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SAR Test Report

Report Number: M131103_FCC_7260HMW AN_SAR_2.4

Test Sample: Convertible Tablet Computer
Radio Modules: T904
Host PC Model Number: WLAN INTEL CENTRINO
ADVANCED-N 7260HMW AN

PC System FCC ID: EJE-WB0088
PC System IC: 337J-WB0088
Date of Issue: 19th November 2013

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SAR TEST REPORT**Report Number: M131103_FCC_7260HMW AN_SAR_2.4****PC System FCC ID:** EJE-WB0088**PC System IC:** 337J-WB0088**1.0 GENERAL INFORMATION**

Table 1

Test Sample:	Portable Convertible Tablet Computer
Model Name:	T904
Radio Modules:	WLAN 7260HMW AN
Interface Type:	Half Mini-PCI Module
Device Category:	Portable Transmitter
Test Device:	Pre-Production Unit
PC System FCC ID:	EJE-WB0088
PC System IC:	337J-WB0088
RF exposure Category:	General Population/Uncontrolled
Manufacturer:	Fujitsu Limited
Test Standard/s:	<ol style="list-style-type: none"> 1. KDB 248227 D01 SAR meas for 802 11 a b g v01r02 2. KDB 447498 D01 General RF Exposure Guidance v05r01 3. KDB 616217 D04 SAR for laptop and tablets v01r01 4. KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r01 5. KDB 865664 D02 RF Exposure Reporting v01r01 6. Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands), RSS-102
Statement Of Compliance:	The Fujitsu Convertible Tablet Computer Model T904 with Wireless LAN and Bluetooth complied with the FCC general public/uncontrolled RF exposure limits of 1.6mW/g per requirements of 47CFR2.1093(d).
Highest Reported SAR:	2450 MHz WLAN Band : 0.355 mW/g
Test Dates:	18 th Nov 2013

Test Officer:


Peter Jakubiec

Authorised Signature:


Chris Zombolas
Technical Director


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SAR TEST REPORT
Portable Convertible Tablet Computer
Model: T904
Report Number: M131103_FCC_7260HMW AN _SAR_2.4

2.0 INTRODUCTION

Testing was performed on the Fujitsu Convertible Tablet PC Model T904 with INTEL Half Mini-PCI Wireless LAN and Bluetooth Combo Module. (INTEL CENTRINO ADVANCED-N 802.11a/b/g/n), Model 7260HMW AN) The INTEL CENTRINO ADVANCED-N module is an OEM product. The Half Mini-PCI Wireless LAN (WLAN) was tested in the dedicated host – Portable Convertible Tablet Computer, Model T904. The system tested will be referred to as the DUT throughout this report.

The Wireless LAN Module incorporates Bluetooth Transmitter, which can only transmit via Antenna B (2), the Bluetooth maximum power was 6dBm (including tune-up) therefore it did not require SAR testing as a stand-alone transmitter. This is in accordance with KDB 447498 section 4.3.1 exemption formula:

$$[(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0 \text{ for 1-g SAR Result - } [(3.98)/(5.3\text{mm})] \cdot [\sqrt{f(2.45\text{GHz})}] = 1.18$$

Also for the simultaneous transmission according to the section 4.3.2 the estimated SAR is given by formula:
(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm) · [$\sqrt{f(2.45\text{GHz})/x}$]
 W/kg

$$\text{Result - } [(3.98)/(5.3\text{mm})] \cdot [\sqrt{f(2.45\text{GHz})/7.5}] = 0.16\text{W/kg.}$$

The highest SAR for the antenna A (1) was 0.355 mW/g so the sum of the simultaneously transmitting Bluetooth and WLAN (Ant. B) was 0.515 mW/g which was below the SAR limit of 1.6mW/g.

The measurement results mentioned herein only apply to the 2450MHz frequency band. An additional report titled "M131103_FCC_7260HMW AN_SAR_5.6" applies to the 5GHz range.



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3.0 TEST SAMPLE TECHNICAL INFORMATION

(Information supplied by the client)

3.1 DUT (WLAN) Details

Table 2

Transmitter:	Mini-Card Wireless LAN Module
FCC ID:	PD97260H
IC:	1000M-7260H
Wireless Module:	INTEL CENTRINO ADVANCED-N 7260(Wilkins Peak2) (11a/b/g/n)
Model Number:	7260HMW AN
Manufacturer:	Intel Corporation
Modulation Type:	DSSS for 802.11b OFDM for 802.11g OFDM for 802.11a OFDM for 802.11n
2.4 GHz (802.11b/g/n):	CCK, DQPSK, DBPSK, 16QAM, 64QAM
5 GHz (802.11a/n):	BPSK, QPSK, 16QAM, 64QAM
Maximum Data Rate:	802.11b = 11 Mbps, 802.11g and 802.11a = 54 Mbps 802.11n = 450 Mbps
Frequency Ranges:	2.412 –2.462 GHz for 11b/g/n 5.18 - 5.825 GHz for 11a/n
Number of Channels:	11 channels for 11b/g/n 24 channels for 11a/n with 20MHz Bandwidth 18 channels for 11n with 40MHz Bandwidth
Antenna Types:	Nissei Inverted F antenna Model: PIFA
Power Supply:	3.3 VDC from PCI bus

Table 3 Channels and Output power setting

Channel and Mode	Frequency MHz	Average Output Power dBm	
		Tx A	Tx B
802.11b 2.4 GHz			
1	2412	15.62	14.16
6	2437	15.74	14.10
11	2462	15.57	14.01
802.11g 2.4 GHz			
2	2417	16.30	15.41
6	2437	16.74	15.53
10	2457	16.65	15.73

NOTE: For 5GHz SAR results refer to report titled “M131103_FCC_7260HMW AN_SAR_5.6”.

3.2 DUT (Bluetooth) Details

Table 4

Transmitter:	Bluetooth contained in same WLAN module
Network Standard:	Bluetooth™ RF Test Specification
Modulation Type:	Frequency Hopping Spread Spectrum (FHSS)
Frequency Range:	2402 MHz to 2480 MHz
Number of Channels:	79



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Carrier Spacing: 1.0 MHz
Antenna Types: Monopole antenna included in the module
Max. Output Power: 6 dBm
Reference Oscillator: 16 MHz (Built-in)
Power Supply: 3.3 VDC from host

Table 5

Channel Number	Frequency (MHz)	Bluetooth Utility power setting
1	2402	Power (Ext, Int) = 0, 96
2	2403	
-	-	
39	2440	
40	2441	
41	2442	
-	-	
78	2479	
79	2480	

3.3 DUT (Notebook PC) Details

Table 6

Host notebook : LifeBook T series
Model Name: T904
Serial Number: Pre-production Sample
Manufacturer: FUJITSU LIMITED

CPU Type and Speed: Core i7 3.3GHz
LCD 13.3"QHD(2560x1440) : LQ133T1JW17
Graphics chip Non
Wired LAN: Intel I218LM : 10 Base-T/100 Base-TX/1000Base-T
Modem: Non
Port Replicator Model: FPCPR245

AC Adapter Model: 90W:
 A13-090P1A(Chicony), A13-090P2A(Chicony)
 ADP-90BE A(Delta), ADP-90BE B(Delta)
 80W:
 ADP-80SB A(Delta), ADP-80SB B(Delta)
 65W:
 ADP-65MD A(Delta), ADP-65MD B(Delta),
 ADP-65YH A(Delta), ADP-65YH B(Delta),
 ADP-65JH AB(Delta), A11-065N5A(Chicony)

Voltage: 19 V
Current Specs: 4.74A / 4.22A / 3.42A
Watts: 90W / 80W / 65W

3.4 Test Sample Accessories

3.4.1 Battery Types

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



Table 7 Battery Details

Brand name:Sony
Model name: L1P4152FTPC(SY6)
Power rating: 14.4V, 3150mAh
Type: Li-ion

4.0 TEST SIGNAL, FREQUENCY AND OUTPUT POWER

INTEL’s CRTU test tool was used to configure the WLAN for testing. The DUT Wireless LAN had a total of 11 channels within the 2412 to 2462 MHz frequency band and 12 channels within the frequency range 5180 to 5825 MHz. In The frequency range 2412 MHz to 2462 MHz the DUT operates in 2 modes, OFDM and DSSS. For the SAR measurements the device was operating in continuous transmit mode using programming codes supplied by Fujitsu.

The Bluetooth operates over 79 channels within the frequency range 2402 to 2480 MHz. The Bluetooth power is low (6dBm max) and is located at a distance of 152mm from other transmitting antennas. Simultaneous transmission evaluation has been performed in accordance with Section 4.3.2 of KDB 447498 D01.

The test results mentioned in this report only apply to the 2.45 GHz frequency band.

The WLAN modules can be configured in a number of different data rates. It was found that the highest source based time averaged power was measured when using the lowest data rates available in each mode. This lowest data rate corresponds to 6Mbps in OFDM mode and 1Mbps in DSSS mode.

The frequency span of the 2450 MHz range band was more than 10MHz consequently; the SAR levels of the test sample were measured for lowest, centre and highest channels in the applicable modes. The DUT is capable of using two antennas transmitting simultaneously (HT8 DATA mode) the power level is 3dB lower (50%) than if a single antenna was transmitting. 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 device was measured after temporary modification of antenna connector inside the device’s TX RX compartment. Measurements were performed with a calibrated Power Meter. The Transmitter power was set to be equal or higher than power specified by the manufacturer and exceeded or was equal to the tune-up power of the transmitter module.

Table 8 Frequency and Conducted Power Results Bluetooth

Channel	Channel Frequency MHz	*Data Rate (Mbps)	Maximum Conducted Output Power Measured (dBm)
Channel 40	2441	N/A	6

4.1 Battery Status

The device battery was fully charged prior to commencement of measurement. Each SAR test was completed within 30 minutes. The battery condition was monitored by measuring the RF field at a defined position inside the phantom before the commencement of each test and again after the completion of the test. It was not possible to perform conducted power measurements at the output of the device, at the beginning and end of each scan due to lack of a suitable antenna port. The uncertainty associated with the power drift was less than 5% and was assessed in the uncertainty budget.



5.0 DETAILS OF TEST LABORATORY

5.1 Location

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5.2 Accreditations

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

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

Table 9

AS/NZS 2772.2:	RF and microwave radiation hazard measurement
ACMA:	Radio communications (Electromagnetic Radiation - Human Exposure) Standard 2003 + Amdt (No. 1):2007
FCC:	Guidelines for Human Exposure to RF Electromagnetic Field OET65C 01/01
EN 50360: 2001	Product standard to demonstrate the compliance of mobile phones with the basic restrictions related to human exposure to electromagnetic fields (300 MHz – 3 GHz)
EN 62209-1:2006	Human Exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models instrumentation and procedures. Part 1: Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (300 MHz to 3 GHz)
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 $21 \pm 1^\circ\text{C}$, the humidity was 40%. 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 $5\mu\text{V}$ in both air and liquid mediums.

6.0 DESCRIPTION OF SAR MEASUREMENT SYSTEM

Table 10

Applicable Head Configurations	: None
Applicable Body Configurations	: 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 IEEE 1528, 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 System verification

6.3.1 System verification Results @ 2450MHz

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

Table 11 System verification Results (Dipole: SPEAG D2450V2 SN: 724)

1. System Frequency and verification Date	2. ϵ_r (measured)	3. σ (mho/m) (measured)	4. Measured SAR 1g (mW/g)	5. Measured SAR 10g (mW/g)
18 th Nov 2013	52.7	2.00	12.5	5.89

6.3.2 Deviation from reference system verification values

The SPEAG calibration reference SAR value is the SAR system verification result obtained in a specific dielectric liquid using the validation dipole (D2450V2) during calibration. The measured one-gram SAR should be within 10% of the expected target reference values shown in table below (2450MHz) below.

Table 12 Deviation from reference system verification values @ 2450MHz

Frequency and Date	Measured SAR 1g (mW/g)	Measured SAR 1g (Normalized to 1W)	SPEAG Calibration reference SAR Value 1g (mW/g)	Deviation From SPEAG Reference 1g (%)	IEEE Std 1528 reference SAR value 1g (mW/g)	Deviation From IEEE 1g (%)
18 th Nov 2013 2450MHz	12.5	50	51.5	-2.91	52.4	4.58

NOTE: All reference system verification 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.

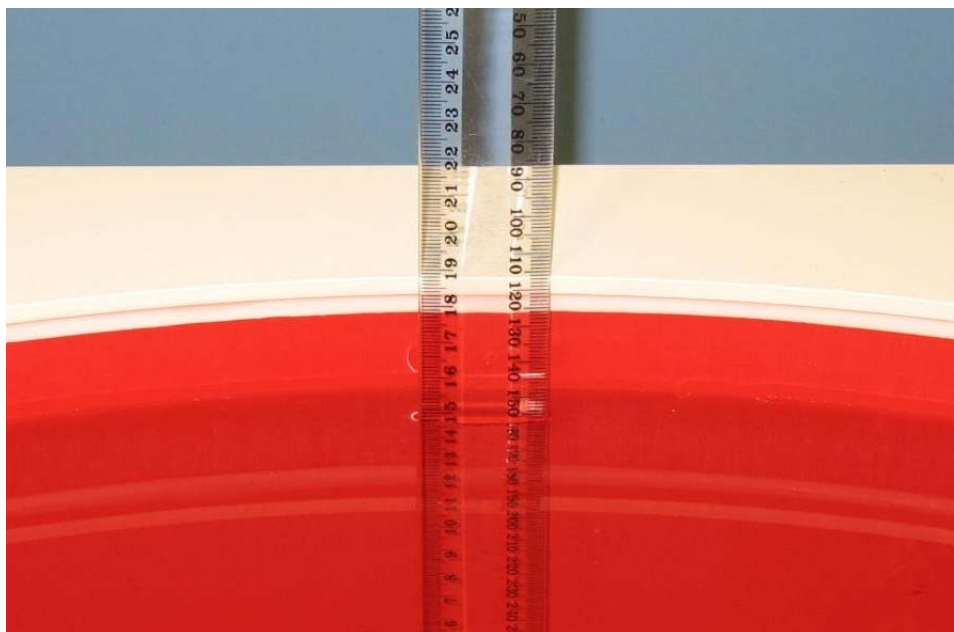


Photo of liquid Depth in Flat Phantom

6.4 Phantom Properties

SPEAG ELI 4.0 Flat Phantom was used during the test which complies with the IEEE 1528 and EN62209-1 and EN62209-2 SAR measurement requirements.

Table 13 Phantom Properties

Phantom Properties	
Depth of Phantom	19 cm
Width of flat section	40 cm
Length of flat section	60 cm
Thickness of flat section	2.0mm +/-0.2mm (flat section)
Dielectric Constant	<5.0
Loss Tangent	<0.05

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 14 Measured Brain Simulating Liquid Dielectric Values for System verifications

(NOT USED IN THIS TEST)

Frequency Band	ϵ_r (target)	σ (target)	ρ kg/m ³
2450 MHz Brain	39.2 ±5%	1.80 ±5%	1000

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

Table 15 Measured Body Simulating Liquid Dielectric Values

Frequency MHz	ϵ_r (50.1-55.3)	σ (S/m) (1.85-2.05)	ρ kg/m ³
2450	52.7	2.00	1000

NOTE: The muscle 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 16 Temperature and Humidity recorded for each day

Date	Ambient Temperature (°C)	Liquid Temperature (°C)	Humidity (%)
18 Nov 2013	20.5	20.1	40

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 17 Tissue Type: Brain @ 2450MHz

Volume of Liquid: 30 Litres

Approximate Composition	% By Weight
Distilled Water	62.7
Salt	0.5
Triton X-100	36.8

Table 18 Tissue Type: Muscle @ 2450MHz

Volume of Liquid: 60 Litres

Approximate Composition	% By Weight
Distilled Water	73.2
Salt	0.04
DGBE	26.7

6.7 Device Holder for Laptops and ELI 4.0

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 12 mm x 12 mm. The actual Area Scan has dimensions of 96 mm x 120mm surrounding the test device. Based on this data, the area of the maximum absorption is determined by Spline interpolation.
- c) Around this point, a volume of 30 mm x 30 mm x 30 mm is assessed by measuring 7 x 7 x 7 points. On the basis of this data set, the spatial peak SAR value is evaluated with the following procedure:
 - (i) The data at the surface are extrapolated, since the centre of the dipoles is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 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.



8.0 MEASUREMENT UNCERTAINTY

The uncertainty analysis is based on the template listed in the IEEE Std 1528-2003 for both device SAR tests and System verification 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 19 Uncertainty Budget for DASY5 Version 52 – DUT SAR test 2450MHz

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	2	R	1.73	1	1	1.15	1.15	∞
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	0.8	R	1.73	1	1	0.46	0.46	∞
Probe Positioning	9.9	R	1.73	1	1	5.72	5.72	∞
Max. SAR Eval.	4	R	1.73	1	1	2.31	2.31	∞
Post Processing	4	R	1.73	1	1	2.31	2.31	∞
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	7.9	R	1.73	1	1	4.56	4.56	∞
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)						13.2	13.1	
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k=	2		26.5	26.2	

Estimated total measurement uncertainty for the DASY5 measurement system was ±13.2%. The extended uncertainty (K = 2) was assessed to be ±26.5% based on 95% confidence level. The uncertainty is not added to the measurement result.



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Table 20 Uncertainty Budget for DASY5 Version 52 – System verification 2450MHz

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 System verification measurement result.



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9.0 EQUIPMENT LIST AND CALIBRATION DETAILS

Table 21 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	03-June-2014	
Data Acquisition Electronics	SPEAG	DAE3 V1	442	04-Dec-2013	✓
Probe E-Field - Dummy	SPEAG	DP1	N/A	Not applicable	
Probe E-Field	SPEAG	ET3DV6	1380	10-Dec-2013	✓
Probe E-Field	SPEAG	ET3DV6	1377	14-June-2014	
Probe E-Field	SPEAG	ES3DV6	3029	Not Used	
Probe E-Field	SPEAG	EX3DV4	3563	14-June-2014	
Probe E-Field	SPEAG	EX3DV4	3657	7-Dec-2013	
Antenna Dipole 300 MHz	SPEAG	D300V3	1012	11-Dec-2014	
Antenna Dipole 450 MHz	SPEAG	D450V3	1074	11-Dec-2014	
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	6-Dec -2014	
Antenna Dipole 2450 MHz	SPEAG	D2450V2	724	04-Dec-2014	✓
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	✓

* Calibrated during the test for the relevant parameters.

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 “Lifebook T series” can be used in either a conventional laptop position (see Appendix A) or a Tablet configuration. The antenna location in the “Lifebook T series” is closest to the top of the screen when used in a conventional laptop configuration and due to the separation distances involved between the phantom and the laptop antenna, testing is not required in this position.

10.1 Positions

10.1.1 “Lap Held” Position Definition (0mm spacing)

The DUT was tested in the 2.00 mm flat section of the ELI4 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 (Portrait or Landscape)

The DUT was tested in the (2.00 mm) flat section of the ELI4 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 flat section of the ELI4 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 its LCD screen was parallel to the 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).

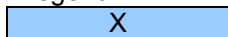
10.2 List of All Test Cases (Antenna In/Out, Test Frequencies, User Modes)

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 were applied for SAR measurements of the host system. KDB 616217 was used in the SAR evaluation.

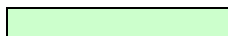
Table 22 Testing configurations

Phantom Configuration	*Device Mode	Antenna	Test Configurations		
			Channel (Low)	Channel (Middle)	Channel (High)
Lap Held	OFDM 2.4GHz	A		X	
		B		X	
	DSSS 2.4GHz	A		X	
		B		X	
Bystander	OFDM 2.4GHz	A		X	
		B		X	
	DSSS 2.4GHz	A		X	
		B		X	
Edge On	OFDM 2.4GHz	A		X	
		B		X	
	DSSS 2.4GHz	A		X	
		B		X	

Legend



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.

NOTE: Throughout this report, Antenna A, B and C refer to Tx1, Tx2 and Tx3 in the host respectively.



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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 2450MHz SAR Results

There are two modes of operation within the 2450MHz band, they include OFDM and DSSS modulations. Refer to section 10.2 for selection of all device test configurations. Table below displays the SAR results.

Table 23 SAR MEASUREMENT RESULTS – DSSS Mode

Test Position	Plot number	Test Mode	Test Ch.	Test Freq. (MHz)	SAR (1g) mW/g	Drift (dB)	ε _r (target 52.7 ±5% 50.1 to 55.3)	σ (target 1.95 ±5% 1.85 to 2.05)
Bystander 25mm Spacing DSSS 2450 MHz Antenna A (1)	1	DSSS 2450 MHz 1Mbs (0)	6	2437	0.04	0.1	52.72	1.978
Bystander 25mm Spacing DSSS 2450 MHz Antenna B (2)	-	DSSS 2450 MHz 1Mbs (0)	6	2437	Noise Floor	N/A	52.72	1.978
Edge On Primary Portrait DSSS 2450 MHz Antenna B (2)	2	DSSS 2450 MHz 1Mbs (0)	6	2437	0.009	0.14	52.72	1.978
Edge On Primary Portrait DSSS 2450 MHz Antenna A (1)	3	DSSS 2450 MHz 1Mbs (0)	6	2437	0.064	-0.06	52.72	1.978
Edge On Primary Portrait OFDM 2450 MHz Antenna A (1)	4	OFDM 2450 MHz 6 Mbs (0)	6	2437	0.086	0.09	52.72	1.978
Edge On Secondary Portrait DSSS 2450 MHz Antenna A (1)	5	DSSS 2450 MHz 1Mbs (0)	6	2437	0.039	-0.14	52.72	1.978
Edge On Secondary Landscape DSSS 2450 MHz Antenna A (1)	6	DSSS 2450 MHz 1Mbs (0)	1	2412	0.19	-0.04	52.82	1.941
Edge On Secondary Landscape DSSS 2450 MHz Antenna A (1)	7	DSSS 2450 MHz 1Mbs (0)	6	2437	0.186	-0.19	52.72	1.978
Edge On Secondary Landscape DSSS 2450 MHz Antenna A (1)	8	DSSS 2450 MHz 1Mbs (0)	11	2462	0.195	-0.01	52.6	2.016
Edge On Secondary Landscape OFDM 2450 MHz Antenna A (1)	9	OFDM 2450 MHz 6 Mbs (0)	2	2417	0.314	-0.01	52.79	1.947
Edge On Secondary Landscape OFDM 2450 MHz Antenna A (1)	10	OFDM 2450 MHz 6 Mbs (0)	6	2437	0.324	-0.02	52.72	1.978
Edge On Secondary Landscape OFDM 2450 MHz Antenna A (1)	11	OFDM 2450 MHz 6 Mbs (0)	10	2457	0.355	-0.01	52.6	2.009
Edge On Secondary Landscape DSSS 2450 MHz Antenna B (2)	12	DSSS 2450 MHz 1Mbs (0)	6	2437	0.02	0.07	52.72	1.978
Edge On Secondary Landscape OFDM 2450 MHz Antenna B (2)	13	OFDM 2450 MHz 6 Mbs (0)	2	2417	0.027	0.06	52.79	1.947
Edge On Secondary Landscape OFDM 2450 MHz Antenna B (2)	14	OFDM 2450 MHz 6 Mbs (0)	6	2437	0.028	0.03	52.72	1.978
Edge On Secondary Landscape OFDM 2450 MHz Antenna B (2)	15	OFDM 2450 MHz 6 Mbs (0)	10	2457	0.025	-0.05	52.6	2.009
Lap Held DSSS 2450 MHz Antenna A (1)	16	OFDM 2450 MHz 6 Mbs (0)	6	2437	0.112	0.17	52.72	1.978
Lap Held DSSS 2450 MHz Antenna B (2)	17	OFDM 2450 MHz 6 Mbs (0)	6	2437	0.002	0.17	52.72	1.978
System Check	18	CW	1	2450	12.5	-0.09	52.66	1.999

NOTE: The measurement uncertainty of 26.5% for 2.45GHz was not added to the result.

The highest SAR level recorded in the 2450MHz band was 0.355 mW/g as evaluated in a 1g cube of averaging mass. This value was obtained in Edge On Secondary Landscape position in OFDM mode, utilizing channel 10 (2457 MHz) and antenna A (1).



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12.0 COMPLIANCE STATEMENT

The Fujitsu Convertible Tablet PC, Model: T904 with INTEL Mini-PCI Wireless LAN Module (INTEL CENTRINO ADVANCED-N 802.11a/b/g/n), Model: 7260HMW AN was found to comply with the FCC and RSS-102 SAR requirements.

The highest Measured SAR level was 0.355 mW/g for a 1g cube. This value was measured at 2457 MHz (channel 10) in the "Edge On Secondary Landscape " position in OFDM modulation mode at the antenna A (1). This was below the limit of 1.6 mW/g for uncontrolled exposure, even taking into account the measurement uncertainty of 26.5 %.

The SAR test variability check was not required because the highest measured SAR was less than 0.8 mW/g.

13.0 ANTENNA HOST PLATFORM LOCATION

