FCC OET BULLETIN 65 SUPPLEMENT C

SAR EVALUATION REPORT / Part 22_24 CDMA Portion

For

USB MODEM

MODEL: AC250U

FCC ID: N7NAC250U

REPORT NUMBER: 09U12929-7, Revision C3

ISSUE DATE: May 05, 2010

Prepared for

SIERRA WIRELESS INC.

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CARLSBAD, CA 92008

Prepared by

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	December 21, 2009	Initial Issue	--
A	December 28, 2009	Correct some typos on cover page and page 5 with correct company name and address.	Sunny Shih
A1	April 22, 2010	Additional SAR for USB connector B (Horizontal-Up) with the device parallel with the phantom at 5 mm.	Sunny Shih
B	April 23, 2010	Updated client address	Aliza Zaffar
C	April 25, 2010	Revised based upon FCC comments	Sunny Shih
C1	April 26, 2010	Revised based upon FCC comments	Sunny Shih
C2	May 03, 2010	Revised based upon FCC comments: section 10 data for 2-1, 3-1 and 4-1 and statement under test setup picture #1	Sunny Shih
C3	May 05,2010	Added footnote on page 21 and statement is added to Page 30 photo.	Sunny Shih

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	SIERRA WIRELESS INC. 200 Faraday Avenue, Suite 150 CARLSBAD, CA 92008
EUT DESCRIPTION:	USB MODEM
MODEL NUMBER:	AC250U
DEVICE CATEGORY:	Portable
EXPOSURE CATEGORY:	General Population/Uncontrolled Exposure
DATE TESTED:	December 15 – 19, 2009 April 21, 2010 (Additional test position)

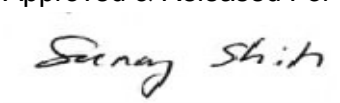
FCC Rule Parts	Frequency Range [MHz]	Highest 1-g SAR (mW/g)	Limit (mW/g)
22H	824 - 849	1.27 mW/g (USB Horizontal-down)	1.6
24E	1850 - 1910	1.54 mW/g (USB Horizontal-Up)	

Applicable Standards	Test Results
FCC OET Bulletin 65 Supplement C 01-01 and the following SAR test procedures: o KDB 941225 D01 SAR test for 3G devices o KDB 447498 D02 SAR Procedures for Dongle Xmtr v02	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.

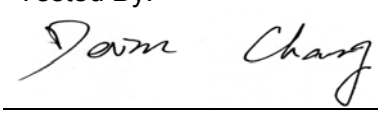
Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by CCS and all revisions are duly noted in the revisions section. Any alteration of this 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 and the following SAR test procedures:

- o KDB 941225 D01 SAR test for 3G devices v02
- o KDB 447498 D02 SAR Procedures for Dongle Xmtr v02

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	EX3DV4	3686	3	23	1010
E-Field Probe	SPEAG	EX3DV3	3531	2	22	1011
Thermometer	ERTCO	639-1S	1718	9	15	2010
Data Acquisition Electronics	SPEAG	DAE3 V1	500	10	20	2010
System Validation Dipole	SPEAG	D835V2	4d002	4	23	2011
System Validation Dipole	SPEAG	D1900V2	5d043	11	23	2011
ESG Vector Signal Generator	Agilent	E4438C	US44271090	9	17	2010
Amplifier	Mini-Circuits	ZVE-8G	90606	N/A		
Amplifier	Mini-Circuits	ZHL-42W	D072701-5	N/A		
Simulating Liquid	CCS	M1900	N/A	Within 24 hrs of first test		
Simulating Liquid	CCS	M835	N/A	Within 24 hrs of first test		

4.2. MEASUREMENT UNCERTAINTY

For December 15 – 19, 2009

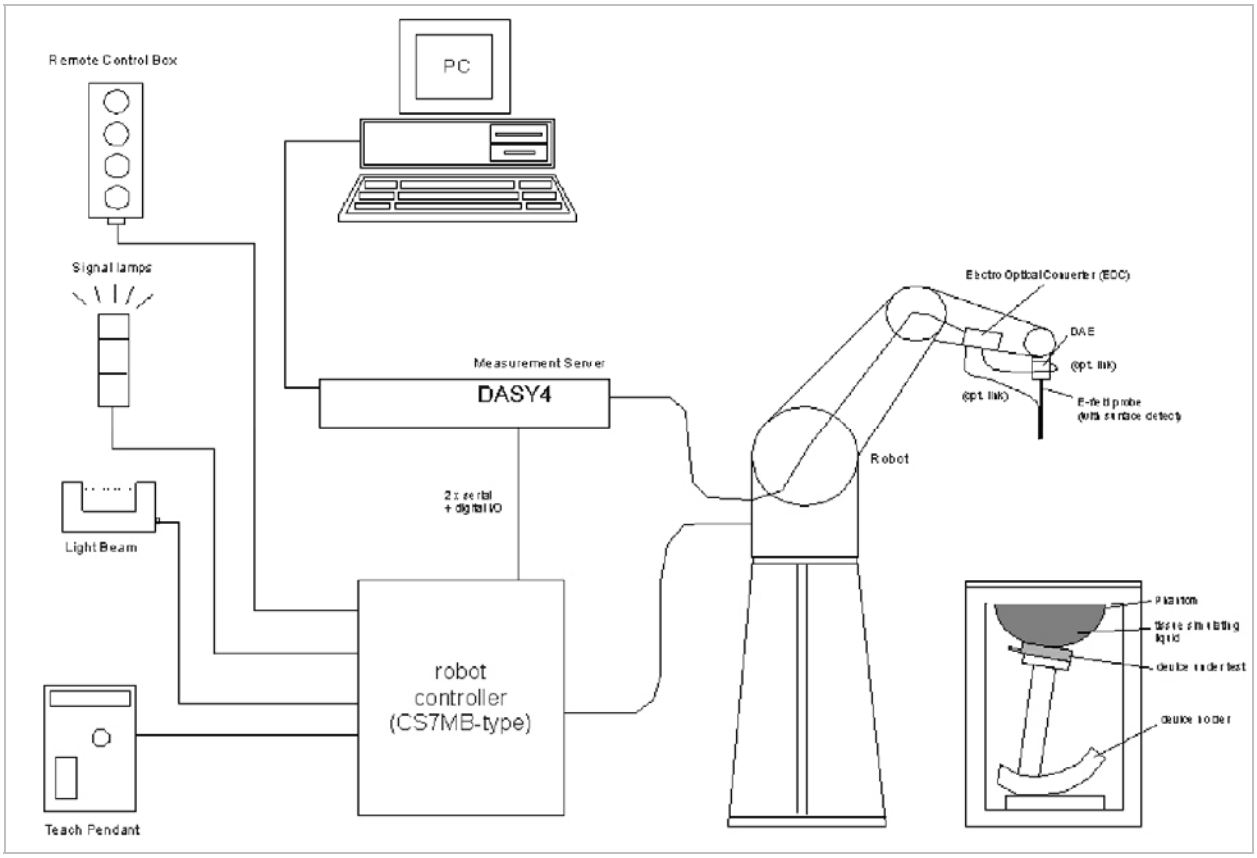
Measurement uncertainty for 300 MHz to 3 GHz averaged over 1 gram

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 @ 835 MHz	4.67	Normal	1	0.64	2.99
Liquid Permittivity - deviation from target	5.00	Rectangular	1.732	0.6	1.73
Liquid Permittivity - measurement @ 835 MHz	1.88	Normal	1	0.6	1.13
				Combined Standard Uncertainty Uc(y) =	9.97
				Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence = 19.93 %	
				Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence = 1.58 dB	

For April 21, 2010 (Additional test position)

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 @ 835 MHz	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 @ 835 MHz	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	

5. 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.

6. 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

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 Head and Body Phantom

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	0.8
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.9	55.2	0.97
900	41.5	0.97	55	1.05
915	41.5	0.98	55	1.06
1450	40.5	1.2	54	1.3
1610	40.3	1.29	53.8	1.4
1800 – 2000	40	1.4	53.3	1.52
2450	39.2	1.8	52.7	1.95
3000	38.5	2.4	52	2.73
5800	35.3	5.27	48.2	6

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

7.1. LIQUID CHECK RESULTS FOR 1900 MHZ

Simulating Liquid Dielectric Parameters for Body 1900 MHz
Room Ambient Temperature = 24°C; Relative humidity = 40% Measured by: Devin Chang

f (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
1900	e'	54.177	Relative Permittivity (ϵ_r):	54.1771	53.3	1.65	± 5
	e"	14.803	Conductivity (σ):	1.56466	1.52	2.94	± 5

Liquid Check
Ambient temperature: 24 deg. C; Liquid temperature: 23 deg. C
December 15, 2009 01:38 PM

Frequency	e'	e"
1710000000.	54.7712	14.1467
1720000000.	54.7493	14.1642
1730000000.	54.7294	14.2044
1740000000.	54.7029	14.2549
1750000000.	54.6678	14.3026
1760000000.	54.6495	14.3365
1770000000.	54.6143	14.3794
1780000000.	54.5668	14.4169
1790000000.	54.5394	14.4435
1800000000.	54.4948	14.4844
1810000000.	54.4675	14.5182
1820000000.	54.4388	14.5431
1830000000.	54.3962	14.5904
1840000000.	54.3540	14.6302
1850000000.	54.3143	14.6640
1860000000.	54.2833	14.6822
1870000000.	54.2559	14.7092
1880000000.	54.2218	14.7437
1890000000.	54.2008	14.7683
1900000000.	**54.1771**	**14.8029**
1910000000.	54.1386	14.8453

The conductivity (σ) can be given as:

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

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

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

Simulating Liquid Dielectric Parameters for Body 1900 MHz
Room Ambient Temperature = 24°C; Relative humidity = 43% Measured by: Devin Chang

f (MHz)	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 $f = \text{target } f * 10^6$

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

7.2. LIQUID CHECK RESULTS FOR 835 MHZ

Simulating Liquid Dielectric Parameters for Body 835MHz
Room Ambient Temperature = 24°C; Relative humidity = 40% Measured by: Devin Chang

f (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
835	e'	56.24	Relative Permittivity (ϵ_r):	56.237	55.2	1.88	± 5
	e"	21.86	Conductivity (σ):	1.015	0.97	4.67	± 5

Liquid Check
Ambient temperature: 24 deg. C; Liquid temperature: 23 deg. C
December 18, 2009 09:23 PM

Frequency	e'	e"
750000000.	57.1304	22.2632
755000000.	57.0875	22.1920
760000000.	57.0362	22.1400
765000000.	57.0055	22.1261
770000000.	56.9152	22.0856
775000000.	56.8152	22.0414
780000000.	56.7186	21.9637
785000000.	56.6856	21.9247
790000000.	56.6003	21.9087
795000000.	56.5270	21.8498
800000000.	56.4966	21.8436
805000000.	56.4693	21.8405
810000000.	56.4368	21.8679
815000000.	56.3867	21.8680
820000000.	56.3558	21.8579
825000000.	56.3302	21.8635
830000000.	56.2930	21.8618
835000000.	**56.2373**	**21.8567**
840000000.	56.2474	21.8203
845000000.	56.1789	21.7869
850000000.	56.1563	21.7285
855000000.	56.1392	21.6944
860000000.	56.1191	21.6533
865000000.	56.0699	21.6378
870000000.	56.0254	21.5579
875000000.	55.9966	21.5273
880000000.	55.9427	21.4894
885000000.	55.8579	21.4876
890000000.	55.8050	21.4547
895000000.	55.7502	21.4016
900000000.	55.6979	21.3957

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 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 21, 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

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

8. 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 EX3DV4 SN3686 and an Isotropic E-Field Probe EX3DV3 SN3531 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 250 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	4/23/10	SAR_{1g}:	9.64	9.96
			SAR_{10g}:	6.28	6.56
D1900V2	D1900V2_5d043_Nov09	11/24/10	SAR_{1g}:	39.8	40.4
			SAR_{10g}:	20.7	21.4

8.1. 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}:	41.7	40.4	3.22	±10
		SAR_{10g}:	21.8	21.4	1.87	

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	

8.2. 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	12/18/10	SAR_{1g}:	10.6	9.96	6.43	±10
		SAR_{10g}:	6.92	6.56	5.49	

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	04/21/10	SAR_{1g}:	10.1	9.96	1.41	±10
		SAR_{10g}:	6.63	6.56	1.07	

9. OUTPUT POWER VERIFICATION

Maximum output power is verified on the Low, Middle and High channels according to procedures in section 4.4.5.2 of 3GPP2 C.S0011/TIA-98-E for 1xRTT, section 3.1.2.3.4 of 3GPP2 C.S0033-0/TIA-866 for Rel. 0 and section 4.3.4 of 3GPP2 C.S0033-A for Rev. A

9.1. CDMA2000 1xRTT

This procedure assumes the Agilent 8960 Test Set has the following applications installed and with valid license.

Application	Rev, License
CDMA2000 Mobile Test	B.13.08, L

- Protocol Rev > 6 (IS-2000-0)
- Radio Config (RC) > Please see following table or details
- FCH Service Option (SO) Setup > Please see following table or details
- Traffic Data Rate > Full
- TDSO SCH Info > F-SCH Parameters > F-SCH Data Rate > 153.6 kbps
  > R-SCH Parameters > R-SCH Data Rate > 153.6 kbps
- Rvs Power Ctrl > Active bits
  - Rvs Power Ctrl > All Up bits (Maximum TxPout)

RF Output Power for Cellular Band

Radio Configuration (RC)	Service Option (SO)	Conducted Output Power (dBm)					
		Ch. 1013 / 824.7 MHz		Ch. 384 / 836.52 MHz		Ch. 777 / 848.31 MHz	
		Average	Peak	Average	Peak	Average	Peak
RC1	2 (Loopback)	23.74		23.80		23.72	
	55 (Loopback)	24.16		24.15		23.75	
RC2	9 (Loopback)	23.57		23.77		23.71	
	55 (Loopback)	23.65		23.80		23.74	
RC3	2 (Loopback)	23.50		23.83		23.67	
	55 (Loopback)	23.56		23.80		23.70	
	32 (Test Data)	23.50		23.85		23.67	
RC4	2 (Loopback)	23.47		23.87		23.70	
	55 (Loopback)	23.56		23.89		23.69	
	32 (Test Data)	23.65		23.82		23.70	
RC5	9 (Loopback)	23.56		23.85		23.69	
	55 (Loopback)	23.58		23.79		23.70	

RF Output Power for PCS Band

Radio Configuration (RC)	Service Option (SO)	Conducted Output Power (dBm)					
		Ch. 25 / 1851.25 MHz		Ch. 600 / 1880 MHz		Ch. 1175 / 1908.75 MHz	
		Average	Peak	Average	Peak	Average	Peak
RC1	2 (Loopback)	24.08		24.00		24.00	
	55 (Loopback)	24.32		24.34		24.32	
RC2	9 (Loopback)	24.05		24.20		24.30	
	55 (Loopback)	24.03		24.15		24.30	
RC3	2 (Loopback)	24.18		24.20		24.25	
	55 (Loopback)	24.20		24.12		24.30	
	32 (Test Data)	24.00		24.10		24.25	
RC4	2 (Loopback)	24.20		24.10		24.30	
	55 (Loopback)	24.03		24.08		24.30	
	32 (Test Data)	24.19		24.15		24.26	
RC5	9 (Loopback)	24.15		24.20		24.30	
	55 (Loopback)	24.13		24.10		24.30	

9.2. CDMA200 1xEv-Do

9.2.1. Release 0

This procedure assumes the Agilent 8960 Test Set has the following applications installed and with valid license.

EVDO Release 0 - RTAP

- Call Setup > Shift & Preset
- Call Control:
  - Access Network Info > Cell Parameters > Sector ID > 00000000 > Subnet Mask > 0
  - Generator Info > Termination Parameters > Max Forward Packet Duration > 16 Slots
- Call Parms:
  - Cell Power > -105.5 dBm/1.23 MHz
  - Cell Band > (Select US Cellular or US PCS)
  - Channel > (Enter channel number)
  - Application Config > Enhanced Test Application Protocol > RTAP
  - RTAP Rate > 153.6 kbps
  - Rvs Power Ctrl > Active bits
  - Protocol Rel > 0 (1xEV-DO)
- Press “Start Data Connection” when “Session Open” appear in “Active Cell”
- Rvs Power Ctrl > All Up bits (Maximum TxPout)

EVDO Release 0 - FTAP

- Call Setup > Shift & Preset
- Call Control:
  - Access Network Info > Cell Parameters > Sector ID > 00000000 > Subnet Mask > 0
  - Generator Info > Termination Parameters > Max Forward Packet Duration > 16 Slots
- Call Parms:
  - Cell Power > -105.5 dBm/1.23 MHz
  - Cell Band > (Select US Cellular or US PCS)
  - Channel > (Enter channel number)
  - Application Config > Enhanced Test Application Protocol > FTAP (default)
  - FTAP Rate > 307.2 kbps (2 Slot, QPSK)
  - Rvs Power Ctrl > Active bits
  - Protocol Rel > 0 (1xEV-DO)
- Press “Start Data Connection” when “Session Open” appear in “Active Cell”
- Rvs Power Ctrl > All Up bits (Maximum TxPout)

RF Power Output for EV-DO Rel 0

Band	FTAP Rate	RTAP Rate	Channel	f (MHz)	Conducted power (dBm)	
					Average	Peak
Cellular	307.2 kbps (2 slot, QPSK)	153.6 kbps	1013	824.70	23.60	
			384	836.52	23.78	
			777	848.31	23.85	
PCS	307.2 kbps (2 slot, QPSK)	153.6 kbps	25	1851.25	24.15	
			600	1880.00	24.18	
			1175	1908.75	24.25	

9.2.2. Revision A

This procedure assumes the Agilent 8960 Test Set has the following applications installed and with valid license.

Application	Rev, License
1xEV-DO Terminal Test	A.09.13

EVDO Release A – RETAP

- Call Setup > Shift & Preset
- Cell Power > -60 dBm/1.23 MHz
- Protocol Rev > A (1xEV-DO-A)
- Application Config > Enhanced Test Application Protocol > RETAP
- R-Data Pkt Size > 4096
- Protocol Subtype Config > Release A Physical Layer Subtype > Subtype 2 > PL Subtype 2 Access Channel MAC Subtype > Default (Subtype 0)
- Access Network Info > Cell Parameters > Sector ID > 00000000 > Subnet Mask > 0
- Generator Info > Termination Parameters > Max Forward Packet Duration >16 Slots > ACK R-Data After > Subpacket 0 (All ACK)
- Rvs Power Ctrl > All Up bits (to get the maximum power)

EVDO Release A - FETAP

- Call Setup > Shift & Preset
- Cell Power > -60 dBm/1.23 MHz
- Protocol Rev > A (1xEV-DO-A)
- Application Config > Enhanced Test Application Protocol > FETAP
- F-Traffic Format > 4 (1024, 2,128) Canonical (307.2k, QPSK)
- Protocol Subtype Config > Release A Physical Layer Subtype > Subtype 2 > PL Subtype 2 Access Channel MAC Subtype > Default (Subtype 0)
- Access Network Info > Cell Parameters > Sector ID > 00000000 > Subnet Mask > 0
- Generator Info > Termination Parameters > Max Forward Packet Duration >16 Slots > ACK R-Data After > Subpacket 0 (All ACK)
- Rvs Power Ctrl > All Up bits (to get the maximum power)

Band	FETAP Traffic Format	RETAP Data Payload Size	Channel	f (MHz)	Conducted power (dBm)	
					Average	Peak
Cellular	307.2k, QPSK/ ACK channel is transmitted at all the slots	4096	1013	824.70	23.70	
			384	836.52	24.00	
			777	848.31	23.98	
PCS	307.2k, QPSK/ ACK channel is transmitted at all the slots	4096	25	1851.25	24.40	
			600	1880.00	24.30	
			1175	1908.75	24.45	

10. SUMMARY OF TEST RESULTS

1_HORIZONTAL-UP / Connector A / Side B faced phantom / Setup Picture #1

(A)
Horizontal-Up Inserted into laptop.

Band	Mode	Test position	Ch No.	f (MHz)	SAR (mW/g)	
					1-g	10-g
PCS	EV-DO Rev A	Horizontal-up 150º Degrees	25	1851.25	1.40	0.735
			600	1880.00	**1.54***	0.803
			1175	1908.75	1.29	0.672
Cellular	EV-DO Rev A	Horizontal-up 150º Degrees	1013	824.70	0.895	0.563
			384	836.52	1.06	0.670
			777	848.31	1.11	0.693

* Note: Based upon the tune up procedure as documented in the filing, the max. output power tuned at factory will be 23 dBm for Cellular and PCS band. Tolerance of +/- 1 dB is expected at System Functional Test set point. For EVDO Rev A, channel 600, the output power is 24.3 dBm/Average which is higher than the maximum tune-up range of 24 dBm. The measured SAR value is in compliance by taking into the power tolerance into the consideration for the production units.

2-1_HORIZONTAL-DOWN/ Connector B/Side A faced phantom / Test Setup Picture #2

(B)
Horizontal-Down With USB cable. Due to the 150 degree operation, this test position to evaluate the 5 mm distance to the closest point of EUT dongle. ***This test position was chosen voluntarily and was not required by KDB 447498 D02.***

Band	Mode	Test position	Ch No.	f (MHz)	SAR (mW/g)	
					1-g	10-g
PCS	EV-DO Rev A	Horizontal-down 150º Degrees	25	1851.25		
			600	1880.00	0.705	0.388
			1175	1908.75		
Cellular	EV-DO Rev A	Horizontal-down 150º Degrees	1013	824.70		
			384	836.52	0.736	0.427
			777	848.31		

2-2_HORIZONTAL-DOWN/Connector B/ Side A parallel and faced phantom with 5 mm distance/Setup Picture #3

(B)

Horizontal-Down With USB cable

Band	Mode	Test position	Ch No.	f (MHz)	SAR (mW/g)	
					1-g	10-g
PCS	EV-DO Rev A	Horizontal-down 150° Degrees	25	1851.25	1.40	0.80
			600	1880.00	1.40	0.81
			1175	1908.75	1.26	0.74
Cellular	EV-DO Rev A	Horizontal-down 150° Degrees	1013	824.70	1.02	0.70
			384	836.52	1.22	0.83
			777	848.31	**1.27**	0.13

3-1_VERTICAL-FRONT/Connector C/ Side A faced phantom /Setup Picture #4

(C)
Vertical-Front

With USB cable. Due to the 150 degree operation, this test position to evaluate the 5 mm distance to the closest point of EUT dongle. ***This test position was chosen voluntarily and was not required by KDB 447498 D02.***

Band	Mode	Test position	Ch No.	f (MHz)	SAR (mW/g)	
					1-g	10-g
PCS	EV-DO Rev A	Vertical-front (Face UP)	25	1851.25	0.87	0.485
			600	1880.00	0.87	0.474
			1175	1908.75	0.88	0.471
Cellular	EV-DO Rev A	Vertical-front (Face UP)	1013	824.70		
			384	836.52	0.747	0.432
			777	848.31		

3-2_VERTICAL-FRONT/ Connector C/Edge B faced to phantom /Setup Picture #5

With USB cable

Band	Mode	Test position	Ch No.	f (MHz)	SAR (mW/g)	
					1-g	10-g
PCS	EV-DO Rev A	Vertical-front (Face Left)	25	1851.25		
			600	1880.00	0.176	0.110
			1175	1908.75		
Cellular	EV-DO Rev A	Vertical-front (Face Left)	1013	824.70		
			384	836.52	0.265	0.163
			777	848.31		

4-1_VERTICAL-BACK/ Connector D/Side B faced phantom /Setup Picture #6

(D)

Vertical-Back Inserted into laptop. Due to the 150 degree operation, this test position to evaluate the 5 mm distance to the closest point of EUT dongle. ***This test position was chosen voluntarily and was not required by KDB 447498 D02.***

Band	Mode	Test position	Ch No.	f (MHz)	SAR (mW/g)	
					1-g	10-g
PCS	EV-DO Rev A	Vertical-back 150º Degrees	25	1851.25	1.25	0.640
			600	1880.00	1.41	0.713
			1175	1908.75	1.21	0.609
Cellular	EV-DO Rev A	Vertical-back 150º Degrees	1013	824.70		
			384	836.52	0.795	0.487
			777	848.31		

4-2_VERTICAL-BACK/Connector D/Edge A faced phantom /Setup Picture #7

Band	Mode	Test position	Ch No.	f (MHz)	SAR (mW/g)	
					1-g	10-g
PCS	EV-DO Rev A	Vertical-back (Face Right)	25	1851.25		
			600	1880.00	0.211	0.115
			1175	1908.75		
Cellular	EV-DO Rev A	Vertical-back (Face Right)	1013	824.70		
			384	836.52	0.15	0.102
			777	848.31		

11. WORST-CASE SAR TEST PLOTS

WORST-CASE SAR PLOT for Part 22H

Date/Time: 4/22/2010 1:09:39 AM

Test Laboratory: Compliance Certification Services

Horizontal down_150 deg

DUT: Sierra Wireless; Type: AC250; Serial: Unit # 1

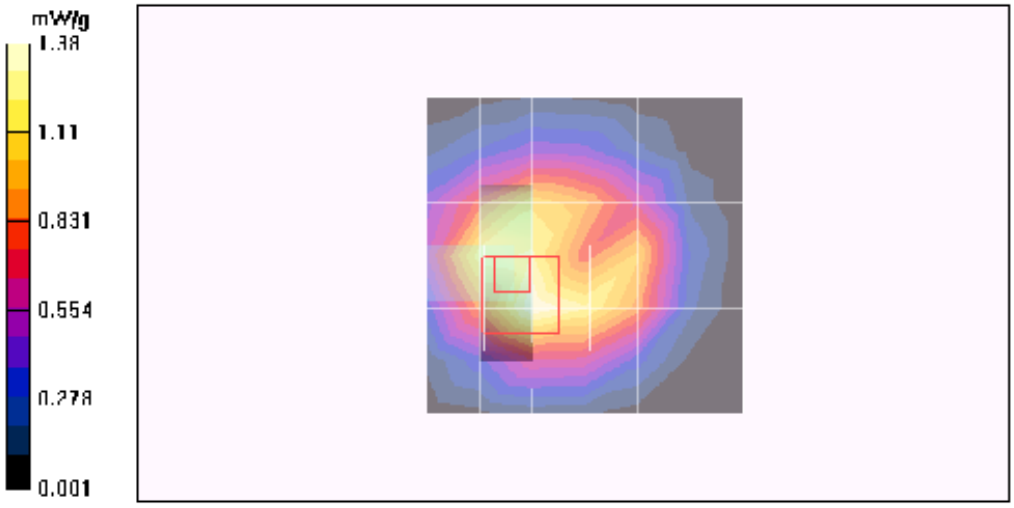
Communication System: CDMA; Frequency: 848.31 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 848.31 MHz; σ = 1 mho/m; ε_r = 56; ρ = 1000 kg/m^3
Phantom section: Flat Section

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:XXXX
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

High-ch/Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.38 mW/g

High-ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 36.6 V/m; Power Drift = 0.133 dB
Peak SAR (extrapolated) = 1.89 W/kg
SAR(1 g) = 1.27 mW/g; SAR(10 g) = 0.883 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.42 mW/g



WORST-CASE SAR PLOT for Part 24E

Date/Time: 12/15/2009 7:33:48 PM

Test Laboratory: Compliance Certification Services

4_Horizontal up_150 deg_121509

DUT: Sierra Wireless; Type: AC250; Serial: Unit # 1

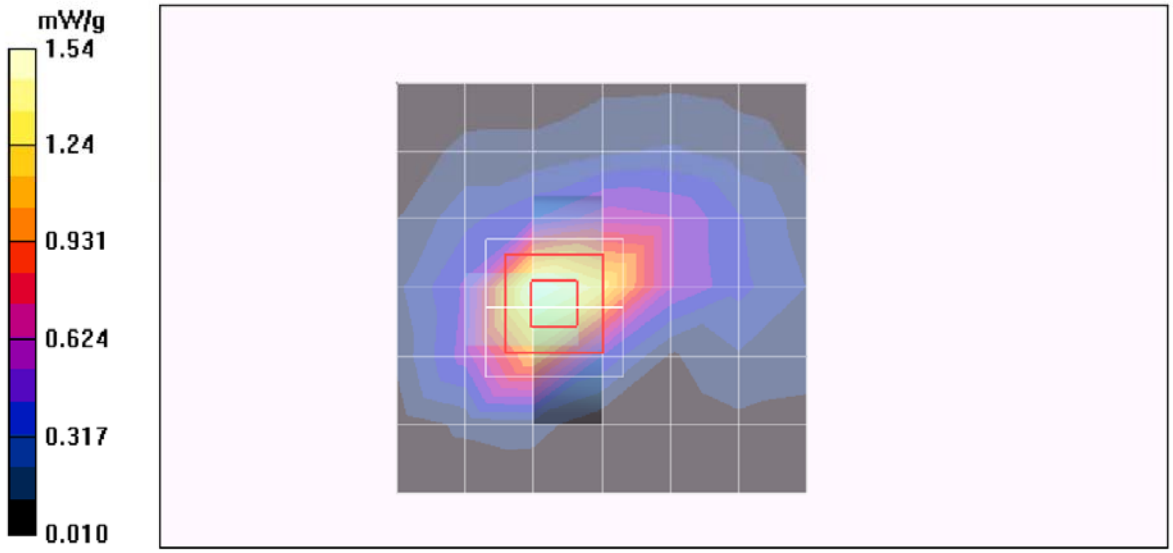
Communication System: CDMA; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.54 mho/m; ε_r = 54.2; ρ = 1000 kg/m^3
Phantom section: Flat Section

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: EX3DV4 - SN3686; ConvF(6.85, 6.85, 6.85); Calibrated: 3/23/2009
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn500; Calibrated: 9/15/2009
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:XXXX
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mid-ch/Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.54 mW/g

Mid-ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 32.4 V/m; Power Drift = 0.480 dB
Peak SAR (extrapolated) = 2.65 W/kg
SAR(1 g) = 1.54 mW/g; SAR(10 g) = 0.803 mW/g
Maximum value of SAR (measured) = 1.94 mW/g



12. ATTACHMENTS

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