Lab Code: 200707-0

FCC PART 15.249

TEST REPORT

For

Light Engine Limited

6/F, Photonics Centre, 2 Science Park East Avenue,

Hong Kong Science Park, Shatin, Hong Kong

FCC ID: WNY6401404205

Report Type:	**Product Type:**
Original Report	P168 Motion Sensor

Test Engineer:	Leon Chen
Report Number:	RSZ11031453-00
Report Date:	2011-09-19
Reviewed By:	Alvin Huang EMC Engineer
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Light Engine Limited* 's product, model *P168 motion (FCC ID: WNY6401404205),* or the "EUT" as referred to in this report is a *P168 motion sensor,* which measures approximately: 11.0 cm (L) x 6.1 cm (W) x 7.0 cm (H), rated input voltage: DC 3V battery

** All measurement and test data in this report was gathered from production sample serial number: 1103012 (Assigned by BACL, Shenzhen). The EUT was received on 2011-03-14.*

Objective

This Type approval report is prepared on behalf of *Light Engine 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.

Related Submittal(s)/Grant(s)

N/A.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2009, 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.

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 December 06, 2010. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2009.

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 an ISO/IEC 17025 accredited laboratory, and is accredited by 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

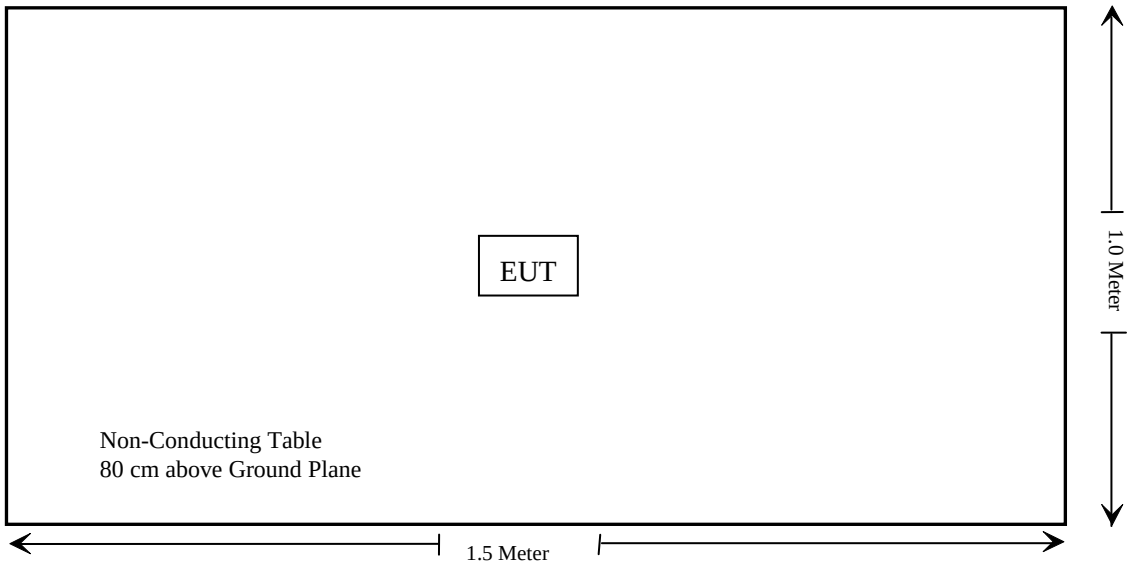
Justification

The system was configured for testing in an engineering mode.

Equipment Modifications

No modifications were made to the unit tested.

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliance
§15.207(a)	Conduction Emissions	N/A*
§15.209(a) §15.249(a) §15.249(c) §15.35	Radiated Emissions	Compliance
§15.215(c)	20 dB Emission Bandwidth	Compliance

Note: * Battery operation

FCC §15.203 - ANTENNA REQUIREMENT

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.

Antenna Connector Construction

The EUT has a chip antenna on PCB, 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.

FCC §15.205, §15.209 & §15.249 - RADIATED EMISSIONS

Applicable Standard

As per FCC§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 FCC§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.

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 $\pm$4.0 dB.

Test Equipment Setup

The spectrum analyzer or receiver is set as:

Below 1000 MHz:

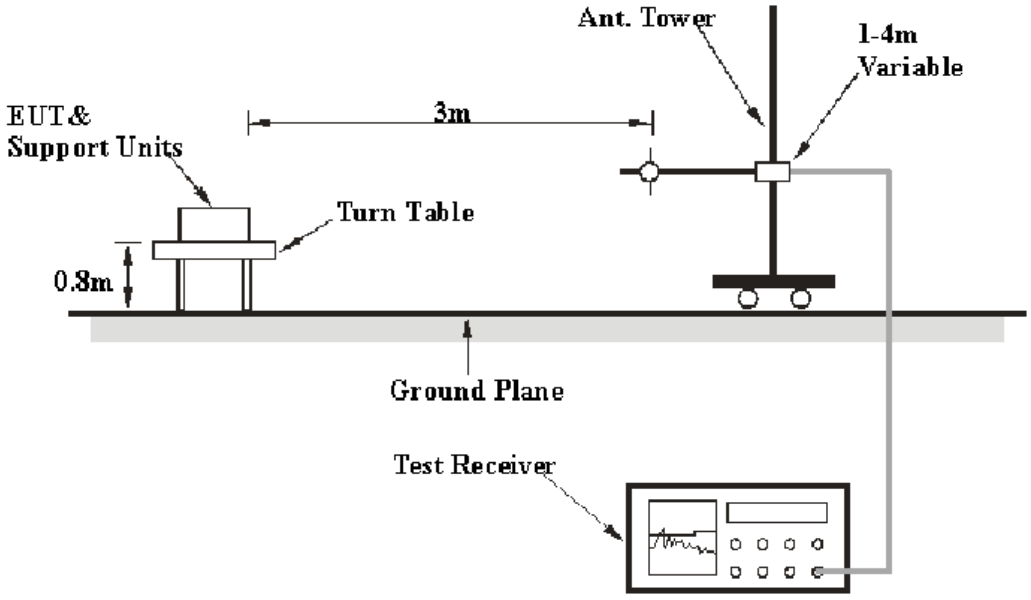
RBW = 100 kHz / VBW = 300 kHz / Sweep = Auto

Above 1000 MHz:

Peak: RBW = 1MHz / VBW = 1MHz / Sweep = Auto

Average: RBW = 1MHz / VBW = 10Hz / Sweep = Auto

EUT Setup



The radiated emission and out of band emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.4-2009. The specification used was the FCC 15.209 and FCC 15.249 limits.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	8447E	1937A01046	2010-08-02	2011-08-01
Rohde & Schwarz	EMI Test Receiver	ESCI	100224	2010-11-11	2011-11-10
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2010-07-05	2011-07-04
Mini-Circuits	Amplifier	ZVA-213+	T-E27H	2011-03-08	2012-03-07
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

*** 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

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 mete, 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:

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - 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 limit. The equation for margin calculation is as follows:

Margin = Limit – Corrected Amplitude

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:

Below 1 GHz

22.5 dB at **30.182875 MHz** in the **Horizontal** polarization

Above 1 GHz

14.26 dB at **4920 MHz** in the **Horizontal** polarization

Test Data

Environmental Conditions

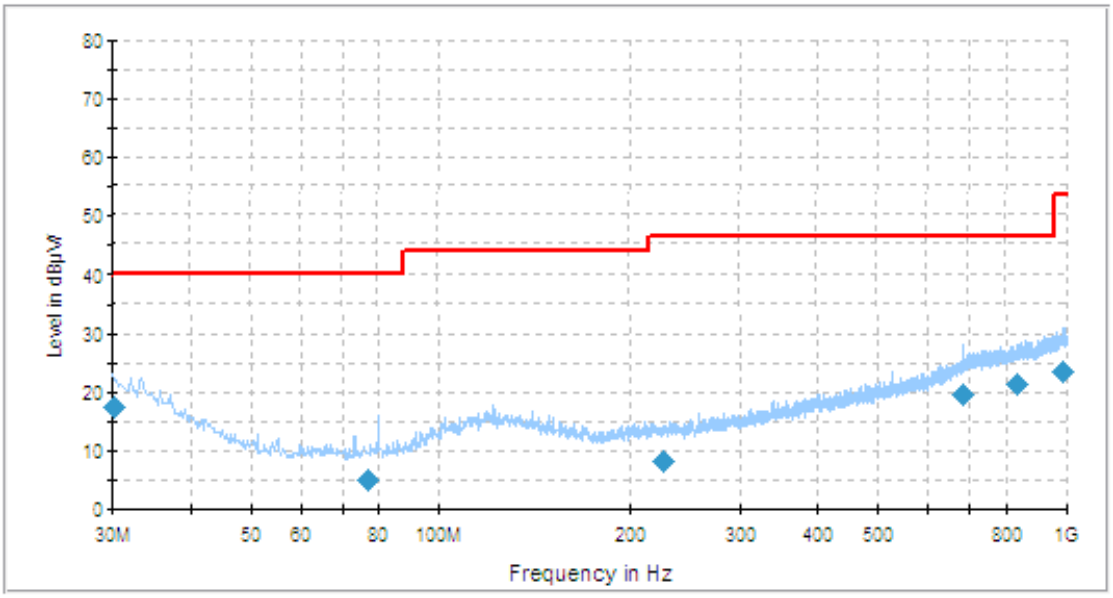
Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	100.2 kPa

The testing was performed by Leon Chen on 2011-04-27

1) 30-1000 MHz:

Test Mode: Transmitting

Auto test (FCC 15.209)



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Test Antenna		Turntable Position (degree)	Correction Factor (dB)	Limit (dBµV/m)	Margin (dB)
		Height (cm)	Polarity (H/V)				
30.182875	17.5	342.0	H	230.0	-5.5	40.0	22.5
984.691000	23.7	171.0	V	81.0	1.4	46.0	22.3
834.505750	21.5	205.0	H	105.0	-1.3	46.0	24.5
683.591500	19.5	209.0	H	226.0	-3.6	46.0	26.5
226.508000	8.4	369.0	V	28.0	-13.9	40.0	31.6
77.131750	5.0	116.0	V	31.0	-18.2	40.0	35.0

2) Above 1 GHz

Freq. (MHz)	S.A. Reading (dBµV)	Detector QP/PK/Ave.	Turntable Direction Degree	Test Antenna			Cable Loss (dB)	Amp. Gain (dB)	Cord. Amp. (dBµV/m)	FCC 15.249/15.209		
				Height (m)	Polar (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	Comment
4920	46.19	PK	53	2.5	H	35.9	4.40	26.75	59.74	74	14.26	harmonic
4820	45.39	PK	327	1.7	H	35.9	4.30	26.79	58.80	74	15.20	harmonic
4870	42.95	PK	53	1.3	H	35.9	4.36	26.77	56.44	74	17.56	harmonic
4820	43.65	PK	77	2.0	V	34.8	4.30	26.79	55.96	74	18.04	harmonic
4870	43.43	PK	290	2.0	V	34.8	4.36	26.77	55.82	74	18.18	harmonic
4920	22.26	Ave	53	2.5	H	35.9	4.40	26.75	35.81	54	18.19	harmonic
4820	22.05	Ave	327	1.7	H	35.9	4.30	26.79	35.46	54	18.54	harmonic
4920	42.63	PK	152	2.5	V	34.8	4.40	26.75	55.08	74	18.92	harmonic
4870	20.43	Ave	53	1.3	H	35.9	4.36	26.77	33.92	54	20.08	harmonic
4820	20.69	Ave	77	2.0	V	34.8	4.30	26.79	33.00	54	21.00	harmonic
4870	20.52	Ave	290	2.0	V	34.8	4.36	26.77	32.91	54	21.09	harmonic
4920	20.42	Ave	152	2.5	V	34.8	4.40	26.75	32.87	54	21.13	harmonic

3) Field strength of fundamental

Freq. (MHz)	S.A. Reading (dBµV)	Detector QP/PK/Ave	Turntable Direction Degree	Test Antenna			Cable Loss (dB)	Amp. Gain (dB)	Cord. Amp. (dBµV/m)	FCC 15.249		
				Height (m)	Polar (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	Comment
2435	87.68	PK	145	2.5	H	30.6	3.07	26.85	94.50	114	19.50	Fund.
2460	87.32	PK	144	2.5	H	30.6	3.11	26.88	94.15	114	19.85	Fund.
2435	86.15	PK	213	2.2	V	30.6	3.07	26.85	92.97	114	21.03	Fund.
2460	85.05	PK	126	2.5	V	30.6	3.11	26.88	91.88	114	22.12	Fund.
2410	85.07	PK	168	2.5	H	30.6	3.03	26.83	91.87	114	22.13	Fund.
2410	83.20	PK	172	2.5	V	30.6	3.03	26.83	90.00	114	24.00	Fund.
2435	61.92	Ave	145	2.5	H	30.6	3.07	26.85	68.74	94	25.26	Fund.
2460	61.73	Ave	144	2.5	H	30.6	3.11	26.88	68.56	94	25.44	Fund.
2435	60.26	Ave	213	2.2	V	30.6	3.07	26.85	67.08	94	26.92	Fund.
2410	60.07	Ave	168	2.5	H	30.6	3.03	26.83	66.87	94	27.13	Fund.
2460	59.91	Ave	126	2.5	V	30.6	3.11	26.88	66.74	94	27.26	Fund.
2410	57.24	Ave	172	2.5	V	30.6	3.03	26.83	64.04	94	29.96	Fund.

4) Out of band emissions

Indicated		Detector (PK/Ave.)	Table Angle Degree	Test Antenna		Correction Factor			FCC 15.249/15.205/15.209			
Frequency (MHz)	S.A. Reading (dBμV)			Height (m)	Polar (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Comment
2489.88	50.28	PK	247	2.2	H	30.4	3.03	26.85	56.86	74	17.14	spurious
2489.88	28.93	Ave	247	2.2	H	30.4	3.03	26.85	35.51	54	18.49	spurious
2489.88	46.54	PK	33	1.9.	V	30.4	3.03	26.85	53.12	74	20.88	spurious
2384.71	45.49	PK	64	2.3	H	30.3	3.03	26.85	51.97	74	22.03	spurious
2384.71	22.32	Ave	64	2.3	H	30.3	3.03	26.85	28.80	54	25.20	spurious
2384.71	21.43	Ave	125	2.1	V	30.3	3.03	26.85	27.91	54	26.09	spurious
2384.71	41.39	PK	125	2.1	V	30.3	3.03	26.85	47.87	74	26.13	spurious
2489.88	19.50	Ave	33	1.9	V	30.4	3.03	26.85	26.08	54	27.92	spurious

FCC §15.215(c) – 20 dB EMISSION BANDWIDTH

Applicable Standard

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in § 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Spectrum Analyzer	FSEM30	849720/019	2010-07-08	2011-07-07
Mini-cicuits	Amplifier	ZVA-213+	T-E27H	2011-03-08	2012-03-07
Sunol Sciences	Horn Antenna	DRH-118	A052604	2011-05-05	2012-05-04

*** 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

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 it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.

3. Measure the frequency difference of two frequencies that indicated 20dB bandwidth.

4. Repeat above procedures until all frequencies measured were complete.

Test Data

Environmental Conditions

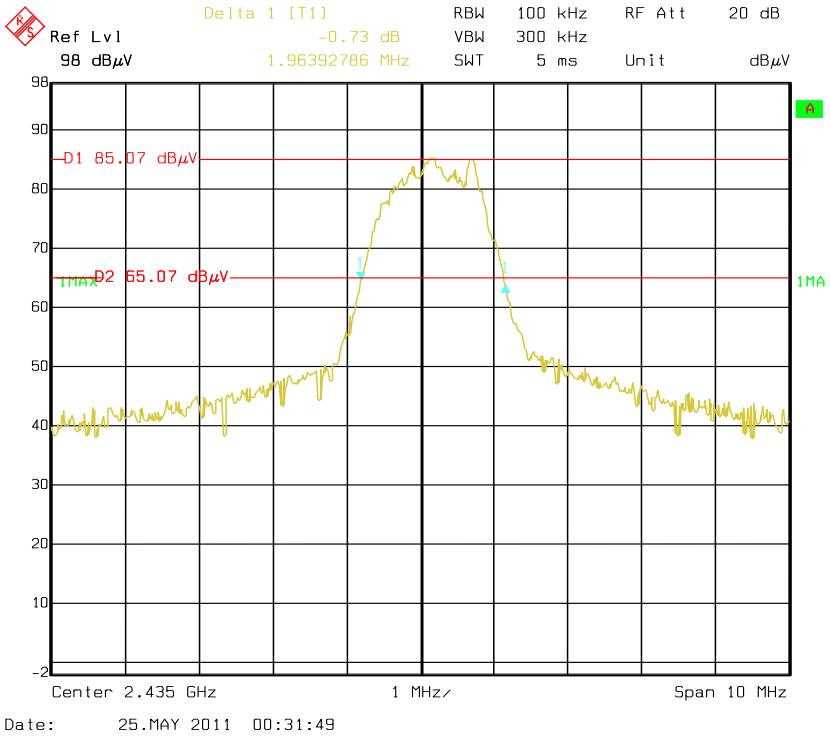
Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	100.2 kPa

**The testing was performed by Leon Chen on 2011-05-25.*

Test Mode: Transmitting

Pleas refer to the plot and tabular data sheet attached.

Channel Frequency (MHz)	20 dB Bandwidth (MHz)
2435	1.96



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