



**FCC OET BULLETIN 65 SUPPLEMENT C
IC RSS-102 ISSUE 2**

SAR EVALUATION REPORT

For

USB WIRELESS MODEM

MODEL: USB305

FCC ID: N7NU305

IC: 2417C-U305

REPORT NUMBER: 09U12572-1, Revision B

ISSUE DATE: September 16, 2009

Prepared for

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Prepared by

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	June 15, 2009	Initial Issue	--
A	06/17/09	Revised FCC ID	A. Zaffar
B	9/16/09	Updated Conducted RF power table in Section 10.4	Sunny Shih

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1. ATTESTATION OF TEST RESULTS

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

EUT DESCRIPTION: USB wireless modem

MODEL NUMBER: USB305

DEVICE CATEGORY: Portable

EXPOSURE CATEGORY: General Population/Uncontrolled Exposure

DATE TESTED: May 23 – 26, 2009

THE HIGHEST SAR VALUES:

FCC / IC Rule Parts	Frequency Range [MHz]	The Highest SAR Values (1g_mW/g)	Limit (mW/g)
22H / RSS-132	824 - 849	1.05 (test position 4)	1.6
24E / RSS-133	1850 - 1910	1.58 (test position 2)	

APPLICABLE STANDARDS AND TEST PROCEDURES:

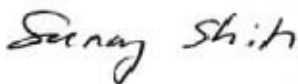
STANDARDS AND TEST PROCEDURES	TEST RESULTS
<ul style="list-style-type: none"> • FCC OET Bulletin 65 Supplement C and the following specific Test Procedures: <ul style="list-style-type: none"> ○ KDB 941225 D01 SAR test for 3G devices ○ 447498 D01 Mobile Portable RF Exposure v03r03 ○ 447498 D02 SAR Procedures for Dongle Xmtr v01 	Pass
<ul style="list-style-type: none"> • RSS-102 ISSUE 2 	Pass

Compliance Certification Services, Inc. (CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by CCS based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by CCS will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For CCS By:

Tested By:




SUNNY SHIH
 ENGINEERING SUPERVISOR
 COMPLIANCE CERTIFICATION SERVICES

CHAO YEN LIN
 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, IC RSS 102 Issue 2 and the following specific FCC Test Procedures.

- KDB 941225 D01 SAR test for 3G devices
- 447498 D01 Mobile Portable RF Exposure v03r03
- o447498 D02 SAR Procedures for Dongle Xmtr v01

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

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

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due date		
				MM	DD	Year
Robot - Six Axes	Stäubli	RX90BL	N/A	N/A		
Robot Remote Control	Stäubli	CS7MB	3403-91535	N/A		
DASY4 Measurement Server	SPEAG	SEUMS001BA	1041	N/A		
Probe Alignment Unit	SPEAG	LB (V2)	261	N/A		
SAM Phantom (SAM1)	SPEAG	QD000P40CA	1185	N/A		
SAM Phantom (SAM2)	SPEAG	QD000P40CA	1050	N/A		
Oval Flat Phantom (ELI 4.0)	SPEAG	QD OVA001 B	1003	N/A		
Electronic Probe kit	HP	85070C	N/A	N/A		
S-Parameter Network Analyzer	Agilent	8753ES-6	MY40001647	11	14	2009
Signal Generator	Agilent	8753ES-6	MY40001647	11	14	2009
E-Field Probe	SPEAG	EX3DV4	3686	3	23	1010
Thermometer	ERTCO	639-1S	1718	5	1	2010
Data Acquisition Electronics	SPEAG	DAE3 V1	427	10	20	2009
System Validation Dipole	SPEAG	D835V2	4d002	6	22	2009
System Validation Dipole	SPEAG	D900V2	108	1	21	2010
System Validation Dipole	SPEAG	D1800V2	294	1	29	2010
System Validation Dipole	SPEAG	D1900V2	5d043	1	29	2010
System Validation Dipole	SPEAG	D2450V2	748	4	14	2010
System Validation Dipole	SPEAG	D5GHzV2	1003	11	21	2009
MXA Signal Analyzer	Agilent	N9020A	US48350984	10	23	2009
ESG Vector Signal Generator	Agilent	E4438C	US44271090	9	17	2010
Power Meter	Giga-tronics	8651A	8651404	1	11	2010
Power Sensor	Giga-tronics	80701A	1834588	1	11	2010
Amplifier	Mini-Circuits	ZVE-8G	90606	N/A		
Amplifier	Mini-Circuits	ZHL-42W	D072701-5	N/A		
Simulating Liquid	CCS	H1900	N/A	Within 24 hrs of first test		
Simulating Liquid	CCS	M1900	N/A	Within 24 hrs of first test		
Simulating Liquid	CCS	H1800	N/A	Within 24 hrs of first test		
Simulating Liquid	CCS	M1800	N/A	Within 24 hrs of first test		
Simulating Liquid	CCS	H1700	N/A	Within 24 hrs of first test		
Simulating Liquid	CCS	M1700	N/A	Within 24 hrs of first test		
Simulating Liquid	CCS	H835	N/A	Within 24 hrs of first test		
Simulating Liquid	CCS	M835	N/A	Within 24 hrs of first test		
Simulating Liquid	CCS	H900	N/A	Within 24 hrs of first test		
Simulating Liquid	CCS	M900	N/A	Within 24 hrs of first test		

4.2. MEASUREMENT UNCERTAINTY

Measurement uncertainty for 300 MHz – 3000 MHz

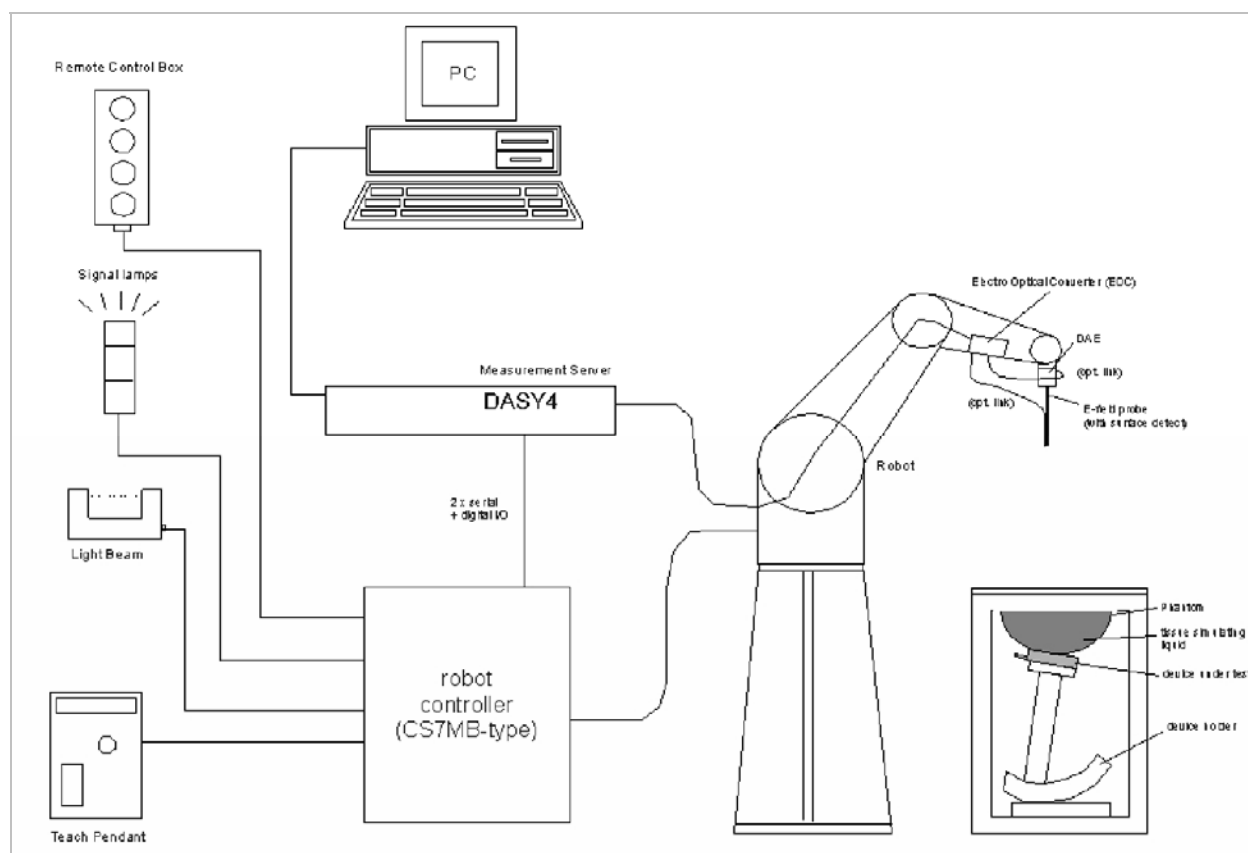
Uncertainty component	Tol. (?)	Probe Dist.	Div.	Ci (1g)	Ci (10g)	Std. Unc.(?)	
						Ui (1g)	Ui(10g)
Measurement System							
Probe Calibration	4.80	N	1	1	1	4.80	4.80
Axial Isotropy	4.70	R	1.732	0.707	0.707	1.92	1.92
Hemispherical Isotropy	9.60	R	1.732	0.707	0.707	3.92	3.92
Boundary Effects	1.00	R	1.732	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 Mechanical Tolerance	0.40	R	1.732	1	1	0.23	0.23
Probe Positioning With Respect to Phantom Shell algorithms for max. SAR evaluation	2.90	R	1.732	1	1	1.67	1.67
	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
Notes for table							
1. Tol. - tolerance in influence quantity							
2. N - Nomal							
3. R - Rectangular							
4. Div. - Divisor used to obtain standard uncertainty							
5. Ci - is te sensitivity coefficient							

5. EQUIPMENT UNDER TEST

USB Wireless Modem, Model USB305

Network:	UMTS (W-CDMA) 850/1900 GSM850/1900
GPRS Multi-slot class:	(E)GPRS: Class 12
Antenna(s):	Internal

6. SYSTEM SPECIFICATIONS



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

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

7. 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. LIQUID PARAMETERS CHECK

The simulating liquids should be checked at the beginning of a series of SAR measurements to determine if the dielectric parameters are within the tolerances of the specified target values. The relative permittivity and conductivity of the tissue material should be within $\pm 5\%$ of the values given in the table below.

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

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

8.1. LIQUID CHECK RESULTS FOR 1900 MHZ

Simulating Liquid Dielectric Parameters for Muscle 1900 MHz

Room Ambient Temperature = 24°C; Relative humidity = 40% Measured by: Sunny Shih

f (MHz)	Muscle Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
1900	e'	52.994	Relative Permittivity (ϵ_r):	52.9936	53.3	-0.57	? 5
	e"	14.250	Conductivity (σ):	1.50621	1.52	-0.91	? 5

Liquid temperature: 23 deg. C

May 23, 2009 01:15 PM

Frequency	e'	e"
1710000000.	53.8467	13.5184
1720000000.	53.8014	13.5201
1730000000.	53.7845	13.5753
1740000000.	53.7810	13.6522
1750000000.	53.7422	13.7884
1760000000.	53.6282	13.8932
1770000000.	53.5147	13.9433
1780000000.	53.4614	13.9243
1790000000.	53.4335	13.9243
1800000000.	53.3895	13.9458
1810000000.	53.3462	13.9158
1820000000.	53.2795	13.8743
1830000000.	53.3039	13.8764
1840000000.	53.3109	13.9959
1850000000.	53.2474	14.1639
1860000000.	53.1001	14.2838
1870000000.	52.9709	14.2793
1880000000.	52.9391	14.2278
1890000000.	52.9668	14.2204
1900000000.	52.9936	14.2499
1910000000.	52.9561	14.2551

The conductivity (σ) can be given as:

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

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

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

Simulating Liquid Dielectric Parameters for Muscle 1900 MHz

Room Ambient Temperature = 24°C; Relative humidity = 40% Measured by: Chaoyen Lin

f (MHz)	Muscle Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
1900	e'	52.895	Relative Permittivity (ϵ_r):	52.8945	53.3	-0.76	? 5
	e''	14.443	Conductivity (σ):	1.52659	1.52	0.43	? 5

Liquid temperature: 23 deg. C

May 26, 2009 01:35 PM

Frequency	e'	e''
1710000000.	53.6070	13.7861
1720000000.	53.5651	13.8338
1730000000.	53.5687	13.9246
1740000000.	53.5480	13.9877
1750000000.	53.5384	14.0782
1760000000.	53.4644	14.0983
1770000000.	53.3883	14.1133
1780000000.	53.3406	14.0865
1790000000.	53.2824	14.0839
1800000000.	53.2310	14.1125
1810000000.	53.1451	14.1242
1820000000.	53.0749	14.1557
1830000000.	53.0539	14.2284
1840000000.	53.0351	14.3502
1850000000.	53.0084	14.4354
1860000000.	52.9541	14.4908
1870000000.	52.8947	14.4895
1880000000.	52.9091	14.4474
1890000000.	52.8906	14.4316
1900000000.	52.8945	14.4427
1910000000.	52.8349	14.4541

The conductivity (σ) can be given as:

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

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

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

8.2. LIQUID CHECK RESULTS FOR 835 MHZ

Simulating Liquid Dielectric Parameters for Muscle 900 MHz

Room Ambient Temperature = 24°C; Relative humidity = 40%

Measured by: Sunny Shih

f (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
835	e'	53.59	Relative Permittivity (ϵ_r):	53.592	55.2	-2.91	? 5
	e''	20.78	Conductivity (σ):	0.965	0.97	-0.49	? 5

Liquid temperature: 23 deg. C

May 24, 2009 02:19 PM

Frequency	e'	e''
800000000.	54.0125	21.2172
805000000.	53.9342	21.1749
810000000.	53.8546	21.0775
815000000.	53.7715	20.9992
820000000.	53.7312	20.9290
825000000.	53.6980	20.8458
830000000.	53.6201	20.7906
835000000.	53.5920	20.7784
840000000.	53.5575	20.7467
845000000.	53.5143	20.7185
850000000.	53.4836	20.7510
855000000.	53.4208	20.7519
860000000.	53.3721	20.7584
865000000.	53.3373	20.7705
870000000.	53.2626	20.7868
875000000.	53.2276	20.8201
880000000.	53.2029	20.8492
885000000.	53.1478	20.8791
890000000.	53.0890	20.8683
895000000.	53.0495	20.8502
900000000.	53.0041	20.7878

The conductivity (σ) can be given as:

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

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

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

9. SYSTEM 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 $\pm 10\%$.

System Performance Check Measurement Conditions

- The measurements were performed in the flat section of the SAM twin phantom filled with Head or Body simulating liquid of the following parameters.
- The DASY4 system with an Isotropic E-Field Probe EX3DV3 was used for the measurements.
- The dipole was mounted on the small tripod so that the dipole feed point was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10 mm (above 1 GHz) and 15 mm (below 1 GHz) from dipole center to the simulating liquid surface.
- The coarse grid with a grid spacing of 15 mm was aligned with the dipole.
 For 5 GHz band - The coarse grid with a grid spacing of 10 mm was aligned with the dipole.
- Special 7x7x7 fine cube was chosen for cube
- Distance between probe sensors and phantom surface was set to 3 mm.
 For 5 GHz band - Distance between probe sensors and phantom surface was set to 2.5 mm
- The dipole input power (forward power) was $250 \text{ mW} \pm 3\%$.
- The results are normalized to 1 W input power.

IEEE Standard 1528-2003 Numerical reference SAR values (W/kg) for reference dipole and flat phantom

Frequency (MHz)	Distance (mm)	1g SAR [W/kg]	10g SAR [W/kg]	Local SAR at surface (above feed-point)
300	15	3	2	4.4
450	15	4.9	3.3	7.2
835	15	9.5	6.2	4.1
900	15	10.8	6.9	16.4
1450	10	29	16	5.02
1800	10	38.1	19.8	69.5
1900	10	39.7	20.5	72.1
2000	10	41.1	21.1	74.6
2450	10	52.4	24	104.2
3000	10	63.8	25.7	104.2

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

9.1. SYSTEM CHECK RESULTS FOR D1900V2

System Validation Dipole: D1900V2 SN: 5d043

Date: May 23, 2009

Ambient Temperature = 24°C; Relative humidity = 40%

Measured by: Sunny Shih

Medium	CW Signal (MHz)	Forward power (mW)	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
Body	1900	250	1g SAR:	40.7	39.8	2.26	±10
			10g SAR:	21.3	20.8	2.40	

Date: May 26, 2009

Ambient Temperature = 24°C; Relative humidity = 40%

Measured by: Chaoyen Lin

Medium	CW Signal (MHz)	Forward power (mW)	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
Body	1900	250	1g SAR:	39.8	39.8	0.00	±10
			10g SAR:	20.7	20.8	-0.48	

9.2. SYSTEM CHECK RESULTS FOR D835V2

System Validation Dipole: D835V2 SN:4d002

Date: May 24, 2009

Ambient Temperature = 24°C; Relative humidity = 40%

Measured by: Sunny Shih

Medium	CW Signal (MHz)	Forward power (mW)	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
Body	835	250	1g SAR:	10.11	9.71	4.12	±10
			10g SAR:	6.62	6.38	3.76	

10. OUTPUT POWER VERIFICATION

10.1. GSM

GPRS (GMSK) - Coding Scheme: MCS4

Band	Ch No.	Frequency	Conducted output power (dBm)			
			1 slot	2 slot	3 slot	4 slot
GSM850	128	824.2	32.10	30.04	28.19	26.99
	190	836.6	32.10	30.03	28.16	26.99
	251	848.8	32.10	30.00	28.11	26.94
GSM1900	512	1850.2	28.50	27.84	25.67	24.49
	661	1880	28.40	27.29	25.54	24.37
	810	1909.8	28.60	27.51	25.75	24.56

EGPRS (8PSK) - Coding Scheme: MCS9

Band	Ch No.	Frequency	Conducted output power (dBm)			
			1 slot	2 slot	3 slot	4 slot
GSM850	128	824.2	27.10	27.12	27.05	25.71
	190	836.6	26.90	26.94	26.90	25.85
	251	848.8	27.10	26.83	26.95	26.05
GSM1900	512	1850.2	25.60	25.76	24.88	23.51
	661	1880	25.70	25.63	24.76	23.56
	810	1909.8	25.60	25.55	24.63	23.38

10.2. UMTS RELEASE 99

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). A summary of these settings are illustrated below:

	Mode	Rel99
	Subtest	-
WCDMA General Settings	Loopback Mode	Test Mode 1
	Rel99 RMC	12.2kbps RMC
	HSDPA FRC	Not Applicable
	HSUPA Test	Not Applicable
	Power Control Algorithm	Algorithm2
	β_c	Not Applicable
	β_d	Not Applicable
	β_{ec}	Not Applicable
	β_c/β_d	8/15
	β_{hs}	Not Applicable
	β_{ed}	Not Applicable

Results

Rel 99 (12.2kps RMC)

Band	Mode	UL Ch No.	DL Ch No.	f (MHz)	O/P Power (dBm)
UMTS850 (Band V)	Rel 99 12.2kps RMC	4132	4357	826.4	22.61
		4182	4407	836.4	22.63
		4233	4458	846.6	22.48
UMTS1900 (Band II)	Rel 99 12.2kps RMC	9262	9662	1852.4	22.49
		9400	9800	1880.0	22.65
		9538	9938	1907.6	22.11

10.3. UMTS HSDPA

The following 4 Sub-tests were completed according to Release 6 procedures in section 5.2 of 3GPP TS34.121. A summary of these settings are illustrated below:

	Mode	Rel6 HSDPA	Rel6 HSDPA	Rel6 HSDPA	Rel6 HSDPA
	Subtest	1	2	3	4
WCDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set1			
	HSUPA Test	Not Applicable			
	Power Control Algorithm	Algorithm 2			
	β_c	2/15	12/15	15/15	15/15
	β_d	15/15	15/15	8/15	4/15
	Bd (SF)	64			
	β_{ec}	-	-	-	-
	β_c/β_d	2/15	12/15	15/8	15/4
	β_{hs}	4/15	24/15	30/15	30/15
	β_{ed}	Not Applicable			
	CM (dB)	0	1	1.5	1.5
MPR (dB)	0	0	0.5	0.5	
HSDPA Specific Settings	DACK	8			
	DNAK	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback (Table 5.2B.4)	4ms			
	CQI Repetition Factor (Table 5.2B.4)	2			
	Ahs = β_{hs}/β_c	30/15			

Results

Rel 6 HSDPA					
Band	Mode	UL Ch No.	DL Ch No.	f (MHz)	O/P Power (dBm)
UMTS850 (Band V)	Subtest 1	4132	4357	826.4	22.53
		4182	4407	836.4	22.51
		4233	4458	846.6	22.54
	Subtest 2	4132	4357	826.4	22.40
		4182	4407	836.4	22.41
		4233	4458	846.6	22.42
	Subtest 3	4132	4357	826.4	21.69
		4182	4407	836.4	21.68
		4233	4458	846.6	21.71
	Subtest 4	4132	4357	826.4	21.63
		4182	4407	836.4	21.63
		4233	4458	846.6	21.66
UMTS1900 (Band II)	Subtest 1	9262	9662	1852.4	22.22
		9400	9800	1880.0	22.34
		9538	9938	1907.6	22.10
	Subtest 2	9262	9662	1852.4	22.18
		9400	9800	1880.0	22.32
		9538	9938	1907.6	22.06
	Subtest 3	9262	9662	1852.4	21.54
		9400	9800	1880.0	21.67
		9538	9938	1907.6	21.47
	Subtest 4	9262	9662	1852.4	21.51
		9400	9800	1880.0	21.59
		9538	9938	1907.6	21.48

10.4. UMTS Rel 6 HSPA (HSDPA & HSUPA)

The following 5 Sub-tests were completed according to Release 6 procedures in section 5.2 of 3GPP TS34.121. A summary of these settings are illustrated below:

Mode	Rel6 HSPA	Rel6 HSPA	Rel6 HSPA	Rel6 HSPA	Rel6 HSPA	
Subtest	1	2	3	4	5	
WCDMA General Settings	Loopback Mode					
	Test Mode 1					
	Rel99 RMC					
	12.2kbps RMC					
	HSDPA FRC					
	H-Set1					
	HSUPA Test					
	HSUPA Loopback					
	Power Control Algorithm					
	Algorithm2					
	β_c	11/15	6/15	15/15	2/15	15/15
	β_d	15/15	15/15	9/15	15/15	15/15
β_{ec}	209/225	12/15	30/15	2/15	24/15	
β_c/β_d	11/15	6/15	15/9	2/15	15/15	
β_{hs}	22/15	12/15	30/15	4/15	30/15	
β_{ed}	1309/225	94/75	47/15	56/75	134/15	
CM (dB)	1.0	3.0	2.0	3.0	1.0	
MPR (dB)	0	2	1	2	0	
HSDPA Specific Settings	DACK					
	8					
	DNAK					
	8					
	DCQI					
	8					
	Ack-Nack repetition factor					
3						
CQI Feedback (Table 5.2B.4)						
4ms						
CQI Repetition Factor (Table 5.2B.4)						
2						
Ahs = β_{hs}/β_c						
30/15						
HSUPA Specific Settings	D E-DPCCH					
	6					
	8					
	8					
	5					
	7					
	DHARQ					
	0					
	0					
	0					
AG Index						
20						
12						
15						
17						
21						
ETFCI (from 34.121 Table C.11.1.3)						
75						
67						
92						
71						
81						
Associated Max UL Data Rate kbps						
242.1						
174.9						
482.8						
205.8						
308.9						
Reference E_TFCIs						
E-TFCI 11						
E-TFCI PO 4						
E-TFCI 67						
E-TFCI PO 18						
E-TFCI 71						
E-TFCI PO 23						
E-TFCI 75						
E-TFCI PO 26						
E-TFCI 81						
E-TFCI PO 27						
E-TFCI 11						
E-TFCI PO 4						
E-TFCI 92						
E-TFCI PO 18						
E-TFCI 11						
E-TFCI PO 4						
E-TFCI 67						
E-TFCI PO 18						
E-TFCI 71						
E-TFCI PO 23						
E-TFCI 75						
E-TFCI PO 26						
E-TFCI 81						
E-TFCI PO 27						

Results

Rel 6 HSPA

Band	Mode	UL Ch No.	DL Ch No.	f (MHz)	O/P Power (dBm)	Pwr Reduction (dB)*
UMTS850 (Band V)	Subtest 1	4132	4357	826.4	21.14	1.47
		4182	4407	836.4	21.08	1.55
		4233	4458	846.6	20.71	1.77
	Subtest 2	4132	4357	826.4	20.45	2.16
		4182	4407	836.4	20.38	2.25
		4233	4458	846.6	20.43	2.05
	Subtest 3	4132	4357	826.4	21.81	0.80
		4182	4407	836.4	21.83	0.80
		4233	4458	846.6	21.86	0.62
	Subtest 4	4132	4357	826.4	20.72	1.89
		4182	4407	836.4	20.88	1.75
		4233	4458	846.6	20.87	1.61
	Subtest 5	4132	4357	826.4	21.50	1.11
		4182	4407	836.4	20.21	2.42
		4233	4458	846.6	20.25	2.23
UMTS1900 (Band II)	Subtest 1	9262	9662	1852.4	20.27	2.22
		9400	9800	1880.0	20.42	2.23
		9538	9938	1907.6	20.41	1.70
	Subtest 2	9262	9662	1852.4	20.37	2.12
		9400	9800	1880.0	20.46	2.19
		9538	9938	1907.6	20.46	1.65
	Subtest 3	9262	9662	1852.4	21.81	0.68
		9400	9800	1880.0	21.92	0.73
		9538	9938	1907.6	21.92	0.19
	Subtest 4	9262	9662	1852.4	20.85	1.64
		9400	9800	1880.0	21.06	1.59
		9538	9938	1907.6	21.01	1.10
	Subtest 5	9262	9662	1852.4	20.37	2.12
		9400	9800	1880.0	21.23	1.42
		9538	9938	1907.6	20.46	1.65

* The differences between the values given in this column and the nominal MPR levels are described in the document "E-DCH Maximum Power Reduction.pdf"

11. SUMMARY OF TEST RESULTS

If the SAR measured at the middle channel for each test configuration is at least 3.0 dB (0.8 mW/g) lower than the SAR limit (1.6 mW/g), testing at the high and low channels is optional for such test configuration(s).

11.1. UMTS BAND II (1900 MHZ)

11.1.1. TEST POSITION 1 (FRONT)

Sep. dist. (mm)	Mode	UL Ch No.	DL Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
5	R99	9262	9662	1852.4	1.51	1.6
		9400	9800	1880.0	1.57	
		9538	9938	1907.6	1.51	

11.1.2. TEST POSITION 2 (BACK)

Sep. dist. (mm)	Mode	UL Ch No.	DL Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
5	R99	9262	9662	1852.4	1.55	1.6
		9400	9800	1880.0	1.58	
		9538	9938	1907.6	1.31	

11.1.3. TEST POSITION 3 (SIDE)

Sep. dist. (mm)	Mode	UL Ch No.	DL Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
5	R99	9262	9662	1852.4	1.58	1.6
		9400	9800	1880.0	1.54	
		9538	9938	1907.6	1.54	

11.1.4. TEST POSITION 4 (SIDE)

Sep. dist. (mm)	Mode	UL Ch No.	DL Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
5	R99	9262	9662	1852.4		1.6
		9400	9800	1880.0	0.433	
		9538	9938	1907.6		

11.1.5. TEST POSITION 5 (TIP)

Sep. dist. (mm)	Mode	UL Ch No.	DL Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
5	R99	9262	9662	1852.4		1.6
		9400	9800	1880.0	0.362	
		9538	9938	1907.6		

11.2. GSM1900

11.2.1. TEST POSITION 1 (FRONT)

Sep. dist. (mm)	Mode	Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
5	GPRS 2 slots	512	1850.2	1.290	1.6
		661	1880.0	1.180	
		810	1909.8	0.981	

11.2.2. TEST POSITION 2 (BACK)

Sep. dist. (mm)	Mode	Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
5	GPRS 1 slots	661	1880.0	0.853	1.6
	GPRS 2 slots	661	1880.0	1.240	
	GPRS 3 slots	661	1880.0	1.220	
	GPRS 4 slots	661	1880.0	1.230	
	GPRS 2 slots	512	1850.2	1.520	
		810	1909.8	0.895	

11.2.3. TEST POSITION 3 (SIDE)

Sep. dist. (mm)	Mode	Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
5	GPRS 2 slots	512	1850.2	1.28	1.6
		661	1880.0	1.31	
		810	1909.8	1.13	

11.2.4. TEST POSITION 4 (SIDE)

Sep. dist. (mm)	Mode	Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
5	GPRS 2 slots	512	1850.2		1.6
		661	1880.0	0.282	
		810	1909.8		

11.2.5. TEST POSITION 5 (TIP)

Sep. dist. (mm)	Mode	Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
5	GPRS 2 slots	512	1850.2		1.6
		661	1880.0	0.311	
		810	1909.8		

11.3. UMTS BAND V (850 MHZ)

11.3.1. TEST POSITION 1

Sep. dist. (mm)	Mode	UL Ch No.	DL Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
5	R99 12.2kps RMC	4132	4357	826.4		1.6
		4182	4407	836.4	0.579	
		4233	4458	846.6		

11.3.2. TEST POSITION 2

Sep. dist. (mm)	Mode	UL Ch No.	DL Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
5	R99 12.2kps RMC	4132	4357	826.4		1.6
		4182	4407	836.4	0.736	
		4233	4458	846.6		

11.3.3. TEST POSITION 3 (SIDE)

Sep. dist. (mm)	Mode	UL Ch No.	DL Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
5	R99 12.2kps RMC	4132	4357	826.4		1.6
		4182	4407	836.4	0.351	
		4233	4458	846.6		

11.3.4. TEST POSITION 4 (SIDE)

Sep. dist. (mm)	Mode	UL Ch No.	DL Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
5	R99 12.2kps RMC	4132	4357	826.4	0.941	1.6
		4182	4407	836.4	0.907	
		4233	4458	846.6	0.694	

11.3.5. TEST POSITION 5 (TIP)

Sep. dist. (mm)	Mode	UL Ch No.	DL Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
5	R99 12.2kps RMC	4132	4357	826.4		1.6
		4182	4407	836.4	0.220	
		4233	4458	846.6		

11.4. GSM850

11.4.1. TEST POSITION 1

Sep. dist. (mm)	Mode	Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
5	2 slots	190	836.6	0.433	1.6
	3 slots	190	836.6	0.430	
	4 slots	190	836.6	0.431	

11.4.2. TEST POSITION 2

Sep. dist. (mm)	Mode	Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
5	GPRS 2 slots	128	824.2		1.6
		190	836.6	0.558	
		251	848.8		

11.4.3. TEST POSITION 3 (SIDE)

Sep. dist. (mm)	Mode	Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
5	GPRS 2 slots	128	824.2		1.6
		190	836.6	0.278	
		251	848.8		

11.4.4. TEST POSITION 4 (SIDE)

Sep. dist. (mm)	Mode	Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
5	GPRS 2 slots	128	824.2	1.050	1.6
		190	836.6	0.834	
		251	848.8	0.465	

11.4.5. TEST POSITION 5 (SIDE)

Sep. dist. (mm)	Mode	Ch No.	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
5	GPRS 2 slots	128	824.2		1.6
		190	836.6	0.205	
		251	848.8		

12. WORST-CASE SAR TEST PLOTS

WORST-CASE SAR PLOT for Part 22H - BODY POSITION

Date/Time: 5/25/2009 1:05:24 AM

Test Laboratory: Compliance Certification Services

GSM850 - Test Position 4

DUT: Sierra Wireless; Type: USB305; Serial: n/a

Communication System: GSM850; Frequency: 824.2 MHz; Duty Cycle: 1:4
Medium parameters used: $f = 825$ MHz; $\sigma = 0.957$ mho/m; $\epsilon_r = 53.7$; $\rho = 1000$ kg/m³
Phantom section: Flat Section

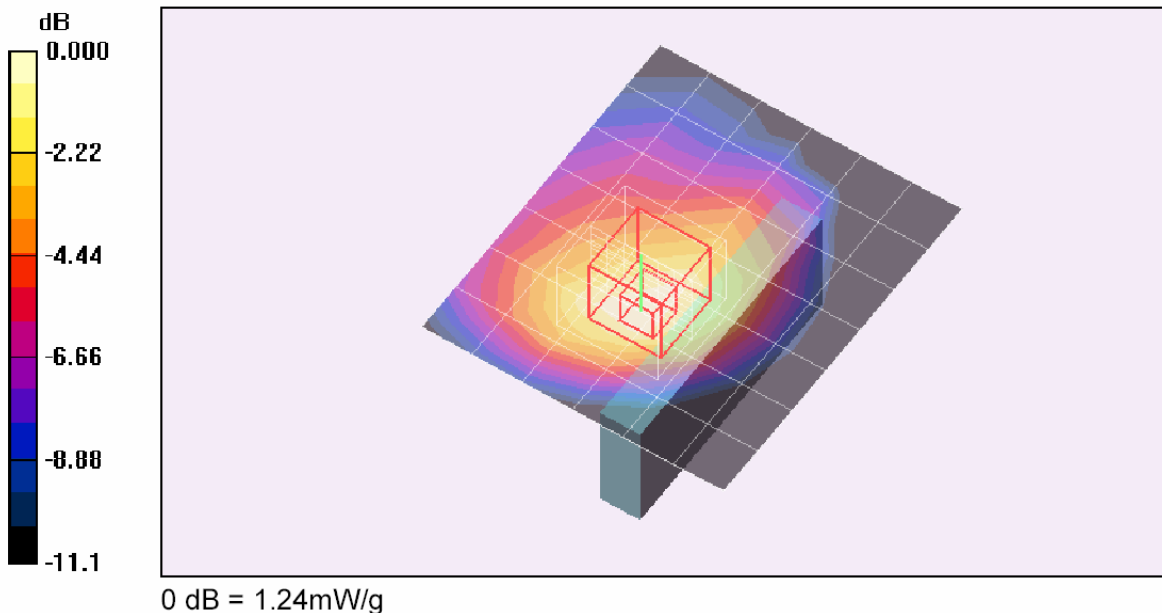
Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

DASY4 Configuration:

- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3686; ConvF(8.7, 8.7, 8.7); Calibrated: 3/23/2009
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 10/20/2008
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:XXXX
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

L-ch_GPRS 2 slots/Area Scan (7x8x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.14 mW/g

L-ch_GPRS 2 slots/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 14.3 V/m; Power Drift = -0.434 dB
Peak SAR (extrapolated) = 1.63 W/kg
SAR(1 g) = 1.05 mW/g; SAR(10 g) = 0.670 mW/g
Maximum value of SAR (measured) = 1.24 mW/g



WORST-CASE SAR PLOT for Part 24E- BODY POSITION

Date/Time: 5/26/2009 4:50:49 PM

Test Laboratory: Compliance Certification Services

Band II - Test Position 2

DUT: Sierra Wireless; Type: USB305; Serial: n/a

Communication System: PCS 1900; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.51$ mho/m; $\epsilon_r = 52.9$; $\rho = 1000$ kg/m³
Phantom section: Flat Section

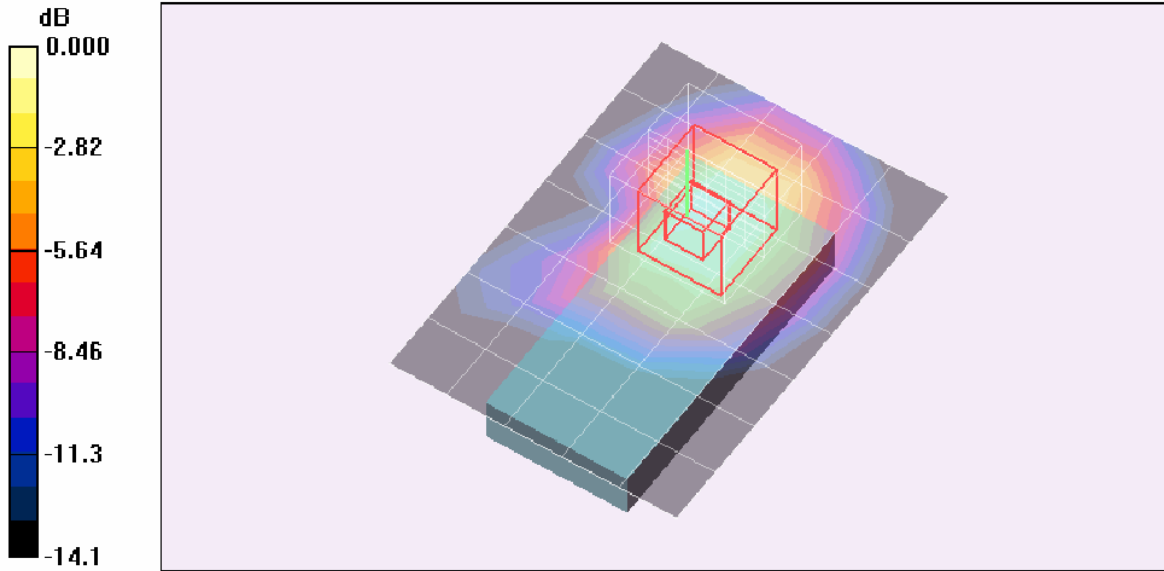
Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

DASY4 Configuration:

- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3686; ConvF(6.85, 6.85, 6.85); Calibrated: 3/23/2009
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 10/20/2008
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:XXXX
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

M-ch_Band II R99/Area Scan (6x8x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.69 mW/g

M-ch_Band II R99/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 12.5 V/m; Power Drift = -1.15 dB
Peak SAR (extrapolated) = 2.52 W/kg
SAR(1 g) = 1.58 mW/g; SAR(10 g) = 0.929 mW/g
Maximum value of SAR (measured) = 1.88 mW/g

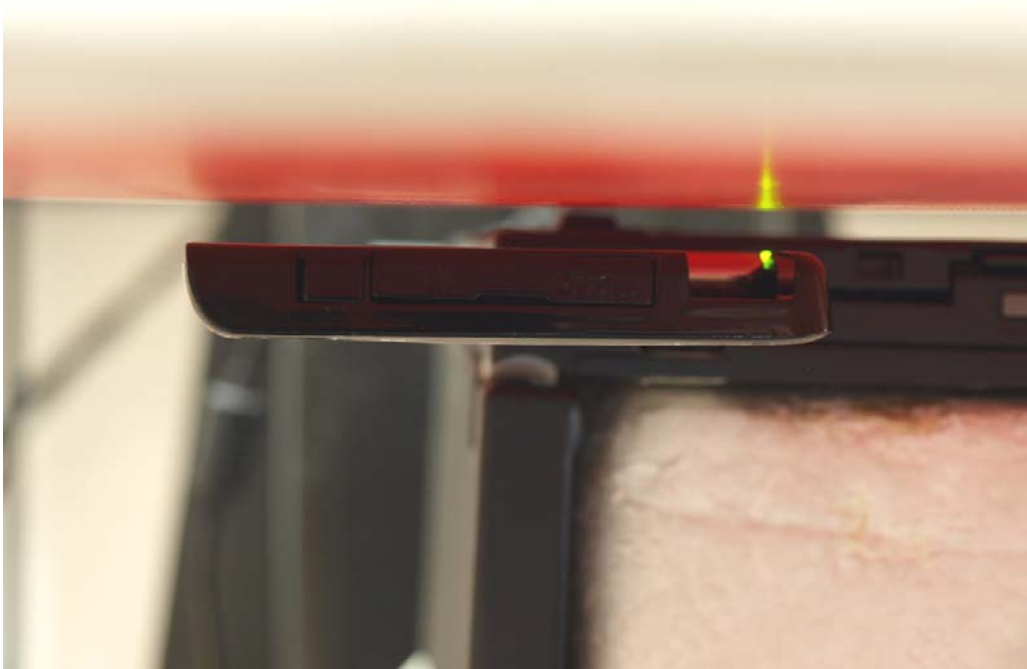


13. ATTACHMENTS

No.	Contents	No. of page (s)
1	System Performance Check Plots	6
2-1	SAR Test Plots for UMTS 1900	14
2-2	SAR Test Plots for GSM 1900	17
2-3	SAR Test Plots for UMTS 850	8
2-4	SAR Test Plots for GSM 850	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. TEST SETUP PHOTO

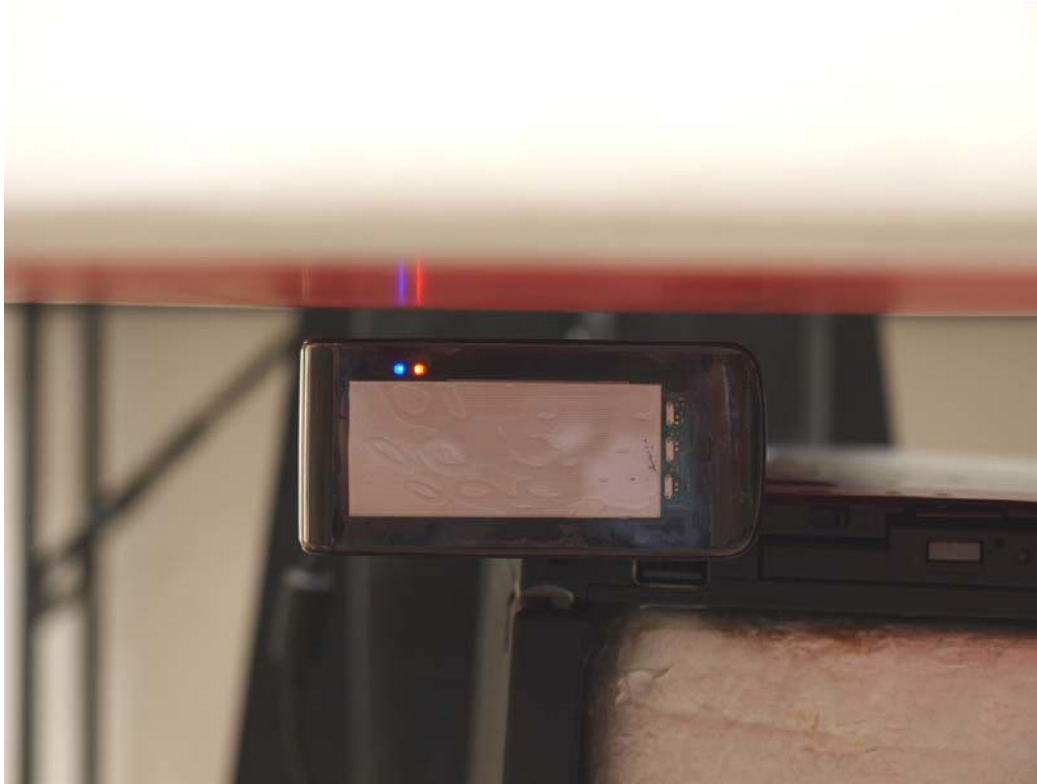
TEST POSITION 1 (5 mm Separation between EUT and Phantom)



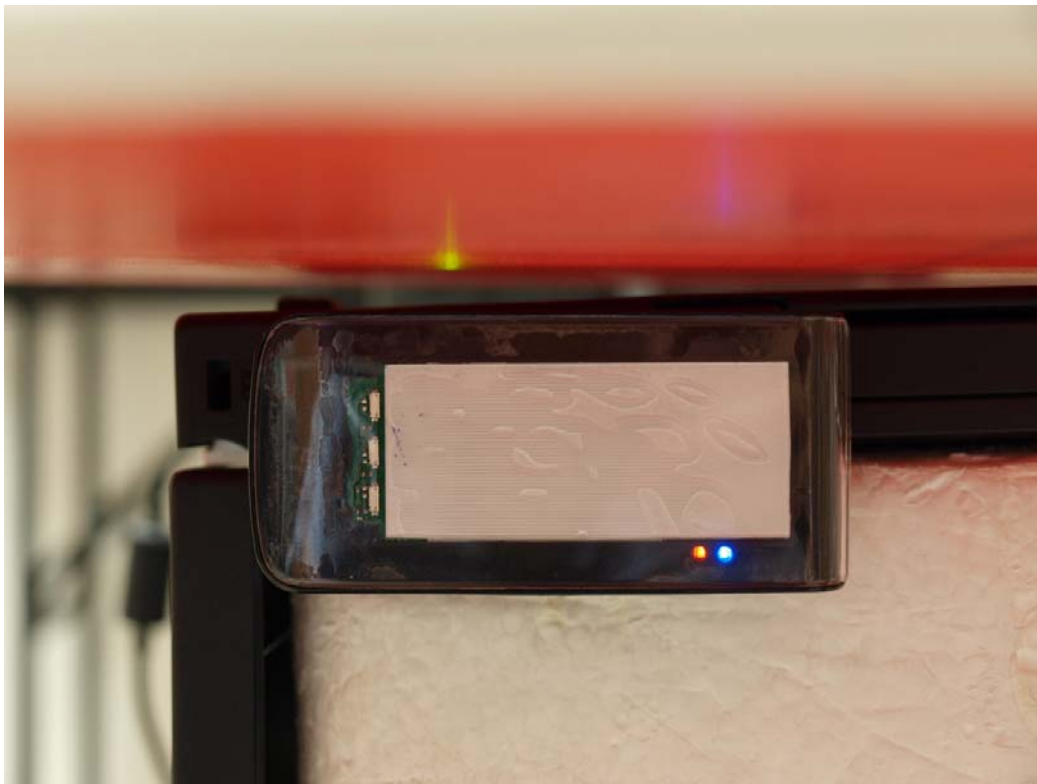
TEST POSITION 2 (5 mm Separation between EUT and Phantom)



TEST POSITION 3
(5 mm Separation between EUT and Phantom)



TEST POSITION 4 (Side)
(5 mm Separation between EUT and Phantom)



TEST POSITION 5 (Side)
(5 mm Separation between EUT and Phantom)



END OF REPORT