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# SAR Test Report

## Report Number: M100860 _ FCC_AR5BHB92_SAR_5.6

| | |
|---|---|
| Test Sample: | Portable Tablet Computer |
| Host PC Model Number: | T580 / TH550 |
| Radio Modules: | WLAN HB92 AR5BHB92 & Bluetooth BSMAN3 |
| PC System FCC ID: | PPD-AR5BHB92-F |
| PC System IC: | IC ID: 4104A-ARBHB92F |
| Date of Issue: | 28th September 2010 |

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# SAR TEST REPORT

## Report Number: M100860 _ FCC_AR5BHB92_SAR_5.6

**PC System FCC ID:** PPD-AR5BHB92-F,
**PC System IC:** IC ID: 4104A-ARBHB92F,

## 1.0 GENERAL INFORMATION

**Table 1**

| | |
|---|---|
| **Test Sample:** | Portable Tablet Computer |
| **Model Name:** | T580 / TH550 |
| **Radio Modules:** | WLAN AR5BHB92 & Bluetooth BSMAN3 |
| **Interface Type:** | Half Mini-PCI Module |
| **Device Category:** | Portable Transmitter |
| **Test Device:** | Pre-Production Unit |
| **FCC System ID:** | PPD-AR5BHB92-F |
| **PC System IC:** | IC ID: 4104A-ARBHB92F |
| **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)<br>**2.** Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands), RSS-102 |
| **Statement Of Compliance:** | The Fujitsu Tablet Computer T580 / TH550 with Wireless LAN model AR5BHB92 and Bluetooth module BSMAN3 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:** | 15th to 22nd September 2010 |
| **Test Officer:** |  **Peter Jakubiec** |
| **Authorised Signature:** |  Peter Jakubiec |

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**SAR TEST REPORT**
**Portable Tablet Computer**
**Model: T580 / TH550**
**Report Number: M100860 _ FCC_AR5BHB92_SAR_5.6**

## 2.0 INTRODUCTION

Testing was performed on the Fujitsu Tablet PC, Model: T580 / TH550 with Atheros Communication Inc. Half Mini-PCI Wireless LAN Module (HB92 802.11a/b/g/n), Model: AR5BHB92 & CSR Bluetooth Module, Model: BSMAN3. The HB92 module is an OEM product. The Half Mini-PCI Wireless LAN (WLAN) was tested in the dedicated host – LifeBook T series, Model T580 / TH550. The system tested will be referred to as the DUT throughout this report.
There are two variants of the Fujitsu Tablet PC, Model: T580 / TH550 one that is equipped with the Bluetooth transmitter and Bluetooth antenna, and one variant that does not contain Bluetooth transmitter or Bluetooth antenna.
SAR testing was conducted on the sample that is equipped with the Bluetooth transmitter and Bluetooth antenna.

The measurement test results mentioned hereon only apply to the 5GHz frequency band; an additional report titled “M100860_FCC_AR5BHB92_SAR_2.4” applies to the 2450MHz frequency range.

## 3.0 TEST SAMPLE TECHNICAL INFORMATION

(Information supplied by the client)

## 3.1 EUT (WLAN) Details

**Table 2**

| | |
|---|---|
| **Transmitter:** | Mini-Card Wireless LAN Module |
| **Wireless Module:** | HB92 (802.11a/b/g/n) |
| **Model Number:** | AR5BHB92 |
| **Manufacturer:** | Atheros Communication Inc, |
| **Modulation Type:** | DSSS for 802.11b<br>OFDM for 802.11g<br>OFDM for 802.11a<br>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<br>802.11n = 300 Mbps |
| **Frequency Ranges:** | 2.412–2.462 GHz for 11b/g/n<br>5.18-5.32 GHz, 5.5-5.6 GHz and 5.745-5.825 GHz for 11a/n |
| **Number of Channels:** | 11 channels for 11b/g/n with 20MHz Bandwidth<br>24 channels for 11a/n with 20MHz Bandwidth<br>18 channels for 11n with 40MHz Bandwidth |
| **Antenna Types:** | Nissei Electric Inverted F Antenna<br>Model: Tx1 Antenna: CP492575<br>Tx2 (or Rx2) Antenna: CP492575<br>Location: Top edge of LCD screen |
| **Power Supply:** | 3.3 VDC from PCI Express bus |

**Table 3 Channels and Output power setting**

**2.4 GHz (802.11b, 802.11g and 802.11n)**

| Mode | Channel | Frequency (MHz) | Data Rate (Mbps) | Tx BW (MHz) | Average Power Target (dBm) | Power Control - PCDAC Setting | | Average Power Measured (dBm) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Gain Control Tx A | Gain Control Tx B | Tx A | Tx B |
| 802.11b 2.4 GHz | 1 | 2412 | 1 | - | **15.0** | 28.0 | 23.0 | 15.15 | 15.23 |
| | 2 | 2417 | | | | - | - | - | - |
| | 3 | 2422 | | | | - | - | - | - |
| | 4 | 2427 | | | | - | - | - | - |
| | 5 | 2432 | | | | - | - | - | - |
| | 6 | 2437 | | | | 26.0 | 22.0 | 15.10 | 15.16 |
| | 7 | 2442 | | | | - | - | - | - |
| | 8 | 2447 | | | | - | - | - | - |
| | 9 | 2452 | | | | - | - | - | - |
| | 10 | 2457 | | | | - | - | - | - |
| | 11 | 2462 | | | | 25.0 | 21.0 | 15.17 | 15.23 |
| | 13 | 2472 | | | | - | - | - | - |
| | | | | | | | | | |
| 802.11g 2.4 GHz | 1 | 2412 | 6 | - | **15.0** | - | - | - | - |
| | 2 | 2417 | | | | - | - | - | - |
| | 3 | 2422 | | | | - | - | - | - |
| | 4 | 2427 | | | | - | - | - | - |
| | 5 | 2432 | | | | - | - | - | - |
| | 6 | 2437 | | | | - | - | - | - |
| | 7 | 2442 | | | | - | - | - | - |
| | 8 | 2447 | | | | - | - | - | - |
| | 9 | 2452 | | | | - | - | - | - |
| | 10 | 2457 | | | | - | - | - | - |
| | 11 | 2462 | | | | - | - | - | - |
| | 13 | 2472 | | | | - | - | - | - |
| | | | | | | | | | |
| 802.11n 2.4 GHz | 1 | 2412 | HT0 | 20 | **15.0** | - | - | - | - |
| | 2 | 2417 | | | | - | - | - | - |
| | 3 | 2422 | | | | - | - | - | - |
| | 4 | 2427 | | | | - | - | - | - |
| | 5 | 2432 | | | | - | - | - | - |
| | 6 | 2437 | | | | - | - | - | - |
| | 7 | 2442 | | | | - | - | - | - |
| | 8 | 2447 | | | | - | - | - | - |
| | 9 | 2452 | | | | - | - | - | - |
| | 10 | 2457 | | | | - | - | - | - |
| | 11 | 2462 | | | | - | - | - | - |
| | 13 | 2472 | | | | - | - | - | - |
| | | | | | | | | | |
| | 3 | 2422 | | 40 Wide | **12.5** | - | - | - | - |
| | 4 | 2427 | | | **15.0** | - | - | - | - |
| | 6 | 2437 | | | | - | - | - | - |
| | 8 | 2447 | | | | - | - | - | - |
| | 9 | 2452 | | | **12.8** | - | - | - | - |

**5 GHz (802.11a)**

| Mode | Channel | Frequency (MHz) | Data Rate (Mbps) | Tx BW (MHz) | Average Power Target (dBm) | Power Control - PCDAC Setting | | Average Power Measured (dBm) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Gain Control Tx A | Gain Control Tx B | Tx A | Tx B |
| 802.11a | **5.2 GHz** | | 6 | - | | | | | |
| | 36 | 5180 | | | **12.0** | - | - | - | - |
| | 40 | 5200 | | | | - | - | - | - |
| | 44 | 5220 | | | | - | - | - | - |
| | 48 | 5240 | | | | - | - | - | - |
| | **5.3 GHz** | | | | | | | | |
| | 52 | 5260 | | | **15.0** | 32.0 | 29.0 | 15.05 | 15.28 |
| | 56 | 5280 | | | | - | - | - | - |
| | 60 | 5300 | | | | - | - | - | - |
| | 64 | 5320 | | | | 32.0 | 28.0 | 15.32 | 15.26 |
| | **5.6 GHz** | | | | | | | | |
| | 100 | 5500 | | | | - | - | - | - |
| | 104 | 5520 | | | **15.0** | 35.0 | 28.0 | 15.08 | 15.19 |
| | 108 | 5540 | | | | - | - | - | - |
| | 112 | 5560 | | | | - | - | - | - |
| | 116 | 5580 | | | | 36.0 | 29.0 | 15.31 | 15.26 |
| | 120 | 5600 | | | | - | - | - | - |
| | 124 | 5620 | | | | 36.0 | 30.0 | 15.28 | 15.36 |
| | 128 | 5640 | | | | - | - | - | - |
| | 132 | 5660 | | | | - | - | - | - |
| | 136 | 5680 | | | | 36.0 | 34.0 | 15.00 | 15.20 |
| | 140 | 5700 | | | | - | - | - | - |
| | **5.8 GHz** | | | | | | | | |
| | 149 | 5745 | | | **15.0** | 37.0 | 36.0 | 15.23 | 15.07 |
| | 153 | 5765 | | | | - | - | - | - |
| | 157 | 5785 | | | | 39.0 | 38.0 | 15.32 | 15.40 |
| | 161 | 5805 | | | | - | - | - | - |
| | 165 | 5825 | | | | 43.0 | 39.0 | 15.43 | 15.09 |

**5 GHz (802.11n)**

| Mode | Channel | Frequency (MHz) | Data Rate (Mbps) | Tx BW (MHz) | Average Power Target (dBm) | Power Control - PCDAC Setting | | Average Power Measured (dBm) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Gain Control Tx A | Gain Control Tx B | Tx A | Tx B |
| 802.11n | **5.2 GHz** | | HT0 | 20 | | | | | |
| | 36 | 5180 | | | 13.5 | 31.0 | 29.0 | 13.73 | 13.96 |
| | 40 | 5200 | | | | - | - | - | - |
| | 44 | 5220 | | | | - | - | - | - |
| | 48 | 5240 | | | | 30.0 | 27.0 | 13.74 | 13.83 |
| | **5.3 GHz** | | | | | | | | |
| | 52 | 5260 | | | 15.0 | - | - | - | - |
| | 56 | 5280 | | | | - | - | - | - |
| | 60 | 5300 | | | | - | - | - | - |
| | 64 | 5320 | | | | - | - | - | - |
| | **5.6 GHz** | | | | | | | | |
| | 100 | 5500 | | | | - | - | - | - |
| | 104 | 5520 | | | 15.0 | - | - | - | - |
| | 108 | 5540 | | | | - | - | - | - |
| | 112 | 5560 | | | | - | - | - | - |
| | 116 | 5580 | | | | - | - | - | - |
| | 120 | 5600 | | | | - | - | - | - |
| | 124 | 5620 | | | | - | - | - | - |
| | 128 | 5640 | | | | - | - | - | - |
| | 132 | 5660 | | | | - | - | - | - |
| | 136 | 5680 | | | | - | - | - | - |
| | 140 | 5700 | | | | - | - | - | - |
| | **5.8 GHz** | | | | | | | | |
| | 149 | 5745 | | | 15.0 | - | - | - | - |
| | 153 | 5765 | | | | - | - | - | - |
| | 157 | 5785 | | | | - | - | - | - |
| | 161 | 5805 | | | | - | - | - | - |
| | 165 | 5825 | | | | - | - | - | - |
| | **5.2 GHz** | | | | | | | | |
| | 38 | 5190 | | 40 Wide | 12.5 | - | - | - | - |
| | 46 | 5230 | | | | - | - | - | - |
| | **5.3 GHz** | | | | | | | | |
| | 54 | 5270 | | | 14.0 | - | - | - | - |
| | 62 | 5310 | | | | - | - | - | - |
| | **5.6 GHz** | | | | | | | | |
| | 102 | 5510 | | | 15.0 | - | - | - | - |
| | 110 | 5550 | | | | - | - | - | - |
| | 118 | 5590 | | | | - | - | - | - |
| | 126 | 5630 | | | | - | - | - | - |
| | 134 | 5670 | | | | - | - | - | - |
| | **5.8 GHz** | | | | | | | | |
| | 151 | 5755 | | | 15.0 | - | - | - | - |
| | 159 | 5795 | | | | - | - | - | - |

NOTE: For 2450 MHz SAR results refer to report titled “M100860_FCC_AR5BHB92_SAR_2.4”.

## 3.2 EUT (Bluetooth) Details

**Table 4**

| | |
|---|---|
| **Transmitter:** | Bluetooth |
| **Model Number:** | BSMAN3 |
| **Manufacturer:** | CSR |
| **Network Standard:** | Bluetooth™ RF Test Specification |
| **Modulation Type:** | Frequency Hopping Spread Spectrum (FHSS) |
| **Frequency Range:** | 2402 MHz to 2480 MHz |
| **Number of Channels:** | 79 |
| **Carrier Spacing:** | 1.0 MHz |
| **Antenna Types:** | Monopole Antenna included in module<br>Module location: Left side of hinge |
| **Max. Output Power:** | 4 dBm |
| **Reference Oscillator:** | 16 MHz (Built-in) |
| **Power Supply:** | 3.3 VDC from host. |

**Table 5 Frequency allocation**

| Channel Number | Frequency (MHz) | Bluetooth Utility power setting |
|---|---|---|
| **1** | **2402** | Power (Ext, Int) = 0, 56 |
| 2 | 2403 | |
| - | - | |
| 39 | 2440 | |
| **40** | **2441** | |
| 41 | 2442 | |
| - | - | |
| 78 | 2479 | |
| **79** | **2480** | |

## 3.3 EUT (Notebook PC) Details

**Table 6**

| | |
|---|---|
| **Host notebook :** | LifeBook T series |
| **Model Name:** | T580 / TH550 |
| **Serial Number:** | Pre-production Sample |
| **Manufacturer:** | FUJITSU LIMITED |
| **CPU Type and Speed:** | Core i7-620M 1.47GHz |
| **LCD** | 10.1”HD |
| **Wired LAN:** | Realteck RTL8111E: 10 Base-T/100 Base-TX/1000Base-T |
| **Modem:** | No |
| **Port Replicator Model:** | No |
| **AC Adapter Model:** | PXW1931N(Tamura), ADP-60ZH A (Delta) |
| **Voltage:** | 19V |
| **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.

**Table 7 Battery Details**

| | | |
|---|---|---|
| Battery S/N | 01A-Z100702001792Z | 01A-Z091026000648Z |
| Model | FPCB219 | FPCB219 |
| V/mAh | 10.8V/5800mAh | 10.8V/5800mAh |

# 4.0 TEST SIGNAL, FREQUENCY AND OUTPUT POWER

Atheros Communication Inc.'s ART test tool was used to configure the WLAN for testing. The DUT Wireless LAN had a total of 11 channels (USA model) 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. Within the 5180 to 5825 MHz frequency range the DUT operates in OFDM mode only. For the SAR measurements the device was operating in continuous transmit mode using programming codes supplied by Fujitsu.

The Bluetooth module operates over 79 channels within the frequency range 2402 to 2480 MHz. It is possible for the Bluetooth module to operate simultaneously with the WLAN module (co-transmission). However, due to low output power of Bluetooth module (less than 5mW), standalone SAR measurement for Bluetooth module was not conducted (as per **"Supplement to the KDB 616217"**). The Bluetooth interface utilizes dedicated antenna, for the purpose of this report labelled antenna "D".

The test results mentioned in this report only apply to the 5.6 GHz frequency range. An additional report titled *"*M100860_FCC_AR5BHB92_SAR_2.4*"* is specific to the 2450MHz range.

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 for the 5.3 GHz, 5.6 GHZ, and 5.8 GHz bands. This lowest data rate corresponds to 6Mbps in OFDM mode and 1Mbps in DSSS mode. The highest source based time averaged power for the 5.2 GHz band was in the HT0 20 MHz mode.

The frequency span of the 2450 MHz range and 5600MHz 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. The EUT 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.

**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 | 3.9 |

### 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 device, at the beginning and end of each scan due to lack of a suitable antenna port. The uncertainty associated with the power drift was less than 12% and was assessed in the uncertainty budget.

## 5.0 DETAILS OF TEST LABORATORY

### 5.1 Location

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### 5.2 Accreditations

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

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

**Table 9**

| | |
|---|---|
| **AS/NZS 2772.1:** | 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) |
| ***EN62209-2:2010** | 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. |

*NATA accreditation pending.
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 34% to 44%. The liquid parameters are measured daily prior to the commencement of each test. Tests were performed to check that reflections within the environment did not influence the SAR measurements. The noise floor of the DASY4 SAR measurement system using the SN3563 probe was less than 5μV in both air and liquid mediums.

# 6.0 DESCRIPTION OF SAR MEASUREMENT SYSTEM

**Table 10**

| | |
|---|---|
| Applicable Head Configurations<br>Applicable Body Configurations | : None<br>: Tablet Position<br>: Edge On Position |

## 6.1 Probe Positioning System

The measurements were performed with the state-of-the-art automated near-field scanning system **DASY4 V4.7 Build 80** from Schmid & Partner Engineering AG (SPEAG). The DASY4 fully complies with the OET65 C (01-01), IEEE 1528 and EN62209-1 SAR measurement requirements.

## 6.2 E-Field Probe Type and Performance

The SAR measurements were conducted with SPEAG dosimetric probe EX3DV4 Serial: 3563. Please refer to appendix C for detailed information.

## 6.4 System verification

### 6.4.1 System verification Results @ 5GHz

The following table 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 100 mW.

**Table 11 System verification Results (Dipole: SPEAG D5GHzV2 SN: 1008)**

| 1. System Frequency and verification Date | 2. ∈r (measured) | 3. σ (mho/m) (measured) | 4. Measured SAR 1g (mW/g) | 5. Measured SAR 10g (mW/g) |
|---|---|---|---|---|
| 5200MHz 16th September 10 | 45.9 | 5.14 | 8.76 | 2.49 |
| 5500MHz 20th September 10 | 44.4 | 5.61 | 9.35 | 2.65 |
| 5800MHz 22nd September 10 | 44.3 | 6.20 | 10.4 | 2.91 |

### 6.4.2 Deviation from reference system verification values

Currently no IEEE Std 1528-2003 SAR reference values are available in 5.6 GHz band, as a consequence all system verification results were compared against the SPEAG calibration reference SAR values.

The reference SAR value is the SAR system verification result obtained in a specific dielectric liquid using the validation dipole (D5GHzV2) after system component calibration. The measured one-gram SAR should be within 10% of the expected target reference values shown in table below.

**Table 12 Deviation from reference system verification values in 5.6 GHz band**

| 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 (%) |
|---|---|---|---|---|
| 5200MHz 16th September 10 | 8.76 | 87.60 | 87.7 | -0.11 |
| 5500MHz 20th September 10 | 9.35 | 93.50 | 92.9 | 0.65 |
| 5800MHz 22nd September 10 | 10.4 | 104.00 | 95.6 | 8.79 |

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

### 6.4.3 Liquid Depth 15cm

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

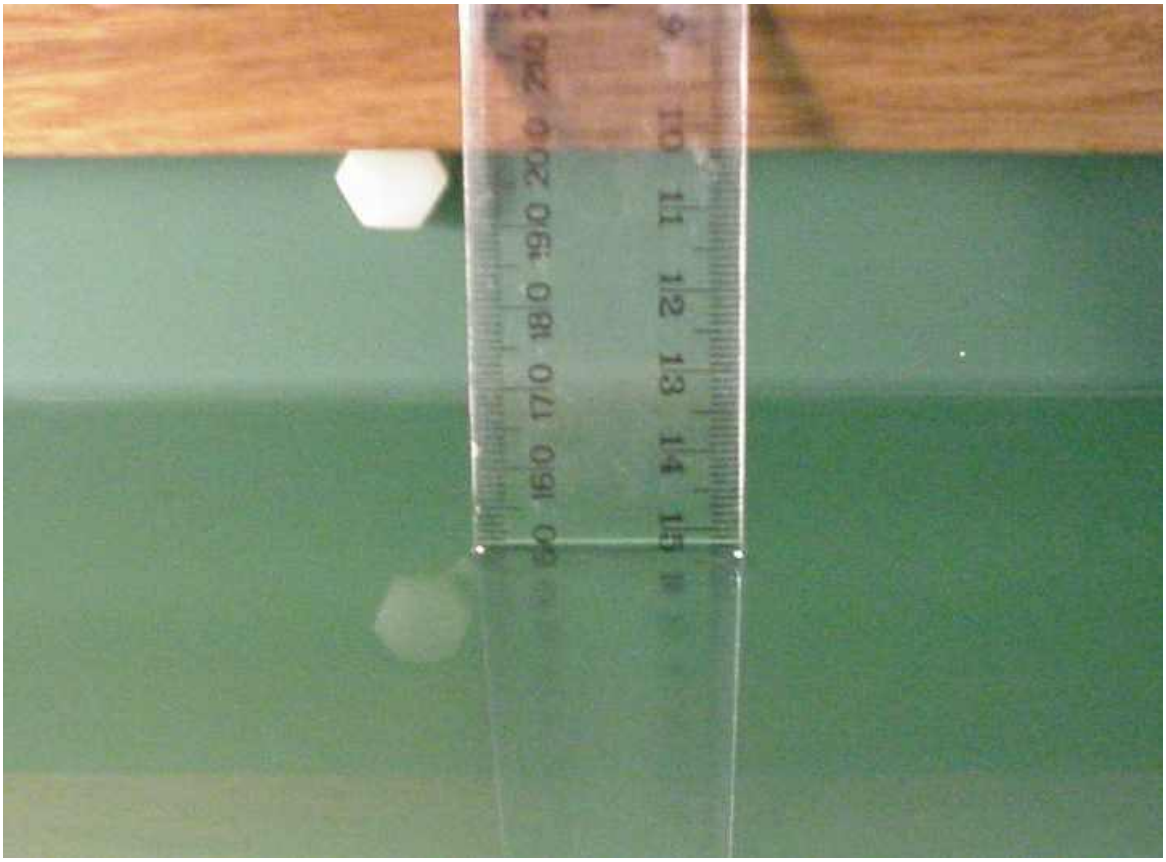

Photo of liquid Depth in Flat Phantom

## 6.5 Phantom Properties

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

## 6.6 Tissue Material Properties

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

**Table 13 Measured Body Simulating Liquid Dielectric Values for System verifications**

| Frequency Band | ∈r (measured range) | ∈r (target) | σ (mho/m) (measured range) | σ (target) | ρ kg/m$^3$ |
|---|---|---|---|---|---|
| 5200 MHz Body | 45.9 | 49.0 ±10% (44.1 to 53.9) | 5.14 | 5.3 ±5% (5.04 to 5.57) | 1000 |
| 5500 MHz Body | 44.4 | 48.6 ±10% (43.7 to 53.4) | 5.61 | 5.6 ±5% (5.32 to 5.88) | 1000 |
| 5800 MHz Body | 44.3 | 48.2 ±10% (43.38 to 53.02) | 6.20 | 6.0 ±5% (5.7 to 6.3) | 1000 |

NOTE: The brain liquid parameters were within the required tolerances of ±5% for σ and 10% for ∈r.

**Table 14 Measured Body Simulating Liquid Dielectric Values for 5200MHz range**

| Frequency Band | ∈r (measured range) | ∈r (target) | σ (mho/m) (measured range) | σ (target) | ρ kg/m$^3$ |
|---|---|---|---|---|---|
| 5180 MHz Body | 45.9 | 49.0 ±10% (44.1 to 53.9) | 5.10 | 5.3 ±5% (5.04 to 5.57) | 1000 |
| 5240 MHz Body | 45.8 | 48.9 ±10% (44.0 to 53.8) | 5.19 | 5.4 ±5% (5.13 to 5.67) | 1000 |
| 5260 MHz Body | 45.8 | 48.9 ±10% (44.0 to 53.8) | 5.24 | 5.4 ±5% (5.13 to 5.67) | 1000 |
| 5320 MHz Body | 45.6 | 48.8 ±10% (43.9 to 53.7) | 5.33 | 5.4 ±5% (5.13 to 5.67) | 1000 |

**Table 15 Measured Body Simulating Liquid Dielectric Values for 5600MHz range**

| Frequency Band | ∈r (measured range) | ∈r (target) | σ (mho/m) (measured range) | σ (target) | ρ kg/m$^3$ |
|---|---|---|---|---|---|
| 5520 MHz Body | 44.4 | 48.6 ±10% (43.7 to 53.4) | 5.65 | 5.6 ±5% (5.32 to 5.88) | 1000 |
| 5580 MHz Body | 44.2 | 48.5 ±10% (43.8 to 53.5) | 5.76 | 5.77 ±5% (5.48 to 6.06) | 1000 |
| 5620 MHz Body | 44.0 | 48.5 ±10% (43.8 to 53.5) | 5.83 | 5.77 ±5% (5.48 to 6.06) | 1000 |
| 5680 MHz Body | 43.8 | 48.4 ±10% (43.6 to 53.2) | 5.93 | 5.9 ±5% (5.61 to 6.20) | 1000 |

**Table 16 Measured Body Simulating Liquid Dielectric Values for 5800MHz range**

| Frequency Band | ∈r (measured range) | ∈r (target) | σ (mho/m) (measured range) | σ (target) | ρ kg/m$^3$ |
|---|---|---|---|---|---|
| 5745 MHz Body | 44.5 | 48.3 ±10% (43.47 to 53.13) | 6.11 | 5.9 ±5% (5.61 to 6.20) | 1000 |
| 5785 MHz Body | 44.4 | 48.2 ±10% (43.38 to 53.02) | 6.19 | 6.0 ±5% (5.7 to 6.3) | 1000 |
| 5825 MHz Body | 44.2 | 48.2 ±10% (43.38 to 53.02) | 6.21 | 6.0 ±5% (5.7 to 6.3) | 1000 |

NOTE: The muscle liquid parameters were within the required tolerances of ±5% for σ and 10% for ∈r.

### 6.6.1 Liquid Temperature and Humidity

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

**Table 17 Temperature and Humidity recorded for each day**

| Date | Ambient Temperature (°C) | Liquid Temperature (°C) | Humidity (%) |
|---|---|---|---|
| 16th September 10 | 21.6 | 21.3 | 35.0 |
| 20th September 10 | 20.6 | 20.3 | 41.0 |
| 22nd September 10 | 21.5 | 21.3 | 42.0 |

## 6.7 Simulated Tissue Composition Used for SAR Test

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

**Table 18 Tissue Type: Muscle @ 5600MHz**

EMCT Liquid, Volume of Liquid: 60 Litres

| Composition |
|---|
| Distilled Water |
| Salt |
| Triton X-100 |

## 6.8 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 DASY4

The SAR evaluation was performed with the SPEAG DASY4 system. A summary of the procedure follows:

a) A measurement of the SAR value at a fixed location is used as a reference value for assessing the power drop of the EUT. The SAR at this point is measured at the start of the test, and then again at the end of the test.

b) The SAR distribution at the exposed flat section of the flat phantom is measured at a distance of 2.0 mm from the inner surface of the shell. The area covers the entire dimension of the EUT and the horizontal grid spacing is 10 mm x 10 mm. The actual Area Scan has dimensions of 70mm 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 24 mm x 24 mm x 20 mm is assessed by measuring 7 x 7 x 9 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 2.0 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.

# 8.0 MEASUREMENT UNCERTAINTY

The uncertainty analysis is based on the template listed in the IEEE Std 1528-2003 for both device SAR tests and Validation uncertainty. The measurement uncertainty of a specific device is evaluated independently.

**Table 19 Uncertainty Budget for DASY4 Version V4.7 Build 80 – DUT SAR test 5GHz**

| Uncertainty Component | Tol. (6%) | Prob. Dist. | Div. | $C_i$ (1g) | $C_i$ (10g) | 1g $u_i$ (6%) | 10g $u_i$ (6%) | $v_i$ |
|---|---|---|---|---|---|---|---|---|
| Measurement System | | | | | | | | |
| Probe Calibration | 6.55 | N | 1 | 1 | 1 | 6.6 | 6.6 | ∞ |
| Axial Isotropy | 4.7 | R | 1.73 | 0.707 | 0.707 | 1.9 | 1.9 | ∞ |
| Hemispherical Isotropy | 9.6 | R | 1.73 | 0.707 | 0.707 | 3.9 | 3.9 | ∞ |
| Boundary Effects | 2 | R | 1.73 | 1 | 1 | 1.2 | 1.2 | ∞ |
| Linearity | 4.7 | R | 1.73 | 1 | 1 | 2.7 | 2.7 | ∞ |
| System Detection Limits | 1 | R | 1.73 | 1 | 1 | 0.6 | 0.6 | ∞ |
| Readout Electronics | 0.3 | N | 1 | 1 | 1 | 0.3 | 0.3 | ∞ |
| Response Time | 0.8 | R | 1.73 | 1 | 1 | 0.5 | 0.5 | ∞ |
| Integration Time | 2.6 | R | 1.73 | 1 | 1 | 1.5 | 1.5 | ∞ |
| RF Ambient Noise | 3 | R | 1.73 | 1 | 1 | 1.7 | 1.7 | ∞ |
| RF Ambient Reflections | 3 | R | 1.73 | 1 | 1 | 1.7 | 1.7 | ∞ |
| Probe Positioner | 0.8 | R | 1.73 | 1 | 1 | 0.5 | 0.5 | ∞ |
| Probe Positioning | 9.9 | R | 1.73 | 1 | 1 | 5.7 | 5.7 | ∞ |
| Max. SAR Eval. | 4 | R | 1.73 | 1 | 1 | 2.3 | 2.3 | ∞ |
| Test Sample Related | | | | | | | | |
| Test Sample Positioning | 1.61 | N | 1 | 1 | 1 | 1.6 | 1.6 | 11 |
| Device Holder Uncertainty | 3.6 | N | 1 | 1 | 1 | 3.6 | 3.6 | 7 |
| Output Power Variation – SAR Drift Measurement | 11.53 | R | 1.73 | 1 | 1 | 6.7 | 6.7 | ∞ |
| Phantom and Setup | | | | | | | | |
| Phantom Uncertainty | 4 | R | 1.73 | 1 | 1 | 2.3 | 2.3 | ∞ |
| Liquid Conductivity – Deviation from target values | 5 | R | 1.73 | 0.64 | 0.43 | 1.8 | 1.2 | ∞ |
| Liquid Conductivity – Measurement uncertainty | 5 | N | 1.00 | 0.64 | 0.43 | 3.2 | 2.2 | 5 |
| Liquid Permittivity – Deviation from target values | 10 | R | 1.73 | 0.6 | 0.49 | 3.5 | 2.8 | ∞ |
| Liquid Permittivity – Measurement uncertainty | 5 | N | 1.00 | 0.6 | 0.49 | 3.0 | 2.5 | 5 |
| Combined standard Uncertainty | | RSS | | | | 14.4 | 14.0 | 154 |
| Expanded Uncertainty (95% CONFIDENCE LEVEL) | | k=2 | | | | 28.9 | 28.08 | |

Estimated total measurement uncertainty for the DASY4 measurement system was ±14.4%. The extended uncertainty (K = 2) was assessed to be ±28.9% based on 95% confidence level. The uncertainty is not added to the measurement result.

**Table 20 Uncertainty Budget for DASY4 Version V4.7 Build 80 – System verification 5GHz**

| Uncertainty Component | Tol. (6%) | Prob. Dist. | Div. | $C_i$ (1g) | $C_i$ (10g) | 1g $u_i$ (6%) | 10g $u_i$ (6%) | $v_i$ |
|---|---|---|---|---|---|---|---|---|
| Measurement System | | | | | | | | |
| Probe Calibration | 6.55 | N | 1 | 1 | 1 | 6.6 | 6.6 | ∞ |
| Axial Isotropy | 4.7 | R | 1.73 | 1 | 1 | 2.7 | 2.7 | ∞ |
| Hemispherical Isotropy | 9.6 | R | 1.73 | 0 | 0 | 0.0 | 0.0 | ∞ |
| Boundary Effects | 2 | R | 1.73 | 1 | 1 | 1.2 | 1.2 | ∞ |
| Linearity | 4.7 | R | 1.73 | 1 | 1 | 2.7 | 2.7 | ∞ |
| System Detection Limits | 1 | R | 1.73 | 1 | 1 | 0.6 | 0.6 | ∞ |
| Readout Electronics | 0.3 | N | 1 | 1 | 1 | 0.3 | 0.3 | ∞ |
| Response Time | 0 | R | 1.73 | 1 | 1 | 0.0 | 0.0 | ∞ |
| Integration Time | 0 | R | 1.73 | 1 | 1 | 0.0 | 0.0 | ∞ |
| RF Ambient Noise | 3 | R | 1.73 | 1 | 1 | 1.7 | 1.7 | ∞ |
| RF Ambient Reflections | 3 | R | 1.73 | 1 | 1 | 1.7 | 1.7 | ∞ |
| Probe Positioner | 0.8 | R | 1.73 | 1 | 1 | 0.5 | 0.5 | ∞ |
| Probe Positioning | 9.9 | R | 1.73 | 1 | 1 | 5.7 | 5.7 | ∞ |
| Max. SAR Eval. | 4 | R | 1.73 | 1 | 1 | 2.3 | 2.3 | ∞ |
| Dipole | | | | | | | | |
| Dipole Axis to Liquid Distance | 2 | N | 1.73 | 1 | 1 | 1.2 | 1.2 | 11 |
| Input Power and SAR drift meas. | 4.7 | R | 1.73 | 1 | 1 | 2.7 | 2.7 | ∞ |
| Phantom and Tissue Param. | | | | | | | | |
| Phantom Uncertainty | 4 | R | 1.73 | 1 | 1 | 2.3 | 2.3 | ∞ |
| Liquid Conductivity – Deviation from target values | 5 | R | 1.73 | 0.64 | 0.43 | 1.8 | 1.2 | ∞ |
| Liquid Conductivity – Measurement uncertainty | 2.5 | N | 1.00 | 0.64 | 0.43 | 1.6 | 1.1 | 5 |
| Liquid Permittivity – Deviation from target values | 10 | R | 1.73 | 0.6 | 0.49 | 3.5 | 2.8 | ∞ |
| Liquid Permittivity – Measurement uncertainty | 2.5 | N | 1.00 | 0.6 | 0.49 | 1.5 | 1.2 | 5 |
| Combined standard Uncertainty | | RSS | | | | 11.7 | 11.4 | 154 |
| Expanded Uncertainty (95% CONFIDENCE LEVEL) | | k=2 | | | | 23.5 | 22.79 | |

Estimated total measurement uncertainty for the DASY4 measurement system was ±11.7%. The extended uncertainty (K = 2) was assessed to be ±23.5% based on 95% confidence level. The uncertainty is not added to the measurement result.

# 9.0 EQUIPMENT LIST AND CALIBRATION DETAILS

**Table 21 SPEAG DASY4 Version V4.7 Build 80**

| Equipment Type | Manufacturer | Model Number | Serial Number | Calibration Due | Used For this Test? |
|---|---|---|---|---|---|
| Robot - Six Axes | Staubli | RX90BL | N/A | Not applicable | ✓ |
| Robot Remote Control | SPEAG | CS7MB | RX90B | Not applicable | ✓ |
| SAM Phantom | SPEAG | N/A | 1260 | Not applicable | |
| SAM Phantom | SPEAG | N/A | 1060 | Not applicable | |
| Flat Phantom | AndreT | 10.1 | P 10.1 | Not Applicable | ✓ |
| Flat Phantom | AndreT | 9.1 | P 9.1 | Not Applicable | |
| Flat Phantom | SPEAG | PO1A 6mm | 1003 | Not Applicable | |
| Data Acquisition Electronics | SPEAG | DAE3 V1 | 359 | 07-July-2011 | |
| Data Acquisition Electronics | SPEAG | DAE3 V1 | 442 | 08-Dec-2010 | ✓ |
| Probe E-Field - Dummy | SPEAG | DP1 | N/A | Not applicable | |
| Probe E-Field | SPEAG | ET3DV6 | 1380 | 11-Dec-2010 | |
| Probe E-Field | SPEAG | ET3DV6 | 1377 | 7-July-2011 | |
| Probe E-Field | SPEAG | ES3DV6 | 3029 | Not Used | |
| Probe E-Field | SPEAG | EX3DV4 | 3563 | 16-July-2011 | ✓ |
| Probe E-Field | SPEAG | EX3DV4 | 3657 | 15-July-2011 | |
| Antenna Dipole 300 MHz | SPEAG | D300V2 | 1005 | 15-Dec-2011 | |
| Antenna Dipole 450 MHz | SPEAG | D450V2 | 1009 | 17-Dec-2010 | |
| Antenna Dipole 900 MHz | SPEAG | D900V2 | 047 | 5-July-2012 | |
| Antenna Dipole 1640 MHz | SPEAG | D1640V2 | 314 | 9-July-2012 | |
| Antenna Dipole 1800 MHz | SPEAG | D1800V2 | 242 | 13-July-2012 | |
| Antenna Dipole 1950 MHz | SPEAG | D1950V3 | 1113 | 12-Dec -2010 | |
| Antenna Dipole 3500 MHz | SPEAG | D3500V2 | 1002 | 17-July-2010 | |
| Antenna Dipole 2450 MHz | SPEAG | D2450V2 | 724 | 10-Dec-2010 | |
| Antenna Dipole 5600 MHz | SPEAG | D5GHzV2 | 1008 | 16-Dec-2011 | ✓ |
| RF Amplifier | EIN | 603L | N/A | *In test | |
| RF Amplifier | Mini-Circuits | ZHL-42 | N/A | *In test | |
| RF Amplifier | Mini-Circuits | ZVE-8G | N/A | *In test | ✓ |
| Synthesized signal generator | Hewlett Packard | ESG-D3000A | GB37420238 | *In test | |
| RF Power Meter | Hewlett Packard | 437B | 3125012786 | 9-Aug-2011 | |
| RF Power Sensor 0.01 - 18 GHz | Hewlett Packard | 8481H | 1545A01634 | 13-Aug-2011 | |
| RF Power Meter | Rohde & Schwarz | NRP | 101415 | 5-May-2011 | ✓ |
| RF Power Sensor | Rohde & Schwarz | NRP - Z81 | 100174 | 16-July-2011 | ✓ |
| RF Power Meter Dual | Hewlett Packard | 435A | 1733A05847 | *In test | ✓ |
| RF Power Sensor | Hewlett Packard | 8482A | 2349A10114 | *In test | ✓ |
| Network Analyser | Hewlett Packard | 8714B | GB3510035 | 30-Sept-2010 | |
| Network Analyser | Hewlett Packard | 8753ES | JP39240130 | 24-Nov-2010 | ✓ |
| Dual Directional Coupler | Hewlett Packard | 778D | 1144 04700 | *In test | |
| Dual Directional Coupler | NARDA | 3022 | 75453 | *In test | ✓ |

* Calibrated during the test for the relevant parameters.

# 10.0 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 A1) or a Tablet configuration. The antenna location in the "LifeBook T series" is closest to the top of the screen when used in a conventional laptop configuration.

## 10.0 Position

### 10.1.1 "Tablet" Position Definition (0mm spacing)

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

### 10.1.2 "Edge On" Position (Portrait or Landscape)

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

### 10.1.3 "Lap Held" Position (0mm spacing)

The DUT was tested in the 2.00 mm flat section of the AndreT Flat phantom P 10.1 for the "Lap Held" position. The DUT was placed at the bottom of the phantom and suspended in such way that the back of the device was touching the phantom. The LCD screen was angled at 90 degrees to the base of the Tablet. 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.

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

The device has a fixed antenna. Depending on the measured SAR level up to three test channels with the test sample operating at maximum power were recorded. The following table represents the matrix used to determine what testing was required. All relevant provisions of KDB 447498 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 22 Testing configurations**

| Phantom Configuration | *Device Mode | Antenna | Test Configurations | | |
|---|---|---|---|---|---|
| | | | Channel (Low) | Channel (Middle) | Channel (High) |
| Lap Held | OFDM 5GHz All Bands | A | | X | |
| | | B | | X | |
| Tablet | OFDM 5GHz All Bands | A | | X | |
| | | B | | X | |
| Edge On | OFDM 5GHz All Bands | A | | X | |
| | | B | | 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. |

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

# 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 GHz Band SAR Results

**Table 23 SAR MEASUREMENT RESULTS Lower Band – OFDM Mode**

| Test Position | Plot No. | Ant | Bit rate Mode (Mbps) | Channel Bandwidth (MHz) | Test Channel | Test Freq (MHz) | Measured 1g SAR Results (mW/g) | Measured Drift (dB) |
|---|---|---|---|---|---|---|---|---|
| Tablet | 1 | A | 6 | - | 52 | 5240 | 0.195 | 0.225 |
| Tablet | 2 | B | 6 | - | 52 | 5240 | 0.072 | -0.188 |
| | | | | | | | | |
| Lap Held | - | A | 6 | - | 52 | 5240 | Noise Floor | - |
| Lap Held | - | B | 6 | - | 52 | 5240 | Noise Floor | - |
| | | | | | | | | |
| Edge On Primary Portrait | 3 | A | 6 | - | 52 | 5240 | 0.732 | -0.212 |
| Edge On Primary Portrait | 4 | A | HT0 | 20 | 48 | 5240 | 0.527 | 0.049 |
| Edge On Secondary Portrait | 5 | B | 6 | - | 52 | 5240 | 0.033 | 0.268 |
| | | | | | | | | |
| Edge On Secondary Landscape | 6 | B | 6 | - | 52 | 5240 | 0.743 | -0.032 |
| Edge On Secondary Landscape | 7 | B | HT0 | 20 | 48 | 5240 | 0.484 | -0.201 |
| Edge On Secondary Landscape | 8 | A | HT0 | 20 | 36 | 5180 | 0.792 | -0.230 |
| | 9 | A | HT0 | 20 | 48 | 5240 | 0.858 | -0.071 |
| | 10 | A | 6 | - | 52 | 5240 | 1.12 | 0.060 |
| | 11 | A | 6 | - | 64 | 5320 | 1.09 | -0.046 |

NOTE: The measurement uncertainty of 28.9% for 5GHz testing is not added to the result.

The highest SAR level recorded in the 5.2 GHz band was 1.12 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 52 (5240MHz) and antenna A.

**Table 24 SAR MEASUREMENT RESULTS Middle Band – OFDM Mode**

| Test Position | Plot No. | Ant | Bit rate Mode (Mbps) | Channel Bandwidth (MHz) | Test Channel | Test Freq (MHz) | Measured 1g SAR Results (mW/g) | Measured Drift (dB) |
|---|---|---|---|---|---|---|---|---|
| Tablet | 12 | A | 6 | - | 124 | 5620 | 0.200 | -0.050 |
| Tablet | 13 | B | 6 | - | 124 | 5620 | 0.105 | 0.223 |
| | | | | | | | | |
| Lap Held | - | A | 6 | - | 124 | 5620 | Noise Floor | - |
| Lap Held | - | B | 6 | - | 124 | 5620 | Noise Floor | - |
| | | | | | | | | |
| Edge On Primary Portrait | 14 | A | 6 | - | 124 | 5620 | 0.711 | 0.075 |
| Edge On Secondary Portrait | 15 | B | 6 | - | 124 | 5620 | 0.036 | 0.414 |
| | | | | | | | | |
| Edge On Secondary Landscape | 16 | A | 6 | - | 104 | 5520 | 1.07 | -0.195 |
| | 17 | A | 6 | - | 116 | 5580 | 1.00 | -0.166 |
| | 18 | A | 6 | - | 124 | 5620 | 1.12 | -0.045 |
| | 19 | A | 6 | - | 136 | 5680 | 0.933 | -0.024 |
| | | | | | | | | |
| Edge On Secondary Landscape | 20 | B | 6 | - | 104 | 5520 | 1.04 | 0.122 |
| | 21 | B | 6 | - | 116 | 5580 | 0.989 | -0.107 |
| | 22 | B | 6 | - | 124 | 5620 | 1.02 | 0.002 |
| | 23 | B | 6 | - | 136 | 5680 | 0.942 | -0.297 |

NOTE: The measurement uncertainty of 28.9% for 5GHz testing is not added to the result.

The highest SAR level recorded in the 5.6 GHz band was 1.12 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 124 (5620MHz) and antenna A.

**Table 25 SAR MEASUREMENT RESULTS Upper Band – OFDM Mode**

| Test Position | Plot No. | Ant | Bit rate Mode (Mbps) | Channel Bandwidth (MHz) | Test Channel | Test Freq (MHz) | Measured 1g SAR Results (mW/g) | Measured Drift (dB) |
|---|---|---|---|---|---|---|---|---|
| Tablet | 24 | A | 6 | - | 157 | 5785 | 0.095 | 0.150 |
| Tablet | 25 | B | 6 | - | 157 | 5785 | 0.075 | -0.231 |
| | | | | | | | | |
| Lap Held | - | A | 6 | - | 157 | 5785 | Noise Floor | - |
| Lap Held | - | B | 6 | - | 157 | 5785 | Noise Floor | - |
| | | | | | | | | |
| Edge On Primary Portrait | 26 | A | 6 | - | 157 | 5785 | 0.529 | -0.290 |
| Edge On Secondary Portrait | 27 | B | 6 | - | 157 | 5785 | 0.038 | 0.300 |
| | | | | | | | | |
| Edge On Secondary Landscape | 28 | A | 6 | - | 149 | 5745 | 1.29 | -0.022 |
| | 29 | A | 6 | - | 157 | 5785 | 1.02 | -0.002 |
| | 30 | A | 6 | - | 165 | 5825 | 0.813 | -0.099 |
| | | | | | | | | |
| Edge On Secondary Landscape | 31 | B | 6 | - | 149 | 5745 | 0.673 | 0.225 |
| | 32 | B | 6 | - | 157 | 5785 | 0.756 | -0.271 |
| | 33 | B | 6 | - | 165 | 5825 | 0.671 | 0.474 |

NOTE: The measurement uncertainty of 28.9% for 5GHz testing is not added to the result.

The highest SAR level recorded in the 5.8 GHz band was 1.29 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 149 (5745MHz) and antenna A.

## 12.0 COMPLIANCE STATEMENT

The Fujitsu Tablet PC, Model: T580 / TH550 with Atheros Communication Inc. Mini-PCI Wireless LAN Module (HB92 802.11a/b/g/n), Model: AR5BHB92 & CSR Bluetooth Module, Model: BSMAN3 was found to comply with the FCC and RSS-102 SAR requirements.

The highest SAR level recorded was 1.29 mW/g for a 1g cube. This value was measured at 5745 MHz (channel 149) in the “Edge On Secondary Landscape” position in OFDM modulation mode at the antenna A. This was below the limit of 1.6 mW/g for uncontrolled exposure, but was within the band of measurement uncertainty around the limit.

## 13.0 MULTIBAND EVALUATION CONSIDERATIONS

Fujitsu **TABLET** PC, Model: **T580/TH550** is equipped with WLAN (AR5BHB92) and Bluetooth (BSMAN3).

According to the FCC SAR evaluation procedures mentioned in **"Supplement to the KDB 616217" (for Tablet PC with the LCD size < 12)**, 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 EUT operates in the 2.4GHz range. It has a maximum output power of 2.5mW (4dBm) which is less than $P_{ref}$ (=60/2.4=25mW).

The shortest distance between the BT module and any other transmitting antenna was 21.5cm.

Because 21.5cm > 5cm, and 2.5mW < 25mW, the Bluetooth module was not considered for SAR evaluation. This is in accordance with the test reduction methods detailed in **"Supplement to the KDB 616217"** and KDB 447498.

**Diagram Showing distance between Antenna Locations**


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