SAR Evaluation Report

IN ACCORDANCE WITH THE REQUIREMENTS OF
FCC OET BULLETIN 65 SUPPLEMENT C
IC RSS 102 ISSUE 1 : 1999

FOR

EXPRESSCARD WIRELESS MODEM

MODEL: AirCard 880E

FCC ID: N7NAC880E
IC: 2417C-AC880E

REPORT NUMBER: 07U11121-4B

ISSUE DATE: JUNE 27, 2007

Prepared for

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Prepared by

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issued date	Revisions	Revised By
--	June 21, 2007	Initial issue	Sunny Shih
B	June 27, 2007	Corrected some typos	Sunny Shih

CERTIFICATE OF COMPLIANCE (SAR EVALUATION)

DATES OF TEST: June 19 - 20, 2007

APPLICANT: ADDRESS:	13811 WIRELESS WAY RICHMOND, BC V6V 3A4 CANADA
FCC ID: IC ID: MODEL:	N7NAC880E 2417C-AC880E AirCard 880E
DEVICE CATEGORY: EXPOSURE CATEGORY:	Portable Device General Population/Uncontrolled Exposure

EXPRESS CARD WIRELESS MODEM IS INSTALLED IN 3 DIFFERENT HOST LAPTOPS			
Test Sample is a:	Production unit		
Host devices:	Host Device		Dist. Between EUT to Phantom
	HP, Pavilion dv8000		19 mm
	Sony, VGN-C140G		19 mm
	Toshiba, Satellite A105		18 mm
Rule Parts	Frequency Range [MHz]	The Highest SAR Values [1g_mW/g]	
FCC 22H	824 - 849	HP	0.727
		Sony	0.626
		Toshiba	**0.947**
FCC 24E	1850 – 1910	**HP**	**0.794**
		Sony	0.597
		Toshiba	0.570

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:	Tested By:
Hsin Fu Shih	Jonathan King
Senior Engineer	EMC Engineer
Compliance Certification Services	Compliance Certification Services

TABLE OF CONTENTS

1 DEVICE UNDER TEST (DUT) DESCRIPTION

EXPRESS CARD WIRELESS MODEM INSTALLED IN 3 DIFFERENT LAPTOPS		
Normal operation:	Lap-held position	
Duty cycle:	GPRS	Duty Cycle
	1 Slot	12.5%
	2 Slots	25%
	3 Slots	37.5%
	4 Slots	50%
	UMTS and UMTS with HSDPA	100%
Host Device(s):	Manufacturer:	Model
	HP	Pavilion dv8000
	Sony	VGN-C140G
	Toshiba	PSAA8U-14N02K
Power supply:	Power supplied through the laptop computer (host device).	

2 FACILITIES AND ACCREDITATION

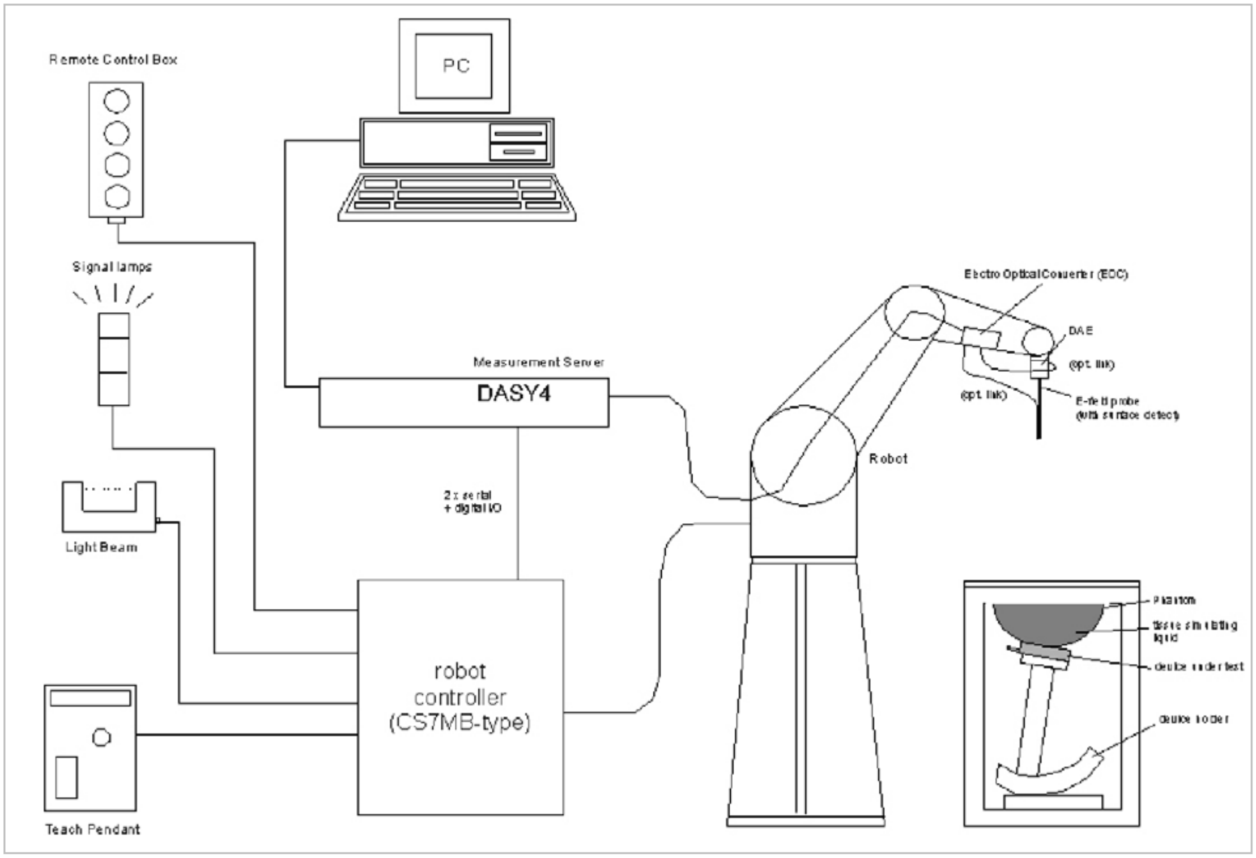
The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, CA 94538 USA. The sites are constructed in conformance with the requirements of ANSI C63.4, ANSI C63.7 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, “Radio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

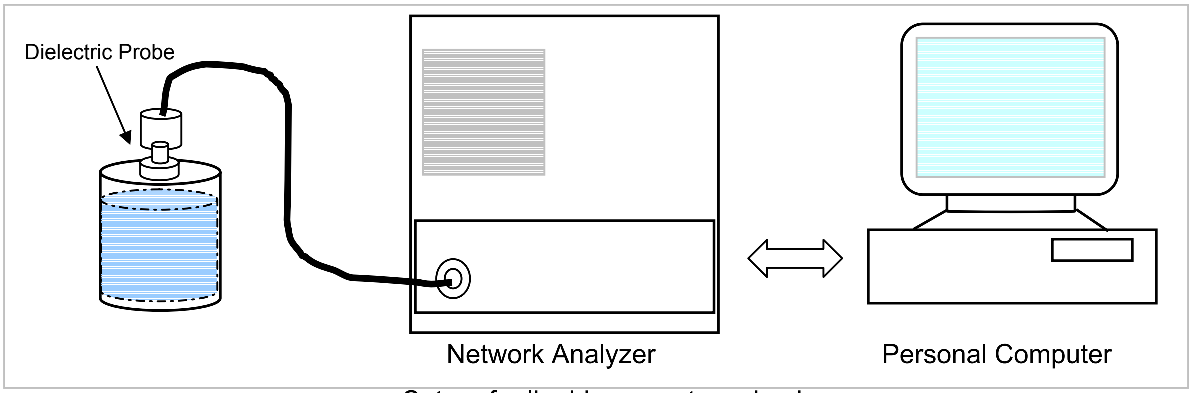
The following tissue formulations are provided for reference only as some of the parameters have not been thoroughly verified. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation.

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)

Simulating Liquid Dielectric Parameters Check Result @ Muscle 835 MHz

Room Ambient Temperature = 23°C; Relative humidity = 45% Measured by: Jonathan King

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
835	22	15	e'	55.1946	Relative Permittivity (ϵ_r):	55.1946	55.2	-0.01	± 5
			e"	21.1143	Conductivity (σ):	0.98080	0.97	1.11	± 5

Liquid Check
Ambient temperature: 23 deg. C; Liquid temperature: 22 deg C
June 19, 2007 09:25 PM

Frequency	e'	e"
800000000.	55.5097	21.2896
805000000.	55.4883	21.2667
810000000.	55.4385	21.2258
815000000.	55.3898	21.1849
820000000.	55.3339	21.1527
825000000.	55.2932	21.1433
830000000.	55.2498	21.1237
835000000.	**55.1946**	**21.1143**
840000000.	55.1236	21.0890
845000000.	55.0935	21.0816
850000000.	55.0521	21.0129
855000000.	54.9915	21.0065
860000000.	54.9401	20.9643
865000000.	54.9057	20.9915
870000000.	54.8489	20.9304
875000000.	54.7910	20.8918
880000000.	54.7394	20.8939
885000000.	54.7071	20.8884
890000000.	54.6630	20.8770
895000000.	54.6589	20.8183
900000000.	54.6480	20.8202

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 Check Result @ Muscle 900 MHz

Room Ambient Temperature = 23°C; Relative humidity = 45% Measured by: Jonathan King

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
900	22	15	e'	54.4296	Relative Permittivity (ϵ_r):	54.4296	55.0	-1.04	± 5
			e"	20.4310	Conductivity (σ):	1.02294	1.05	-2.58	± 5

Liquid Check
Ambient temperature: 23 deg. C; Liquid temperature: 22 deg C
June 19, 2007 09:04 PM

Frequency	e'	e"
850000000.	54.7925	20.5877
855000000.	54.7515	20.5766
860000000.	54.7230	20.5391
865000000.	54.6686	20.5442
870000000.	54.6232	20.5137
875000000.	54.5786	20.4832
880000000.	54.5236	20.4783
885000000.	54.4789	20.4695
890000000.	54.4478	20.4660
895000000.	54.4321	20.4459
900000000.	**54.4296**	**20.4310**
905000000.	54.3854	20.4274
910000000.	54.3475	20.4111
915000000.	54.3219	20.3847
920000000.	54.2715	20.3840
925000000.	54.2025	20.3603
930000000.	54.1776	20.3546
935000000.	54.1167	20.3333
940000000.	54.0588	20.3414
945000000.	54.0292	20.3177
950000000.	53.9782	20.3131

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 Check Result @ Muscle 1900 MHz

Room Ambient Temperature = 23°C; Relative humidity = 45% Measured by: Jonathan King

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
1900	22	15	e'	51.9783	Relative Permittivity (ϵ_r):	51.9783	53.3	-2.48	± 5
			e''	13.6794	Conductivity (σ):	1.44590	1.52	-4.87	± 5

Liquid Check
Ambient temperature: 23 deg. C; Liquid temperature: 22 deg. C
June 19, 2007 09:13 AM

Frequency	e'	e''
1710000000.	52.6369	12.9437
1720000000.	52.6145	12.9890
1730000000.	52.5963	13.0235
1740000000.	52.5647	13.0654
1750000000.	52.5032	13.1250
1760000000.	52.4849	13.1559
1770000000.	52.4441	13.2131
1780000000.	52.3926	13.2507
1790000000.	52.3488	13.2821
1800000000.	52.3332	13.3148
1810000000.	52.2979	13.3430
1820000000.	52.2778	13.3617
1830000000.	52.2435	13.4072
1840000000.	52.1933	13.4239
1850000000.	52.1701	13.4530
1860000000.	52.1498	13.4831
1870000000.	52.0980	13.5237
1880000000.	52.0592	13.5886
1890000000.	52.0102	13.6237
1900000000.	**51.9783**	**13.6794**
1910000000.	51.9253	13.7332

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: 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 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.

Reference SAR Values for body-tissue

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: D900V2 SN: 108

Date: June 19, 2007

Ambient Temperature = 23°C; Relative humidity = 45% Measured by: Jonathan King

Body Simulating Liquid			SAR (mW/g)		Normalized to 1 W	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)						
900	22	15	1g	2.83	11.32	11.1	1.98	± 10
			10g	1.84	7.36	7.17	2.65	± 10

System Validation Dipole: D1900V2 SN:5d043

Date: June 19, 2007

Ambient Temperature = 23°C; Relative humidity = 45% 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	9.43	37.72	39.8	-5.23	± 10
			10g	4.98	19.92	20.8	-4.23	± 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

The following setting is used to configure the CMU200 to establish the link for SAR testing.

Service selection ➔ Test Mode A – Auto Slot Config. ➔ off
Main Service ➔ Packet Data
Network Support ➔ GSM+GPRS
Slot Config ➔ 33 dBm for GPRS850; 30 dBm for GPRS1900
27 dBm for EGPRS850; 26 dBm for EGPRS1900

Conducted power:

GSM850

Channel	Frequency (MHz)	GPRS			
		1 slot Power (dBm)	2 slots Power (dBm)	3 slots Power (dBm)	4 slots Power (dBm)
128	824.2	32.1	32.1	29.2	26.3
192	837.0	32.1	32.1	29.1	26.2
251	848.8	32.1	32.0	29.1	26.2

GSM850

Channel	Frequency (MHz)	EGPRS			
		1 slot Power (dBm)	2 slots Power (dBm)	3 slots Power (dBm)	4 slots Power (dBm)
128	824.2	27.3	27.3	27.3	27.3
192	837.0	27.3	27.3	27.2	27.3
251	848.8	27.2	27.2	27.2	27.2

GSM1900

Channel	Frequency (MHz)	GPRS			
		1 slot Power (dBm)	2 slots Power (dBm)	3 slots Power (dBm)	4 slots Power (dBm)
512	1850.2	29.4	29.4	29.4	29.3
661	1880.0	29.7	29.9	29.7	29.6
810	1909.8	29.8	29.8	29.7	29.7

GSM1900

Channel	Frequency (MHz)	EGPRS			
		1 slot Power (dBm)	2 slots Power (dBm)	3 slots Power (dBm)	4 slots Power (dBm)
512	1850.2	26.5	26.5	26.4	26.4
661	1880.0	26.8	26.8	26.7	26.7
810	1909.8	26.8	26.8	26.8	26.8

WCDMA + HSDPA Procedure
The following settings were used to configure the Radio Communication Tester, CMU200.

- Connection
    - Dedicated Chan (CS): RMC
    - Band Select:
        - Band VI for US Cell Band
        - Band II for US PCS Band
        - Band I for 2100MHz band
- Network
    - Requested UE Data
        - Authentication: Off
        - Security: Off
        - IMEI: ON
        - RLC Reestablish: Off
- BS Signal
    - Node –B Setting
        - RF Channel Downlink
            - Band VI: 4357 / 4407 / 4458
            - Band II: 9662 / 9800 / 9938
            - Band I: 10562 / 10700 / 10838
    - Circuit Switched
        - RMC Setting
            - Reference Channel Type: 12.2Kbps
            - Test Mode: Loop Mode 2
            - Channel Data Source DTCH: All One
        - Signaling RAB Setting
            - SRB Cell DCH: 13.6 Kbps
- UE Signal
    - Analyzer Setting
        - RF Channel Uplink:
            - Band VI: 4132 / 4182 / 4233
            - Band II: 9262 / 9400 / 9538
            - Band I; 9612 / 9750 / 9888
        - UE power Control
            - Max Allowed UE Power: 25
    - UE Gain Factor
        - HSDPA (for WCDMA + HSDPA mode only)
            - βc: 9
            - βd: 15
            - ΔACK: 5
            - ΔNACK: 5
            - ΔCQI: 2

RF Output Power Measurement Results – for RMC Channel Type

Channel Type: 12.2K RMC

Cell Band

Channel	Frequency (MHz)	Ch Power (dBm)
4132	826.4	22.5
4182	836.4	22.6
4233	846.6	22.7

PCS Band

Channel	Frequency (MHz)	Ch Power (dBm)
9262	1852.4	22.4
9400	1880.0	22.4
9538	1907.6	22.4

RF Output Power Measurement Results - for 12.2k RMC HSDPA Channel Type

12.2k RMC + HSDPA

Cell Band

Channel	Frequency (MHz)	Ch Power (dBm)
4132	826.4	22.6
4182	836.4	22.5
4233	846.6	22.6

PCS Band

Channel	Frequency (MHz)	Ch Power (dBm)
9262	1852.4	22.7
9400	1880.0	22.6
9538	1907.6	22.6

8 SAR MEASURMENT RESULTS

8.1 CELL BAND

8.1.1 HOST DEVICE - TOSHIBA

This host was chosen for the full investigation due to its highest GPRS 2 Slots measurement

Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated1) SAR 1g (mW/g)
GPRS 1 Slot				
128	824.2			0.000
192	837.0	0.497	-0.054	0.503
251	848.8			0.000
GPRS 2 Slots				
128	**824.2**	**0.947**	**0.000**	**0.947**
192	837.0	0.868	-0.015	0.871
251	848.8	0.820	0.000	0.820
GPRS 3 Slots				
128	824.2			0.000
192	837.0	0.669	-0.041	0.675
251	848.8			0.000
GPRS 4 Slots				
128	824.2			0.000
192	837.0	0.465	-0.059	0.471
251	848.8			0.000

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.

HOST DEVICE - TOSHIBA

EGPRS 4 Slot

Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated1) SAR 1g (mW/g)
128	824.2			0.000
192	837.0	0.444	-0.057	0.450
251	848.8			0.000

WCDMA

Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated1) SAR 1g (mW/g)
4132	826.40			0.000
4182	836.40	0.330	0.000	0.330
4233	846.60			0.000

HSDPA

Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated1) SAR 1g (mW/g)
4132	826.40			0.000
4182	836.40	0.348	0.000	0.348
4233	846.60			0.000

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 DEVICE - SONY

GPRS 2 Slot

Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated1) SAR 1g (mW/g)
128	824.2			0.000
192	837.0	0.604	-0.154	0.626
251	848.8			0.000

HSDPA

Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated1) SAR 1g (mW/g)
4132	826.40			0.000
4182	836.40	0.217	0.000	0.217
4233	846.60			0.000

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 DEVICE - HP

GPRS 2 Slot

Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated1) SAR 1g (mW/g)
128	824.2			0.000
192	837.0	0.727	-0.117	0.747
251	848.8			0.000

HSDPA

Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated1) SAR 1g (mW/g)
4132	826.40			0.000
4182	836.40	0.274	0.000	0.274
4233	846.60			0.000

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 PCS BAND

8.2.1 HOST DEVICE - TOSHIBA

GPRS 4 Slots

Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated1) SAR 1g (mW/g)
512	1850.2			0.000
661	1880.0	0.551	-0.147	0.570
810	1909.8			0.000

EGPRS 4 Slots

Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated1) SAR 1g (mW/g)
9262	1852.4			0.000
9400	1880.0	0.320	-0.182	0.334
9538	1907.4			0.000

WCDMA

Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated1) SAR 1g (mW/g)
9262	1852.4			0.000
9400	1880.0	0.473	0.000	0.473
9538	1907.4			0.000

HSDPA

Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated1) SAR 1g (mW/g)
9262	1852.4			0.000
9400	1880.0	0.493	0.000	0.493
9538	1907.4			0.000

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 DEVICE - HP

GPRS 4 Slots				
Channel	**f (MHz)**	**Measured SAR 1g (mW/g)**	**Power Drift (dB)**	**Extrapolated1) SAR 1g (mW/g)**
512	**1850.2**	**0.794**	**0.000**	**0.794**
661	1880.0	0.702	0.000	0.702
810	1909.8	0.666	0.000	0.666
HSDPA				
Channel	**f (MHz)**	**Measured SAR 1g (mW/g)**	**Power Drift (dB)**	**Extrapolated1) SAR 1g (mW/g)**
9262	1852.4			0.000
9400	1880.0	0.548	0.000	0.548
9538	1907.4			0.000

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 DEVICE - SONY

GPRS 4 Slots				
Channel	**f (MHz)**	**Measured SAR 1g (mW/g)**	**Power Drift (dB)**	**Extrapolated1) SAR 1g (mW/g)**
512	1850.2			0.000
661	1880.0	0.583	-0.106	0.597
810	1909.8			0.000

HSDPA				
Channel	**f (MHz)**	**Measured SAR 1g (mW/g)**	**Power Drift (dB)**	**Extrapolated1) SAR 1g (mW/g)**
9262	1852.4			0.000
9400	1880.0	0.397	0.000	0.397
9538	1907.4			0.000

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	11	7	2007
Data Acquisition Electronics	SPEAG	DAE3 V1	427	11	16	2007
System Validation Dipole	SPEAG	D900V2	108	2	22	2008
System Validation Dipole	SPEAG	D1900V2	5d043	1	23	2008
Signal Generator	R&S	SMP 04	DE34210	10	9	2007
Power Meter	Giga-tronics	8651A	8651404	4	3	2008
Amplifier	Mini-Circuits	ZHL-42W	D072701-5	N/A		
Radio Communication Tester	R &S	CMU 200	106291	4	16	2008
Simulating Liquid	CCS	M835	N/A	Within 24 hrs of first test		
Simulating Liquid	CCS	M900	N/A	Within 24 hrs of first test		
Simulating Liquid	CCS	M1900	N/A	Within 24 hrs of first test		

11 PHOTOS

EUT - AirCard 880E

Host Device – HP Pavilion dv8000

Host Device – Sony VGN-C140G

Host Device – Toshiba PSAA8U-14N02K

12 ATTACHMENTS

No.	Contents	No. Of Pages
1	System Performance Check Plots	4
2-1	Cell Band SAR Test Plots	14
2-2	PCS Band SAR Test Plots	11
3	Certificate of E-Field Probe - EX3DV4SN3554	10
4	Certificate of System Validation Dipole - D1900V2 SN:5d043	9
5	Certificate of System Validation Dipole - D900V2 SN:108	9

END OF REPORT