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FCC PART 22H & 24E

MEASUREMENT AND TEST REPORT

For

Tobii Technology AB

Karlsrovägen 2D, 18253 Danderyd, Sweden

FCC ID: W5MTOBIIC15

Report Type: Original Report	Product Type: Tobii C15
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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-C15-R1.0A-V0 (FCC ID: W5MTOBIIC15)* or the "EUT" as referred to in this report is a *Tobii C15*, which measures approximately: 37 cm (L) x 30 cm (W) x 4 cm (H), rated input voltage: DC 24 V adapter or DC 14.8 V battery.

Adapter information: AC Power Adapter

Manufacturer: Powerbox

Model: EXM 80 5121;

Input: 100-240 VAC, 1.7A, 50-60 Hz;

Output: 24VDC, 2.9 A

All measurement and test data in this report was gathered from production sample serial number: 1006060 (Assigned by BACL, Shenzhen). The EUT was received on 2010-06-25.

Objective

This type approval report is prepared on behalf of *Tobii Technology AB* in accordance with Part 2, Subpart J, Part 22 Subpart H, 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(BT), FCC Part 15.247(WiFi) and FCC Part 15B submission with FCC ID: W5MTOBIIC15.

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 22 Subpart H - Public Mobile Services

Part 24 Subpart E - Personal Communication Services

Applicable Standards: TIA/EIA 603-C, ANSI C63.4-2003.

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).



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

SYSTEM TEST CONFIGURATION

Justification

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

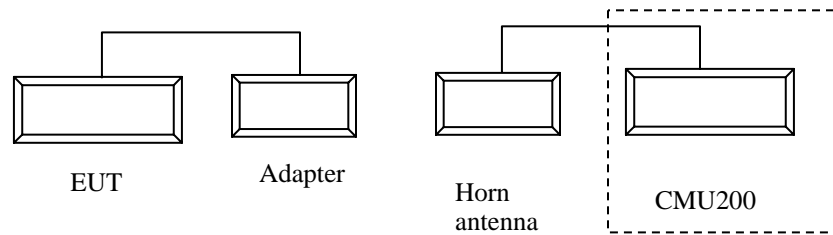
The GSM/PCS item test was performed with the EUT operating at normal mode.

The GPRS item test was performed with the EUT operating at engineering mode.

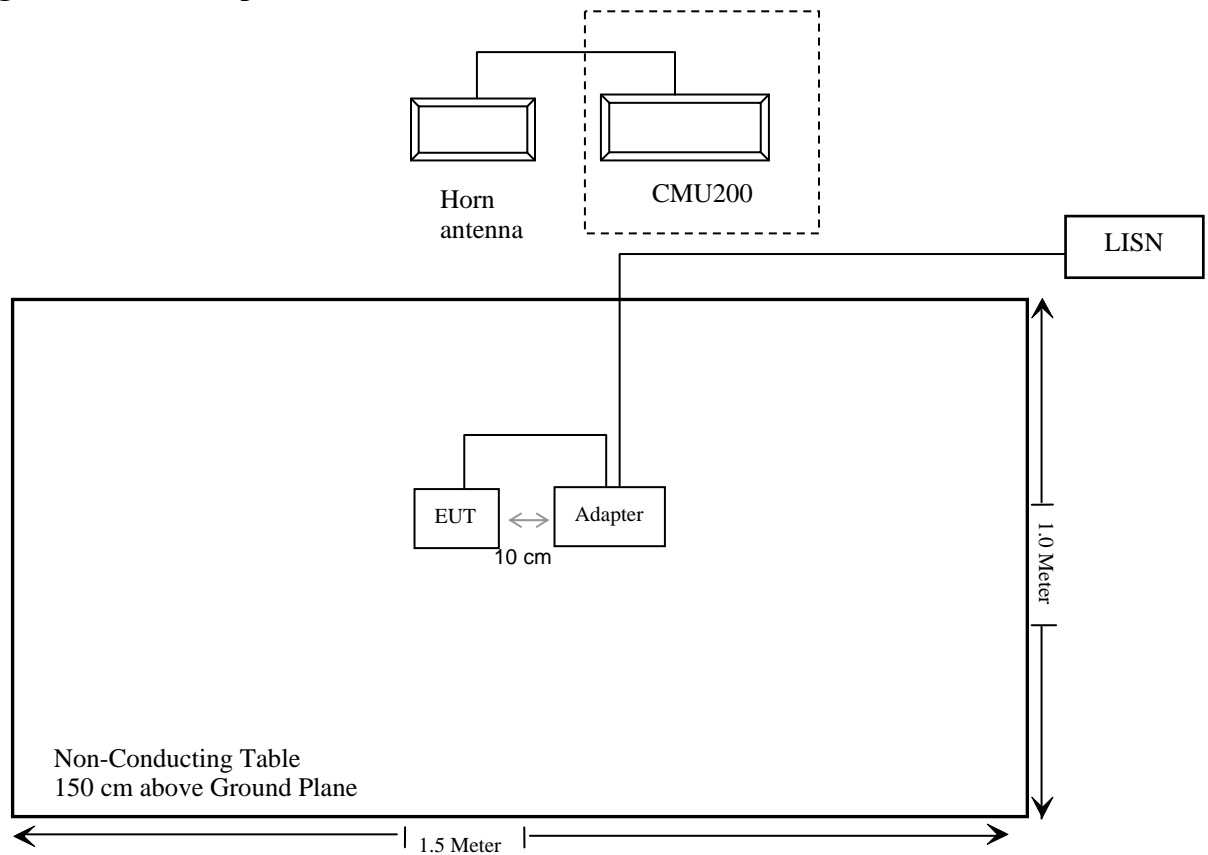
Equipment Modifications

No modifications were made to the EUT.

Configuration of Test Setup



Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1307; §2.1093	RF Exposure (SAR)	Compliance
§2.1046; §22.913 (a); §24.232 (c)	RF Output Power	Compliance
§2.1047	Modulation Characteristics	N/A
§2.1049; §22.905 §22.917; §24.238	99% & -26 dB Occupied Bandwidth	Compliance*
§2.1051; §22.917 (a); §24.238 (a)	Spurious Emissions at Antenna Terminal	Compliance*
§2.1053; §22.917 (a); §24.238 (a)	Field Strength of Spurious Radiation	Compliant
§22.917 (a); §24.238 (a)	Out of band emission, Band Edge	Compliance*
§2.1055 §22.355; §24.235	Frequency stability vs. temperature Frequency stability vs. voltage	Compliance*

Note: *Please refer to FCC ID: QIPMC55I granted on 2008-01-23, report number: 2-20722858C/07-C1, which was issued by CETECOM GmbH issued on 2008-01-03.

FCC §1.1307 & §2.1093 - RF EXPOSURE

Applicable Standard

FCC §1.1307 and §2.1093.

Test Result

Compliance

Please refer to the SAR report: R1008238-FCC-SAR issued by BACL, Sunnyvale on 2010-09-07.

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FCC §2.1047 - MODULATION CHARACTERISTIC

Note: *Please refer to FCC ID: QIPMC55I granted on 2008-01-23, report number: 2-20722858C/07-C1, which was issued by CETECOM GmbH issued on 2008-01-03.

FCC §2.1046, §22.913 (a) & §24.232 (c) - RF OUTPUT POWER

Applicable Standard

According to FCC §2.1046 and §22.913 (a), the ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

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 Procedure

Radiated method:

TIA 603-C section 2.2.17

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Sunol Sciences	Horn Antenna	DRH-118	A052604	2010-05-05	2011-05-04
Rohde & Schwarz	Spectrum Analyzer	FSEM30	849720/019	2010-07-08	2011-07-07
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2010-03-11	2011-03-11
HP	Amplifier	2VA-213+	T-E27H	2010-03-08	2011-03-07
HP	Signal Generator	HP8657A	2849U00982	2009-10-28	2010-10-27
HP	Amplifier	HP8447D	2944A09795	2010-08-02	2011-08-02
HP	Synthesized Sweeper	8341B	2624A00116	2009-11-07	2010-11-06
COM POWER	Dipole Antenna	AD-100	041000	2009-09-25	2010-09-25
A.H. System	Horn Antenna	SAS-200/571	135	2010-05-17	2011-05-17

* **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

Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	100.0 kPa

The testing was performed by Phoenix Liu on 2010-08-19.

Conducted Power

Note: *Please refer to FCC ID: QIPMC55I granted on 2008-01-23, report number: 2-20722858C/07-C1

ERP & EIRP:**ERP for Cellular Band (Part 22H)**

Indicated		Table Angle Degree	Test Antenna		Substituted			Antenna Gain Correction (dBd)	Cable Loss (dB)	Absolute Level (dBm)	Part 22H Limit (dBm)
Frequency (MHz)	Receiver Reading (dBμV)		Height (m)	Polar (H/V)	Frequency (MHz)	S.G. Level (dBm)	Ant. Polar (H/V)				
Low Channel											
824.2	114.12	320	2.0	H	824.2	20.56	H	0	0.9	19.66	38.45
824.2	116.60	260	2.0	V	824.2	21.61	V	0	0.9	20.71	38.45
Middle Channel											
836.6	114.19	196	2.0	H	836.6	20.29	H	0	0.9	19.39	38.45
836.6	116.77	240	2.0	V	836.6	21.32	V	0	0.9	20.42	38.45
High Channel											
848.8	116.48	245	2.0	H	848.8	20.58	H	0	0.9	19.68	38.45
848.8	119.44	220	2.0	V	848.8	21.95	V	0	0.9	21.05	38.45

EIRP for PCS Band (Part 24E)

Indicated		Table Angle Degree	Test Antenna		Substituted			Antenna Gain Correction (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Part 24E Limit (dBm)
Frequency (MHz)	Receiver Reading (dBμV)		Height (m)	Polar (H/V)	Frequency (MHz)	S.G. Level (dBm)	Ant. Polar (H/V)				
Low Channel											
1850.2	109.56	360	1.15	H	1850.2	11.3	H	6.2	1.02	16.48	33
1850.2	110.92	60	1.40	V	1850.2	12.5	V	6.2	1.02	17.68	33
Middle Channel											
1880	109.70	17	1.15	H	1880	12.2	H	6.2	1.03	17.37	33
1880	110.35	300	1.40	V	1880	13.6	V	6.2	1.03	18.77	33
High Channel											
1909.8	107.22	50	1.40	H	1909.8	11.3	H	6.2	1.03	16.47	33
1909.8	109.80	144	1.36	V	1909.8	13.8	V	6.2	1.03	18.97	33

FCC §2.1049, §22.917, §22.905 & §24.238 - OCCUPIED BANDWIDTH

Applicable Standards

FCC §2.1049, §22.917, §22.905 and §24.238.

Test Data

Please refer to FCC ID: QIPMC55I granted on 2008-01-23, report number: 2-20722858C/07-C1

FCC §2.1051, §22.917(a) & §24.238(a) - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Applicable Standards

FCC §2.1051, §22.917(a) and §24.238(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: QIPMC55I granted on 2008-01-23. report number: 2-20722858C/07-C1

FCC §2.1053, §22.917 & §24.238 - SPURIOUS RADIATED EMISSIONS

Applicable Standards

FCC § 2.1053, §22.917 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 = $10 \lg (\text{TXpwr in Watts}/0.001)$ – 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	2010-05-05	2011-05-04
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2010-03-11	2011-03-11
Rohde & Schwarz	Spectrum Analyzer	FSEM30	849720/019	2010-07-08	2011-07-07
HP	Amplifier	2VA-213+	T-E27H	2010-03-08	2011-03-07
HP	Signal Generator	HP8657A	2849U00982	2009-10-28	2010-10-27
HP	Amplifier	HP8447D	2944A09795	2010-08-02	2011-08-02
HP	Synthesized Sweeper	8341B	2624A00116	2009-11-07	2010-11-06
COM POWER	Dipole Antenna	AD-100	041000	2009-09-25	2010-09-25
A.H. System	Horn Antenna	SAS-200/571	135	2010-05-17	2011-05-17
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	109038	2010-06-11	2011-06-10

* **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**

Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	100.0 kPa

The testing was performed by Phoenix Liu on 2010-08-19.

Test mode: Transmitting

Cellular Band (Part 22H)

Indicated		Table Angle Degree	Test Antenna		Substituted				Absolute Level (dBm)	Limit (dBm)	Margin (dB)
Frequency (MHz)	Receiver Reading (dBμV)		Height (m)	Polar (H/V)	Frequency (MHz)	Level (dBm)	Ant. Gain (dBi)	Cable Loss (dB)			
Middle Channel, Below 1 GHz											
624.14	35.93	70	1.5	V	624.14	-59.1	0	1.50	-60.60	-13	47.60
936.24	35.54	150	1.5	H	936.24	-60.3	0	1.88	-62.18	-13	49.18
199.26	33.85	210	1.3	H	199.26	-61.6	0	0.73	-62.33	-13	49.33
199.26	34.37	242	1.2	V	199.26	-61.8	0	0.73	-62.53	-13	49.53
Middle Channel, Above 1 GHz											
1600	61.66	178	1.7	V	1600	-39.18	7.7	2.33	-33.81	-13	20.81
1600	53.96	315	2.0	H	1600	-48.88	6.9	2.33	-44.31	-13	31.31
2929.8	47.67	73	1.5	V	2929.8	-50.06	8.8	3.34	-44.60	-13	31.60
2929.8	45.29	80	1.3	H	2929.8	-54.44	7.8	3.34	-49.98	-13	36.98
5563.8	43.02	80	1.3	V	5563.8	-55.98	9.1	4.57	-51.45	-13	38.45
6987.6	42.41	140	1.3	V	6987.6	-55.76	9.3	5.00	-51.46	-13	38.46
5563.8	42.69	132	1.5	H	5563.8	-55.31	8.3	4.57	-51.58	-13	38.58
6987.9	41.37	117	1.4	H	6987.9	-56.8	7.9	5.00	-53.90	-13	40.90

PCS Band (Part 24E)

Indicated		Table Angle Degree	Test Antenna		Substituted				Absolute Level (dBm)	Limit (dBm)	Margin (dB)
Frequency (MHz)	Receiver Reading (dBμV)		Height (m)	Polar (H/V)	Frequency (MHz)	Level (dBm)	Ant. Gain (dBi)	Cable Loss (dB)			
Middle Channel, Below 1 GHz											
131.24	32.79	210	1.0	H	131.24	-62.3	0	0.68	-62.98	-13	49.98
936.26	34.35	150	1.5	H	936.26	-62.3	0	1.88	-64.18	-13	51.18
30.78	30.36	242	1.2	V	30.78	-64.8	0	0.43	-65.23	-13	52.23
199.24	30.65	170	1.5	V	199.24	-65.1	0	0.73	-65.83	-13	52.83
Middle Channel, Above 1 GHz											
1600	61.66	178	1.7	V	1600	-40.18	7.7	2.33	-34.81	-13	21.81
1600	53.96	315	2.0	H	1600	-48.88	6.9	2.33	-44.31	-13	31.31
3002	44.52	190	1.9	V	3002	-54.21	8.8	3.34	-48.75	-13	35.75
3002	43.97	1.5	1.6	H	3002	-54.76	7.8	3.34	-50.30	-13	37.30
5527	43.96	170	1.6	V	5527	-55.05	9.1	4.61	-50.56	-13	37.56
6272	42.81	180	1.5	V	6272	-55.78	9.3	4.88	-51.36	-13	38.36
5527	43.57	80	1.5	H	5527	-55.68	8.3	4.61	-51.99	-13	38.99
6272	42.57	110	1.5	H	6272	-56.02	8.2	4.88	-52.7	-13	39.70

FCC §22.917(a) & §24.238(a) - BAND EDGES

Applicable Standards

According to FCC §22.917(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.

According to FCC §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: QIPMC55I granted on 2008-01-23, report number: 2-20722858C/07-C1

FCC §2.1055, §22.355 & §24.235 - FREQUENCY STABILITY**Applicable Standards**

FCC §2.1055 (a), §2.1055 (d), §22.355, §24.235

According to §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table below:

Frequency Tolerance for Transmitters in the Public Mobile Services

Frequency Range (MHz)	Base, fixed (ppm)	Mobile ≤ 3 watts (ppm)	Mobile ≤ 3 watts (ppm)
25 to 50	20.0	20.0	50.0
50 to 450	5.0	5.0	50.0
450 to 512	2.5	5.0	5.0
821 to 896	1.5	2.5	2.5
928 to 929.	5.0	N/A	N/A
929 to 960.	1.5	N/A	N/A
2110 to 2220	10.0	N/A	N/A

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: QIPMC55I granted on 2008-01-23, report number: 2-20722858C/07-C1

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