



NVLAP LAB CODE 200707-0



FCC PART 15.249

EMI MEASUREMENT AND TEST REPORT

For

Latitude Limited

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Kwai Chung, N.T., Hong Kong

FCC ID: WM4368

Report Type:	Product Type:
Original Report	2.4GHz Chest strap
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Report Number:	<u>RSZ08081302</u>
Report Date:	<u>2008-09-11</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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1 GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

The *Latitude Limited*'s product, model: T00018D or the "EUT" as referred to in this report is a 2.4GHz Chest strap which measures approximately 42.0 cm L x 3.10 cm W x 1.3 cm H, rated input voltage: DC 3V battery.

**All measurement and test data in this report was gathered from production sample serial number: 0808019 (Assigned by BACL, Shenzhen). The EUT was received on 2008-08-13.*

1.2 Objective

This Type approval report is prepared on behalf of *Latitude Limited* in accordance with Part 2, Subpart J, and Part 15, Subparts A, B and C of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.249 rules.

1.3 Related Submittal(s)/Grant(s)

No Related Submittals.

1.4 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 radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

1.5 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 04, 2004. 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>

2 SYSTEM TEST CONFIGURATION

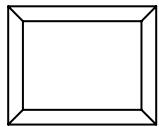
2.1 Justification

The system was configured for testing in a typical fashion (as normally used by a typical user).

2.2 Equipment Modifications

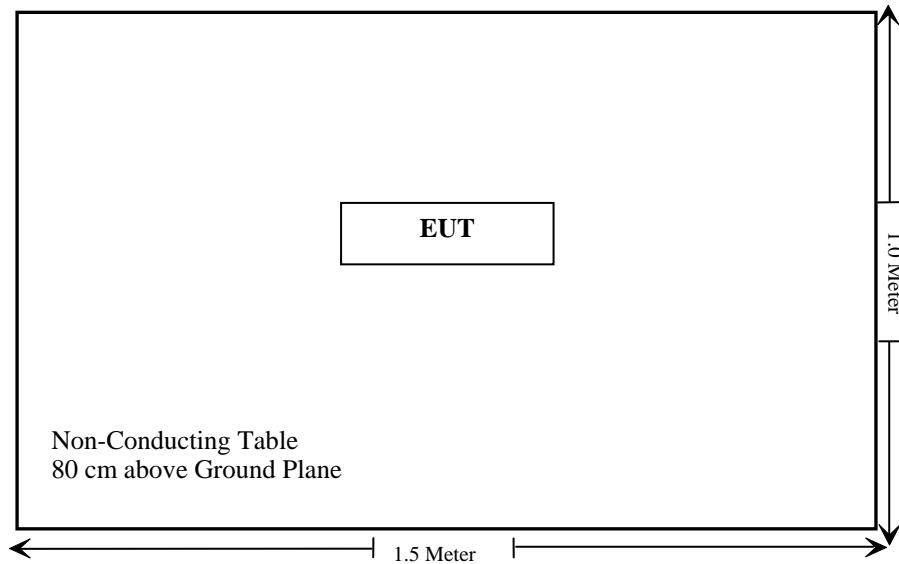
No modifications were made to the unit tested.

2.3 Configuration of Test Setup



EUT

2.4 Block Diagram of Test Setup



3 SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliant
§15.207(a)	Conduction Emissions	N/A*
§15.205(a), §15.209(a), 15.249(a), §15.249(c)	Radiated Emissions	Compliant
§15.249(d)	Out of Band Emissions	Compliant

Note:*: Battery operation.

4 §15.203 - ANTENNA REQUIREMENT

4.1 Applicable Standard

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used.

4.2 Antenna Connector Construction

The EUT antenna is a permanently attached antenna, which in accordance to section 15.203, is considered sufficient to comply with the provisions of this section.

Result: Compliant.

Please refer to the EUT photos.

5 §15.205(a) §15.209(a) §15.249(a) §15.249(C) - RADIATED EMISSIONS

5.1 Applicable Standard

As per §15.249 (a), except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

As per §15.249 (c), Field strength limits are specified at a distance of 3 meters.

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

5.2 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.

5.3 Test Equipment Setup

The spectrum analyzer or receiver is set as:

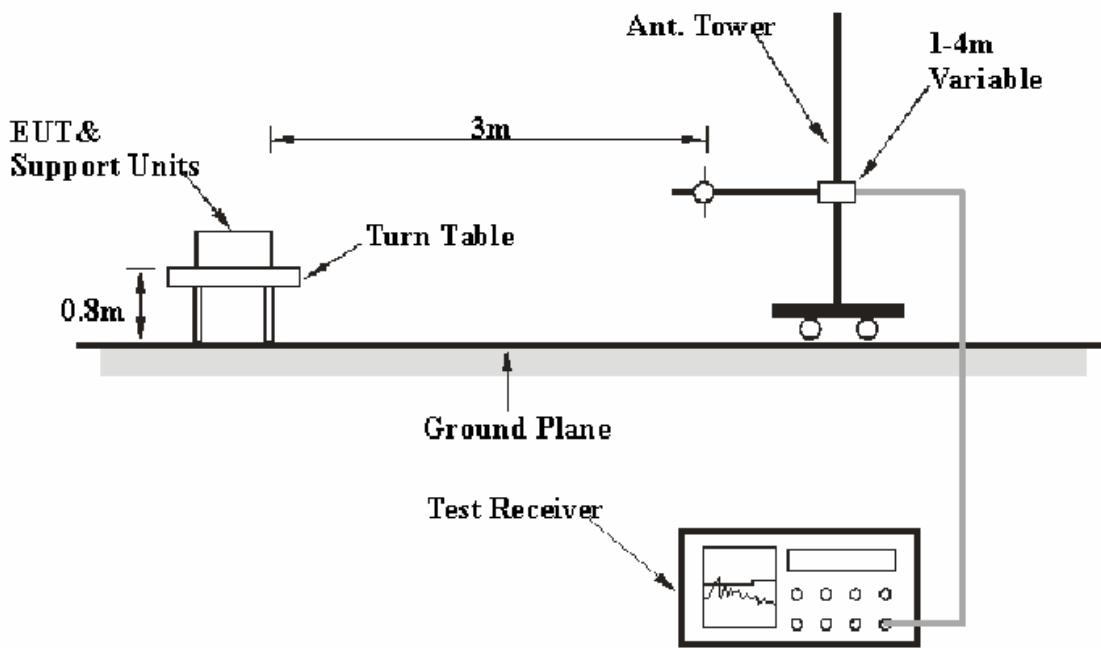
Below 1000MHz:

$$\text{RBW} = 100 \text{ kHz} / \text{VBW} = 300 \text{ kHz} / \text{Sweep} = \text{Auto}$$

Above 1000MHz:

- (1) Peak: $\text{RBW} = 1\text{MHz} / \text{VBW} = 1\text{MHz} / \text{Sweep} = \text{Auto}$
- (2) Average: $\text{RBW} = 1\text{MHz} / \text{VBW} = 10\text{Hz} / \text{Sweep} = \text{Auto}$

5.4 EUT Setup



The radiated emission and out of band emission tests were performed in the 3 meters chamber B, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC 15.209 and FCC 15.249 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 was connected to a 120 VAC/60 Hz power source.

5.5 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100224	2007-10-16	2008-10-16
HP	Amplifier	8447E	1937A01046	2007-11-15	2008-11-15
Sunol Sciences	Bilog Antenna	JB1	A040904-2	2008-08-14	2009-08-14
HP	Amplifier	8449B	3008A00277	2007-09-29	2008-09-29
Sunol Sciences	Horn Antenna	DRH-118	A052604	2007-09-25	2008-09-25
R&S	Spectrum Analyzer	FSEM30	849720/019	2008-05-09	2009-05-09

*** 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.

5.6 Test Procedure

For the radiated emissions test, the EUT, and all support equipment power cords was connected to the AC floor outlet.

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

The EUT is set 3 meter away from the testing antenna, which is varied from 1-4 meter, and the EUT is placed on a turntable, which is 0.8 meter above ground plane, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna should be changed the polarization both of horizontal and vertical.

Corrected Amplitude & Margin Calculation

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

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

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

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

5.7 Test Results Summary

According to the data in the following table, the EUT complied with the FCC Part 15.209 & 15.249, with the worst margin reading of:

30-1000 MHz:

13.70 dB at 30.276182 MHz in the **Vertical** polarization

Above 1GHz:

4.22 dB at 2440 MHz in the **Horizontal** polarization

5.8 Test Data

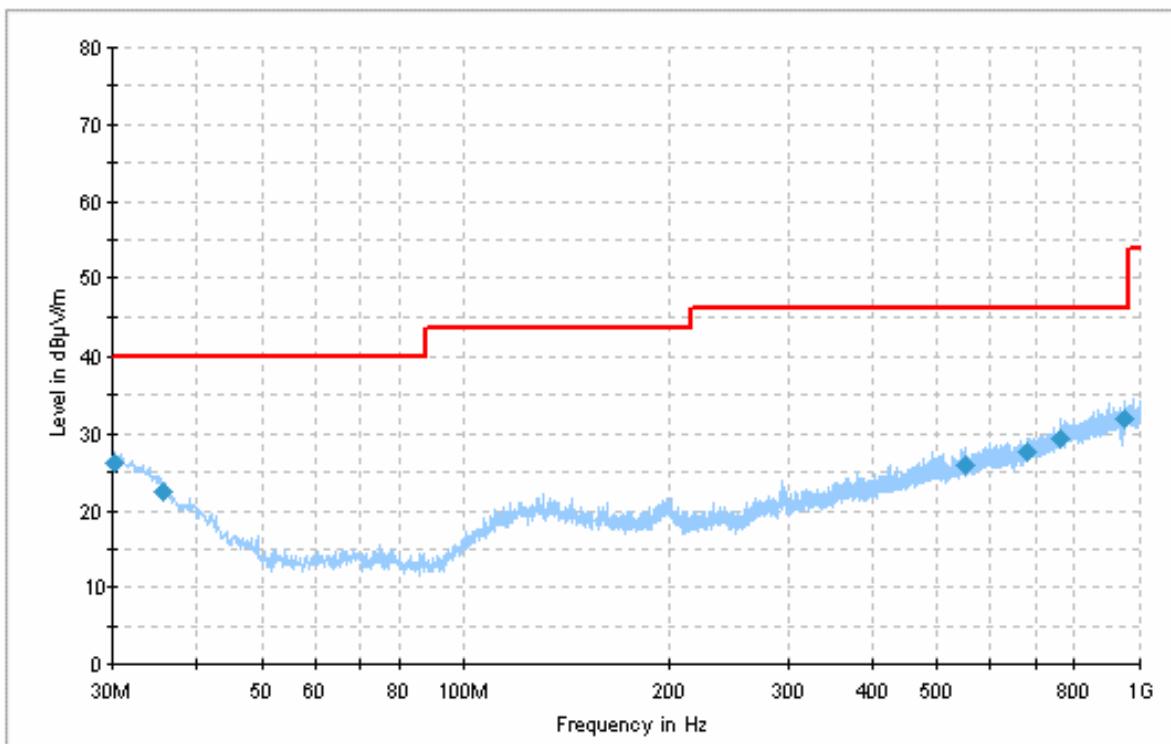
Environmental Conditions

Temperature:	25 °C
Relative Humidity:	53%
ATM Pressure:	100.9kPa

The testing was performed by Herith Shi on 2008-09-07.

Test Mode: Transmitting

30-1000 MHz:



Frequency (MHz)	Corrected Amplitude (dB μ V/m)	Antenna Height (cm)	Ant. Polarity (H/V)	Turtable Position (deg)	Correction Factor (dB)	Limit (dB μ V/m)	Margin (dB)
30.276182	26.3	401.0	V	41.0	-8.8	40.0	13.7
951.030300	31.9	165.0	H	187.0	0.5	46.0	14.1
762.962975	29.4	359.0	H	66.0	-3.1	46.0	16.6
35.669375	22.4	389.0	V	250.0	-12.7	40.0	17.6
682.159075	27.7	377.0	H	246.0	-6.6	46.0	18.3
550.361200	25.8	346.0	H	96.0	-10.6	46.0	20.2

Above 1GHz:

Freq. (MHz)	Meter Reading (dB μ V)	Detector PK/QP/AV	Direction Degree	Ant. Height (m)	Ant. Polar (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre- Amp. Gain (dB)	Cord. Amp. (dB μ V/m)	Part 15.209 & 15.249	
										Limit (dB μ V/m)	Margin (dB)
Fundamental											
2440	84.88	AV	170	1.0	H	30.90	7.90	33.90	89.78	94	4.22
2440	83.24	AV	40	1.0	V	30.30	7.90	33.90	87.54	94	6.46
2440	86.03	PK	170	1.0	H	30.90	7.90	33.90	90.93	114	23.07
2440	85.31	PK	40	1.0	V	30.30	7.90	33.90	89.61	114	24.39
Harmonics/Spurious											
4880	32.35	AV	50	1.0	H	36.30	7.56	33.70	42.51	54	11.49
4880	33.07	AV	170	1.2	V	35.00	7.56	33.70	41.93	54	12.07
3129	34.12	AV	10	1.0	H	32.90	8.09	33.80	41.31	54	12.69
3112	34.22	AV	30	1.1	V	31.40	8.07	33.80	39.89	54	14.11
4880	45.12	PK	50	1.0	H	36.30	7.56	33.70	55.28	74	18.72
3129	46.75	PK	10	1.0	H	32.90	8.09	33.80	53.94	74	20.06
3112	47.83	PK	30	1.1	V	31.40	8.07	33.80	53.50	74	20.50
4880	44.58	PK	170	1.2	V	35.00	7.56	33.70	53.44	74	20.56

6 §15.249(d) – OUT OF BAND EMISSIONS

6.1 Applicable Standard

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

6.2 Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set the RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including the specified frequencies of band edges.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

6.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100224	2007-10-16	2008-10-16
HP	Amplifier	8449B	3008A00277	2007-09-29	2008-09-29
Sunol Sciences	Horn Antenna	DRH-118	A052604	2007-09-25	2008-09-25

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

6.4 Test Data

Environmental Conditions

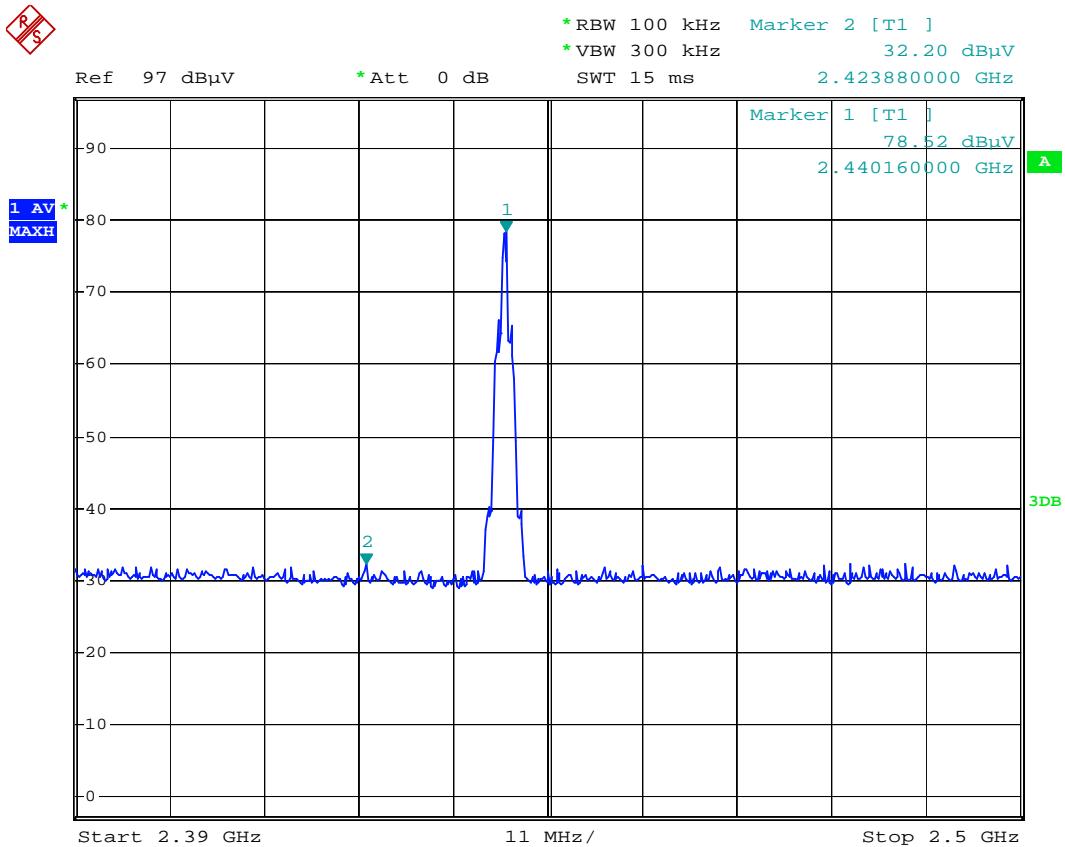
Temperature:	25 °C
Relative Humidity:	53%
ATM Pressure:	100.9kPa

The testing was performed by Herith Shi on 2008-09-07.

Test Result: Compliant.

Please refer to following table and plots.

Freq. (MHz)	Reading (dB μ V)	Detector (PK/AV)	Direction (Degree)	Ant. Height (m)	Ant. Polar (H/V)	Ant. Factor (dB)	Cable Loss (dB)	Pre- Amp. Gain (dB)	Cord. Reading (dB μ V/m)	FCC 15.209	
										Limit (dB μ V/m)	Margin (dB)
2489.20	31.42	AV	10	1.0	H	32.50	8.19	33.81	38.30	54	15.70
2486.75	31.12	AV	30	1.1	V	31.30	8.17	33.81	36.78	54	17.22
2345.4	31.92	AV	40	1.0	V	30.10	7.80	33.91	35.91	54	18.09
2396.78	30.72	AV	170	1.0	H	30.60	7.60	33.91	35.01	54	18.99
2489.20	44.05	PK	10	1.0	H	32.50	8.19	33.81	50.93	74	23.07
2486.75	44.73	PK	30	1.1	V	31.30	8.17	33.81	50.39	74	23.61
2345.40	45.53	PK	40	1.0	V	30.10	7.80	33.91	49.52	74	24.48
2396.78	44.33	PK	170	1.0	H	30.60	7.60	33.91	48.62	74	25.38



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