



NVLAP LAB CODE 200707-0



FCC PART 15B

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: W5MTOBII15) or the "EUT" as referred to in this report is a *TOBII C15*, which measures approximately 37.0 cm L x 30.0 cm W x 4.0 cm H. Rated input voltage: DC 24V from adapter.

Adapter information: AC Power Adapter
Manufacturer: Powerbox
Model: EXM 80 5121;
Input: 100-240VAC, 1.7A, 50-60 Hz;
Output: 24VDC, 2.9A

** All measurement and test data in this report was gathered from production sample serial number: 1006063(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 15, Subparts A and B of the Federal Communication Commissions rules.

The objective of the manufacturer is to determine compliance with FCC Part 15B, Class B.

Related Submittal(s)/Grant(s)

Part 15C Bluetooth, 802.11b/g Wi-Fi and Part 22H, 24E GSM submissions with same FCC ID.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003, 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.

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Shenzhen). 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

Justification

The system was configured for testing in a manufacturer testing fashion.

EUT Exercise Software

WINTHRAX.EXE

Equipment Modifications

No modification was made to the unit tested.

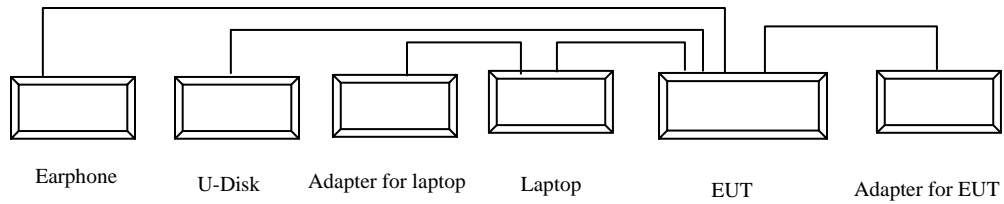
Host System Configuration List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
PHILIPS	Earphone	SBCHP250	N/A	DOC
DELL	Keyboard	L100	CNORH656658907BL04TY	DOC
Kingston	U-Disk	D-4G	N/A	N/A
Compaq	Laptop	PP2040	N/A	N/A

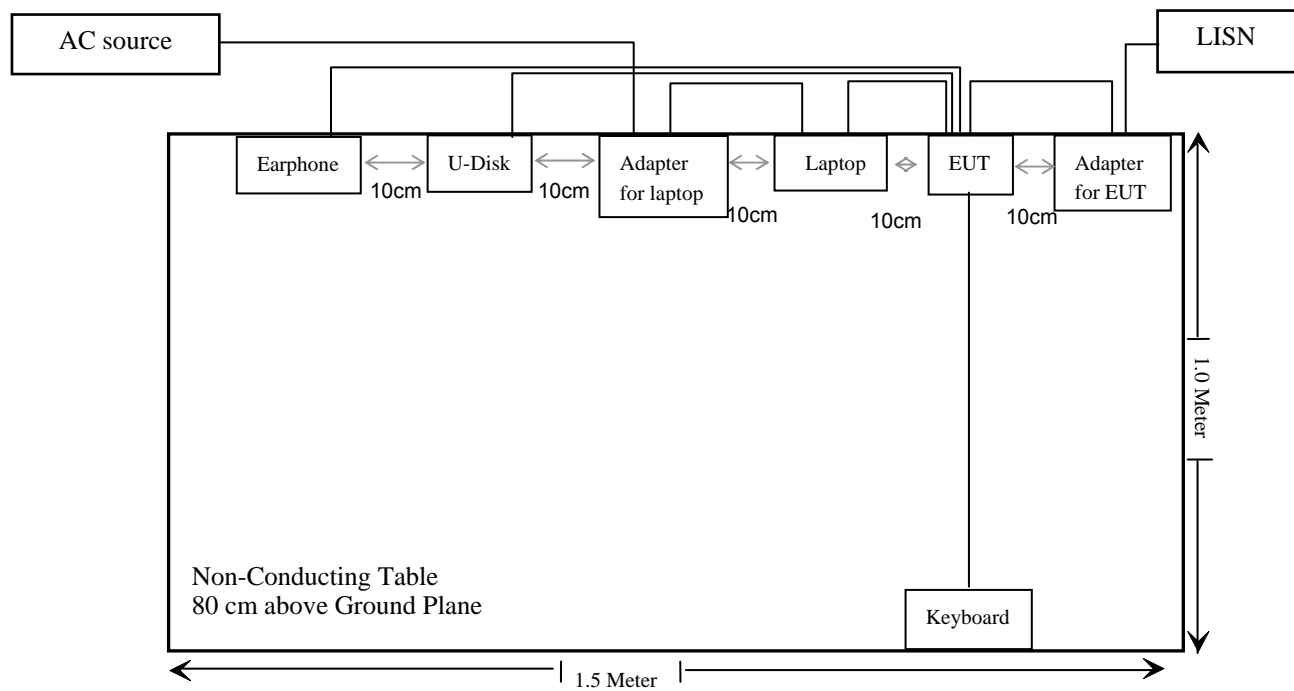
External I/O Cable

Cable Description	Length (m)	From/Port	To
Unshielded Detachable RJ45 Cable	1.5	Laptop	EUT

Configuration of Test Setup



Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§15.107	AC Line Conducted Emissions	Compliance
§15.109	Radiated Emissions	Compliance*

Note: *Within measurement uncertainty!

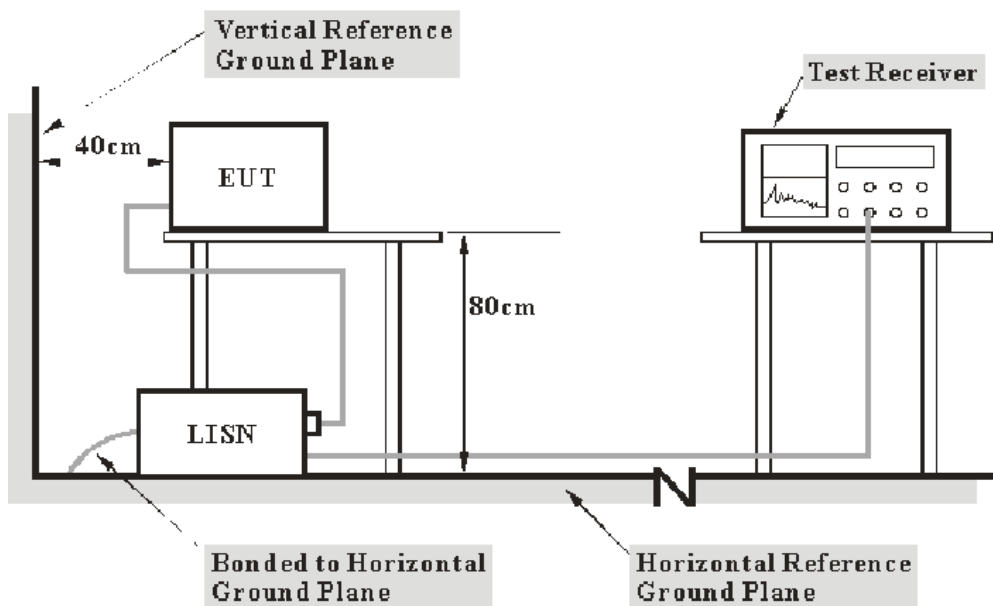
FCC §15.107 – AC LINE CONDUCTED EMISSIONS

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at Bay Area Compliance Laboratories Corp. (Shenzhen) is ± 2.4 dB.

EUT Setup



- Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.4-2003 measurement procedure. The specification used was with the FCC Part 15.107 limits.

The spacing between the peripherals was 10 cm.

The adapter of EUT connected to a 120 VAC/60 Hz power source.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

<u>Frequency Range</u>	<u>IF B/W</u>
150 kHz – 30 MHz	9 kHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS30	830245/006	2010-03-03	2011-03-02
Rohde & Schwarz	L.I.S.N.	ESH2-Z5	892107/021	2010-03-09	2011-03-08
SCHAFFNER	CDN	CDN T400	16913	2009-11-24	2010-11-24

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

Test Procedure

During the conducted emission test, the adapter of EUT was connected to the outlet of the LISN, and other equipment were connected to AC source.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.107, Class B, with the worst margin reading of:

6.2 dB at 0.250 MHz in the Line conductor mode

Test Data

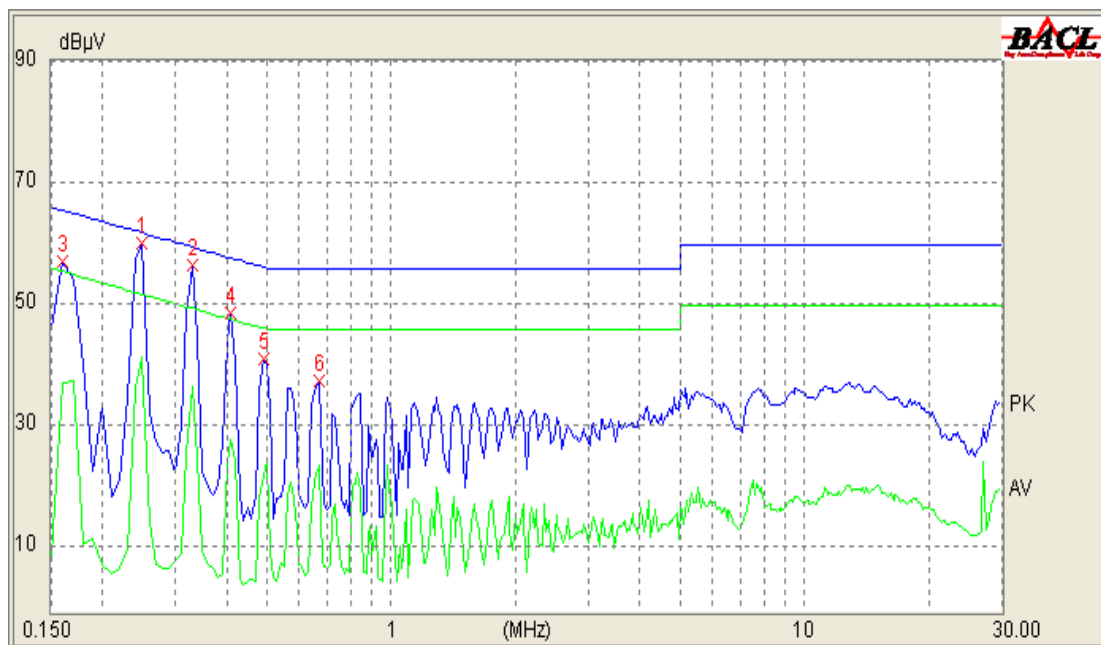
Environmental Conditions

Temperature:	25 °C
Relative Humidity:	48 %
ATM Pressure:	100.0 kPa

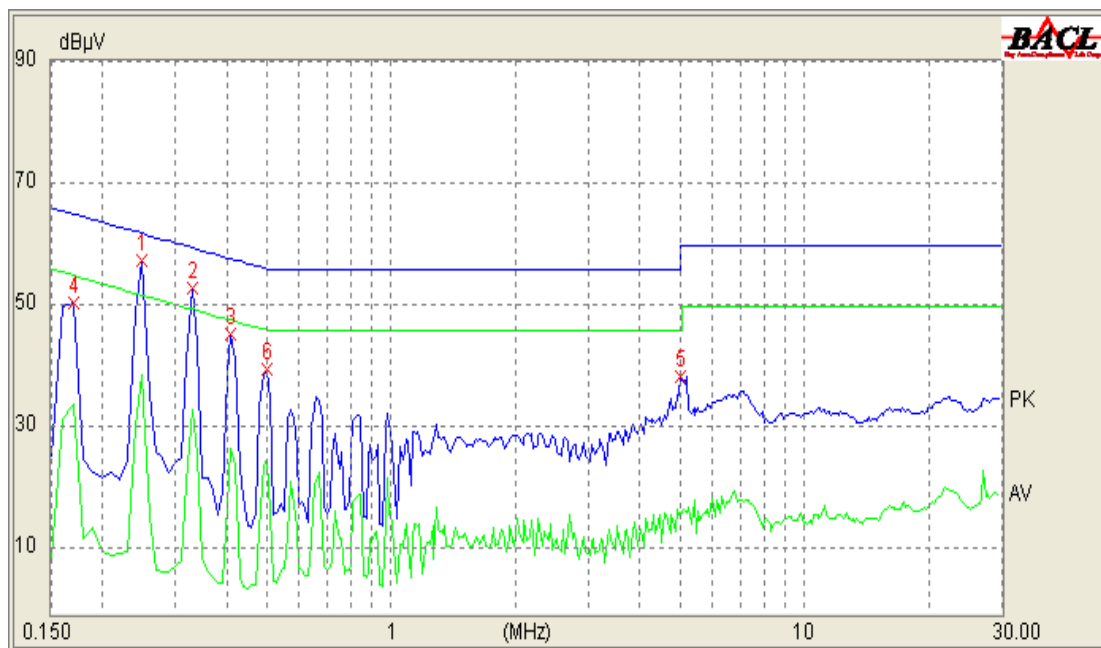
The testing was performed by Tim Zhang on 2010-07-12.

Test Mode: Running

120V, 60 Hz Line:



Conducted Emissions			FCC Part 15.107		
Frequency (MHz)	Correction Factor (dB)	Cord. Result (dBμV)	Limit (dBμV)	Margin (dB)	Detector (PK/ QP/Ave)
0.250	10.10	55.60	61.82	6.22	QP
0.330	10.10	51.00	59.51	8.51	QP
0.250	10.10	41.69	51.82	10.13	Ave
0.330	10.10	36.67	49.51	12.84	Ave
0.410	10.10	42.69	57.75	15.06	QP
0.160	10.10	48.89	65.56	16.67	QP
0.160	10.10	37.50	55.56	18.06	Ave
0.410	10.10	28.10	47.75	19.65	Ave
0.670	10.10	23.94	46.00	22.06	Ave
0.490	10.10	34.02	56.21	22.19	QP
0.670	10.10	33.77	56.00	22.23	QP
0.490	10.10	22.45	46.21	23.76	Ave

120 V/60 Hz, Neutral:

Conducted Emissions			FCC Part 15.107		
Frequency (MHz)	Correction Factor (dB)	Cord. Result (dBμV)	Limit (dBμV)	Margin (dB)	Detector (PK/QP/Ave)
0.250	10.10	52.46	61.82	9.36	QP
0.330	10.10	47.68	59.51	11.83	QP
0.250	10.10	38.73	51.82	13.09	Ave
0.330	10.10	33.27	49.51	16.24	Ave
0.410	10.10	40.03	57.75	17.72	QP
0.170	10.10	46.10	65.01	18.91	QP
0.500	10.10	35.68	56.00	20.32	QP
0.410	10.10	26.89	47.75	20.86	Ave
0.500	10.10	25.07	46.00	20.93	Ave
0.170	10.10	33.93	55.01	21.08	Ave
5.030	10.20	26.52	56.00	29.48	QP
5.060	10.20	16.34	46.00	29.66	Ave

FCC §15.109 - RADIATED EMISSIONS

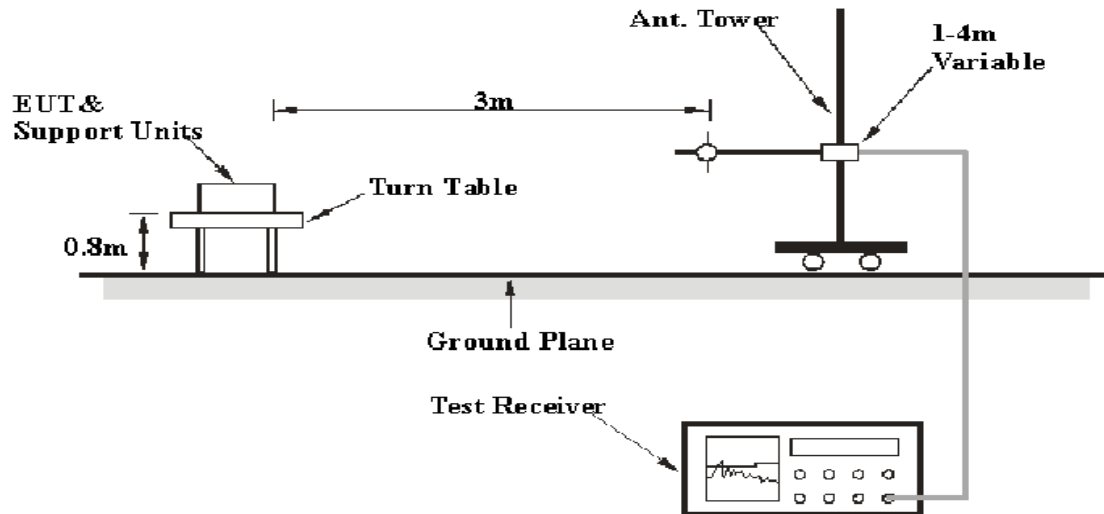
Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

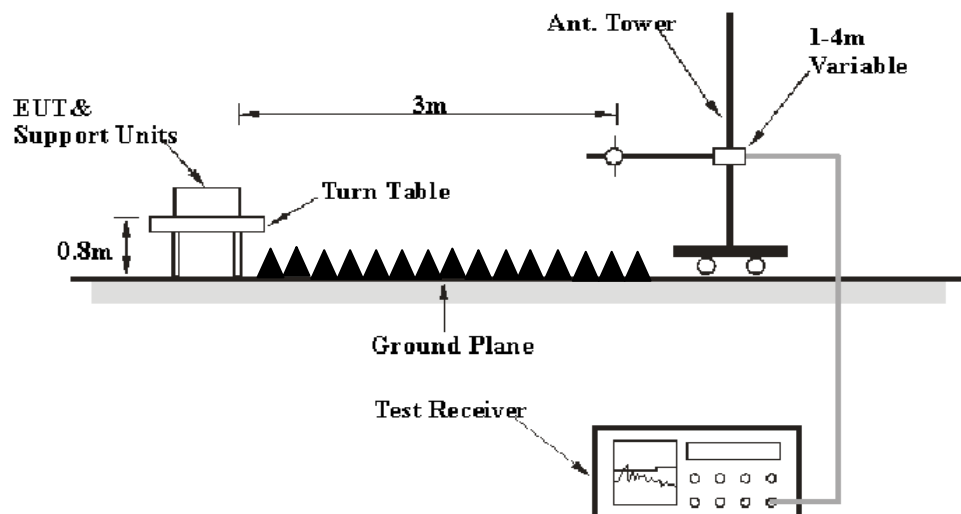
Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at Bay Area Compliance Laboratories Corp. (Shenzhen) is ± 4.0 dB.

EUT Setup

Below 1GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters chamber B test site, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC Part 15.109 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

The adapter of EUT was connected to a 120 VAC/60 Hz power source.

EMI Test Receiver Setup

The system was investigated from 30 MHz to 2 GHz.

During the radiated emission test, the EMI test receiver was set with the following configurations:

<i>Frequency</i>	<i>RB/W</i>	<i>VB/W</i>	<i>IF B/W</i>	<i>Detector</i>
30 MHz-1 GHz	100 kHz	300 kHz	120 kHz	Quasi-peak
Above 1 GHz	1 MHz	3 MHz		Peak
	1 MHz	10 Hz		Average

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2009-11-07	2010-11-06
HP	Amplifier	HP8447E	1937A01046	2009-11-15	2010-11-15
Rohde & Schwarz	EMI Test Receiver	ESCI	100224	2009-11-07	2010-11-06
Sunol Sciences	Broadband Antenna	JB1	A040904-2	2010-04-12	2011-04-12
HP	Preamplifier	8449B	3008A00277	2010-09-11	2011-09-10
Sunol Sciences	Horn Antenna	DRH-118	A052604	2010-05-05	2011-05-04

* **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 Procedure

During the radiated emissions test, the adapter of EUT and all other support equipment were connected to the AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All data was recorded in the Quasi-peak detection mode from 30 MHz to 1 GHz, Peak and average detection mode above 1 GHz.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Loss and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Loss} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Results Summary

According to the data in the following table, the EUT complied with the FCC Part 15.109, Class B, with the worst margin reading of:

2.1 dB at 30.594448 MHz in the horizontal polarization for running mode

Test Data

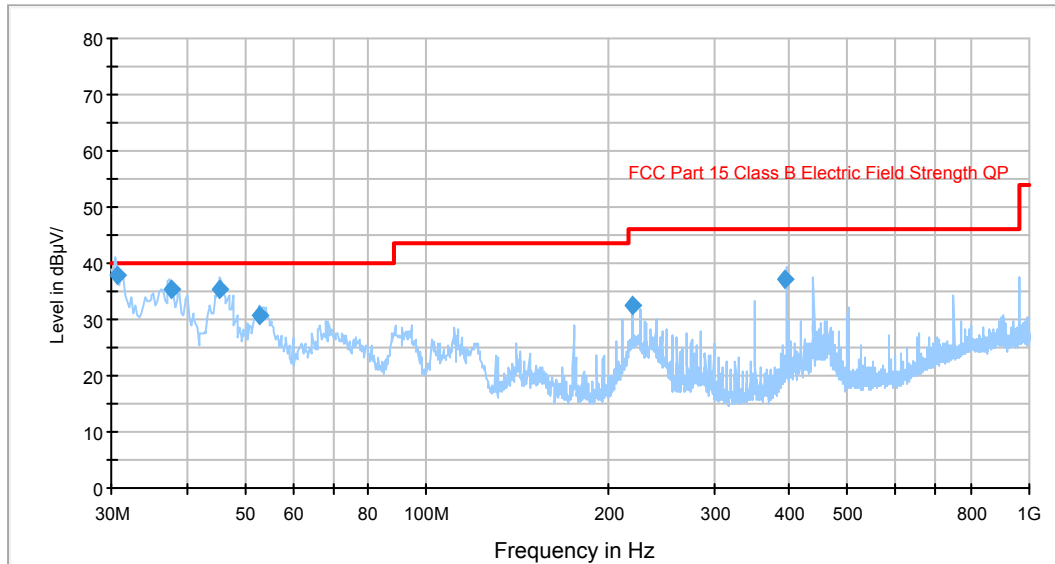
Environmental Conditions

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

The testing was performed by Tim Zhang on 2010-07-12.

Below 1 GHz:

Auto Test(FCC 15 Class B)



Frequency (MHz)	Corrected Amplitude (dBμV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Position (Degree)	Correction Factor (dB)	Limit (dBμV/m)	Margin (dB)
30.594448	37.9	105.0	H	242.0	-19.6	40.0	2.1*
45.275625	35.4	104.0	H	0.0	-18.1	40.0	4.6
37.610500	35.3	106.0	H	278.0	-19.1	40.0	4.7
394.378750	37.3	105.0	V	206.0	-11.5	46.0	8.7
52.911500	30.8	400.0	V	258.0	-17.7	40.0	9.2
219.392500	32.0	205.0	H	203.0	-14.6	46.0	14.0

Note: *Within measurement uncertainty!

Above 1 GHz:

Frequency (MHz)	Corrected Amplitude (dBμV/m)	Detector (PK/Ave.)	Limit (dBμV/m)	Margin (dB)
1243.1	37.06	Ave	54	16.94
1078.2	35.76	Ave	54	18.24
2046.3	33.08	Ave	54	20.92
1243.1	46.21	PK	74	27.79
1078.2	44.38	PK	74	29.62
2046.3	42.20	PK	74	31.8

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