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SAR Test Report

Report Number: M100598_FCC_GOBI2000_SAR_GSM-UMTS

Test Sample:	Portable TABLET Computer with Intel or Atheros WLAN Modules
Radio Module Under Test:	WWAN GOBI2000
Host PC Model:	T900 / TH900
WWAN FCC ID:	N7NGOBI2
WWAN IC:	2417C-GOBI2
Date of Issue:	25th June 2010

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1.0 GENERAL INFORMATION

Table 1

Test Sample:	Portable TABLET Computer with Intel or Atheros WLAN Modules
Radio Module Under Test:	WWAN GOBI2000
Interface Type:	Mini-PCI Module
Device Category:	Portable Transmitter
Test Device:	Pre-Production Unit
Host PC model:	T900 / TH900
WWAN FCC ID:	N7NGOBI2
WWAN IC:	2417C-GOBI2
RF exposure Category:	General Population/Uncontrolled
Manufacturer:	Fujitsu Limited
Test Standard/s:	**1.** Evaluating Compliance with FCC Guidelines For Human Exposure to Radiofrequency Electromagnetic Fields Supplement C (Edition 01-01) to OET Bulletin 65 (Edition 97-01) **2.** Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands), RSS-102
Statement Of Compliance:	The Fujitsu TABLET Computer T900 / TH900 with Sierra Wireless GSM/UMTS Module GOBI2000 complied with the FCC General public/uncontrolled RF exposure limits of 1.6mW/g per requirements of 47CFR2.1093(d). It also complied with IC RSS-102 requirements.
Test Dates:	7th - 9th June 2010
Test Officer:	**Peter Jakubiec**
Authorised Signature:	**Peter Jakubiec**

This document is issued in accordance with NATA's accreditation requirements. The results of tests, calibration and/or measurements included in this document are traceable to Australian/national standards. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing and calibration reports.

SAR TEST REPORT
Portable TABLET Computer
Model: T900 / TH900
Report Number: M100598_FCC_GOBI2000_SAR_GSM-UMTS

2.0 INTRODUCTION

Testing was performed on the Fujitsu TABLET PC, Model: T900 / TH900 with SIERRA Mini-PCI Wireless WAN Module, Model: GOBI2000. The SIERRA WIRELESS module is an OEM product. The Mini-PCI Wireless WAN (WWAN) was tested in the dedicated host – LIFEBOOK T SERIES, Model T900 / TH900.

3.0 TEST SAMPLE TECHNICAL INFORMATION

(Information supplied by the client)

3.1 WWAN Details

Table 2

Transmitter:	Mini-Card UMTS Module
Wireless Module:	UMTS
Model Number:	Gobi2000
Manufacturer:	Sierra Wireless
GSM Frequency Bands:	850 / 900 / 1800 / 1900 MHz
UMTS Frequency Bands:	Band I(2100MHz) / Band II(1900MHz) / Band V(850MHz) / Band VIII(900 MHz)
Features:	EGPRS, GPRS, UMTS and HSDPA, and HSUPA
Output Power:	**GPRS:** 850 MHz = 33 dBm and 1900 MHz = 30 dBm **EGPRS**: 850 MHz = 27 dBm and 1900 MHz = 26 dBm **UMTS**: 850 MHz and 1900 MHz bands = 24 dBm
Antenna Type:	Nissei Electric
Antenna Gain:	Max peak gain 0.89 dBi

3.1.1 Test Signal, Frequency and Output Power

The EUT was provided by Fujitsu Australia Pty Ltd. It was put into operation using a Rhodes & Schwarz Radio Communication Tester CMU200. The channels utilised in the measurements were the traffic channels shown in the table below. The power level was set to Class 4 for 850 MHz and Class 1 for 1900 MHz GSM bands and class 3 for 850 and 1900 MHz UMTS bands.

Table 3 Channels and Output power

Channel and Mode	Frequency MHz	Average Output Power dBm
GPRS Mode		
Channels 128, 190 and 251	824.2, 836.6 and 848.8	33
Channels 512, 661 and 810	1850.2, 1880 and1909.8	30
UMTS Mode		
Channels 4132, 4183 and 4233	826.4, 836.6 and 846.6	24
Channels 9262, 9400 and 9538	1852.4, 1880 and 1907.6	24

3.3 EUT (Notebook PC) Details

There are two variants of the Fujitsu Tablet PC, Model: T900 / TH900 one that is equipped with the Bluetooth transmitter and Bluetooth antenna FCC ID: EJE-WB0080 , IC ID: 337J-WB0080 for Host system #1 and FCC ID: EJE-WB0059 , IC ID: 337J-WB0059 for Host system #2 , and one variant that does not contain Bluetooth transmitter or Bluetooth antenna FCC ID: EJE-WL0020 , IC ID: 337J-WL0020 for Host system #1 and FCC ID: EJE-WL0019 , IC ID: 337J-WL0019 for Host system #2.
SAR testing was conducted on the sample that is equipped with the Bluetooth transmitter and Bluetooth antenna.
According to the manufacturer specifications the Bluetooth is a low power transmitter (4dBm), also Bluetooth Antenna is located >5cms from any other antenna in the system. The Antenna location is shown on page 29 of the report

Table 4

Host notebook :	LifeBook T series
Model Name(Reg No.):	T900 / TH900
Serial Number:	Pre-production Sample
Manufacturer:	FUJITSU LIMITED
CPU Type and Speed:	Core i7 M620 2.67GHz
LCD	13.3"WXGA
Wired LAN:	Intel 82577LM : 10 Base-T/100 Base-TX/1000Base-T
Modem:	Agere MDC1.5 modem Model: D40
Port Replicator Model:	ZPR0030
AC Adapter Model:	80W: SEE100P2-19.0 (Sanken), SEC100P3-19.0 (Sanken), ADP-80NB A (Delta) 100W: SEE120P2-19.0 (Sanken)
Voltage:	19V
Current Specs:	4.22A / 5.27A
Watts:	80W / 100W

Host System # 1 : FCC Granted HOST PC FCC ID: EJE-WB0080 , IC ID: 337J-WB0080 (with Bluetooth variant)
FCC ID: EJE-WL0020 , IC ID: 337J-WL0020 (with No Bluetooth variant)

Radio Module #1:	WLAN (Puma Peak IEEE802.11a/b/g/n, 2x2)
WLAN Model Number:	622ANHMW
WLAN Manufacturer:	Intel Corp.
Interface Type:	Half Mini-Card Wireless LAN Module
Radio Module #2:	Bluetooth module
Model Number:	EYSMJCS
Manufacturer:	Taiyo Yuden
Interface Type:	USB

Host System # 2 : FCC Granted FCC ID: EJE-WB0059 , IC ID: 337J-WB0059 (with Bluetooth variant)
FCC ID: EJE-WL0019 , IC ID: 337J-WL0019 (with NO Bluetooth variant)

Radio Module #1:	WLAN (HB92 IEEE802.11a/b/g/n)
WLAN Model Number:	AR5BHB92
WLAN Manufacturer:	Atheros Corp.
Interface Type:	Half Mini-Card Wireless LAN Module
Radio Module #2:	Bluetooth module
Model Number:	EYSMJCS
Manufacturer:	Taiyo Yuden
Interface Type:	USB

3.4 Test sample Accessories

3.4.1 Battery Types

One type of Fujitsu Lithium Ion Battery is used to power the Portable TABLET Computer with Wireless WAN Model: GOBI2000. SAR measurements were performed with the battery as shown below.

Table 5 Battery Details

Battery #1		**Battery #2**	
Product No.	FPCBP215	Product No.	FPCBP215
V/mAh	10.8V/5800mAh	V/mAh	10.8V/5800mAh
Serial No.	01A-Z090511000293Z	Serial No.	01A-Z090429000610Z

4.0 TEST SIGNAL, FREQUENCY AND OUTPUT POWER

The Portable Tablet Computer Wireless WAN had a total of 423 channels (USA model) within the 824.2 to 848.8 MHz and 1850.2 to 1909.8 MHz GPRS frequency bands and 379 channels within the UMTS frequency ranges 826.4 to 846.6 MHz and 1852.4 to 1907.6 MHz. For the SAR measurements the device was operating at full transmit power. The fixed frequency channels used in the testing are shown in Table Below.

The frequency span of the GSM and UMTS bands was more than 10MHz consequently; the SAR levels of the test sample were measured for lowest, centre and highest channels in the applicable modes. There were no wires or other connections to the Portable TABLET Computer during the SAR measurements.

The conducted power of the device was measured after temporary modification of antenna connector inside the device's TX RX compartment. Measurements were performed with a calibrated Power Meter. Maximum burst-averaged output power for each mode (GPRS/EDGE) and the corresponding multi-slot class were obtained and shown in the following tables.

Table 6 Frequency and Conducted Power Results GSM

Coding Scheme	GPRS Multi-slot Power Class	RF Channel	Measured Power (dBm)
CS1	10	128	**32.05**
CS1	10	190	**32.39**
CS1	10	251	**31.95**
CS1	11	128	**N/A**
CS1	11	190	**N/A**
CS1	11	251	**N/A**
CS1	12	128	**N/A**
CS1	12	190	**N/A**
CS1	12	251	**N/A**

Table 7 Frequency and Conducted Power Results EDGE

Coding Scheme	EGPRS Multislot Class	RF Channel	Measured Power (dBm)
MCS5	10	128	**27.96**
MCS5	10	190	**28.35**
MCS5	10	251	**27.81**
MCS5	11	128	**N/A**
MCS5	11	190	**N/A**
MCS5	11	251	**N/A**
MCS5	12	128	**N/A**
MCS5	12	190	**N/A**
MCS5	12	251	**N/A**

Table 8 Frequency and Conducted Power Results GSM

Coding Scheme	GPRS Multislot Class	RF Channel	Measured Power (dBm)
CS1	10	512	**29.85**
CS1	10	661	**29.30**
CS1	10	810	**27.89**
CS1	11	512	**N/A**
CS1	11	661	**N/A**
CS1	11	810	**N/A**
CS1	12	512	**N/A**
CS1	12	661	**N/A**
CS1	12	810	**N/A**

Table 9 Frequency and Conducted Power Results EDGE

Coding Scheme	EGPRS Multislot Class	RF Channel	Measured Power (dBm)
MCS5	10	512	**26.53**
MCS5	10	661	**26.10**
MCS5	10	810	**24.76**
MCS5	11	512	**N/A**
MCS5	11	661	**N/A**
MCS5	11	810	**N/A**
MCS5	12	512	**N/A**
MCS5	12	661	**N/A**
MCS5	12	810	**N/A**

Conducted Power Measurement UMTS 850 MHz

Configuration:
12.2 kbps RMC
Test Loop Mode 1
βc = 8, βd = 15 (3GPP default)
TPC (Transmit Power Control) = All 1s

Table 10

Channel No.	βc	βd	Result (dBm)
4132	8	15	24.41
4183	8	15	24.46
4233	8	15	24.44

Conducted Power Measurement UMTS + HSDPA 850 MHz

Configuration:
Device HSDPA Category 6 (Downlink 3.6 Mbps and Uplink 384 kbps)
H-Set = 1
QPSK in H-Set (1)
CQI Feedback Cycle = 4ms; CQI Repetition Rate = 2ms; ACK-NACK repetition factor = 3

Table 11

Sub Test No.	βc	βd	ΔAKN	ΔNAKN	ΔCQI	Result (dBm)		
						4132	4183	4233
1	2	15	8	8	8	24.07	24.03	23.93
2	12	15	8	8	8	23.37	23.46	23.29
3	15	8	8	8	8	23.37	23.48	23.26
4	15	4	8	8	8	23.42	23.43	23.29

Conducted Power Measurement UMTS + HSDPA + HSUPA 850 MHz

Configuration:
Device HSUPA Release 6 (5.7 Mbps)
RMC 12.2 kbps + HSPA 34.108 with loop mode 1
HS-DPCCH, E-DPCCH, E-DPDCH Enabled
Power Control – TPC algorithm 2
3GPP default HS-DPCCH power offset parameters Δ_{AKN} = 5; Δ_{NAKN} = 5; Δ_{CQI} = 2
E-TFCI table index = 0
E-DCH minimum set E-TFCI = 9
PLnon-max = 0.84
Max. number channelization codes = 2xsf4
Initial Serving Grant Value = Off
Δ HARQ =0
Number of Ref.E-TFCIs – Subtests 1,2,4,5 = 5; Subtest 3 = 2
Set1 Pattern Type = Closed Loop

Table 12

Sub Test No.	βc	βd	Δ AKN	Δ NAKN	Δ CQI	Δ E-DPCCH	AG Index	Result (dBm)		
								4132	4183	4233
1	11	15	8	8	8	6	20	23.62	23.51	23.25
2	6	15	8	8	8	8	12	21.54	21.46	21.34
3	15	9	8	8	8	8	15	22.16	22.25	22.27
4	2	15	8	8	8	5	17	21.76	21.56	21.53
5	15	15	8	8	8	7	21	23.88	23.21	23.20

Conducted Power Measurement UMTS 1900 MHz

Configuration:
12.2 kbps RMC
Test Loop Mode 1
βc = 8, βd = 15 (3GPP default)
TPC (Transmit Power Control) = All 1s

Table 13

Channel No.	βc	βd	Result (dBm)
9262	8	15	24.51
9400	8	15	24.71
9538	8	15	24.11

Conducted Power Measurement UMTS + HSDPA 1900 MHz

Configuration:
Device HSDPA Category 6 (Downlink 3.6 Mbps and Uplink 384 kbps)
H-Set = 1
QPSK in H-Set (1)
CQI Feedback Cycle = 4ms; CQI Repetition Rate = 2ms; ACK-NACK repetition factor = 3

Table 14

Sub Test No.	βc	βd	ΔAKN	ΔNAKN	ΔCQI	Result (dBm)		
						9262	9400	9538
1	2	15	8	8	8	24.33	24.63	23.94
2	12	15	8	8	8	23.75	23.96	23.34
3	15	8	8	8	8	23.81	24.13	23.48
4	15	4	8	8	8	23.79	24.02	23.45

Conducted Power Measurement UMTS + HSDPA + HSUPA 1900 MHz

Configuration:
Device HSUPA Release 6 (5.7 Mbps)
HS-DPCCH, E-DPCCH, E-DPDCH Enabled
Power Control – TPC algorithm 2
3GPP default HS-DPCCH power offset parameters Δ_{AKN} = 5; Δ_{NAKN} = 5; Δ_{CQI} = 2
E-TFCI table index = 0
E-DCH minimum set E-TFCI = 9
PLnon-max = 0.84
Max. number channelization codes = 2xsf4
Initial Serving Grant Value = Off
Δ HARQ =0
Number of Ref.E-TFCIs – Subtests 1,2,4,5 = 5; Subtest 3 = 2
Set1 Pattern Type = Closed Loop

Table 15

Sub Test No.	βc	βd	Δ AKN	Δ NAKN	Δ CQI	Δ E-DPCCH	AG Index	Result (dBm)		
								9262	9400	9538
1	11	15	8	8	8	6	20	23.04	22.92	23.33
2	6	15	8	8	8	8	12	21.02	21.01	21.42
3	15	9	8	8	8	8	15	21.59	21.79	22.25
4	2	15	8	8	8	5	17	21.25	21.38	21.63
5	15	15	8	8	8	7	21	22.78	22.59	23.18

4.1 Battery Status

The device battery was fully charged prior to commencement of measurement. Each SAR test was completed within 30 minutes. The battery condition was monitored by measuring the RF field at a defined position inside the phantom before the commencement of each test and again after the completion of the test. It was not possible to perform conducted power measurements at the output of the device, at the beginning and end of each scan due to lack of a suitable antenna port. The uncertainty associated with the power drift was less than 12% and was assessed in the uncertainty budget.

5.0 DETAILS OF TEST LABORATORY

5.1 Location

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5.2 Accreditations

EMC Technologies Pty. Ltd. is accredited by the National Association of Testing Authorities, Australia (NATA).
NATA Accredited Laboratory Number: 5292

EMC Technologies Pty Ltd is NATA accredited for the following standards:

Table 16

AS/NZS 2772.1:	RF and microwave radiation hazard measurement
ACMA:	Radio communications (Electromagnetic Radiation - Human Exposure) Standard 2003, +Amdt 1:2007
FCC:	Guidelines for Human Exposure to RF Electromagnetic Field OET65C 01/01
EN 50360: 2001	Product standard to demonstrate the compliance of mobile phones with the basic restrictions related to human exposure to electromagnetic fields (300 MHz – 3 GHz)
EN 62209-1: 2006	Human Exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models instrumentation and procedures. **Part 1:** Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (300 MHz to 3 GHz)
IEEE 1528: 2003	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head Due to Wireless Communications Devices: Measurement Techniques.

Refer to NATA website www.nata.asn.au for the full scope of accreditation.

5.3 Environmental Factors

The measurements were performed in a shielded room with no background RF signals. The temperature in the laboratory was controlled to within 21±1°C, the humidity was in the range 37% to 47%. The liquid parameters are measured daily prior to the commencement of each test. Tests were performed to check that reflections within the environment did not influence the SAR measurements. The noise floor of the DASY4 SAR measurement system using the SN1380 probe was less than 5μV in both air and liquid mediums.

6.0 DESCRIPTION OF SAR MEASUREMENT SYSTEM

Table 17

Applicable Head Configurations	: None
Applicable Body Configurations	: Tablet Position
	: Edge On Position

6.1 Probe Positioning System

The measurements were performed with an automated near-field scanning system **DASY4 V4.7 Build 53** from Schmid & Partner Engineering AG (SPEAG). The DASY4 fully complies with the OET65 C (01-01), IEEE 1528 and EN62209-1 SAR measurement requirements.

6.2 E-Field Probe Type and Performance

The SAR measurements were conducted with SPEAG dosimetric probe ET3DV6 Serial: 1380. Please refer to appendix C for detailed information.

6.4 System Verification

6.4.1 System Verification Results (900 MHz and 1950 MHZ)

The following tables lists the dielectric properties of the tissue simulating liquid measured prior to SAR system verification. The results of the system verification are listed in columns 4 and 5. The forward power into the reference dipole for SAR system verification was adjusted to 250 mW.

Table 18 System verification Results

1. System Verification Date & Frequency	2. ϵr (measured)	3. σ (mho/m) (measured)	4. Measured SAR 1g (mW/g)	5. Measured SAR 10g (mW/g)
7th June 2010 1950 MHz	38.8	1.47	10.4	5.38
8th June 2010 1950 MHz	40.7	1.46	10.9	5.60
9th June 2010 900 MHz	40.8	0.97	2.85	1.83

6.4.2 Deviation from reference system verification values

The reference SAR values are derived using a reference dipole and flat section of the SAM phantom suitable for a centre frequency of 900 MHz and 1950 MHz. These reference SAR values are obtained from the IEEE Std 1528-2003 and are normalized to 1W.

The SPEAG calibration reference SAR value is the SAR system verification result obtained in a specific dielectric liquid using the validation dipole during calibration. The measured one-gram SAR should be within 10% of the expected target reference values shown in table below below.

Table 19 Deviation from reference system verification values @ (900MHz and 1800 MHz and 1950 MHz)

Frequency and Date	Measured SAR 1g (mW/g)	Measured SAR 1g (Normalized to 1W)	SPEAG Calibration reference SAR Value 1g (mW/g)	Deviation From SPEAG Reference 1g (%)	IEEE Std 1528 reference SAR value 1g (mW/g)	Deviation From IEEE 1g (%)
7th June 2010 1950 MHz	10.4	41.60	41.3	0.73	40.5	2.72
8th June 2010 1950 MHz	10.9	43.60	41.3	5.57	40.5	7.65
9th June 2010 900 MHz	2.85	11.40	10.9	4.59	10.8	5.56

NOTE: All reference system verification values are referenced to 1W input power.

6.4.3 Liquid Depth 15cm

During the SAR measurement process the liquid level was maintained to a level of 15cm with a tolerance of 0.5cm.

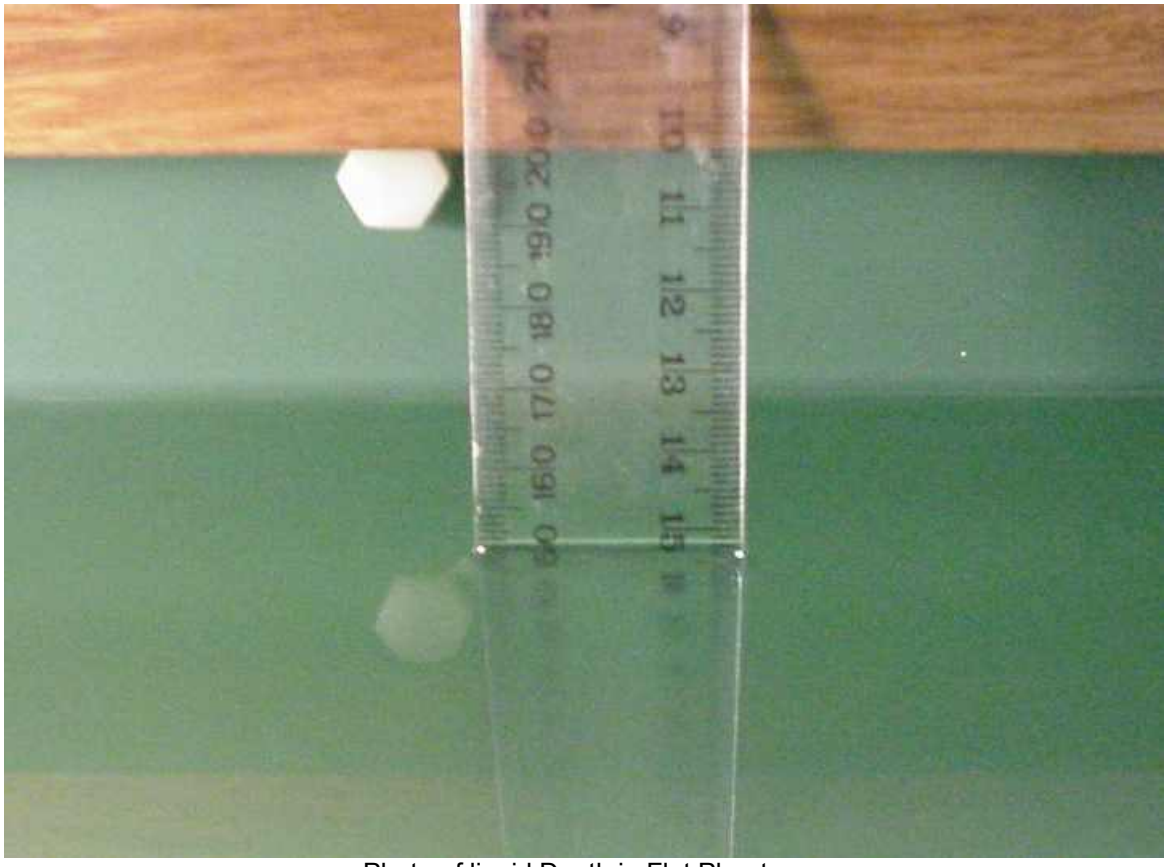

Photo of liquid Depth in Flat Phantom

6.5 Phantom Properties

The phantoms used during the testing comply with the OET65 C (01-01), IEEE 1528 and EN62209-1 SAR measurement requirements.

6.6 Tissue Material Properties

The dielectric parameters of the brain simulating liquid were measured prior to SAR assessment using the HP85070A dielectric probe kit and HP8753ES Network Analyser. The actual dielectric parameters are shown in the following table.

Table 20 Measured Brain Simulating Liquid Dielectric Values for System Verifications

Frequency Band	∈r (measured range)	∈r (target)	σ (mho/m) (measured range)	σ (target)	ρ kg/m^3
900 MHz Brain	40.8	41.5 ±5% (39.4 to 43.6)	0.97	0.97 ±5% (0.92 to 1.02)	1000
1950 MHz Brain	38.8 – 40.7	40.0 ±5% (38.0 to 42.0)	1.46 – 1.47	1.40 ±5% (1.33 to 1.47)	1000

NOTE: The brain liquid parameters were within the required tolerances of ±5%.

Table 21 Measured Body Simulating Liquid Dielectric Values at 850MHz

Frequency Band	∈r (measured range)	∈r (target)	σ (mho/m) (measured range)	σ (target)	ρ kg/m^3
825 MHz Body	54.7	55.2 ±5% (52.4 to 58.0)	0.97 – 0.98	0.97 ±5% (0.92 to 1.02)	1000
835 MHz Body	54.6	55.2 ±5% (52.4 to 58.0)	0.99	0.97 ±5% (0.92 to 1.02)	1000
850 MHz Body	54.5	55.2 ±5% (52.4 to 58.0)	1.00	0.97 ±5% (0.92 to 1.02)	1000

Note: The body liquid parameters were within the required tolerances of ±5%.

Table 22 Measured Body Simulating Liquid Dielectric Values at 1880MHz

Frequency Band	∈r (measured range)	∈r (target)	σ (mho/m) (measured range)	σ (target)	ρ kg/m^3
1850 MHz Body	51.7 – 51.9	53.3 ±5% (50.6 to 56.0)	1.46	1.52 ±5% (1.44 to 1.60)	1000
1880.0 MHz Body	51.6 – 51.8	53.3 ±5% (50.6 to 56.0)	1.47 – 1.48	1.52 ±5% (1.44 to 1.60)	1000
1910 MHz Body	51.5 – 51.7	53.3 ±5% (50.6 to 56.0)	1.49 – 1.50	1.52 ±5% (1.44 to 1.60)	1000

Note: The body liquid parameters were within the required tolerances of ±5%.

6.6.1 Liquid Temperature and Humidity

The humidity and dielectric/ambient temperatures were recorded during the assessment of the tissue material dielectric parameters. The difference between the ambient temperature of the liquid during the dielectric measurement and the temperature during tests was less than |2|°C.

Table 23 Temperature and Humidity recorded for each day

Date	Ambient Temperature (°C)	Liquid Temperature (°C)	Humidity (%)
7th June 2010	20.7	20.4	47
8th June 2010	21.0	20.8	47
9th June 2010	21.2	21.0	37

6.7 Simulated Tissue Composition Used for SAR Test

The tissue simulating liquids are created prior to the SAR evaluation and often require slight modification each day to obtain the correct dielectric parameters.

Table 24 Tissue Type: Brain @ 850/900MHz

Volume of Liquid: 30 Litres

Approximate Composition	% By Weight
Distilled Water	41.05
Salt	1.35
Sugar	56.5
HEC	1.0
Bactericide	0.1

Table 25 Tissue Type: Body @ 850/900MHz

Volume of Liquid: 30 Litres

Approximate Composition	% By Weight
Distilled Water	56
Salt	0.76
Sugar	41.76
HEC	1.21
Bactericide	0.27

Table 26 Tissue Type: Brain @ 1800/1950MHz

Volume of Liquid: 30 Litres

Approximate Composition	% By Weight
Distilled Water	61.17
Salt	0.31
Bactericide	0.29
Triton X-100	38.23

Table 27 Tissue Type: Body @ 1800/1950MHz

Volume of Liquid: 30 Litres

Approximate Composition	% By Weight
Distilled Water	40.4
Salt	0.5
Sugar	58
HEC	1
Bactericide	0.1

*Refer “OET Bulletin 65 97/01 P38”

6.8 Phantom Properties

The phantoms used during the testing comply with the OET65 C (01-01), IEEE 1528 and EN62209-1 SAR measurement requirements.

6.9 Device Holder for Laptops and P 10.1 Phantom

A low loss clamp was used to position the TABLET underneath the phantom surface. Small pieces of foam were then used to press the TABLET flush against the phantom surface.

Refer to Appendix A for photographs of device positioning

7.0 SAR MEASUREMENT PROCEDURE USING DASY4

The SAR evaluation was performed with the SPEAG DASY4 system. 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 3.9 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. The actual Area Scan has dimensions of 120mm x 120mm surrounding the test device. Based on this data, the area of the maximum absorption is determined by Spline interpolation.

c) Around this point, a volume of 30 mm x 30 mm x 30 mm is assessed by measuring 7 x 7 x 7 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 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.2 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.

8.0 MEASUREMENT UNCERTAINTY

The uncertainty analysis is based on the template listed in the IEEE Std 1528-2003 for both Handset SAR tests and Validation uncertainty. The measurement uncertainty of a specific device is evaluated independently and the total uncertainty for both evaluations (95% confidence level) must be less than 30%.

Table 28 Uncertainty Budget for DASY4 V4.7 Build 53 – EUT SAR

Uncertainty Component	Tol. (6%)	Prob. Dist.	Div.	C_i (1g)	C_i (10g)	1g u_i (6%)	10g u_i (6%)	v_i
Measurement System								
Probe Calibration	5.5	N	1	1	1	5.5	5.5	∞
Axial Isotropy	4.7	R	1.73	0.707	0.707	1.9	1.9	∞
Hemispherical Isotropy	9.6	R	1.73	0.707	0.707	3.9	3.9	∞
Boundary Effects	1	R	1.73	1	1	0.6	0.6	∞
Linearity	4.7	R	1.73	1	1	2.7	2.7	∞
System Detection Limits	1	R	1.73	1	1	0.6	0.6	∞
Readout Electronics	0.3	N	1	1	1	0.3	0.3	∞
Response Time	0.8	R	1.73	1	1	0.5	0.5	∞
Integration Time	2.6	R	1.73	1	1	1.5	1.5	∞
RF Ambient Noise	3	R	1.73	1	1	1.7	1.7	∞
RF Ambient Reflections	3	R	1.73	1	1	1.7	1.7	∞
Probe Positioner	0.4	R	1.73	1	1	0.2	0.2	∞
Probe Positioning	2.9	R	1.73	1	1	1.7	1.7	∞
Max. SAR Eval.	1	R	1.73	1	1	0.6	0.6	∞
Test Sample Related								
Test Sample Positioning	1.61	N	1	1	1	1.6	1.6	11
Device Holder Uncertainty	3.6	N	1	1	1	3.6	3.6	7
Output Power Variation – SAR Drift Measurement	7.40	R	1.73	1	1	4.3	4.3	∞
Phantom and Setup								
Phantom Uncertainty	4	R	1.73	1	1	2.3	2.3	∞
Liquid Conductivity – Deviation from target values	5	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity – Measurement uncertainty	2.5	N	1.00	0.64	0.43	1.6	1.1	5
Liquid Permittivity – Deviation from target values	5	R	1.73	0.6	0.49	1.7	1.4	∞
Liquid Permittivity – Measurement uncertainty	2.5	N	1.00	0.6	0.49	1.5	1.2	5
Combined standard Uncertainty		RSS				10.8	10.6	154
Expanded Uncertainty (95% CONFIDENCE LEVEL)		k=2				21.6	21.25	

Estimated total measurement uncertainty for the DASY4 measurement system was ±10.8%. The extended uncertainty (K = 2) was assessed to be ±21.6% based on 95% confidence level. The uncertainty is not added to the measurement result.

Table 29 Uncertainty Budget for DASY4 V4.7 Build xx – System verification

Uncertainty Component	Tol. (6%)	Prob. Dist.	Div.	C_i (1g)	C_i (10g)	1g u_i (6%)	10g u_i (6%)	v_i
Measurement System								
Probe Calibration	5.5	N	1	1	1	5.5	5.5	∞
Axial Isotropy	4.7	R	1.73	1	1	2.7	2.7	∞
Hemispherical Isotropy	9.6	R	1.73	0	0	0.0	0.0	∞
Boundary Effects	1	R	1.73	1	1	0.6	0.6	∞
Linearity	4.7	R	1.73	1	1	2.7	2.7	∞
System Detection Limits	1	R	1.73	1	1	0.6	0.6	∞
Readout Electronics	0.3	N	1	1	1	0.3	0.3	∞
Response Time	0	R	1.73	1	1	0.0	0.0	∞
Integration Time	0	R	1.73	1	1	0.0	0.0	∞
RF Ambient Noise	3	R	1.73	1	1	1.7	1.7	∞
RF Ambient Reflections	3	R	1.73	1	1	1.7	1.7	∞
Probe Positioner	0.4	R	1.73	1	1	0.2	0.2	∞
Probe Positioning	2.9	R	1.73	1	1	1.7	1.7	∞
Max. SAR Eval.	1	R	1.73	1	1	0.6	0.6	∞
Dipole								
Dipole Axis to Liquid Distance	2	N	1.73	1	1	1.2	1.2	11
Input Power and SAR drift meas.	4.7	R	1.73	1	1	2.7	2.7	∞
Phantom and Tissue Param.								
Phantom Uncertainty	4	R	1.73	1	1	2.3	2.3	∞
Liquid Conductivity – Deviation from target values	5	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity – Measurement uncertainty	2.5	N	1.00	0.64	0.43	1.6	1.1	5
Liquid Permittivity – Deviation from target values	5	R	1.73	0.6	0.49	1.7	1.4	∞
Liquid Permittivity – Measurement uncertainty	2.5	N	1.00	0.6	0.49	1.5	1.2	5
Combined standard Uncertainty		RSS				9.0	8.7	154
Expanded Uncertainty (95% CONFIDENCE LEVEL)		k=2				17.9	17.34	

Estimated total measurement uncertainty for the DASY4 measurement system was ±9.0%. The extended uncertainty (K = 2) was assessed to be ±17.9% based on 95% confidence level. The uncertainty is not added to the System verification measurement result.

9.0 EQUIPMENT LIST AND CALIBRATION DETAILS

Table 30 SPEAG DASY4 Version V4.7 Build 53

Equipment Type	Manufacturer	Model Number	Serial Number	Calibration Due	Used For this Test?
Robot - Six Axes	Staubli	RX90BL	N/A	Not applicable	✓
Robot Remote Control	SPEAG	CS7MB	RX90B	Not applicable	✓
SAM Phantom	SPEAG	N/A	1260	Not applicable	✓
SAM Phantom	SPEAG	N/A	1060	Not applicable	✓
Flat Phantom	AndreT	10.1	P 10.1	Not Applicable	✓
Flat Phantom	AndreT	9.1	P 9.1	Not Applicable	✓
Flat Phantom	SPEAG	PO1A 6mm	1003	Not Applicable	
Data Acquisition Electronics	SPEAG	DAE3 V1	359	08-July-2010	
Data Acquisition Electronics	SPEAG	DAE3 V1	442	08-Dec-2010	✓
Probe E-Field - Dummy	SPEAG	DP1	N/A	Not applicable	
Probe E-Field	SPEAG	ET3DV6	1380	11-Dec-2010	✓
Probe E-Field	SPEAG	ET3DV6	1377	14-July-2010	
Probe E-Field	SPEAG	ES3DV6	3029	Not Used	
Probe E-Field	SPEAG	EX3DV4	3563	16-July-2010	
Probe E-Field	SPEAG	EX3DV4	3557	16-Dec-2010	
Antenna Dipole 300 MHz	SPEAG	D300V2	1005	15-Dec-2011	
Antenna Dipole 450 MHz	SPEAG	D450V2	1009	17-Dec-2010	
Antenna Dipole 900 MHz	SPEAG	D900V2	047	7-July-2010	✓
Antenna Dipole 1640 MHz	SPEAG	D1640V2	314	16-July-2010	
Antenna Dipole 1800 MHz	SPEAG	D1800V2	242	8-July-2010	
Antenna Dipole 1950 MHz	SPEAG	D1950V3	1113	12-Dec -2010	✓
Antenna Dipole 3500 MHz	SPEAG	D3500V2	1002	17-July-2010	
Antenna Dipole 2450 MHz	SPEAG	D2450V2	724	10-Dec-2010	
Antenna Dipole 5600 MHz	SPEAG	D5GHzV2	1008	16-Dec-2011	
RF Amplifier	EIN	603L	N/A	*In test	
RF Amplifier	Mini-Circuits	ZHL-42	N/A	*In test	✓
RF Amplifier	Mini-Circuits	ZVE-8G	N/A	*In test	
Synthesized signal generator	Hewlett Packard	ESG-D3000A	GB37420238	*In test	✓
RF Power Meter Dual	Hewlett Packard	437B	3125012786	29-June-2010	✓
RF Power Sensor 0.01 - 18 GHz	Hewlett Packard	8481H	1545A01634	01-July-2010	✓
RF Power Meter Dual	Gigatronics	8542B	1830125	26-Mar-2010	
RF Power Sensor	Gigatronics	80301A	1828805	26-Mar-2010	
RF Power Meter Dual	Hewlett Packard	435A	1733A05847	*In test	✓
RF Power Sensor	Hewlett Packard	8482A	2349A10114	*In test	✓
Network Analyser	Hewlett Packard	8714B	GB3510035	30-Sept-2010	
Network Analyser	Hewlett Packard	8753ES	JP39240130	24-Nov-2010	✓
Dual Directional Coupler	Hewlett Packard	778D	1144 04700	*In test	
Dual Directional Coupler	NARDA	3022	75453	*In test	✓

* Calibrated during the test for the relevant parameters.

10.0 OET BULLETIN 65 – SUPPLEMENT C TEST METHOD

Notebooks should be evaluated in normal use positions, typical for lap-held bottom-face only. However the number of positions will depend on the number of configurations the laptop can be operated in. The "LIFEBOOK T SERIES" can be used in either a conventional laptop position (see Appendix A1) or a Tablet configuration. The antenna location in the "LIFEBOOK T SERIES" is closest to the top of the screen when used in a conventional laptop configuration and due to the separation distances involved between the phantom and the laptop antenna, testing is not required in this position.

See Appendix A for photos of test positions.

10.1.1 "Tablet" Position Definition (0mm spacing)

The device was tested in the 2.00 mm flat section of the AndreT Flat phantom P 10.1 for the "Tablet" position. The Transceiver was placed at the bottom of the phantom and suspended in such way that the back of the device was touching the phantom. This device orientation simulates the PC's normal use – being held on the lap of the user. A spacing of 0mm ensures that the SAR results are conservative and represent a worst-case position.

10.1.2 "Edge On" Position

The device was tested in the (2.00 mm) flat section of the AndreT phantom for the "Edge On" position. The Antenna edge of the Transceiver was placed underneath the flat section of the phantom and suspended until the edge touched the phantom. *Refer to Appendix A for photos of measurement positions.*

10.2 List of All Test Cases (Antenna In/Out, Test Frequencies, User Modes)

The device has a fixed antenna. Depending on the measured SAR level up to three test channels with the test sample operating at maximum power were recorded. The following table represents the matrix used to determine what testing was required. All relevant provisions of KDB 616271, KDB 447498 and KDB 941225 are applied for SAR measurements of the host system. SAR measurement for the HSDPA and HSUPA modes were additionally conducted because SAR results in WWAN bands are higher than 1.2 mW/g (75% of the SAR limit) therefore worst case UMTS configuration measurements were repeated in the HSDPA and HSUPA modes.

Table 31 Testing configurations

Phantom Configuration	Antenna Position	Device Mode WWAN Band Name	Test Configurations		
			Channel (Low)	Channel (Middle)	Channel (High)
Tablet	In	GPRS 850 MHz		x	
		GPRS 1900 MHz		x	
		WCDMA 850 MHz		x	
		WCDMA 1900 MHz		x	
		HSUPA 1900 MHz			
		HSDPA 1900 MHz			
	Out	GPRS 850 MHz		x	
		GPRS 1900 MHz		x	
		WCDMA 850 MHz		x	
		WCDMA 1900 MHz		x	
		HSUPA 1900 MHz			
		HSDPA 1900 MHz			
Secondary Landscape	In	GPRS 850 MHz		x	
		GPRS 1900 MHz		x	
		WCDMA 850 MHz		x	
		WCDMA 1900 MHz		x	
		HSUPA 1900 MHz		x	
		HSDPA 1900 MHz		x	
Secondary Portrait	In	GPRS 850 MHz		x	
		GPRS 1900 MHz		x	
		WCDMA 850 MHz		x	
		WCDMA 1900 MHz		x	
		HSUPA 1900 MHz			
		HSDPA 1900 MHz			
	Out	GPRS 850 MHz		x	
		GPRS 1900 MHz		x	
		WCDMA 850 MHz		x	
		WCDMA 1900 MHz		x	
		HSUPA 1900 MHz			
		HSDPA 1900 MHz			

Legend

X	Testing Required in this configuration
	Testing required in this configuration only if SAR of middle channel is more than 3dB below the SAR limit or this position represents the worst case.
X	Additional SAR measurement for the HSDPA and HSUPA modes

Note: 1) Primary Landscape and Primary Portrait positions were not considered for SAR evaluation due to the separation distances of the UMTS antenna and the notebook.

11.0 SAR MEASUREMENT RESULTS

The SAR values averaged over 1g tissue masses were determined for the sample device for all test configurations listed in section 10.2.

11.1.1 SAR Results

There are two modes of operation which include UMTS and GPRS transmission. Table below displays the SAR results.

Table 32 SAR MEASUREMENT RESULTS – 850MHz GPRS

Test Position	Plot No.	Test Channel	Test Freq (MHz)	Measured 1g SAR Results (mW/g)	Measured Drift (dB)
Tablet Ant In	-	190	836	Noise Floor	-
Tablet Ant Out	1	190	836	0.547	0.001
Secondary Portrait Ant In	2	190	836	0.040	0.068
Secondary Portrait Ant Out	3	190	836	0.492	0.042
Secondary Landscape Ant In	4	128	824	0.507	-0.182
	5	190	836	0.780	-0.007
	6	251	849	0.731	-0.068

NOTE: The measurement uncertainty of 21.6% was not added to the result.

Table 33 SAR MEASUREMENT RESULTS – 1900MHz GPRS

Test Position	Plot No.	Test Channel	Test Freq (MHz)	Measured 1g SAR Results (mW/g)	Measured Drift (dB)
Tablet Ant In	-	661	1880	Noise Floor	-
Tablet Ant Out	7	661	1880	0.172	0.296
Secondary Portrait Ant In	8	661	1880	0.046	-0.042
Secondary Portrait Ant Out	9	661	1880	0.509	-0.107
Secondary Landscape Ant In	10	512	1850.2	0.906	0.089
	11	661	1880	1.01	0.070
	12	810	1909.8	1.47	0.058

NOTE: The measurement uncertainty of 21.6% was not added to the result.

Table 34 SAR MEASUREMENT RESULTS – 850MHz UMTS

Test Position	Plot No.	Test Channel	Test Freq (MHz)	Measured 1g SAR Results (mW/g)	Measured Drift (dB)
Tablet Ant In	-	4183	836.6	Noise Floor	-
Tablet Ant Out	13	4183	836.6	0.412	0.067
Secondary Portrait Ant In	14	4183	836.6	0.035	0.016
Secondary Portrait Ant Out	15	4183	836.6	0.377	0.052
Secondary Landscape Ant In	16	4132	826.4	0.556	0.264
	17	4183	836.6	0.890	-0.299
	18	4233	846.6	0.688	-0.172

NOTE: The measurement uncertainty of 21.6% was not added to the result.

Table 35 SAR MEASUREMENT RESULTS – 1900MHz UMTS

Test Position	Plot No.	Test Channel	Test Freq (MHz)	Measured 1g SAR Results (mW/g)	Measured Drift (dB)
Tablet Ant In	-	9400	1880	Noise Floor	-
Tablet Ant Out	19	9400	1880	0.231	-0.141
Secondary Portrait Ant In	20	9400	1880	0.073	-0.222
Secondary Portrait Ant Out	21	9400	1880	0.709	-0.142
Secondary Landscape Ant In	22	9262	1852.4	1.46	-0.239
	23	9400	1880	1.56	-0.310
	24	9538	1907.6	1.36	-0.141
Secondary Landscape Ant In (HSDPA)	25	9262	1852.4	1.35	-0.076
	26	9400	1880	1.59	-0.116
	27	9538	1907.6	1.14	-0.187
Secondary Landscape Ant In (HSUPA)	28	9262	1852.4	1.45	-0.164
	29	9400	1880	1.50	0.014
	30	9538	1907.6	1.37	0.070

NOTE: The measurement uncertainty of 21.6% was not added to the result.

The highest SAR level recorded was 1.59 mW/g as evaluated in a 1g cube of averaging mass. This value was obtained in the Secondary Landscape position in HSDPA mode, utilizing channel 9400 (1880 MHz).

12.0 COMPLIANCE STATEMENT

The Fujitsu TABLET PC, Model: T900 / TH900 with SIERRA WIRELESS Mini-PCI Wireless WAN Module, Model: GOBI2000 was found to comply with the FCC and RSS-102 SAR requirements.

The highest SAR level recorded was 1.59 mW/g for a 1g cube. This value was measured at 1880 MHz (channel 9400) in the “Secondary Landscape” position in HSDPA transmission mode. This was below the limit of 1.6 mW/g for uncontrolled exposure, but was within the band of measurement uncertainty around the limit.

13.0 MULTIBAND EVALUATION CONSIDERATIONS

Fujitsu Tablet PC, Model: T900 / TH900 can be equipped with GOBI2000 WWAN transmitter in addition to WLAN and Bluetooth.

Report numbers M091069_FCC_622ANHMW_SAR_2.4-1 and M100599_FCC_622ANHMW_SAR_5.6 relate to SAR testing of a T900 / TH900 sample that includes the Intel 622ANHMW WLAN module.

Report number M1005100_FCC_AR5BHB92_SAR_5.6 relates to SAR testing of a T900 / TH900 sample that includes the Atheros AR5BHB92 WLAN module.

Report numbers M080425_FCC_AR5BHB92_SAR_2.4-1 and M080425_FCC_AR5BHB92_SAR_5.6-1 relates to SAR testing of a T5010 sample that includes the Atheros AR5BHB92 WLAN module. The T5010 sample was considered for this submission at the customer's request.

According to the FCC SAR evaluation procedures mentioned in KDB447498, when the sum of SAR results (simultaneously transmitting antennas WLAN and WWAN) is > 1.6mW/g, or the ratio of above sum to the distance between peak SAR locations > 0.3, simultaneous transmission SAR evaluation is required.

In addition, according to the FCC SAR evaluation procedures mentioned in KDB616217, stand-alone SAR evaluation is NOT required when the maximum transmitter and antenna output power less than or equal to $60/f_{(GHz)}$ (P_{ref}) The Bluetooth module in the DUT operates in the 2.4GHz range. It has a maximum output power of 5mW which is < P_{ref} (=60/2.4=25mW).

The shortest distance between the BT module and any other transmitting antenna was xxcm.
Because xxcm > 5cm, and 5mW < 25mW, the Bluetooth module was not considered for SAR evaluation. This is in accordance with the test reduction methods detailed in KDB 616217 and KDB 447498

Multiband evaluation was not conducted for UMTS/GSM WWAN (GOBI200) and WIFI (622ANHMW) because the ratio of the sum of highest SAR results for the WWAN and WiFi (in 5GHz band) to the distance between peak SAR locations of WWAN and WIFI Tx1 antennas is – (1.59 + 1.30) mW/g / 14.5 cm = 0.2 < 0.3.

Multiband evaluation was not conducted for UMTS/GSM WWAN (GOBI200) and WIFI (AR5BHB92) because the ratio of the sum of highest SAR results for the WWAN and WiFi (in 5GHz band) to the distance between peak SAR locations of WWAN and WIFI Tx1 antennas is – (1.59 + 1.26) mW/g / 14.8 cm = 0.19 < 0.3.

Note: The closest distance between the peak SAR locations for any combination of WLAN and WWAN was more than 10.6 cm (the distance between WLAN Antenna A and WWAN Tx Antennas).

Summary of the highest SAR results considered for multiband evaluation:

1) Worst case WWAN SAR: in 3G HSDPA mode, Secondary Landscape position Ant. IN, Channel 9400 (1880 MHz): 1.59 mW/g
2) Worst case WLAN SAR (Intel 622ANHMW Module): 5.6 GHz band, Secondary Landscape position Ant. A Channel 104 (5520 MHz), OFDM mode: 1.30 mW/g (M100599_FCC_622ANHMW_SAR_5.6)
3) Worst case WLAN SAR (Atheros AR5HB92 Module): 5.6 GHz band, Secondary Landscape position Ant. A Channel 116 (5580 MHz), OFDM mode: 1.26 mW/g (M1005100_FCC_AR5BHB92_SAR_5.6)

Diagram Showing Peak SAR Locations and Distances (Intel 622ANHMW Model)

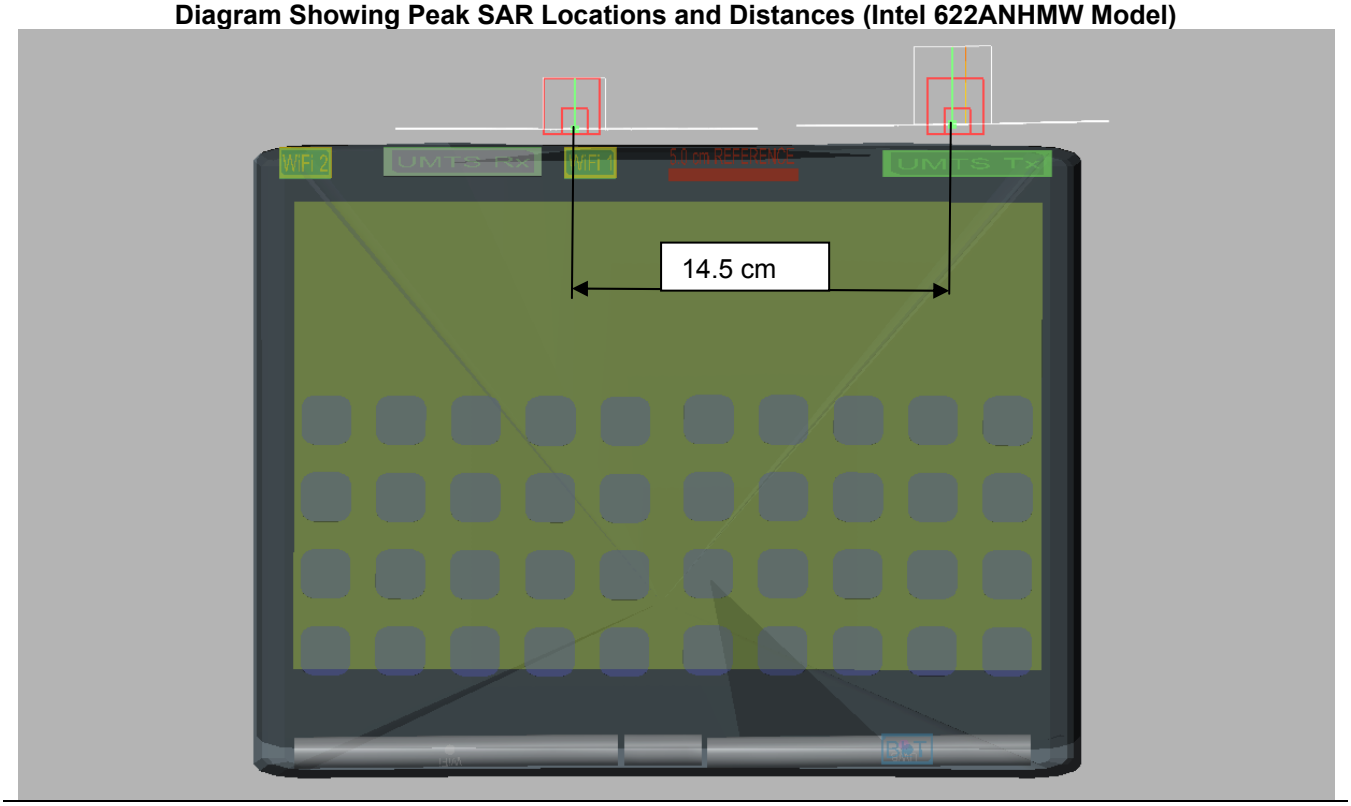

Diagram Showing Peak SAR Locations and Distances (Atheros AR5HB92 Model)

Diagram Showing Antenna Positions