FCC OET BULLETIN 65 SUPPLEMENT C

SAR EVALUATION REPORT

FOR

USB WIRELESS MODEM

MODEL: Compass 888

FCC ID: N7NC888

IC: 2417C-C888

REPORT NUMBER: 08U11897-3A1

ISSUE DATE: SEPTEMBER 18, 2008

Prepared for

SIERRA WIRELESS, INC
13811 WIRELESS WAY
RICHMOND, BC V6V 3A4 CANADA

Prepared by

COMPLIANCE CERTIFICATION SERVICES
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issued date	Revisions	Revised By
--	JULY 23, 2008	Initial issue	Sunny Shih
A	September 3, 2008	Additional testing based on FCC reviewer's comments	Sunny Shih
A1	September 18, 2008	Update WCDMA output power	Sunny Shih

TABLE OF CONTENTS

1 ATTESTATION OF TEST RESULTS

COMPANY NAME:	SIERRA WIRELESS, INC 13811 WIRELESS WAY RICHMOND, BC V6V 3A4 CANADA
EUT DESCRIPTION:	USB wireless modem
MODEL:	Compass 888
DEVICE CATEGORY:	Portable
EXPOSURE CATEGORY:	General Population/Uncontrolled Exposure
DATE TESTED:	July 18 – 20, 2008 September 1 – 2, 2008
THE HIGHEST SAR VALUES:	See Table below

FCC / IC Rule Parts	Frequency Range [MHz]	The Highest SAR(1 g) Values
22H	824 - 849	0.626 mW/g (horizontal-up with laptop)
24E	1850 - 1910	1.19 mW/g (horizontal-up with laptop)

REFERENCE STANDARD/TEST PROCEDURE
FCC OET BULLETIN 65 SUPPLEMENT C and KDB447498 Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies, Published on May 15, 2008

Compliance Certification Services, Inc. (CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by CCS based on interpretations and/or observations of test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

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

SUNNY SHIH
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:

JONATHAN KING
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2 TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC OET Bulletin 65 Supplement C and in consultation with the FCC lab staff.

3 FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.
CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://www.ccsemc.com.

4 CALIBRATION AND UNCERTAINTY

4.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

5 MEASUREMENT UNCERTAINTY

Measurement uncertainty for 300 MHz – 3000 MHz

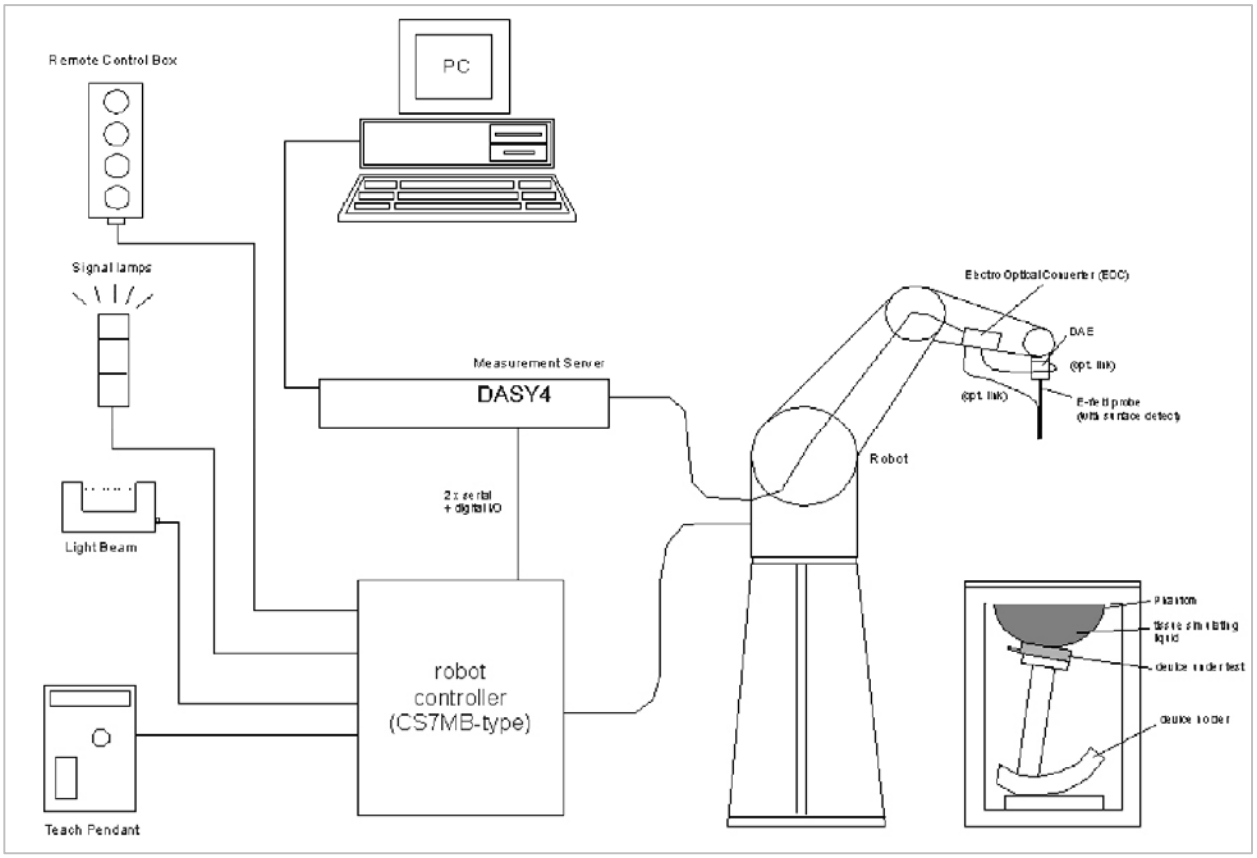
Uncertainty component	Tol. (±%)	Probe Dist.	Div.	Ci (1g)	Ci (10g)	Std. Unc.(±%)	
						Ui (1g)	Ui(10g)
Measurement System							
Probe Calibration	4.80	N	1	1	1	4.80	4.80
Axial Isotropy	4.70	R	1.732	0.707	0.707	1.92	1.92
Hemispherical Isotropy	9.60	R	1.732	0.707	0.707	3.92	3.92
Boundary Effects	1.00	R	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

6 EQUIPMENT UNDER TEST (EUT) DESCRIPTION

EUT Description:	USB Wireless Modem Model: Compass 888
Network:	UMTS (W-CDMA) 850/1900 GSM850/1900
GPRS Multi-slot class:	GPRS: Class 10 EGPRS: Class 12
Duty Cycle:	GPRS Mode: 1 Slot: 12.5%; 2 Slots: 25% EGPRS: 1 Slot: 12.5%; 2 Slots: 25%; 3 Slots: 37.5%; 4 Slots: 50% UMTS: 100%
Host Device:	Dell Latitude D620, with USB orientations as follow: vertical-left with laptop Short Term Confidential horizontal-up with laptop Short Term Confidential
USB cable:	Length: 18 cm Setup for vertical-right with laptop Short Term Confidential horizontal-down with laptop Short Term Confidential
Power supply:	Power supplied through laptop computer (host device)

7 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.

7.1 COMPOSITION OF INGREDIENTS FOR TISSUE SIMULATING LIQUIDS

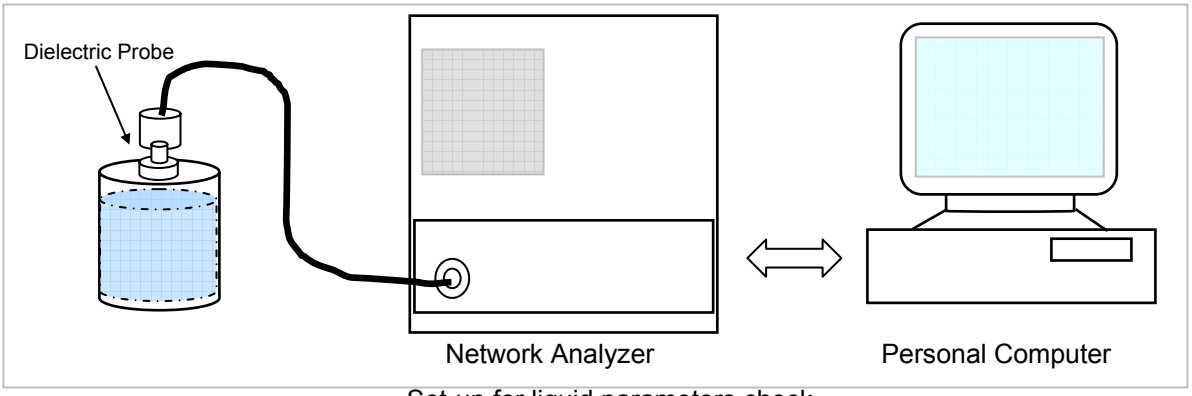
The following tissue formulations are provided for reference only as some of the parameters have not been thoroughly verified. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation.

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

8 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)

8.1 SIMULATING LIQUID PARAMETER CHECK RESULT

Simulating Liquid Dielectric Parameters Check Result @ Muscle 1900 MHz

Room Ambient Temperature = 26°C; Relative humidity = 30% Measured by: Sunny Shih

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
1900	24	15	e'	51.763	Relative Permittivity (ε_r):	51.7630	53.3	-2.88	± 5
			e"	14.2174	Conductivity (σ):	1.50277	1.52	-1.13	± 5

Liquid Check
Ambient temperature: 26 deg. C; Liquid temperature: 25 deg. C
July 18, 2008 06:53 PM

Frequency	e'	e''
1710000000.	52.3038	13.6765
1720000000.	52.2830	13.7001
1730000000.	52.2630	13.7446
1740000000.	52.2288	13.7646
1750000000.	52.2074	13.8066
1760000000.	52.1895	13.8242
1770000000.	52.1589	13.8631
1780000000.	52.1243	13.8946
1790000000.	52.0867	13.9289
1800000000.	52.0653	13.9712
1810000000.	52.0253	13.9935
1820000000.	51.9720	14.0274
1830000000.	51.9231	14.0473
1840000000.	51.8776	14.0896
1850000000.	51.8519	14.0866
1860000000.	51.8462	14.1128
1870000000.	51.8294	14.1487
1880000000.	51.8146	14.1685
1890000000.	51.7666	14.1930
1900000000.	**51.7630**	**14.2174**
1910000000.	51.7008	14.2340

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 = 25.5°C; Relative humidity =42 % Measured by: Sunny Shih

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
835	24	15	e'	55.2019	Relative Permittivity (ε_r):	55.2019	55.2	0.00	± 5
			e"	21.1337	Conductivity (σ):	0.98171	0.97	1.21	± 5

Liquid Check
Ambient temperature: 25.5deg. C; Liquid temperature: 24 deg. C
July 20, 2008 03:43 PM

Frequency	e'	e"
750000000.	55.9399	21.7241
755000000.	55.8739	21.7381
760000000.	55.8375	21.7301
765000000.	55.8336	21.6752
770000000.	55.8023	21.6419
775000000.	55.7823	21.6048
780000000.	55.7503	21.6305
785000000.	55.7283	21.5826
790000000.	55.7041	21.5589
795000000.	55.6261	21.5430
800000000.	55.5625	21.4995
805000000.	55.5073	21.4762
810000000.	55.4450	21.3991
815000000.	55.3987	21.3170
820000000.	55.3555	21.2571
825000000.	55.2741	21.1671
830000000.	55.2241	21.1444
835000000.	**55.2019**	**21.1337**
840000000.	55.1369	21.0950
845000000.	55.0862	21.0624
850000000.	55.0152	21.0597
855000000.	54.9812	21.0648
860000000.	54.9692	21.0398
865000000.	54.9129	21.0103
870000000.	54.8795	21.0368
875000000.	54.8490	21.0405
880000000.	54.8452	21.0550
885000000.	54.8016	21.0742
890000000.	54.7829	21.0729
895000000.	54.7176	21.0584
900000000.	54.6896	21.0030

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 1900 MHz

Room Ambient Temperature = 25°C; Relative humidity = 40% Measured by: Carol Baumann

Simulating Liquid		Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Depth (cm)							
1900	15	e'	51.2435	Relative Permittivity (ε_r):	51.2435	53.3	-3.86	± 5
		e"	14.3720	Conductivity (σ):	1.51911	1.52	-0.06	± 5

Liquid Check
Ambient temperature: 25 deg. C; Liquid temperature: 24 deg. C
September 01, 2008 10:51 AM

Frequency	e'	e''
1710000000.	51.9503	13.7402
1720000000.	51.8941	13.7545
1730000000.	51.8357	13.7816
1740000000.	51.8175	13.7803
1750000000.	51.8037	13.8400
1760000000.	51.7369	13.9285
1770000000.	51.6703	14.0099
1780000000.	51.6231	14.0507
1790000000.	51.6126	14.0901
1800000000.	51.6156	14.1218
1810000000.	51.6185	14.1427
1820000000.	51.5628	14.1131
1830000000.	51.5554	14.1177
1840000000.	51.5247	14.1351
1850000000.	51.4707	14.1727
1860000000.	51.3769	14.2237
1870000000.	51.2856	14.2627
1880000000.	51.2394	14.2739
1890000000.	51.2395	14.3158
1900000000.	**51.2435**	**14.3720**
1910000000.	51.2485	14.4590

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 = 25°C; Relative humidity = 40% Measured by: Carol Baumann

Simulating Liquid		Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Depth (cm)							
835	15	e'	54.4577	Relative Permittivity (ϵ_r):	54.4577	55.2	-1.34	± 5
		e"	21.1559	Conductivity (σ):	0.98274	0.97	1.31	± 5

Liquid Check
Ambient temperature: 25 deg. C; Liquid temperature: 24 deg. C
September 02, 2008 09:21 AM

Frequency	e'	e"
750000000.	55.2454	21.6586
755000000.	55.1364	21.6422
760000000.	55.1216	21.6181
765000000.	55.0932	21.5515
770000000.	55.0375	21.5064
775000000.	54.9762	21.4756
780000000.	54.9336	21.4619
785000000.	54.8818	21.4515
790000000.	54.8794	21.4470
795000000.	54.8188	21.4054
800000000.	54.7601	21.3980
805000000.	54.6989	21.3802
810000000.	54.6486	21.3418
815000000.	54.6295	21.3095
820000000.	54.5810	21.2712
825000000.	54.5317	21.2279
830000000.	54.4834	21.1848
835000000.	**54.4577**	**21.1559**
840000000.	54.3783	21.1580
845000000.	54.3484	21.1420
850000000.	54.2644	21.1245
855000000.	54.2125	21.0736
860000000.	54.1747	21.0288
865000000.	54.0999	20.9983
870000000.	54.0580	20.9666
875000000.	54.0277	20.9627
880000000.	54.0131	20.9421
885000000.	53.9639	20.9668
890000000.	53.9416	20.9492
895000000.	53.8927	20.9421
900000000.	53.8321	20.9292

The conductivity (σ) can be given as:

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

where f = target f * 10^6

ε_0 = 8.854 * 10^{-12}

9 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 7 x 7 x 7 fine cube was chosen for cube integration
- Distance between probe sensors and phantom surface was set to 3 mm.
  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.

9.1 SYSTEM PERFORMANCE CHECK RESULTS

System Validation Dipole: D835V2 SN:4d002

Date: July 20, 2008

Ambient Temperature = 25°C; Relative humidity = 41% Measured by: Sunny Shih

Body Simulating Liquid			SAR (mW/g)		Normalized to 1 W	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)						
835	23.5	15	1g	2.45	9.8	9.71	0.93	± 10
			10g	1.62	6.48	6.38	1.57	± 10

Date: September 2, 2008

Ambient Temperature = 25°C; Relative humidity = 40% Measured by: Carol Baumann

Body Simulating Liquid		SAR (mW/g)	Normalized to 1 W	Target	Deviation (%)	Limit (%)
f (MHz)	Depth (cm)					
835	15	1g	10.2	9.71	5.05	± 10
		10g	6.77	6.38	6.11	± 10

System Validation Dipole: D1900V2 SN:5d043

Date: July 18, 2008

Ambient Temperature = 25°C; Relative humidity = 42% Measured by: Sunny Shih

Body Simulating Liquid			SAR (mW/g)		Normalized to 1 W	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)						
1900	23.5	15	1g	9.42	37.68	39.8	-5.33	± 10
			10g	4.95	19.8	20.8	-4.81	± 10

Date: September 1, 2008

Ambient Temperature = 25°C; Relative humidity = 40% Measured by: Carol Baumann

Body Simulating Liquid		SAR (mW/g)	Normalized to 1 W	Target	Deviation (%)	Limit (%)
f (MHz)	Depth (cm)					
1900	15	1g	38.7	39.8	-2.76	± 10
		10g	20.3	20.8	-2.40	± 10

10 PROCEDURE USED TO ESTABLISH TEST SIGNAL

GSM/EGSM Procedure

The following settings were used to configure the Radio Communication Tester, CMU200. The insertion loss of 0.5 dB was used for the PCS band and 0.3dB was used for the Cell Band. All measurements listed below are average power unless specified otherwise.

GPRS/EGPRS

Function: Menu select > GSM Mobile Station > GSM 850/900/1800/1900

Press **Connection control** to choose the different menus
Press **RESET** > choose all to reset all settings

Connection	Press **Signal Off** to turn off the signal and change settings Network Support > GSM+GPRS or GSM+EGPRS Main Service > Packet Data Service selection > Test Mode A – Auto Slot Config. off	
MS Signal	Press Slot Config bottom on the right twice to select and change the number of time slots and power setting > Slot configuration	> Uplink/Gamma > 33 dBm for GPRS 850/900 > 27 dBm for EGPRS 850/900 > 30 dBm for GPRS1800/1900 > 26 dBm for EGPRS1800/1900
BS Signal	Enter the same channel number for TCH channel (test channel) and BCCH channel	
	Frequency Offset >	+ 0 Hz
	Mode >	BCCH and TCH
	BCCH Level >	-85 dBm (May need to adjust if link is not stable)
	BCCH Channel >	choose desire test channel [Enter the same channel number for TCH channel (test channel) and BCCH channel]
	Channel Type >	Off
	P0>	4 dB
	Slot Config >	Unchanged (if already set under MS Signal)
	TCH >	choose desired test channel
	Hopping >	Off
	Main Timeslot >	3 (Default)
Network	Coding Scheme >	CS4 (GPRS) and MCS9 (EGPRS)
	Bit Stream >	2E9-1PSR Bit Pattern
AF/RF	Enter appropriate offsets for Ext. Att. Output and Ext. Att. Input	
Connection	Press **Signal On** to turn on the signal and change settings	

RF Output Power Result for GSM/EDGE (GMSK:MCS4; 8-PSK:MCS9)

Frequency (MHz)	GPRS			
	1 slot Power (dBm)	2 slots Power (dBm)	3 slots Power (dBm)	4 slots Power (dBm)
824.2	31.9	29.1		
836.6	31.9	29.2		
848.8	31.9	29.1		

Frequency (MHz)	EGPRS			
	1 slot Power (dBm)	2 slots Power (dBm)	3 slots Power (dBm)	4 slots Power (dBm)
824.2	27.2	27.1	27.2	26.1
836.6	27.2	27.2	27.2	26.1
848.8	27.1	27.1	27.1	26.1

Frequency (MHz)	GPRS			
	1 slot Power (dBm)	2 slots Power (dBm)	3 slots Power (dBm)	4 slots Power (dBm)
1850.2	29.1	26.1		
1880.0	28.9	25.9		
1909.8	29.1	26.1		

Frequency (MHz)	EGPRS			
	1 slot Power (dBm)	2 slots Power (dBm)	3 slots Power (dBm)	4 slots Power (dBm)
1850.2	26.8	26.3	24.4	23.2
1880.0	26.5	26.0	24.1	23.0
1909.8	26.7	26.2	24.3	23.2

RF Output Power Result for WCDMA R99

The following tests were completed according to the test requirements outlined in section 5.2 of the 3GPP TS34.121-1 V7.5.0 specification. The EUT supports power Class 3, which has a nominal maximum output power of 24 dBm (+1.7/-3.7) RMC12.2kps is used for this testing. All bits up.

Band	Channel	Frequency	Conducted output power (dBm)	
			Average	Peak
Cellular	4132	826.4	22.61	25.89
	4182	836.4	22.65	25.96
	4233	846.6	22.56	25.49
PCS	9262	1852.4	22.49	26.02
	9400	1880.0	22.69	26.49
	9538	1907.6	22.84	26.58

RF Output Power Result for HSDPA Rel6

Sub-Test 1: βc =2/15, βd =15/15, βhs =4/15

Sub-Test 2: βc =12/15, βd =15/15, βhs =24/15

Sub-Test 3: βc =15/15, βd =15/18, βhs =30/15

Sub-Test 4: βc =15/15, βd =4/15, βhs =30/15

		Cell Band			PCS Band		
Sub Test	Channel	Low	Middle	High	Low	Middle	High
#1 MPR=0dB	RMS.(dBm)	22.32	22.40	22.41	22.39	22.47	22.23
#2 MPR=0dB	RMS.(dBm)	22.29	22.19	22.18	22.52	22.63	22.82
#3 MPR=0.5dB	RMS.(dBm)	21.3	21.18	21.2	21.51	21.51	21.7
#4 MPR=0.5dB	RMS.(dBm)	20.89	20.91	21.06	20.82	20.69	20.67

RF Output Power Result for HSUPA Rel6

Sub-Test 1: βc=11/15, βd =15/15, βhs=22/15, βec =209/225, βed =1039/225, AG=20, 1xSF4, E-TFCI=75

Sub-Test 2: βc =6/15, βd =15/15, βhs =12/15, βec =12/15, βed =94/75, AG=12, 1xSF4, E-TFCI=67

Sub-Test 3: βc =15/15, βd =91/5, βhs =30/15, βec =30/15, βed =47/15, AG=15, 2xSF4, E-TFCI=92, Note: # of reference E-TFCI=2.

Sub-Test 4: βc =2/15, βd =15/15, βhs =4/15, βec =2/15, βed =56/75, AG=17, 1xSF4, E-TFCI=71

Sub-Test 5: βc =15/15, βd =15/15; βhs =30/15, βec =24/15, βed =134/15, AG=21 1xSF4, E-TFCI=81

		Cell Band			PCS Band		
Sub Test	Channel	Low	Middle	High	Low	Middle	High
#1 MPR=0dB	RMS.(dBm)	20.55	20.43	20.41	21.82	21.69	21.73
#2 MPR=2dB	RMS.(dBm)	19.74	19.66	19.72	20.16	20.14	20.3
#3 MPR=1dB	RMS.(dBm)	20.57	20.53	20.51	21.6	21.57	21.86
#4 MPR=2dB	RMS.(dBm)	20.15	20.17	20.04	20.79	20.32	20.47
#5 MPR=0dB	RMS.(dBm)	20.4	20.31	20.27	21.11	21.16	21.36

Final Test Mode Selection Rational:

Based upon FCC published SAR measurement procedure for 3G device, when the HSDPA/HSUPA average output power is less than ¼ dB higher than R99, Body SAR evaluation is not required. As documented in the above output power verification, the highest average output power for R99 in Cellular band is 22.65 dBm and in PCS band is 22.84 dBm. The highest average output power for HSDPA is 22.27 dBm@cellular band and 22.82 dBm@ PCS band. HSUPA:20.57 dBm@cellular band and 21.86 dBm@PCS band. Per FCC procedures, only WCDMA/R99 is chosen for final SAR evaluation.

For GPRS and EDGE model of evaluation: due to higher voltage crest factor in 8-PSK than GMSK and normally result in higher SAR errors because probe calibrations generally do not compensate for crest factors in digital modulations. GPRS/GMSK Class 10 mode of operation is chosen for final SAR evaluation.

11 SAR MEASURMENT RESULTS (Final Test Results)

11.1 Cell Band

11.1.1 Horizontal-up (direct connect to PC)

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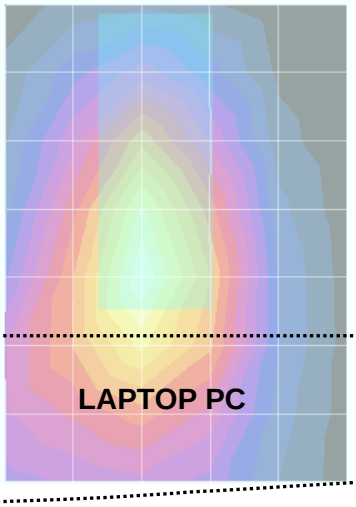
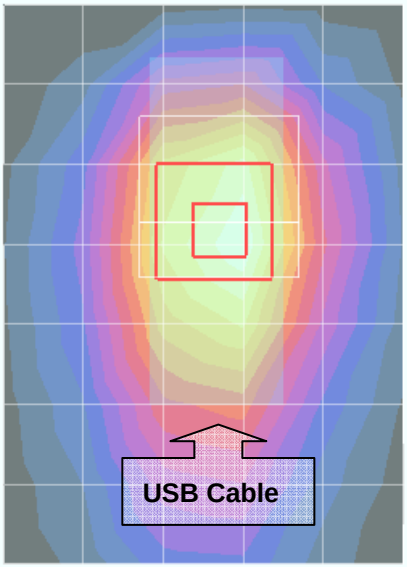
GPRS 2 Slots with 10 mm separation distance		
Channel no.: 128, 824.2 MHz	Channel no.: 190, 836.6 MHz	Channel no.: 251, 848.8 MHz
	SAR (1g) = 0.532 mW/g	
WCDMA R99 with 10 mm separation distance		
Channel no.: 4132, 826.4 MHz	Channel no.: 4182, 836.4 MHz	Channel no.: 4233, 846.6 MHz
	SAR (1g) = **0.626** mW/g	
		

11.1.2 Horizontal-down (With USB Cable)

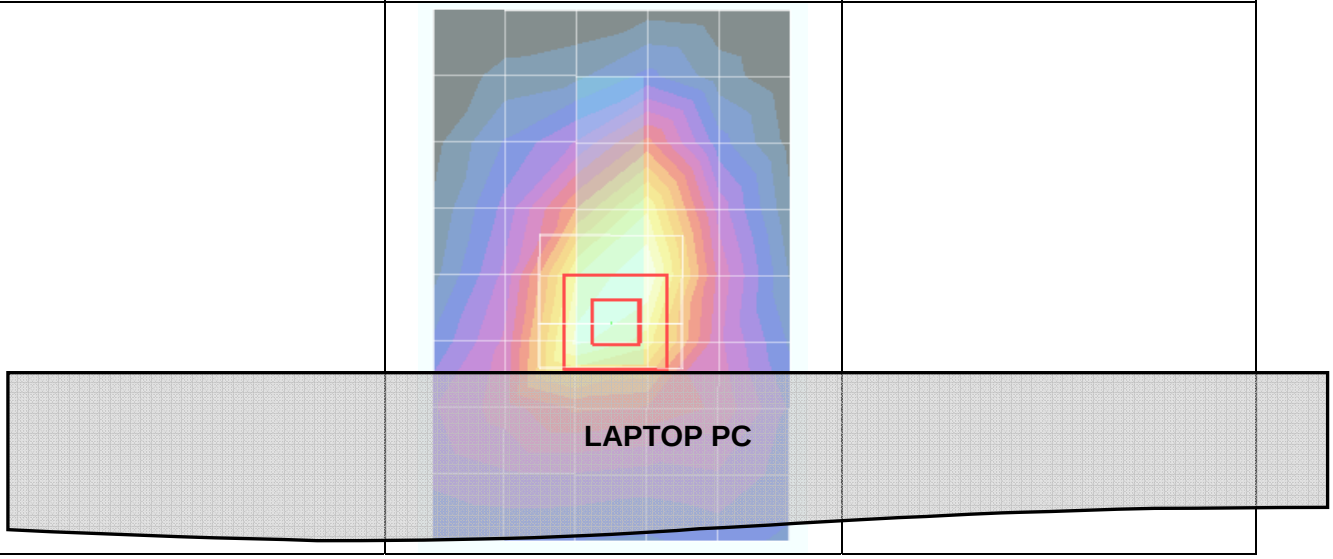
Short Term Confidential

GPRS 2 Slots with 10 mm separation distance		
Channel no.: 128, 824.2 MHz	Channel no.: 190, 836.6 MHz	Channel no.: 251, 848.8 MHz
	SAR (1g) = 0.287 mW/g	
WCDMA R99 with 10 mm separation distance		
Channel no.: 4132, 826.4 MHz	Channel no. = 4182, 836.4 MHz	Channel no.: 4233, 846.6 MHz
	SAR (1g) = 0.465 mW/g	
		

11.1.3 Vertical-left (direct connect to PC)

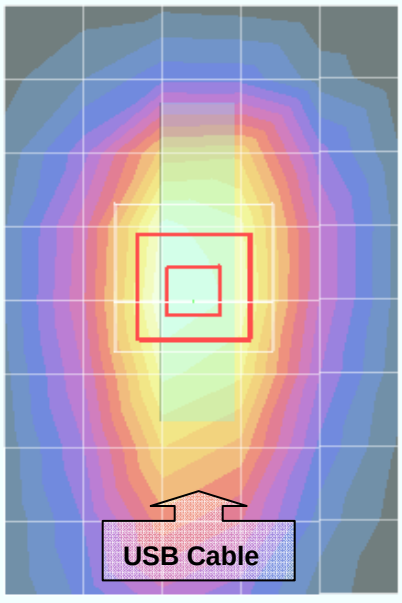
Short Term Confidential

GPRS 2 Slots at 10 mm separation distance		
Channel no.: 128, 824.2 MHz	Channel no.: 190, 836.6 MHz	Channel no.: 251, 848.8 MHz
	SAR (1g) = 0.404 mW/g	
WCDMA R99 with 10 mm separation distance		
Channel no.: 4132, 826.4 MHz	Channel no. = 4182, 836.4 MHz	Channel no.: 4233, 846.6 MHz
	SAR (1g) = 0.440 mW/g	



11.1.4 Vertical-right (with USB cable)

Short Term Confidential

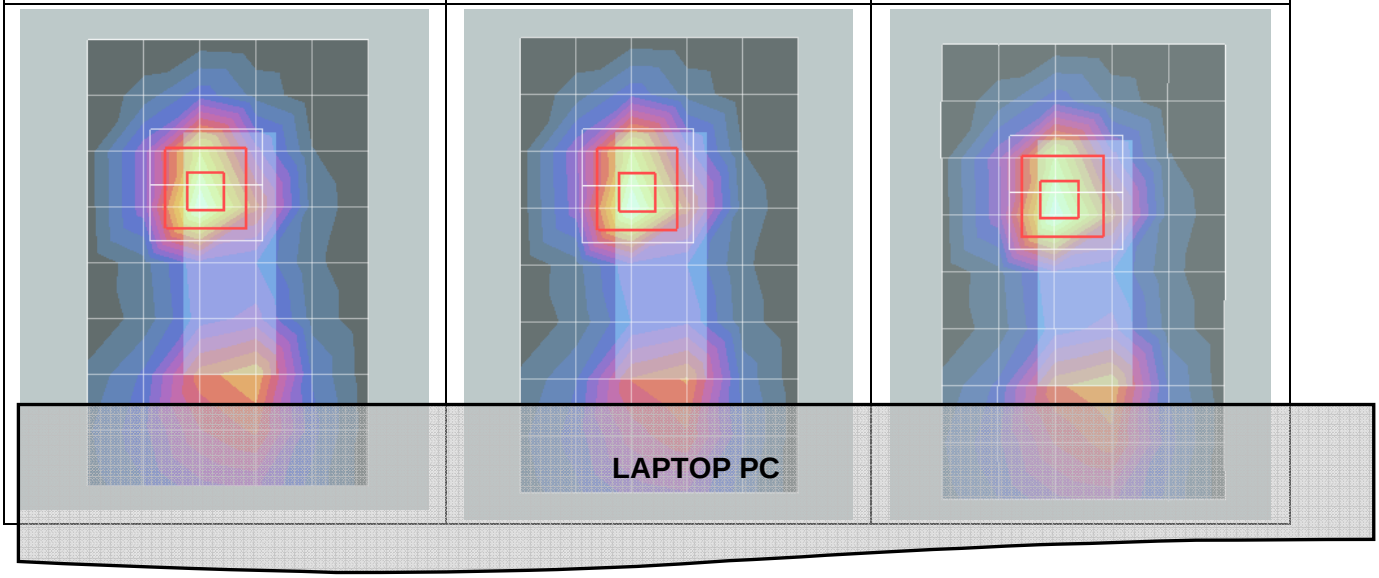
GPRS 2 Slots with 10 mm separation distance		
Channel no.: 128, 824.2 MHz	Channel no.: 190, 836.6 MHz	Channel no.: 251, 848.8 MHz
	SAR (1g) = 0.144 mW/g	
WCDMA R99 with10 mm separation distance		
Channel no.: 4132, 826.4 MHz	Channel no.: 4182, 836.4 MHz	Channel no.: 4233, 846.6 MHz
	SAR (1g) = 0.199 mW/g	
		

11.2 PCS BAND

11.2.1 Horizontal-up (direct connect to PC)

Short Term Confidential

GPRS 2 Slots with 10 mm separation distance		
Channel no.: 512, 1850.2 MHz	Channel no.: 661, 1880.0 MHz	Channel no.: 810, 1909.8 MHz
	SAR (1g) = 0.497 mW/g	
WCDMA R99 with10 mm separation distance		
Channel no.: 9262, 1852.4 MHz	Channel no.: 9400, 1880.0 MHz	Channel no.: 9538, 1907.6 MHz
SAR (1g) = 1.1 mW/g	SAR (1g) = 0.981 mW/g	SAR (1g) = **1.19** mW/g



11.2.2 Horizontal-down (with USB Cable)

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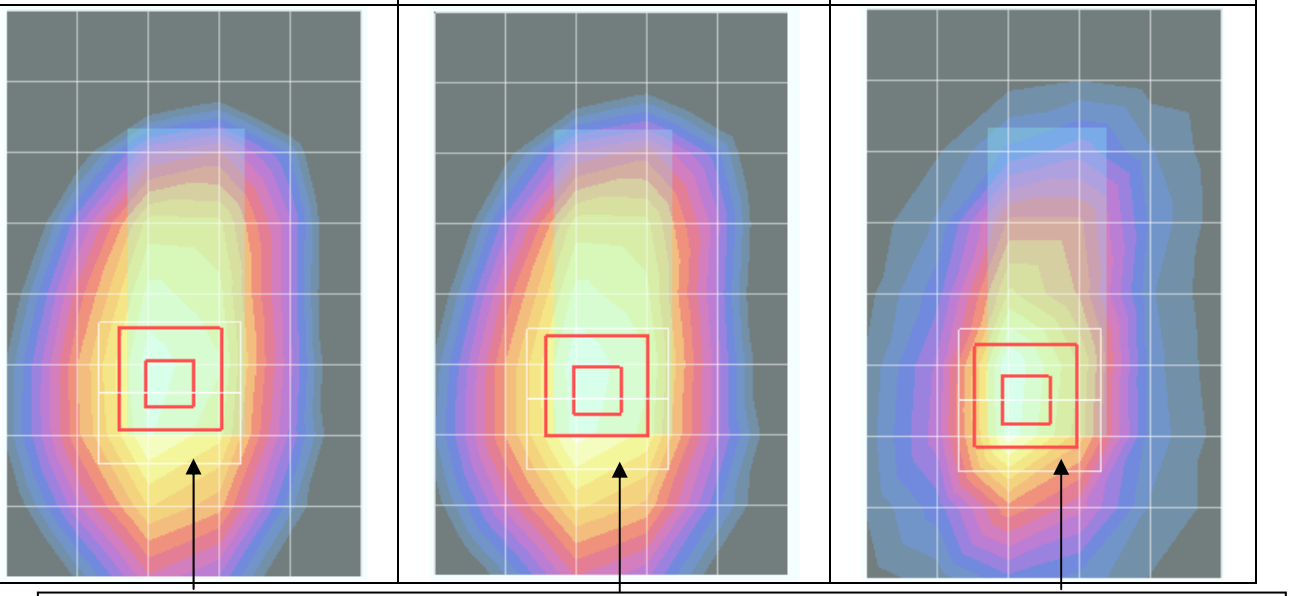
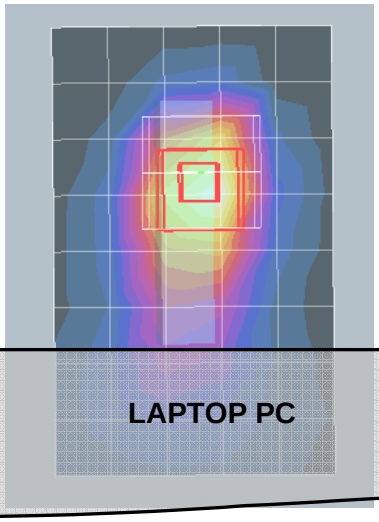
GPRS 2 Slots with 10 mm separation distance		
Channel no.: 512, 1850.2 MHz	Channel no.: 661, 1880.0 MHz	Channel no.: 810, 1909.8 MHz
	SAR (1g) = 0.382 mW/g	
WCDMA R99 with 10 mm separation distance		
Channel no.: 9262, 1852.4 MHz	Channel no.: 9400, 1880.0 MHz	Channel no.: 9538, 1907.6 MHz
	SAR (1g) = 0.545 mW/g	



USB Cable

11.2.3 Vertical-left (direct connect to PC)

Short Term Confidential		
GPRS 2 Slots with 10 mm separation distance		
Channel no. 512, 1850.2 MHz	Channel no. = 661, 1880.0 MHz	Channel no.: 810, 1909.8 MHz
	SAR (1g) = 0.389 mW/g	
WCDMA R99 with 10 mm separation distance		
Channel no.: 9262, 1852.4 MHz	Channel no. = 9400, 1880.0 MHz	Channel no.: 9538, 1907.6 MHz
	SAR (1g) = 0.597 mW/g	
		

11.2.4 Vertical-right (with USB cable)

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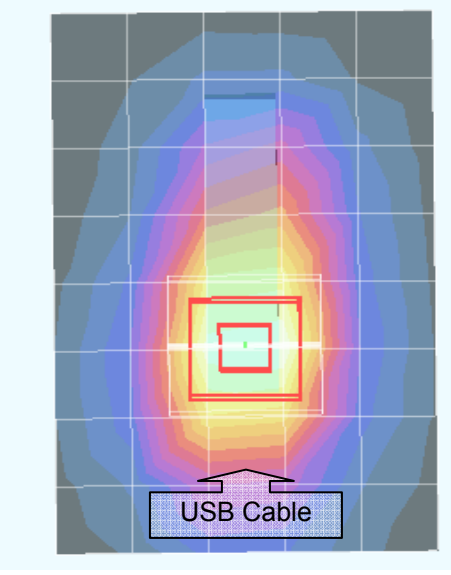
GPRS 2 Slots with 10 mm separation distance		
Channel no.: 512, 1850.2 MHz	Channel no. = 661, 1880.0 MHz	Channel no.: 810, 1909.8 MHz
	SAR (1g) = 0.286 mW/g	
WCDMA R99 with 10 mm separation distance		
Channel no.: 9262, 1852.4 MHz	Channel no. = 9400, 1880.0 MHz	Channel no.: 9538, 1907.6 MHz
	SAR (1g) = 0.312 mW/g	
		

12 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	MY40001647	11	14	2008
E-Field Probe	SPEAG	EX3DV3	3531	4	24	2009
Thermometer	ERTCO	639-1S	1718	5	28	2009
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	29	2010
Signal Generator	R&S	SMP 04	DE34210	2	16	2009
Power Meter	Giga-tronics	8651A	8651404	1	11	2010
Power Sensor	Giga-tronics	80701A	1834588	1	11	2010
Amplifier	Mini-Circuits	ZHL-42W	D072701-5			N/A
Radio Communication Tester	R &S	CMU 200	106291	5	16	2009
Simulating Liquid	CCS	M835	N/A	Within 24 hrs of first test		
Simulating Liquid	CCS	M1900	N/A	Within 24 hrs of first test		

13 ATTACHMENTS

No.	Contents	No. Of Pages
1	System Performance Check Plots	8
2-1	Cell Band SAR Test Plots with 10 mm Separation distance	9
2-2	PCS Band SAR Test Plots with 10 mm Separation distance	10
3	Certificate of E-Field Probe - EX3DV3SN3531	10
4	Certificate of System Validation Dipole - D835V2 SN:4d002	9
5	Certificate of System Validation Dipole - D1900V2 SN:5d043	9

14 PHOTOS

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END OF REPORT