SAR Evaluation Report

IN ACCORDANCE WITH THE REQUIREMENTS OF
FCC REPORT AND ORDER:
ET DOCKET 93-62, AND OET BULLETIN 65 SUPPLEMENT C

FOR

850/900/1800/1900 MHZ QUADBAND MODULE

MODEL: MC8765

FCC ID: N7NMC8765

REPORT NUMBER: 06U10129-3C

ISSUE DATE: APRIL 11, 2006

Prepared for

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Prepared by

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Revision History

Rev.	Issued date	Revisions	Revised By
A	March 16, 2006	Initial issue	MH
B	March 29, 2006	Correction of WLAN FCC ID	ND
C	April 11, 2006	Addition of a note regarding the operation in 900 MHz and 1800 MHz bands not applicable in U.S. in page 3 of 31, section 1, section 5.1 and section 8.	ND

CERTIFICATE OF COMPLIANCE (SAR EVALUATION)

DATES OF TEST: March 10, 13, and 14, 2006

APPLICANT: ADDRESS:	SIERRA WIRELESS INC 13811 WIRELESS WAY, RICHMOND, BC V6V 3A4 CANADA
FCC ID: MODEL:	N7NMC8765 MC8765
DEVICE CATEGORY: EXPOSURE CATEGORY:	Portable Device General Population/Uncontrolled Exposure

850/900/1800/1900 MHz Quadband module is installed in 14 and 15-inch Lenovo host laptops along with WLAN Golan module, FCC ID: PD9LEN3945ABG for collocation.

The 850/900/1800/1900 MHz Quadband module is capable of operating at 900 MHz and 1800 MHz bands, which are not applicable in U.S.

Test Sample is a:	Production unit		
Host Device(s):	1- 14” Lenovo 2- 15” Lenovo		
Antenna(s)	Dual Band Planner Inverted F Antenna, Foxconn Hon Hai Precision IND. Co., Ltd.		
Rule Parts	Frequency Range [MHz]	The Highest SAR Values [1g_mW/g]	Collocation SAR Values [1g_mW/g]
FCC 22H	824.7-848.80	0.075	0.093
FCC 24E	1851.25-1909.80	0.059	0.063

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).

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:

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Tested By:

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EMC Engineer
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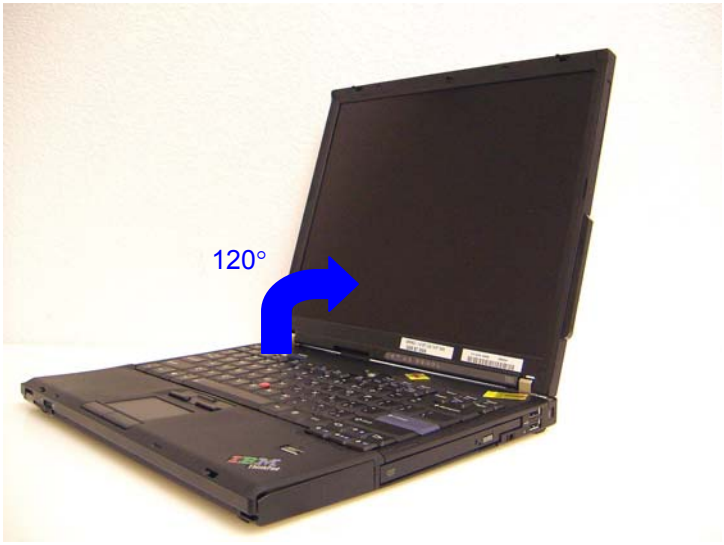
1 EQUIOMENT UNDER TEST (EUT) DESCRIPTION

850/900/1800/1900 MHz Quadband module is installed in 14 and 15-inch Lenovo host laptops along with WLAN Golan module, FCC ID: PD9LEN3945ABG for collocation. The 850/900/1800/1900 MHz Quadband module is capable of operating at 900 MHz and 1800 MHz bands, which are not applicable in U.S.	
Normal operation:	Lap-held position 
Accessory:	N/A
Earphone/Headset Jack:	N/A
Duty cycle:	25% for GPRS/EGPRS 100% for WCDMA
Host Device(s):	1- 14” Lenovo 2- 15” Lenovo
Antenna(s)	Dual Band Planner Inverted F Antenna, Foxconn Hon Hai Precision IND. Co., Ltd.
Power supply:	Power supplied through the laptop computer (host device).

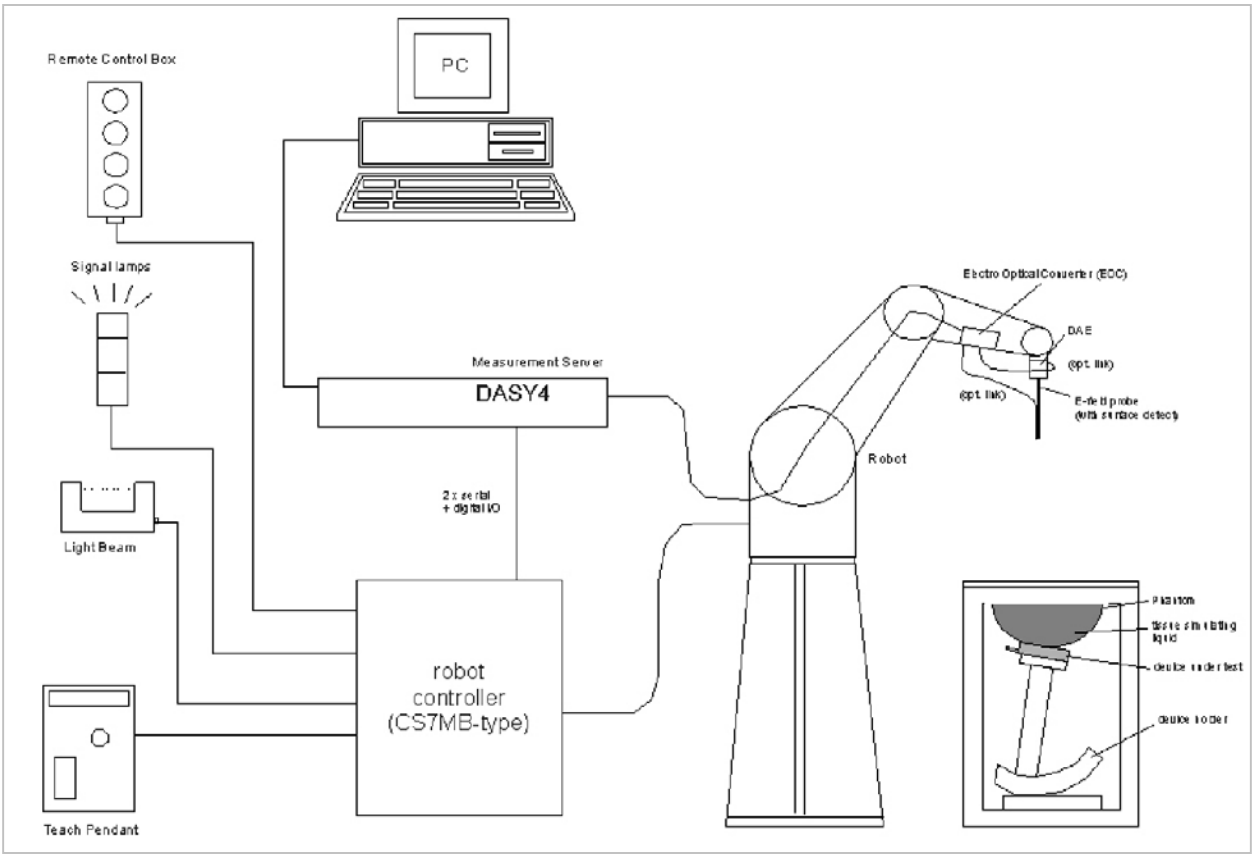
2 FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 561F Monterey Road, Morgan Hill, California, 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."

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 INGREDIANTS FOR TISSUE SIMULATIG LIQUIDS

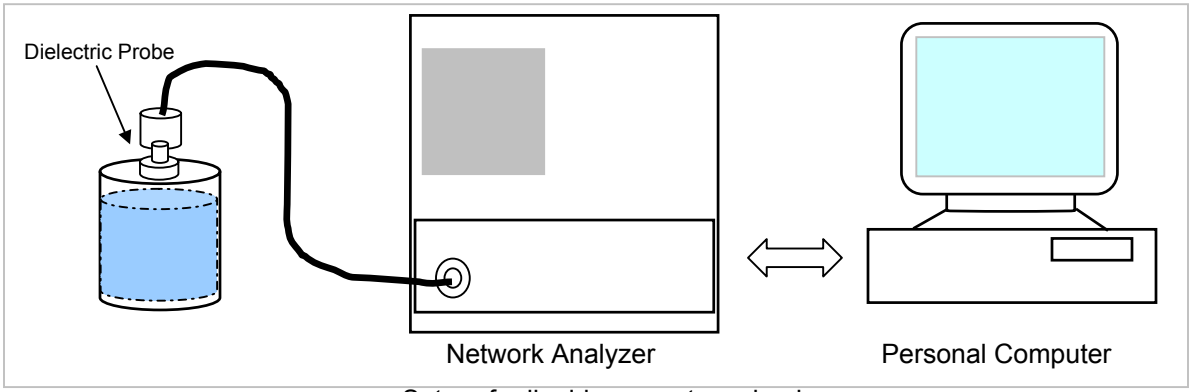
The following tissue formulations are provided for reference only as some of the parameters have not been thoroughly verified. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation.

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

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

4 SIMULATING LIQUID PARAMETERS CHECK

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



Set-up for liquid parameters check

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

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

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

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

4.1 SIMULATING LIQUID PARAMETER CHECK RESULT

Simulating Liquid Dielectric Parameters Check Result @ Muscle 835 MHz

Room Ambient Temperature = 23°C; Relative humidity = 30% Measured by: Ninous Davoudi

Simulating Liquid			Parameters		Target	Measured	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)						
835	21	15	ε"	Relative Permittivity (ϵ_r):	55.2	52.9480	-4.08	± 5
			20.4842	Conductivity (σ):	0.97	0.95153	-1.90	± 5

Liquid Check
Ambient temperature: 23.0 deg. C; Liquid temperature: 21.0 deg C
March 10, 2006 09:38 AM

Frequency	e'	e"
750000000.	53.8413	20.8106
755000000.	53.7890	20.7727
760000000.	53.7343	20.7595
765000000.	53.6842	20.7216
770000000.	53.6352	20.7186
775000000.	53.5596	20.7015
780000000.	53.5164	20.6738
785000000.	53.4776	20.6562
790000000.	53.3954	20.6423
795000000.	53.3420	20.6416
800000000.	53.2898	20.6405
805000000.	53.2281	20.6090
810000000.	53.1861	20.5823
815000000.	53.1584	20.5619
820000000.	53.1130	20.5202
825000000.	53.0659	20.5181
830000000.	53.0097	20.5028
835000000.	52.9480	20.4842
840000000.	52.9330	20.4709
845000000.	52.8507	20.4495
850000000.	52.8052	20.4366
855000000.	52.7502	20.3952
860000000.	52.7041	20.4045
865000000.	52.6323	20.3700
870000000.	52.5837	20.3379
875000000.	52.5371	20.3372
880000000.	52.4788	20.3304
885000000.	52.4193	20.3453
890000000.	52.3893	20.2968
895000000.	52.3612	20.2791
900000000.	52.3157	20.2682
905000000.	52.2712	20.2571
910000000.	52.2240	20.2369

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 835 MHz

Room Ambient Temperature = 23°C; Relative humidity = 30% Measured by: Ninous Davoudi

Simulating Liquid f (MHz)	Temp. (°C)	Depth (cm)	Parameters		Target	Measured	Deviation (%)	Limit (%)
835	21	15	ε"	Relative Permittivity (ϵ_r):	55.2	53.2632	-3.51	± 5
			20.5680	Conductivity (σ):	0.97	0.95543	-1.50	± 5

Liquid Check
Ambient temperature: 23 deg. C; Liquid temperature: 21deg C
March 13, 2006 11:32 AM

Frequency	e'	e"
750000000.	54.1553	20.9693
755000000.	54.0802	20.9014
760000000.	54.0063	20.8694
765000000.	53.9866	20.8549
770000000.	53.9151	20.8228
775000000.	53.8590	20.8324
780000000.	53.7866	20.7898
785000000.	53.7672	20.7641
790000000.	53.6906	20.7696
795000000.	53.6288	20.7474
800000000.	53.5783	20.7216
805000000.	53.5424	20.7023
810000000.	53.4891	20.6947
815000000.	53.4676	20.6315
820000000.	53.4036	20.6505
825000000.	53.3528	20.6094
830000000.	53.2971	20.5980
835000000.	53.2632	20.5680
840000000.	53.1924	20.5844
845000000.	53.1542	20.5672
850000000.	53.0839	20.5187
855000000.	53.0441	20.4918
860000000.	52.9968	20.5002
865000000.	52.9400	20.4800
870000000.	52.8749	20.4633
875000000.	52.8074	20.4371
880000000.	52.7919	20.4340
885000000.	52.7241	20.4296
890000000.	52.6666	20.4215
895000000.	52.6577	20.3741
900000000.	52.6253	20.3724
905000000.	52.5957	20.3488
910000000.	52.5378	20.3828
915000000.	52.4858	20.3631
920000000.	52.4578	20.3240

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 = 23°C; Relative humidity = 30% Measured by: Ninous Davoudi

Simulating Liquid			Parameters		Target	Measured	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)						
1900	21	15	ε"	Relative Permittivity (ε_r):	53.3	51.3555	-3.65	± 5
			13.7826	Conductivity (σ):	1.52	1.45681	-4.16	± 5

Liquid Check
Ambient temperature: 23.0 deg. C; Liquid temperature: 21.0 deg C
March 13, 2006 03:40 PM

Frequency	e'	e"
1710000000.	52.0547	13.2048
1720000000.	52.0010	13.2353
1730000000.	51.9665	13.2648
1740000000.	51.9247	13.3005
1750000000.	51.8943	13.3519
1760000000.	51.8412	13.4078
1770000000.	51.8010	13.4462
1780000000.	51.7513	13.4749
1790000000.	51.7156	13.4922
1800000000.	51.6775	13.5047
1810000000.	51.6286	13.5442
1820000000.	51.5836	13.5525
1830000000.	51.5499	13.5762
1840000000.	51.5218	13.5919
1850000000.	51.4874	13.6556
1860000000.	51.4298	13.6900
1870000000.	51.3826	13.7017
1880000000.	51.3744	13.7115
1890000000.	51.3678	13.7375
1900000000.	51.3555	13.7826
1910000000.	51.3123	13.8306

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

The 850/900/1800/1900 MHz Quadband module is capable of operating at 900 MHz and 1800 MHz bands, which are not applicable in U.S.

System Validation Dipole: D835V2 SN:4d002

Date: March 10, 2006

Ambient Temperature = 23 °C; Relative humidity = 30% Measured by: Ninous Davoudi

Body Simulating Liquid			Mrasured		Target_1g	Deviation[%]	Limit [%]
f (MHz)	Temp. [°C]	Depth [cm]	1g	Normalized to 1 W			
835	21	15	2.54	10.16	9.71	4.63	± 10
			10g	Normalized to 1 W	Target_10g	Deviation[%]	Limit [%]
			1.67	6.68	6.38	4.70	± 10

System Validation Dipole: D835V2 SN:4d002

Date: March 13, 2006

Ambient Temperature = 23 °C; Relative humidity = 30% Measured by: Ninous Davoudi

Body Simulating Liquid			Mrasured		Target_1g	Deviation[%]	Limit [%]
f (MHz)	Temp. [°C]	Depth [cm]	1g	Normalized to 1 W			
835	21	15	2.57	10.28	9.71	5.87	± 10
			10g	Normalized to 1 W	Target_10g	Deviation[%]	Limit [%]
			1.7	6.8	6.38	6.58	± 10

System Validation Dipole: D1900V2 SN:5d043

Date:

Ambient Temperature = 23°C; Relative humidity = 30% Measured by: Ninous Davoudi

Body Simulating Liquid			Mrasured		Target_1g	Deviation[%]	Limit [%]
f (MHz)	Temp. [°C]	Depth [cm]	1g	Normalized to 1 W			
1900	21	15	10.00	40	39.8	0.50	± 10
			10g	Normalized to 1 W	Target_10g	Deviation[%]	Limit [%]
			5.25	21	20.8	0.96	± 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=Z=30 mm is assessed by measuring 8 x 8 x 8 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 8 x 8 x 8 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 procedures had been used to prepare the EUT for the SAR test.

The manufacturer supplied a special driving program (Procomm Plus) by using the following commands to turn the transmitter on and change the channels and bands:

MC8765_TX_GSM850_xxx

MC8765_TX_EDGE850_xxx

MC8765_TX_GSM1900_xxx

MC8765_TX_EDGE1900_xxx

Conducted powers were measured prior to SAR measurement.

GSM850 [GPRS Class: Class 10 (2 slot)]

The cable assembly insertion loss of 8.3 dB (including 8.00 dB pad and 0.3 dB cable) was entered as an offset in the power meter to allow the power reading.

GPRS mode:

Ch	f (MHz)	Conducted Power Avg Power
128	824.2	32.15
192	837.0	32.20
251	848.8	32.12

EGPRS (EDGE) mode:

Ch	f (MHz)	Conducted Power Avg Power
128	824.2	27.89
192	837.0	27.73
251	848.8	27.70

GSM1900 [GPRS Class: Class 10 (2 slot)]

The cable assembly insertion loss of 8.47 dB (including 8.17 dB pad and 0.3 dB cable) was entered as an offset in the power meter to allow the power reading.

GPRS mode:

Ch	f (MHz)	Conducted Power Avg Power
512	1850.20	29.76
661	1880.00	29.69
810	1909.80	29.24

EGPRS (EDGE) mode:

Ch	f (MHz)	Conducted Power Avg Power
512	1850.20	27.53
661	1880.00	27.42
810	1909.80	27.43

The following settings were used to configure the Wireless Communications Test Set, Agilent 8960 Series 10, E5515C.

Instrument information

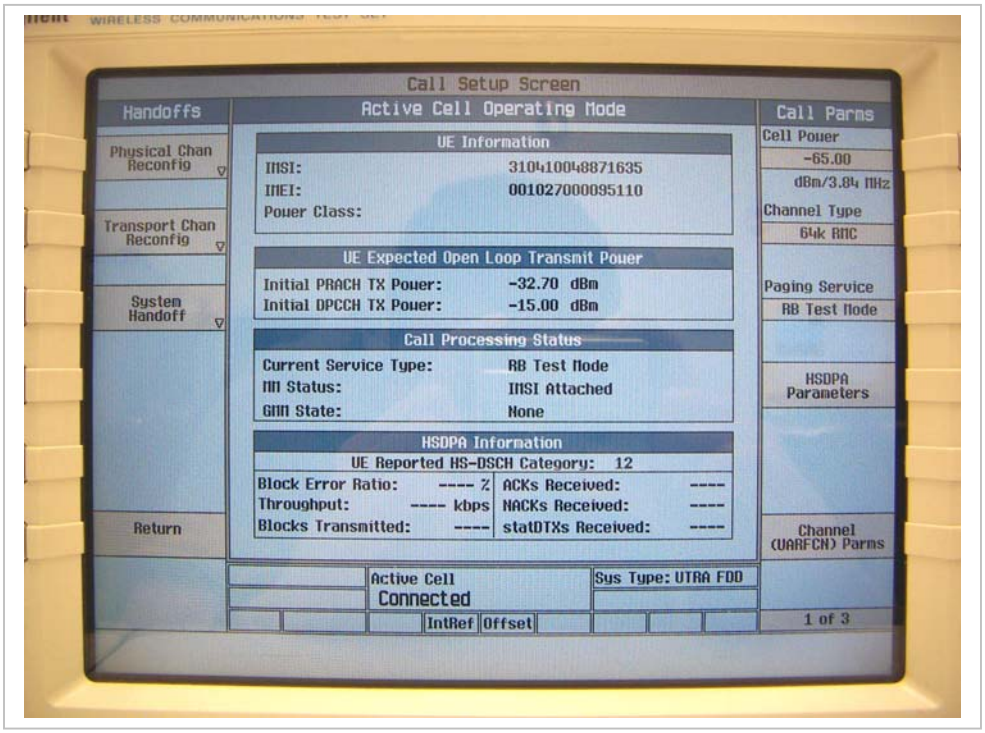
Application:	WCDMA Mobile Test
	E1963A A.08.31
Format:	WCDMA/FDD
Calibration due:	August 31 2007
Serial Number:	GB43193908

Call Parms

Channel Type:	64k RMC
Paging Service:	RB Test Mode
DL Channel:	9662 / 9800 / 9938 / 4357 / 4407 / 4458
UL Channel:	9262 / 9400 / 9538 / 4132 / 4182 / 4233
DL DTCH Data:	CCITT PRBS15
RLC Reestablish:	off
SRB Config.:	13.6k DCCH
UL CL Pwr Ctrl Parms:	All up bits

Call Control:

Security Setting:	> Authentication > off
Cell Parameter:	> PS domain information > Present
	> ATT (IMSI Attach) Flag State > Set



Conducted powers were measured prior to SAR measurement:

W-CDMA850

The cable assembly insertion loss of 8.30 dB (including 8.0 dB pad and 0.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

WCDMA mode:

Ch	f (MHz)	Conducted Power Avg Power
4132	826.40	23.88
4182	836.40	23.94
4233	846.60	23.91

W-CDMA1900

The cable assembly insertion loss of 8.47 dB (including 8 dB pad and 0.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

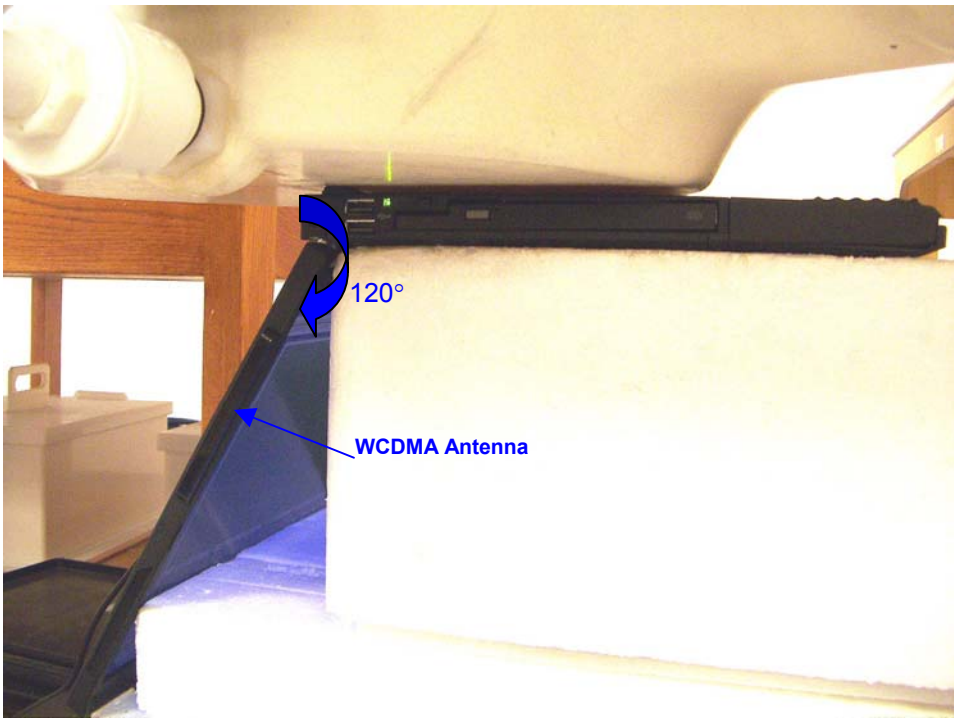
WCDMA mode:

Ch	f (MHz)	Conducted Power Avg Power
9262	1852.40	23.95
9400	1880.00	23.19
9538	1907.60	23.90

8 SAR MEASURMENT RESULTS

The 850/900/1800/1900 MHz Quadband module is capable of operating at 900 MHz and 1800 MHz bands, which are not applicable in U.S.

8.1 14" LENOVO, CELL BAND



GPRS

Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dBm)	Extrapolated[1] SAR 1g (mW/g)
128	824.20	0.075	0.000	**0.075**
192	837.00	0.069	0.000	0.069
251	848.80	0.060	0.000	0.060
128 [3]	824.20	0.093	0.000	**0.093**

EGPRS

Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dBm)	Extrapolated[1] SAR 1g (mW/g)
128	824.20	0.023	0.000	0.023
192	837.00	0.021	0.000	0.021
251	848.80	0.018	0.000	0.018

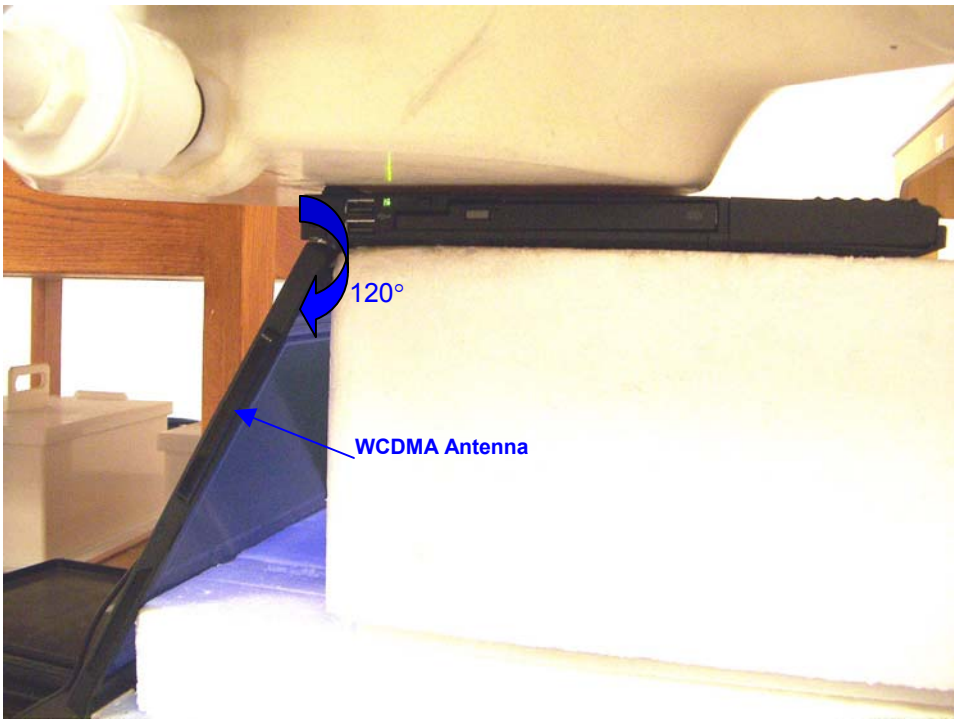
WCDMA

Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dBm)	Extrapolated[1] SAR 1g (mW/g)
4132	826.40	0.046	-0.190	0.048
4182	836.40	0.047	0.000	0.047
4233	846.60	0.044	-0.126	0.045

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) Please see attachments for the detailed measurement data and plots showing the maximum SAR location of the EUT.
3) Collocation with Golan WLAN module FCC ID: PD9LEN3945ABG.

8.2 14" LENOVO, PCS BAND



GPRS

Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dBm)	Extrapolated[1] SAR 1g (mW/g)
512	1850.20	0.030	0.000	0.030
661	1880.00	0.046	0.000	0.046
810	1909.80	0.059	0.000	**0.059**
810 [3]	1909.80	0.061	-0.140	**0.063**

EGPRS

Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dBm)	Extrapolated[1] SAR 1g (mW/g)
512	1850.20	0.015	0.000	0.015
661	1880.00	0.027	-0.072	0.027
810	1909.80	0.029	0.000	0.029

WCDMA

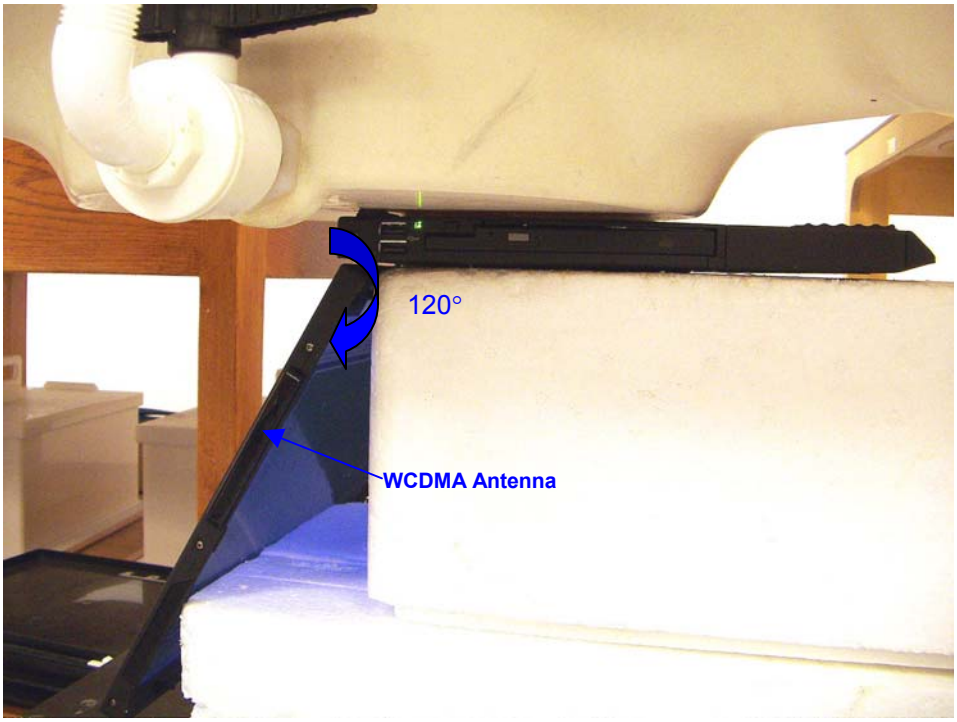
Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dBm)	Extrapolated[1] SAR 1g (mW/g)
9262	1852.40	0.055	-0.051	0.056
9400	1880.00	0.053	-0.073	0.054
9538	1907.60	0.057	-0.029	0.057

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) Please see attachments for the detailed measurement data and plots showing the maximum SAR location of the EUT.
3) Collocation with Golan WLAN module FCC ID: PD9LEN3945ABG.

8.3 15" LENOVO, CELL BAND

Spot check tests are performed based on the worst case from 14" Lenovo laptop.



GPRS

Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dBm)	Extrapolated[1)] SAR 1g (mW/g)
128	824.20	0.028	0.000	0.028
128[4)]	824.20	0.027	0.000	0.027

EGPRS

Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dBm)	Extrapolated[1)] SAR 1g (mW/g)
128	824.20	0.013	0.000	0.013

WCDMA

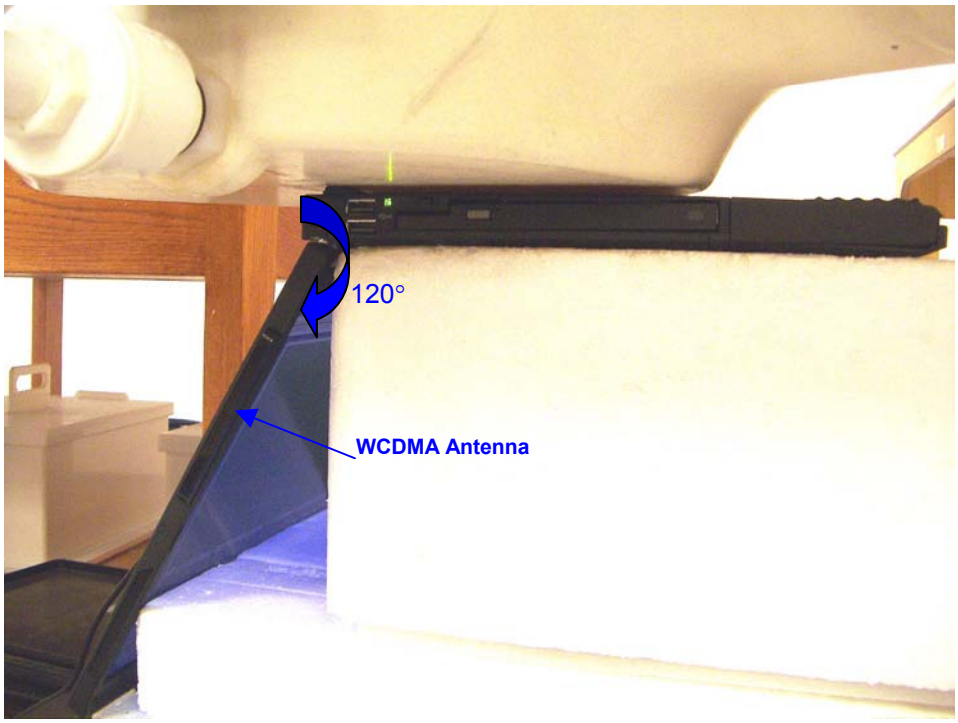
Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dBm)	Extrapolated[1)] SAR 1g (mW/g)
4132	826.40	0.021	0.000	0.021

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) Spot check tests are done based on the worst-case results from 14" laptop.
3) Please see attachments for the detailed measurement data and plots showing the maximum SAR location of the EUT.
4) Collocation with Golan WLAN module FCC ID: PD9LEN3945ABG

8.4 15” LENOVO, PCS BAND

Spot check tests are performed based on the worst case from 14” Lenovo laptop.



GPRS				
Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dBm)	Extrapolated[1)] SAR 1g (mW/g)
810	1909.80	0.011	0.000	0.011
EGPRS				
Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dBm)	Extrapolated[1)] SAR 1g (mW/g)
810	1909.80	0.005	-0.172	0.006
WCDMA				
Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dBm)	Extrapolated[1)] SAR 1g (mW/g)
9538	1907.60	0.015	0.000	0.015
9538 [4)]	1907.60	0.018	0.000	0.018

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) Spot check tests are done based on the worst-case results from 14” laptop.
3) Please see attachments for the detailed measurement data and plots showing the maximum SAR location of the EUT.
4) Collocation with Golan WLAN module FCC ID: PD9LEN3945ABG

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

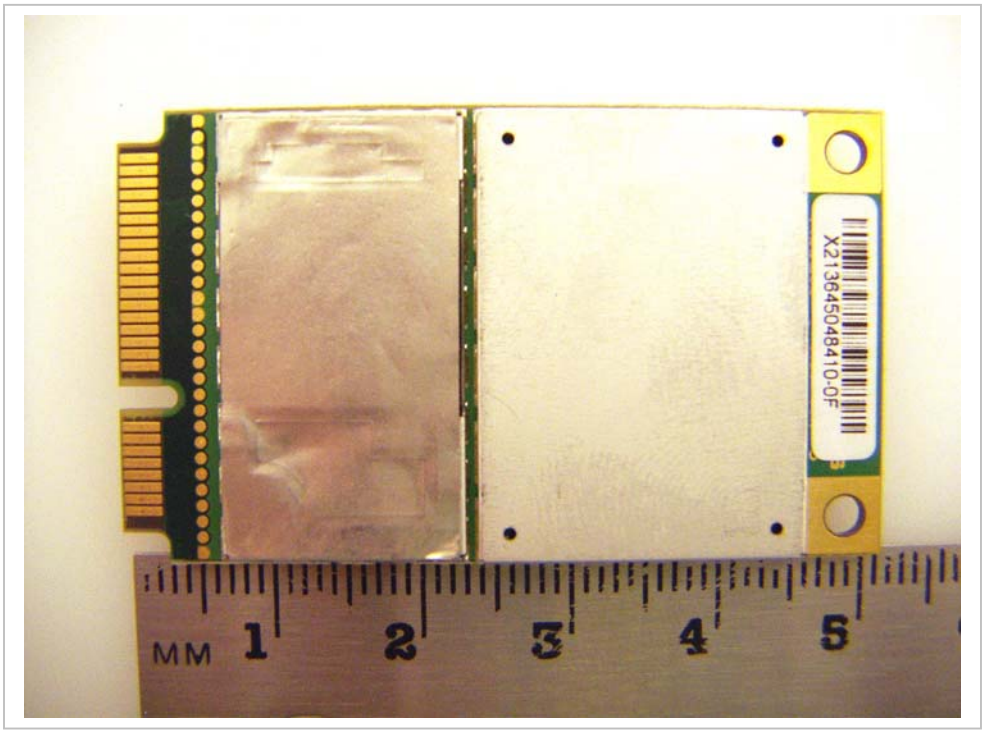
Notesfor table
1. Tol. - tolerance in influence quaitity
2. N - Nomal
3. R - Rectangular
4. Div. - Divisor used to obtain standard uncertainty
5. Ci - is te sensitivity coefficient

10 EQUIPMENT LIST AND CALIBRATION

Name of Equipment	Manufacturer	Type/Model	Serial Number	Cal. Due date
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
S-Parameter Network Analyzer	Agilent	8753ES-6	US39173569	2/9/07
Electronic Probe kit	Hewlett Packard	85070C	N/A	N/A
E-Field Probe	SPEAG	EX3DV3	3531	7/21/06
Thermometer	ERTCO	639-1	8636	10/20/06
SAM Phantom (SAM1)	SPEAG	TP-1185	QD000P40CA	N/A
SAM Phantom (SAM2)	SPEAG	TP-1015	N/A	N/A
Data Acquisition Electronics	SPEAG	DAE4	558	1/20/07
System Validation Dipole	SPEAG	D835V2	4d002	1/23/08
System Validation Dipole	SPEAG	D1900V2	5d043	1/29/08
Power Meter	Giga-tronics	8651A	8651404	12/27/06
Power Sensor	Giga-tronics	80701A	1834588	12/27/07
Amplifier	Mini-Circuits	ZVE-8G	0360	N/A
Amplifier	Mini-Circuits	ZHL-42W	D072701-5	N/A
Radio Communication Tester	Rohde & Schwarz	CMU 200	838114/032	12/17/06
Simulating Liquid	CCS	M835	N/A	Within 24 hrs of first test
Simulating Liquid	CCS	M1900	N/A	Within 24 hrs of first test

11 EUT PHOTOS

850/900/1800/1900 MHZ QUADBAND MODULE



14” Lenovo

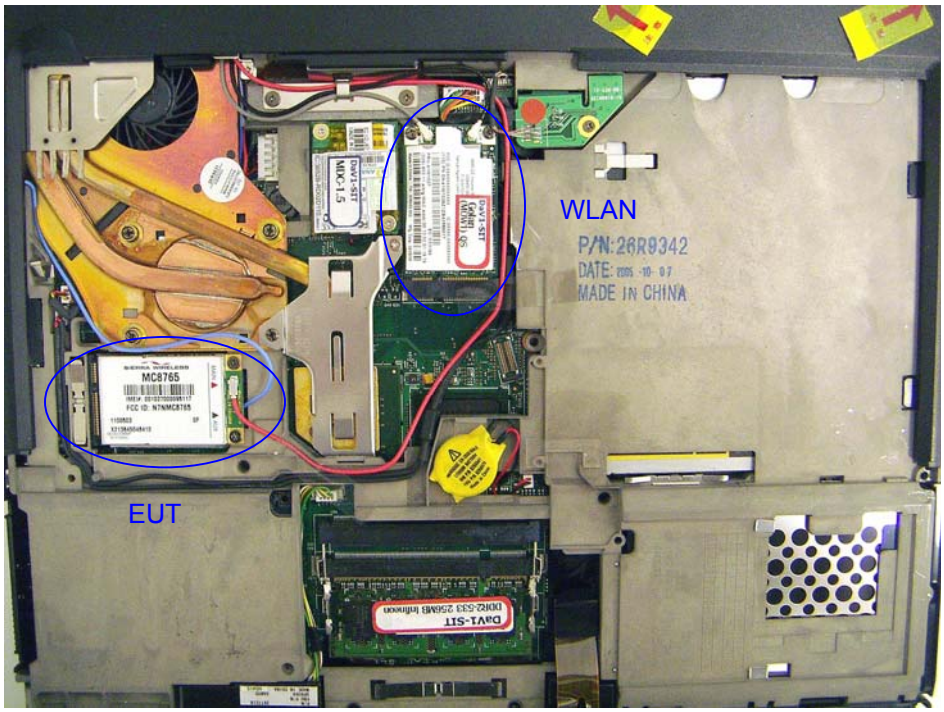
15” lenovo

14” Lenovo

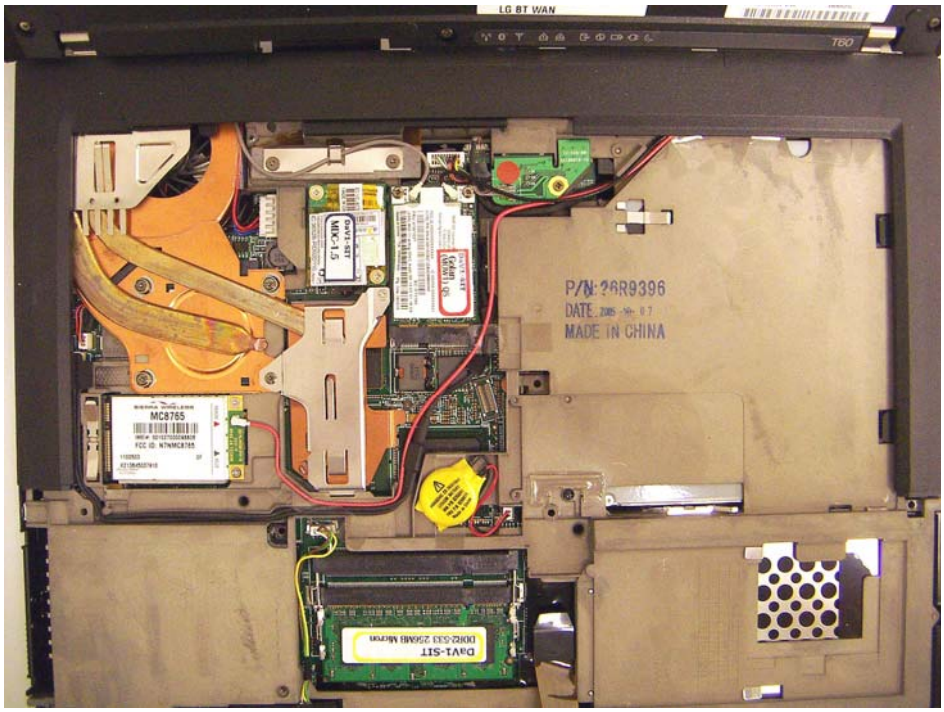
15” Lenovo

Antenna Location
14” Lenovo

EUT location
14” Lenovo



15” Lenovo



12 ATTACHMENTS

No.	Contents	No. Of Pages
1	System Performance Check Plots	6
2-1	SAR Test Plots 14 Inch Host	22
2-2	SAR Test Plots 15 Inch Host	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

END OF REPORT