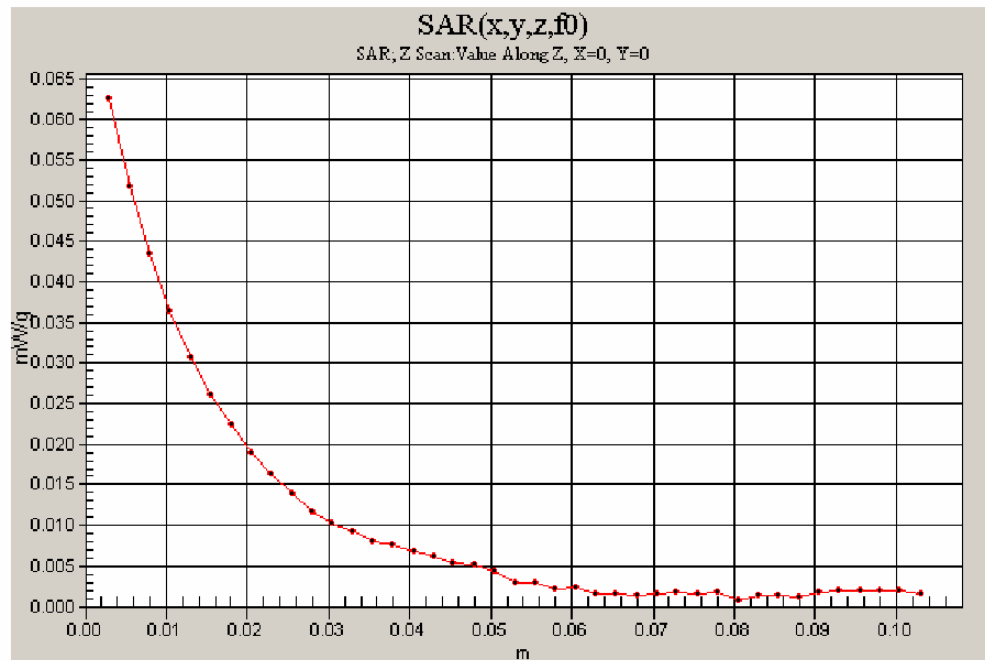
GSM835

DUT: Samsung; Type: NP-NC10; Serial: EY1793AS200118P

Communication System: GSM850; Frequency: 836.6 MHz; Duty Cycle: 1:4

Lapheld - Mid-ch GPRS 2 slots/Z Scan (1x1x41): Measurement grid: dx=20mm, dy=20mm, dz=2.5mm[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.063 mW/g



The SAR Plot for GSM850 GPRS 3 Slots

Date/Time: 3/9/2009 7:59:12 PM

Test Laboratory: Compliance Certification Services

GSM835

DUT: Samsung; Type: NP-NC10; Serial: EY1793AS200118P

Communication System: GSM850; Frequency: 836.6 MHz; Duty Cycle: 1:2.67

Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.985$ mho/m; $\epsilon_r = 54.9$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Room Ambient Temperature: 23.0 deg. C; Liquid Temperature: 22.0 deg. C

DASY4 Configuration:

- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(10.22, 10.22, 10.22); Calibrated: 4/23/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 10/20/2008
- Phantom: SAM 2 (Twin); Type: SAM 2; Serial: 1050
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

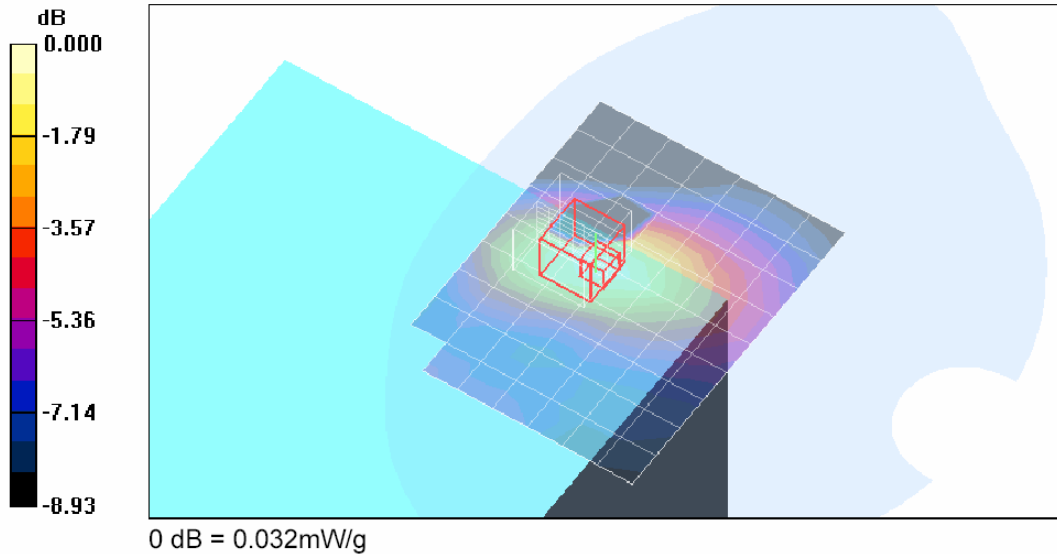
Lapheld - Mid-ch GPRS 3 slots/Area Scan (8x10x1): Measurement grid: dx=15mm, dy=15mm[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.032 mW/g

Lapheld - Mid-ch GPRS 3 slots/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm

Reference Value = 3.61 V/m; Power Drift = 0.059 dB

Peak SAR (extrapolated) = 0.040 W/kg

SAR(1 g) = 0.028 mW/g; SAR(10 g) = 0.019 mW/g[Info: Interpolated medium parameters used for SAR evaluation.](#)

The SAR Plot for UMTS1900 Rel 99

Date/Time: 3/9/2009 2:14:26 PM

Test Laboratory: Compliance Certification Services

UMTS1900

DUT: Samsung; Type: NP-NC10; Serial: EY1793AS200118P

Communication System: PCS 1900; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.56$ mho/m; $\epsilon_r = 52.8$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Room Ambient Temperature: 23.0 deg. C; Liquid Temperature: 22.0 deg. C

DASY4 Configuration:

- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(8.7, 8.7, 8.7); Calibrated: 4/23/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 10/20/2008
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:XXXX
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Lapheld - Mid-ch/Area Scan (10x11x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.031 mW/g

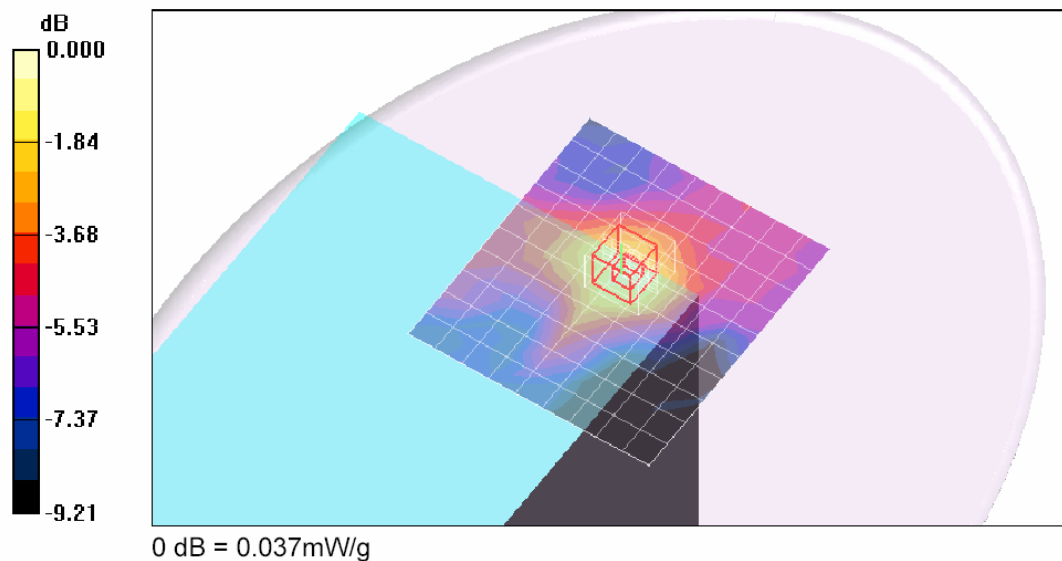
Lapheld - Mid-ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm

Reference Value = 1.58 V/m; Power Drift = -0.395 dB

Peak SAR (extrapolated) = 0.052 W/kg

SAR(1 g) = 0.032 mW/g; SAR(10 g) = 0.021 mW/g

Maximum value of SAR (measured) = 0.037 mW/g



The SAR Plot for GSM1900 GPRS 2 Slot

Date/Time: 3/9/2009 2:59:47 PM

Test Laboratory: Compliance Certification Services

GSM1900

DUT: Samsung; Type: NP-NC10; Serial: EY1793AS200118P

Communication System: PCS 1900; Frequency: 1880 MHz; Duty Cycle: 1:4

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.56$ mho/m; $\epsilon_r = 52.8$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Room Ambient Temperature: 23.0 deg. C; Liquid Temperature: 22.0 deg. C

DASY4 Configuration:

- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(8.7, 8.7, 8.7); Calibrated: 4/23/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 10/20/2008
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:XXXX
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Lapheld - Mid-ch_GPRS 2 slots/Area Scan (10x11x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.027 mW/g

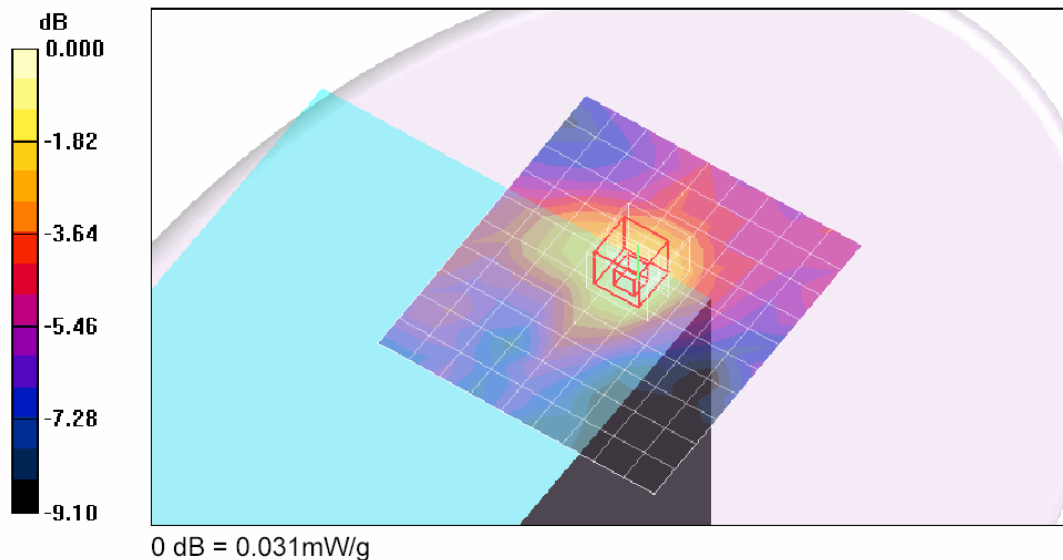
Lapheld - Mid-ch_GPRS 2 slots/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm

Reference Value = 1.67 V/m; Power Drift = 0.206 dB

Peak SAR (extrapolated) = 0.041 W/kg

SAR(1 g) = 0.026 mW/g; SAR(10 g) = 0.017 mW/g

Maximum value of SAR (measured) = 0.031 mW/g



The SAR Plot for GSM1900 GPRS 3 Slot

Date/Time: 3/9/2009 3:49:44 PM

Test Laboratory: Compliance Certification Services

GSM1900

DUT: Samsung; Type: NP-NC10; Serial: EY1793AS200118P

Communication System: PCS 1900; Frequency: 1880 MHz; Duty Cycle: 1:2.67

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.56$ mho/m; $\epsilon_r = 52.8$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Room Ambient Temperature: 23.0 deg. C; Liquid Temperature: 22.0 deg. C

DASY4 Configuration:

- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(8.7, 8.7, 8.7); Calibrated: 4/23/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 10/20/2008
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:XXXX
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Lapheld - Mid-ch_GPRS 3 slots/Area Scan (10x11x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.020 mW/g

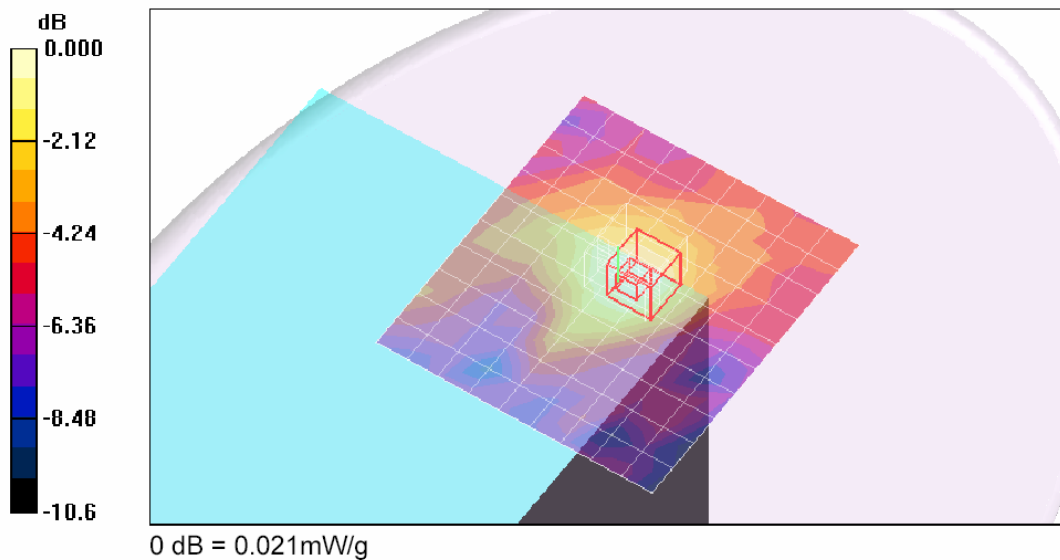
Lapheld - Mid-ch_GPRS 3 slots/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm

Reference Value = 1.39 V/m; Power Drift = 0.443 dB

Peak SAR (extrapolated) = 0.088 W/kg

SAR(1 g) = 0.020 mW/g; SAR(10 g) = 0.012 mW/g

Maximum value of SAR (measured) = 0.021 mW/g



14 ATTACHMENTS

No.	Contents	No. Of Pages
1	System Performance Check Plots	4
2	Certificate of E-Field Probe - EX3DV3SN3531	10
3	Certificate of System Validation Dipole - D835V2 SN:4d002	9
4	Certificate of System Validation Dipole - D1900V2 SN:5d043	9

15 SETUP PHOTOS

Setup photo with Flat Phantom



Setup photo with SAM phantom



16 HOST DEVICE PHOTOS

Model: NP-NC10



End of Report