

# EMC TEST REPORT

**No.1116509-1**

## Electromagnetic disturbances

### EQUIPMENT UNDER TEST

Equipment : Tablet PC with eye tracking device  
Type / model : T-C12-R1.0A-V1  
Manufacturer : Tobii Technology AB  
Tested by request of : Tobii Technology AB

### SUMMARY

Referring to the emission limits and the operating mode during the tests specified in this report the equipment complies with the requirements according to the following standard.

**FCC part 15 (2009):** Radio frequency device, Subpart B: Unintentional radiators.  
Class B equipment.

Date of issue: June 21, 2011

Tested by:



Lars Ahlqvist

Approved by:



Hans Kohlén

Laboratories are accredited by the Swedish Board for Accreditation and Conformity Assessment (SWEDAC) under the terms of Swedish legislation. The accredited laboratory activities meet the requirements in SS-EN ISO/IEC 17 025 (2005). This report may not be reproduced other than in full, except with the prior written approval by Intertek Semko.

Intertek Semko AB

Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden  
Telephone +46 8 750 00 00, Fax +46 8 750 60 30

[www.intertek.se](http://www.intertek.se)

Registered in Sweden: No: SE556024059901, Registered office: As address

## CONTENTS

	Page
1. Client information .....	3
2. Equipment under test (EUT) .....	3
2.1 Identification of the EUT .....	3
2.2 Additional information about the EUT .....	3
2.3 Peripheral equipment .....	3
3. Test specifications .....	4
3.1 Standards .....	4
3.2 Additions, deviations and exclusions from standards and accreditation .....	4
3.3 Mode of operation during the test .....	4
3.4 Compliance .....	4
3.4 Test site .....	5
3.5 Test equipment .....	5
4. Test summary .....	6
5. Tables and diagrams .....	7
6. Photos .....	10
7. Intertek Semko EMC Center measurement uncertainties .....	13

## 1. CLIENT INFORMATION

The EUT has been tested by request of

Company: Tobii Technology AB  
Karlsrovägen 2D  
182 53 Danderyd  
Sweden

Name of contact: Håkan Englund

## 2. EQUIPMENT UNDER TEST (EUT)

### 2.1 Identification of the EUT

Equipment: Tablet PC with eye tracking device  
Type/Model: T-C12-R1.0A-V1  
Serial number: MTC12-040100832036  
Manufacturer: Tobii Technology AB  
Highest clock rate used: 800 MHz  
Rating: 100-240 VAC, 50/60 Hz  
Class: II

### 2.2 Additional information about the EUT

The EUT was tested in a table top configuration.  
The EUT consists of the following units:

Units	Type	Serial number
Tablet PC	T-C12-R1.0A-V1	MTC12-030111810145
Eye tracking device	CEye	ISEY1-010100728284
AC/DC Supply	Powerbox EXM 80 5121	101201592/FC:11

The EUT was tested with the following cables:

Cable	Type	Length
Mains power	Two-core	1.5 m
LAN cable	Shielded	> 3.0 m
Headphone cable	Unshielded	1.0 m
Keyboard USB cable	Unshielded	2.0 m

### 2.3 Peripheral equipment

Peripheral equipment is defined as equipment needed for correct operation of the EUT, but not included as part of the EUT.

Equipment	Model/Type	Serial number
Keyboard	Hewlett-Packards KU-0316	-
Headphones	Koss portapro	-
Router	D-Link DI-524	DY07365002028

### 3. TEST SPECIFICATIONS

#### 3.1 Standards

Requirements:

CFR 47: Telecommunication, Chapter I – FCC Part 15- Radio Frequency Devices – Subpart B: Unintentional radiators (2009).

Test methods:

ANSI C.63.4-2003. American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

#### 3.2 Additions, deviations and exclusions from standards and accreditation

No additions, deviations or exclusions have been made from standard and accreditation.

#### 3.3 Mode of operation during the test

The EUT was supplied with 120 V AC, 60 Hz.

The EUT was continuously tracking after eyes during the tests. The LAN port was connected and terminated to an external router. The USB port was connected to a keyboard and the audio port to headphones as described in clause 2.3.

#### 3.4 Compliance

Purpose of test: To determine whether the Equipment Under Test (EUT) fulfils the EMC requirements of FCC 15 subpart B for Class B equipment.

Limits for conducted emission, Class B equipment:

Frequency range	Quasi Peak	Average
0.15 – 0.50 MHz	66 to 56 dB $\mu$ V*	56 to 46 dB $\mu$ V*
0.50 – 5 MHz	56 dB $\mu$ V	46 dB $\mu$ V
5 – 30 MHz	60 dB $\mu$ V	50 dB $\mu$ V

\* Decreases with the logarithm of the frequency.

Limits for radiated emission, Class B at 3 m distance.

Frequency range	Quasi Peak	Average
30 – 88 MHz	40.0 dB $\mu$ V/m	
88 – 216 MHz	43.5 dB $\mu$ V/m	
216 – 960 MHz	46.0 dB $\mu$ V/m	
960 – 1000 MHz	54.0 dB $\mu$ V/m	
	<b>Peak</b>	<b>Average</b>
1,0 – 6,0 GHz	74.0 dB $\mu$ V/m	54.0 dB $\mu$ V/m

### 3.4 Test site

Measurements were performed at:

Intertek Semko AB.  
Torshamnsgatan 43,  
P.O. Box 1103  
SE-164 22 Kista

Intertek Semko AB is a FCC listed test site with site registration number 90913.  
Intertek Semko AB is also accredited by Swedac and acknowledged by FCC as a CAB for measuring devices subject to Declaration of Conformity (DOC) under Parts 15 & 18.

### 3.5 Test equipment

Test equipment that was used during conducted emission:

Equipment	Manufacturer	Model	Inventory nr.
LISN	Rohde&Schwarz	ESH3-Z5	2727
LISN	Rohde&Schwarz	ESH3-Z5	8768
Measurement receiver	Rohde&Schwarz	ESCI	12741
Cable	-	Coax	9883

The measuring test equipment that was used during radiated emission:

Equipment	Manufacturer	Model	Inventory nr.
Measurement receiver	Rohde&Schwarz	ESU	12866
Measurement receiver	Rohde&Schwarz	ESCI	12798
Measurement receiver	Rohde&Schwarz	ESU	13178
Integrated measurement system	Rohde&Schwarz	IMS	12800
Pre-amplifier	Hewlett-Packard	8449B	6685
Pre-amplifier	Hewlett-Packard	OPT H64	7992/7993
Antenna	Chase	CBL 6111A	8578
Antenna	Rohde&Schwarz	HL562	30711
Biconical antenna	EMCO	3110	3006
Cable	Huber+Suhner	RG 214	9506
Cable	Huber+Suhner	Sucoflex 104PB	40035
Cable	Huber+Suhner	Sucoflex 104PB	9755

#### 4. TEST SUMMARY

The test has been carried out at the Intertek Semko AB premises in Kista, Sweden.  
The results in this report apply only to sample tested:

Basic standard	Description	Result
FCC Part 15 B	<b>AC power port continuous disturbance voltage in the frequency range 0.15 MHz to 30 MHz</b>	<b>PASS</b>
	The EUT complies with Class B limits. The margin to the limit was at least 10.8 dB, found at 0.150 MHz. See diagram 1 and table 1.	
FCC Part 15 B	<b>Radiated electromagnetic field in the frequency range 30 MHz to 1000 MHz</b>	<b>PASS</b>
	The EUT complies with Class B limits. The margin to the limit was at least 2.5 dB, found at 336.010 MHz. The margin is within the measurement uncertainty interval. See diagram 2 and table 2.	
FCC Part 15 B	<b>Radiated electromagnetic field in the frequency range 1 GHz to 6 GHz</b>	<b>PASS</b>
	The EUT complies with Class B limits. The margin to the limit was at least 12.6 dB, found at 4000.6 MHz. See diagram 3 and table 3.	

## 5. TABLES AND DIAGRAMS

Diagram 1, Conducted emission, AC power port, Peak overview sweep

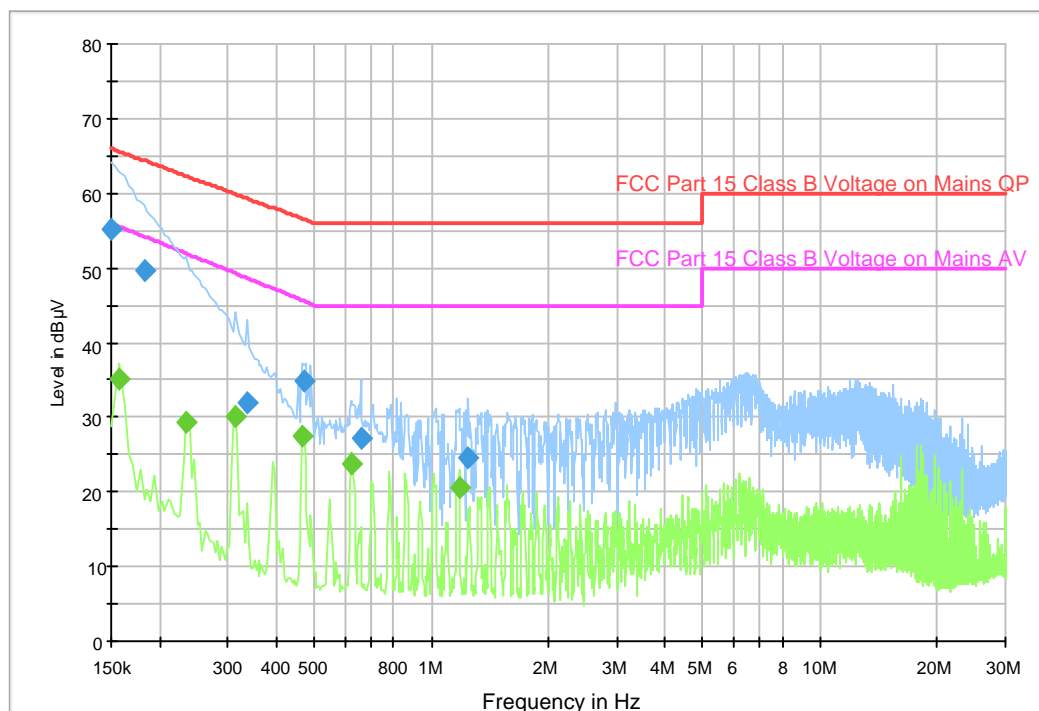


Table 1, Conducted emission, AC power port, Measurement results

Frequency (MHz)	QuasiPeak (dBμV)	Line	Margin (dB)	Limit (dBμV)
0.150	55.2	N	10.8	66.0
0.182	49.6	L1	14.8	64.4
0.334	31.9	L1	27.5	59.4
0.470	34.9	N	21.6	56.5
0.658	27.2	L1	28.8	56.0
1.246	24.4	N	31.6	56.0
Frequency (MHz)	Average (dBμV)	Line	Margin (dB)	Limit (dBμV)
0.158	35.2	N	20.3	55.5
0.234	29.3	N	22.6	51.9
0.314	30.0	N	19.3	49.3
0.466	27.4	N	18.2	45.6
0.622	23.9	N	21.1	45.0
1.178	20.7	L1	24.3	45.0

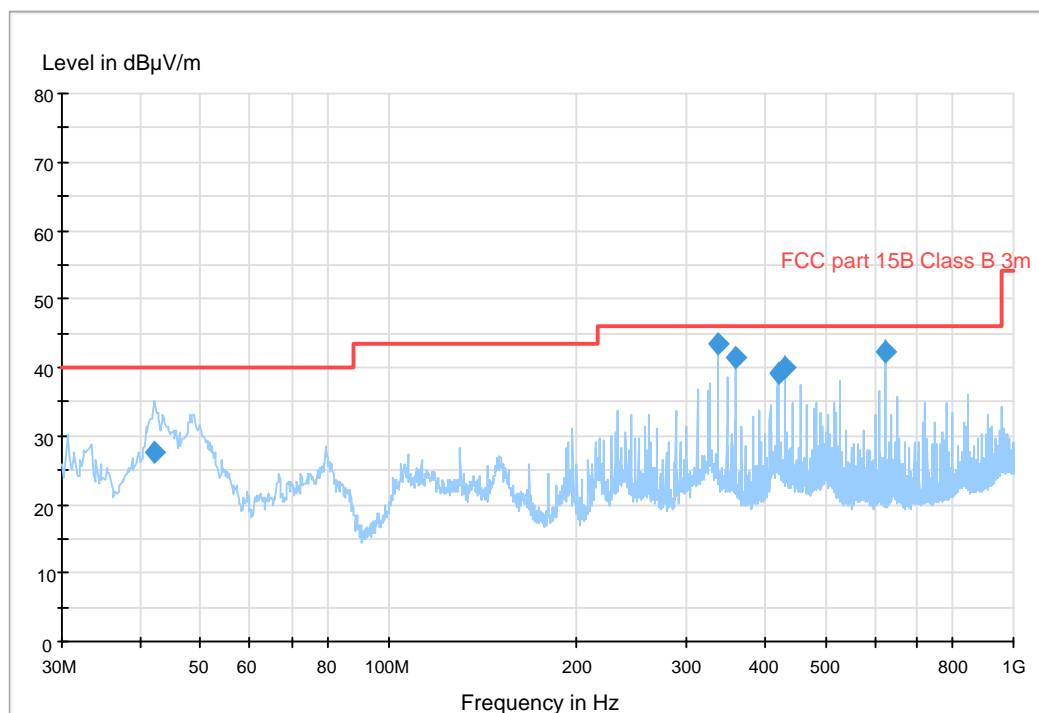
Measuring bandwidth: 9 kHz

Measuring time: 1 s

### Example calculation:

Measured level [dBμV] = Analyser reading [dBμV] + cable loss [dB] + LISN loss [dB]

**Diagram 2, Radiated emission, Peak overview sweep, Frequency range 30-1000 MHz, Measured distance 3 m**



**Table 2, Radiated emission, Measurement results**

Frequency (MHz)	QuasiPeak (dBμV/m)	Polarization	Margin (dB)	Limit (dBμV/m)
42.160	27.5	V	12.5	40.0
336.010	43.5	V	2.5*	46.0
360.017	41.5	V	4.5*	46.0
419.990	39.2	V	6.8	46.0
432.006	39.9	V	6.1	46.0
623.982	42.4	H	3.6*	46.0

Measuring bandwidth: 120 kHz

Measuring time: 1 s

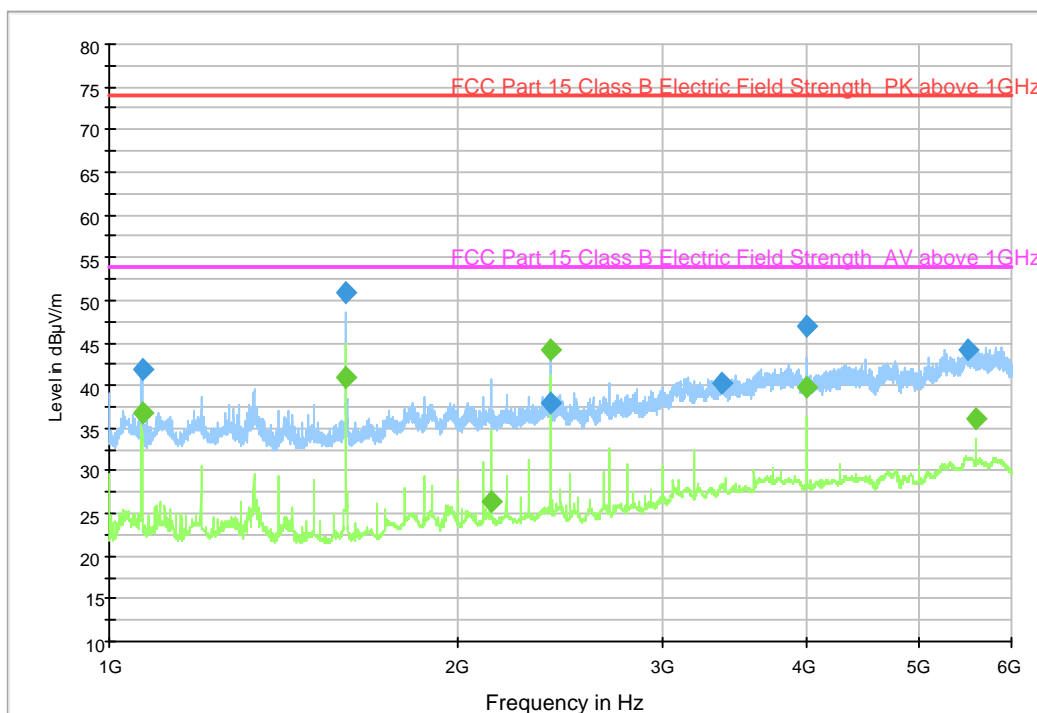
\*The measured result is below the limit by a margin less than the measurement uncertainty; it is therefore not possible to state compliance based on the 95 % level of confidence. However, the result indicates that compliance is more probable than non-compliance with the specification limit.

#### Example calculation:

Measured level [dBμV/m] = Analyser reading [dBμV] + cable loss [dB] – preamplifier gain [dB] + antenna factor [dB/m]



**Diagram 3, Radiated emission, Peak overview sweep, Frequency range 1-6 GHz,  
Measured distance 3 m**



**Table 3, Radiated emission, Measurement results**

Frequency (MHz)	MaxPeak (dBμV/m)	Polarization	Margin (dB)	Limit (dBμV/m)
1600.00	49.4	V	24.6	74.0
2400.40	46.0	H	28.0	74.0
3370.80	41.2	H	32.8	74.0
4000.60	47.6	H	26.4	74.0
5004.20	42.0	V	32.0	74.0
5539.00	44.6	V	29.4	74.0
Frequency (MHz)	Average (dBμV/m)	Polarization	Margin (dB)	Limit (dBμV/m)
1200.00	35.4	H	18.6	54.0
1600.40	31.2	V	22.8	54.0
2400.40	41.2	H	12.8	54.0
3600.40	32.9	V	21.1	54.0
4000.60	41.4	H	12.6	54.0
5600.60	35.2	H	18.8	54.0

Measuring bandwidth: 1 MHz

Measuring time: 1 s

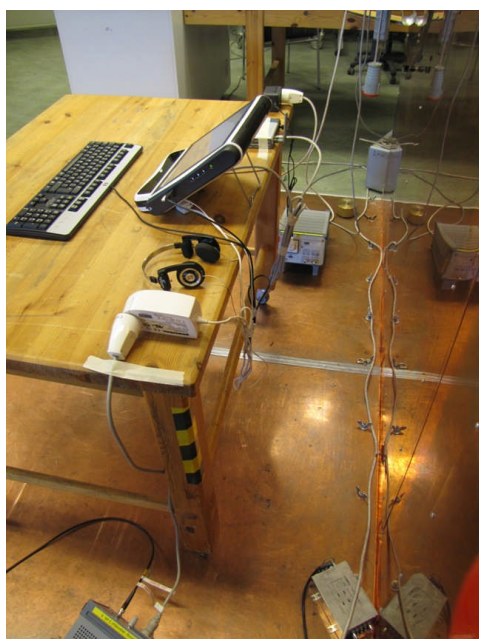
#### Example calculation:

Measured level [dBμV/m] = Analyser reading [dBμV] + cable loss [dB] – preamplifier gain [dB] + antenna factor [dB/m]

## 6. PHOTOS



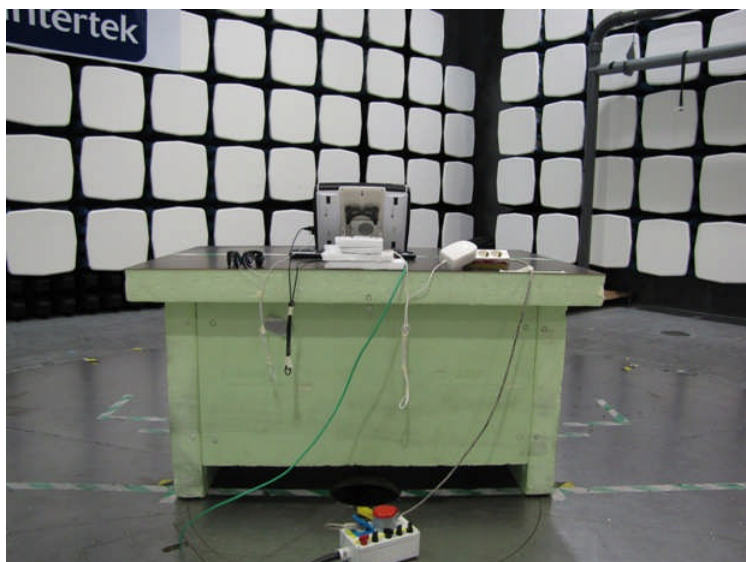
Test set-up for conducted emission (front view).



Test set-up for conducted emission (rear view).



Test set-up for radiated emission in frequency interval 30-1000 MHz (front view).



Test set-up for radiated emission in frequency interval 30-1000 MHz (rear view).



Test set-up for radiated emission in frequency interval 1-6 GHz (front view).



Test set-up for radiated emission in frequency interval 1-6 GHz (rear view).

## 7. INTERTEK SEMKO EMC CENTER MEASUREMENT UNCERTAINTIES

All uncertainties are given with a level of confidence of approximately 95% ( $k=2$ ) and are the maximum values within the complete range. Measurement uncertainties are calculated in accordance with EA-4/02:1997.

Continuous conducted disturbances with AMN in the frequency range 9 kHz to 30 MHz  $\pm 3.6$  dB

Measurement uncertainty for radiated disturbance

Uncertainty for the frequency range 30 to 1000 MHz at 1 m  $\pm 6.2$  dB

Uncertainty for the frequency range 30 to 1000 MHz at 3 m  $\pm 4.8$  dB

Uncertainty for the frequency range 30 to 1000 MHz at 10 m  $\pm 4.6$  dB