FCC OET BULLETIN 65 SUPPLEMENT C
IC RSS-102 ISSUE 4,
IEEE STD 1528:2003
CLASS II PERMISSIVE CHANGE

SAR EVALUATION REPORT

For

Cellular/PCS WCDMA/GSM/EDGE Module
(Tested inside of SAMSUNG Notebook PC, NP-NC110, NP-NC210)

MODEL NUMBER: GT-Y3300
FCC ID: A3LGTY3300
IC ID: 649E- GTY3300
IMEI: 357063/03/274656/9

REPORT NUMBER: 11I13602-1A

ISSUE DATE: February 24, 2011

Prepared for

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

Prepared by

COMPLIANCE CERTIFICATION SERVICES (UL CCS)
47173 BENICIA STREET
FREMONT, CA 94538, U.S.A.
TEL: (510) 771-1000
FAX: (510) 661-0888

NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	February 13, 2011	Initial Issue	--
A	February 24, 2011	Updated report includes the following. 1. Page 25: Removed 1.5 cm separation from SAR table. 2. Added Section 10 SAR Measurement Procedures.	Sunny Shih

TABLE OF CONTENTS

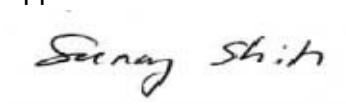
1. ATTESTATION OF TEST RESULTS

Applicant name:	SAMSUNG ELECTRONICS CO., LTD. 416 MAETAN 3-DONG, YEONGTONG-GU,SUWON-CITY, GYEONGGI-DO 443-742 KOREA		
EUT description:	The EUT is the Samsung 850/1900 GSM/WCDMA/GPRS/EDGE Module with HSPA (Tested inside of SAMSUNG Notebook PC, NP-NC110, NP-NC210)		
Model number:	GT-Y3300		
Device category:	Portable		
Exposure category:	General Population/Uncontrolled Exposure		
Date tested:	February 7 - 8, 2011		
FCC / IC Rule Parts	Freq. Range [MHz]	Highest 1-g SAR (mW/g)	Limit (mW/g)
22H / RSS-132	824 - 849	0.024 mW/g Lap-held w/ 17.5 cm Separation distance 0.324 mW/g Near by person w/ 2.5 cm separation distance	1.6
24E / RSS-133	1850 - 1910	0.011 mW/g Lap-held w/ 17.5 cm Separation distance 0.701 mW/g Near by person w/ 2.5 cm separation distance	
Applicable Standards			Test Results
FCC OET Bulletin 65 Supplement C 01-01, IEEE Std 1528:2003 IC RSS 102 Issue 4			Pass

Compliance Certification Services, Inc. (UL 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 UL CCS based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

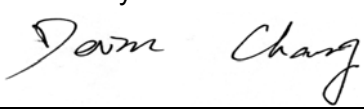
Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL CCS will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government (NIST Handbook 150, Annex A). This report is written to support regulatory compliance of the applicable standards stated above.

Approved & Released For CCS By:



Sunny Shih
Engineering Team Leader
Compliance Certification Services (UL CCS)

Tested By:



Devin Chang
Associate RF Engineer
Compliance Certification Services (UL CCS)

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC OET Bulletin 65 Supplement C, IEEE STD 1528: 2003, IC RSS 102 Issue 4 and the following specific FCC Test Procedures.

- KDB 941225 D01 SAR test for 3G devices
- KDB 616217 Laptop Computer SAR Procedures

3. FACILITIES AND ACCREDITATION

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

UL 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.

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due date		
				MM	DD	Year
Dielectric Probe Kit	HP	85070C	N/A	N/A		
S-Parameter Network Analyzer	Agilent	E5071B	MY42100131	8	2	2011
Signal Generator	Agilent	E5071B	MY42100131	8	2	2011
Dielectric Probe Kit	HP	85070C	N/A	N/A		
E-Field Probe	SPEAG	EX3DV3	3531	2	23	2011
Data Acquisition Electronics	SPEAG	DAE4	1239	11	11	2011
System Validation Dipole	SPEAG	D835V2	4d002	4	23	2011
System Validation Dipole	SPEAG	D1900V2	5d043	11	24	2011
Power Meter	Giga-tronics	8651A	8651404	3	13	2012
Power Sensor	Giga-tronics	80701A	1834588	3	13	2012
Wireless comunication test set	Agilent	E5515C (8960)	GB46160222	6	17	2012
Simulating Liquid	SPEAG	MSL900	MSL900	Within 24 hrs of first test		
Simulating Liquid	SPEAG	MSL1900	MSL1900	Within 24 hrs of first test		

Note: Per KDB 450824 D02 requirements for dipole calibration, UL CCS has adopted two years calibration intervals. On annual basis, each measurement dipole has been evaluated and is in compliance with the following criteria:

1. There is no physical damage on the dipole
2. System validation with specific dipole is within 10% of calibrated value.
3. Return-loss is within 20% of calibrated measurement (test data on file in UL CCS)
4. Impedance is within 5Ω of calibrated measurement (test data on file in UL CCS)

4.2. MEASUREMENT UNCERTAINTY

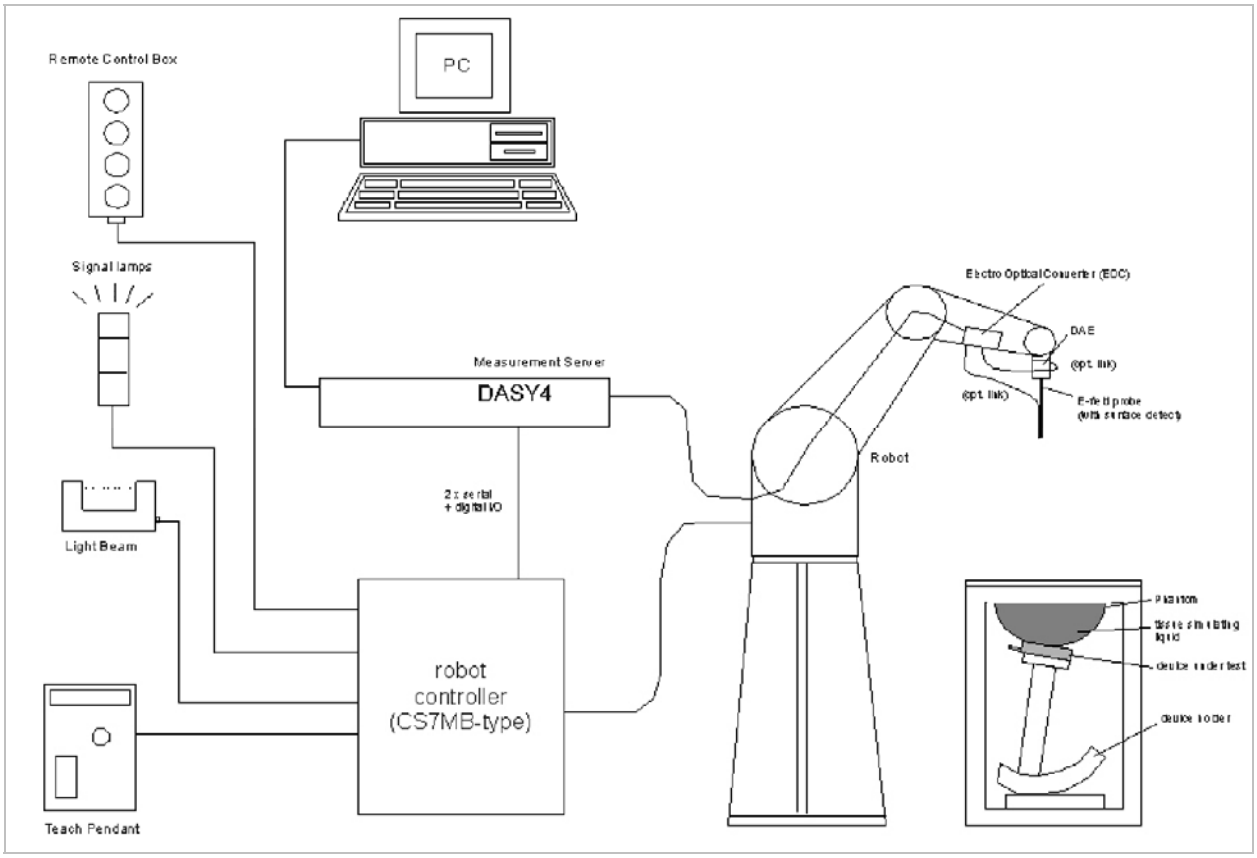
Measurement uncertainty for 300 MHz to 3 GHz averaged over 1 gram

Component	error, %	Probe Distribution	Divisor	Sensitivity	U (Xi), %
Measurement System					
Probe Calibration (k=1)	5.50	Normal	1	1	5.50
Axial Isotropy	1.15	Rectangular	1.732	0.7071	0.47
Hemispherical Isotropy	2.30	Rectangular	1.732	0.7071	0.94
Boundary Effect	0.90	Rectangular	1.732	1	0.52
Probe Linearity	3.45	Rectangular	1.732	1	1.99
System Detection Limits	1.00	Rectangular	1.732	1	0.58
Readout Electronics	0.30	Normal	1	1	0.30
Response Time	0.80	Rectangular	1.732	1	0.46
Integration Time	2.60	Rectangular	1.732	1	1.50
RF Ambient Conditions - Noise	3.00	Rectangular	1.732	1	1.73
RF Ambient Conditions - Reflections	3.00	Rectangular	1.732	1	1.73
Probe Positioner Mechanical Tolerance	0.40	Rectangular	1.732	1	0.23
Probe Positioning with respect to Phantom	2.90	Rectangular	1.732	1	1.67
Extrapolation, Interpolation and Integration	1.00	Rectangular	1.732	1	0.58
Test Sample Related					
Test Sample Positioning	2.90	Normal	1	1	2.90
Device Holder Uncertainty	3.60	Normal	1	1	3.60
Output Power Variation - SAR Drift	5.00	Rectangular	1.732	1	2.89
Phantom and Tissue Parameters					
Phantom Uncertainty (shape and thickness)	4.00	Rectangular	1.732	1	2.31
Liquid Conductivity - deviation from target	5.00	Rectangular	1.732	0.64	1.85
Liquid Conductivity - measurement	1.02	Normal	1	0.64	0.65
Liquid Permittivity - deviation from target	5.00	Rectangular	1.732	0.6	1.73
Liquid Permittivity - measurement uncertainty	2.43	Normal	1	0.6	1.46
				Combined Standard Uncertainty Uc(y) =	9.57
				Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence = 19.15 %	
				Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence = 1.52 dB	

5. EQUIPMENT UNDER TEST

The EUT is the Samsung 850/1900 GSM/WCDMA/GPRS/EDGE Module with HSPA (Tested inside of SAMSUNG Notebook PC, NP-NC110, NP-NC210)	
Normal operation:	Laptop mode (display open at 90° to the keyboard)
Antenna tested:	Manufactured: WNC; Part number: Main: 81.EKZ15.G08
Antenna-to-antenna/user separation distances:	See Section 15 for details of antenna locations and separation distances.
Simultaneous transmission:	• WWAN can transmit simultaneously with WiFi • WWAN can transmit simultaneously with Bluetooth • WiFi can transmit simultaneously with Bluetooth
Assessment for SAR evaluation for Simultaneous transmission: (According to KDB 616217, Table 2)	**WiFi and BT** The Bluetooth's output power (2.79 mW) is ≤ 60/f(GHz) mW, which stand-alone SAR evaluation is not required. Thus, simultaneous transmission SAR evaluation is not required for WiFi/Bluetooth antenna pair. (Bluetooth - FCC ID: QDS-BRCM1051; IC ID: 4324A- BRCM1051) **WWAN and BT** Same as WiFi and BT **WWAN and WiFi** SAR is not required due to $\sum (SAR_{1g})$ < SAR limit.

6. SYSTEM SPECIFICATIONS



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 validating the proper functioning of the system.

7. 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

Simulating Liquids for 5 GHz, Manufactured by SPEAG

Ingredients	(% by weight)
Water	78
Mineral oil	11
Emulsifiers	9
Additives and Salt	2

8. TISSUE DIELECTRIC PARAMETERS

The simulating liquids should be checked at the beginning of a series of SAR measurements to determine of the dielectric parameters are within the tolerances of the specified target values. For frequencies in 300 MHz to 2 GHz, the measured conductivity and relative permittivity should be within ± 5% of the target values. For frequencies in the range of 2–3 GHz and above the measured conductivity should be within ± 5% of the target values. The measured relative permittivity tolerance can be relaxed to no more than ± 10%.

Reference Values of Tissue Dielectric Parameters for Body (for 300 – 3000 MHz and 5800 MHz)
The 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)	Body (Supplement C 01-01)	
	ε_r	σ (S/m)
300	58.20	0.92
450	56.70	0.94
835	55.20	0.97
900	55.00	1.05
915	55.00	1.06
1450	54.00	1.30
1610	53.80	1.40
1800 – 2000	53.30	1.52
2450	52.70	1.95
3000	52.00	2.73
5800	48.20	6.00

(ε_r = relative permittivity, σ = conductivity and ρ = 1000 kg/m^3)

8.1. LIQUID CHECK RESULTS

Simulating Liquid Dielectric Parameters for Body 835 MHz Measured by: David Lee

f (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
835	e'	56.54	Relative Permittivity (ϵ_r):	56.539	55.2	2.43	± 5
	e"	21.09	Conductivity (σ):	0.980	0.97	1.02	± 5

Liquid Check
Ambient temperature: 24 deg. C; Liquid temperature: 23 deg. C
February 07, 2011 06:17 PM

Frequency	e'	e"
800000000.	56.8486	21.2320
805000000.	56.8054	21.2151
810000000.	56.7569	21.1953
815000000.	56.7127	21.1747
820000000.	56.6674	21.1515
825000000.	56.6209	21.1336
830000000.	56.5829	21.1098
835000000.	**56.5386**	**21.0946**
840000000.	56.4950	21.0709
845000000.	56.4501	21.0566
850000000.	56.4113	21.0407
855000000.	56.3682	21.0282
860000000.	56.3259	21.0101
865000000.	56.2798	20.9971
870000000.	56.2420	20.9771
875000000.	56.1914	20.9591
880000000.	56.1500	20.9490
885000000.	56.1078	20.9363
890000000.	56.0604	20.9204
895000000.	56.0094	20.9082
900000000.	55.9719	20.8905
905000000.	55.9258	20.8763
910000000.	55.8797	20.8652
915000000.	55.8394	20.8450
920000000.	55.8011	20.8321
925000000.	55.7634	20.8189
930000000.	55.7267	20.8027
935000000.	55.6853	20.7941
940000000.	55.6486	20.7859
945000000.	55.6115	20.7759
950000000.	55.5701	20.7695

The conductivity (σ) can be given as:

$$\sigma = \omega \varepsilon_0 e'' = 2 \pi f \varepsilon_0 e''$$

where f = target f * 10^6

$\varepsilon_0 = 8.854 * 10^{-12}$

Simulating Liquid Dielectric Parameters for Body 1900 MHz Measured by: David Lee

f (MHz)	Muscle Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
1900	e'	52.241	Relative Permittivity (ϵ_r):	52.2413	53.3	-1.99	± 5
	e"	14.239	Conductivity (σ):	1.50508	1.52	-0.98	± 5

Liquid Check
Ambient temperature: 24 deg. C; Liquid temperature: 23 deg. C; Relative humidity = 42%
February 07, 2011 02:25 PM

Frequency	e'	e"
1710000000.	52.9188	13.5738
1720000000.	52.8977	13.6067
1730000000.	52.8776	13.6365
1740000000.	52.8517	13.6712
1750000000.	52.8235	13.7056
1760000000.	52.7819	13.7441
1770000000.	52.7374	13.7895
1780000000.	52.6899	13.8311
1790000000.	52.6473	13.8773
1800000000.	52.6077	13.9192
1810000000.	52.5774	13.9574
1820000000.	52.5466	13.9918
1830000000.	52.5181	14.0259
1840000000.	52.4876	14.0564
1850000000.	52.4512	14.0891
1860000000.	52.4126	14.1172
1870000000.	52.3682	14.1443
1880000000.	52.3222	14.1740
1890000000.	52.2788	14.2074
1900000000.	**52.2413**	**14.2392**
1910000000.	52.2075	14.2742

The conductivity (σ) can be given as:

$$\sigma = \omega \varepsilon_0 e'' = 2 \pi f \varepsilon_0 e''$$

where f = target f * 10^6

$\varepsilon_0 = 8.854 * 10^{-12}$

9. SYSTEM VERIFICATION

The system performance check is performed prior to any usage of the system in order to verify SAR system measurement accuracy. The system performance check verifies that the system operates within its specifications of ±10%.

System Performance Check Measurement Conditions

- The measurements were performed in the flat section of the SAM twin phantom filled with Head or Body simulating liquid of the following parameters.
- The DASY4 system with an Isotropic E-Field Probe EX3DV3 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 7x7x7 fine cube was chosen for cube
- Distance between probe sensors and phantom surface was set to 3 mm.
  For 5 GHz band - Distance between probe sensors and phantom surface was set to 2.5 mm
- The dipole input power (forward power) was 100 mW
- The results are normalized to 1 W input power.

Reference SAR Values for HEAD & BODY-tissue from calibration certificate of SPEAG.

System validation dipole	Cal. certificate #	Cal. date	SAR Avg (mW/g)		
			Tissue:	Head	Body
D835V2 SN: 4d002	D1835V2-4d002_Apr09	4/23/09	SAR_{1g}:	9.64	9.96
			SAR_{10g}:	6.28	6.56
D1900V2 SN: 5d043	D1900V2-5d043_Nov09	11/24/09	SAR_{1g}:	39.8	40.4
			SAR_{10g}:	20.7	21.4

9.1. SYSTEM CHECK RESULTS

System validation dipole	Date Tested	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
		Tissue:	Body			
D835V2 SN: 4d002	02/07/11	SAR_{1g}:	9.48	9.96	-4.82	±10
		SAR_{10g}:	6.26	6.56	-4.57	
System validation dipole	Date Tested	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
		Tissue:	Body			
D1900V2 SN: 5d043	02/07/11	SAR_{1g}:	38.2	40.4	-5.45	±10
		SAR_{10g}:	20.2	21.4	-5.61	

SYSTEM CHECK PLOT FOR D835V2

Date/Time: 2/7/2011 8:59:20 PM

Test Laboratory: UL CCS

System Check D835V2 SN 4d002

DUT: Dipole 835 MHz D835V2; Type: D835V2; Serial: D835V2 - SN: 4d002

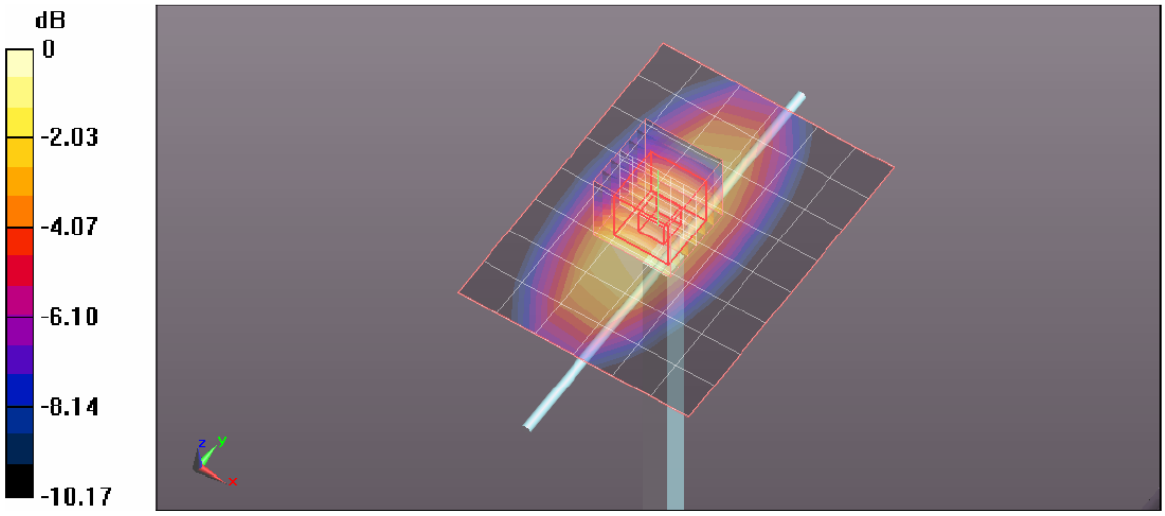
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.98 mho/m; ε_r = 56.539; ρ = 1000 kg/m^3
Phantom section: Flat Section

Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

DASY5 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(10.18, 10.18, 10.18); Calibrated: 2/23/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1239; Calibrated: 11/17/2010
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1099
- Measurement SW: DASY52, Version 52.6 (1);SEMCAD X Version 14.4.2 (2595)

D835V2 SN 4d002/Pin=100 mW/Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.041 mW/g

D835V2 SN 4d002/Pin=100 mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 34.473 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 1.400 W/kg
SAR(1 g) = 0.948 mW/g; SAR(10 g) = 0.626 mW/g
Maximum value of SAR (measured) = 1.149 mW/g



0 dB = 1.150mW/g

SYSTEM CHECK – Z Plot FOR D835V2

Date/Time: 2/7/2011 9:14:23 PM

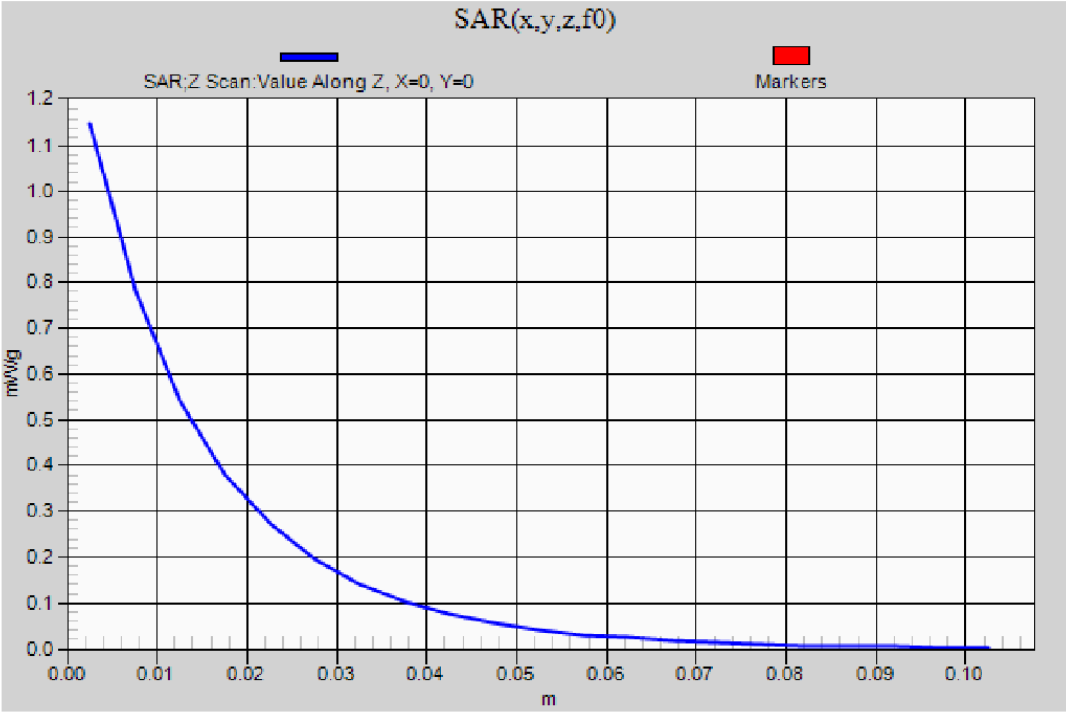
Test Laboratory: UL CCS

System Check D835V2 SN 4d002

DUT: Dipole 835 MHz D835V2; Type: D835V2; Serial: D835V2 - SN: 4d002

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

D835V2 SN 4d002/Pin=100 mW/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 1.149 mW/g



SYSTEM CHECK PLOT FOR D1900V2

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Test Laboratory: UL CCS

System Check D1900V2 SN 5d043

DUT: Dipole 1900 MHz D1900V2; Type: D1900V2; Serial: D1900V2 - SN: 5d043

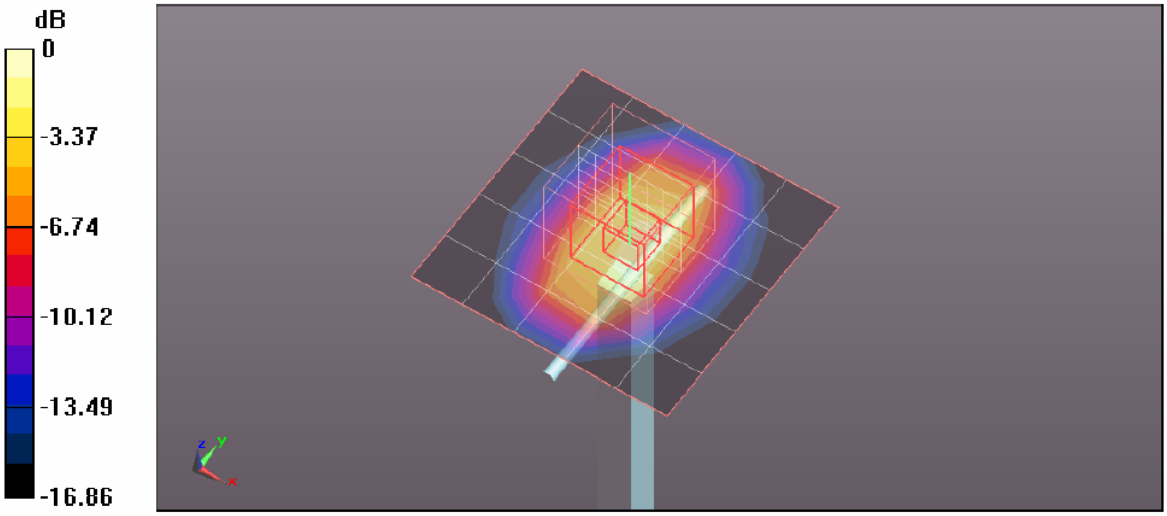
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.57 mho/m; ε_r = 51.05; ρ = 1000 kg/m^3
Phantom section: Flat Section

Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

DASY5 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(8.04, 8.04, 8.04); Calibrated: 2/23/2010
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1239; Calibrated: 11/17/2010
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1099
- Measurement SW: DASY52, Version 52.6 (1);SEMCAD X Version 14.4.2 (2595)

D1900V2/Pin=100 mW/Area Scan (6x6x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 3.756 mW/g

D1900V2/Pin=100 mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 59.642 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 6.840 W/kg
SAR(1 g) = 3.82 mW/g; SAR(10 g) = 2.02 mW/g
Maximum value of SAR (measured) = 5.427 mW/g



0 dB = 5.430mW/g

SYSTEM CHECK – Z Plot FOR D1900V2

Date/Time: 2/7/2011 3:09:14 PM

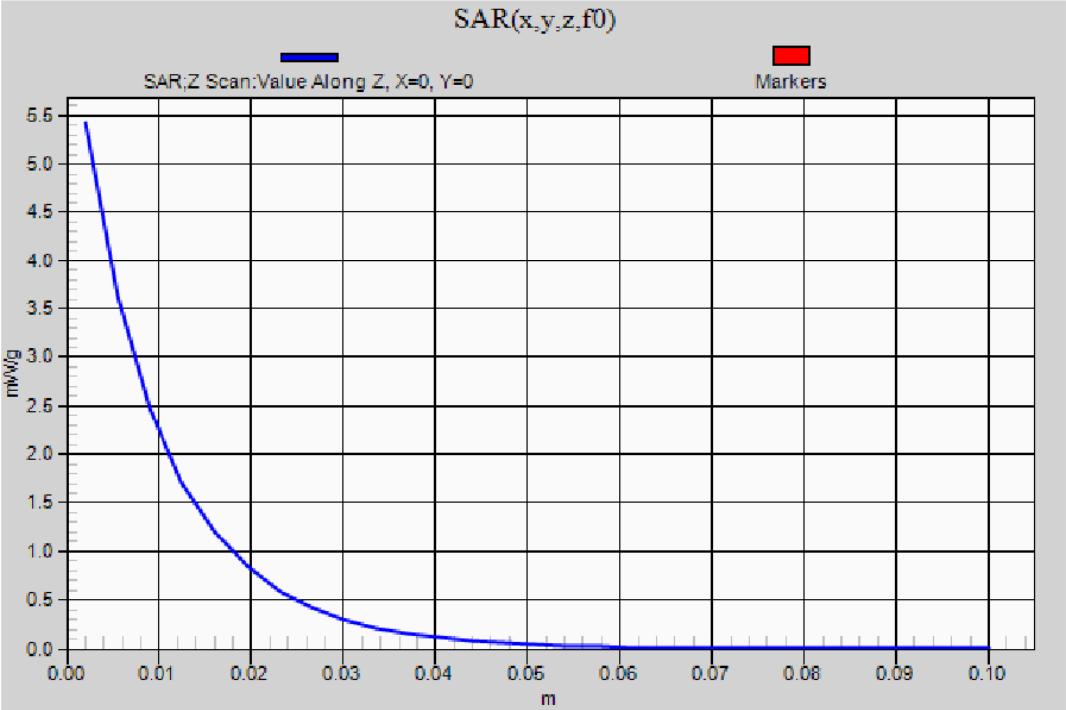
Test Laboratory: UL CCS

System Check D1900V2 SN 5d043

DUT: Dipole 1900 MHz D1900V2; Type: D1900V2; Serial: D1900V2 - SN: 5d043

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1

D1900V2/Pin=100 mW/Z Scan (1x1x29): Measurement grid: dx=20mm, dy=20mm, dz=3.5mm
Maximum value of SAR (measured) = 5.418 mW/g



10. SAR MEASUREMENT PROCEDURES

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.

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. RF OUTPUT POWER VERIFICATION

11.1. GSM

GPRS (GMSK) - Coding Scheme: CS1

Band	Ch No.	f (MHz)	Avg burst Pwr (dBm)							
			1 slot	Frame Avg Pwr	2 slot	Frame Avg Pwr	3 slot	Frame Avg Pwr	4 slot	Frame Avg Pwr
GSM850	128	824.2	32.6	23.6	32.5	26.5	31.5	**27.2**	30.2	27.2
	190	836.6	32.6	23.6	32.5	26.5	31.6	**27.3**	30.3	27.3
	251	848.8	32.8	23.8	32.7	26.7	31.8	**27.5**	30.5	27.5
GSM1900	512	1850.2	28.6	19.6	28.5	22.5	27.7	23.4	26.6	**23.6**
	661	1880	28.4	19.4	28.3	22.3	27.5	23.2	26.4	**23.4**
	810	1909.8	28.9	19.9	28.8	22.8	27.8	23.5	26.7	**23.7**

Note: Based on above Frame average power measurements result, the following worst-case mode/channel number has been chosen for SAR testing.

- GPRS850 - 3 slot/High-channel (251/848.8 MHz)
- GPRS1900 - 4 slot/High-channel (810/1909.8 MHz)

EGPRS (8PSK) - Coding Scheme: MCS4

Band	Ch No.	f (MHz)	Avg burst Pwr (dBm)							
			1 slot	Frame Avg Pwr	2 slot	Frame Avg Pwr	3 slot	Frame Avg Pwr	4 slot	Frame Avg Pwr
GSM850	128	824.2	26.8	17.8	26.6	20.6	25.5	21.2	24.1	21.1
	190	836.6	26.7	17.7	26.5	20.5	25.6	21.3	24.3	21.3
	251	848.8	26.8	17.8	26.6	20.6	25.5	21.2	24.2	21.2
GSM1900	512	1850.2	26.1	17.1	25.9	19.9	25.1	20.8	23.7	20.7
	661	1880	26.3	17.3	26.1	20.1	25.3	21.0	23.8	20.8
	810	1909.8	26.1	17.1	25.8	19.8	24.9	20.6	23.4	20.4

Note: Based on above average output power measurements result, GSMK mode is higher than 8PSK mode; therefore SAR is only performed at GSMK mode.

11.2. UMTS RELEASE 99

The following tests were completed according to the test requirements outlined in section 5.2 of the 3GPP TS34.121-1 specification. The EUT supports power Class 3, which has a nominal maximum output power of 24 dBm (+1.7/-3.7).

	Mode	Rel99
	Subtest	-
WCDMA General Settings	Loopback Mode	Test Mode 1
	Rel99 RMC	12.2kbps RMC
	Power Control Algorithm	Algorithm2
	βc/βd	8/15

Results

Rel 99 (12.2kps RMC)

Band	Mode	UL Ch No.	DL Ch No.	f (MHz)	Avg Tx Pwr (dBm)
UMTS850 (Band V)	Rel 99 12.2kbps RMC	4132	4357	826.4	24.0
		4183	4408	836.6	23.9
		4233	4458	846.6	23.8
UMTS1900 (Band II)	Rel 99 12.2kps RMC	9262	9662	1852.4	23.8
		9400	9800	1880.0	23.9
		9538	9938	1907.6	23.5

Note: Based on above Frame average power measurements result, the following worst-case mode/channel number has been chosen for SAR testing.

- UMTS Band V – Rel 99/Low-channel (826.4 MHz)
- UMTS Band II – Rel 99/Middle-channel (1880 MHz)

11.3. UMTS 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			
	Power Control Algorithm	Algorithm 2			
	βc	2/15	12/15	15/15	15/15
	βd	15/15	15/15	8/15	4/15
	Bd (SF)	64			
	βc/βd	2/15	12/15	15/8	15/4
	βhs	4/15	24/15	30/15	30/15
	CM (dB)	0	1	1.5	1.5
HSDPA Specific Settings	D_{ACK}	8			
	D_{NAK}	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback (Table 5.2B.4)	4ms			
	CQI Repetition Factor (Table 5.2B.4)	2			
	Ahs =βhs/βc	30/15			

Results

Rel 6 HSDPA

Band	Mode	UL Ch No.	DL Ch No.	f (MHz)	Avg Tx Pwr (dBm)
UMTS850 (Band V)	Subtest 1	4132	4357	826.4	23.9
		4183	4408	836.6	23.8
		4233	4458	846.6	23.8
	Subtest 2	4132	4357	826.4	22.0
		4183	4408	836.6	21.8
		4233	4458	846.6	22.1
	Subtest 3	4132	4357	826.4	21.3
		4183	4408	836.0	21.2
		4233	4458	846.6	21.2
	Subtest 4	4132	4357	826.4	21.2
		4183	4408	836.4	21.1
		4233	4458	846.6	21.0
UMTS1900 (Band II)	Subtest 1	9262	9662	1852.4	23.4
		9400	9800	1880.0	23.4
		9538	9938	1907.6	23.1
	Subtest 2	9262	9662	1852.4	21.2
		9400	9800	1880.0	21.2
		9538	9938	1907.6	20.9
	Subtest 3	9262	9662	1852.4	20.5
		9400	9800	1880.0	20.6
		9538	9938	1907.6	20.4
	Subtest 4	9262	9662	1852.4	20.2
		9400	9800	1880.0	20.3
		9538	9938	1907.6	20.1

Note: KDB 941225 D01 – Body SAR is not required for HSDPA when the maximum average output of each RF channel with HSDPA active is less than ¼ dB higher than that measured without HSDPA using 12.2 kbps RMC or the maximum SAR for 12.2 kbps RMC is < 75% of the SAR limit

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. A summary of these settings are illustrated below:

	Mode	Rel6 HSPA	Rel6 HSPA	Rel6 HSPA	Rel6 HSPA	Rel6 HSPA
	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				
	βc	11/15	6/15	15/15	2/15	15/15
	βd	15/15	15/15	9/15	15/15	15/15
	βec	209/225	12/15	30/15	2/15	24/15
	βc/βd	11/15	6/15	15/9	2/15	15/15
	βhs	22/15	12/15	30/15	4/15	30/15
	βed	1309/225	94/75	47/15 47/15	56/75	134/15
	CM (dB)	1.0	3.0	2.0	3.0	1.0
	MPR (dB)	0	2	1	2	0
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 = βhs/βc	30/15				
HSUPA Specific Settings	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)	Avg Tx Pwr (dBm)
UMTS850 (Band V)	Subtest 1	4132	4357	826.4	23.8
		4183	4408	836.6	23.7
		4233	4458	846.6	23.8
	Subtest 2	4132	4357	826.4	22.3
		4183	4408	836.6	22.2
		4233	4458	846.6	22.3
	Subtest 3	4132	4357	826.4	22.9
		4183	4408	836.6	22.8
		4233	4458	846.6	22.9
	Subtest 4	4132	4357	826.4	22.2
		4183	4408	836.0	22.0
		4233	4458	846.6	22.2
	Subtest 5	4132	4357	826.4	23.7
		4183	4408	836.4	23.8
		4233	4458	846.6	23.7
UMTS1900 (Band II)	Subtest 1	9262	9662	1852.4	23.4
		9400	9800	1880.0	23.5
		9538	9938	1907.6	23.2
	Subtest 2	9262	9662	1852.4	21.7
		9400	9800	1880.0	21.8
		9538	9938	1907.6	21.5
	Subtest 3	9262	9662	1852.4	22.6
		9400	9800	1880.0	22.7
		9538	9938	1907.6	22.4
	Subtest 4	9262	9662	1852.4	21.8
		9400	9800	1880.0	21.9
		9538	9938	1907.6	21.5
	Subtest 5	9262	9662	1852.4	23.4
		9400	9800	1880.0	23.4
		9538	9938	1907.6	23.3

Note: KDB 941225 D01 – Body SAR is not required for handsets with HSPA capabilities when the maximum average output of each RF channel with HSUPA/HSDPA active is less than ¼ dB higher than that measured without HSUPA/HSDPA using 12.2 kbps RMC and the maximum SAR for 12.2kbps RMC is ≤ 75% of the SAR limit.

12. SUMMARY OF TEST RESULT

12.1. GPRS850

Lab-held

Test position	Mode	Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
Lap-held	GSPS 3 slots	128	824.2		1.6
		190	836.6	0.024	
		251	848.8		

Nearby Person w/ 2.5 cm separation distance

Test position	Mode	Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
Nearby Person	GSPS 3 slots	128	824.2		1.6
		190	836.6	0.324	
		251	848.8		

12.2. UMTS BAND V

Lab-held

Test position	Mode	UL Ch No.	DL Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
Lap-held	Rel 99 12.2kps RMC	4132	4357	826.4		1.6
		4183	4408	836.6	0.016	
		4233	4458	846.6		

Near By Person w/ 2.5 cm separation distance

Test position	Mode	UL Ch No.	DL Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
Nearby Person	Rel 99 12.2kps RMC	4132	4357	826.4		1.6
		4183	4408	836.6	0.226	
		4233	4458	846.6		

Notes:

1) KDB 941225 D01 – Body SAR is not required for HSDPA when the maximum average output of each RF channel with HSDPA active is less than ¼ dB higher than that measured without HSDPA using 12.2 kbps RMC or the maximum SAR for 12.2 kbps RMC is < 75% of the SAR limit.
2) KDB 941225 D01 – Body SAR is not required for handsets with HSPA capabilities when the maximum average output of each RF channel with HSUPA/HSDPA active is less than ¼ dB higher than that measured without HSUPA/HSDPA using 12.2 kbps RMC and the maximum SAR for 12.2kbps RMC is ≤ 75% of the SAR limit.

12.3. GPRS1900

Lab-held

Test position	Mode	Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
Lap-held	GPRS 4 slots	512	1850.2		1.6
		661	1880.0	0.00698	
		810	1909.8		

Near By Person w/ 2.5 cm separation distance

Test position	Mode	Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
Nearby Person	GPRS 4 slots	512	1850.2		1.6
		661	1880.0	0.547	
		810	1909.8		

12.4. UMTS BAND II

Lab-held

Test position	Mode	UL Ch No.	DL Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
Lapheld	Rel 99 12.2kps RMC	9262	9662	1852.4		1.6
		9400	9800	1880.0	0.011	
		9538	9938	1907.6		

Near By Person w/2.5 cm separation distance

Test position	Mode	UL Ch No.	DL Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
Nearby Person	Rel 99 12.2kps RMC	9262	9662	1852.4		1.6
		9400	9800	1880.0	0.701	
		9538	9938	1907.6		

Notes:

1) KDB 941225 D01 – Body SAR is not required for HSDPA when the maximum average output of each RF channel with HSDPA active is less than ¼ dB higher than that measured without HSDPA using 12.2 kbps RMC or the maximum SAR for 12.2 kbps RMC is < 75% of the SAR limit.
2) KDB 941225 D01 – Body SAR is not required for handsets with HSPA capabilities when the maximum average output of each RF channel with HSUPA/HSDPA active is less than ¼ dB higher than that measured without HSUPA/HSDPA using 12.2 kbps RMC and the maximum SAR for 12.2kbps RMC is ≤ 75% of the SAR limit.

13. SAR TEST PLOTS

GSM850 Lap-held

Date/Time: 2/8/2011 2:49:54 PM

Test Laboratory: UL CCS

Cell bands

DUT: Samsung; Type: NP-NC110; Serial: AZAE93KZC00036N

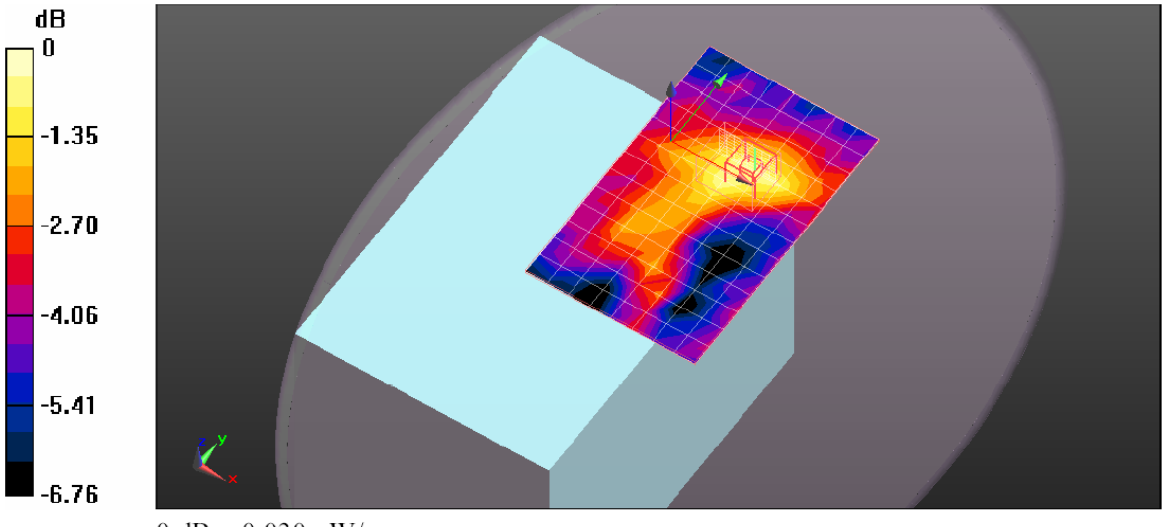
Communication System: GPRS 3 Slot; Frequency: 836.6 MHz;Duty Cycle: 1:2.66686
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.981 mho/m; ε_r = 56.525; ρ = 1000 kg/m^3
Phantom section: Flat Section

Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

DASY5 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(10.18, 10.18, 10.18); Calibrated: 2/23/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1239; Calibrated: 11/17/2010
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1099
- Measurement SW: DASY52, Version 52.6 (1);SEMCAD X Version 14.4.2 (2595)

Labheld/GPRS 3 Slots_M-ch/Area Scan (9x14x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.027 mW/g

Labheld/GPRS 3 Slots_M-ch/Zoom Scan (9x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 5.343 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 0.036 W/kg
SAR(1 g) = 0.024 mW/g; SAR(10 g) = 0.018 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.028 mW/g



0 dB = 0.030mW/g

GSM850 Nearby Person

Date/Time: 2/8/2011 2:00:32 PM

Test Laboratory: UL CCS

Cell bands

DUT: Samsung; Type: NP-NC110; Serial: AZAE93KZC00036N

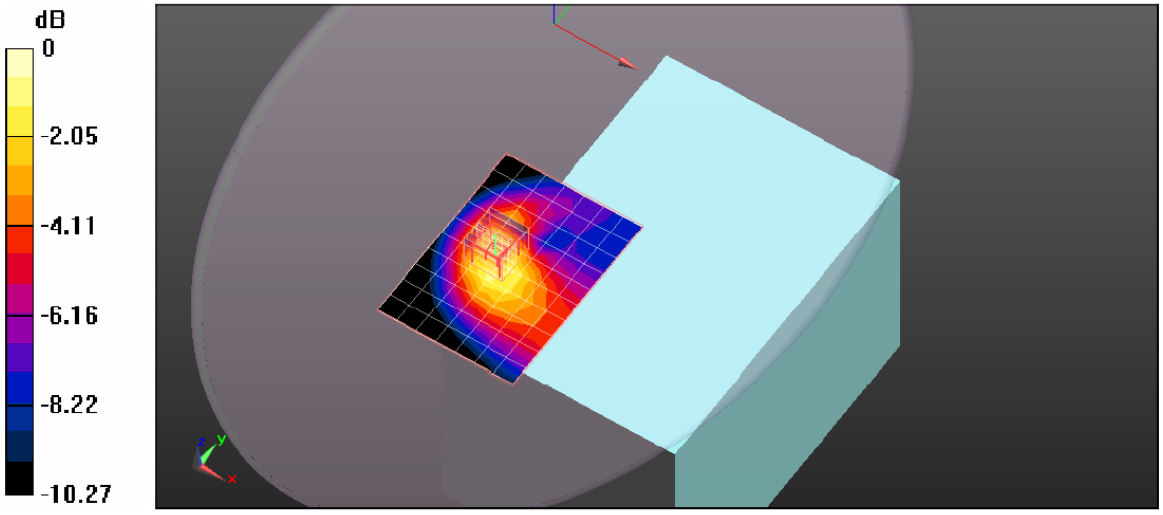
Communication System: GPRS 3 Slot; Frequency: 836.6 MHz;Duty Cycle: 1:2.66686
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.981 mho/m; ε_r = 56.525; ρ = 1000 kg/m^3
Phantom section: Flat Section

Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

DASY5 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(10.18, 10.18, 10.18); Calibrated: 2/23/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1239; Calibrated: 11/17/2010
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1099
- Measurement SW: DASY52, Version 52.6 (1);SEMCAD X Version 14.4.2 (2595)

Near by Person/GPRS 3 Slots_M-ch/Area Scan (8x11x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.377 mW/g

Near by Person/GPRS 3 Slots_M-ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 19.806 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.455 W/kg
SAR(1 g) = 0.324 mW/g; SAR(10 g) = 0.220 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.386 mW/g



0 dB = 0.390mW/g

GSM850 Z Plot Nearby Person

Date/Time: 2/8/2011 2:18:24 PM

Test Laboratory: UL CCS

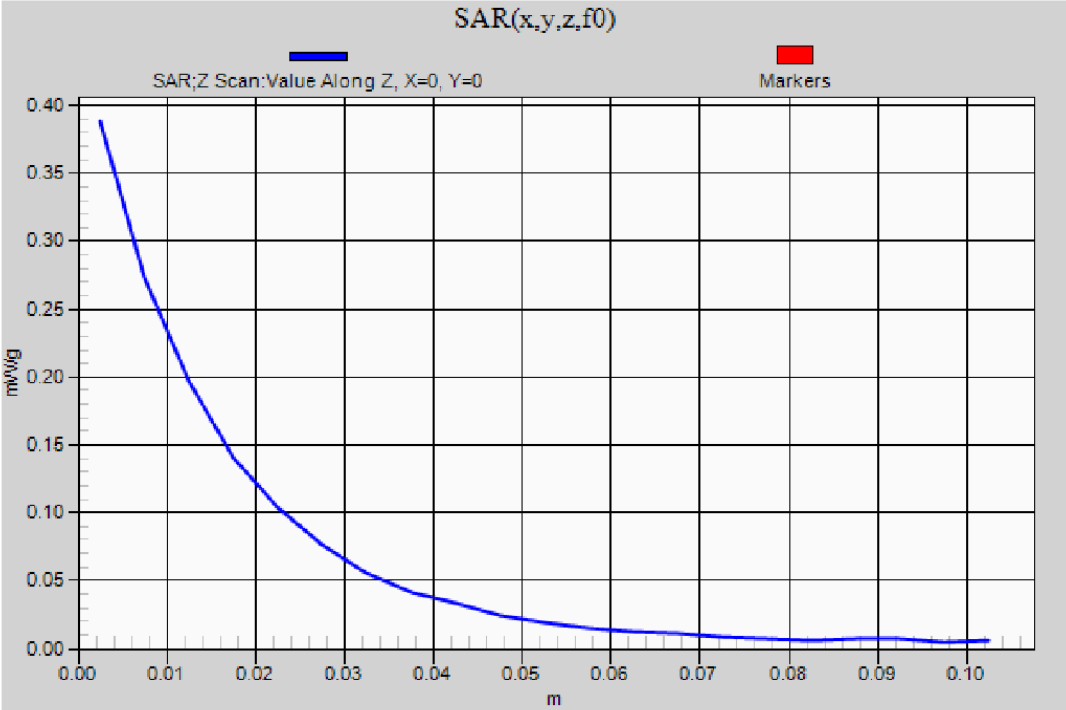
Cell bands

DUT: Samsung; Type: NP-NC110; Serial: AZAE93KZC00036N

Communication System: GPRS 3 Slot; Frequency: 836.6 MHz;Duty Cycle: 1:2.66686

Near by Person/GPRS 3 Slots_M-ch/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.388 mW/g



UMTS Band V Lap-help

Date/Time: 2/8/2011 11:53:14 AM

Test Laboratory: UL CCS

Cell bands

DUT: Samsung; Type: NP-NC110; Serial: AZAE93KZC00036N

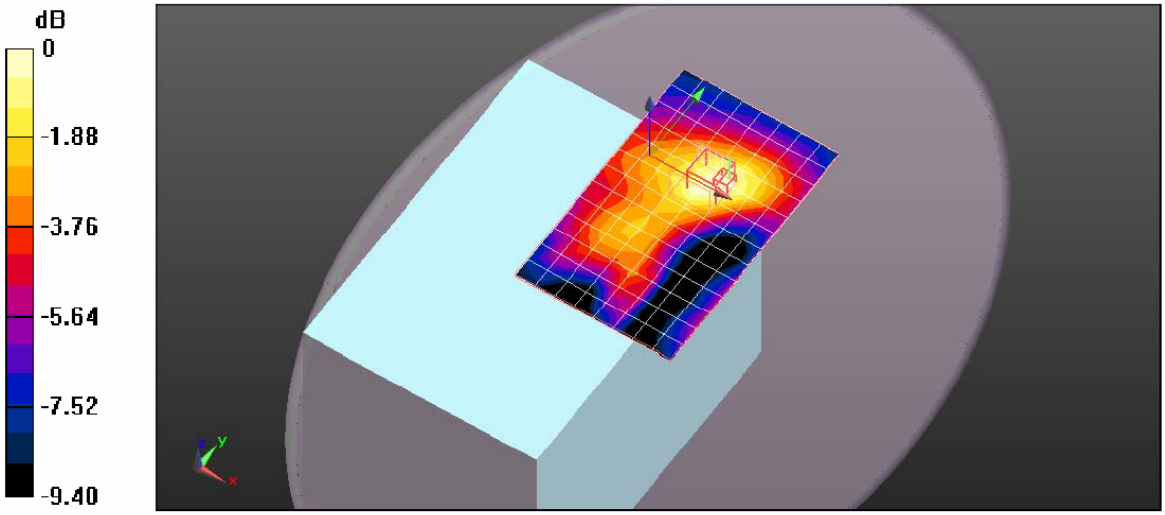
Communication System: UMTS FDD (WCDMA); Frequency: 836.6 MHz;Duty Cycle: 1:2.18776
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.981 mho/m; ε_r = 56.525; ρ = 1000 kg/m^3
Phantom section: Flat Section

Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

DASY5 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(10.18, 10.18, 10.18); Calibrated: 2/23/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1239; Calibrated: 11/17/2010
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1099
- Measurement SW: DASY52, Version 52.6 (1);SEMCAD X Version 14.4.2 (2595)

Labheld/UMTS B V_M-ch/Area Scan (9x14x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.019 mW/g

Labheld/UMTS B V_M-ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 4.405 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 0.025 W/kg
SAR(1 g) = 0.016 mW/g; SAR(10 g) = 0.011 mW/g
Info: Interpolated medium parameters used for SAR evaluation.



0 dB = 0.020mW/g

UMTS Band V Nearby Person

Date/Time: 2/8/2011 12:58:59 PM

Test Laboratory: UL CCS

Cell bands

DUT: Samsung; Type: NP-NC110; Serial: AZAE93KZC00036N

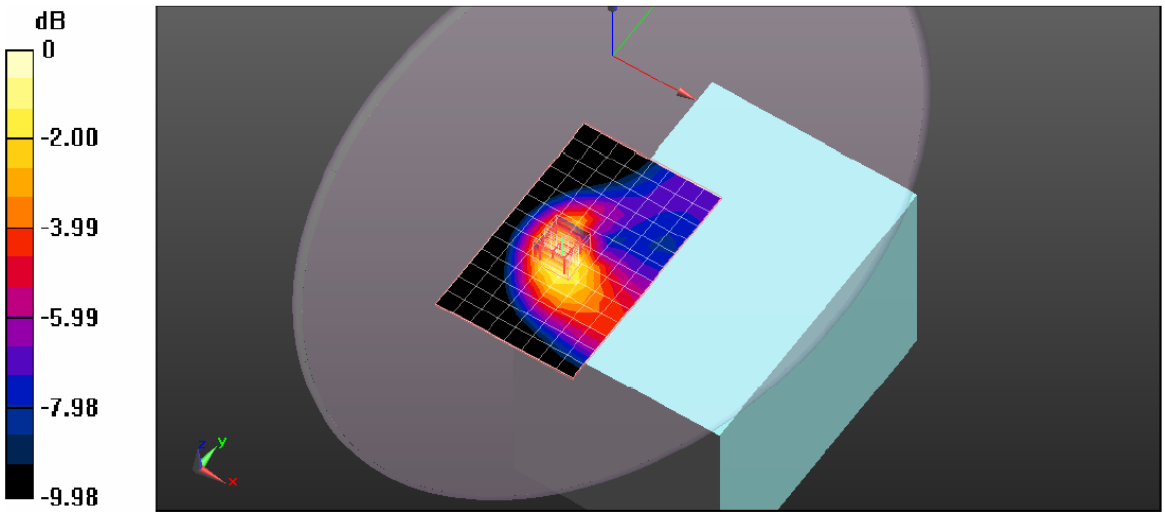
Communication System: UMTS Band V; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.981 mho/m; ε_r = 56.525; ρ = 1000 kg/m^3
Phantom section: Flat Section

Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

DASY5 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(10.18, 10.18, 10.18); Calibrated: 2/23/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1239; Calibrated: 11/17/2010
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1099
- Measurement SW: DASY52, Version 52.6 (1);SEMCAD X Version 14.4.2 (2595)

Nearby Person/UMTS B V_M-ch/Area Scan (9x14x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.249 mW/g

Nearby Person/UMTS B V_M-ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 16.087 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 0.318 W/kg
SAR(1 g) = 0.226 mW/g; SAR(10 g) = 0.154 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.266 mW/g



0 dB = 0.270mW/g

UMTS Band V Z Plot Nearby Person

Date/Time: 2/8/2011 1:16:50 PM

Test Laboratory: UL CCS

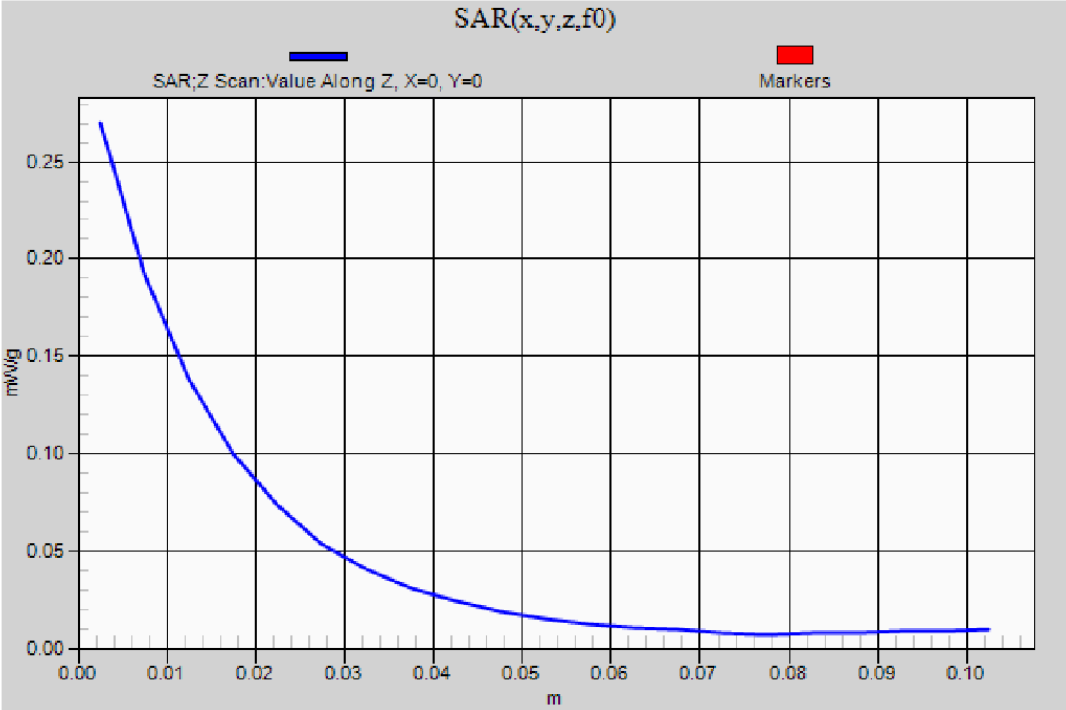
Cell bands

DUT: Samsung; Type: NP-NC110; Serial: AZAE93KZC00036N

Communication System: UMTS Band V; Frequency: 836.6 MHz;Duty Cycle: 1:1

Nearby Person/UMTS B V_M-ch/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.270 mW/g



GSM1900 Lap-held

Date/Time: 2/7/2011 9:31:03 PM

Test Laboratory: UL CCS

PCS

DUT: SUMSUNG; Type: NP-NC110; Serial: AZAE93KZC00036N

Communication System: GPRS 4 Slot; Frequency: 1880 MHz;Duty Cycle: 1:1.99986
Medium parameters used: f = 1880 MHz; σ = 1.482 mho/m; ε_r = 52.322; ρ = 1000 kg/m^3
Phantom section: Flat Section

Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

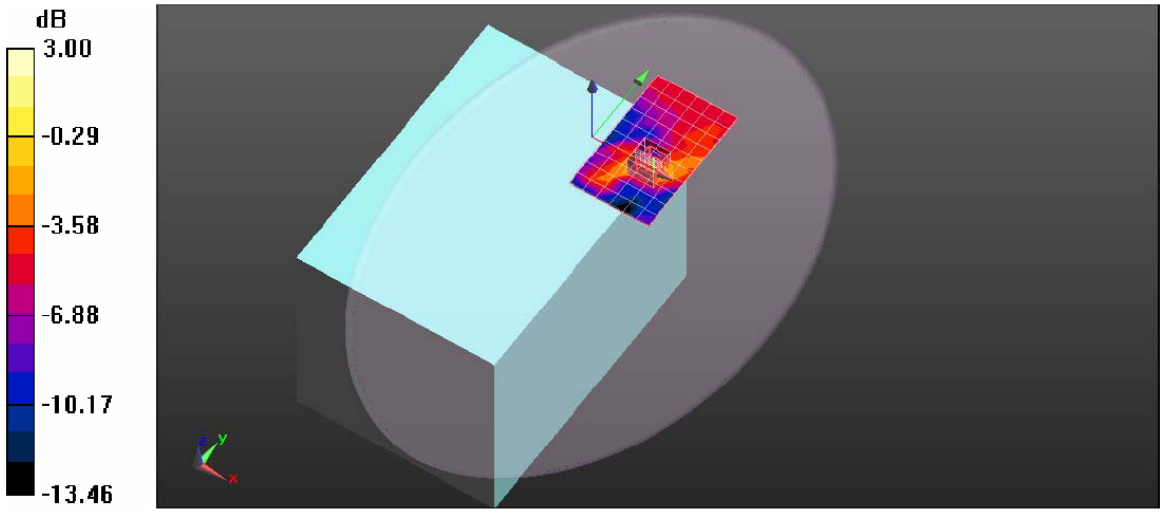
DASY5 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(8.04, 8.04, 8.04); Calibrated: 2/23/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1239; Calibrated: 11/17/2010
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: xxxx
- Measurement SW: DASY52, Version 52.6 (1);SEMCAD X Version 14.4.2 (2595)

Lap-Held GPRS1900 Class 12/GPRS1900 4 Uplink_ch 661/Zoom Scan (7x7x9)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 2.324 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.014 W/kg
SAR(1 g) = 0.00698 mW/g; SAR(10 g) = 0.00337 mW/g
Maximum value of SAR (measured) = 0.00971 mW/g

Lap-Held GPRS1900 Class 12/GPRS1900 4 Uplink_ch 661/Area Scan (7x11x1):

Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.011 mW/g



0 dB = 0.011mW/g

GSM1900 Nearby Person

Date/Time: 2/7/2011 11:01:44 PM

Test Laboratory: UL CCS

PCS

DUT: SUMSUNG; Type: NP-NC110; Serial: AZAE93KZC00036N

Communication System: GPRS 4 Slot; Frequency: 1880 MHz;Duty Cycle: 1:1.99986
Medium parameters used: f = 1880 MHz; σ = 1.482 mho/m; ε_r = 52.322; ρ = 1000 kg/m^3
Phantom section: Flat Section

Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

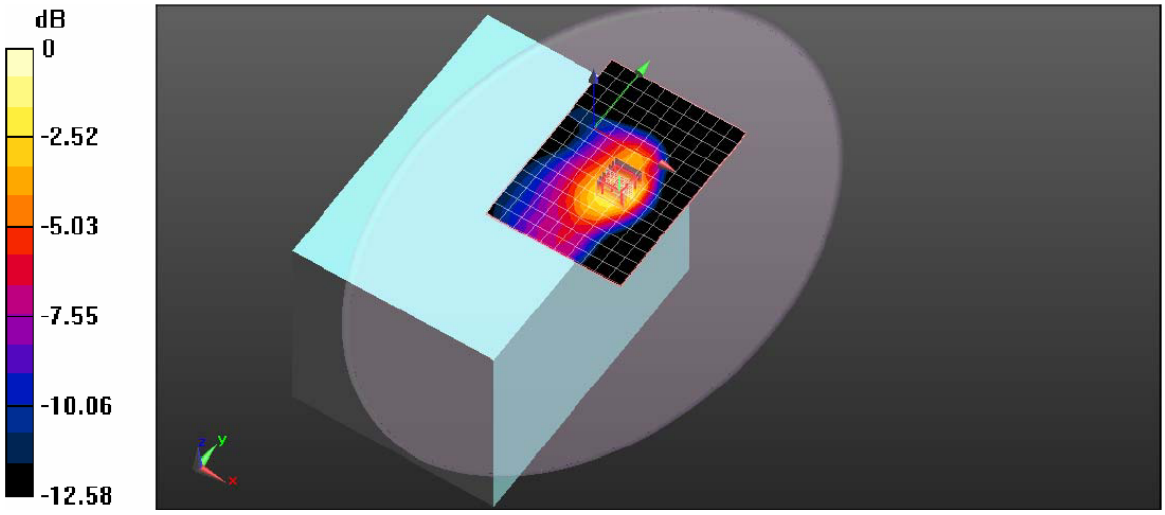
DASY5 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(8.04, 8.04, 8.04); Calibrated: 2/23/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1239; Calibrated: 11/17/2010
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: xxxx
- Measurement SW: DASY52, Version 52.6 (1);SEMCAD X Version 14.4.2 (2595)

Near By Person GPRS1900 Class 12/GPRS1900 4 Uplink_ch 661/Area Scan (11x15x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.689 mW/g

Near By Person GPRS1900 Class 12/GPRS1900 4 Uplink_ch 661/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm

Reference Value = 21.736 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.896 W/kg
SAR(1 g) = 0.547 mW/g; SAR(10 g) = 0.327 mW/g
Maximum value of SAR (measured) = 0.691 mW/g



0 dB = 0.690mW/g

GSM1900 Z Plot Nearby Person

Date/Time: 2/7/2011 11:20:22 PM

Test Laboratory: UL CCS

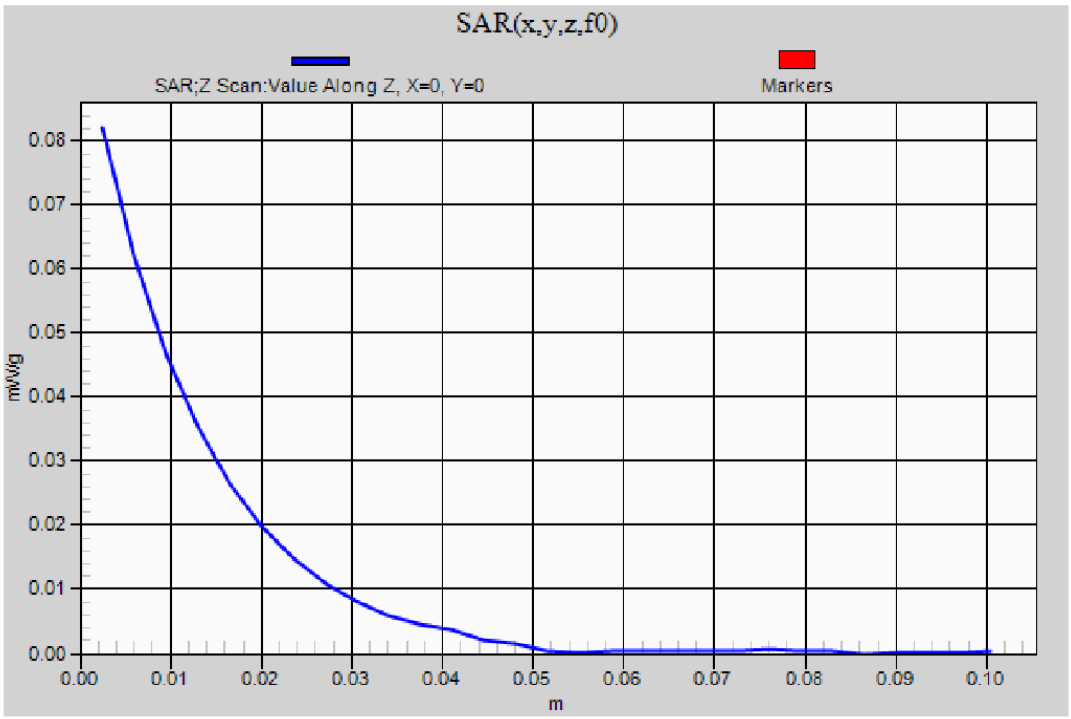
PCS

DUT: SUMSUNG; Type: NP-NC110; Serial: AZAE93KZC00036N

Communication System: GPRS 4 Slot; Frequency: 1880 MHz;Duty Cycle: 1:1.99986

Near By Person GPRS1900 Class 12/GPRS1900 4 Uplink_ch 661/Z Scan (1x1x29):

Measurement grid: dx=20mm, dy=20mm, dz=3.5mm
Maximum value of SAR (measured) = 0.082 mW/g



UMTS Band II Lap-held

Date/Time: 2/7/2011 6:48:35 PM

Test Laboratory: UL CCS

UMTS FDD II

DUT: SUMSUNG; Type: NP-NC110; Serial: AZAE93KZC00036N

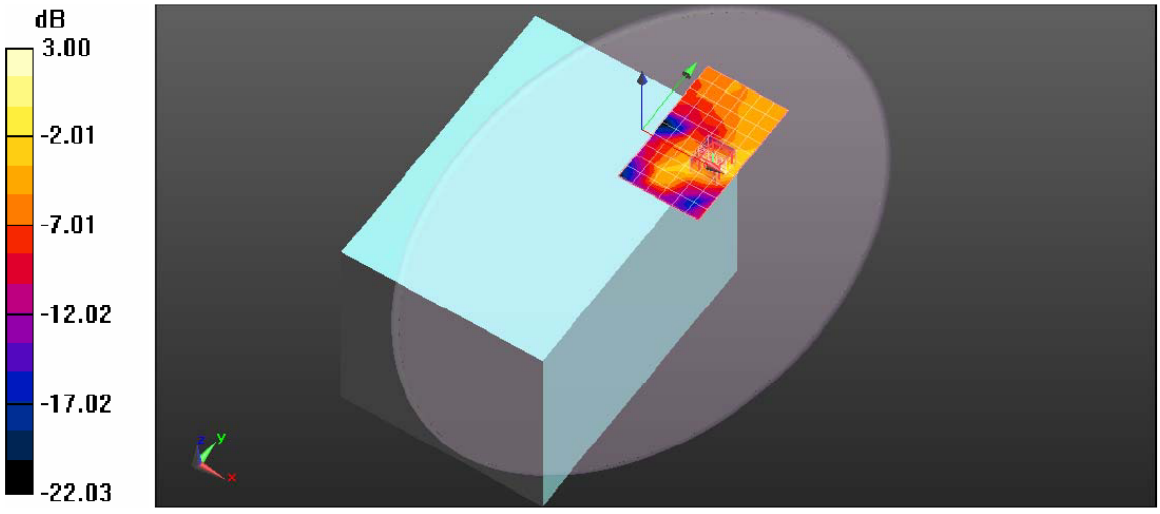
Communication System: UMTS FDD (WCDMA); Frequency: 1880 MHz;Duty Cycle: 1:2.18776
Medium parameters used: f = 1880 MHz; σ = 1.482 mho/m; ε_r = 52.322; ρ = 1000 kg/m^3
Phantom section: Flat Section

Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

DASY5 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(8.04, 8.04, 8.04); Calibrated: 2/23/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1239; Calibrated: 11/17/2010
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: xxxx
- Measurement SW: DASY52, Version 52.6 (1);SEMCAD X Version 14.4.2 (2595)

Lap-Held FDD II/FDD II RMC12.2kbps_ch 9400/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.013 mW/g

Lap-Held FDD II/FDD II RMC12.2kbps_ch 9400/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 3.027 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 0.024 W/kg
SAR(1 g) = 0.011 mW/g; SAR(10 g) = 0.00461 mW/g
Maximum value of SAR (measured) = 0.015 mW/g



0 dB = 0.015mW/g

UMTS Band II Nearby Person

Date/Time: 2/7/2011 8:07:52 PM

Test Laboratory: UL CCS

UMTS FDD II

DUT: SUMSUNG; Type: NP-NC110; Serial: AZAE93KZC00036N

Communication System: UMTS FDD (WCDMA); Frequency: 1880 MHz;Duty Cycle: 1:2.18776
Medium parameters used: f = 1880 MHz; σ = 1.482 mho/m; ε_r = 52.322; ρ = 1000 kg/m^3
Phantom section: Flat Section

Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

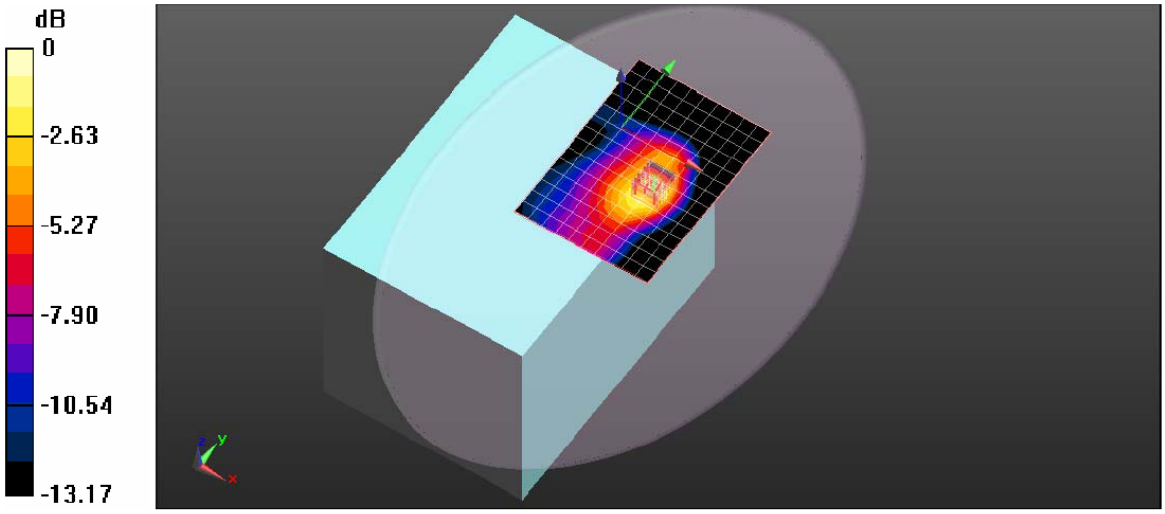
DASY5 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(8.04, 8.04, 8.04); Calibrated: 2/23/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1239; Calibrated: 11/17/2010
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: xxxx
- Measurement SW: DASY52, Version 52.6 (1);SEMCAD X Version 14.4.2 (2595)

Near By Person FDD II/FDD II RMC12.2kbps_ch 9400 2/Area Scan (11x15x1):

Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.840 mW/g

Near By Person FDD II/FDD II RMC12.2kbps_ch 9400 2/Zoom Scan (7x7x9)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 24.096 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 1.156 W/kg
SAR(1 g) = 0.701 mW/g; SAR(10 g) = 0.418 mW/g
Maximum value of SAR (measured) = 0.884 mW/g



0 dB = 0.880mW/g

UMTS Band II Z Plot Nearby Person

Date/Time: 2/7/2011 8:29:18 PM

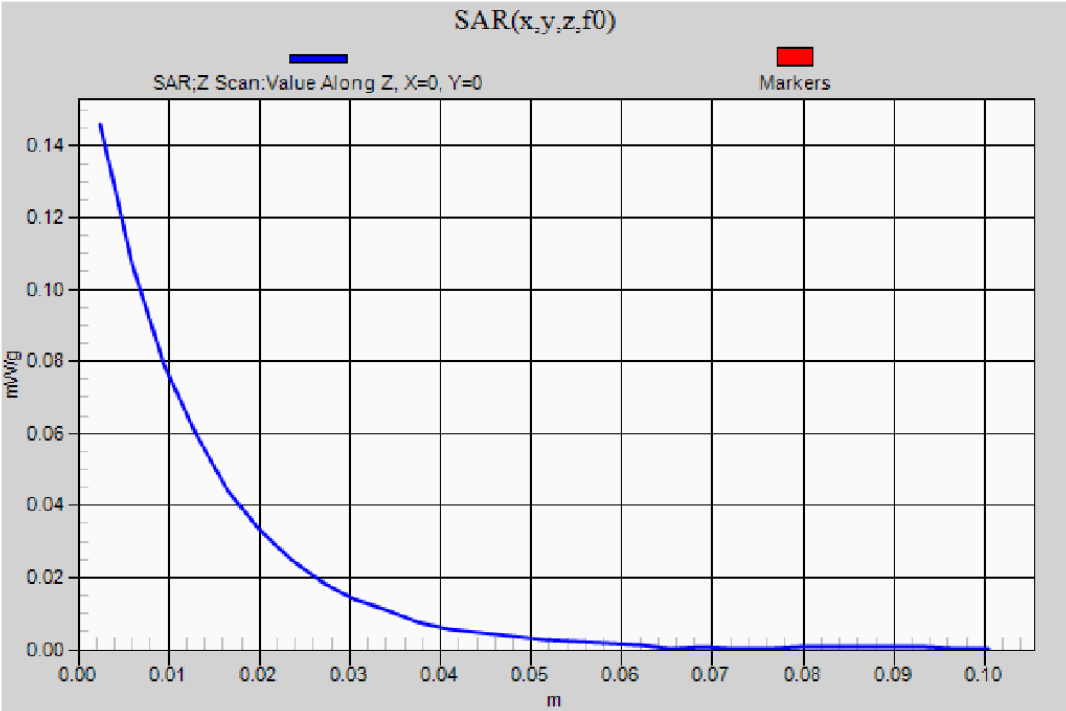
Test Laboratory: UL CCS

UMTS FDD II

DUT: SUMSUNG; Type: NP-NC110; Serial: AZAE93KZC00036N

Communication System: UMTS FDD (WCDMA); Frequency: 1880 MHz;Duty Cycle: 1:2.18776

Near By Person FDD II/FDD II RMC12.2kbps_ch 9400 2/Z Scan (1x1x29): Measurement grid: dx=20mm, dy=20mm, dz=3.5mm
Maximum value of SAR (measured) = 0.146 mW/g



14. ATTACHMENTS

No.	Contents	No. of page (s)
1	Certificate of E-Field Probe - EX3DV3 SN 3531	11
2	Certificate of System Validation Dipole - D835V2 SN:4d002	9
3	Certificate of System Validation Dipole - D1900V2 SN:5d043	9