SAR Evaluation Report

IN ACCORDANCE WITH THE REQUIREMENTS OF
FCC OET BULLETIN 65 SUPPLEMENT C
IC RSS 102 ISSUE 2 : NOVEMBER 2005

FOR

USB WIRELESS MODEM
(L704 AND C705 CHANGED TO IMPROVE ANTENNA MATCHING)

MODEL: COMPASS 597

FCC ID: N7NC597
IC: 2417C-C597

REPORT NUMBER: 07U11455-13

ISSUE DATE: JANUARY 18, 2008

Prepared for

SIERRA WIRELESS INC.
2290 COSMOS CT.
CARLSBAD, CA 92011

Prepared by

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issued date	Revisions	Revised By
--	1-18-08	Initial issue	Hsin Fu Shih

CERTIFICATE OF COMPLIANCE (SAR EVALUATION)

DATES OF TEST: January 18th 2008

APPLICANT: ADDRESS:	SIERRA WIRELESS INC. 2290 COSMOS CT. CARLSBAD, CA 92011
FCC ID: MODEL:	N7NC597 COMPASS 597
DEVICE CATEGORY: EXPOSURE CATEGORY:	Portable Device General Population/Uncontrolled Exposure

USB Wireless Modem is installed in three different host laptops for SAR testing			
Test Sample is a:	Production unit		
Rule Parts	Frequency Range [MHz]	The Highest SAR Values [1g_mW/g]	
FCC 22H	824 - 849	Host Device	Highest SAR Value
		Acer Aspire 5100	1.060
		Gateway T-Series	0.939
		Toshiba Satellite	0.821
FCC 24E	1850 - 1910	Host Device	Highest SAR Value
		Acer Aspire 5100	0.970
		Gateway T-Series	0.761
		Toshiba Satellite	0.873

This wireless portable device has been shown to be capable of compliance for localized specific absorption rate (SAR) for General Population/Uncontrolled Exposure limits specified in ANSI/IEEE Std. C95.1-1992 and had been tested in accordance with the measurement procedures specified in FCC OET 65 Supplement C (Edition 01-01) and RSS 102.

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 Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

Approved & Released For CCS By:

Hsin Fu Shih
Engineering Supervisor
Compliance Certification Services

Tested By:

Jonathan King
EMC Engineer
Compliance Certification Services

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1 DEVICE UNDER TEST (DUT) DESCRIPTION

USB Wireless Modem is installed in three different host laptops for SAR testing Host device — Distance between EUT and Phantom Acer Aspire 5100 — 12 mm Gateway T-Series — 16 mm Toshiba Satellite P105-S9337 — 19 mm	
Normal operation:	Lap-held position
Duty cycle:	100%
Antenna(s)	Encapsulating Monopole, Slot Antenna. Typical Antenna Gain: 824-89 4MHz - 1.3dBi (max), 0.5 dBi (avg) 1850-1990 MHz - 2.7dBi (max), 2.0 dBi (avg.)
Power supply:	Power supplied through the laptop computer (host device).

2 FACILITIES AND ACCREDITATION

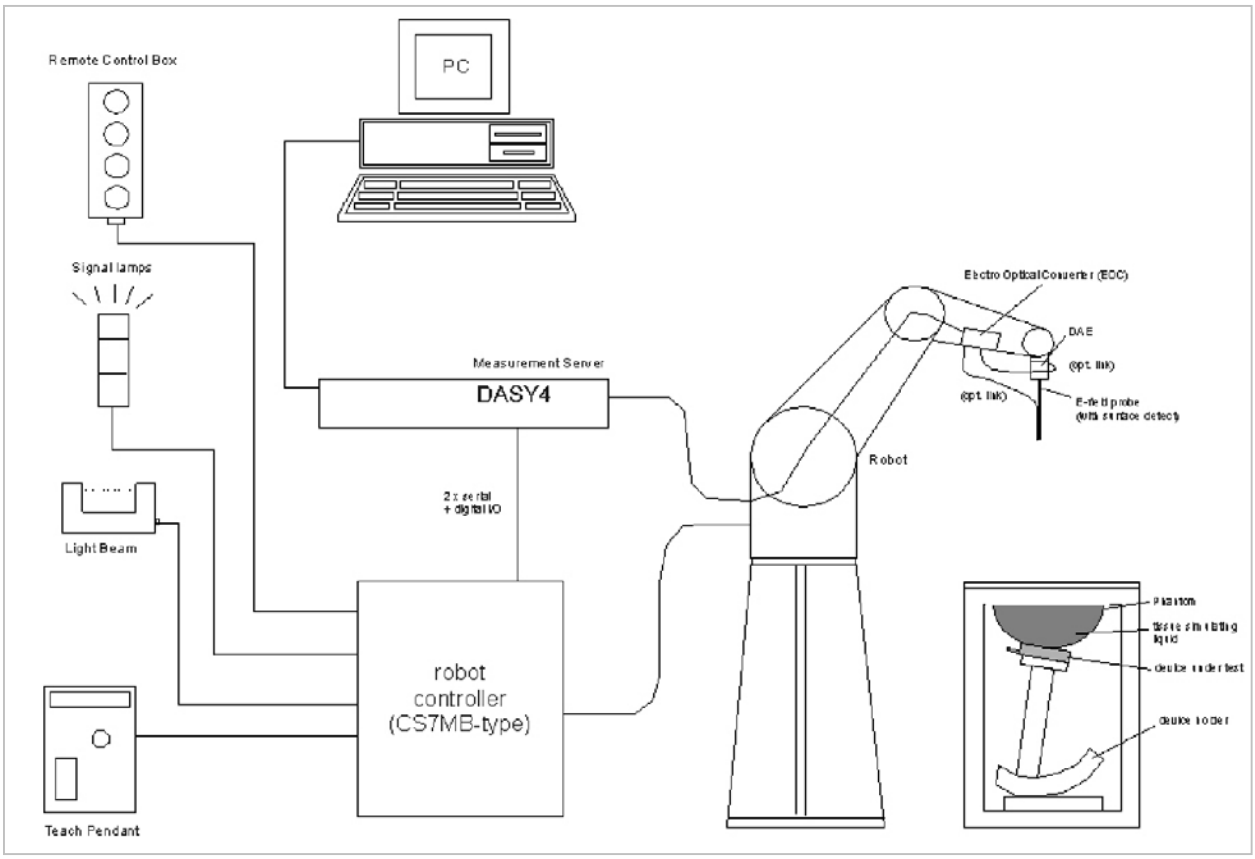
The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, CA 94538 USA. The sites are constructed in conformance with the requirements of ANSI C63.4, ANSI C63.7 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

NVLAP LAB CODE 200065-0

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

No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

3 SYSTEM DESCRIPTION



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

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

3.1 COMPOSITION OF INGREDIENTS FOR TISSUE SIMULATING LIQUIDS

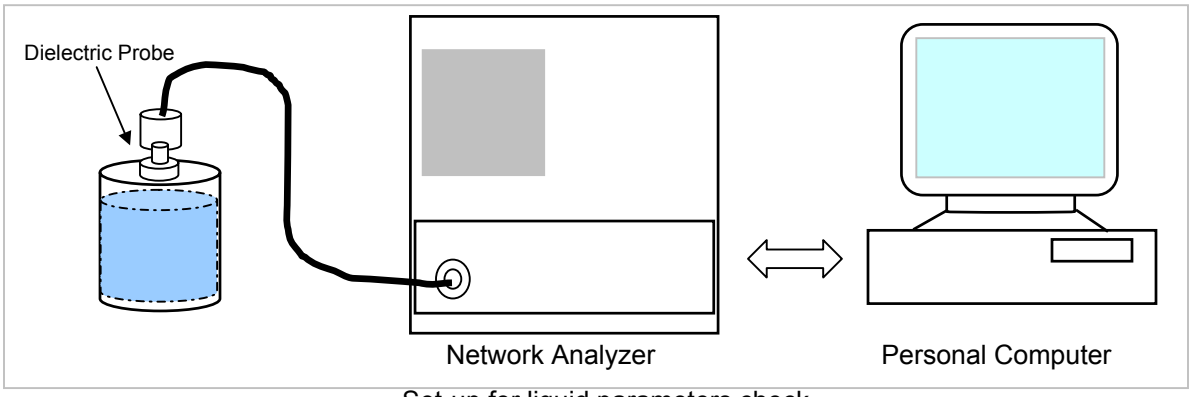
The following tissue formulations are provided for reference only as some of the parameters have not been thoroughly verified. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation.

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

Salt: 99+% Pure Sodium Chloride Sugar: 98+% Pure Sucrose
Water: De-ionized, 16 MΩ+ resistivity HEC: Hydroxyethyl Cellulose
DGBE: 99+% Di(ethylene glycol) butyl ether, [2-(2-butoxyethoxy)ethanol]
Triton X-100 (ultra pure): Polyethylene glycol mono [4-(1,1, 3, 3-tetramethylbutyl)phenyl]ether

4 SIMULATING 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. The relative permittivity and conductivity of the tissue material should be within ± 5% of the values given in the table below.



Set-up for liquid parameters check

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

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

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

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

4.1 SIMULATING LIQUID PARAMETER CHECK RESULT

Simulating Liquid Dielectric Parameters Check Result @ Muscle 1900 MHz

Room Ambient Temperature = 22°C; Relative humidity = 35% Measured by: Jonathan King

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
1900	21	15	e'	51.3558	Relative Permittivity (ε_r):	51.3558	53.3	-3.65	± 5
			e"	14.4999	Conductivity (σ):	1.53263	1.52	0.83	± 5

Liquid Check
Ambient temperature: 22 deg. C; Liquid temperature: 21 deg. C
January 17, 2008 09:39 AM

Frequency	e'	e"
1710000000.	52.0478	13.9047
1720000000.	52.0048	13.9437
1730000000.	51.9658	13.9760
1740000000.	51.9221	14.0266
1750000000.	51.8805	14.0506
1760000000.	51.8352	14.0850
1770000000.	51.7952	14.1190
1780000000.	51.7465	14.1531
1790000000.	51.7000	14.1787
1800000000.	51.6703	14.2049
1810000000.	51.6243	14.2307
1820000000.	51.5834	14.2560
1830000000.	51.5413	14.2862
1840000000.	51.5052	14.3295
1850000000.	51.4716	14.3566
1860000000.	51.4742	14.3741
1870000000.	51.4295	14.4006
1880000000.	51.4081	14.4355
1890000000.	51.3756	14.4554
1900000000.	**51.3558**	**14.4999**
1910000000.	51.3033	14.5452

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 Check Result @ Muscle 835 MHz

Room Ambient Temperature = 22°C; Relative humidity = 35% Measured by: Jonathan King

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
835	21	15	e'	55.857	Relative Permittivity (ε_r):	55.8570	55.2	1.19	± 5
			e"	20.9311	Conductivity (σ):	0.97229	0.97	0.24	± 5

Liquid Check
Ambient temperature: 22 deg. C; Liquid temperature: 21 deg. C
January 17, 2008 03:52 PM

Frequency	e'	e"
800000000.	56.1466	21.0585
805000000.	56.1150	21.0493
810000000.	56.0757	21.0316
815000000.	56.0251	20.9957
820000000.	55.9723	20.9665
825000000.	55.9397	20.9580
830000000.	55.9098	20.9541
835000000.	**55.8570**	**20.9311**
840000000.	55.8090	20.9176
845000000.	55.7679	20.8906
850000000.	55.6823	20.8592
855000000.	55.6242	20.8394
860000000.	55.5861	20.8121
865000000.	55.5171	20.7864
870000000.	55.4566	20.7793
875000000.	55.4120	20.7553
880000000.	55.3500	20.7386
885000000.	55.3018	20.7272
890000000.	55.2820	20.7046
895000000.	55.2119	20.6602
900000000.	55.1855	20.6564
905000000.	55.1355	20.6308
910000000.	55.1089	20.6220
915000000.	55.0724	20.6121
920000000.	55.0473	20.6027
925000000.	55.0058	20.5641
930000000.	54.9604	20.5634
935000000.	54.8934	20.5820
940000000.	54.8599	20.5560
945000000.	54.8135	20.5458
950000000.	54.7827	20.5697

The conductivity (σ) can be given as:

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

where f = target $f * 10^6$

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

5 SYSTEM PERFORMANCE CHECK

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

System Performance Check Measurement Conditions

- The measurements were performed in the flat section of the SAM twin phantom filled with Body simulating liquid of the following parameters.
- The DASY4 system with an Isotropic E-Field Probe EX3DV3-SN: 3554 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 5 x 5 x 7 fine cube was chosen for cube integration(dx=dy=7.5mm; dz=5mm).
  For 5 GHz band - Special 8x8x8 fine cube was chosen for cube integration(dx=dy=4.3mm; dz=3mm)
- Distance between probe sensors and phantom surface was set to 4 mm.
  For 5 GHz band - Distance between probe sensors and phantom surface was set to 2.0mm
- The dipole input power (forward power) was 250 mW±3%.
- The results are normalized to 1 W input power.

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

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

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

5.1 SYSTEM PERFORMANCE CHECK RESULTS

System Validation Dipole: D1900V2 SN:5d043

Date: January 17, 2008

Ambient Temperature = 22°C; Relative humidity = 30% Measured by: Jonathan King

Body Simulating Liquid			SAR (mW/g)		Normalized to 1 W	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)						
1900	22	15	1g	10.10	40.4	39.8	1.51	± 10
			10g	5.23	20.92	20.8	0.58	± 10

System Validation Dipole: D835V2 SN:4d002

Date: January 17, 2008

Ambient Temperature = 22°C; Relative humidity = 30% Measured by: Jonathan King

Body Simulating Liquid			SAR (mW/g)		Normalized to 1 W	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)						
835	22	15	1g	2.42	9.68	9.71	-0.31	± 10
			10g	1.59	6.36	6.38	-0.31	± 10

6 SAR MEASURMENT PROCEDURE

A summary of the procedure follows:

a) A measurement of the SAR value at a fixed location is used as a reference value for assessing the power drop of the EUT. The SAR at this point is measured at the start of the test, and then again at the end of the test.

b) The SAR distribution at the exposed flat section of the flat phantom is measured at a distance of 4 mm from the inner surface of the shell. The area covers the entire dimension of the EUT and the horizontal grid spacing is 15 mm x 15 mm. Based on this data, the area of the maximum absorption is determined by Spline interpolation. The first Area Scan covers the entire dimension of the EUT to ensure that the hotspot was correctly identified.

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

c) Around this point, a volume of X=Y= 30 and Z=21 mm is assessed by measuring 5 x 5 x 7 mm points. On the basis of this data set, the spatial peak SAR value is evaluated with the following procedure:

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

   (i) The data at the surface are extrapolated, since the centre of the dipoles is 1.2 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.3 mm. The extrapolation is based on a least square algorithm. A polynomial of the fourth order is calculated through the points in z-axes. This polynomial is then used to evaluate the points between the surface and the probe tip.

   (ii) The maximum interpolated value is searched with a straightforward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1 g and 10 g) are computed using the 3D-Spline interpolation algorithm. The 3D-Spline is composed of three one-dimensional splines with the “Not a knot”- condition (in x, y and z-direction). The volume is integrated with the trapezoidal – algorithm. One thousand points (10 x 10 x 10) are interpolated to calculate the averages.

   (iii) All neighbouring volumes are evaluated until no neighbouring volume with a higher average value is found.

   (iv) The SAR value at the same location as in Step (a) is again measured to evaluate the actual power drift.

6.1 DASY4 SAR MEASURMENT PROCEDURE

Step 1: Power Reference Measurement

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

Step 2: Area Scan

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

Step 3: Zoom Scan

Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The Zoom Scan measures 5 x 5 x 7 points within a cube whose base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the Zoom Scan evaluates the averaged SAR for 1 g and 10 g and displays these values next to the job's label.

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

Step 4: Power drift measurement

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

Step 5: Z-Scan

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

7 PROCEDURE USED TO ESTABLISH TEST SIGNAL

2.75G_CDMA2000 1xRTT

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

Application	Rev, License
CDMA2000 Mobil Test	B.10.11, L

1xRTT

- 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) > RC3 (Fwd3, Rvs3)
- FCH Service Option (SO) Setup > 32 (+ F-SCH)
- 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

Once “Active Cell” show “Connected ” then change “Rvs Power Ctrl” from “Active bits” to “**All Up bits**” to get the maximum power.

CDMA2000 1xRTT

Preliminary Measurement Results @ Middle channel

Radio Configuration (RC)	Service Option (SO)	Output Power (dBm)			
		Cellular Band @ M-ch		PCS Band @ M-ch	
		Average	Peak	Average	Peak
RC1 (Fwd1, Rvs1)	1 (Voice)				
	2 (Loopback)	24.58	28.18	24. 41	27.58
	3 (Voice)				
	55 (Loopback)	24.58	28.18	24.41	27.58
RC2 (Fwd2, Rvs2)	9 (Loopback)	24.58	28.18	24.41	27.58
	17 (Voice)				
	55 (Loopback)	24.58	28.18	24.41	27.58
RC3 (Fwd3, Rvs3)	1 (Voice)				
	2 (Loopback)	24.58	28.18	24.41	27.58
	3 (Voice)				
	55 (Loopback)	24.58	28.18	24.41	27.58
	32 (+ F-SCH)	**24.58**	28.19	**24.41**	27.59
	32 (+ SCH)	23.90	28.00	23.77	27.43
RC43 (Fwd4, Rvs3)	1 (Voice)				
	2 (Loopback)	24.58	28.18	24.40	27.61
	3 (Voice)				
	55 (Loopback)	24.58	28.18	24.40	27.59
	32 (+ F-SCH)	24.58	28.18	24.40	27.59
	32 (+ SCH)	23.90	28.08	23.77	27.43
RC54 (Fwd5, Rvs4)	9 (Loopback)	24.58	28.18	24.40	27.60
	17 (Voice)				
	55 (Loopback)	24.58	28.18	24.40	27.66

Worst-case Measurement Result @ Low, Middle and High Channel

Cellular Band

Radio Configuration (RC)	Service Option (SO)	Channel	Frequency	Output Power (dBm)	
				Average	Peak
RC3 (Fwd3, Rvs3)	32 (+ F-SCH)	1013	824.70	24.38	27.88
		384	836.52	24.58	28.19
		777	848.31	24.54	28.10

PCS Band

Radio Configuration (RC)	Service Option (SO)	Channel	Frequency	Output Power (dBm)	
				Average	Peak
RC3 (Fwd3, Rvs3)	32 (+ F-SCH)	25	1851.25	24.31	27.52
		600	1880.00	24.41	27.59
		1175	1908.75	23.90	26.76

3G_CDMA2000 1xEV-DO Release 0 (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.06.06, L

FTAP

- Call Setup > Shift & Preset
- Protocol Rev > 0 (1xEV-DO)
- Access Network Info > Cell Parameters > Sector ID > 00000000 > Subnet Mask > 0
- Generator Info > Termination Parameters > Max Forward Packet Duration > 16 Slots

- Application Config > Enhanced Test Application Protocol > FTAP
- FTAP Rate > 307.2 kbps (2 Slot, QPSK)
- Rvs Power Ctrl > All Up bits (to get the maximum power)

RTAP

- Call Setup > Shift & Preset
- Protocol Rev > 0 (1xEV-DO)
- Access Network Info > Cell Parameters > Sector ID > 00000000 > Subnet Mask > 0
- Generator Info > Termination Parameters > Max Forward Packet Duration > 16 Slots

- Application Config > Enhanced Test Application Protocol > RTAP
- RTAP Rate > 153.6 kbps
- Rvs Power Ctrl > All Up bits (to get the maximum power)

3G_CDMA2000 1xEV-DO Release 0 (Rel 0)

Preliminary Measurement Results @ Middle channel

Cellular Band - RTAP					Cellular Band - FTAP				
			Conducted power (dBm)					Conducted power (dBm)	
Channel	f (MHz)	RTAP Rate	Average	Peak	Channel	f (MHz)	FTAP Rate	Average	Peak
384	836.52	9.6	24.22	28.20	384	836.52	307.2 kbps (2 slot, QPSK)	24.33	28.22
		19.2	24.40	28.23					
		38.4	24.47	28.25					
		76.8	24.56	28.27					
		153.6	**24.57**	**28.28**					

PCS Band - RTAP					PCS Band - FTAP				
			Conducted power (dBm)					Conducted power (dBm)	
Channel	f (MHz)	RTAP Rate	Average	Peak	Channel	f (MHz)	FTAP Rate	Average	Peak
600	1880.00	9.6	24.10	27.42	600	1880.00	307.2 kbps (2 slot, QPSK)	24.22	27.49
		19.2	24.13	27.42					
		38.4	24.20	27.38					
		76.8	24.24	27.30					
		153.6	**24.40**	**27.80**					

Worst-case Measurement Result @ Low, Middle and High Channel

Cellular Band - RTAP					Cellular Band - FTAP				
			Conducted power (dBm)					Conducted power (dBm)	
Channel	f (MHz)	RTAP Rate	Average	Peak	Channel	f (MHz)	FTAP Rate	Average	Peak
1013	824.70	153.6	24.27	28.20	1013	824.70	307.2 kbps (2 slot, QPSK)	24.04	27.80
384	836.52		24.57	28.28	384	836.52		24.33	28.22
777	848.31		24.61	28.30	777	848.31		24.26	27.95

PCS Band - RTAP					PCS Band - FTAP				
			Conducted power (dBm)					Conducted power (dBm)	
Channel	f (MHz)	RTAP Rate	Average	Peak	Channel	f (MHz)	FTAP Rate	Average	Peak
25	1851.25	153.6	24.27	27.26	25	1851.25	307.2 kbps (2 slot, QPSK)	24.06	27.42
600	1880.00		24.40	27.80	600	1880.00		24.22	27.49
1175	1908.75		23.18	26.28	1175	1908.75		23.12	26.60

3G_CDMA2000 1xEV-DO Revision A (Rev 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.06.06, L

FETAP

- Call Setup > Shift & Preset
- Protocol Rev > A (1xEV-DO-A)
- Access Network Info > Cell Parameters > Sector ID > 00000000 > Subnet Mask > 0
- Generator Info > Termination Parameters > Max Forward Packet Duration >16 Slots

- Application Config > Enhanced Test Application Protocol > FETAP
- FTAP Rate > 307.2 kbps (2 Slot, QPSK)
- Protocol Subtype Config > Release A Physical Layer Subtype > Subtype 0
- Rvs Power Ctrl > All Up bits (to get the maximum power)

RETAP

- Call Setup > Shift & Preset
- Protocol Rev > A (1xEV-DO-A)
- 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)

- Application Config > Enhanced Test Application Protocol > RETAP
- F-Traffic Format > 4 (1024, 2,128) Canonical (307.2k, QPSK)
- R-Data Pkt Size > 4096 (for PCS band),12288 (for Cellular band)
- Protocol Subtype Config > Release A Physical Layer Subtype > Subtype 2
  > PL Subtype 2 Access Channel MAC Subtype > Default (Subtype 0)
- Rvs Power Ctrl > All Up bits (to get the maximum power)

3G-CDMA2000 1xEV-DO Revision A (Rev A)

Preliminary Measurement Results @ Middle channel

Cellular Band - RETAP

Channel	f (MHz)	R-Data Pkt Size	Conducted power (dBm) Average	Peak
384	836.52	128	24.00	28.32
		256	24.09	28.28
		512	24.17	28.28
		768	24.27	28.28
		1024	24.30	28.25
		1536	24.40	28.32
		2048	24.45	28.19
		3072	24.62	28.38
		4096	24.64	28.32
		6144	24.65	28.38
		8192	24.68	28.39
		12288	**24.73**	**28.41**

Cellular Band - FETAP

Channel	f (MHz)	FTAP Rate	Conducted power (dBm) Average	Peak
384	836.52	307.2 (2 slot)	24.43	28.27
		307.2 (4 slot)	24.20	28. 19

PCS Band - RETAP

Channel	f (MHz)	R-Data Pkt Size	Conducted power (dBm) Average	Peak
600	1880.00	128	24.00	27.51
		256	24.01	27.51
		512	24.10	27.42
		768	24.14	27.42
		1024	24.18	27.42
		1536	24.23	27.42
		2048	24.27	27.38
		3072	24.43	27.53
		4096	**24.44**	**27.91**
		6144	24.40	27.56
		8192	24.40	27.60
		12288	24.42	27.56

PCS Band - FETAP

Channel	f (MHz)	FTAP Rate	Conducted power (dBm) Average	Peak
600	1880	307.2 (2 slot)	24.18	27.42
		307.2 (4 slot)	23.92	27.23

Worst-case Measurement Result @ Low, Middle and High Channel

Cellular Band - RETAP

Channel	f (MHz)	R-Data Pkt Size	Conducted power (dBm) Average	Peak
1013	824.70	12288	24.47	28.23
384	836.52		24.73	28.30
777	848.31		24.68	28.30

Cellular Band - FETAP

Channel	f (MHz)	FTAP Rate	Conducted power (dBm) Average	Peak
1013	824.70	307.2 (2 slot)	23.95	27.90
384	836.52		24.43	28.27
777	848.31		24.21	28.10

PCS Band – RETAP

Channel	f (MHz)	R-Data Pkt Size	Conducted power (dBm) Average	Peak
25	1851.25	4096	24.34	27.50
600	1880.00		24.44	27.91
1175	1908.75		23.22	26.48

PCS Band – FETAP

Channel	f (MHz)	FTAP Rate	Conducted power (dBm) Average	Peak
25	1851.25	307.2 (2 slot)	24.06	27.38
600	1880.00		24.18	27.42
1175	1908.75		23.00	26.47

8 SAR MEASURMENT RESULTS

8.1 PCS BAND

8.1.1 HOST LAPTOP – ACER

Note: The following modes were chosen based on conducted output power measurement results and previous original CCS project # 07U11455-5.

Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
CDMA2000 - 1xRTT RC3 SO32 (+F-SCH)				
25	1851.25	0.765	0.000	0.765
600	1880.00	0.887	-0.085	0.904
1175	1908.75	0.839	-0.113	0.861
1xEV-DO Rev A (RETAP)				
25	1851.25	0.871	-0.020	0.875
600	**1880.00**	**0.970**	**0.000**	**0.970**
1175	1908.75	0.806	-0.180	0.840

Notes:

1) The exact method of extrapolation is Measured SAR x 10^(-drift/10). The SAR reported at the end of the measurement process by the DASY4 system can be scaled up by the Power drift to determine the SAR at the beginning of the measurement process.
2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional.
3) Please see attachments for the detailed measurement data and plots showing the maximum SAR location of the EUT.

8.1.2 HOST LAPTOP - GATEWAY

Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
CDMA2000 1xRTT RC3 SO32 (+F-SCH)				
25	1851.25			
600	1880.00	0.693	0.000	0.693
1175	1908.75			
1xEV-DO Rev A (RETAP)				
25	1851.25			
600	**1880.00**	**0.761**	**-0.108**	**0.780**
1175	1908.75			

Notes:

1) The exact method of extrapolation is Measured SAR x 10^(-drift/10). The SAR reported at the end of the measurement process by the DASY4 system can be scaled up by the Power drift to determine the SAR at the beginning of the measurement process.
2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional.
3) Please see attachments for the detailed measurement data and plots showing the maximum SAR location of the EUT.

8.1.3 HOST LAPTOP - TOSHIBA

Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
CDMA2000 RC3 SO32 (+F-SCH)				
25	1851.25			
600	1880.00	0.770	0.000	0.770
1175	1908.75			
1xEV-DO Rev A (RETAP)				
25	1851.25			
600	**1880.00**	**0.873**	**0.000**	**0.873**
1175	1908.75			

Notes:

1) The exact method of extrapolation is Measured SAR x 10^(-drift/10). The SAR reported at the end of the measurement process by the DASY4 system can be scaled up by the Power drift to determine the SAR at the beginning of the measurement process.
2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional.
3) Please see attachments for the detailed measurement data and plots showing the maximum SAR location of the EUT.

8.2 CELL BAND

8.2.1 HOST LAPTOP - ACER

Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
CDMA2000 RC3 SO32 (+F-SCH)				
1013	**824.70**	**1.060**	**0.000**	**1.060**
384	836.52	1.020	0.000	1.020
777	848.31	0.870	0.000	0.870
CDMA2000 1XEV-DO Rel 0 (RTAP)				
1013	824.70	0.815	0.000	0.815
384	836.52	0.783	0.000	0.783
777	848.31	0.964	-0.133	0.994

`Notes:

1) The exact method of extrapolation is Measured SAR x 10^(-drift/10). The SAR reported at the end of the measurement process by the DASY4 system can be scaled up by the Power drift to determine the SAR at the beginning of the measurement process.
2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional.
3) Please see attachments for the detailed measurement data and plots showing the maximum SAR location of the EUT.

8.2.2 HOST LAPTOP - GATEWAY

Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
CDMA2000 RC3 SO32 (+F-SCH)				
1013	824.70			
384[5)]	**836.52**	**0.939**	**0.000**	**0.939**
777	848.31			
CDMA2000 1XEV-DO Rel 0 (RTAP)				
1013	824.70			
384[6)]	836.52	0.728	-0.096	0.744
777	848.31			

Notes:

1) The exact method of extrapolation is Measured SAR x 10^(-drift/10). The SAR reported at the end of the measurement process by the DASY4 system can be scaled up by the Power drift to determine the SAR at the beginning of the measurement process.
2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional.
3) Please see attachments for the detailed measurement data and plots showing the maximum SAR location of the EUT.

8.2.3 HOST LAPTOP - TOSHIBA

Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
CDMA2000 1xRTT RC3 SO32 (+F-SCH)				
1013	824.70			
384[5)]	**836.52**	**0.821**	**0.000**	**0.821**
777	848.31			
CDMA2000 1XEV-DO Rel 0 (RETAP)				
1013	824.70			
384[6)]	836.52	0.636	0.000	0.636
777	848.31			

Notes:

1) The exact method of extrapolation is Measured SAR x 10^(-drift/10). The SAR reported at the end of the measurement process by the DASY4 system can be scaled up by the Power drift to determine the SAR at the beginning of the measurement process.
2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional.
3) Please see attachments for the detailed measurement data and plots showing the maximum SAR location of the EUT.

9 MEASURMENT UNCERTAINTY

9.1 MEASURMENT UNCERTAINTY FOR 300 MHz – 3000 MHz

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

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

10 EQUIPMENT LIST AND CALIBRATION

Name of Equipment	Manufacturer	Type/Model	Serial Number	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	US39173569	2	14	2008
E-Field Probe	SPEAG	EX3DV4	3554	4	24	2008
Thermometer	ERTCO	639-1S	1718	8	30	2008
Data Acquisition Electronics	SPEAG	DAE3 V1	500	11	16	2008
System Validation Dipole	SPEAG	D835V2	4d002	6	22	2009
System Validation Dipole	SPEAG	D1900V2	5d043	1	23	2008
Signal Generator	R&S	SMP 04	DE34210	2	16	2009
Power Meter	Giga-tronics	8651A	8651404	4	3	2008
Power Sensor	Giga-tronics	80701A	1834588	4	17	2008
Amplifier	Mini-Circuits	ZHL-42W	D072701-5			N/A
Radio Communication Tester	Agilent	E5515C	GB46160222	6	29	2008
Simulating Liquid	CCS	M835	N/A	Within 24 hrs of first test		
Simulating Liquid	CCS	M1900	N/A	Within 24 hrs of first test		

11 PHOTOS

EUT

Host Device: Acer Aspire 5100

Host Device: Gateway T-Series

Host Device: Toshiba Satellite

12 ATTACHMENTS

No.	Contents	No. Of Pages
1	System Performance Check Plots	2
2-1	SAR Test Plots – PCS Band	11
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3	Certificate of E-Field Probe - EX3DV4SN3554	10
4	Certificate of System Validation Dipole - D835V2 SN:4d002	9
5	Certificate of System Validation Dipole - D1900V2 SN:5d043	9

END OF REPORT