FCC OET BULLETIN 65 SUPPLEMENT C

SAR EVALUATION REPORT

For

850/900/1800/1900MHZ GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA
MINI-PCIE WIRELESS WAN CARD
(Tested Inside Toshiba NB300)

MODEL: F3307
IMEI: 358830030002412

FCC ID: VV7-MBMF33071-T

REPORT NUMBER: 10U13160-3

ISSUE DATE: April 23, 2010

Prepared for

Ericsson AB
Mobile Broadband Modules
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Prepared by

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	April 23, 2010	Initial Issue	--

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	Ericsson AB Mobile Broadband Modules Lindholmspiren 11 Gothenburg, SE 417 56, Sweden
EUT DESCRIPTION:	850/900/1800/1900MHZ GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA MINI-PCIE WIRELESS WAN CARD. (Tested Inside Toshiba NB300)
MODEL NUMBER:	F3307
DEVICE CATEGORY:	Portable
EXPOSURE CATEGORY:	General Population/Uncontrolled Exposure
DATE TESTED:	April 22-21, 2010

FCC / IC Rule Parts	Frequency Range [MHz]	Highest 1-g SAR (mW/g)	Limit (mW/g)
22H / RSS-132	824 - 849	Body: 0.040	1.6
24E / RSS-133	1850 - 1910	Body: 0.051	

Applicable Standards	Test Results
FCC OET Bulletin 65 Supplement C 01-01 IC RSS 102 Issue 4	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. 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 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. 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 SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:

DEVIN CHANG
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC OET Bulletin 65 Supplement C 01-01, IC RSS 102 Issue 4 and the following specific FCC Test Procedures.

- KDB 447498 D01 Mobile Portable RF Exposure v04
- KDB 941225 D01 SAR test for 3G devices v02
- KDB 941225 D03 SAR Test Reduction GSM/GPRS/EDGE vo1
- KDB 616217 D03 SAR Supp Note and Netbook Laptop v01

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.

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due date		
				MM	DD	Year
Robot - Six Axes	Stäubli	RX90BL	N/A	N/A		
Robot Remote Control	Stäubli	CS7MB	3403-91535	N/A		
DASY4 Measurement Server	SPEAG	SEUMS001BA	1041	N/A		
Probe Alignment Unit	SPEAG	LB (V2)	261	N/A		
SAM Phantom (SAM1)	SPEAG	QD000P40CA	1185	N/A		
SAM Phantom (SAM2)	SPEAG	QD000P40CA	1050	N/A		
Oval Flat Phantom (ELI 4.0)	SPEAG	QD OVA001 B	1003	N/A		
Electronic Probe kit	HP	85070C	N/A	N/A		
S-Parameter Network Analyzer	Agilent	8753ES-6	MY40001647	11	22	2010
Signal Generator	Agilent	8753ES-6	MY40001647	11	22	2010
E-Field Probe	SPEAG	EX3DV3	3531	2	22	2011
Thermometer	ERTCO	639-1S	1718	5	1	2010
Data Acquisition Electronics	SPEAG	DAE3 V1	500	9	15	2010
System Validation Dipole	SPEAG	D835V2	4d002	4	22	2011
System Validation Dipole	SPEAG	D900V2	108	11	23	2011
System Validation Dipole	SPEAG	D1800V2	294	11	24	2011
System Validation Dipole	SPEAG	D1900V2	5d043	11	23	2011
System Validation Dipole	SPEAG	D2450V2	748	4	13	2011
System Validation Dipole	SPEAG	D5GHzV2	1075	9	3	2011
Amplifier	Mini-Circuits	ZVE-8G	90606	N/A		
Amplifier	Mini-Circuits	ZHL-42W	D072701-5	N/A		
Simulating Liquid	CCS	H1900	N/A	Within 24 hrs of first test		
Simulating Liquid	CCS	M1900	N/A	Within 24 hrs of first test		
Simulating Liquid	CCS	H1800	N/A	Within 24 hrs of first test		
Simulating Liquid	CCS	M1800	N/A	Within 24 hrs of first test		
Simulating Liquid	CCS	H835	N/A	Within 24 hrs of first test		
Simulating Liquid	CCS	M835	N/A	Within 24 hrs of first test		
Simulating Liquid	CCS	H900	N/A	Within 24 hrs of first test		
Simulating Liquid	CCS	M900	N/A	Within 24 hrs of first test		
Simulating Liquid	SPEAG	H2450	N/A	Within 24 hrs of first test		
Simulating Liquid	SPEAG	M2450	N/A	Within 24 hrs of first test		

Note: Per KDB 450824 D02 requirements for dipole calibration, CCS has adopted three 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 CCS)
4. Impedance is within 5Ω of calibrated measurement (test data on file in 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) @ Body 850 MHz	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	2.40	Normal	1	0.64	1.54
Liquid Permittivity - deviation from target	5.00	Rectangular	1.732	0.6	1.73
Liquid Permittivity - measurement	1.80	Normal	1	0.6	1.08
				Combined Standard Uncertainty Uc(y) =	9.63
				Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence = 19.25 %	
				Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence = 1.53 dB	

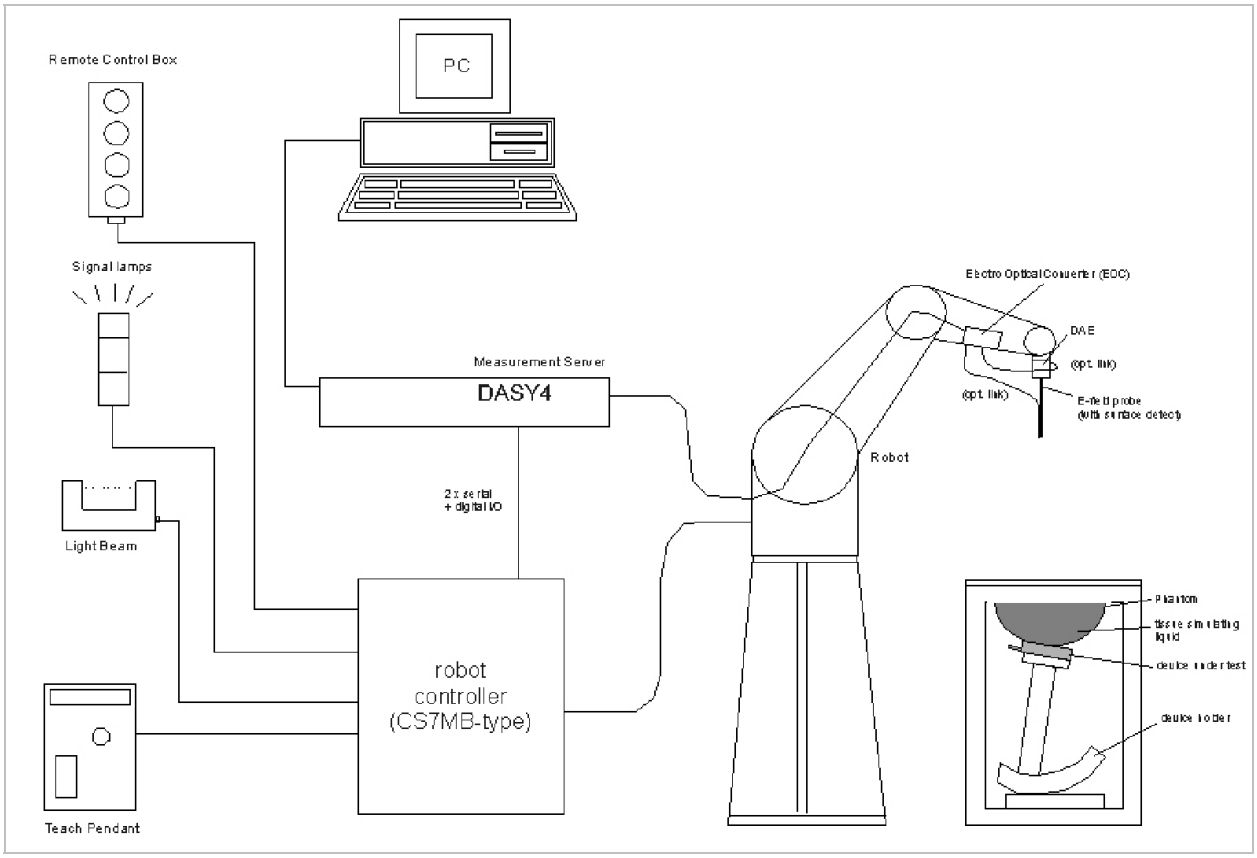
Measurement uncertainty for 300 MHz to 3 GHz averaged over 10 gram

Component	error, %	Probe Distribution	Divisor	Sensitivity	U (Xi), %
Measurement System					
Probe Calibration (k=1) @ 850 MHz	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	0.43	1.24
Liquid Conductivity - measurement	2.40	Normal	1	0.43	1.03
Liquid Permittivity - deviation from target	5.00	Rectangular	1.732	0.49	1.41
Liquid Permittivity - measurement uncertainty	1.80	Normal	1	0.49	0.88
				Combined Standard Uncertainty Uc(y), % =	9.39
				Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence = 18.77 %	
				Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence = 1.49 dB	

5. EQUIPMENT UNDER TEST

850/900/1800/1900MHZ GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA MINI-PCIE WIRELESS WAN CARD (Tested Inside Toshiba NB300)	
GPRS Multi-slot class:	Class 10
Normal operation:	Lap-held only SAR test with display open at 90° to the keyboard
Antenna tested:	Manufactured: Hitachi Part number: Main: HCG17-CP4
Antenna-to-user separation distances:	19 cm from 3G main antenna-to-user
Antenna-to-antenna separation distances:	7 cm from 3G main antenna-to-WiFi Main antenna 12 cm from 3G main antenna-to-WiFi Aux antenna
Simultaneous transmission:	3G can transmit simultaneously with WiFi
Assessment for SAR evaluation for Simultaneous transmission:	**3G and WiFi** Acc. to KDB 616217, simultaneous transmission SAR not required when ∑(SAR1g) < SAR limit, and antenna-to-antenna distances > 5 cm and antenna-to-user distance > 5 cm.

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. LIQUID PARAMETERS CHECK

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 just under 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 Phantom
(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)

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

In the current guidelines and draft standards for compliance testing of mobile phones (i.e., IEEE P1528, OET 65 Supplement C), the dielectric parameters suggested for head and body tissue simulating liquid are given only at 3.0 GHz and 5.8 GHz. As an intermediate solution, dielectric parameters for the frequencies between 5 to 5.8 GHz were obtained using linear interpolation (see table below).

SPEAG has developed suitable head and body tissue simulating liquids consisting of the following ingredients: de-ionized water, salt and a special composition including mineral oil and an emulgators. Dielectric parameters of these liquids were measured suing a HP 8570C Dielectric Probe Kit in conjunction with HP 8753ES Network Analyzer (30 kHz – 6G Hz). The differences with respect to the interpolated values were well within the desired ±5% for the whole 5 to 5.8 GHz range.

f (MHz)	Body Tissue		Reference
	rel. permitivity	conductivity	
3000	52.0	2.73	Standard
5100	49.1	5.18	Interpolated
5200	49.0	5.30	Interpolated
5300	48.9	5.42	Interpolated
5400	48.7	5.53	Interpolated
5500	48.6	5.65	Interpolated
5600	48.5	5.77	Interpolated
5700	48.3	5.88	Interpolated
5800	48.2	6.00	Standard

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

7.1. LIQUID CHECK RESULTS FOR 835 MHZ

Simulating Liquid Dielectric Parameters for Body 835 MHz

Room Ambient Temperature = 24°C; Relative humidity = 40% Measured by: Devin Chang

f (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
835	e'	56.19	Relative Permittivity (ϵ_r):	56.191	55.2	1.80	± 5
	e"	21.38	Conductivity (σ):	0.993	0.97	2.40	± 5
900	e'	55.49	Relative Permittivity (ϵ_r):	55.493	55.0	0.90	± 5
	e"	21.19	Conductivity (σ):	1.061	1.05	1.06	± 5

Liquid Check
Ambient temperature: 24 deg. C; Liquid temperature: 23 deg. C
April 20, 2010 09:58 AM

Frequency	e'	e"
790000000.	56.4894	21.6951
795000000.	56.4774	21.6568
800000000.	56.4245	21.6356
805000000.	56.4219	21.6019
810000000.	56.4079	21.5192
815000000.	56.3834	21.4839
820000000.	56.3676	21.4715
825000000.	56.3108	21.4313
830000000.	56.2488	21.4127
835000000.	**56.1914**	**21.3831**
840000000.	56.1578	21.3454
845000000.	56.0566	21.3051
850000000.	55.9992	21.2683
855000000.	55.9696	21.2790
860000000.	55.8913	21.2639
865000000.	55.8258	21.2687
870000000.	55.7566	21.2406
875000000.	55.7002	21.2633
880000000.	55.6616	21.2453
885000000.	55.5870	21.2614
890000000.	55.5230	21.2325
895000000.	55.4922	21.2285
900000000.	**55.4925**	**21.1936**
905000000.	55.4343	21.1757
910000000.	55.4291	21.1356
915000000.	55.4354	21.0846
920000000.	55.4074	21.0541
925000000.	55.3885	21.0014
930000000.	55.3866	20.9686
935000000.	55.3149	20.9741
940000000.	55.2717	20.9541

The conductivity (σ) can be given as:

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

where f = target f * 10^6

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

7.2. LIQUID CHECK RESULTS FOR 1900 MHZ

Simulating Liquid Dielectric Parameters for Body 1900 MHz

Room Ambient Temperature = 24°C; Relative humidity = 43% Measured by: Devin Chang

f (MHz)	Muscle Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
1900	e'	53.753	Relative Permittivity (ε_r):	53.7532	53.3	0.85	± 5
	e"	14.232	Conductivity (σ):	1.50436	1.52	-1.03	± 5

Liquid Check
Ambient temperature: 24 deg. C; Liquid temperature: 23 deg. C
April 21, 2010 09:14 AM

Frequency	e'	e"
1710000000.	54.4118	13.5844
1720000000.	54.3789	13.6179
1730000000.	54.3659	13.6491
1740000000.	54.3360	13.7090
1750000000.	54.3085	13.7307
1760000000.	54.2601	13.7753
1770000000.	54.2191	13.8029
1780000000.	54.1722	13.8243
1790000000.	54.1300	13.8609
1800000000.	54.0906	13.9031
1810000000.	54.0491	13.9500
1820000000.	54.0146	13.9884
1830000000.	53.9647	14.0225
1840000000.	53.9406	14.0610
1850000000.	53.9062	14.1042
1860000000.	53.8905	14.1249
1870000000.	53.8639	14.1637
1880000000.	53.8241	14.1866
1890000000.	53.7912	14.2174
1900000000.	**53.7532**	**14.2324**
1910000000.	53.7015	14.2664

The conductivity (σ) can be given as:

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

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

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

8. SYSTEM PERFORANCE CHECK

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 Body simulating liquid of the following parameters.
- The DASY4 system with an Isotropic E-Field Probe EX3DV4-SN: 3686 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 (2.4 GHz) fine cube was chosen for cube integration and Special 8x8x10 (5 GHz) fine cube was chosen for cube integration
- Distance between probe sensors and phantom surface was set to 3mm.
  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. due date	SAR Avg (mW/g)		
			Tissue:	Head	Body
D835V2	D835V2-4d002_Apr09	4/22/2011	SAR_{1g}:	9.64	9.96
			SAR_{10g}:	6.28	6.56
D1900V2	D1900V2-5d043_Nov09	11/23/2011	SAR_{1g}:	39.8	40.4
			SAR_{10g}:	20.7	21.4

8.1. SYSTEM CHECK RESULTS FOR D835V2

Ambient Temperature = 25°C; Relative humidity = 40% Measured by: Devin Chang

System validation dipole	Date Tested	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
		Tissue:	Body			
D835V2	04/20/10	SAR_{1g}:	10.1	9.96	1.41	±10
		SAR_{10g}:	6.63	6.56	1.07	

8.2. SYSTEM CHECK RESULTS FOR D1900V2

Ambient Temperature = 24°C; Relative humidity = 40% Measured by: Devin Chang

System validation dipole	Date Tested	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
		Tissue:	Body			
D1900V2	04/21/10	SAR_{1g}:	40.3	40.4	-0.25	±10
		SAR_{10g}:	21.2	21.4	-0.93	

s

System Check Plot for D835V2

Date/Time: 4/20/2010 10:14:58 AM

Test Laboratory: Compliance Certification Services

System Performance Check - D835V2

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

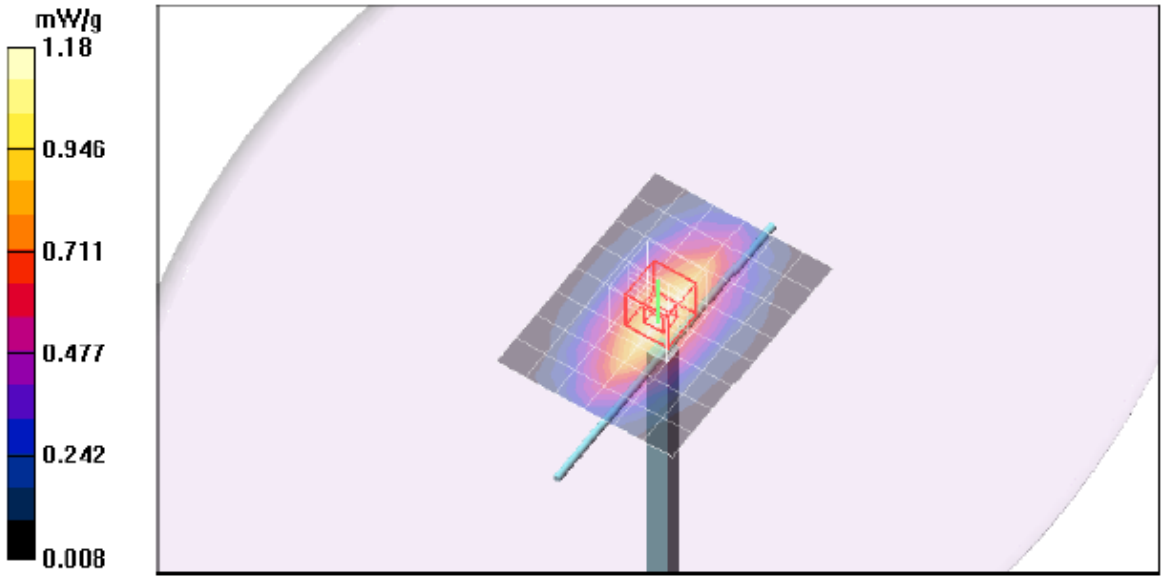
Communication System: CW 835; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.993 mho/m; ε_r = 56.2; ρ = 1000 kg/m^3
Phantom section: Flat Section

Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 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(10.18, 10.18, 10.18); Calibrated: 2/23/2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn500; Calibrated: 9/15/2009
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=15mm, Pin=100 mW/Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.18 mW/g

d=15mm, Pin=100 mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 34.7 V/m; Power Drift = -0.111 dB
Peak SAR (extrapolated) = 1.48 W/kg
SAR(1 g) = 1.01 mW/g; SAR(10 g) = 0.663 mW/g
Maximum value of SAR (measured) = 1.17 mW/g



System Check Z-Plot for D835V2

Date/Time: 4/20/2010 10:33:26 AM

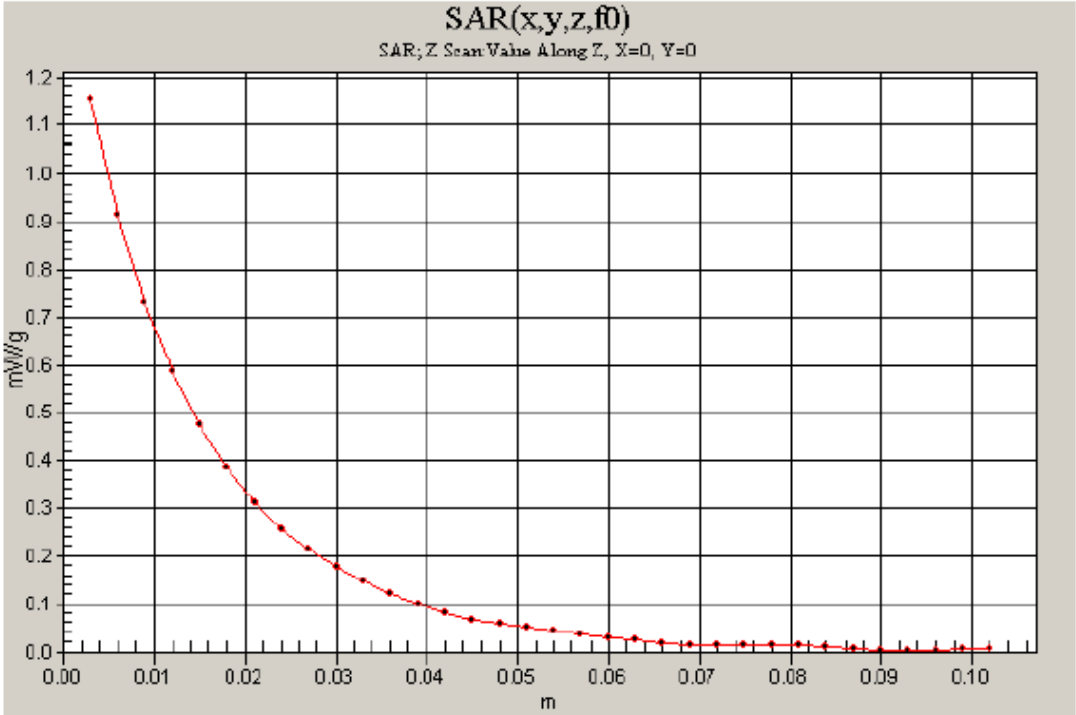
Test Laboratory: Compliance Certification Services

System Performance Check - D835V2

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

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

d=15mm, Pin=100 mW/Z Scan (1x1x34): Measurement grid: dx=20mm, dy=20mm, dz=3mm
Maximum value of SAR (measured) = 1.15 mW/g



System Check Plot for D1900V2

Date/Time: 4/21/2010 9:54:27 AM

Test Laboratory: Compliance Certification Services

System Performance Check - D1900V2

DUT: Dipole; Type: D1900V2; Serial: 5d043

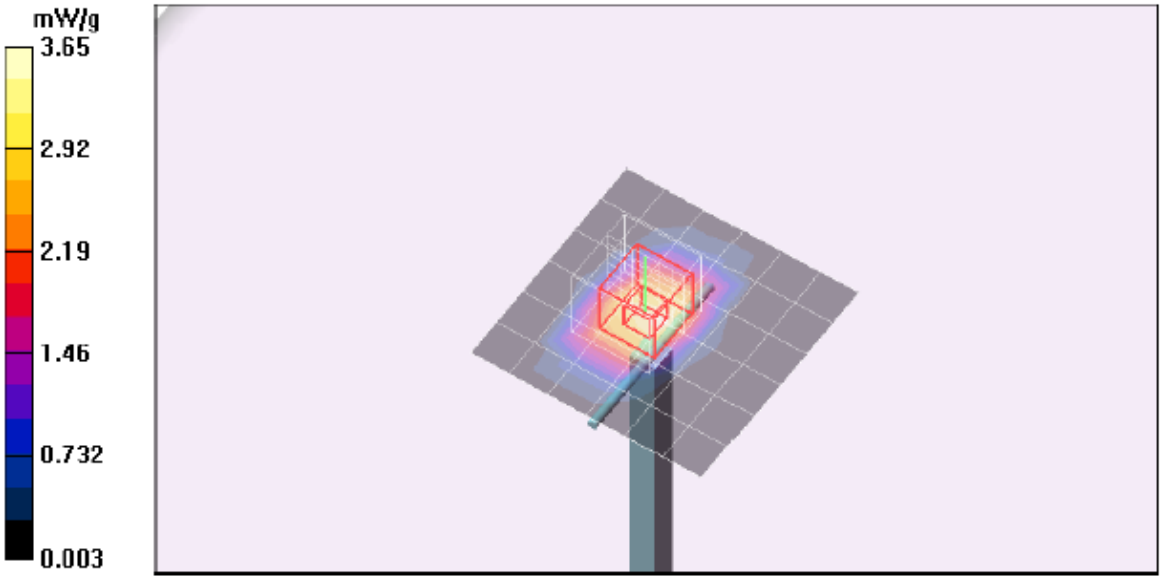
Communication System: System Check Signal - CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.5 mho/m; ε_r = 53.8; ρ = 1000 kg/m^3
Phantom section: Flat Section

Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 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(8.04, 8.04, 8.04); Calibrated: 2/23/2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn500; Calibrated: 9/15/2009
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=100mW/Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 3.65 mW/g

d=10mm, Pin=100mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.6 V/m; Power Drift = 0.101 dB
Peak SAR (extrapolated) = 7.29 W/kg
SAR(1 g) = 4.03 mW/g; SAR(10 g) = 2.12 mW/g
Maximum value of SAR (measured) = 5.12 mW/g



System Check Z-Plot for D1900V2

Date/Time: 4/21/2010 10:11:17 AM

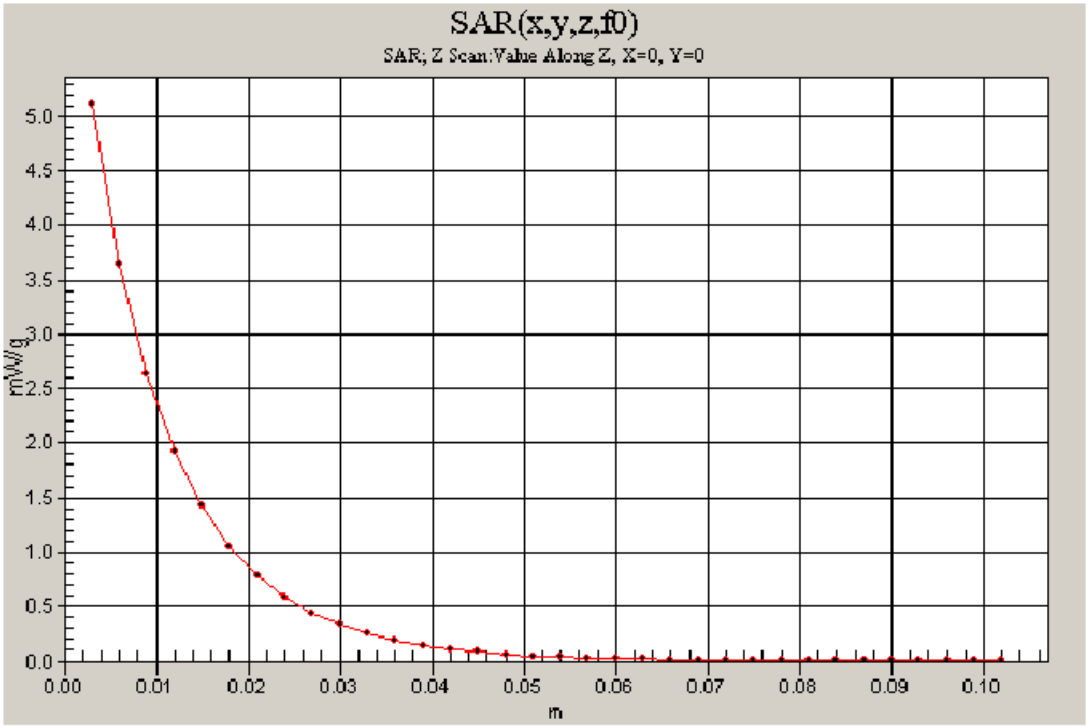
Test Laboratory: Compliance Certification Services

System Performance Check - D1900V2

DUT: Dipole; Type: D1900V2; Serial: 5d043

Communication System: System Check Signal - CW; Frequency: 1900 MHz;Duty Cycle: 1:1

d=10mm, Pin=100mW/Z Scan (1x1x34): Measurement grid: dx=20mm, dy=20mm, dz=3mm
Maximum value of SAR (measured) = 5.11 mW/g



9. OUTPUT POWER VERIFICATION

9.1. GSM850/1900

GPRS (GMSK) - Coding Scheme: CS1

Band	Ch No.	f (MHz)	Avg burst Pwr (dBm)			
			1 slot	Frame Avg Pwr	2 slot	Frame Avg Pwr
GSM850	128	824.2	32.50	23.50	32.40	26.40
	190	836.6	32.80	23.80	32.80	26.80
	251	848.8	32.70	23.70	32.70	26.70
GSM1900	512	1850.2	29.10	20.10	29.10	23.10
	661	1880	29.10	20.10	29.10	23.10
	810	1909.8	29.20	20.20	29.10	23.10

EGPRS (8PSK) - Coding Scheme: MCS5

Band	Ch No.	f (MHz)	Avg burst Pwr (dBm)			
			1 slot	Frame Avg Pwr	2 slot	Frame Avg Pwr
GSM850	128	824.2	27.60	18.60	27.60	21.60
	190	836.6	27.80	18.80	27.80	21.80
	251	848.8	27.70	18.70	27.50	21.50
GSM1900	512	1850.2	26.30	20.30	26.30	20.30
	661	1880	26.30	20.30	26.30	20.30
	810	1909.8	26.50	20.50	26.50	20.50

9.2. 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 6 HSDPA

Band	Mode	UL Ch No.	DL Ch No.	f (MHz)	Avg Tx Pwr (dBm)
UMTS850 (Band V)	R99 (12.2 kbps RMC)	4132	4357	826.4	23.60
		4175	4400	835.0	23.40
		4233	4458	846.6	23.60
UMTS1900 (Band II)	R99 (12.2 kbps RMC)	9262	9662	1852.4	23.20
		9400	9800	1880.0	23.70
		9538	9938	1907.6	23.60

9.3. 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	23.50
		4183	4408	836.6	23.40
		4233	4458	846.6	23.50
	Subtest 2	4132	4357	826.4	22.40
		4183	4408	836.6	22.30
		4233	4458	846.6	22.40
	Subtest 3	4132	4357	826.4	22.20
		4183	4408	836.0	22.10
		4233	4458	846.6	22.20
	Subtest 4	4132	4357	826.4	22.10
		4183	4408	836.4	22.10
		4233	4458	846.6	22.10
UMTS1900 (Band II)	Subtest 1	9262	9662	1852.4	23.20
		9400	9800	1880.0	23.50
		9538	9938	1907.6	23.40
	Subtest 2	9262	9662	1852.4	22.40
		9400	9800	1880.0	22.50
		9538	9938	1907.6	22.40
	Subtest 3	9262	9662	1852.4	21.80
		9400	9800	1880.0	21.50
		9538	9938	1907.6	21.30
	Subtest 4	9262	9662	1852.4	21.20
		9400	9800	1880.0	21.30
		9538	9938	1907.6	21.70

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.

9.4. UMTS Rel 6 HSPA (HSDPA & 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 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	23.40
		4182	4407	836.4	23.30
		4233	4458	846.6	23.40
	Subtest 2	4132	4357	826.4	21.50
		4182	4407	836.4	21.40
		4233	4458	846.6	21.60
	Subtest 3	4132	4357	826.4	22.16
		4182	4407	836.4	21.92
		4233	4458	846.6	22.12
	Subtest 4	4132	4357	826.4	21.66
		4182	4407	836.4	21.42
		4233	4458	846.6	21.62
	Subtest 5	4132	4357	826.4	23.30
		4182	4407	836.4	23.20
		4233	4458	846.6	23.30
UMTS1900 (Band II)	Subtest 1	9262	9662	1852.4	23.20
		9400	9800	1880.0	23.40
		9538	9938	1907.6	23.40
	Subtest 2	9262	9662	1852.4	21.20
		9400	9800	1880.0	21.20
		9538	9938	1907.6	20.90
	Subtest 3	9262	9662	1852.4	21.90
		9400	9800	1880.0	21.90
		9538	9938	1907.6	22.10
	Subtest 4	9262	9662	1852.4	21.30
		9400	9800	1880.0	21.10
		9538	9938	1907.6	21.50
	Subtest 5	9262	9662	1852.4	23.20
		9400	9800	1880.0	23.30
		9538	9938	1907.6	23.30

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.

10. SAR TEST RESULTS

10.1. GSM850/1900

Band	Mode	Ch No.	Freq. (MHz)	SAR (mW/g)	
				1-g	10-g
GSM850	GPRS 2 slots	128	824.2		
		190	836.6	**0.040**	**0.029**
		251	848.8		
GSM1900	GPRS 2 slots	512	1850.2		
		661	1880.0	0.036	0.025
		810	1909.8		

10.2. UMTS Band V/II

Band	Mode	UL Ch No.	DL Ch No.	Freq. (MHz)	SAR (mW/g)	
					1-g	10-g
Band V	R99 12.2kbps RMC	4132	4357	826.4		
		4183	4408	836.6	0.018	0.014
		4233	4458	846.6		
Band II	R99 12.2kbps RMC	9262	9662	1850.2		
		9400	9800	1880.0	**0.051**	**0.035**
		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.

11. WORST-CASE SAR TEST PLOTS

Worst-case SAR Plot for Part 22

Date/Time: 4/20/2010 11:13:16 AM

Test Laboratory: Compliance Certification Services

Laptop Mode

DUT: Toshiba; Type: NA; Serial: NA

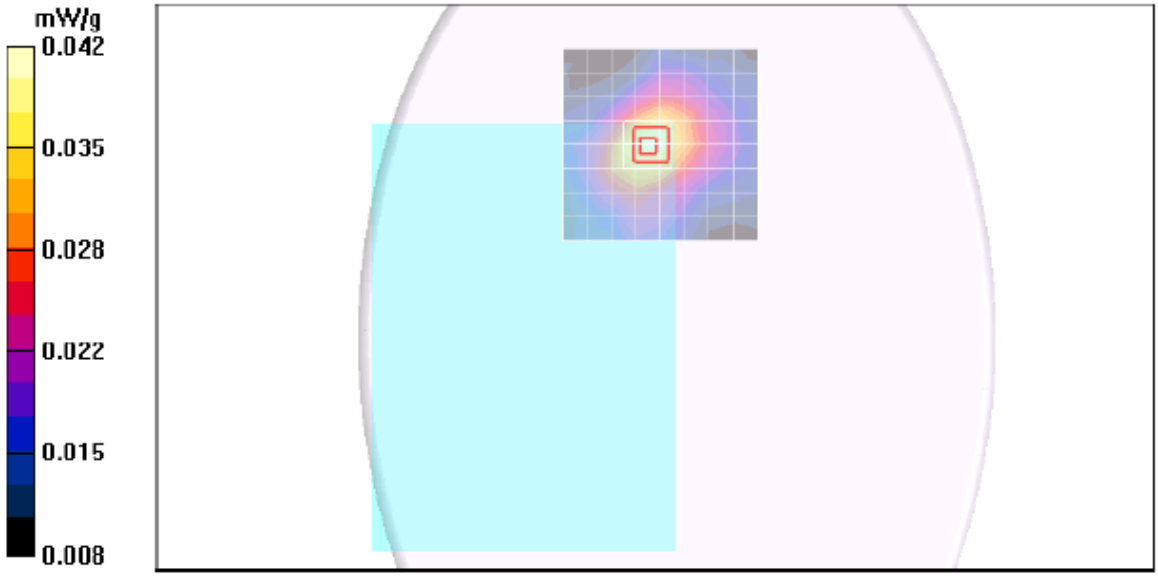
Communication System: GSM850; Frequency: 836.6 MHz;Duty Cycle: 1:4
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.995 mho/m; ε_r = 56.2; ρ = 1000 kg/m^3
Phantom section: Flat Section

Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 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(10.18, 10.18, 10.18); Calibrated: 2/23/2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn500; Calibrated: 9/15/2009
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

GPRS 850_2 slot_M ch/Area Scan (9x9x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.042 mW/g

GPRS 850_2 slot_M ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 6.48 V/m; Power Drift = 0.161 dB
Peak SAR (extrapolated) = 0.057 W/kg
SAR(1 g) = 0.040 mW/g; SAR(10 g) = 0.029 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.045 mW/g



Worst-case SAR Plot for Part 24

Date/Time: 4/21/2010 1:21:28 PM

Test Laboratory: Compliance Certification Services

Laptop Mode

DUT: Toshiba; Type: NA; Serial: NA

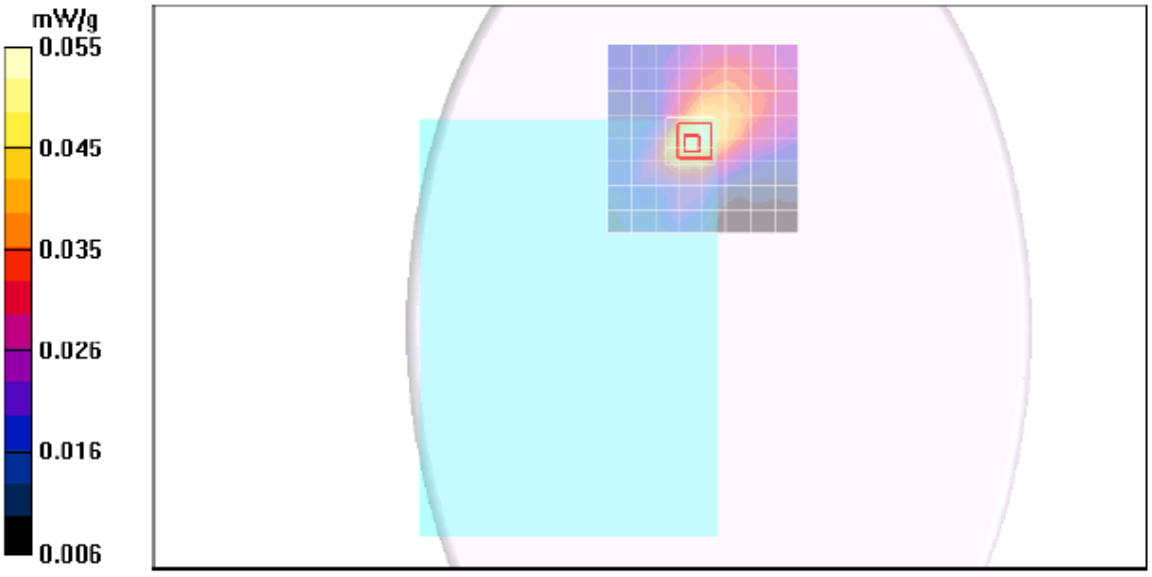
Communication System: PCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.48 mho/m; ε_r = 53.8; ρ = 1000 kg/m^3
Phantom section: Flat Section

Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 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(8.04, 8.04, 8.04); Calibrated: 2/23/2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn500; Calibrated: 9/15/2009
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

UMTS Band II_M ch/Area Scan (9x9x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.055 mW/g

UMTS Band II_M ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 6.12 V/m; Power Drift = 0.099 dB
Peak SAR (extrapolated) = 0.077 W/kg
SAR(1 g) = 0.051 mW/g; SAR(10 g) = 0.035 mW/g
Maximum value of SAR (measured) = 0.058 mW/g



12. ATTACHMENTS

No.	Contents	No. of page (s)
1	SAR Test Plots for GSM850 and 1900	4
2	Certificate of E-Field Probe – EX3DV3 SN3531	11
3	Certificate of System Validation Dipole - D835V2 SN:4d002	9
6	Certificate of System Validation Dipole - D1900V2 SN:5d043	9