Global Product Certification
EMC-EMF-Safety Approvals

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SAR Test Report

Report Number: M120637_FCC_MC8355_SAR_GSM-UMTS

Test Sample: Fujitsu Portable TABLET PC
Radio Module Under Test: WWAN GOBI3000
Host PC Model: T902
WWAN FCC ID: N7NMC8355
WWAN IC: 2417C-MC8355
Date of Issue: 14th July 2012

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1.0 GENERAL INFORMATION

Table 1

Test Sample:	Portable TABLET Computer
Radio Module Under Test:	MC8355
Interface Type:	Mini-PCI Module
Device Category:	Portable Transmitter
Test Device:	Pre-Production Unit
Host PC model:	T902
WWAN FCC ID:	N7NMC8355
WWAN IC:	2417C-MC8355
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
3. **EN 62209-2:2010**
   Human exposure to radio frequency fields from hand-held and bodymounted wireless communication devices. Human models, instrumentation, and procedures.
   Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)

Statement Of Compliance: The Fujitsu TABLET Computer T902 with Sierra Wireless GSM/UMTS/CDMA Module MC8355 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: 29th June to 11th July 2012

Test Officer:

Peter Jakubiec

Authorised Signature:

Peter Jakubiec

SAR TEST REPORT
Portable TABLET Computer
Model: T902
Report Number: M120637_FCC_MC8355_SAR_GSM-UMTS

2.0 INTRODUCTION

Testing was performed on the Fujitsu TABLET PC, Model: T902 with SIERRA Mini-PCI Wireless WAN Module (GOBI3000), Model: MC8355. The GOBI3000 module is an OEM product. The Mini-PCI Wireless WAN (WWAN) was tested in the dedicated host – Model T902. The system tested will be referred to as the DUT throughout this report.

3.0 TEST SAMPLE TECHNICAL INFORMATION

(Information supplied by the client)

3.1 WWAN Details

Table 2

Transmitter:	Mini-Card Wireless WAN Module
FCC ID:	N7NMC8355
IC:	2417C-MC8355
Model Number:	MC8355
Manufacturer:	SIERRA WIRELESS INC
Network Standard:	GSM Release 6 /
UMTS bands :	IMT 2100 / 850 / 1900MHz(Band Class I, II, V)
GSM / EDGE bands:	850 / 900/ 1800 / 1900 MHz
Channel spacing:	200kHz(GSM), 5MHz(WCDMA)
Channel raster:	200kHz
Antenna type:	Main: Monopole, AUX: PIFA
Antenna Manufacturer:	NISSEI ELECTRIC CO. LTD.
Antenna Part Number:	Main: CP519214, AUX: CP519215
Frequency Ranges:	824.2 – 848.8 MHz and 1850.2 – 1909.8 MHz for GPRS 826.4 – 846.6 MHz and 1852.4 – 1907.6 MHz for UMTS - 848.31 MHz and 1851.25 – 1908.75 MHz for CDMA

3.2 Test Signal, Frequency and Output Power

The DUT 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.

Channels and Output power:

Table 3

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
CDMA Mode		
Channels 1013, 384 and 777	824.7, 836.52 and 848.31	23
Channels 25, 600 and 1175	1851.25, 1880 and 1908.75	23

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3.3 DUT (Notebook PC) Details

The intention of this application is to FCC/IC certify Sierra Wireless Inc. WWAN module FCC ID: N7NMC8355 and IC: 2417C-MC8355 in a Fujitsu host PC model T902 in following configurations:

- with only WLAN model Intel 62205ANHMW FCC ID: EJE-WL0027 and IC: 337J-WL0027
- T902 with WLAN model Intel 62205ANHMW FCC ID: EJE-WL0027 and IC: 337J-WL0027 **AND** Bluetooth model BCM92070MD_REF6 modularly certified FCC ID: QDS-BRCM1043 and IC ID: 4324A-BRCM1043

SAR testing was conducted on the sample that is equipped with the Bluetooth transmitter with antenna and Intel WLAN modules with 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 in Section 13 of this report.

Table 4

Host notebook :	LifeBook T series
Model Name:	T902
Serial Number:	Pre-production Sample
Manufacturer:	FUJITSU LIMITED
CPU Type and Speed:	Core i7 2.9GHz
LCD	13.3”WXGA(1280x800 : LP133WD2
Graphics chip	Non
Wired LAN:	**Intel 82579LM : 10 Base-T/100 Base-TX/1000Base-T**
Modem:	**Non**
Port Replicator Model:	***FPCPR132***
AC Adapter Model:	65W: PXW1934N 80W: ADP-80NB A(Delta), SEE100P2-19.0(Sanken), PJW1942N(Tamura), PJW1942NA(Tamura)
Voltage:	19 V
Current Specs:	4.22A / 3.42A
Watts:	80W / 65W

3.4 Test sample Accessories

3.4.1 Battery Types

One type of Fujitsu Lithium Ion battery is used to power the DUT.

Standard Battery

Table 5

Model	FPCBP373
V/mAh	10.8V/6700mAh

4.0 TEST SIGNAL, FREQUENCY AND OUTPUT POWER

For the SAR measurements the DUT was operating at full transmit power. The fixed frequency channels used in the testing are shown in Tables below.

The frequency span of the GSM, UMTS and CDMA 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 DUT Host PC during the SAR measurements.
At the beginning of the SAR tests, the conducted power of the WWAN module was measured after temporary modification of antenna connector inside the Host's TX RX compartment. Measurements were performed with a calibrated Power Meter. The results of this measurement are listed in tables below. Burst Average power was used to calculate the Frame Average power (100% Duty Cycle) which determines the worst case Multislot Class.

Conducted Power Measurement CDMA 2000 1xRTT 850/1900 MHz

Configuration:
Network > System Parameters > System ID = 2004; Network Identity > Network ID Number = 65535

Service cfg > Primary Service Class > Selected Service = Loopback Service; Primary Service Class > Loopback Service > Selected Service Option = Service Option x (x - 2, 9 or 55); Service Option x (x - 2, 9 or 55) > FCH Config > Frames > Frame Rate = Full; Selected Service Option > Service Option 55 > FCH Config > FCH > F-FCH-MO = 0001hex (Fundamental Channel Test Mode 1) or 0002hex (Fundamental Channel Test Mode 2)

Service cfg > Primary Service Class > Selected Service = Test Data Service; Primary Service Class > Test Data Service > Selected Service Option = Service Option 32; Test Data Service Option 32 > FCCH & SCH Config > SCH0 Enable = Off (or On); Test Data Service Option 32 > FCCH & SCH Config > SCH1 Enable = Off (or On); Test Data Service Option 32 > FCCH & SCH Config > SCH0 Config > Data Rate = 9.6 kbps; FCCH & SCH Config > SCH1 Config > Data Rate = 9.6 kbps

BS Signal > RF Settings > RF Power > CDMA Power = -104 dBm/1.23MHz (RF > External attenuation IN/OUT as per cable losses); RF Settings > RF Channel [BC0] = 384; RF Settings > RF Channel [BC1] = 325; BS Signal > RF Settings > RF Power > PICH Level = -7dB; BS Signal > FCH > FCH Level = -7.4 dB
BS Signal > Power Control > Power Ctrl. Bits = All Up (Service Options 2,9 and 55)
BS Signal > Power Control > Power Ctrl. Bits = Hold (Service Options 32)

Table 6

Cellular Band

Fundamental Channel Test Mode	Supplemental Code Channel Test Mode	Loopback Service Option	Test Data Service Option	SCHn	Result (dBm)		
					Ch. 1013	Ch. 384	Ch.777
1	N/A	SO 2	N/A	N/A	25.10	25.13	24.88
1	N/A	SO 55	N/A	N/A	25.09	25.09	24.89
2	N/A	SO 9	N/A	N/A	25.11	25.08	24.90
2	N/A	SO 55	N/A	N/A	25.08	25.07	24.87
N/A	3	N/A	SO 32	OFF	25.04	25.08	24.89
N/A	3	N/A	SO 32	ON	25.09*	25.06*	24.88*

*SCH1 Enable – rejected by DUT

PCS Band

Fundamental Channel Test Mode	Supplemental Code Channel Test Mode	Loopback Service Option	Test Data Service Option	SCHn	Result (dBm)		
					Ch. 25	Ch. 600	Ch.1175
1	N/A	SO 2	N/A	N/A	23.49	22.83	23.09
1	N/A	SO 55	N/A	N/A	23.62	22.93	23.12
2	N/A	SO 9	N/A	N/A	23.60	22.95	23.15
2	N/A	SO 55	N/A	N/A	23.56	23.06	23.16
N/A	3	N/A	SO 32	OFF	23.70	22.94	22.98
N/A	3	N/A	SO 32	ON	23.60	22.95	22.99

Conducted Power Measurement 1xEvDo Revision 0 850/1900 MHz

Configuration:
Network > Network Release = Release 0; Network > System ID = 2004; Access Probes > Initial Adjust (Probe Initial Adjust) = 15 dBm; Probe Increment (Power Step) = 7.5 dB/step; Open Loop Adjust (BC0) = -81 dB (US cellular); Open Loop Adjust (BC1) = -84 dB (N.American PCS)
AN Signal > Sector > Format = Manual; Sector ID = 00800580 00000000 00000000 00000000; RF Settings > RF Power > 1xEv-Do Power = -105.5 dBm/1.23MHz (RF > External attenuation IN/OUT as per cable losses); RF Settings > RF Channel [BC0] = 37; RF Settings > RF Channel [BC1] = 325; Power Control > Power control bits = All Up
Layer > Application Layer > Test Applications > FTAP Cfg > DRC > ACK Ch Fixed Mode = Ack.Always; DRC > Fixed Rate = 4 (307.2 kbps, 2-slots); Test Applications > RTAP Cfg > Data > Min. Rate = 5 (153.6 kbps); Data > Min. Rate = 5 (153.6 kbps)

Table 7

Cellular Band

Release 0 Subtype	Open Loop Adjust (BC0)	Result (dBm)		
		Ch. 1013	Ch. 384	Ch.777
0	-81 dB	25.16	**25.26**	24.97

Table 8

PCS Band

Release 0 Subtype	Open Loop Adjust (BC0)	Result (dBm)		
		Ch. 25	Ch. 600	Ch.1175
0	-84 dB	**23.84**	23.19	23.31

Conducted Power Measurement 1xEvDo Revision A 850/1900 MHz

Configuration:
Network > Network Release = Release A; Network > System ID = 2004; Access Probes > Initial Adjust (Probe Initial Adjust) = 15 dBm; Probe Increment (Power Step) = 7.5 dB/step; Open Loop Adjust (BC0) = -81 dB (US cellular); Open Loop Adjust (BC1) = -84 dB (N.American PCS)
AN Signal > Sector > Format = Manual; Sector ID = 00800580 00000000 00000000 00000000; RF Settings > RF Power > 1xEv-Do Power = -60 dBm/1.23MHz (RF > External attenuation IN/OUT as per cable losses); RF Settings > RF Channel [BC0] = 37; RF Settings > RF Channel [BC1] = 325; Power Control > Power control bits = All Up
Subtype 0:
Layer > Protocol View Filter = Release 0 Settings; Layer > Application Layer > Test Applications > FTAP Cfg > DRC > ACK Ch Fixed Mode = Ack.Always; DRC > Fixed Rate = 4 (307.2 kbps, 2-slots); Test Applications > RTAP Cfg > Data > Min. Rate = 5 (153.6 kbps); Data > Max. Rate = 5 (153.6 kbps)
Subtype 2:
Layer > Protocol View Filter = Release A Settings; Layer > Application Layer > Test Applications > FTAP Cfg > DRC > ACK Ch Fixed Mode = Ack.Always; DRC > Rate = 16 (307.2 kbps, 2-slots); Test Applications > RTAP Cfg > Data > Min. Packet Size = 9 (4096 bits); Data > Max. Packet Size = 9 (4096 bits);

Table 9

Cellular Band

Release 0 Subtype	Open Loop Adjust (BC0)	Result (dBm)		
		Ch. 1013	Ch. 384	Ch.777
0	-81 dB	N/A*	N/A*	N/A*
2	-81 dB	25.12	25.17	24.90

Table 10

PCS Band

Release 0 Subtype	Open Loop Adjust (BC0)	Result (dBm)		
		Ch. 25	Ch. 600	Ch.1175
0	-84 dB	N/A*	N/A*	N/A*
2	-84 dB	23.66	23.12	23.27

*DUT has no Subtype 0 capabilities

Table: Frequency and Conducted Power Results GSM

Table 11

Coding Scheme	GPRS Multislot Class	RF Channel	Measured Power Burst Average (dBm)	Calculated Power Frame Average (100% Duty Cycle) (dBm)
CS1	10	128	33.21	27.03
CS1	10	190	**33.27**	27.09
CS1	10	251	33.23	27.05
CS1	11	128	N/A*	N/A*
CS1	11	190	N/A*	N/A*
CS1	11	251	N/A*	N/A*
CS1	12	128	N/A*	N/A*
CS1	12	190	N/A*	N/A*
CS1	12	251	N/A*	N/A*

Table 12

Coding Scheme	EGPRS Multislot Class	RF Channel	Measured Power Burst Average (dBm)	Calculated Power Frame Average (100% Duty Cycle) (dBm)
MCS5	10	128	32.85	26.67
MCS5	10	190	33.02	26.84
MCS5	10	251	32.82	26.64
MCS5	11	128	N/A*	N/A*
MCS5	11	190	N/A*	N/A*
MCS5	11	251	N/A*	N/A*
MCS5	12	128	N/A*	N/A*
MCS5	12	190	N/A*	N/A*
MCS5	12	251	N/A*	N/A*

*DUT has no GPRS/EGPRS Multislot Class 11 and 12 capabilities

Table 13

Coding Scheme	GPRS Multislot Class	RF Channel	Measured Power Burst Average (dBm)	Calculated Power Frame Average (100% Duty Cycle) (dBm)
CS1	10	512	**28.55**	22.37
CS1	10	661	28.41	22.23
CS1	10	810	28.30	22.12
CS1	11	512	N/A*	N/A*
CS1	11	661	N/A*	N/A*
CS1	11	810	N/A*	N/A*
CS1	12	512	N/A*	N/A*
CS1	12	661	N/A*	N/A*
CS1	12	810	N/A*	N/A*

Table 14

Coding Scheme	EGPRS Multislot Class	RF Channel	Measured Power Burst Average (dBm)	Calculated Power Frame Average (100% Duty Cycle) (dBm)
MCS5	10	512	27.89	21.71
MCS5	10	661	27.99	21.81
MCS5	10	810	27.75	21.57
MCS5	11	512	N/A*	N/A*
MCS5	11	661	N/A*	N/A*
MCS5	11	810	N/A*	N/A*
MCS5	12	512	N/A*	N/A*
MCS5	12	661	N/A*	N/A*
MCS5	12	810	N/A*	N/A*

*DUT has no GPRS/EGPRS Multislot Class 11 and 12 capabilities

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 15

Channel No.	βc	βd	Result (dBm)
4132	8	15	25.05
4183	8	15	**25.15**
4233	8	15	25.08

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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 Fidback Cycle = 4ms; CQI Repetition Rate = 2ms

Table 16

Sub Test No.	βc	βd	∆AKN	∆NAKN	∆CQI	Result (dBm)			MPR (dB)
						4132	4183	4233	
1	2	15	8	8	8	24.49	24.62	24.62	0.0
2	12	15	8	8	8	24.34	24.42	24.41	0.0
3	15	8	8	8	8	24.18	24.22	24.23	0.5
4	15	4	8	8	8	24.08	24.16	24.17	0.5

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
DPCH Channel Code {βd (SF)} = 64
Power Control – TPC algorithm 2
3GPP default HS-DPCCH power offset parameters ∆AKN = 5; ∆NAKN = 5; ∆CQI = 2
E-TFCI table index = 0
E-DCH minimum set E-TFCI = 9
PLnon-max = 0.84
Maximum Channelisation Code {βed (SF) and βed (codes)} – Subtests 1,2,4,5 = SF4; Subtest 3 = 2xSF4
Initial Serving Grant Value = Off
∆ HARQ =0
Number of Ref.E-TFCIs – Subtests 1,2,4,5 = 5; Subtest 3 = 2
Set1 Patern Type = Closed Loop

Table 17

Sub Test	βc	βd	∆ AKN	∆ NAKN	∆ CQI	∆ E-DPCCH	βed (SF)	βed (codes)	AG Index	Result (dBm)			MPR (dB)
										4132	4183	4233	
1	10	15	8	8	8	6	4	1	20	24.45	24.51	23.93	0.0
2	6	15	8	8	8	8	4	1	12	22.81	22.82	22.61	2.0
3	15	9	8	8	8	8	4	2	15	23.64	23.41	23.25	1.0
4	2	15	8	8	8	5	4	1	17	22.95	22.58	23.05	2.0
5	15	15	8	8	8	7	4	1	21	23.85	23.86	23.80	0.0

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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 18

Channel No.	βc	βd	Result (dBm)
9262	8	15	23.62
9400	8	15	23.64
9538	8	15	**23.76**

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 Fidback Cycle = 4ms; CQI Repetition Rate = 2ms
3GPP default HS-DPCCH power offset parameters ΔAKN = 5; ΔNAKN = 5; ΔCQI = 2

Table 19

Sub Test No.	βc	βd	ΔAKN	ΔNAKN	ΔCQI	Result (dBm)			MPR (dB)
						9262	9400	9538	
1	2	15	8	8	8	23.14	23.20	23.29	0.0
2	12	15	8	8	8	22.95	22.92	23.05	0.0
3	15	8	8	8	8	22.78	22.72	22.83	0.5
4	15	4	8	8	8	22.79	22.75	22.77	0.5

Conducted Power Measurement UMTS + HSDPA + HSUPA 1900 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
DPCH Channel Code {βd (SF)} = 64
Power Control – TPC algorithm 2
3GPP default HS-DPCCH power offset parameters ΔAKN = 5; ΔNAKN = 5; ΔCQI = 2
E-TFCI table index = 0
E-DCH minimum set E-TFCI = 9
PLnon-max = 0.84
Maximum Channelisation Code {βed (SF) and βed (codes)} – Subtests 1,2,4,5 = SF4; Subtest 3 = 2xSF4
Initial Serving Grant Value = Off
Δ HARQ =0
Number of Ref.E-TFCIs – Subtests 1,2,4,5 = 5; Subtest 3 = 2
Set1 Patern Type = Closed Loop

Table 20

Sub Test	βc	βd	Δ AKN	Δ NAKN	Δ CQI	Δ E-DPCCH	βed (SF)	βed (codes)	AG Index	Result (dBm)			MPR (dB)
										9262	9400	9538	
1	10	15	8	8	8	6	4	1	20	22.57	22.71	22.77	0.0
2	6	15	8	8	8	8	4	1	12	20.91	20.96	20.88	2.0
3	15	9	8	8	8	8	4	2	15	21.89	22.03	21.67	1.0
4	2	15	8	8	8	5	4	1	17	21.28	21.37	21.05	2.0
5	15	15	8	8	8	7	4	1	21	22.55	22.67	22.75	0.0

4.1 Battery Status

The DUT 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 DUT, 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 5% and was assessed in the uncertainty budget.

5.0 DETAILS OF TEST LABORATORY

5.1 Location

EMC Technologies Pty Ltd
176 Harrick Road
Keilor Park, (Melbourne) Victoria
Australia 3042

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Facsimile: +61 3 9331 7455
email: melb@emctech.com.au
website: www.emctech.com.au

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 21

AS/NZS 2772.2:	RF and microwave radiation hazard measurement
ACMA:	Radio communications (Electromagnetic Radiation - Human Exposure) Standard 2003
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)
EN 62209-2:2010	Human Exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models instrumentation and procedures **Part 2**: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 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 42%. 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 DASY5 SAR measurement system using the SN1380 probe was less than 5μV in both air and liquid mediums.

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6.0 DESCRIPTION OF SAR MEASUREMENT SYSTEM

Table 22

Applicable Head Configurations Applicable Body Configurations	: None : Lap Held Position : Edge On Position : Bystander

6.1 Probe Positioning System

The measurements were performed with the state-of-the-art automated near-field scanning system **DASY5 Version 52** from Schmid & Partner Engineering AG (SPEAG). The DASY5 fully complies with the OET65 C (01-01), IEEE 1528 and EN62209-1 and EN62209-2 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.

6.3 Validation

6.3.1 Validation Results (900 MHz and 1800 MHz and 1950 MHz)

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

Table: Validation Results

Table 23

1. Validation Date & Frequency	2. ∈r (measured)	3. σ (mho/m) (measured)	4. Measured SAR 1g (mW/g)	5. Measured SAR 10g (mW/g)
3rd July 2012 1800 MHz	51.0	1.55	9.33	5.03
4th July 2012 1950 MHz	51.3	1.59	9.85	5.09
5th July 2012 1950 MHz	50.8	1.59	9.82	5.10
6th July 2012 1950 MHz	50.8	1.60	9.95	5.18
9th July 2012 900 MHz	55.3	1.01	2.70	1.76
10th July 2012 900 MHz	52.6	1.05	2.82	1.83
11th July 2012 900 MHz	52.8	1.05	2.83	1.84

6.3.2 Deviation from reference validation 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, 1800 MHz and 1950 MHz. These reference SAR values are obtained from the IEEE Std 1528-2003 and EN 62209-2 and are normalized to 1W.

The SPEAG calibration reference SAR value is the SAR validation 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.

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Table: Deviation from reference validation values @ (900MHz and 1800 MHz and 1950 MHz)

Table 24

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 (%)
9th July 2012 900 MHz	2.70	10.80	11.1	-2.70
10th July 2012 900 MHz	2.82	11.28	11.1	1.62
11th July 2012 900 MHz	2.83	11.32	11.1	1.98
3rd July 2012 1800 MHz	9.33	37.32	38.7	-3.57
4th July 2012 1950 MHz	9.85	39.40	38.8	1.55
5th July 2012 1950 MHz	9.82	39.28	38.8	1.24
6th July 2012 1950 MHz	9.95	39.80	38.8	2.58

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

6.3.3 Liquid Depth 15cm

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

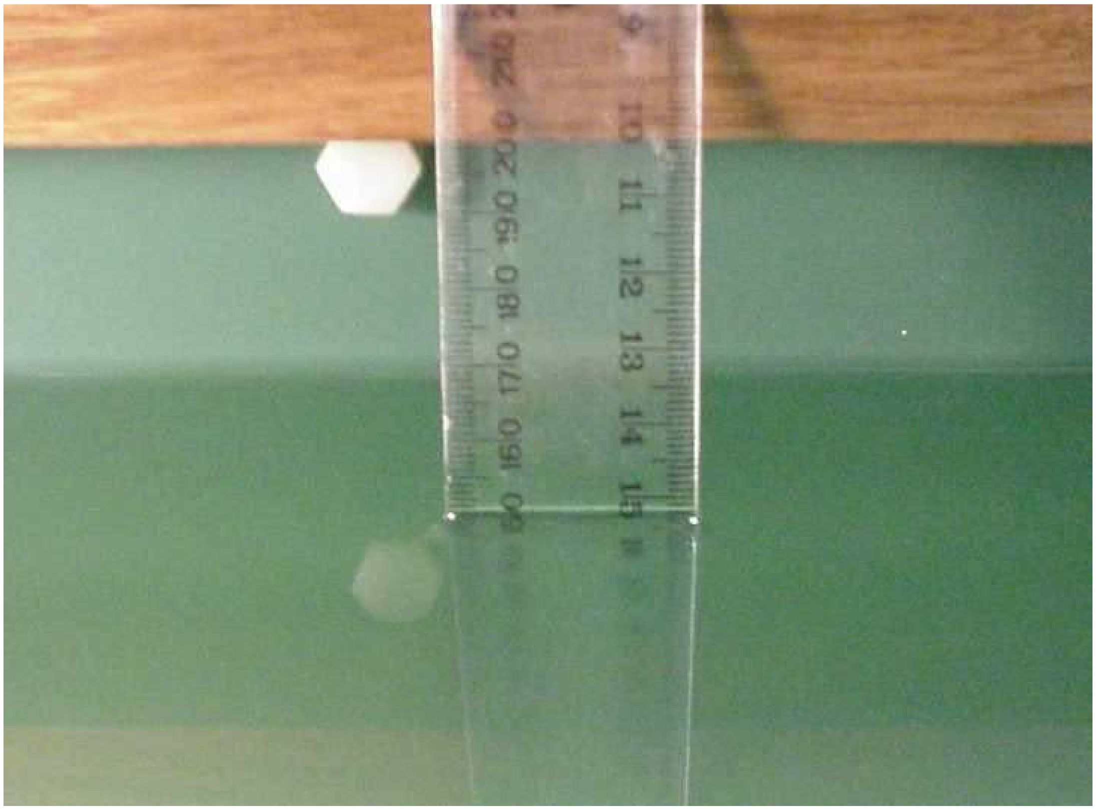

Photo of liquid Depth in Flat Phantom

6.4 Phantom Properties

The phantoms used during the testing comply with the OET65 C (01-01), IEEE 1528 and EN62209-1 and EN62209-2 SAR measurement requirements.

Phantom Properties	Required	Measured
Thickness of flat section	2.0mm ± 0.2mm (bottom section)	2.12-2.20mm
Dielectric Constant	<5.0	4.603 @ 300MHz (worst-case frequency)
Loss Tangent	<0.05	0.0379 @ 2500MHz (worst-case frequency)

6.5 Tissue Material Properties

The dielectric parameters of the human tissue 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: Measured Body Simulating Liquid Dielectric Values at 850MHz

Table 25

Frequency Band	∈r (measured range)	∈r (target)	σ (mho/m) (measured range)	σ (target)	ρ kg/m^3
825 MHz Body	53.4 - 55.9	55.2 ±5% (52.4 to 58.0)	0.94 – 0.97	0.97 ±5% (0.92 to 1.02)	1000
835 MHz Body	53.2 - 55.8	55.2 ±5% (52.4 to 58.0)	0.96 – 0.98	0.97 ±5% (0.92 to 1.02)	1000
850 MHz Body	53.2 - 55.7	55.2 ±5% (52.4 to 58.0)	0.97- 0.99	0.97 ±5% (0.92 to 1.02)	1000

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

Table: Measured Body Simulating Liquid Dielectric Values at 1800MHz

Table 26

Frequency Band	∈r (measured range)	∈r (target)	σ (mho/m) (measured range)	σ (target)	ρ kg/m^3
1712.4 MHz Body	51.3	53.3 ±5% (50.6 to 56.0)	1.48	1.49 ±5% (1.42 to 1.56)	1000
1735.4 MHz Body	51.3	53.3 ±5% (50.6 to 56.0)	1.50	1.49 ±5% (1.42 to 1.56)	1000
1752.6 MHz Body	51.2	53.3 ±5% (50.6 to 56.0)	1.51	1.49 ±5% (1.42 to 1.56)	1000

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

Table: Measured Body Simulating Liquid Dielectric Values at 1880MHz

Table 27

Frequency Band	∈r (measured range)	∈r (target)	σ (mho/m) (measured range)	σ (target)	ρ kg/m^3
1850 MHz Body	51.2 – 51.6	53.3 ±5% (50.6 to 56.0)	1.54 -1.56	1.52 ±5% (1.44 to 1.60)	1000
1880.0 MHz Body	51.1 – 51.5	53.3 ±5% (50.6 to 56.0)	1.56 – 1.57	1.52 ±5% (1.44 to 1.60)	1000
1910 MHz Body	51.0 - 51.4	53.3 ±5% (50.6 to 56.0)	1.58	1.52 ±5% (1.44 to 1.60)	1000

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

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6.5.1 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: Temperature and Humidity recorded for each day

Table 28

Date	Ambient Temperature (°C)	Liquid Temperature (°C)	Humidity (%)
3rd July 2012 1800 MHz	20.6	20.2	40
4th July 2012 1950 MHz	20.6	20.3	41
5th July 2012 1950 MHz	20.9	20.5	40
6th July 2012 1950 MHz	21.0	20.6	38
9th July 2012 900 MHz	20.5	20.1	37
10th July 2012 900 MHz	20.6	20.3	38
11th July 2012 900 MHz	20.5	20.2	42

6.6 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: Tissue Type: Body @ 850/900MHz
Volume of Liquid: 30 Litres

Table 29

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

*Refer "OET Bulletin 65 97/01 P38"

Table: Tissue Type: Body @ 1800/1950MHz MHz
Volume of Liquid: 30 Litres

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

6.7 Device Holder for Laptops and P 10.1 Phantom

A low loss clamp was used to position the DUT underneath the phantom surface.

Refer to Appendix A for photographs of device positioning

7.0 SAR MEASUREMENT PROCEDURE USING DASY5

The SAR evaluation was performed with the SPEAG DASY5 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 DUT. 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 DUT and the horizontal grid spacing is 15 mm x 15 mm. The actual Area Scan has dimensions of 150mm x 90mm 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 4 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.

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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 30: Uncertainty Budget for DASY5 Version 52 – DUT SAR

Error Description	Uncert. Value	Prob. Dist.	Div.	C_i (1g)	C_i (10g)	1g u_i	10g u_i	v_i
Measurement System								
Probe Calibration	6	N	1.00	1	1	6.00	6.00	∞
Axial Isotropy	4.7	R	1.73	0.7	0.7	1.90	1.90	∞
Hemispherical Isotropy	9.6	R	1.73	0.7	0.7	3.88	3.88	∞
Boundary Effects	1	R	1.73	1	1	0.58	0.58	∞
Linearity	4.7	R	1.73	1	1	2.71	2.71	∞
System Detection Limits	1	R	1.73	1	1	0.58	0.58	∞
Readout Electronics	0.3	N	1.00	1	1	0.30	0.30	∞
Response Time	0.8	R	1.73	1	1	0.46	0.46	∞
Integration Time	2.6	R	1.73	1	1	1.50	1.50	∞
RF Ambient Noise	3	R	1.73	1	1	1.73	1.73	∞
RF Ambient Reflections	3	R	1.73	1	1	1.73	1.73	∞
Probe Positioner	0.4	R	1.73	1	1	0.23	0.23	∞
Probe Positioning	2.9	R	1.73	1	1	1.67	1.67	∞
Max. SAR Eval.	1	R	1.73	1	1	0.58	0.58	∞
Post Processing	2	R	1.73	1	1	1.15	1.15	∞
Test Sample Related								
Power Scaling	0	R	1.73	1	1	0.00	0.00	∞
Test Sample Positioning	2.9	N	1.00	1	1	2.90	2.90	145
Device Holder Uncertainty	3.6	N	1.00	1	1	3.60	3.60	5
Output Power Variation – SAR Drift Measurement	4.06	R	1.73	1	1	2.34	2.34	∞
Phantom and Setup								
Phantom Uncertainty	7.5	R	1.73	1	1	4.33	4.33	∞
Liquid Conductivity – Deviation from target values	5	R	1.73	0.64	0.43	1.85	1.24	∞
Liquid Permittivity – Deviation from target values	5	R	1.73	0.6	0.49	1.73	1.41	∞
Liquid Conductivity – Measurement uncertainty	2.5	N	1.00	0.64	0.71	1.60	1.78	∞
Liquid Permittivity – Measurement uncertainty	2.5	N	1.00	0.6	0.26	1.50	0.65	∞
Temp.unc. - Conductivity	1.7	R	1.73	0.78	0.71	0.77	0.70	∞
Temp. unc. - Permittivity	0.3	R	1.73	0.23	0.26	0.04	0.05	∞
Combined standard Uncertainty (u_c)						11.5	11.4	
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k=	2		23.1	22.7	

Estimated total measurement uncertainty for the DASY5 measurement system was ±11.5%. The extended uncertainty (K = 2) was assessed to be ±23.1% based on 95% confidence level. The uncertainty is not added to the measurement result.

Table 31: Uncertainty Budget for DASY5 Version 52 – Validation

Error Description	Uncert. Value	Prob. Dist.	Div.	C_i (1g)	C_i (10g)	1g u_i	10g u_i	v_i
Measurement System								
Probe Calibration	6	N	1.00	1	1	6.00	6.00	∞
Axial Isotropy	4.7	R	1.73	1	1	2.71	2.71	∞
Hemispherical Isotropy	9.6	R	1.73	0	0	0.00	0.00	∞
Boundary Effects	1	R	1.73	1	1	0.58	0.58	∞
Linearity	4.7	R	1.73	1	1	2.71	2.71	∞
System Detection Limits	1	R	1.73	1	1	0.58	0.58	∞
Readout Electronics	0.3	N	1.00	1	1	0.30	0.30	∞
Response Time	0	R	1.73	1	1	0.00	0.00	∞
Integration Time	0	R	1.73	1	1	0.00	0.00	∞
RF Ambient Noise	1	R	1.73	1	1	0.58	0.58	∞
RF Ambient Reflections	1	R	1.73	1	1	0.58	0.58	∞
Probe Positioner	0.8	R	1.73	1	1	0.46	0.46	∞
Probe Positioning	6.7	R	1.73	1	1	3.87	3.87	∞
Max. SAR Eval.	2	R	1.73	1	1	1.15	1.15	∞
Post Processing	2	R	1.73	1	1	1.15	1.15	∞
Dipole Related								
Deviation of exp. dipole	5.5	R	1.73	1	1	3.18	3.18	∞
Dipole Axis to Liquid Dist.	2	R	1.73	1	1	1.15	1.15	∞
Input power & SAR drift	3.40	R	1.73	1	1	1.96	1.96	∞
Phantom and Setup								
Phantom Uncertainty	4	R	1.73	1	1	2.31	2.31	∞
Liquid Conductivity – Deviation from target values	5	R	1.73	0.64	0.43	1.85	1.24	∞
Liquid Permittivity – Deviation from target values	5	R	1.73	0.6	0.49	1.73	1.41	∞
Liquid Conductivity – Measurement uncertainty	2.5	N	1.00	0.78	0.71	1.95	1.78	∞
Liquid Permittivity – Measurement uncertainty	2.5	N	1.00	0.26	0.26	0.65	0.65	∞
Temp.unc. - Conductivity	1.7	R	1.73	0.78	0.71	0.77	0.70	∞
Temp. unc. - Permittivity	0.3	R	1.73	0.23	0.26	0.04	0.05	∞
Combined standard Uncertainty (u_c)						10.1	9.9	
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k=	2		20.2	19.8	

Estimated total measurement uncertainty for the DASY5 measurement system was ±10.1%. The extended uncertainty (K = 2) was assessed to be ±20.2% based on 95% confidence level. The uncertainty is not added to the Validation measurement result.

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9.0 EQUIPMENT LIST AND CALIBRATION DETAILS

Table 32: SPEAG DASY5 Version 52

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	ELI 4.0	1101	Not Applicable	
Data Acquisition Electronics	SPEAG	DAE3 V1	359	21-June-2013	
Data Acquisition Electronics	SPEAG	DAE3 V1	442	05-Dec-2012	✓
Probe E-Field - Dummy	SPEAG	DP1	N/A	Not applicable	
Probe E-Field	SPEAG	ET3DV6	1380	12-Dec-2012	✓
Probe E-Field	SPEAG	ET3DV6	1377	20-June-2013	
Probe E-Field	SPEAG	ES3DV6	3029	Not Used	
Probe E-Field	SPEAG	EX3DV4	3563	21-June-2013	
Probe E-Field	SPEAG	EX3DV4	3657	14-Dec-2012	
Antenna Dipole 300 MHz	SPEAG	D300V3	1012	30-Nov-2012	
Antenna Dipole 450 MHz	SPEAG	D450V3	1074	30-Nov-2012	
Antenna Dipole 750 MHz	SPEAG	D750V2	1051	9-Jan-2014	
Antenna Dipole 900 MHz	SPEAG	D900V2	047	22-June-2014	✓
Antenna Dipole 1640 MHz	SPEAG	D1640V2	314	20-June-2014	
Antenna Dipole 1800 MHz	SPEAG	D1800V2	242	20-June-2014	✓
Antenna Dipole 1950 MHz	SPEAG	D1950V3	1113	10-Dec -2012	✓
Antenna Dipole 2450 MHz	SPEAG	D2450V2	724	09-Dec-2012	
Antenna Dipole 2600 MHz	SPEAG	D2600V2	1044	10-Jan-2014	
Antenna Dipole 3500 MHz	SPEAG	D3500V2	1002	13-July-2013	
Antenna Dipole 5600 MHz	SPEAG	D5GHzV2	1008	14-Dec-2013	
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	Hewlett Packard	437B	3125012786	23-Aug-2012	✓
RF Power Sensor 0.01 - 18 GHz	Hewlett Packard	8481H	1545A01634	23-Aug-2012	✓
RF Power Meter	Rohde & Schwarz	NRP	101415	18-Aug-2012	
RF Power Sensor	Rohde & Schwarz	NRP - Z81	100174	21-Sept-2012	
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	27-Sept-2012	
Network Analyser	Hewlett Packard	8753ES	JP39240130	7-Nov-2012	✓
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.

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10.0 TEST METHODOLOGY

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 DUT can be used in either a conventional laptop position (see Appendix A) or a Tablet configuration. The antenna location in the DUT 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.

10.1.1 "Lap Held" Position Definition (0mm spacing)

The DUT was tested in the 2.00 mm flat section of the AndreT Flat phantom for the "Lap Held" position. The Transceiver was placed at the bottom of the phantom and suspended in such way that the back of the DUT 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 DUT was tested in the (2.00 mm) flat section of the AndreT Flat 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.*

10.1.3 "Bystander" Position (25mm spacing)

The DUT was tested in the 2.00 mm flat section of the AndreT Flat phantom for the "Bystander" position. The Transceiver was placed at the bottom of the phantom and suspended in such way that the back of it's LCD screen was parallel to phantom and at 25mm distance. This orientation simulates use of the device in a way that allows occasional RF exposure of the nearby person (Bystander).

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

The DUT 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 447498, KDB 941225 and KDB 616217 are applied for SAR measurements of the host system. SAR measurement for the HSDPA and HSUPA modes were not conducted because SAR results in WWAN 3G bands are lower than 1.2 mW/g (75% of the SAR limit).

Table: Testing configurations

Table 33

Phantom Configuration	Device Mode WWAN Band Name	Test Configurations		
		Channel (Low)	Channel (Middle)	Channel (High)
Lap Held	GPRS 850 MHz		x	
	GPRS 1900 MHz	x		
	WCDMA 850 MHz		x	
	WCDMA 1750 MHz			x
	WCDMA 1900 MHz			x
	CDMA 850 MHz		x	
	CDMA 1900 MHz	x		
Edge On	GPRS 850 MHz		x	
	GPRS 1900 MHz	x		
	WCDMA 850 MHz		x	
	WCDMA 1750 MHz			x
	WCDMA 1900 MHz			x
	CDMA 850 MHz		x	
	CDMA 1900 MHz	x		
Bystander	GPRS 850 MHz		x	
	GPRS 1900 MHz	x		
	WCDMA 850 MHz		x	
	WCDMA 1750 MHz			x
	WCDMA 1900 MHz			x
	CDMA 850 MHz		x	
	CDMA 1900 MHz	x		

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 it is the worst case.

11.0 SAR MEASUREMENT RESULTS

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

11.1 SAR Results

There are three modes of operation which include UMTS, GPRS and Ev-Do transmission. The table below displays the SAR results.

Table: SAR MEASUREMENT RESULTS – 850MHz GPRS

Table 34

Test Position	Plot No.	Test Channel	Test Freq (MHz)	Measured 1g SAR Results (mW/g)	Measured Drift (dB)
Bystander 25mm Spacing Antenna In	-	190	836	Noise Floor	-
Bystander 25mm Spacing Antenna Out	1	128	824.2	**0.641**	-0.06
	2	190	836.6	0.519	-0.09
	3	251	848.6	0.481	0.02
Lap Held Antenna In	-	190	836	Noise Floor	-
Lap Held Antenna Out	5	190	836	0.400	-0.08
Secondary Portrait Antenna In	-	190	836	Noise Floor	-
Secondary Portrait Antenna Out	7	190	836	0.389	0.01
Secondary Landscape Antenna In	8	190	836	0.383	-0.17

NOTE: The measurement uncertainty of 23.1% was not added to the result.

The highest SAR level recorded was 0.641 mW/g as evaluated in a 1g cube of averaging mass. This value was obtained in Bystander 25mm Spacing Antenna Out position in GPRS mode, utilizing channel 128 (824.2 MHz).

Table: SAR MEASUREMENT RESULTS – 1900MHz GPRS

Table 35

Test Position	Plot No.	Test Channel	Test Freq (MHz)	Measured 1g SAR Results (mW/g)	Measured Drift (dB)
Bystander 25mm Spacing Antenna In	-	512	1850.2	Noise Floor	-
Bystander 25mm Spacing Antenna Out	9	512	1850.2	0.152	-0.01
Lap Held Antenna In	-	512	1850.2	Noise Floor	-
Lap Held Antenna Out	10	512	1850.2	**0.450**	0.04
	11	661	1880	0.418	-0.09
	12	810	1909.8	0.302	-0.01
Secondary Portrait Antenna In	-	512	1850.2	Noise Floor	-
Secondary Portrait Antenna Out	13	512	1850.2	0.376	0.06
Secondary Landscape Antenna In	14	512	1850.2	0.269	0.00

NOTE: The measurement uncertainty of 23.1% was not added to the result.

The highest SAR level recorded was 0.450 mW/g as evaluated in a 1g cube of averaging mass. This value was obtained in Lap Held Antenna Out position in GPRS mode, utilizing channel 512 (1850.2 MHz).

Table: SAR MEASUREMENT RESULTS – 850MHz UMTS

Table 36

Test Position	Plot No.	Test Channel	Test Freq (MHz)	Measured 1g SAR Results (mW/g)	Measured Drift (dB)
Bystander 25mm Spacing Antenna In	-	4183	836.6	Noise Floor	-
Bystander 25mm Spacing Antenna Out	15	4183	836.6	0.378	-0.09
Lap Held Antenna In	-	4183	836.6	Noise Floor	-
Lap Held Antenna Out	16	4132	826.4	0.364	0.07
Secondary Portrait Antenna In	-	4183	836.6	Noise Floor	-
Secondary Portrait Antenna Out	17	4183	836.6	0.254	-0.08
Secondary Landscape Antenna In	18	4132	826.4	**0.435**	-0.04
	19	4183	836.6	0.405	0.04
	20	4233	846.6	0.404	-0.04

NOTE: The measurement uncertainty of 23.1% was not added to the result.

The highest SAR level recorded was 0.435 mW/g as evaluated in a 1g cube of averaging mass. This value was obtained in Secondary Landscape Antenna In position in UMTS mode, utilizing channel 4132 (826.4 MHz).

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Table: SAR MEASUREMENT RESULTS – 1900MHz UMTS

Table 37

Test Position	Plot No.	Test Channel	Test Freq (MHz)	Measured 1g SAR Results (mW/g)	Measured Drift (dB)
Bystander 25mm Spacing Antenna In	-	9538	1907.6	Noise Floor	-
Bystander 25mm Spacing Antenna Out	21	9538	1907.6	0.190	-0.02
Lap Held Antenna In	-	9538	1907.6	Noise Floor	-
Lap Held Antenna Out	22	9538	1907.6	0.512	0.04
Secondary Portrait Antenna In	-	9538	1907.6	Noise Floor	-
Secondary Portrait Antenna Out	23	9538	1907.6	0.427	-0.06
Secondary Landscape Antenna In	24	9262	1852.4	0.321	-0.01
	25	9400	1880	0.369	-0.09
	26	9538	1907.6	**0.561**	0.07

NOTE: The measurement uncertainty of 23.1% was not added to the result.

The highest SAR level recorded was 0.561 mW/g as evaluated in a 1g cube of averaging mass. This value was obtained in Secondary Landscape Antenna In position in UMTS mode, utilizing channel 9538 (1907.6 MHz).

Table: SAR MEASUREMENT RESULTS – 1750MHz UMTS

Table 38

Test Position	Plot No.	Test Channel	Test Freq (MHz)	Measured 1g SAR Results (mW/g)	Measured Drift (dB)
Bystander 25mm Spacing Antenna In	-	1513	1752.6	Noise Floor	-
Bystander 25mm Spacing Antenna Out	27	1513	1752.6	0.171	-0.04
Lap Held Antenna In	-	1513	1752.6	Noise Floor	-
Lap Held Antenna Out	28	1312	1712.4	0.523	0.14
	29	1427	1735.4	**0.547**	-0.12
	30	1513	1752.6	0.547	-0.02
Secondary Portrait Antenna In	-	1513	1752.6	Noise Floor	-
Secondary Portrait Antenna Out	31	1513	1752.6	0.458	-0.09
Secondary Landscape Antenna In	32	1513	1752.6	0.227	0.05

NOTE: The measurement uncertainty of 23.1% was not added to the result.

The highest SAR level recorded was 0.547mW/g as evaluated in a 1g cube of averaging mass. This value was obtained in Lap Held Antenna Out position in UMTS mode, utilizing channel 1427 (1735.4 MHz).

Table: SAR MEASUREMENT RESULTS – 850 Ev-Do

Table 39

Test Position	Plot No.	Test Channel	Test Freq (MHz)	Measured 1g SAR Results (mW/g)	Measured Drift (dB)
Bystander 25mm Spacing Antenna In	-	0384	836.52	Noise Floor	-
Bystander 25mm Spacing Antenna Out	33	0384	836.52	0.378	-0.17
Lap Held Antenna In	-	0384	836.52	Noise Floor	-
Lap Held Antenna Out	34	0384	836.52	0.346	0.11
Secondary Portrait Antenna In	-	0384	836.52	Noise Floor	-
Secondary Portrait Antenna Out	35	0384	836.52	0.252	-0.18
Secondary Landscape Antenna In	36	1013	824.7	**0.515**	-0.01
	37	0384	836.52	0.411	0.03
	38	0777	848.31	0.336	-0.07

NOTE: The measurement uncertainty of 23.1% was not added to the result.

The highest SAR level recorded was 0.515 mW/g as evaluated in a 1g cube of averaging mass. This value was obtained in Secondary Landscape Antenna In position in Ev-Do mode, utilizing channel 1013 (824.7 MHz).

Table: SAR MEASUREMENT RESULTS – 1900 Ev-Do

Table 40

Test Position	Plot No.	Test Channel	Test Freq (MHz)	Measured 1g SAR Results (mW/g)	Measured Drift (dB)
Bystander 25mm Spacing Antenna In	-	0025	1851.25	Noise Floor	-
Bystander 25mm Spacing Antenna Out	39	0025	1851.25	0.192	-0.13
Lap Held Antenna In	-	0025	1851.25	Noise Floor	-
Lap Held Antenna Out	40	1175	1908.75	0.457	-0.01
	41	0025	1851.25	**0.541**	0.08
	42	0600	1880	0.514	-0.13
Secondary Portrait Antenna In	-	0025	1851.25	Noise Floor	-
Secondary Portrait Antenna Out	43	0025	1851.25	0.525	-0.06
Secondary Landscape Antenna In	44	0025	1851.25	0.351	0.14

NOTE: The measurement uncertainty of 23.1% was not added to the result.

The highest SAR level recorded was 0.541mW/g as evaluated in a 1g cube of averaging mass. This value was obtained in Lap Held Antenna Out position in Ev-Do mode, utilizing channel 0025 (1851.25MHz).

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12.0 COMPLIANCE STATEMENT

The Fujitsu TABLET PC, Model: T902 with SIERRA WIRELESS Mini-PCI Wireless WAN Module (GOBI3000), Model: MC8355 was found to comply with the FCC and RSS-102 SAR requirements.

The highest SAR level recorded was 0.641 mW/g for a 1g cube. This value was measured at 824.2 MHz (channel 128) in the "Bystander 25mm Spacing Antenna Out" position in GPRS transmission mode. This was below the limit of 1.6 mW/g for uncontrolled exposure, even taking into account the measurement uncertainty of 23.1 %.

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13.0 MULTIBAND EVALUATION CONSIDERATIONS

Fujitsu Tablet PC, Model: T902 can be equipped with GOBI3000 WWAN transmitter in addition to WLAN and Bluetooth.

Report numbers M120603_62205ANHMW_SAR_2.4 and M120603_62205ANHMW_SAR_5.6 relate to SAR testing of a T902 sample that includes the INTEL 62205ANHMW WLAN module.

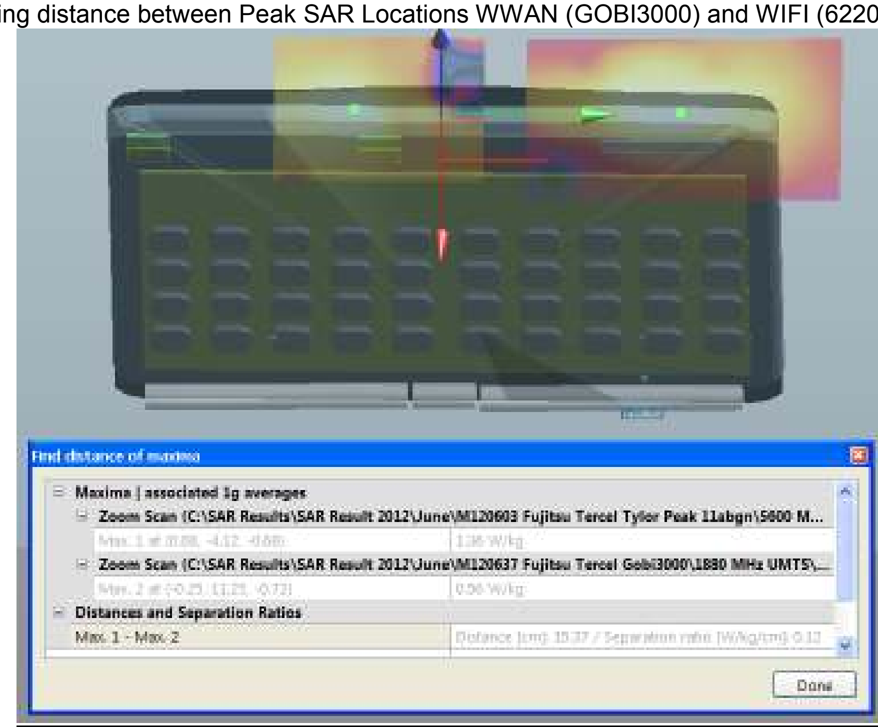
According to the FCC SAR evaluation procedures mentioned in KDB447498, when the sum of SAR results (simultaneously transmitting antennas WLAN and WWAN) is > 1.6mW/g, or the ratio of above sum to the distance between peak SAR locations > 0.3, simultaneous transmission SAR evaluation is required.

In addition, according to the FCC SAR evaluation procedures mentioned in KDB 616217 stand-alone SAR evaluation is NOT required when the maximum transmitter and antenna output power is 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 less than 5mW which is < P_{ref} (=60/2.4=25mW).

The shortest distance between the BT module and any other transmitting antenna was more than 20cm. Because 20cm > 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/CDMA WWAN (GOBI3000) and WLAN (62205ANHMW) because the ratio of the sum of highest SAR results for the WWAN and WLAN (5GHz band Antenna B) to the distance between peak SAR locations of WWAN transmitting antenna and WIFI Antenna B is – (0.561 + 1.36) mW/g / 15.37 cm = **0.12** < 0.3.

Diagram Showing distance between Peak SAR Locations WWAN (GOBI3000) and WIFI (62205ANHMW):



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