



NVLAP LAB CODE 200707-0



# FCC PART 24 E MEASUREMENT AND TEST REPORT

For

**Tobii Technology AB**

Karlsrovägen 2D, 18256 Danderyd, Sweden

**FCC ID: W5MTOBIIC8**

<b>Report Type:</b> Original Report	<b>Product Type:</b> A Laptop Computer with Bluetooth, WiFi and GSM Modules
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<b>Report Number:</b> <u>RSZ08121003-24E</u>	
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\* This report may contain data that are not covered by the NVLAP accreditation and are marked with an asterisk "\*" (Rev.2)

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## GENERAL INFORMATION

### Product Description for Equipment Under Test (EUT)

The Tobii Technology AB's product, model number: *T-C84-R1.0A-V0* or the "EUT" as referred to in this report is a *Tobii C8(A Laptop Computer with Bluetooth, WiFi and GSM Modules)*, which measures approximately: 23.2 cm L x 20.6 cm W x 3.9 cm H, input voltage: DC 24V Adapter or DC 11.1V battery.

Frequency band: PCS 1900: 1850-1910 MHz (Tx), 1930-1990 MHz (Rx)

Bluetooth: 2402-2480 MHz (Tx/ Rx)

WiFi: 2412-2462 MHz (Tx/ Rx)

#### Antenna Information:

The EUT has 3 antennae, one is for Bluetooth, the gain is -4.6dBi; one is for WiFi, the gain is -2.3dBi; other is for PCS, the gain is -5.8dBi. All antennae are printed on PCB.

*\* All measurement and test data in this report was gathered from production sample serial number: 0812032 (Assigned by BACL, Shenzhen). The EUT was received on 2008-12-10.*

### EUT Photo



*Please see additional photos in Exhibit B & C*

## Objective

This type approval report is prepared on behalf of *Tobii Technology AB* in accordance with Part 2, Subpart J, and Part 24 Subpart E of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC rules for output power, modulation characteristic, occupied bandwidth, and spurious emission at antenna terminal, spurious radiated emission, frequency stability, band edge and radiated margin.

## Related Submittal(s)/Grant(s)

FCC Part 15.247 and Part 15 B submission with FCC ID: W5MTOBIIC8.

## Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2, Sub-part J as well as the following parts:

Part 24 Subpart E - PCS

Applicable Standards: TIA/EIA 603-C, ANSI 63.4-2003.

All radiated and conducted emissions measurements were performed at Bay Area Compliance Laboratories Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

## Test Facility

The Test site used by Bay Area Compliance Laboratories Corp.(Shenzhen) to collect test data is located in the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratories Corp. (Shenzhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on November 21, 2007. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratories Corp. (Shenzhen) is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200707-0).



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The current scope of accreditations can be found at  
<http://ts.nist.gov/Standards/scopes/2007070.htm>

## **SYSTEM TEST CONFIGURATION**

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### **Justification**

The EUT was configured for testing according to TIA/EIA-603-C.

The final qualification test was performed with the EUT operating at normal mode.

### **Equipment Modifications**

No modifications were made to the EUT.

**Host System Configuration List and Details**

Manufacturer	Description	Model	Serial Number	FCC ID
DELL	Motherboard	OWC297	CN-OWC297-70821-566-02BR	DoC
DELL	Power	NPS-250KB D	CN-0H2678-17972-56E8NBM	DoC
Seagate	Hard Disk	ST340014A	5JXK3NAD	DoC
DELL	3.5' Floppy	N/A	CN-0N8893-69802-54Q-02OZ	DoC
Lite-ON	CD-Rom	LTN-489S	N/A	DoC
Intel	CPU	Celeron D-2533	N/A	N/A
ProMOS	Memory	V826632K24SATG-C0	0525-K1933700	N/A
Intel	Ethernet	PRO 10/100 VE	N/A	DoC

**Local Support Equipment List and Details**

Manufacturer	Description	Model	Serial Number	FCC ID
DELL	PC	DELL 170L	CN-0TC670-70821-560-F4WQ	DoC
DELL	Keyboard	SK-8110	CN07N244-71616-56I-110O	DoC
DELL	Mouse	M071KC	519046820	DoC
DELL	Mouse	MUC5UO	N/A	DoC
DELL	LCD Monitor	1505FP	Y4287-7168-574-GBSH	DoC
SOMIC	Earphone	ST-818	N/A	DoC
Kingston	U disk 1	Data Traveler	N/A	DoC
HuaPu	U disk 2	DPF-802	N/A	DoC
Powerbox AB	Adapter	EXM805121	084700072/FC:11	Verification

**External I/O Cable**

Cable Description	Length (M)	From/Port	To
Shielded Detachable K/B Cable	1.5	K/B Port	K/B
Shielded Detachable Mouse Cable	1.5	Mouse Port	Mouse
Shielded Detachable VGA Cable	1.5	VGA Port	Monitor
Shielded Detachable Power Line	1.96	EUT	Adapter

The diagram illustrates the system architecture, divided into two main sections by a dashed line. On the left, the USB Port and Mini USB Port are connected to the U Disk. The USB Port is also connected to the Adapter, which is connected to the Receptacle. The Mini USB Port is connected to the EUT. The EUT is connected to the Earphone and the Mouse. On the right, the Host PC System is connected to the Keyboard and the Monitor. The Host PC System is also connected to the Mouse. The Keyboard is connected to the Mouse.

The diagram illustrates the experimental setup for the proposed method. It features a non-conduction table positioned 80 cm above the ground plane. On the table, a Receptacle is connected to LISN 2. A USB Port is connected to a USB device, which is in turn connected to an Earphone. The Earphone is connected to the EUT (Equipment Under Test). The EUT is connected to a Mini-USB device, which is connected to a Mouse. The distance between the USB Port and the Mouse is 1.5 Meter. The table height is 1.0 Meter. On the right side, a PC is connected to LISN 1. The PC is connected to a Monitor, a Keyboard, and a Mouse. The distance between the PC and the Mouse is 10cm. The distance between the Keyboard and the Mouse is 10cm. The distance between the PC and the Monitor is 10cm. The distance between the EUT and the Mini-USB device is 10cm. The distance between the Earphone and the EUT is 10cm. The distance between the USB Port and the Earphone is 10cm. The distance between the Receptacle and the USB Port is 10cm.

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**SUMMARY OF TEST RESULTS**

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FCC Rules	Description of Test	Result
§1.1037, §2.1093	RF Exposure	Compliant *
§2.1046, § 24.232 (c)	RF Output Power	Compliant*
§ 2.1047	Modulation Characteristics	Compliant*
§ 2.1049, § 24.238	99% & -26 dB Occupied Bandwidth	Compliant*
§ 2.1051, § 24.238 (a)	Spurious Emissions at Antenna Terminal	Compliant*
§ 2.1053, § 24.238 (a)	Field Strength of Spurious Radiation	Compliant
§ 24.238 (a)	Out of Band Emission, Band Edge	Compliant*
§ 2.1055, § 24.235	Frequency Stability vs. temperature Frequency Stability vs. voltage	Compliant*

\* Please refer to FCC ID: QIPMC55 granted on 2004-02-13, report number: 2\_3450-01-02/03.



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## **§1.1037, §2.1093 - RF EXPOSURE**

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### **Applicable Standard**

§1.1310 and §2.1093

### **Test Result**

\* Please refer to the SAR report, report No.R0901121-SAR.

## **§2.1047 - MODULATION CHARACTERISTIC**

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### **Applicable Standard**

According to FCC § 2.1047(d), Part 24E there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

**§ 2.1046 & § 24.232 (c) - RF OUTPUT POWER**

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**Applicable Standard**

According to FCC §2.1046 and §24.232 (C), in no case may the peak output power of a base station transmitter exceed 2 watt EIRP.

**Test Data**

\* Please refer to FCC ID: QIPMC55 granted on 2004-02-13, report number: 2\_3450-01-02/03.

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## **§2.1049 & §24.238 - OCCUPIED BANDWIDTH**

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### **Applicable Standards**

CFR 47 §2.1049 and §24.238.

### **Test Data**

\* Please refer to FCC ID: QIPMC55 granted on 2004-02-13, report number: 2\_3450-01-02/03.

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## **§2.1051 & §24.238(a) - SPURIOUS EMISSIONS AT ANTENNA TERMINALS**

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### **Applicable Standards**

CFR 47 §2.1051 and §4.238(a).

The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency as specified in § 2.1051.

### **Test Data**

\* Please refer to FCC ID: QIPMC55 granted on 2004-02-13, report number: 2\_3450-01-02/03.

## §2.1053 & § 24.238 - SPURIOUS RADIATED EMISSIONS

### Applicable Standards

CFR 47 § 2.1053 and § 24.238.

### Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB =  $10 \lg (\text{TX pwr in Watts}/0.001)$  – the absolute level

Spurious attenuation limit in dB =  $43 + 10 \text{Log}_{10} (\text{power out in Watts})$

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Sunol Sciences	Horn Antenna	DRH-118	A052604	2008-09-25	2009-09-25
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2008-03-11	2009-03-11
Rohde & Schwarz	Spectrum Analyzer	FSEM30	849720/019	2008-05-09	2009-05-09
HP	Preamplifier	8449B	3008A00277	2008-09-12	2009-09-11
HP	Signal Generator	HP8657A	2849U00982	2008-10-16	2009-10-16
HP	Amplifier	HP8447D	2944A09795	2008-08-02	2009-08-02
HP	Synthesized Sweeper	8341B	2624A00116	2008-11-07	2009-11-06
COM POWER	Dipole Antenna	AD-100	041000	2008-09-25	2009-09-25
A.H. System	Horn Antenna	SAS-200/571	135	2008-05-17	2009-05-17
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	1100.0008.02	2008-06-21	2009-06-21

**\* Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

**Test Data****Environmental Conditions**

<b>Temperature:</b>	25 °C
<b>Relative Humidity:</b>	56 %
<b>ATM Pressure:</b>	100.0kPa

The testing was performed by Bruce Zhang on 2009-03-06.

Test Mode: Transmitting (PCS1900) (below 1 GHz):

Indicated		Table Angle Degree	Test Antenna		Substituted				Absolute Level (dBm)	Part 24E Limit (dBm)	Margin (dB)
Frequency (MHz)	Reading (dBμV)		Height (m)	Polar (H/V)	Frequency (MHz)	S.G. Level (dBm)	Antenna Gain (dBi)	Cable Loss (dB)			
700.32	45.17	135	1.0	V	700.32	-53.5	0	0.74	-54.24	-13	41.24
239.0	34.37	85	1.0	H	239.0	-62.7	0	0.60	-63.3	-13	50.30
434.30	34.58	260	2.0	V	434.30	-63.3	0	0.56	-63.86	-13	50.86
432.5	33.54	320	1.5	H	432.5	-64.1	0	0.56	-64.66	-13	51.66

Test Mode: Transmitting (PCS1900) (Above 1GHz):

Indicated		Table Angle Degree	Test Antenna		Substituted				Absolute Level (dBm)	Part 24E Limit (dBm)	Margin  (dB)
Frequency (MHz)	Reading (dBμV)		Height (m)	Polar (H/V)	Frequency (MHz)	S.G. Level (dBm)	Antenna Gain (dBi)	Cable Loss (dB)			
Middle Channel											
2496	50.42	140	1.2	H	2496	-46.8	7.3	1.19	-40.72	-13	27.72
3760	49.18	313	1.3	H	3760	-47.6	7.1	1.47	-41.94	-13	28.94
2418	50.86	48	1.05	H	2418	-48.3	7.4	1.16	-42.05	-13	29.05
1600	61.66	178	1.7	V	1600	-47.8	6.2	0.95	-42.52	-13	29.52
2418	51.32	15	1.0	V	2418	-50.0	7.4	1.16	-43.71	-13	30.71
2496	50.45	22	1.0	V	2496	-50.2	7.3	1.19	-44.11	-13	31.11
1600	53.96	315	2.0	H	1600	-51.5	6.2	0.95	-46.21	-13	33.21
3760	45.37	190	1.0	V	3760	-53.2	7.1	1.47	-47.56	-13	34.56

**§24.238(a) - BAND EDGES**

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**Applicable Standards**

According to §24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

**Test Data**

\* Please refer to FCC ID: QIPMC55 granted on 2004-02-13, report number: 2\_3450-01-02/03.



**§2.1055, §24.235 - FREQUENCY STABILITY**

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**Applicable Standard**

CFR47 § 2.1055 (a), §24.235

According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

**Test Data**

\* Please refer to FCC ID: QIPMC55 granted on 2004-02-13, report number: 2\_3450-01-02/03.

**\*\*\*\*\* END OF REPORT \*\*\*\*\***