SAR Evaluation Report

IN ACCORDANCE WITH THE REQUIREMENTS OF FCC OET BULLETIN 65 SUPPLEMENT C

FOR

850/900/1800/1900 MHZ QUADBAND MODULE

MODEL: MC8765

FCC ID: N7NMC8765

REPORT NUMBER: 06U10573-3C

ISSUE DATE: OCTOBER 6, 2006

Prepared for

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Prepared by

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Revision History

Rev.	Issued date	Revisions	Revised By
--	September 22, 2006	Initial issue	HS
B	September 28, 2006	Changed WLAN FCC ID.	SR
C	October 6, 2006	Update section 7	ND

CERTIFICATE OF COMPLIANCE (SAR EVALUATION)

DATES OF TEST: September 19, 20 and 21, 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 installed into C2 Note, which includes collocation with WLAN (Gwinette, FCC ID: PPD-AR5BXB72-L) and Bluetooth FCC ID: MCLJ07H081.

Note: This device contains 900/1800/2100 MHz bands that are not operational in US territories. This report is applicable to 850 and 1900 MHz bands.

Test Sample is a:	Production unit		
Host Laptop	C2 Note		
Rule Parts	Frequency Range [MHz]	The Highest SAR Values [1g_mW/g]	Collocation SAR Values [1g_mW/g]
22H	824.2-848.8	0.0541	0.0546
24E	1850.2-1909.8	0.0705	0.0674

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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Hsin Fu Shih
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Tested By:

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1 EQUIPMENT UNDER TEST (EUT) DESCRIPTION

850/900/1800/1900 MHz QuadBand Module installed into C2 Note, which includes collocation with WLAN (Gwinette, FCC ID: PPD-AR5BXB72-L) and Bluetooth FCC ID: MCLJ07H081. Note: This device contains 900/1800/2100 MHz bands that are not operational in US territories. This report is applicable to 850 and 1900 MHz bands.	
GPRS Multi-slot Classes:	Class 10 (2up, 3 down) for both GPRS and EGPRS
Normal operation:	Lap-held position
Duty cycle:	25% both GPRS and EGPRS modes
Normal operation:	Lap-held position
Host Device(s):	C2 Note Laptop
Antenna(s)	Foxconn Hon Hai Precision Ind. Co., Ltd. (R.O.C.), Dual Band Monopole Antenna.
Power supply:	Power supplied through the laptop computer (host device).

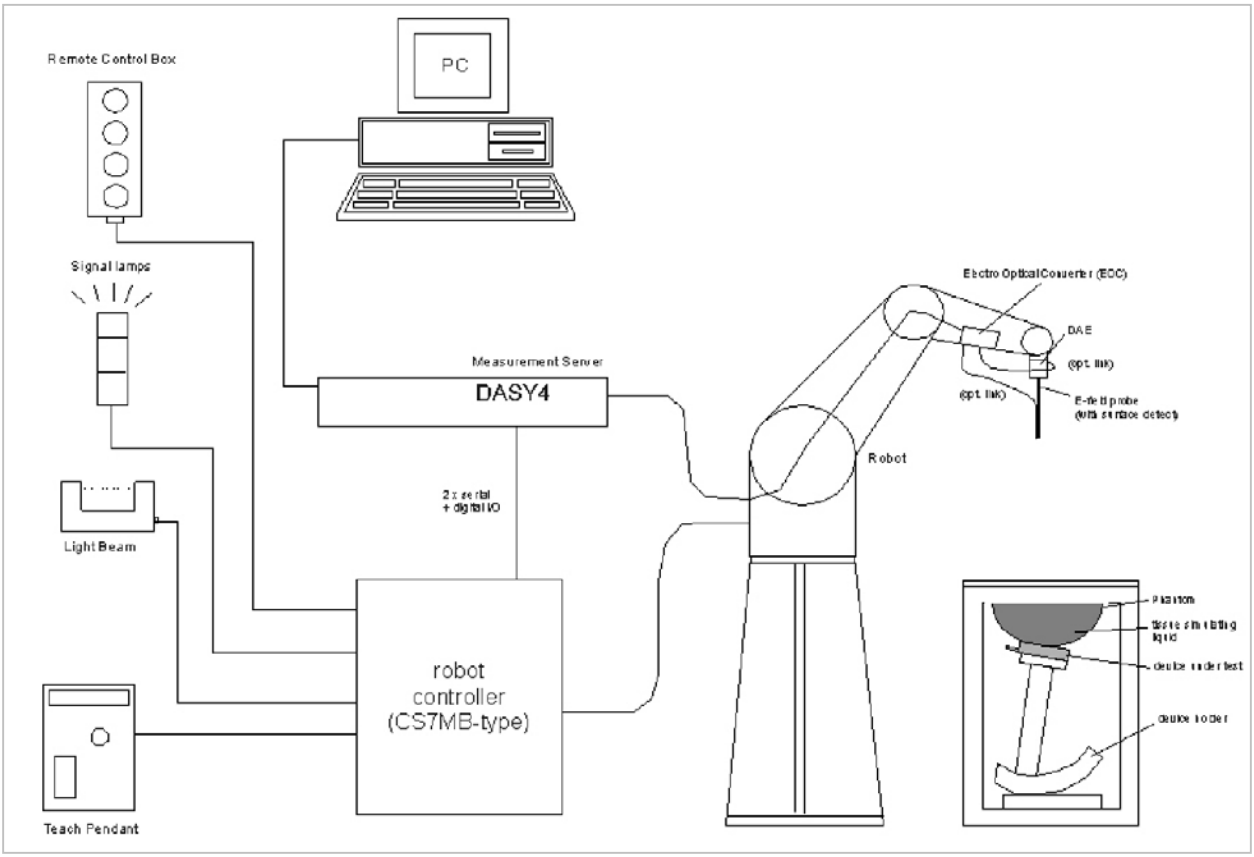
2 FACILITIES AND ACCREDITATION

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.

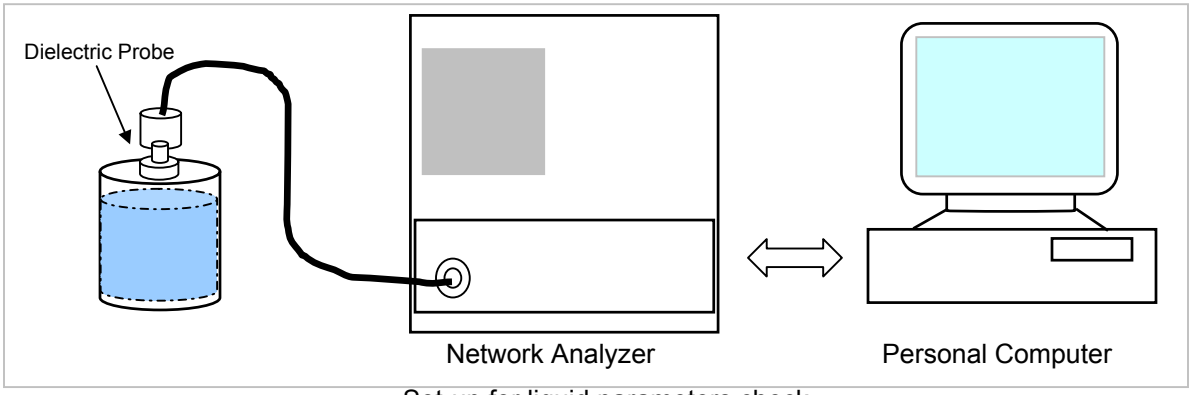
The following tissue formulations are provided for reference only as some of the parameters have not been thoroughly verified. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation.

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 = 40 % Measured by: Sunny Shih

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
835	22	15	e'	52.7033	Relative Permittivity (ϵ_r):	52.7033	55.2	-4.52	± 5
			e"	20.6266	Conductivity (σ):	0.95815	0.97	-1.22	± 5

Liquid Check
Ambient temperature: 22.5 deg. C; Liquid temperature: 22 deg C
September 20, 2006 01:28 PM

Frequency	e'	e"
750000000.	53.5615	20.9734
755000000.	53.4969	20.9278
760000000.	53.4511	20.9002
765000000.	53.4451	20.8830
770000000.	53.3523	20.8481
775000000.	53.2819	20.8411
780000000.	53.2577	20.7958
785000000.	53.2068	20.7712
790000000.	53.1469	20.7843
795000000.	53.0881	20.7629
800000000.	53.0269	20.7312
805000000.	53.0074	20.7194
810000000.	52.9535	20.7026
815000000.	52.8905	20.6726
820000000.	52.8539	20.6670
825000000.	52.7941	20.6088
830000000.	52.7266	20.6036
835000000.	**52.7033**	**20.6266**
840000000.	52.6724	20.5648
845000000.	52.5942	20.5205
850000000.	52.5249	20.5277

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 = 40% Measured by: Sunny Shih

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
1900	22	15	e'	52.3651	Relative Permittivity (ϵ_r):	52.3651	53.3	-1.75	± 5
			e"	13.8112	Conductivity (σ):	1.45984	1.52	-3.96	± 5

Liquid Check
Ambient temperature: 23.0 deg. C; Liquid temperature: 22.0 deg C
September 19, 2006 08:05 AM

Frequency	e'	e"
1710000000.	53.0111	13.1108
1720000000.	52.9800	13.1536
1730000000.	52.9400	13.1784
1740000000.	52.9166	13.2294
1750000000.	52.8906	13.2790
1760000000.	52.8482	13.3063
1770000000.	52.8118	13.3467
1780000000.	52.7656	13.4029
1790000000.	52.7287	13.4334
1800000000.	52.6934	13.4843
1810000000.	52.6703	13.4925
1820000000.	52.6137	13.5263
1830000000.	52.5892	13.5576
1840000000.	52.5454	13.5810
1850000000.	52.5162	13.6348
1860000000.	52.4971	13.6654
1870000000.	52.4469	13.6990
1880000000.	52.4166	13.7365
1890000000.	52.3892	13.7752
1900000000.	**52.3651**	**13.8112**
1910000000.	52.3123	13.8450

The conductivity (σ) can be given as:

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

where $f = target\ f * 10^6$

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

5 SYSTEM PERFORMANCE CHECK

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

System Performance Check Measurement Conditions

- The measurements were performed in the flat section of the SAM twin phantom filled with Body simulating liquid of the following parameters.
- The DASY4 system with an Isotropic E-Field Probe EX3DV3-SN: 3531 was used for the measurements.
- The dipole was mounted on the small tripod so that the dipole feed point was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10 mm (above 1 GHz) and 15 mm (below 1 GHz) from dipole center to the simulating liquid surface.
- The coarse grid with a grid spacing of 15 mm was aligned with the dipole.
  For 5 GHz band - The coarse grid with a grid spacing of 10 mm was aligned with the dipole.
- Special 5 x 5 x 7 fine cube was chosen for cube integration(dx=dy=7.5mm; dz=5mm).
  For 5 GHz band - Special 8x8x8 fine cube was chosen for cube integration(dx=dy=4.3mm; dz=3mm)
- Distance between probe sensors and phantom surface was set to 4 mm.
  For 5 GHz band - Distance between probe sensors and phantom surface was set to 2.0mm
- The dipole input power (forward power) was 250 mW±3%.
- The results are normalized to 1 W input power.

Reference SAR Values for body-tissue

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

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

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

5.1 SYSTEM PERFORMANCE CHECK RESULTS

System Validation Dipole: D835V2 SN:4d002

Date: September 20, 2006

Ambient Temperature = 23°C; Relative humidity = 40% Measured by: Sunny Shih

Body Simulating Liquid			SAR (mW/g	Normalized to 1 W	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C	Depth (cm)					
835	22	15	1g	10.5	9.71	8.14	± 10
			10g	6.92	6.38	8.46	± 10

System Validation Dipole: D1900V2 SN:5d043

Date: September 19, 2006

Room Ambient Temperature = 23 °C; Relative humidity = 40 % Measured by: Sunny Shih:

Body Simulating Liquid			SAR (mW/g)		Normalized to 1 W	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C	Depth (cm						
1900	22	15	1g	9.44	37.76	39.8	-5.13	± 10
			10g	5.03	20.12	20.8	-3.27	± 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 following setting is used to prepare the EUT in GSM850/1900MHz bands for the SAR test.

Agilent 8960 series 10 E5515C, Wireless Communication Test Set is used to control the EUT and measure the output power.

The following setting was used to establish the signal.

System Config:	GSM/GPRS Mobile Test	
	E1968A	A.06.31
Call Parms:	BCH ➔	Cell Band: GSM850/PCS
	TCH ➔	Traffic Band: GSM850/PCS
		Traffic Channel: 128/192/251 or 512/661/810
		MS Tx Level: 0
	PDTCH ➔	Traffic Band: GSM850/PCS
		Traffic Channel: 128/192/251 512/661/810
		MS Tx Level: 0
		Coding Scheme: CS-4
		MultiSlot Config: 2up, 3down
Control:	Active Cell ➔	GSM/GPRS/EGPRS

GSM850, GPRS

Channel	Frequency (MHz)	Power (dBm)
128	824.2	32.15
192	837.0	32.20
251	848.8	32.12

GSM1900, GPRS

Channel	Frequency (MHz)	Power (dBm)
512	1850.2	29.76
661	1880.0	29.69
810	1909.8	29.24

GSM850, EGPRS

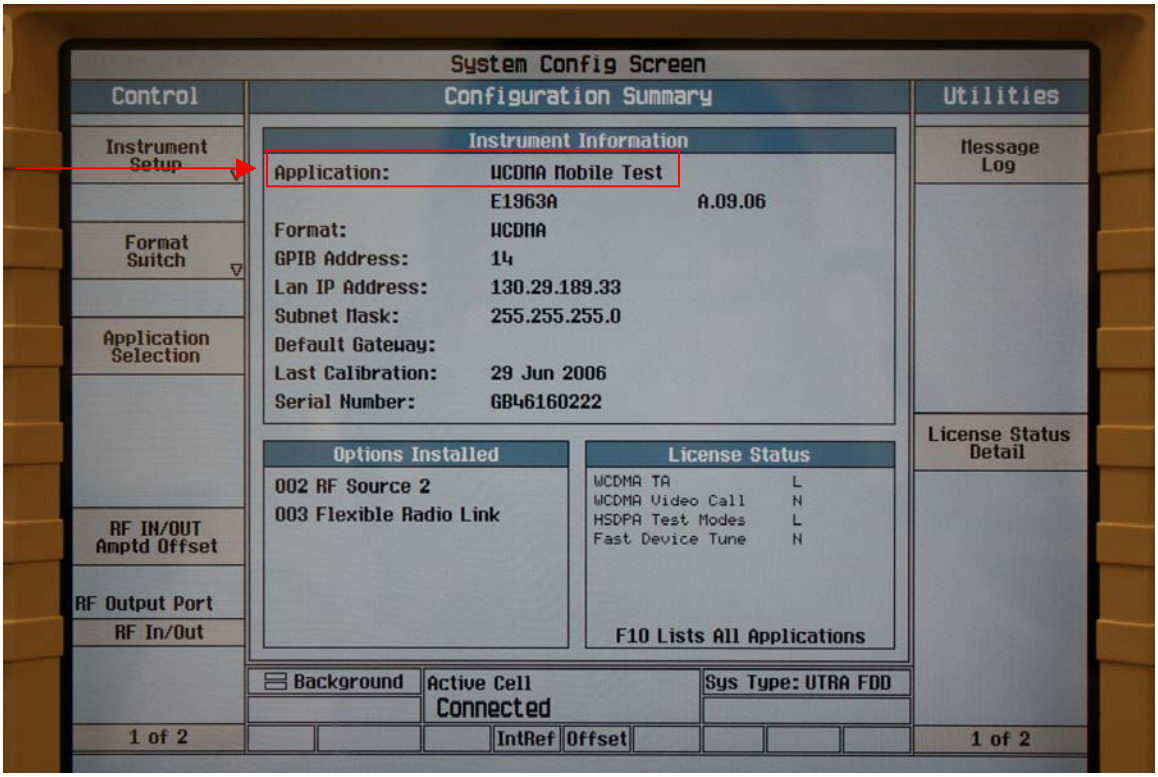
Channel	Frequency (MHz)	Power (dBm)
128	824.2	27.89
192	837.0	27.73
251	848.8	27.70

GSM1900, EGPRS

Channel	Frequency (MHz)	Power (dBm)
512	1850.2	27.53
661	1880.0	27.42
810	1909.8	27.43

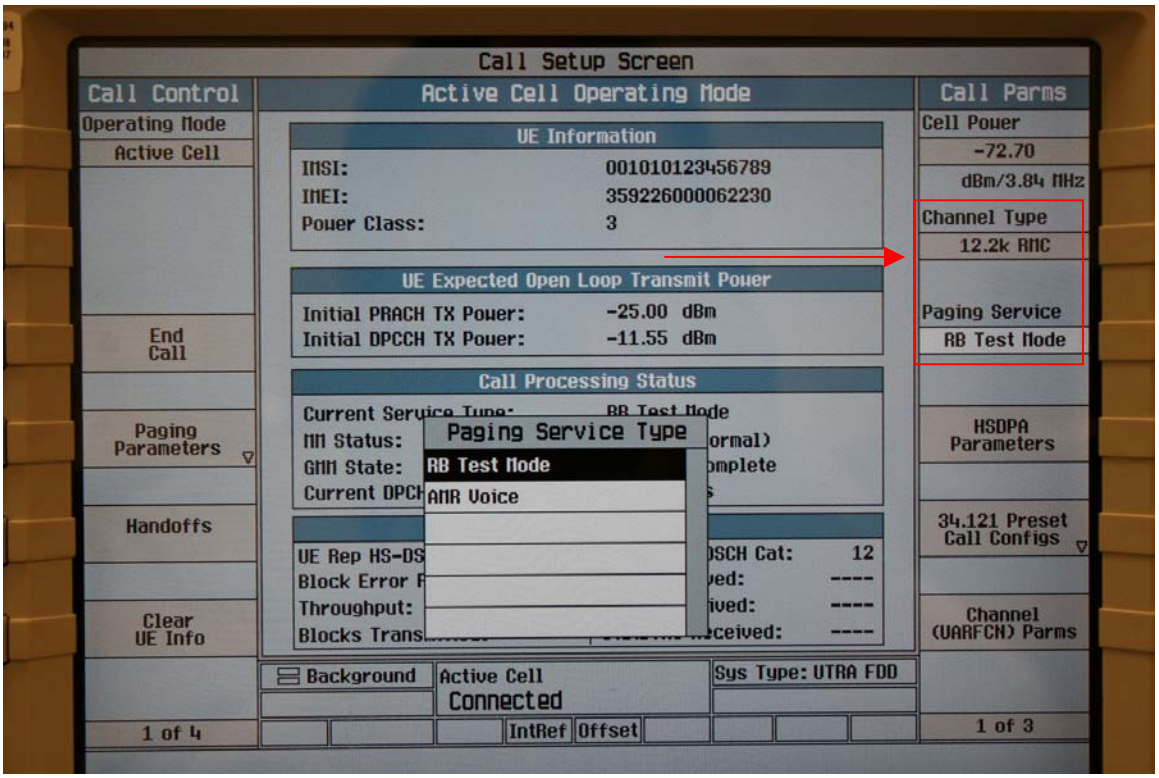
The following settings were used to configure the Wireless Communications Test Set, Agilent 8960 Series 10, E5515C.

Application: WCDMA Mobile Test

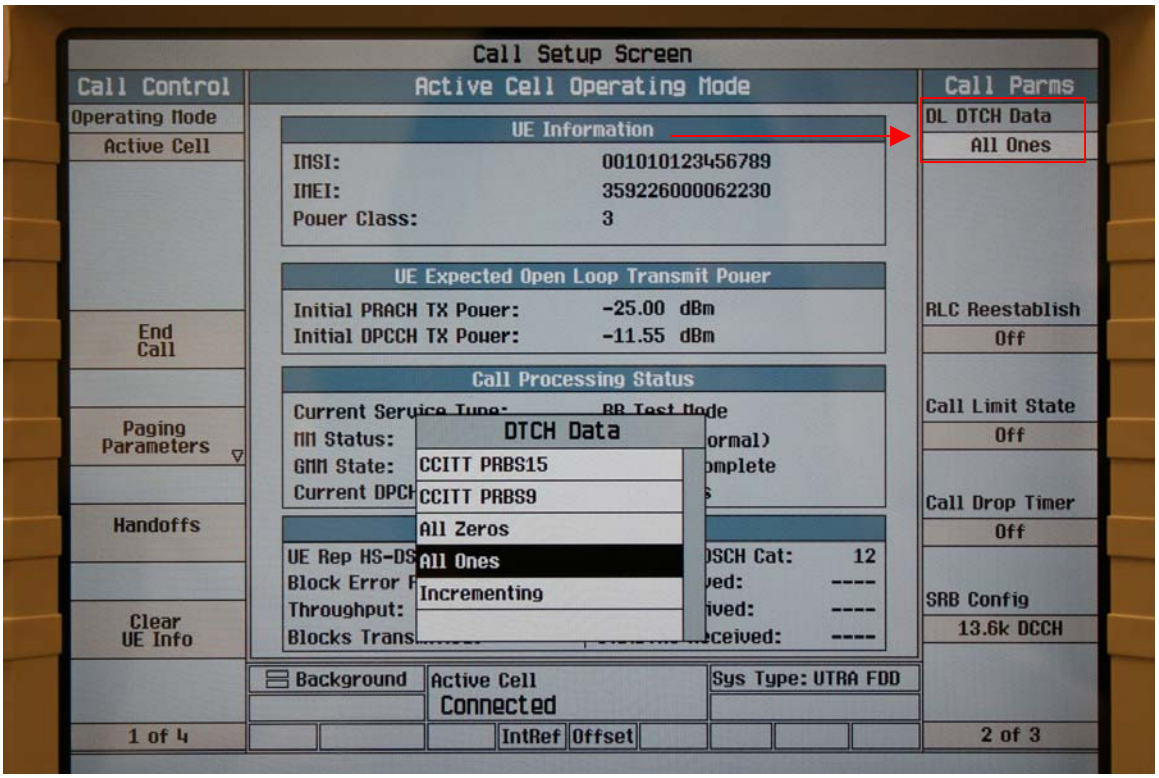


Channel Type: 12.2k RMC

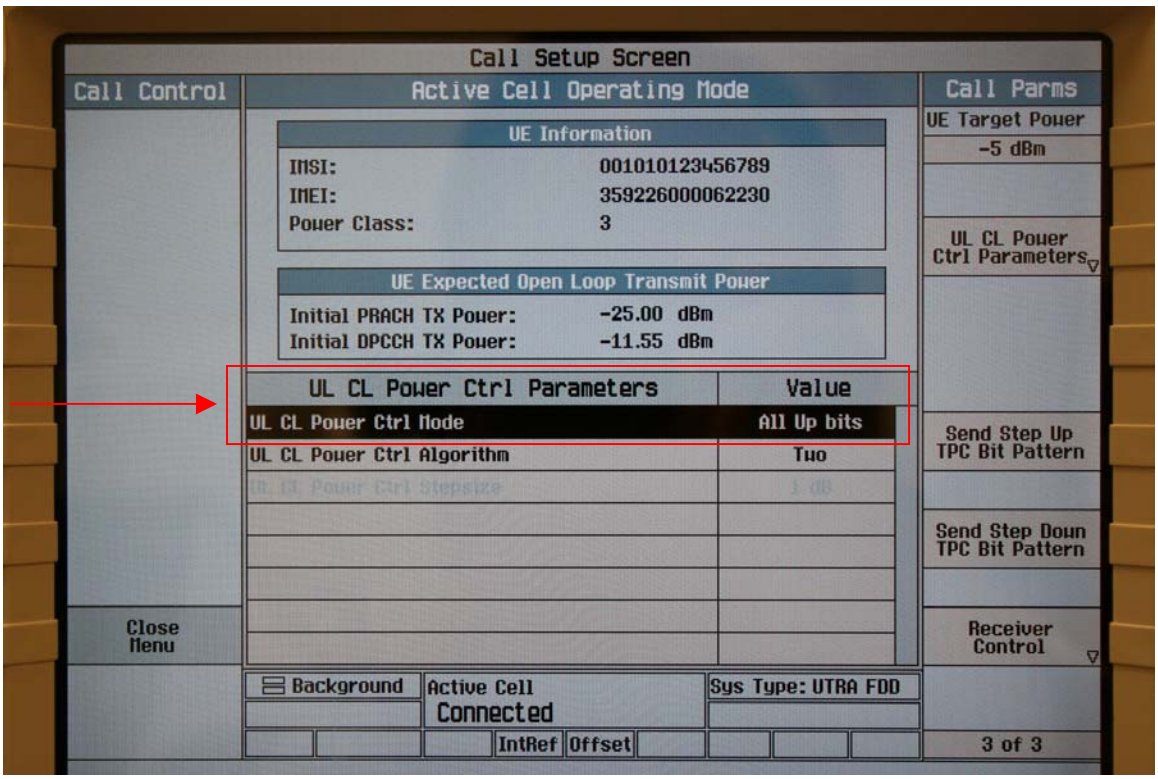
Paging Service: RB Test Mode



DL DTCH Data: All Ones



UL CL Power Ctrl Parameters: All Up bits



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.

Channel	Frequency (MHz)	Power (dBm)
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.

Channel	Frequency (MHz)	Power (dBm)
9262	1852.40	23.95
9400	1880.00	23.19
9538	1907.60	23.90

8 SAR MEASURMENT RESULTS

8.1 CELL BAND

8.1.1 ANTENNA POSITION - NORMAL

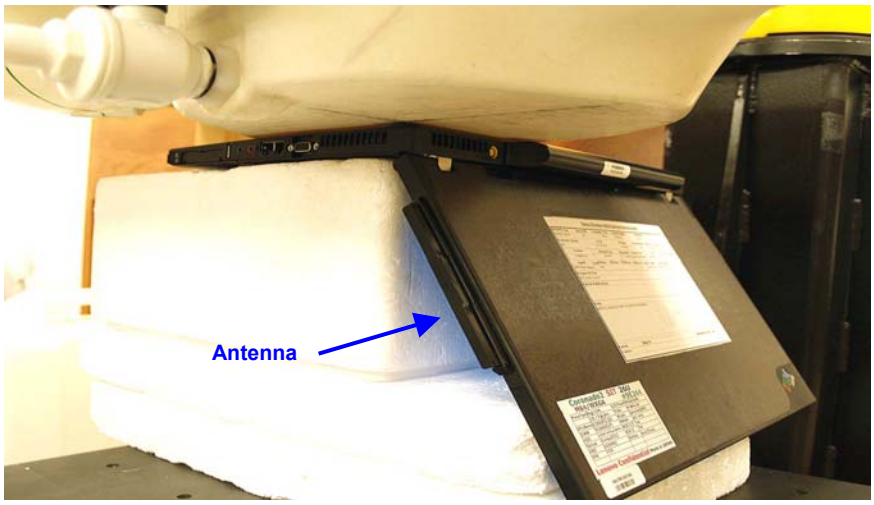
GSM850

Test Mode	Channel	f (MHz)	Measured SAR 1g (mW/g)
GPRS Mode, Ant. Position - Normal	128	824.2	0.0454
	192	837.0	0.0497
	251	**848.8**	**0.0541**
	251 [2]	848.8	0.0532
	251 [3]	848.8	0.0528
	251 [4]	848.8	0.0530
	251 [5]	848.8	0.0526
	251 [6]	848.8	0.0525
	251 [7]	848.8	0.0526
	251 [8]	848.8	0.0541
	251 [9]	**848.8**	**0.0546**
	251 [10]	848.8	0.0532
	251 [11]	848.8	0.0531
EGPRS Mode, Ant. position - Normal	128	824.2	0.0147
	192	837.0	
	251	848.8	
WCDMA Mode, Ant. position -Normal	4132	826.4	0.0317
	4182	836.4	
	4233	846.6	

Notes:

1) When measured SAR is less than 3dB limit, testing on high and low channels are optional.
2) Collocation with Blue tooth and WLAN in 2.4GHz band b mode middle channel.
3) Collocation with Blue tooth and WLAN in 2.4GHz band g mode middle channel.
4) Collocation with Blue tooth and WLAN in 2.4GHz band HT20 mode middle channel.
5) Collocation with Blue tooth and WLAN in 2.4GHz band HT40 mode middle channel.
6) Collocation with Blue tooth and WLAN in 5.2GHz band a mode middle channel.
7) Collocation with Blue tooth and WLAN in 5.2GHz band HT20 mode middle channel.
8) Collocation with Blue tooth and WLAN in 5.2GHz band HT40 mode middle channel.
9) Collocation with Blue tooth and WLAN in 5.8GHz band a mode middle channel.
10) Collocation with Blue tooth and WLAN in 5.8GHz band HT20 mode middle channel.
11) Collocation with Blue tooth and WLAN in 5.8GHz band HT40 mode middle channel.

8.1.2 ANTENNA POSITION - EXTENDED



GSM850

Test Mode	Channel	f (MHz)	Measured SAR 1g (mW/g)
GPRS Mode, Ant. Position - Extended	128 192 251	824.2 837.0 848.8	0.0489
EGPRS Mode, Ant. position - Extended	128 192 251	824.2 837.0 848.8	0.0130
WCDMA Mode, Ant. position - Extended	4132 4182 4233	826.4 836.4 846.6	0.0492

Notes:

1) When measured SAR is less than 3dB limit, testing on high and low channels are optional.

8.2 PCS BAND

8.2.1 ANTENNA POSITION - NORMAL

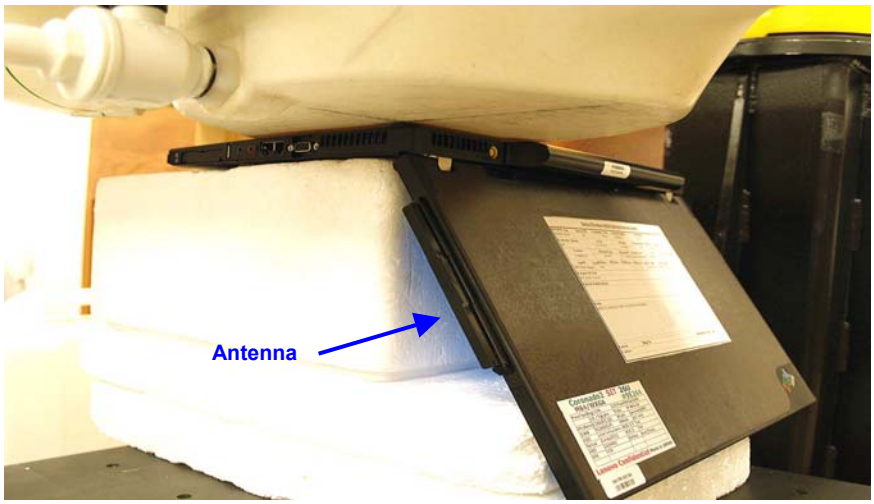
GSM1900

Test Mode	Channel	f (MHz)	Measured SAR 1g (mW/g)
GPRS Mode, Ant. Position - Normal	512 661 810	1850.20 1880.00 1909.80	0.0214
EGPRS Mode, Ant. position - Normal	512 661 810	1850.20 1880.00 1909.80	0.0138
WCDMA Mode, Ant. position -Normal	9262 9400 9538	1852.40 1880.00 1907.60	0.0343

Notes:

1) When measured SAR is less than 3dB limit, testing on high and low channels are optional.

8.2.2 ANTENNA POSITION - EXTENDED



GSM1900

Test Mode	Channel	f (MHz)	Measured SAR 1g (mW/g)
GPRS Mode, Ant. Position - Extended	512	1850.20	0.0496
	661	1880.00	
	810	1909.80	
EGPRS Mode, Ant. position - Extended	512	1850.20	0.0328
	661	1880.00	
	810	1909.80	
WCDMA Mode, Ant. Position - Extended	9262	1852.40	0.0627
	9400	**1880.00**	**0.0705**
	9538	1907.60	0.0503
	9400 [2]	**1880.00**	**0.0674**
	9400 [3]	1880.00	0.0655
	9400 [4]	1880.00	0.0657
	9400 [5]	1880.00	0.0656
	9400 [6]	1880.00	0.0661
	9400 [7]	1880.00	0.0674
	9400 [8]	1880.00	0.0663
	9400 [9]	1880.00	0.0644
	9400 [10]	1880.00	0.0659
	9400 [11]	1880.00	0.0659

Notes:

1) When measured SAR is less than 3dB limit, testing on high and low channels are optional.
2) Collocation with Blue tooth and WLAN in 2.4GHz band b mode middle channel.
3) Collocation with Blue tooth and WLAN in 2.4GHz band g mode middle channel.
4) Collocation with Blue tooth and WLAN in 2.4GHz band HT20 mode middle channel.
5) Collocation with Blue tooth and WLAN in 2.4GHz band HT40 mode middle channel.
6) Collocation with Blue tooth and WLAN in 5.2GHz band a mode middle channel.
7) Collocation with Blue tooth and WLAN in 5.2GHz band HT20 mode middle channel.
8) Collocation with Blue tooth and WLAN in 5.2GHz band HT40 mode middle channel.
9) Collocation with Blue tooth and WLAN in 5.8GHz band a mode middle channel.
10) Collocation with Blue tooth and WLAN in 5.8GHz band HT20 mode middle channel.
11) Collocation with Blue tooth and WLAN in 5.8GHz band HT40 mode middle channel.

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

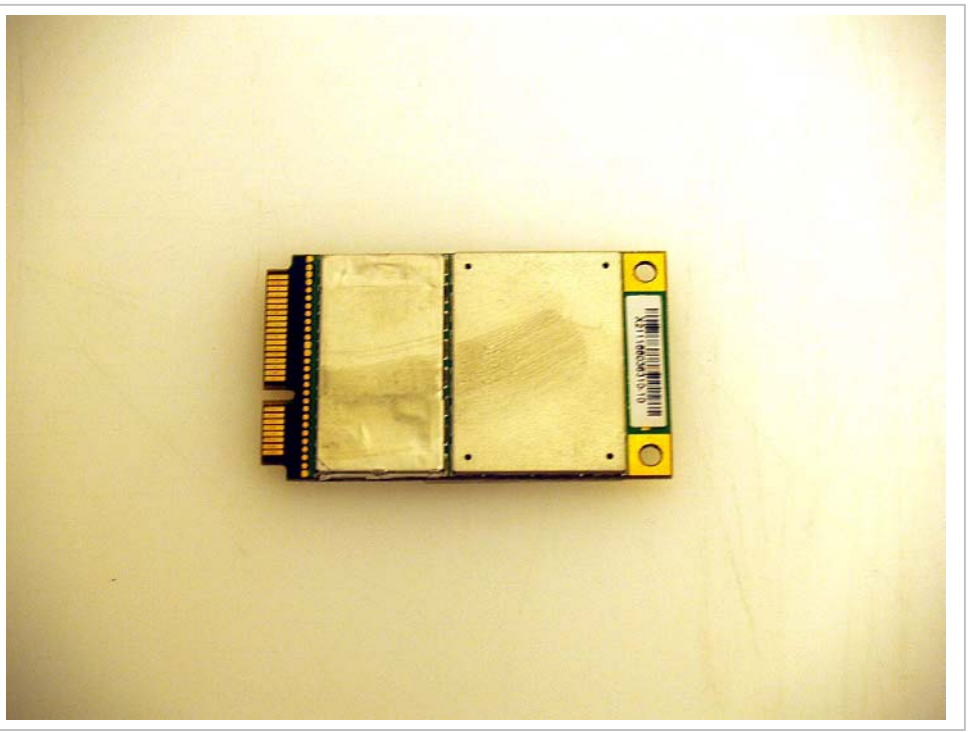
Notesfor table
1. Tol. - tolerance in influence quaitity
2. N - Nomal
3. R - Rectangular
4. Div. - Divisor used to obtain standard uncertainty
5. Ci - is te sensitivity coefficient

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	EX3DV4	3552	5/30/07
Thermometer	ERTCO	639-1S	1718	1/11/07
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	3/21/07
Simulating Liquid	CCS	M835	N/A	Within 24 hrs of first test
Simulating Liquid	CCS	M1900	N/A	Within 24 hrs of first test

11 PHOTOS

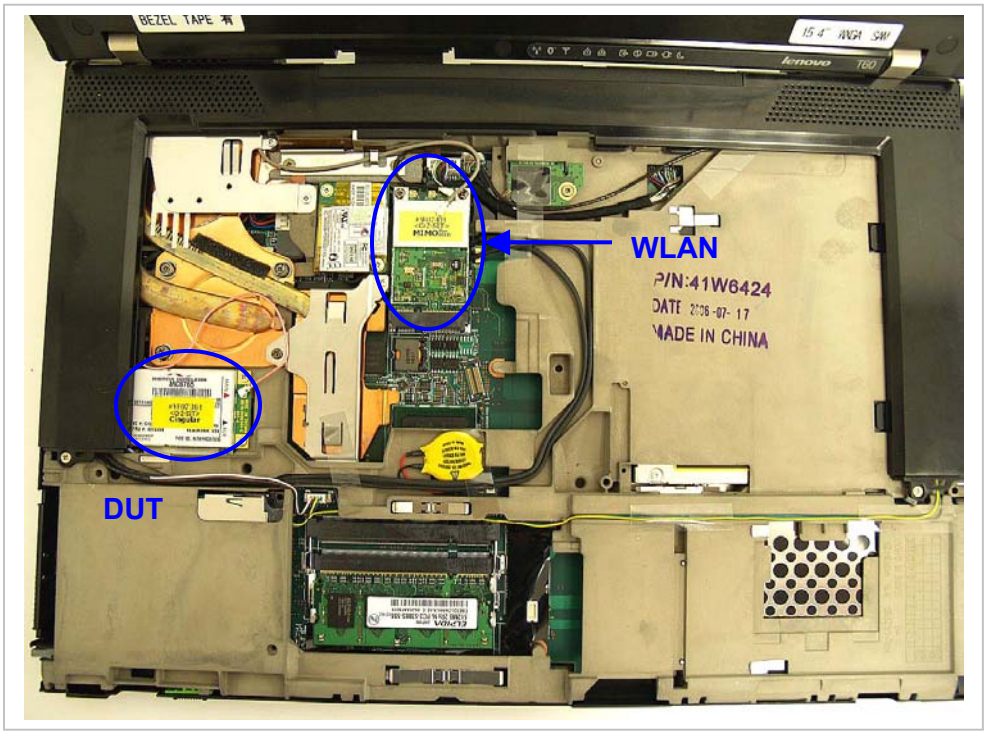
DUT



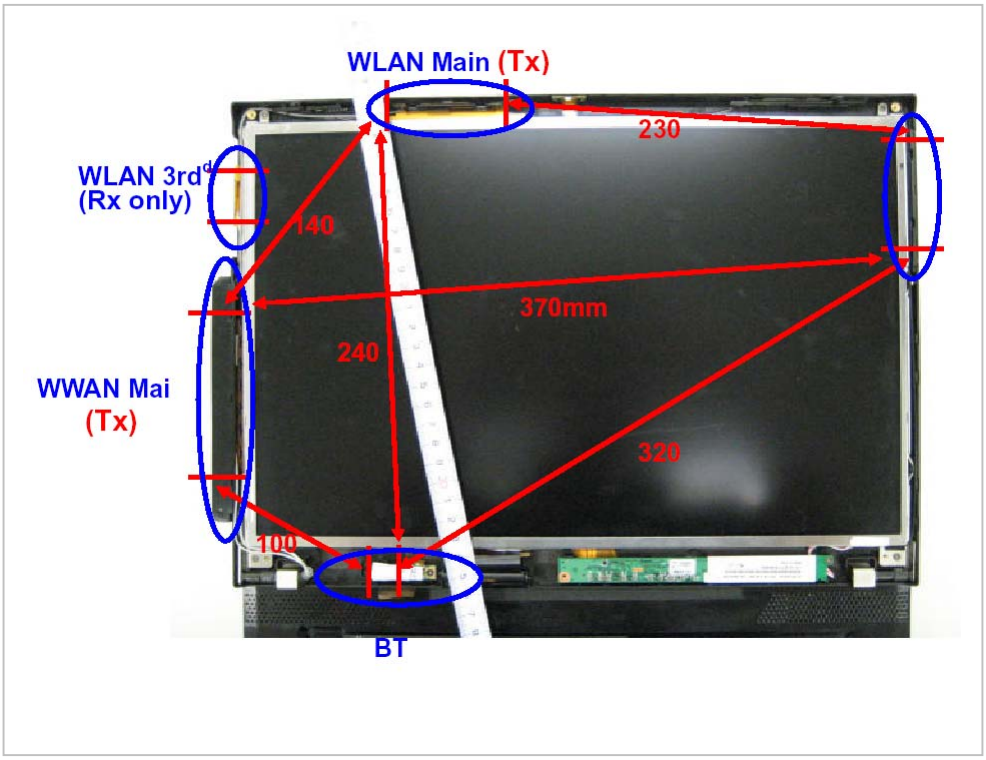
Antenna Positions
Normal

Extended

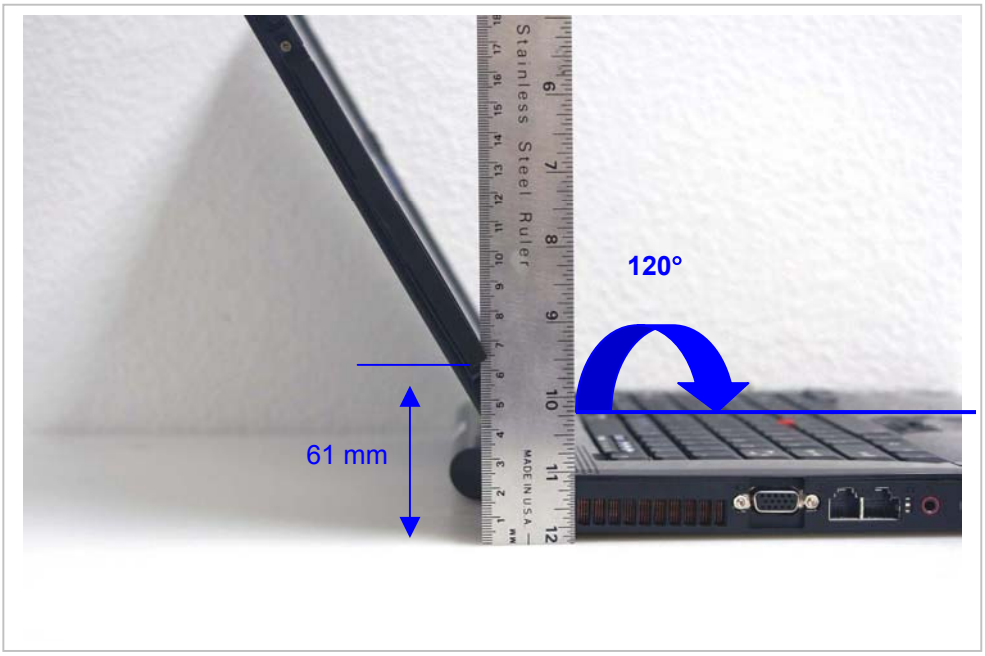
DUT Location



Antennas Locations



Lap held position



12 ATTACHMENTS

No.	Contents	No. Of Pages
1	System Performance Check Plots	4
2-1	SAR Test Plots-Cell Band	19
2-2	SAR Test Plots-PCS Band	19
3	Certificate of E-Field Probe - EXDV4SN3552	9
4	Certificate of System Validation Dipole - D835V2 SN:4d002	9
5	Certificate of System Validation Dipole - D1900V2 SN:5d043	9

END OF REPORT