



**FCC OET BULLETIN 65 SUPPLEMENT C  
CLASS II PERMISSIVE CHANGE  
SAR EVALUATION REPORT  
(Part 22 & 24)**

*For*

**PCA, EVDO MINI-PCI EXPRESS CARD CDMA MODEM**

**MODEL NUMBER: MC5728V**

**FCC ID: N7N-MC5728**

**REPORT NUMBER: 10U13330-3, Revision A**

**ISSUE DATE: NOVEMBER 9, 2010**

*Prepared for*

**SIERRA WIRELESS INC.  
2200 FARADAY AVE. STE. 150  
CARLSBAD, CA 92008**

*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

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--	October 26, 2010	Initial Issue	--
A	November 9, 2010	Revised model number	A. Zaffar

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# 1. ATTESTATION OF TEST RESULTS

Applicant name:	SIERRA WIRELESS INC. 200 Faraday Avenue, Suite 150 CARLSBAD, CA 92008
EUT description:	PCA, EVDO MINI-PCI EXPRESS CARD CDMA MODEM
Model number:	MC5728V
Device category:	Portable
Exposure category:	General Population/Uncontrolled Exposure
Date tested:	September 2 -3 and 20, 2010

FCC Rule Parts	Freq. Range [MHz]	The Highest 1-g SAR mW/g	Limit (mW/g)
22H	824 - 849	1.17 (Top position)	1.6
24E	1850 - 1910	0.599 (Top position)	

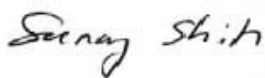
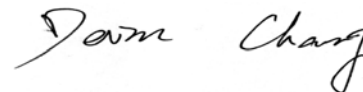
Applicable Standards	Test Results
FCC OET Bulletin 65 Supplement C 01-01 and the following test procedures: - KDB 447498 Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies - KDB 941225 D01 SAR test for 3G devices v02	Pass

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 UL CCS By:

Tested By:

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

Devin Chang  
 EMC 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 01-01, and the following specific FCC Test Procedures.

- KDB 648474 D01 SAR Handsets Multi Xmitter and Ant, v01r05
- KDB 941225 D01 SAR test for 3G devices v02

## 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
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		
Dielectric 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	3531	3	22	2011
Thermometer	ERTCO	639-1S	1718	7	19	2011
Data Acquisition Electronics	SPEAG	DAE3 V1	500	9	15	2010
Data Acquisition Electronics	SPEAG	DAE3 V1	427	7	21	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	5	13	2012
Power Sensor	Giga-tronics	80701A	1834588	5	13	2012
Power Meter	Boonton	4541	12414	2	26	2011
Power Sensor	Boonton	57006	6871	2	23	2011
Amplifier	Mini-Circuits	ZVE-8G	90606	N/A		
Amplifier	Mini-Circuits	ZHL-42W	D072701-5	N/A		
Simulating Liquid	SPEAG	M1900	N/A	Within 24 hrs of first test		
Simulating Liquid	SPEAG	M835	N/A	Within 24 hrs of first test		

**Note:** Per KDB 450824 D02 requirements for dipole calibration, UL 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 UL CCS)
4. Impedance is within 5Ω of calibrated measurement (test data on file in UL CCS )

## 4.2. MEASUREMENT UNCERTAINTY

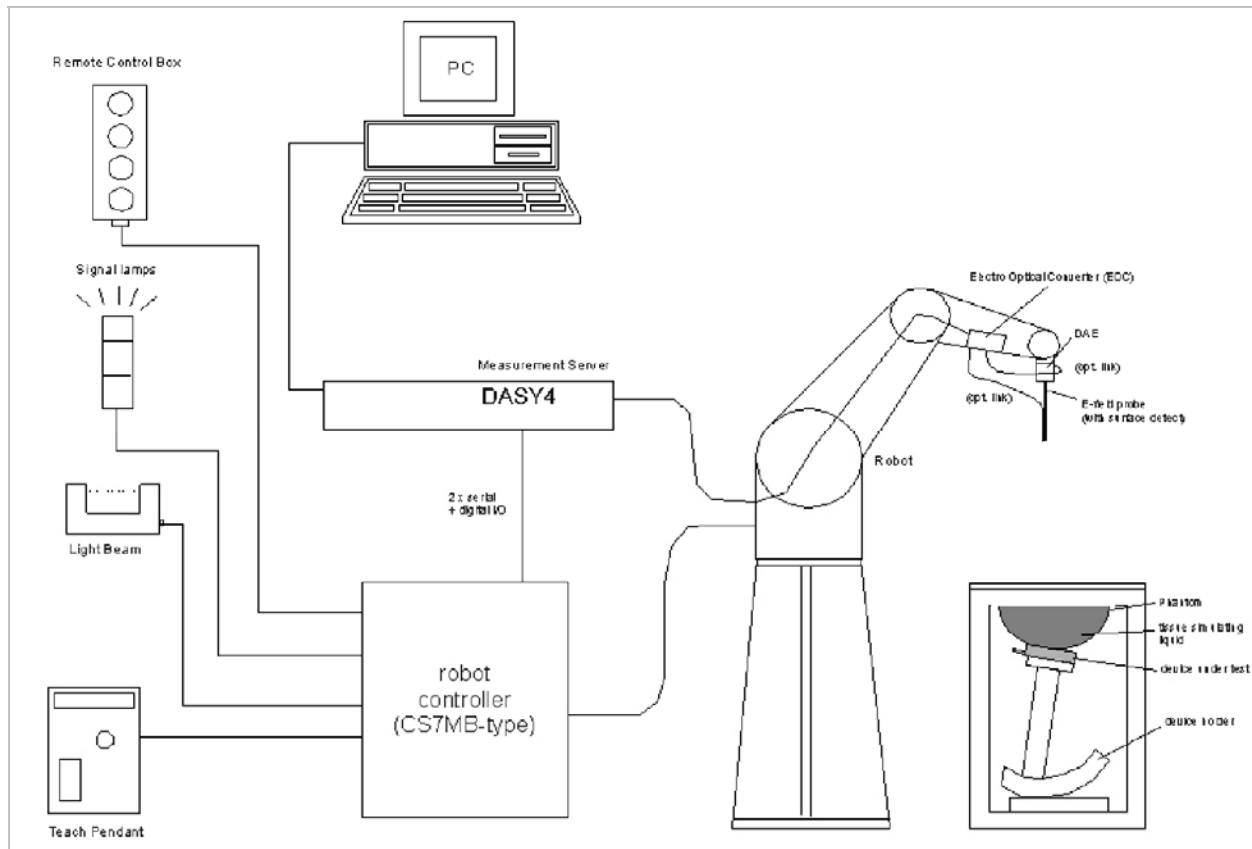
Measurement uncertainty for 300 MHz to 3 GHz averaged over 1 gram

Component	error, %	Probe Distribution	Divisor	Sensitivity	U (Xi), %
<b>Measurement System</b>					
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
<b>Test Sample Related</b>					
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
<b>Phantom and Tissue Parameters</b>					
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 @ Body 850 MHz	2.62	Normal	1	0.64	1.68
Liquid Permittivity - deviation from target	5.00	Rectangular	1.732	0.6	1.73
Liquid Permittivity - measurement uncertainty @ Body 1900 MHz	-1.32	Normal	1	0.6	-0.79
Combined Standard Uncertainty U <sub>c</sub> (y) =					9.62
Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence =				19.24	%
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), %
<b>Measurement System</b>					
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
<b>Test Sample Related</b>					
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
<b>Phantom and Tissue Parameters</b>					
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 @ Body 850 MHz	2.62	Normal	1	0.43	1.13
Liquid Permittivity - deviation from target	5.00	Rectangular	1.732	0.49	1.41
Liquid Permittivity - measurement uncertainty @ Body 1900 MHz	-1.32	Normal	1	0.49	-0.65
Combined Standard Uncertainty U <sub>c</sub> (y), % =					9.38
Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence =				18.75	%
Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence =				1.49	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 to validate 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. TISSUE DIELECTRIC PARAMETERS CHECK

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

### Reference Values of Tissue Dielectric Parameters

The body tissue parameters that have not been specified in IEEE Std 1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations and extrapolated according to the head parameters specified in IEEE Std 1528.

Target Frequency (MHz)	Body	
	$\epsilon_r$	$\sigma$ (S/m)
150	61.9	0.8
300	58.2	0.92
450	56.7	0.94
835	55.2	0.97
900	55	1.05
915	55	1.06
1450	54	1.3
1610	53.8	1.4
1800 – 2000	53.3	1.52
2450	52.7	1.95
3000	52	2.73
5800	48.2	6

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

### 7.1. TISSUE PARAMETERS CHECK RESULTS FOR 835 MHZ

Simulating Liquid Dielectric Parameters for Body 835 MHz

Measured by: Devin Chang

f (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
835	e'	54.64	Relative Permittivity ( $\epsilon_r$ ):	54.644	55.2	-1.01	± 5
	e''	21.43	Conductivity ( $\sigma$ ):	0.995	0.97	2.62	± 5

**Liquid Check**

Ambient temperature: 24 deg. C; Liquid temperature: 23 deg. C; Relative humidity = 40%

September 03, 2010 10:16 AM

Frequency	e'	e''
800000000.	55.0554	21.6568
805000000.	55.0125	21.6693
810000000.	55.0767	21.4711
815000000.	54.9092	21.5808
820000000.	54.9992	21.4836
825000000.	54.8736	21.4320
830000000.	54.7206	21.5041
<b>835000000.</b>	<b>54.6443</b>	<b>21.4284</b>
840000000.	54.6022	21.2642
845000000.	54.6036	21.4296
850000000.	54.5440	21.3871
855000000.	54.5689	21.4897
860000000.	54.4012	21.4139
865000000.	54.3106	21.4032
870000000.	54.3711	21.3538
875000000.	54.3804	21.4638
880000000.	54.2894	21.2102
885000000.	54.1852	21.3138
890000000.	54.1674	21.1741
895000000.	54.2210	20.7881
900000000.	53.9379	21.2270
905000000.	54.0111	20.7937
910000000.	54.0522	20.9787
915000000.	54.1293	21.1930
920000000.	53.8037	21.0687
925000000.	53.9560	20.8729
930000000.	53.8717	21.0695
935000000.	53.8380	21.0964
940000000.	53.8422	21.0210
945000000.	53.8539	20.8237
950000000.	53.9406	20.9553

The conductivity ( $\sigma$ ) can be given as:

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

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

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

## 7.2. TISSUE PARAMETERS CHECK RESULTS FOR 1900 MHZ

Simulating Liquid Dielectric Parameters for Body 1900 MHz

Measured by: Devin Chang

f (MHz)	Muscle Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
1900	e'	52.596	Relative Permittivity ( $\epsilon_r$ ):	52.5963	53.3	-1.32	± 5
	e''	14.162	Conductivity ( $\sigma$ ):	1.49694	1.52	-1.52	± 5

### Liquid Check

Ambient temperature: 24 deg. C; Liquid temperature: 23 deg. C; Room Ambient Temperature = 24°C

September 02, 2010 11:06 AM

Frequency	e'	e''
1710000000.	53.1933	13.5094
1720000000.	53.1773	13.5438
1730000000.	53.1387	13.5704
1740000000.	53.1000	13.6063
1750000000.	53.0658	13.6374
1760000000.	53.0195	13.6746
1770000000.	52.9962	13.7093
1780000000.	52.9669	13.7260
1790000000.	52.9258	13.7605
1800000000.	52.9193	13.7951
1810000000.	52.8690	13.8413
1820000000.	52.8478	13.8556
1830000000.	52.8021	13.9063
1840000000.	52.7673	13.9348
1850000000.	52.7429	13.9659
1860000000.	52.7111	14.0091
1870000000.	52.6872	14.0502
1880000000.	52.6562	14.0790
1890000000.	52.6167	14.1300
<b>1900000000.</b>	<b>52.5963</b>	<b>14.1622</b>
1910000000.	52.5538	14.2047

The conductivity ( $\sigma$ ) can be given as:

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

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

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

## 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  $\pm 10\%$ .

### 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-SN: 3531 was used for the measurements.
- The dipole was mounted on the small tripod so that the dipole feed point was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10 mm (above 1 GHz) and 15 mm (below 1 GHz) from dipole center to the simulating liquid surface.
- The coarse grid with a grid spacing of 15 mm was aligned with the dipole.  
 For 5 GHz band - The coarse grid with a grid spacing of 10 mm was aligned with the dipole.
- Special 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	D835V2-4d002_Apr09	4/23/09	SAR <sub>1g</sub> :	9.64	9.96
			SAR <sub>10g</sub> :	6.28	6.56
D1900V2	D1900V2-5d043_Nov09	11/24/09	SAR <sub>1g</sub> :	39.8	40.4
			SAR <sub>10g</sub> :	20.7	21.4

### 8.1. SYSTEM VERIFICATION RESULTS FOR D835V2

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			
D835V2	09/03/10	SAR <sub>1g</sub> :	10.4	9.96	4.42	$\pm 10$
		SAR <sub>10g</sub> :	6.91	6.56	5.34	

### 8.2. SYSTEM VERIFICATION RESULTS FOR D1900V2

Ambient Temperature = 24°C; Relative humidity = 35%

Measured by: Devin Chang

System validation dipole	Date Tested	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
		Tissue:	Body			
D1900V2	09/02/10	SAR <sub>1g</sub> :	38.9	40.4	-3.71	$\pm 10$
		SAR <sub>10g</sub> :	20.6	21.4	-3.74	

### SYSTEM CHECK PLOT

Date/Time: 9/3/2010 10:29:43 AM

Test Laboratory: Compliance Certification Services

#### System Performance Check - D835V2

DUT: D835V2; Type: D835V2; Serial: 4d002

Communication System: CW 835MHz; Frequency: 835 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.995$  mho/m;  $\epsilon_r = 54.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

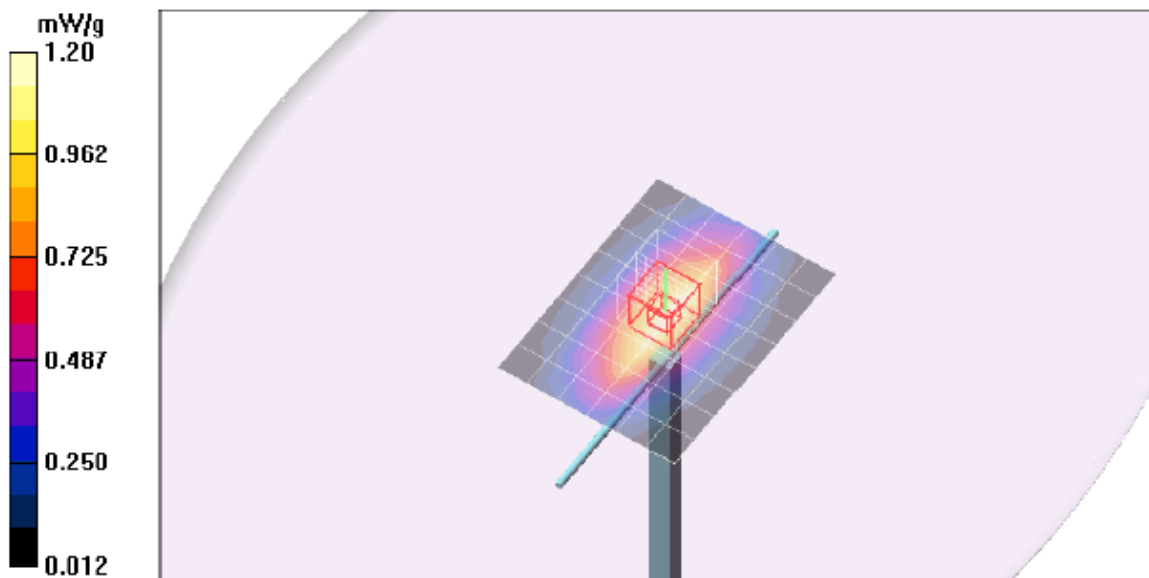
Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

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

**d=15mm, Pin=100 mW/Area Scan (7x9x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (measured) = 1.20 mW/g

**d=15mm, Pin=100 mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm  
Reference Value = 35.0 V/m; Power Drift = 0.013 dB  
Peak SAR (extrapolated) = 1.53 W/kg  
**SAR(1 g) = 1.04 mW/g; SAR(10 g) = 0.691 mW/g**  
Maximum value of SAR (measured) = 1.21 mW/g



**SYSTEM CHECK – Z Plot**

Date/Time: 9/3/2010 10:47:55 AM

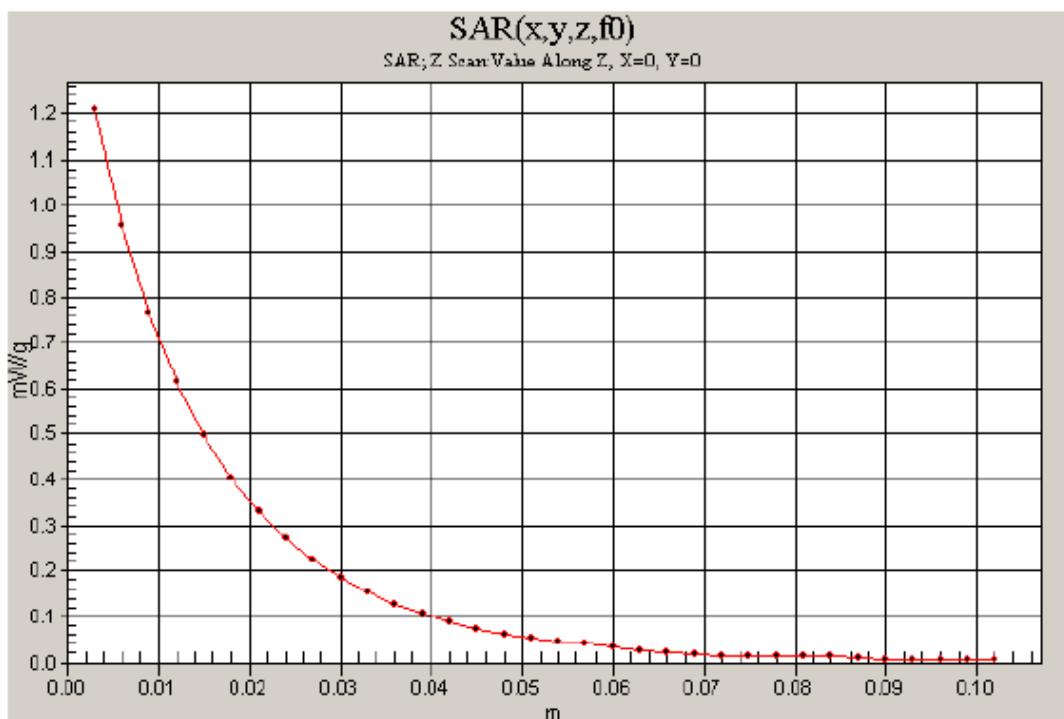
Test Laboratory: Compliance Certification Services

**System Performance Check - D835V2**

DUT: D835V2; Type: D835V2; Serial: 4d002

Communication System: CW 835MHz; 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) = 1.21 mW/g



### SYSTEM CHECK PLOT

Date/Time: 9/2/2010 3:48:50 PM

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;  $\sigma = 1.5$  mho/m;  $\epsilon_r = 52.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

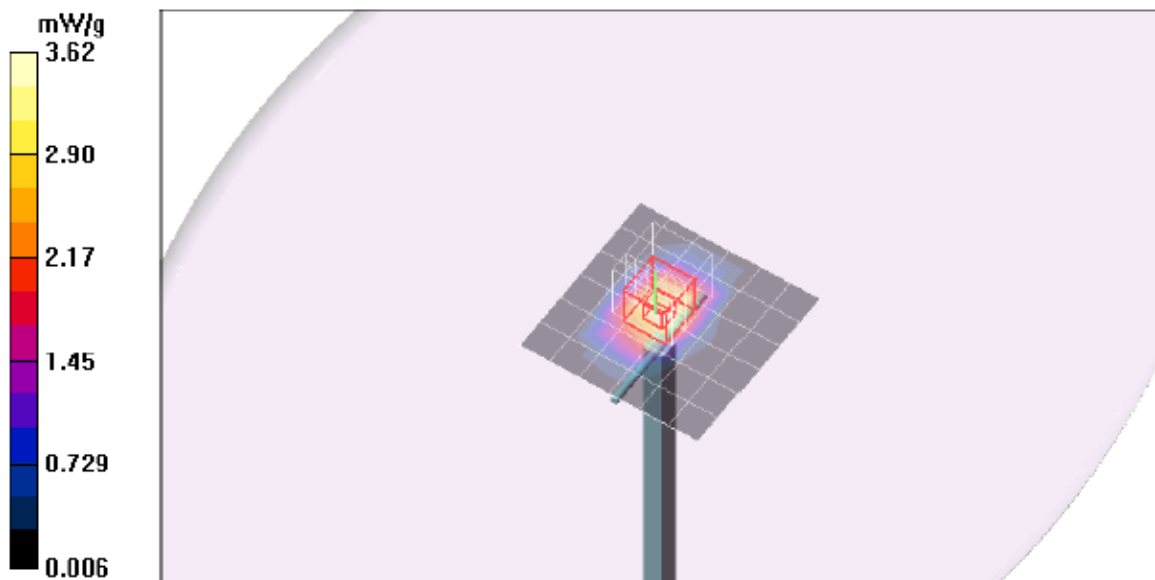
Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

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) = 3.62 mW/g

**d=10mm, Pin=100mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm  
Reference Value = 56.3 V/m; Power Drift = 0.107 dB  
Peak SAR (extrapolated) = 6.98 W/kg  
**SAR(1 g) = 3.89 mW/g; SAR(10 g) = 2.06 mW/g**  
Maximum value of SAR (measured) = 4.88 mW/g





**SYSTEM CHECK – Z Plot**

Date/Time: 9/2/2010 4:05:39 PM

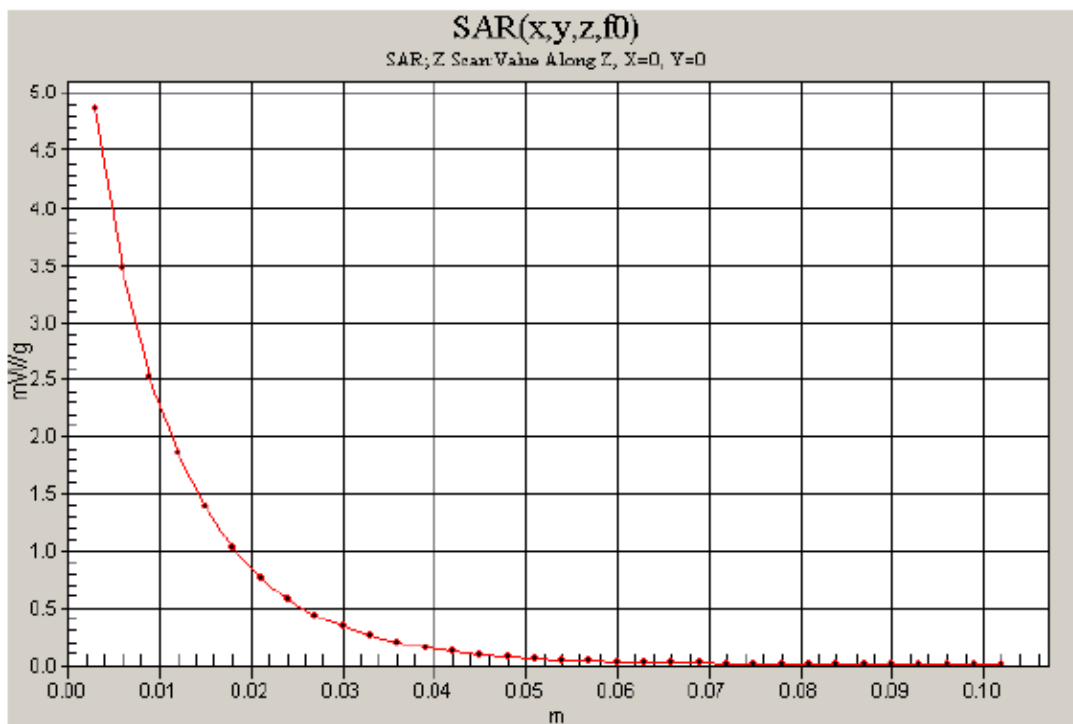
Test Laboratory: Compliance Certification Services

**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) = 4.87 mW/g



## 9. RF 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. RF POWER OUTPUT FOR 1xRTT

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

<u>Application</u>	<u>Rev, License</u>
CDMA2000 Mobile Test	B.13.08, L

- Call Setup > Shift & Preset
- Cell Info > Cell Parameters > System ID (SID) > 8  
     > Network ID (NID) > 65535
- 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	Average	Average
RC1	2 (Loopback)	24.5	24.8	24.6
	55 (Loopback)	24.5	24.7	24.6
RC2	9 (Loopback)	24.5	24.8	24.6
	55 (Loopback)	24.5	24.8	24.6
RC3	2 (Loopback)	24.6	24.8	24.6
	55 (Loopback)	24.6	24.8	24.7
	32 (+ F-SCH)	24.6	<b>24.8</b>	24.6
	32 (+ SCH)	24.6	24.7	24.6
RC4	2 (Loopback)	24.6	24.8	24.6
	55 (Loopback)	24.5	24.8	24.6
	32 (+ F-SCH)	24.6	24.8	24.6
	32 (+ SCH)	24.6	24.8	24.6
RC5	9 (Loopback)	24.5	24.7	24.5
	55 (Loopback)	24.6	24.8	24.5

**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	Average	Average
RC1	2 (Loopback)	24.2	24.5	24.5
	55 (Loopback)	24.3	24.6	24.6
RC2	9 (Loopback)	24.3	24.6	24.6
	55 (Loopback)	24.3	24.6	24.6
RC3	2 (Loopback)	24.4	24.6	24.6
	55 (Loopback)	24.4	24.7	24.6
	32 (+ F-SCH)	24.2	<b>24.7</b>	24.6
	32 (+ SCH)	24.2	24.6	24.6
RC4	2 (Loopback)	24.3	24.6	24.5
	55 (Loopback)	24.3	24.6	24.5
	32 (+ F-SCH)	24.3	24.6	24.6
	32 (+ SCH)	24.3	24.7	24.6
RC5	9 (Loopback)	24.3	24.6	24.5
	55 (Loopback)	24.3	24.6	24.5

## 9.2. RF POWER OUTPUT FOR EVDO REL 0

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 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 Params:
  - 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 Params:
  - 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

#### Cell Band

FTAP Rate	RTAP Rate	Channel	f (MHz)	Conducted pwr (dBm)
				Average
307.2 kbps (2 slot, QPSK)	153.6 kbps	1013	824.70	24.5
		384	836.52	24.6
		777	848.31	24.3

#### PCS Band

FTAP Rate	RTAP Rate	Channel	f (MHz)	Conducted pwr (dBm)
				Average
307.2 kbps (2 slot, QPSK)	153.6 kbps	25	1851.25	24.1
		600	1880.00	24.4
		1175	1908.75	24.5

### 9.3. RF POWER OUTPUT FOR EVDO REV A

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

<u>Application</u>	<u>Rev, License</u>
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)

#### RF Power Output Results for EV-DO Rev A

##### Cell Band

FETAP-Traffic Format	RETAP-Data Payload Size	Channel	f (MHz)	Conducted pwr (dBm)
				Average
307.2k, QPSK/ ACK channel is transmitted at all the slots	4096	1013	824.70	24.2
		384	836.52	24.5
		777	848.31	24.3

##### PCS Band

FETAP-Traffic Format	RETAP-Data Payload Size	Channel	f (MHz)	Conducted pwr (dBm)
				Average
307.2k, QPSK/ ACK channel is transmitted at all the slots	4096	25	1851.25	24.2
		600	1880.00	24.3
		1175	1908.75	24.4

## 10. KDB 941225 TEST REDUCTION CONSIDERATION

### CDMA2000 1x handsets Test configurations based on KDB 941225 SAR test for 3G devices v02

#### Body SAR

1. SAR for RC3
  - 1) With DUT configured using TDSO/SO32, to transmit at full rate on FCH with all other code channels disabled.
  - 2) For multiples code channels (FCH + SCH<sub>n</sub>)
    - (1) Not required when the maximum average output of each RF channel is less than 0.25 dB higher than as measured with FCH only.
    - (2) Else SAR is measured on the maximum output channel (FCH + SCH<sub>n</sub>) with FCH at full rate and SCH<sub>0</sub> enabled at 9600 bps, for exposure configuration that produced highest SAR for that channel with FCH only.
2. SAR for RC1
  - 1) Not required when the maximum average output of each channel is less than 0.25 dB higher than as measured in RC3.
  - 2) Else SAR is measured on the maximum output channel in RC1, with Loopback Service Option SO55, at full rate, for exposure configuration that produced highest SAR for that channel in RC3.
3. Handsets with Ev-Do
  - 1) SAR for Release 0 (Rel. 0)
    - (1) Not required when the maximum average output of each channel is less than 0.25 dB higher than as measured in RC3 (1xRTT)
    - (2) Else SAR is measured on the maximum output channel, at 153.6 kbps, for exposure configuration that produced highest SAR for that channel in RC3.
  - 2) SAR for Revision A (Rev. A)
    - (1) Not required when the maximum average output of each channel is less than as measured in Release 0, or is less than 0.25 dB higher than as measured in RC3 (1xRTT).
    - (2) Else SAR is measured on the maximum output channel, using a Reverse Data Channel payload size of 4096 bits and a Termination Target of 16 slots defined for Subtype 2 Physical Layer configurations (TBD: may be "for exposure configuration that produced highest SAR for that channel in RC3")

#### Notes:

Based upon the power measurement in section 9.1, SAR for multiple code channel (FCH+SCH) is not required due to the output power is not ¼ dB higher than RC3/SO32.

Based upon the power measurement in section 9.2 and 9.3, SAR for 1xEVDO Rel. 0 and Rev. A power measurement is not ¼ dB higher than RC3.

Thus, **RC3/SO32** is used for all body SAR measurement.

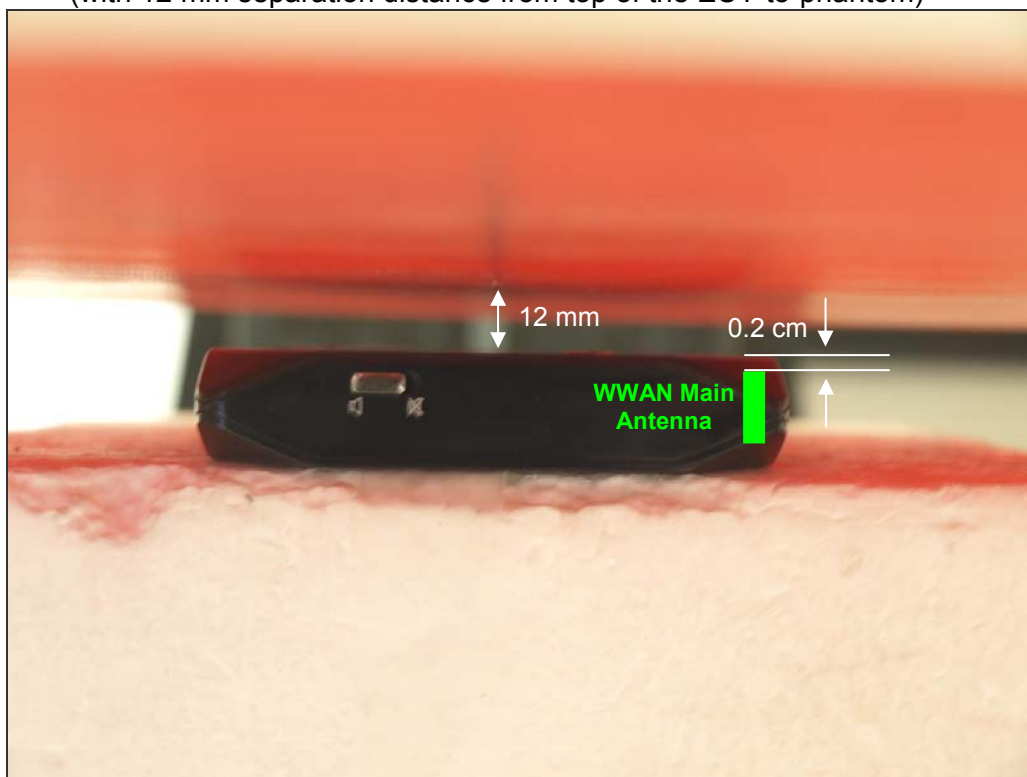
# 11. SUMMARY OF TEST RESULTS

## 1. Top Position

Band	Mode	UL Ch No.	f (MHz)	SAR (mW/g)	
				1-g	10-g
Cellular	1xRTT (RC3, SO32)	1013	824.70	<b>1.170</b>	0.804
		384	836.52	1.010	0.691
		777	848.31	0.886	0.606
PCS	1xRTT (RC3, SO32)	25	1851.25		
		600	1880.00	<b>0.599</b>	0.397
		1175	1908.75		

### SETUP PHPTO

(with 12 mm separation distance from top of the EUT-to-phantom)

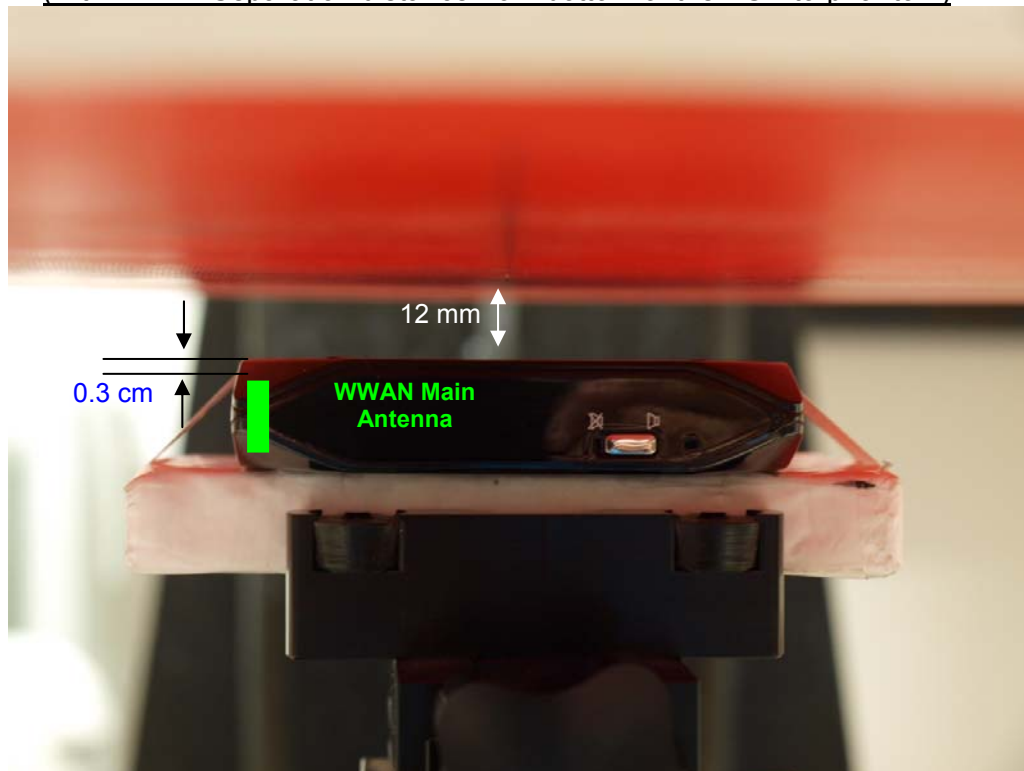


## 2. Bottom Position

Band	Mode	UL Ch No.	f (MHz)	SAR (mW/g)	
				1-g	10-g
Cellular	1xRTT (RC3, SO32)	1013	824.70	1.050	0.731
		384	836.52	0.951	0.663
		777	848.31	0.900	0.630
PCS	1xRTT (RC3, SO32)	25	1851.25		
		600	1880.00	0.367	0.232
		1175	1908.75		

### SETUP PHPTO

(with 12 mm Separation distance from bottom of the EUT-to-phantom)

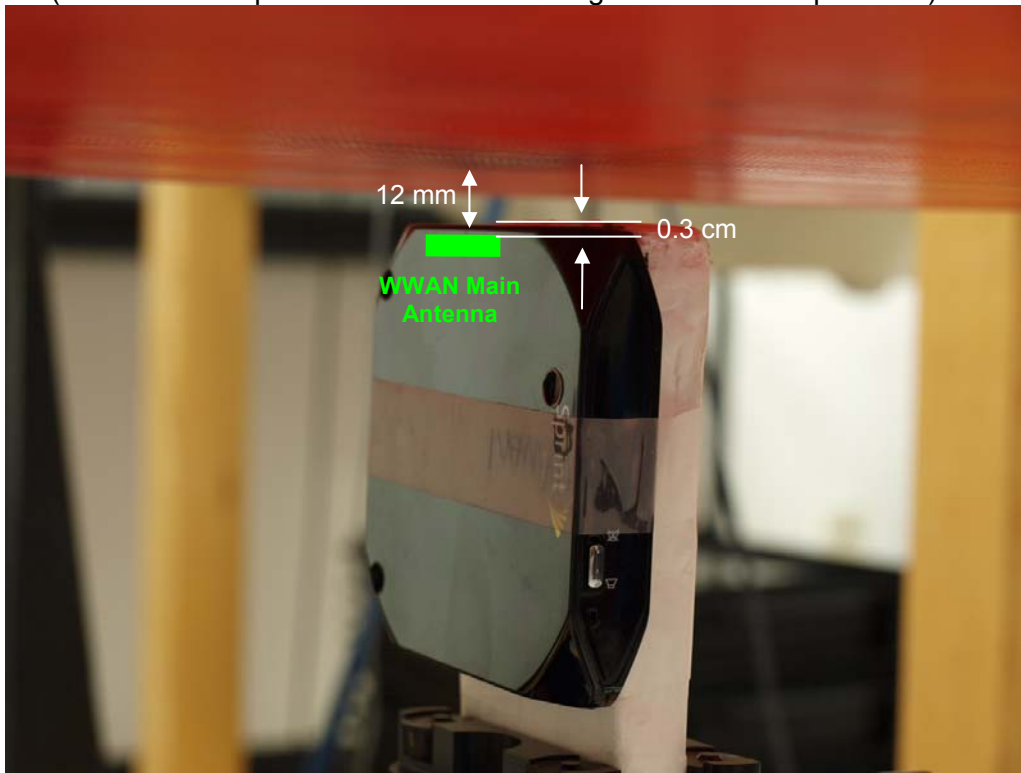




**3. Edge Position (Closest distance from Tx antenna-to-phantom)**

Band	Mode	UL Ch No.	f (MHz)	SAR (mW/g)	
				1-g	10-g
Cellular	1xRTT (RC3, SO32)	1013	824.70		
		384	836.52	0.309	0.203
		777	848.31		
PCS	1xRTT (RC3, SO32)	25	1851.25		
		600	1880.00	0.116	0.074
		1175	1908.75		

**SETUP PHPTO**  
 (with 12 mm Separation distance from Edge of the EUT-to-phantom)



## 12. KDB 648474 SIMULTANEOUS TRANSMISSION CONSIDERATION

### SUMMARY OF SAR EVALUATION FOR HANDSET DEVICE WITH MULTIPLE TRANSMITTERS

<u>Individual Transmitter</u>	<u>Stand-alone SAR</u>
WWAN	Yes
WiFi	Yes
WiMAX	Yes

### SIMULTANEOUS TRANSMISSION

- WWAN can transmit simultaneously with WiFi (FCC ID: N7N-MHS801)
- WWAN can not transmit simultaneously with WiMAX (FCC ID: N7N-MHS801)
- WiFi can transmit simultaneously with WiMax

Highest SAR value for WWAN & WiFi (FCC ID: N7N-MHS801) and the sum of the 1-g SAR

Tes position	Highest 1-g SAR (W/kg)		$\Sigma$ 1-g SAR (W/kg)
	WWAN	WiFi	
Body (Top)	Part 22	1.17	1.549
	Part 24	0.599	0.978

### CONCLUSION:

<u>Simultaneous transmission</u>	<u>Require for Simultaneous Transmission SAR with volume scans</u>
WWAN & WiFi	No (Due to the sum of the 1-g SAR < 1.6 W/kg)
WWAN & WiMAX	No (WWAN can not transmit simultaneously with WiMAX)

### 13. SAR TEST PLOTS

#### TOP SAR PLOT FOR CELL BAND

Date/Time: 9/3/2010 11:32:13 AM

Test Laboratory: Compliance Certification Services

#### Cell 850\_Top mode

DUT: Sierra Wireless; Type: NA; Serial: NA

Communication System: CDMA Cell Band; Frequency: 824.7 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 825$  MHz;  $\sigma = 0.984$  mho/m;  $\epsilon_r = 54.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

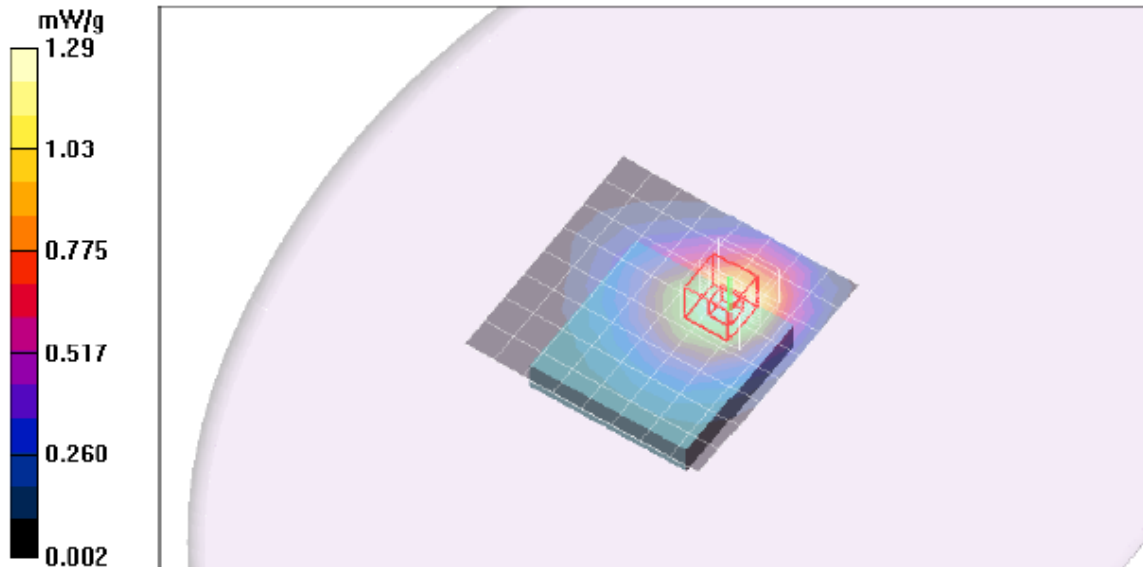
Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

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

**1xRTT\_L-ch/Area Scan (9x9x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (measured) = 1.29 mW/g

**1xRTT\_L-ch/Zoom Scan (7x7x9)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=3mm  
Reference Value = 36.3 V/m; Power Drift = -0.065 dB  
Peak SAR (extrapolated) = 1.66 W/kg  
**SAR(1 g) = 1.17 mW/g; SAR(10 g) = 0.804 mW/g**  
Maximum value of SAR (measured) = 1.35 mW/g



TOP SAR PLOT FOR CELL BAND – Z plot

Date/Time: 9/3/2010 12:45:51 PM

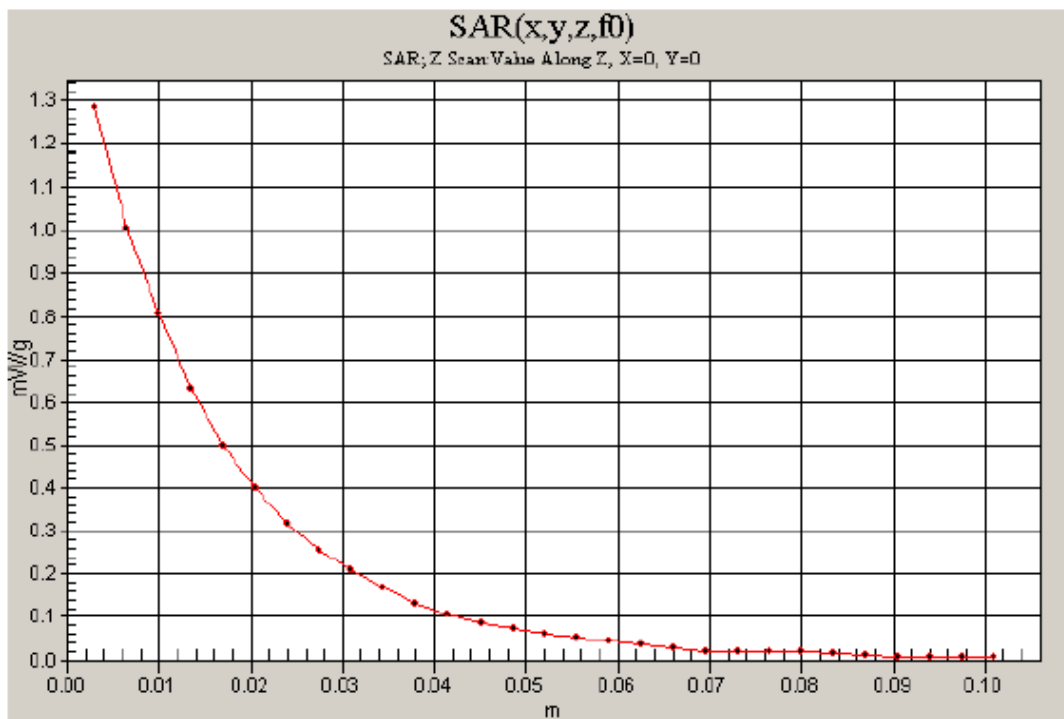
Test Laboratory: Compliance Certification Services

**Cell 850\_Top mode**

DUT: Sierra Wireless; Type: NA; Serial: NA

Communication System: CDMA Cell Band; Frequency: 824.7 MHz; Duty Cycle: 1:1

**1xRTT\_L-ch/Z Scan (1x1x29):** Measurement grid: dx=20mm, dy=20mm, dz=3.5mm  
Maximum value of SAR (measured) = 1.28 mW/g



TOP SAR PLOT FOR CELL BAND

Date/Time: 9/3/2010 11:04:40 AM

Test Laboratory: Compliance Certification Services

**Cell 850\_Top mode**

DUT: Sierra Wireless; Type: NA; Serial: NA

Communication System: CDMA Cell Band; Frequency: 836.52 MHz; Duty Cycle: 1:1  
Medium parameters used (interpolated):  $f = 836.52$  MHz;  $\sigma = 0.995$  mho/m;  $\epsilon_r = 54.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
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

**1xRTT\_M-ch-1/Area Scan (9x9x1):** Measurement grid: dx=15mm, dy=15mm

Info: [Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 1.11 mW/g

**1xRTT\_M-ch-1/Zoom Scan (7x7x9)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=3mm

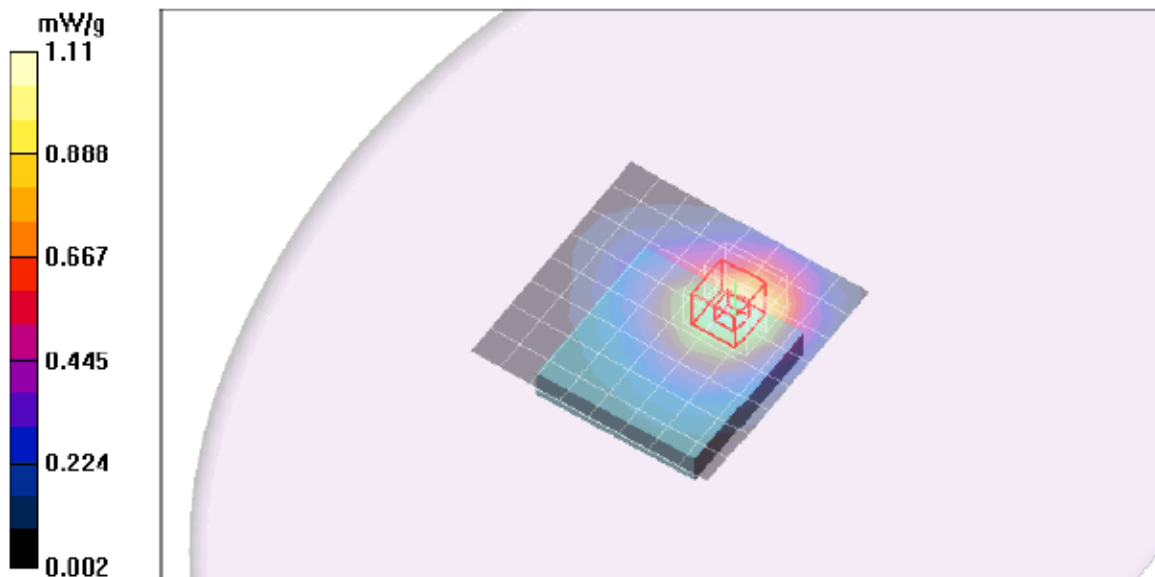
Reference Value = 33.4 V/m; Power Drift = -0.053 dB

Peak SAR (extrapolated) = 1.43 W/kg

**SAR(1 g) = 1.01 mW/g; SAR(10 g) = 0.691 mW/g**

Info: [Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 1.16 mW/g



TOP SAR PLOT FOR CELL BAND

Date/Time: 9/3/2010 12:20:42 PM

Test Laboratory: Compliance Certification Services

**Cell 850\_Top mode**

DUT: Sierra Wireless; Type: NA; Serial: NA

Communication System: CDMA Cell Band; Frequency: 848.31 MHz; Duty Cycle: 1:1  
Medium parameters used (interpolated):  $f = 848.31$  MHz;  $\sigma = 1.01$  mho/m;  $\epsilon_r = 54.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
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

**1xRTT\_H-ch/Area Scan (9x9x1):** Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.974 mW/g

**1xRTT\_H-ch/Zoom Scan (7x7x9)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=3mm

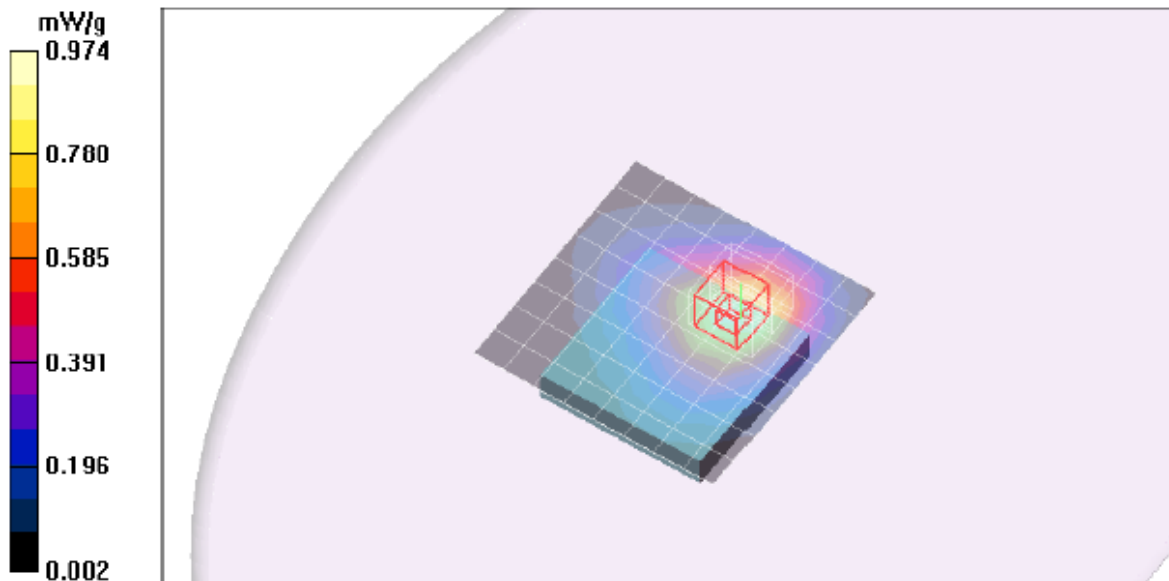
Reference Value = 31.1 V/m; Power Drift = 0.075 dB

Peak SAR (extrapolated) = 1.26 W/kg

**SAR(1 g) = 0.886 mW/g; SAR(10 g) = 0.606 mW/g**

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 1.01 mW/g



TOP SAR PLOT FOR PCS BAND

Date/Time: 9/2/2010 7:48:17 PM

Test Laboratory: Compliance Certification Services

**PCS 1900\_Top mode**

DUT: Sierra Wireless; Type: NA; Serial: NA

Communication System: CDMA PCS Band; Frequency: 1880 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.47$  mho/m;  $\epsilon_r = 52.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

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

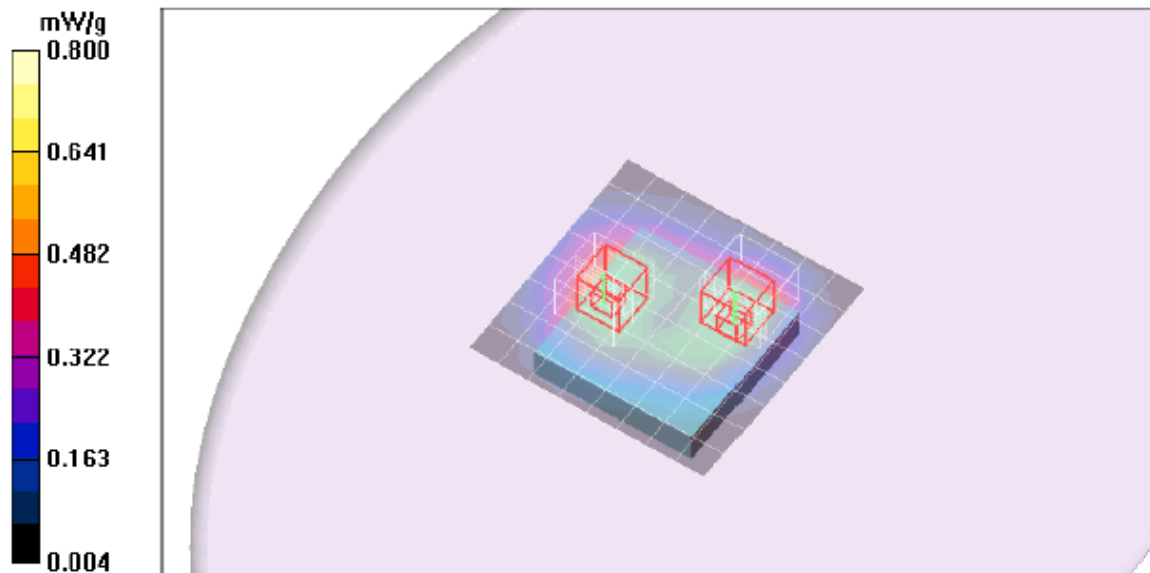
DASY4 Configuration:

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

**1xRTT\_M-ch/Area Scan (9x9x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (measured) = 0.681 mW/g

**1xRTT\_M-ch/Zoom Scan (7x7x9)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=3mm  
Reference Value = 21.6 V/m; Power Drift = -0.087 dB  
Peak SAR (extrapolated) = 0.897 W/kg  
**SAR(1 g) = 0.582 mW/g; SAR(10 g) = 0.356 mW/g**  
Maximum value of SAR (measured) = 0.687 mW/g

**1xRTT\_M-ch/Zoom Scan (7x7x9)/Cube 1:** Measurement grid: dx=5mm, dy=5mm, dz=3mm  
Reference Value = 21.6 V/m; Power Drift = -0.087 dB  
Peak SAR (extrapolated) = 0.876 W/kg  
**SAR(1 g) = 0.599 mW/g; SAR(10 g) = 0.397 mW/g**  
Maximum value of SAR (measured) = 0.695 mW/g



TOP SAR PLOT FOR PCS BAND – Z plot

Date/Time: 9/2/2010 8:27:09 PM

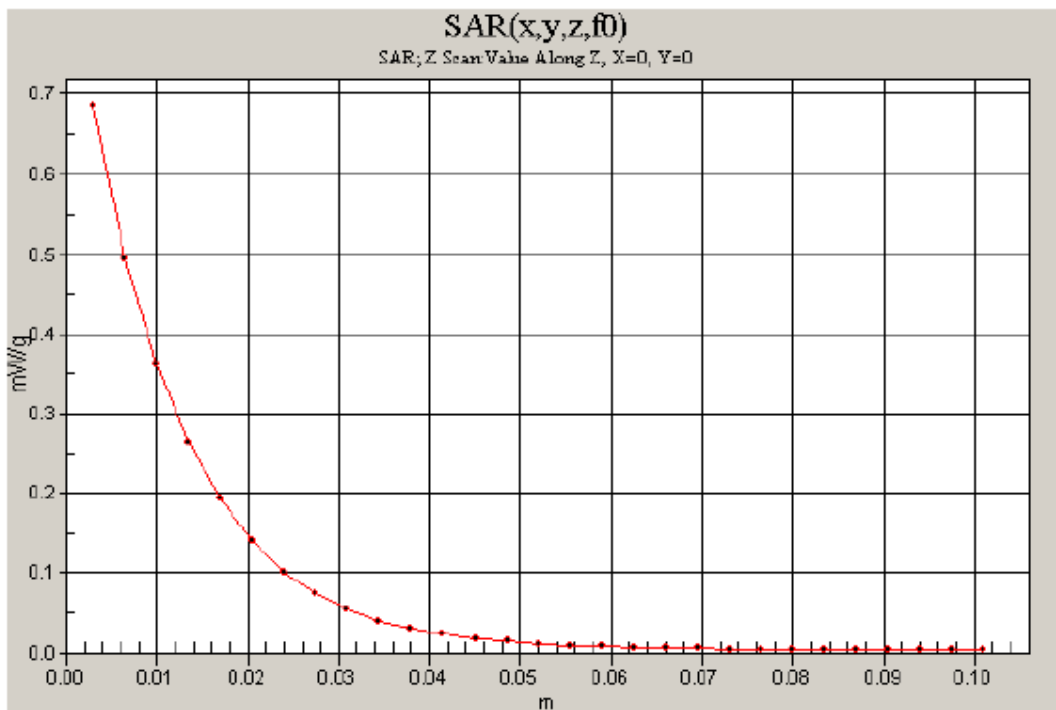
Test Laboratory: Compliance Certification Services

**PCS 1900\_Top mode**

DUT: Sierra Wireless; Type: NA; Serial: NA

Communication System: CDMA PCS Band; Frequency: 1880 MHz; Duty Cycle: 1:1

**1xRTT\_M-ch/Z Scan (1x1x29):** Measurement grid: dx=20mm, dy=20mm, dz=3.5mm  
Maximum value of SAR (measured) = 0.685 mW/g





BOTTOM SAR PLOT FOR CELL BAND

Date/Time: 9/3/2010 3:42:56 PM

Test Laboratory: Compliance Certification Services

**Cell 850\_Bottom mode**

DUT: Sierra Wireless; Type: NA; Serial: NA

Communication System: CDMA Cell Band; Frequency: 824.7 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 825 \text{ MHz}$ ;  $\sigma = 0.984 \text{ mho/m}$ ;  $\epsilon_r = 54.9$ ;  $\rho = 1000 \text{ kg/m}^3$   
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

**1xRTT\_L-ch/Area Scan (9x9x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (measured) = 1.15 mW/g

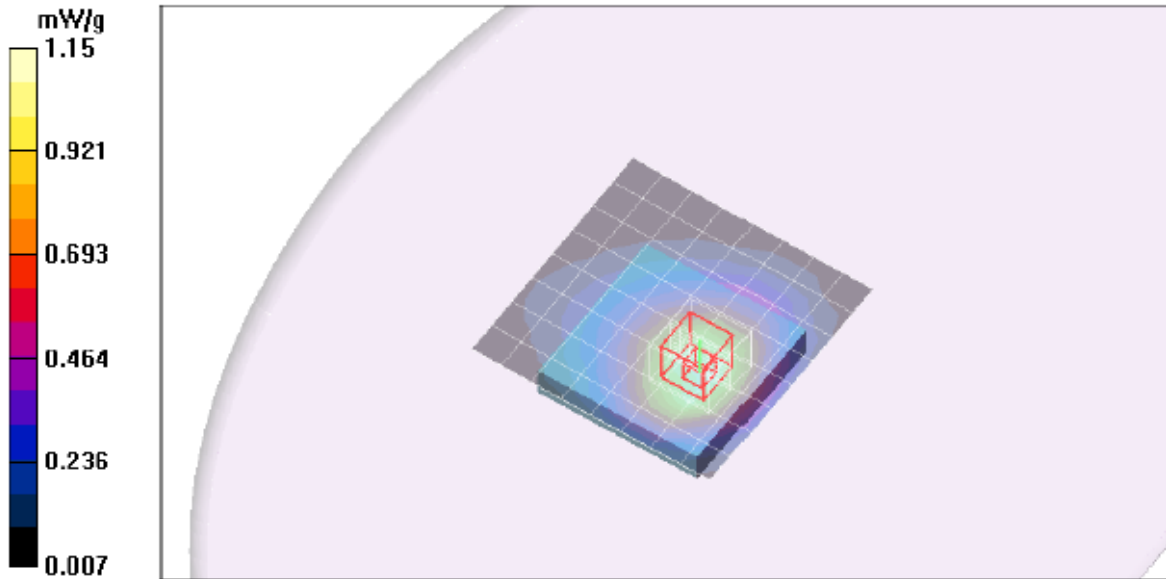
**1xRTT\_L-ch/Zoom Scan (7x7x9)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=3mm

Reference Value = 34.4 V/m; Power Drift = 0.097 dB

Peak SAR (extrapolated) = 1.48 W/kg

**SAR(1 g) = 1.05 mW/g; SAR(10 g) = 0.731 mW/g**

Maximum value of SAR (measured) = 1.21 mW/g



BOTTOM SAR PLOT FOR CELL BAND

Date/Time: 9/3/2010 3:18:00 PM

Test Laboratory: Compliance Certification Services

**Cell 850\_Bottom mode**

DUT: Sierra Wireless; Type: NA; Serial: NA

Communication System: CDMA Cell Band; Frequency: 836.52 MHz; Duty Cycle: 1:1  
Medium parameters used (interpolated):  $f = 836.52$  MHz;  $\sigma = 0.995$  mho/m;  $\epsilon_r = 54.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
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

**1xRTT\_M-ch/Area Scan (9x9x1):** Measurement grid: dx=15mm, dy=15mm

Info: [Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 1.05 mW/g

**1xRTT\_M-ch/Zoom Scan (7x7x9)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=3mm

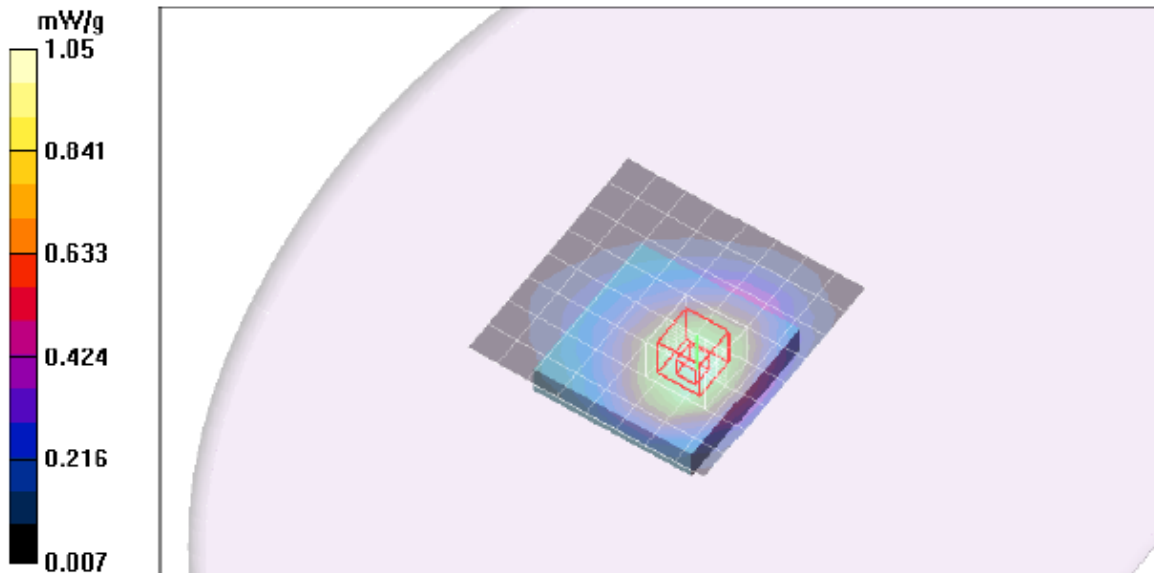
Reference Value = 32.5 V/m; Power Drift = 0.142 dB

Peak SAR (extrapolated) = 1.32 W/kg

**SAR(1 g) = 0.951 mW/g; SAR(10 g) = 0.663 mW/g**

Info: [Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 1.09 mW/g



BOTTOM SAR PLOT FOR CELL BAND

Date/Time: 9/3/2010 4:07:51 PM

Test Laboratory: Compliance Certification Services

**Cell 850\_Bottom mode**

DUT: Sierra Wireless; Type: NA; Serial: NA

Communication System: CDMA Cell Band; Frequency: 848.31 MHz; Duty Cycle: 1:1  
Medium parameters used (interpolated):  $f = 848.31$  MHz;  $\sigma = 1.01$  mho/m;  $\epsilon_r = 54.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
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

**1xRTT\_H-ch/Area Scan (9x9x1):** Measurement grid: dx=15mm, dy=15mm

Info: [Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.972 mW/g

**1xRTT\_H-ch/Zoom Scan (7x7x9)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=3mm

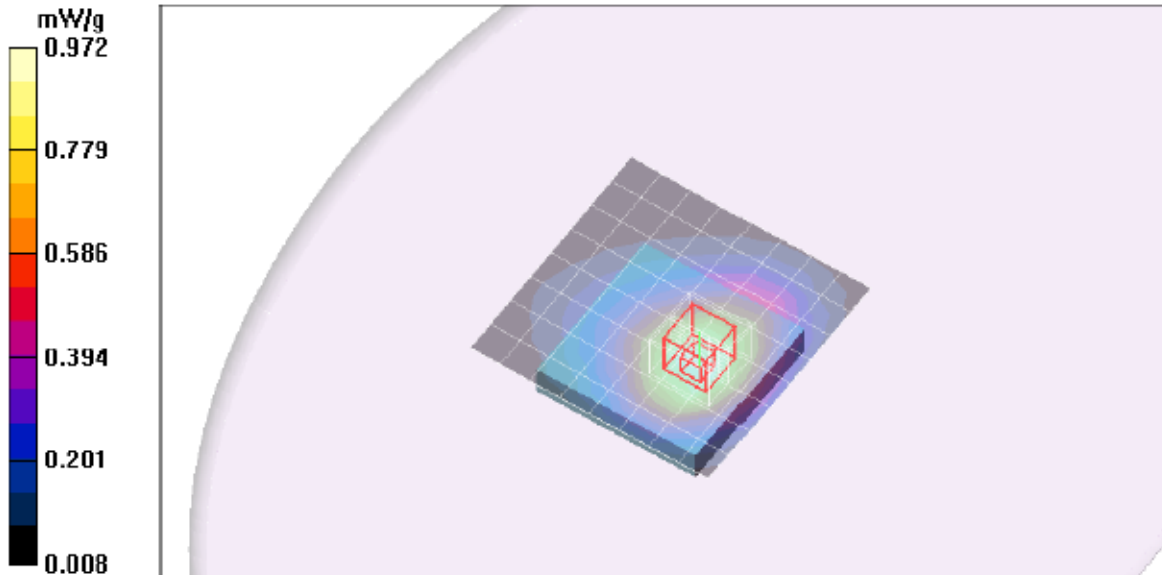
Reference Value = 31.1 V/m; Power Drift = 0.150 dB

Peak SAR (extrapolated) = 1.25 W/kg

**SAR(1 g) = 0.900 mW/g; SAR(10 g) = 0.630 mW/g**

Info: [Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 1.03 mW/g



BOTTOM SAR PLOT FOR PCS BAND

Date/Time: 9/2/2010 6:03:13 PM

Test Laboratory: Compliance Certification Services

**PCS 1900\_Bottom mode**

DUT: Sierra Wireless; Type: NA; Serial: NA

Communication System: CDMA PCS Band; Frequency: 1880 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.47$  mho/m;  $\epsilon_r = 52.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

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

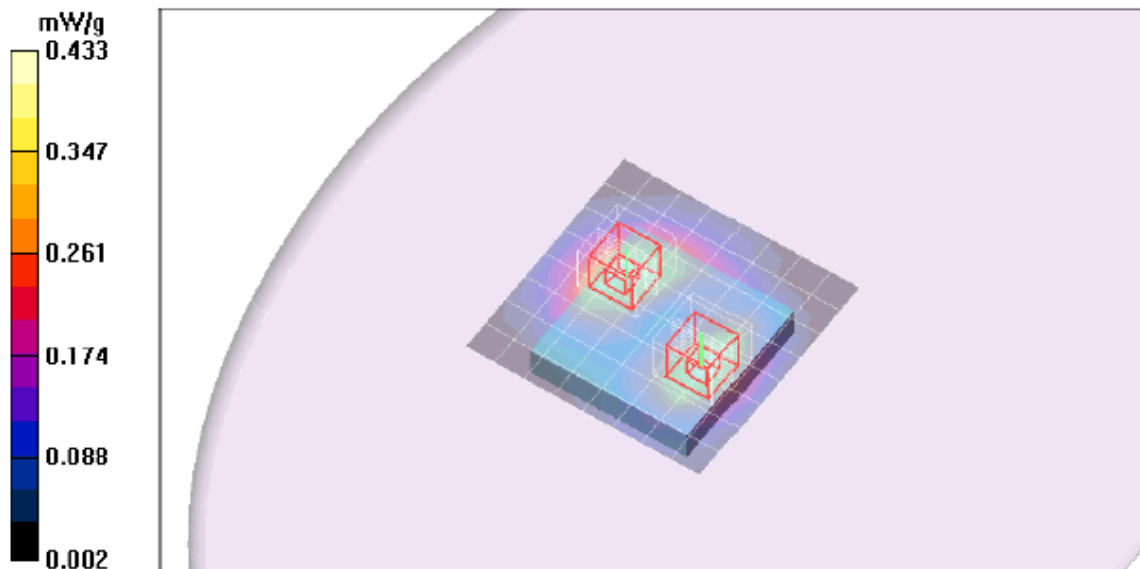
DASY4 Configuration:

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

**1xRTT\_M-ch/Area Scan (9x9x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (measured) = 0.433 mW/g

**1xRTT\_M-ch/Zoom Scan (7x7x9)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=3mm  
Reference Value = 17.2 V/m; Power Drift = 0.041 dB  
Peak SAR (extrapolated) = 0.543 W/kg  
**SAR(1 g) = 0.367 mW/g; SAR(10 g) = 0.232 mW/g**  
Maximum value of SAR (measured) = 0.431 mW/g

**1xRTT\_M-ch/Zoom Scan (7x7x9)/Cube 1:** Measurement grid: dx=5mm, dy=5mm, dz=3mm  
Reference Value = 17.2 V/m; Power Drift = 0.041 dB  
Peak SAR (extrapolated) = 0.559 W/kg  
**SAR(1 g) = 0.367 mW/g; SAR(10 g) = 0.228 mW/g**  
Maximum value of SAR (measured) = 0.432 mW/g



EDGE SAR PLOT FOR CELL BAND

Date/Time: 9/3/2010 4:44:57 PM

Test Laboratory: Compliance Certification Services

**Cell 850\_Edge mode**

DUT: Sierra Wireless; Type: NA; Serial: NA

Communication System: CDMA Cell Band; Frequency: 836.52 MHz; Duty Cycle: 1:1  
Medium parameters used (interpolated):  $f = 836.52$  MHz;  $\sigma = 0.995$  mho/m;  $\epsilon_r = 54.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

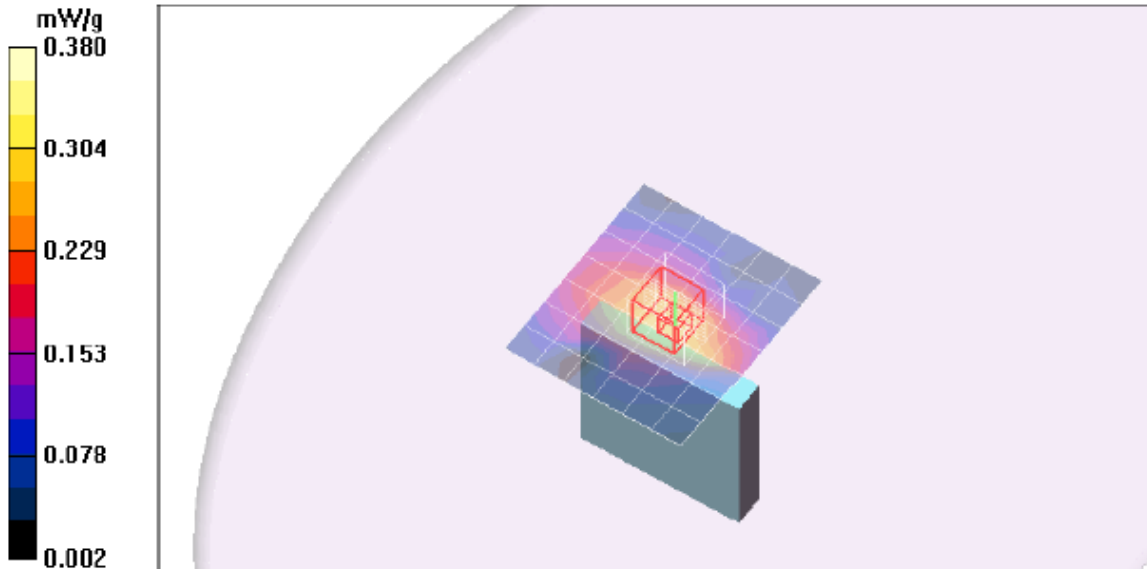
Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

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

**1xRTT\_M-ch/Area Scan (7x8x1):** Measurement grid: dx=15mm, dy=15mm  
[Info: Interpolated medium parameters used for SAR evaluation.](#)  
Maximum value of SAR (measured) = 0.322 mW/g

**1xRTT\_M-ch/Zoom Scan (7x7x9)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=3mm  
Reference Value = 17.8 V/m; Power Drift = 0.162 dB  
Peak SAR (extrapolated) = 0.468 W/kg  
**SAR(1 g) = 0.309 mW/g; SAR(10 g) = 0.203 mW/g**  
[Info: Interpolated medium parameters used for SAR evaluation.](#)  
Maximum value of SAR (measured) = 0.363 mW/g



EDGE SAR PLOT FOR PCS BAND

Date/Time: 9/2/2010 8:39:46 PM

Test Laboratory: Compliance Certification Services

**PCS 1900\_Edge mode**

DUT: Sierra Wireless; Type: NA; Serial: NA

Communication System: CDMA PCS Band; Frequency: 1880 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.47$  mho/m;  $\epsilon_r = 52.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

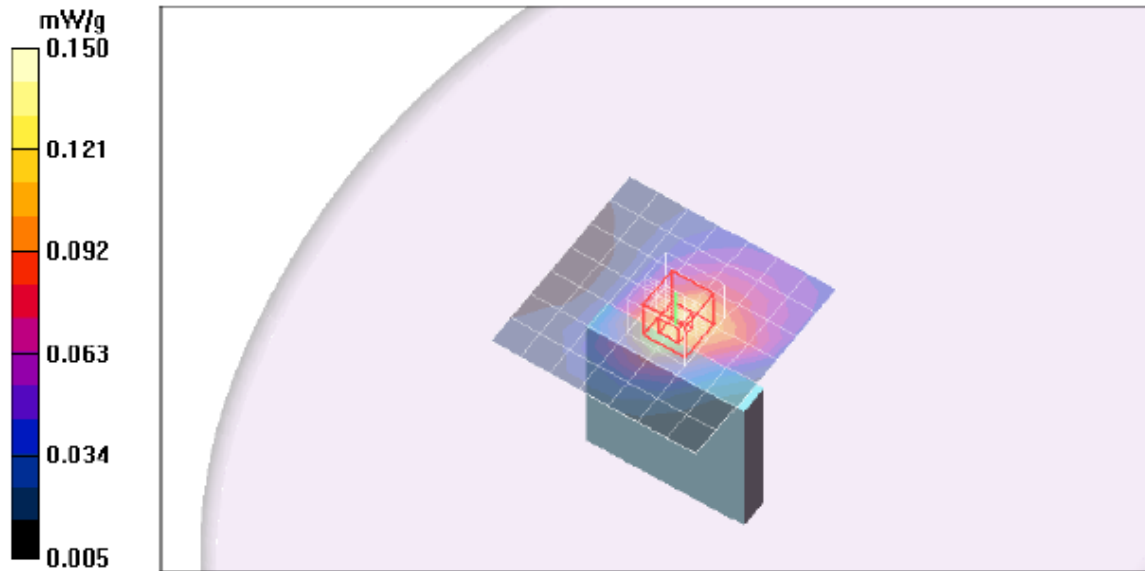
Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

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

**1xRTT\_M-ch/Area Scan (8x8x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (measured) = 0.131 mW/g

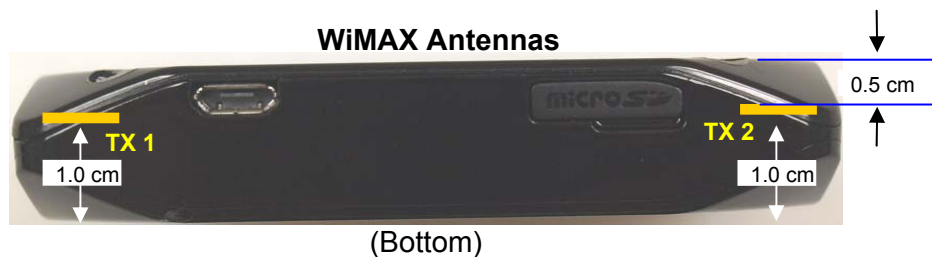
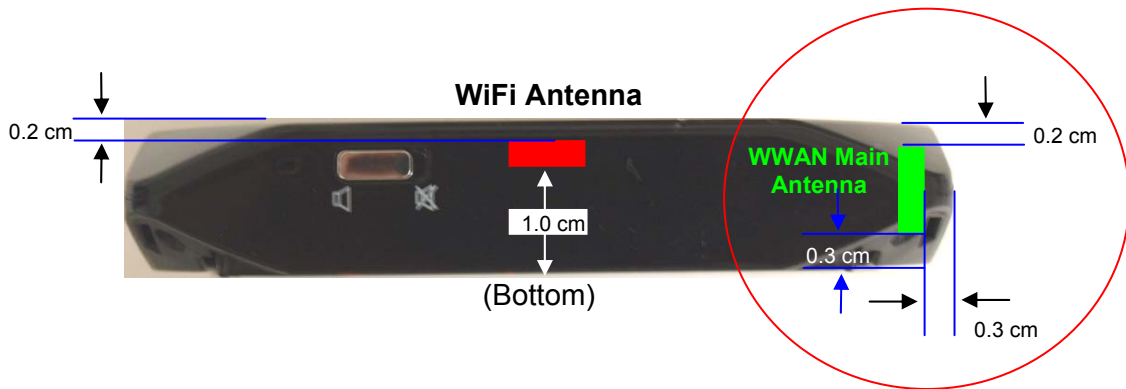
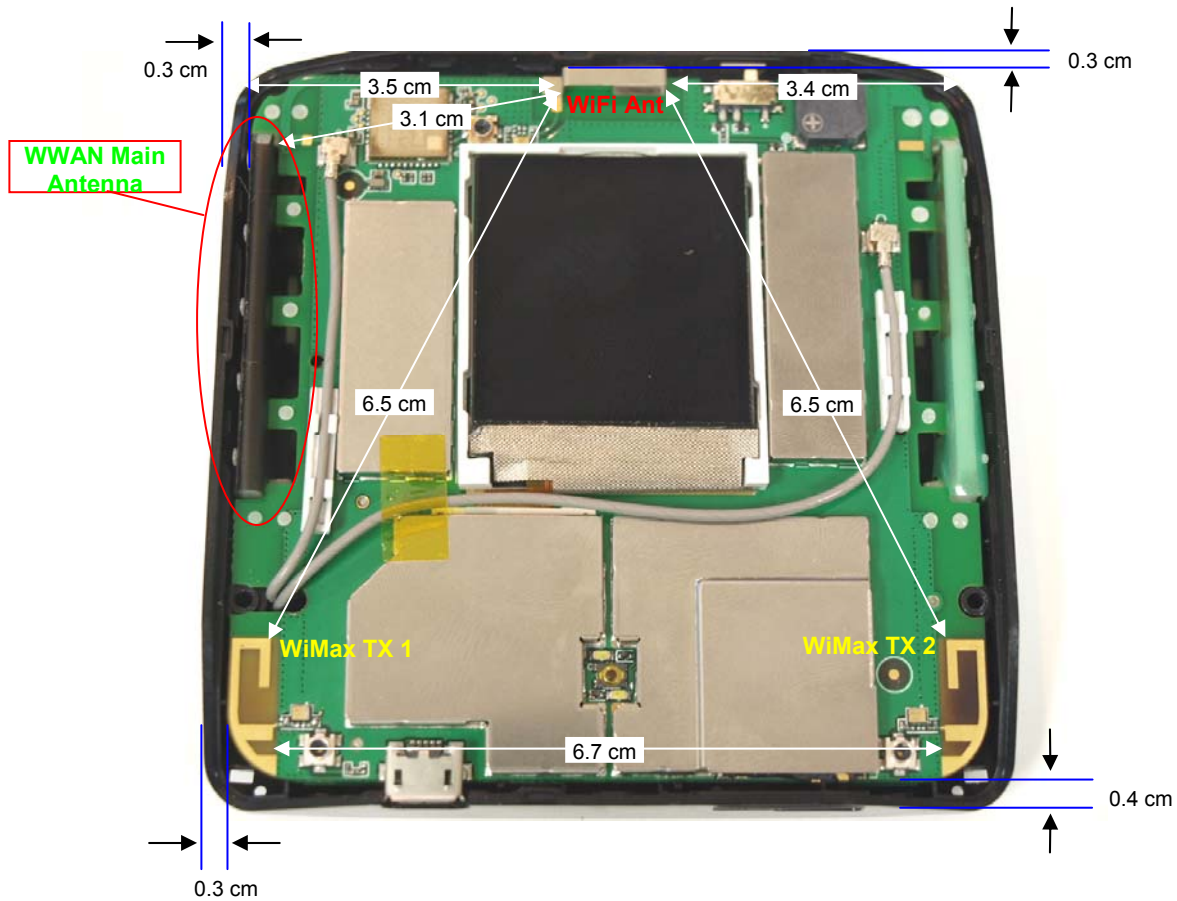
**1xRTT\_M-ch/Zoom Scan (7x7x9)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=3mm  
Reference Value = 9.47 V/m; Power Drift = -0.087 dB  
Peak SAR (extrapolated) = 0.173 W/kg  
**SAR(1 g) = 0.116 mW/g; SAR(10 g) = 0.074 mW/g**  
Maximum value of SAR (measured) = 0.136 mW/g



## 14. ATTACHMENTS

<u>No.</u>	<u>Contents</u>	<u>No. of page (s)</u>
1	Certificate of E-Field Probe - EX3DV3 SN3531	11
2	Certificate of System Validation Dipole D835V2 SN:4d002	9
3	Certificate of System Validation Dipole D1900V2 SN:5d043	9

### 15. ANTENNA LOCATIONS AND SEPARATION DISTANCES





## 16. HOST DEVICE PHOTO

Top / Front



Bottom / Back





**END OF REPORT**