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SAR Test Report

Report No. M121125R2_FCC_MC8355_SAR_GSM-UMTS

Replacement for Report Number: M121125R_FCC_MC8355_SAR_GSM-UMTS

Test Sample:	Fujitsu Stylistic Q series Tablet PC
Radio Module Under Test:	WWAN MC8355
Host PC Model:	Q572
WWAN FCC ID:	EJE-MC8355D
WWAN IC:	337J-MC8355D
Date of Issue:	19th December 2012

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SAR TEST REPORT

Report Number: M121125R2_FCC_MC8355_SAR_GSM-UMTS
WWAN FCC ID: EJE-MC8355D IC: 337J-MC8355D

1.0 GENERAL INFORMATION

Table 1

Test Sample:	Fujitsu Stylistic Q series Tablet PC
Radio Module Under Test:	MC8355
Interface Type:	Mini-PCI Module
Device Category:	Portable Transmitter
Test Device:	Pre-Production Unit
Host PC model:	Q572
WWAN FCC ID:	EJE-MC8355D
WWAN IC:	337J-MC8355D
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 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)
4. 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.

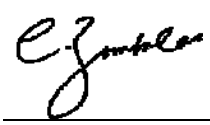
Statement Of Compliance: The Fujitsu Tablet Computer Q572 with Sierra Wireless GSM/UMTS/EVDO Module MC8355 complied with the FCC General public/uncontrolled RF exposure limits of 1.6mW/g per requirements of 47CFR2.1093(d). It also complied with IC RSS-102 requirements.

Test Dates: 4th November to 10th November 2012

Test Officer:

Peter Jakubiec

Authorised Signature:



Chris Zombolas
Technical Director

SAR TEST REPORT
Portable Tablet Computer
Model: Q572
Report Number: M121125R2_FCC_MC8355_SAR_GSM-UMTS

2.0 INTRODUCTION

Testing was performed on the Fujitsu Tablet PC, Model: Q572 with SIERRA Mini-PCI Wireless WAN Module (Gobi 3000), Model: MC8355, with Ralink USB Wireless LAN Module (802.11a/b/g/n), and Broadcom Bluetooth Module, Model: BCM92070MD_REF6. Bluetooth Transmitter nominal power is less than 5mW. The Gobi 3000 module is an OEM product. The Mini-PCI Wireless WAN (WWAN) was tested in the dedicated host – STYLISTIC Q series, Model Q572. The system tested will be referred to as the DUT throughout this report.

2.1 Product Features

a. G- Sensor is implemented to enable power reduction based upon tilting angle of slate PC and viewing positions.

b. Overall dimension of slate PC: 273.5 mm x 176mm (with 10.1 inches LCD size)

c. Does not support Hot spot / Tethering functionality.

d. WWAN Module : Sierra Gobi3000, Original FCC ID: N7NMC8355 submitted as Fujitsu FCC ID: EJE-MC8355D

i. Part 22/24 (No LTE)

1. Frequency band: Cellular/PCS and AWS band
2. GSM/GPRS / EDGE / UMTS/HSPA+

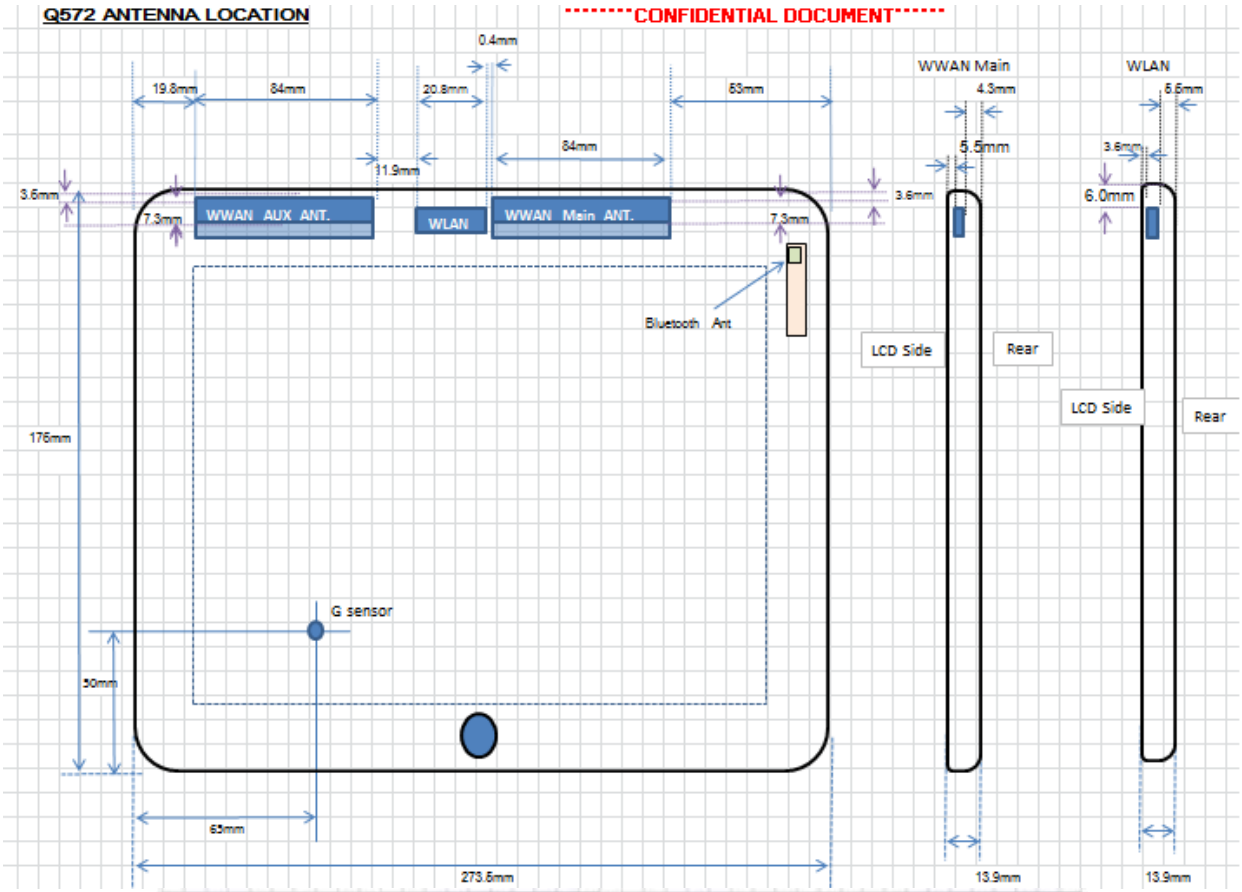
a) GPRS/EDGE Class 10
b) HSDPA Rel 7 / Cat 10
c) HSUPA Rel 6 Cat 6

3. CDMA 2000: a)1x b) EVDO Release 0 and A

e. WLAN Module 802.11 a/b/g/n (1x1) : FCC ID: EJE-WL0025 - The WWAN and WLAN modules will not be able to transmit simultaneously with maximum hand-off duration less than 30 seconds hence simultaneous SAR evaluation is not applied.

f. Bluetooth Module : FCC ID: QDS-BRCM1043 Bluetooth 4.0 + Low power Energy (max 4dBm)

2.2 Antenna Location and Separation Distance



2.3 TEST PLAN

a. RF conducted output power measurement – Max. Power and With Power back-off (power reduced) comparison

Original FCC ID (Qualcomm)	J9CGOBI3000
FCC ID established via section 2.933 procedure (Sierra)	N7NMC8355
FCC ID established via section 2.933 procedure as required for Sensor based tablet PC (Fujitsu)	EJE-MC8355D
This application: Class II Permissive change (Fujitsu)	EJE-MC8355D

b. WiFi Portion

No Power reduction for WiFi. Full power

2.4 Referenced KDBs

The tests will be performed in accordance with FCC OET Bulletin 65 Supplement C 01-01, IEEE STD 1528-2003, and the following KDB procedures. (pre-25th Oct 2012 released KDBs)

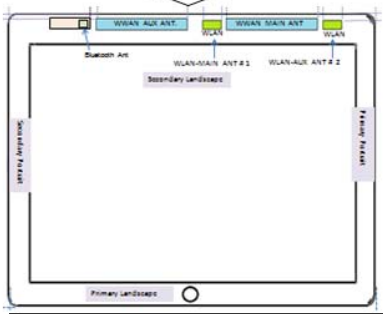
- 941225 D01 SAR test for 3G devices v02
- 941225 D03 SAR Test Reduction GSM/GPRS/EDGE vo1
- 447498 D01 Mobile Portable RF Exposure v04
- Power Reduction by sensing (April 2011, Oct 2011 and April 2012 TCBC workshop SAR Updates)

2.5 SAR Test Configurations

c. Slate Tablet Mode (direct contact to flat phantom with 0 mm separation distance)

EDGE # 1 (Disabled/Tx Off)

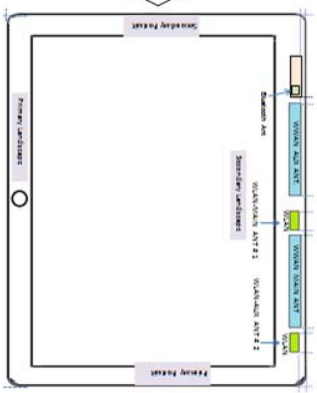
PROBE



WWAN transmitter will be disabled in this Orientation / RF Tx OFF. Edge.
SAR Test NOT performed

EDGE # 4

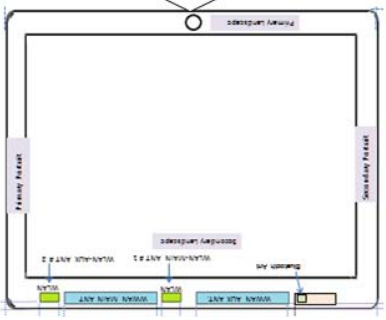
PROBE



Ant to User Distance = 137 mm
SAR Test NOT performed

EDGE # 3

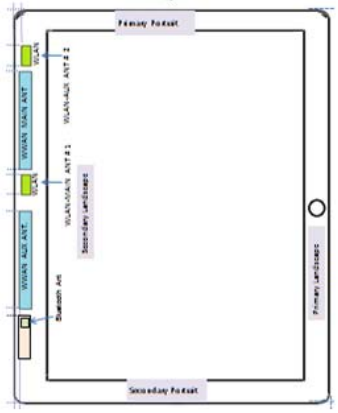
PROBE



Ant to User Distance = 168 mm
SAR Test NOT performed

EDGE # 2

PROBE

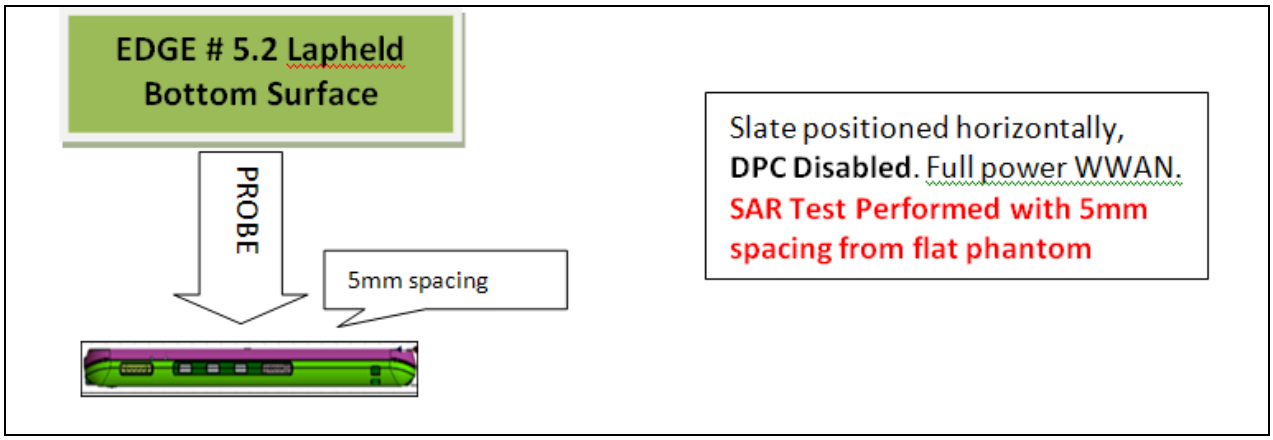


Ant to User Distance = 53 mm
Slate positioned vertically to phantom with Edge 2 in direct contact with phantom 0mm spacing. DPC Disabled, Full power WWAN.
Worst case SAR verified

EDGE # 5.1 Lapheld Bottom Surface

PROBE

Slate positioned horizontally, **DPC Enabled** for Power Reduction in WWAN.
SAR Test Performed at 0mm spacing from flat phantom



2.6 Summary of Test Configurations

Configuration	WWAN Ant-to-User distance	SAR Require	Comments
(1) Edge 1 Secondary Landscape	3.6 mm	No	WWAN transmitter will be disabled in this Orientation / RF OFF hence non-functional. See section 5 for setup illustration.
(2) Edge 4 Secondary Portrait	137 mm	No	SAR evaluation will not be performed for this configuration as this is not the most conservative edge. Testing as per KDB 447498 4) b) ii) (2). See section 5 for edge illustration.
(3) Edge 3 Primary Landscape	168 mm	No	SAR evaluation will not be performed for this configuration as this is not the most conservative edge. Testing as per KDB 447498 4) b) ii) (2) See section 5 for edge illustration.
(4) Edge 2 Primary Portrait	53 mm	Yes	Worst case SAR evaluation performed with the EUT edge in direct contact with phantom flat section.). See Section 5 for setup illustration.
(5) Edge 5.1 Lapheld Base (Back Surface)	4.3 mm	Yes	SAR evaluation will be performed with the EUT surface in direct contact with phantom flat section. Tested with Power reduction, DPC mode Enabled. (0 mm separation). See section 5 for setup illustration.
(6) Edge 5.2 Lapheld Base (Back/Bottom Surface)	4.3 mm + 5mm spacing	Yes	SAR evaluation will be performed with the EUT surface parallel to phantom with 5mm. Tested with Full Power, DPC mode Disabled. (5 mm separation). See section 5 for setup illustration.

3.0 TEST SAMPLE TECHNICAL INFORMATION

(Information supplied by the client)

3.1 WWAN Details

Table 2

Transmitter:	WWAN (UMTS/EVDO combo)
Model Number:	Gobi3000
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
CDMA bands:	850 / 1900 MHz
Channel spacing:	200Khz(GSM), 5MHz(WCDMA)
Channel raster:	200kHz
Antenna type:	Main: Monopole, AUX: PIFA
Antenna Manufacturer:	NISSEI ELECTRIC CO. LTD.

Test Signal, Frequency and Output Power

The DUT was provided by Fujitsu Australia Pty Ltd. It was put into operation using a Rohde & 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, class 3 for 850, 1750 MHz and 1900 MHz UMTS bands, Power Class 3 for the 850 MHz (BC0) and Power Class 2 1900 MHz (BC1) CDMA 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	32.6 +/-1 dB
Channels 512, 661 and 810	1850.2, 1880 and1909.8	28.5 +/- 0.5 dB
UMTS Mode		
Channels 4132, 4183 and 4233	826.4, 836.6 and 846.6	23.5 +/- 0.5 dB
Channels 9262, 9400 and 9538	1852.4, 1880 and 1907.6	23 +/- 0.5 dB
Channels 1312, 1427 and 1513	1712.4, 1735.4 and 1752.6	22.5+/- 0.5 dB
CDMA Mode		
Channels 1013, 384 and 777	824.7, 836.52 and 848.31	24 +/- 1 dB
Channels 25, 600 and 1175	1851.25, 1880 and 1908.75	23+/- 0.5 dB

3.3 DUT (Notebook PC) Details

The intention of this application is to certify WWAN module FCC ID: EJE-MC8355D and IC: 337J-MC8355D in a Fujitsu host PC model Q572 with WLAN model Ralink WLU5110-D50(ROHS) AND Bluetooth model BCM92070MD_REF6.

SAR testing was conducted on the sample that is also equipped with the Bluetooth transmitter with antenna and Ralink 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 on page 5 of the report

Table 4

Host notebook :	STYLISTIC Q series
Model Name:	Q572
Serial Number:	Pre-production Sample
Manufacturer:	FUJITSU LIMITED
CPU Type and Speed:	AMD Z-60 APU 1.0GHz
LCD	10.1”WXGA(1280x800 : LP101WH4-SLP1
Graphics chip	Non
Wired LAN:	Non
Modem:	Non
Port Replicator Model:	FPCPR202
AC Adapter Model:	60W: PXW1931N(Tamura)
Voltage:	19 V
Current Specs:	3.16A
Watts:	60W

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	Li-ion
V/mAh	7.4V/5000mAh

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 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 DUT during the SAR measurements.
At the beginning of the SAR tests, the conducted power of the DUT was measured after temporary modification of antenna connector inside the DUT'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.

Gobi3000 - IMEI – 355096040071499 0dB Power Reduction

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)

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	24.94	24.92	24.83
1	N/A	SO 55	N/A	N/A	24.93	24.87	24.82
2	N/A	SO 9	N/A	N/A	24.90	24.88	24.80
2	N/A	SO 55	N/A	N/A	24.91	24.86	24.83
N/A	3	N/A	SO 32	OFF	24.89	24.89	24.79
N/A	3	N/A	SO 32	ON	24.91	24.90	24.84

*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	23.40	23.12	23.16
1	N/A	SO 55	N/A	N/A	23.11	23.13	23.20
2	N/A	SO 9	N/A	N/A	23.39	23.09	23.15
2	N/A	SO 55	N/A	N/A	23.38	23.14	23.18
N/A	3	N/A	SO 32	OFF	23.37	23.11	23.17
N/A	3	N/A	SO 32	ON	23.38	23.10	23.18

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)

Cellular Band

Release 0 Subtype	Open Loop Adjust (BC0)	Result (dBm)		
		Ch. 1013	Ch. 384	Ch.777
0	-81 dB	25.21	25.19	25.11

PCS Band

Release 0 Subtype	Open Loop Adjust (BC0)	Result (dBm)		
		Ch. 25	Ch. 600	Ch.1175
0	-84 dB	23.66	23.41	23.55

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);

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	24.95	24.90	24.82

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	23.36	23.14	23.29

*DUT has no Subtype 0 capabilities

Table: Frequency and Conducted Power Results GSM

Table 6

Coding Scheme	GPRS Multislot Class	Number of Uplink Time-Slots	RF Channel	Measured Power Burst Average (dBm)	Calculated Power Frame Average (100% Duty Cycle) (dBm)
CS1	8	1	128	33.31	24.12
CS1	8	1	190	33.35	24.16
CS1	8	1	251	33.20	24.01
CS1	10	2	128	33.37	27.19
CS1	10	2	190	33.38	27.20
CS1	10	2	251	33.21	27.03
CS1	11	3	128	N/A*	N/A*
CS1	11	3	190	N/A*	N/A*
CS1	11	3	251	N/A*	N/A*
CS1	12	4	128	N/A*	N/A*
CS1	12	4	190	N/A*	N/A*
CS1	12	4	251	N/A*	N/A*

Table 7

Coding Scheme	GPRS Multislot Class	Number of Uplink Time-Slots	RF Channel	Measured Power Burst Average (dBm)	Calculated Power Frame Average (100% Duty Cycle) (dBm)
MCS5	8	1	128	27.47	18.28
MCS5	8	1	190	27.52	18.33
MCS5	8	1	251	27.57	18.38
MCS5	10	2	128	27.83	21.65
MCS5	10	2	190	27.81	21.63
MCS5	10	2	251	27.66	21.48
MCS5	11	3	128	N/A*	N/A*
MCS5	11	3	190	N/A*	N/A*
MCS5	11	3	251	N/A*	N/A*
MCS5	12	4	128	N/A*	N/A*
MCS5	12	4	190	N/A*	N/A*
MCS5	12	4	251	N/A*	N/A*

Table 8

Coding Scheme	GPRS Multislot Class	Number of Uplink Time-Slots	RF Channel	Measured Power Burst Average (dBm)	Calculated Power Frame Average (100% Duty Cycle) (dBm)
CS1	8	1	512	28.51	19.32
CS1	8	1	661	28.43	19.24
CS1	8	1	810	28.16	18.97
CS1	10	2	512	28.53	22.35
CS1	10	2	661	28.44	22.26
CS1	10	2	810	28.24	22.06
CS1	11	3	512	N/A*	N/A*
CS1	11	3	661	N/A*	N/A*
CS1	11	3	810	N/A*	N/A*
CS1	12	4	512	N/A*	N/A*
CS1	12	4	661	N/A*	N/A*
CS1	12	4	810	N/A*	N/A*

Table 9

Coding Scheme	GPRS Multislot Class	Number of Uplink Time-Slots	RF Channel	Measured Power Burst Average (dBm)	Calculated Power Frame Average (100% Duty Cycle) (dBm)
MCS5	8	1	512	24.53	15.34
MCS5	8	1	661	24.75	15.56
MCS5	8	1	810	24.45	15.26
MCS5	10	2	512	24.57	18.39
MCS5	10	2	661	24.80	18.62
MCS5	10	2	810	24.47	18.29
MCS5	11	3	512	N/A*	N/A*
MCS5	11	3	661	N/A*	N/A*
MCS5	11	3	810	N/A*	N/A*
MCS5	12	4	512	N/A*	N/A*
MCS5	12	4	661	N/A*	N/A*
MCS5	12	4	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

Channel No.	βc	βd	Result (dBm)
4132	8	15	24.98
4183	8	15	24.97
4233	8	15	24.84

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

Sub Test No.	βc	βd	ΔAKN	ΔNAKN	ΔCQI	Result (dBm)			MPR (dB)
						4132	4183	4233	
1	2	15	8	8	8	24.46	24.47	24.45	0.0
2	12	15	8	8	8	24.17	24.13	24.12	0.0
3	15	8	8	8	8	24.00	23.98	23.95	0.5
4	15	4	8	8	8	23.98	23.94	23.95	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 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
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

Sub Test	βc	βd	Δ AKN	Δ NAKN	Δ CQI	Δ 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	23.57	23.67	23.69	0.0
2	6	15	8	8	8	8	4	1	12	22.01	22.12	22.01	2.0
3	15	9	8	8	8	8	4	2	15	22.59	22.89	23.01	1.0
4	2	15	8	8	8	5	4	1	17	22.06	22.15	22.07	2.0
5	15	15	8	8	8	7	4	1	21	24.36	23.59	23.53	0.0

Conducted Power Measurement UMTS 1700 MHz

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

Channel No.	βc	βd	Result (dBm)
1312	8	15	23.15
1427	8	15	23.37
1513	8	15	23.25

Conducted Power Measurement UMTS + HSDPA 1700 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 Δ_{AKN} = 5; Δ_{NAKN} = 5; Δ_{CQI} = 2

Sub Test No.	βc	βd	ΔAKN	ΔNAKN	ΔCQI	Result (dBm)			MPR (dB)
						1312	1427	1513	
1	2	15	8	8	8	22.71	22.87	22.75	0.0
2	12	15	8	8	8	22.31	22.46	22.41	0.0
3	15	8	8	8	8	22.24	22.36	22.30	0.5
4	15	4	8	8	8	22.26	22.41	22.39	0.5

Conducted Power Measurement UMTS + HSDPA + HSUPA 1700 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 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
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

Sub Test	βc	βd	Δ AKN	Δ NAKN	Δ CQI	Δ E-DPCCH	βed (SF)	βed (codes)	AG Index	Result (dBm)			MPR (dB)
										1312	1427	1513	
1	10	15	8	8	8	6	4	1	20	22.25	22.45	22.73	0.0
2	6	15	8	8	8	8	4	1	12	20.52	20.62	20.67	2.0
3	15	9	8	8	8	8	4	2	15	21.51	21.44	21.75	1.0
4	2	15	8	8	8	5	4	1	17	20.86	20.76	20.85	2.0
5	15	15	8	8	8	7	4	1	21	22.28	22.34	22.33	0.0

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

Channel No.	βc	βd	Result (dBm)
9262	8	15	23.48
9400	8	15	23.59
9538	8	15	23.58

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 Δ_{AKN} = 5; Δ_{NAKN} = 5; Δ_{CQI} = 2

Sub Test No.	βc	βd	ΔAKN	ΔNAKN	ΔCQI	Result (dBm)			MPR (dB)
						9262	9400	9538	
1	2	15	8	8	8	23.01	23.14	23.11	0.0
2	12	15	8	8	8	22.67	22.78	22.74	0.0
3	15	8	8	8	8	22.50	22.67	22.69	0.5
4	15	4	8	8	8	22.53	22.66	22.64	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 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
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

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	22.32	22.81	22.71	0.0
2	6	15	8	8	8	8	4	1	12	20.56	20.94	20.94	2.0
3	15	9	8	8	8	8	4	2	15	21.61	21.75	21.88	1.0
4	2	15	8	8	8	5	4	1	17	20.80	21.18	21.09	2.0
5	15	15	8	8	8	7	4	1	21	22.10	22.67	22.33	0.0

Gobi3000 -5 dB Power reduction - IMEI – 355096040071499

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)

Cellular Band

Release 0 Subtype	Open Loop Adjust (BC0)	Result (dBm)		
		Ch. 1013	Ch. 384	Ch.777
0	-81 dB	19.87	19.82	19.81

PCS Band

Release 0 Subtype	Open Loop Adjust (BC0)	Result (dBm)		
		Ch. 25	Ch. 600	Ch.1175
0	-84 dB	18.34	18.31	18.35

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

Channel No.	βc	βd	Result (dBm)
4132	8	15	20.39
4183	8	15	20.38
4233	8	15	20.21

Conducted Power Measurement UMTS 1700 MHz

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

Channel No.	βc	βd	Result (dBm)
1312	8	15	18.40
1427	8	15	18.63
1513	8	15	18.54

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 1sTable 10

Channel No.	βc	βd	Result (dBm)
9262	8	15	18.49
9400	8	15	18.85
9538	8	15	18.82

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

Telephone: +61 3 9365 1000
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 11

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 41% to 51%. 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 SN3563 probe was less than 5μV in both air and liquid mediums.

6.0 DESCRIPTION OF SAR MEASUREMENT SYSTEM

Table 12

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

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 EX3DV4 Serial: 3563. 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 13

1. Validation Date & Frequency	2. $\in$r (measured)	3. σ (mho/m) (measured)	4. Measured SAR 1g (mW/g)	5. Measured SAR 10g (mW/g)
4th Dec. 2012 1950 MHz	51.0	1.60	10.6	5.33
5th Dec. 2012 1950 MHz	53.0	1.59	10.3	5.22
6th Dec. 2012 1800 MHz	51.0	1.54	10.5	5.48
7th Dec. 2012 900 MHz	52.5	1.04	2.82	1.84
10th Dec. 2012 900 MHz	53.5	1.06	2.94	1.91

6.3.2 Deviation from reference validation values

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.

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

Table 14

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 (%)
7th Dec. 2012 900 MHz	2.82	11.28	11.1	1.62
10th Dec. 2012 900 MHz	2.94	11.76	11.1	5.95
6th Dec. 2012 1800 MHz	10.5	42.00	38.7	8.53
4th Dec. 2012 1950 MHz	10.6	42.40	38.8	9.28
5th Dec. 2012 1950 MHz	10.3	41.20	38.8	6.19

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.

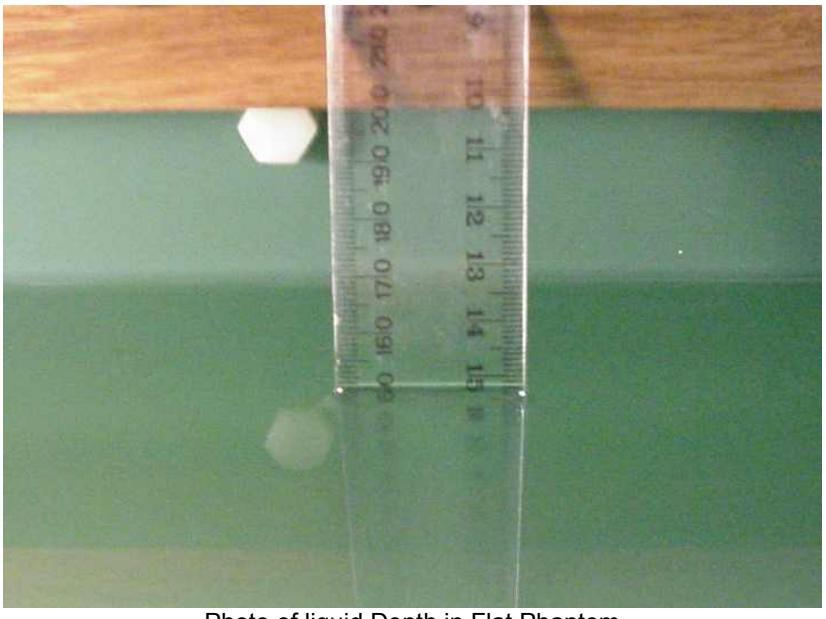


Photo of liquid Depth in Flat Phantom

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 for Validations

Table 15

Frequency Band	$\in$r (measured range)	$\in$r (target)	σ (mho/m) (measured range)	σ (target)	ρ kg/m^3
900 MHz Body	52.5 – 53.5	55.0 ±5% (52.3 to 57.8)	1.04 – 1.06	1.05 ±5% (1.00 to 1.10)	1000
1800 MHz Body	51.0	53.3 ±5% (50.6 to 56.0)	1.54	1.52 ±5% (1.44 to 1.60)	1000
1950 MHz Body	51.0 – 53.0	53.3 ±5% (50.6 to 56.0)	1.59 – 1.60	1.52 ±5% (1.44 to 1.60)	1000

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

Table: Measured Body Simulating Liquid Dielectric Values at 850MHz

Table 16

Frequency Band	$\in$r (measured range)	$\in$r (target)	σ (mho/m) (measured range)	σ (target)	ρ kg/m^3
825 MHz Body	53.2 – 54.2	55.2 ±5% (52.4 to 58.0)	0.96 – 0.98	0.97 ±5% (0.92 to 1.02)	1000
835 MHz Body	53.2 – 54.1	55.2 ±5% (52.4 to 58.0)	0.97 – 0.99	0.97 ±5% (0.92 to 1.02)	1000
850 MHz Body	53.1 – 53.9	55.2 ±5% (52.4 to 58.0)	0.99 – 1.01	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 1880MHz

Table 17

Frequency Band	∈r (measured range)	∈r (target)	σ (mho/m) (measured range)	σ (target)	ρ kg/m^3
1850 MHz Body	51.4 – 53.4	53.3 ±5% (50.6 to 56.0)	1.55 – 1.56	1.52 ±5% (1.44 to 1.60)	1000
1880.0 MHz Body	51.3 – 53.3	53.3 ±5% (50.6 to 56.0)	1.56 – 1.57	1.52 ±5% (1.44 to 1.60)	1000
1910 MHz Body	51.1 – 53.2	53.3 ±5% (50.6 to 56.0)	1.58 – 1.59	1.52 ±5% (1.44 to 1.60)	1000

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

Table: Measured Body Simulating Liquid Dielectric Values at 1735MHz

Table 18

Frequency Band	∈r (measured range)	∈r (target)	σ (mho/m) (measured range)	σ (target)	ρ kg/m^3
1712 MHz Body	51.3	53.3 ±5% (50.6 to 56.0)	1.48	1.52 ±5% (1.44 to 1.60)	1000
1735 MHz Body	51.3	53.3 ±5% (50.6 to 56.0)	1.50	1.52 ±5% (1.44 to 1.60)	1000
1750 MHz Body	51.2	53.3 ±5% (50.6 to 56.0)	1.51	1.52 ±5% (1.44 to 1.60)	1000

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

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 19

Date	Ambient Temperature (°C)	Liquid Temperature (°C)	Humidity (%)
4th Dec. 2012	21.4	21.0	51.0
5th Dec. 2012	20.9	20.5	46.0
6th Dec. 2012	21.2	20.9	41.0
7th Dec. 2012	21.4	20.1	45.0
10th Dec. 2012	20.8	20.4	46.0

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.

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

Table 20

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"

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 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 90 mm x 150 mm 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 1.0 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 4.0 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 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 21: 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	4.28	R	1.73	1	1	2.47	2.47	∞
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)						11.6	11.4	
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k= 2			23.1	22.8	

Estimated total measurement uncertainty for the DASY5 measurement system was ±11.6%. 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 22: 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.

9 EQUIPMENT LIST AND CALIBRATION DETAILS

Table 23: 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	30-Aug-2013	✓
RF Power Sensor 0.01 - 18 GHz	Hewlett Packard	8481H	1545A01634	03-Sept-2013	✓
RF Power Meter	Rohde & Schwarz	NRP	101415	17-Sept-2013	
RF Power Sensor	Rohde & Schwarz	NRP - Z81	100174	17-Sept-2013	
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-2013	
Network Analyser	Hewlett Packard	8753ES	JP39240130	5-Nov-2013	✓
Dual Directional Coupler	Hewlett Packard	778D	1144 04700	*In test	
Dual Directional Coupler	NARDA	3022	75453	*In test	✓
Radio Communication Test Set	Rohde & Schwarz	CMU200	101573	Not Applicable	✓
Radio Communication Test Set	Anritsu	MT8820A	6200240559	Not Applicable	
Radio Communication Test Set	Agilent	PXT E6621A	MY51100168	Not Applicable	

* Calibrated during the test for the relevant parameters.

10 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 tablet can be operated in. The "STYLISTIC Q SERIES" PC can be used on the lap (see Appendix A) or hand held as a Tablet PC.

10.1 "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.

10.2 "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.*

10.3 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 and KDB 941225 are applied for SAR measurements of the host system. Due to the screen size <12 inches, KDB 616217 was not used in the SAR evaluation instead "Supplement to the KDB 616217" was followed.

Table: Testing configurations

Table 24

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	
	Ev-Do 850 MHz		x	
	Ev-Do 1900 MHz		x	
	WCDMA 850 MHz		x	
	WCDMA 1735 MHz		x	
	WCDMA 1900 MHz		x	
Edge On	GPRS 850 MHz		x	
	GPRS 1900 MHz		x	
	Ev-Do 850 MHz		x	
	Ev-Do 1900 MHz		x	
	WCDMA 850 MHz		x	
	WCDMA 1735 MHz		x	
	WCDMA 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 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. Table below displays the SAR results.

Table: SAR MEASUREMENT RESULTS – 850MHz GPRS

Table 25

Test Position	Plot No.	Test Channel	Test Freq (MHz)	Number of Time Slots	Measured Burst avr. power (dBm)	Measured 1g SAR Results (mW/g)	Measured Drift (dB)
Lap Held 0mm Spacing DPC ON	1	128	824	2	28.92	0.685	0.01
	2	190	836	2	28.69	0.726	-0.03
	3	251	849	2	28.69	0.826	-0.06
Lap Held 5mm Spacing DPC OFF	4	128	824	2	33.37	1.03	-0.01
	5	190	836	2	33.38	1.18	0.00
	6	251	849	2	33.21	1.33	-0.01
Edge # 2 - Primary Portrait	7	128	824	2	33.37	0.093	0.03
	8	190	836	2	33.38	0.087	-0.04
	9	251	849	2	33.21	0.099	-0.10

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

The highest SAR level recorded was 1.33 mW/g as evaluated in a 1g cube of averaging mass. This value was obtained in Lap Held 5mm Spacing position with DPC OFF in GPRS mode, utilizing channel 251 (849 MHz).

Table: SAR MEASUREMENT RESULTS – 1900MHz GPRS

Table 26

Test Position	Plot No.	Test Channel	Test Freq (MHz)	Number of Time Slots	Measured Burst avr. power (dBm)	Measured 1g SAR Results (mW/g)	Measured Drift (dB)
Lap Held 0mm Spacing DPC ON	10	512	1850.2	2	23.54	0.946	-0.06
	11	661	1880	2	23.82	1.36	-0.11
	12	810	1909.8	2	23.38	1.53	0.03
Lap Held 5mm Spacing DPC OFF	13	512	1850.2	2	28.53	1.21	-0.03
	14	661	1880	2	28.44	1.50	0.05
	15	810	1909.8	2	28.24	1.54	0.05
Edge # 2 - Primary Portrait	16	512	1850.2	2	28.53	0.359	0.07
	17	661	1880	2	28.44	0.421	-0.01
	18	810	1909.8	2	28.24	0.431	0.09

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

The highest SAR level recorded was 1.54 mW/g as evaluated in a 1g cube of averaging mass. This value was obtained in Lap Held 5mm Spacing position with DPC OFF in GPRS mode, utilizing channel 810 (1909.8 MHz).

Table: SAR MEASUREMENT RESULTS – 850MHz UMTS

Table 27

Test Position	Plot No.	Test Channel	Test Freq (MHz)	Measured average power (dBm)	Measured 1g SAR Results (mW/g)	Measured Drift (dB)
Lap Held 0mm Spacing DPC ON	19	4132	826.4	20.39	0.373*	0.02
	20	4183	836.6	20.38	0.436	-0.07
	21	4233	846.6	20.21	0.482	-0.07
Lap Held 5mm Spacing DPC OFF	22	4132	826.4	24.98	0.543*	0.07
	23	4183	836.6	24.97	0.602	0.05
	24	4233	846.6	24.84	0.673	0.03
Edge # 2 - Primary Portrait	25	4132	826.4	24.98	0.018*	0.13
	26	4183	836.6	24.97	0.016	-0.19
	27	4233	846.6	24.84	0.019	0.16

(*): SAR compensated with respect to +5% tolerance in $\in$r and -5% tolerance in σ
NOTE: The measurement uncertainty of 23.1% was not added to the result.

The highest SAR level recorded was 0.673 mW/g as evaluated in a 1g cube of averaging mass. This value was obtained in Lap Held 5mm Spacing position with DPC OFF in UMTS mode, utilizing channel 4233 (846.6 MHz).

Table: SAR MEASUREMENT RESULTS – 1735MHz UMTS

Table 28

Test Position	Plot No.	Test Channel	Test Freq (MHz)	Measured average power (dBm)	Measured 1g SAR Results (mW/g)	Measured Drift (dB)
Lap Held 0mm Spacing DPC ON	28	1312	1712.4	18.40	1.13*	-0.09
	29	1427	1735.4	18.63	1.23*	-0.07
	30	1513	1752.6	18.54	1.25*	0.07
Lap Held 5mm Spacing DPC OFF	31	1312	1712.4	23.15	1.36*	-0.07
	32	1427	1735.4	23.37	1.47*	-0.07
	33	1513	1752.6	23.25	1.45*	-0.07
Edge # 2 - Primary Portrait	34	1312	1712.4	23.15	0.280*	-0.13
	35	1427	1735.4	23.37	0.335*	-0.08
	36	1513	1752.6	23.25	0.371*	-0.05

(*): SAR compensated with respect to +5% tolerance in $\in$r and -5% tolerance in σ
NOTE: The measurement uncertainty of 23.1% was not added to the result.

The highest SAR level recorded was 1.47 mW/g as evaluated in a 1g cube of averaging mass. This value was obtained in Lap Held 5mm Spacing position with DPC OFF in UMTS mode, utilizing channel 1427 (1735.4 MHz).

Table: SAR MEASUREMENT RESULTS – 1900MHz UMTS

Table 29

Test Position	Plot No.	Test Channel	Test Freq (MHz)	Measured average power (dBm)	Measured 1g SAR Results (mW/g)	Measured Drift (dB)
Lap Held 0mm Spacing DPC ON	37	9262	1852.4	18.49	1.34	-0.15
	38	9400	1880	18.85	1.32	0.04
	39	9538	1907.6	18.82	1.50	0.06
Lap Held 5mm Spacing DPC OFF	40	9262	1852.4	23.48	1.34	0.03
	41	9400	1880	23.59	1.34	0.10
	42	9538	1907.6	23.58	1.51	-0.03
Edge # 2 - Primary Portrait	43	9262	1852.4	23.48	0.403	0.12
	44	9400	1880	23.59	0.435	0.03
	45	9538	1907.6	23.58	0.597	-0.01

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

The highest SAR level recorded was 1.51 mW/g as evaluated in a 1g cube of averaging mass. This value was obtained in Lap Held 5mm Spacing position with DPC OFF in UMTS mode, utilizing channel 9538 (1907.6 MHz).

Table: SAR MEASUREMENT RESULTS – 850MHz Ev-Do Rev.0

Table 30

Test Position	Plot No.	Test Channel	Test Freq (MHz)	Measured average power (dBm)	Measured 1g SAR Results (mW/g)	Measured Drift (dB)
Lap Held 0mm Spacing DPC ON	46	1013	824.7	19.87	0.391	0.02
	47	0384	836.52	19.82	0.476	-0.05
	48	0777	848.31	19.81	0.521	-0.02
Lap Held 5mm Spacing DPC OFF	49	1013	824.7	25.21	0.540	-0.15
	50	0384	836.52	25.19	0.613	-0.05
	51	0777	848.31	25.11	0.757	0.01
Edge # 2 - Primary Portrait	52	1013	824.7	25.21	0.042	0.17
	53	0384	836.52	25.19	0.040	-0.17
	54	0777	848.31	25.11	0.048	-0.14

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

The highest SAR level recorded was 0.757 mW/g as evaluated in a 1g cube of averaging mass. This value was obtained in Lap Held 5mm Spacing position with DPC OFF in Ev-Do mode, utilizing channel 0777 (848.31 MHz).

Table: SAR MEASUREMENT RESULTS – 1900MHz Ev-Do Rev.0

Table 31

Test Position	Plot No.	Test Channel	Test Freq (MHz)	Measured average power (dBm)	Measured 1g SAR Results (mW/g)	Measured Drift (dB)
Lap Held 0mm Spacing DPC ON	55	0025	1851.25	18.34	0.806	-0.03
	56	0600	1880	18.31	0.893	-0.03
	57	1175	1908.75	18.35	0.708	-0.16
Lap Held 5mm Spacing DPC OFF	58	0025	1851.25	23.66	1.01	-0.07
	59	0600	1880	23.41	1.14	-0.11
	60	1175	1908.75	23.55	0.930	0.00
Edge # 2 - Primary Portrait	61	0025	1851.25	23.66	0.069	0.06
	62	0600	1880	23.41	0.083	-0.18
	63	1175	1908.75	23.55	0.076	0.11

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

The highest SAR level recorded was 1.14 mW/g as evaluated in a 1g cube of averaging mass. This value was obtained in Lap Held 5mm Spacing position with DPC OFF in Ev-Do mode, utilizing channel 600 (1880 MHz).

12 COMPLIANCE STATEMENT

The Fujitsu Tablet PC, Model: Q572 with SIERRA WIRELESS Mini-PCI Wireless WAN Module (Gobi 3000), Model MC8355 was found to comply with the FCC and RSS-102 SAR requirements.

The highest SAR level recorded was 1.54 mW/g for a 1g cube. This value was measured at 1909.8 MHz (channel 810) in the Lap Held 5mm Spacing position with DPC OFF in GPRS 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 MULTIBAND EVALUATION CONSIDERATIONS

No simultaneous transmission of WWAN and WLAN is possible for the Fujitsu Tablet PC, Model: Q572.