

TEST REPORT

Applicant Name & Address : REGAL IDEAS INC.
9320 4TH AVE South, Seattle, WA 98108

Sample Description
Product : Flexible lighting products
Model No. : LED Lighting System
Electrical Rating : 120VAC,60Hz,4.8W
FCC ID : 2AB4J-LED-C-1

Date Received : 05 March 2014

Date Test Conducted : 05 March 2014 - 16 May 2014

Test standards : FCC Part 15: 2013 Subpart B

Test Result : Pass

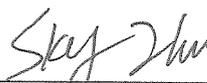
Conclusion : The submitted samples complied with the above rules/standards.

Remark : None.

*****End of Page*****

Prepared and Checked By:

Approved By:



Sky Zhu
Engineer
Intertek Guangzhou



Helen Ma *Signature*
Sr. Project Engineer
Intertek Guangzhou

04 August 2014 *Date*

This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program. The test report only allows to be revised within three years from its original issued date unless further standard or the requirement was noticed.

Intertek Testing Services Shenzhen Ltd. Guangzhou Branch
Block E, No.7-2 Guang Dong Software Science Park, Caipin Road, Guangzhou Science City, GETDD Guangzhou, China
Tel / Fax: 86-20-8213 9688/86-20-3205 7538



CONTENT

TEST REPORT	1
CONTENT	2
1 TEST RESULTS SUMMARY	3
2 TEST RESULTS CONCLUSION	4
3 LABORATORY MEASUREMENTS	5
4 TEST RESULTS	6
4.1 CONDUCTED DISTURBANCE VOLTAGE AT MAINS PORTS	6
4.1.1 <i>Used Test Equipment</i>	6
4.1.2 <i>Block Diagram of Test Setup</i>	6
4.1.3 <i>Test Setup and Procedure</i>	6
4.1.4 <i>Limit</i>	7
4.1.5 <i>Test Data</i>	8
4.1.6 <i>Emission Curve</i>	9
4.1.7 <i>Measurement Uncertainty</i>	9
4.2 RADIATED EMISSION (30 MHz -2000 MHz)	10
4.2.1 <i>Used Test Equipment</i>	10
4.2.2 <i>Block Diagram of Test Setup</i>	10
4.2.3 <i>Field Strength Calculation</i>	11
4.2.4 <i>Test Setup and Procedure</i>	12
4.2.5 <i>Limit</i>	12
4.2.6 <i>Test Data</i>	13
4.2.7 <i>Test Curve</i>	14
4.2.8 <i>Measurement uncertainty</i>	14



1

TEST RESULTS SUMMARY

Classification of EUT: Class B

Test Item	Standard	Result
Conducted disturbance voltage at mains ports	FCC Part 15: 2013, Subpart B	Pass
Radiated emission (30 MHz–1 GHz)	FCC Part 15: 2013, Subpart B	Pass
Radiated emission (Above 1 GHz)	FCC Part 15: 2013, Subpart B	Pass
Remark: Reference publication is used for methods of measurement: ANSI C63.4:2009		

Remark: 1. When determining the test results, measurement uncertainty of tests has been considered.

2

Test Results Conclusion
(with Justification)

RE: EMC Testing Pursuant to FCC Part 15, Subpart B Performed On the Flexible lighting products, Model: LED Lighting System

We tested the Flexible lighting products, Model: LED Lighting System, to determine if it was in compliance with the relevant FCC rules as marked on the Test Results Summary. We found that the unit met the requirement of FCC Part 15, Subpart B when tested as received. The worst case's test data was presented in this test report.

The equipment under test (EUT) is controlled by a remote controller; the controller is an intentional radiator using 315MHz frequency.

The controller option of this receiver is subject to Certification procedure.

The production units are required to conform to the initial sample as received when the units are placed on the market.



3

LABORATORY MEASUREMENTS

Configuration Information

Equipment Under Test (EUT):	Flexible lighting products
Model:	LED Lighting System
Serial No.	Not Labeled
Support Equipment:	N/A
Rated Voltage:	120V, 60Hz
Condition of Environment:	Temperature : 22~28°C Relative Humidity: 35~60% Atmosphere Pressure 86~106kPa

Notes:

The EMI measurements had been made in the operating mode producing the largest emission in the frequency band being investigated consistent with normal applications.

An attempt had been made to maximize the emission by varying the configuration of the EUT.

All of the tests are performed at:

Intertek Testing Services Shenzhen Ltd. Guangzhou Branch

Block E, No.7-2 Guang Dong Software Science Park, Caipin Road, Guangzhou Science City, GETDD Guangzhou, China.

This test facility and site measurement data have been fully placed on file with the Industrial Canada, test firm registration number is 2042U-1.

4 TEST RESULTS

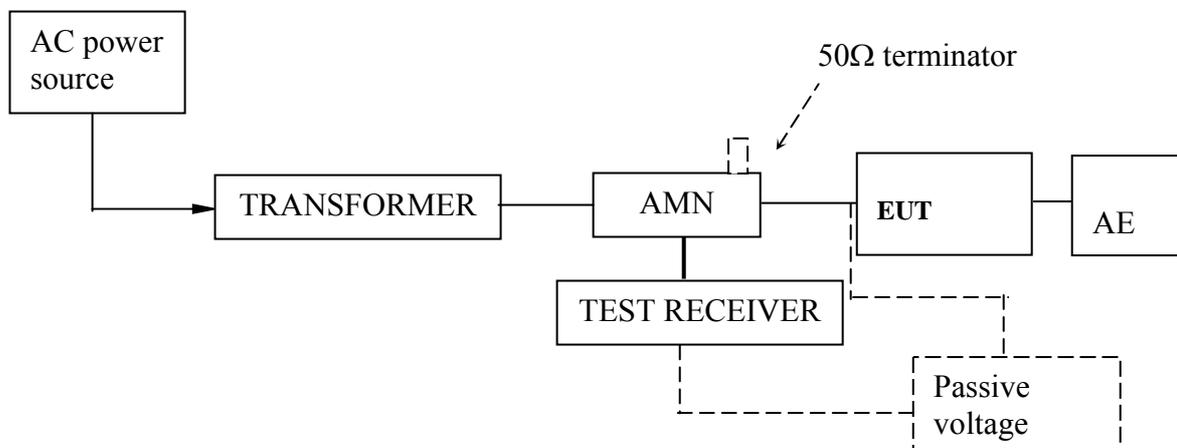
4.1 Conducted Disturbance Voltage at mains ports

Test Result: Pass

4.1.1 Used Test Equipment

Equipment No.	Equipment	Model	Manufacturer
EM004-04	EMC shield Room	8m×3m×3m	Zhongyu
EM080-05	EMI receiver	ESCI	R&S
EM006-05	LISN	ENV216	R&S

4.1.2 Block Diagram of Test Setup



4.1.3 Test Setup and Procedure

Test was performed according to ANSI C63.4: 2009. The EUT was set to achieve the maximum emission level. The mains terminal disturbance voltage was measured with the EUT in a shielded room. The EUT was connected to AC power source through an Artificial Mains Network which provides a 50Ω linear impedance. Artificial hand is used if appropriate (for handheld apparatus). The load/control terminal disturbance voltage was measured with passive voltage probe if appropriate.

The table-top EUT was placed on a 0.8m high non-metallic table above earthed ground plane (Ground Reference Plane). And for floor standing EUT, was placed on a 0.1m high non-metallic supported on GRP. The EUT keeps a distance of at least 0.8m from any other of the metallic surface. The Artificial Mains Network is situated at a distance of 0.8m from the EUT.

During the test, mains lead of EUT excess 0.8m was folded back and forth parallel to the lead so as to form a horizontal bundle with a length between 0.3m and 0.4m.

The bandwidth of test receiver was set at 9 kHz. The frequency range from 150 kHz to 30MHz was checked.



4.1.4 Limit

Class B

Frequency range MHz	AC mains terminals dB (uV)	
	Quasi-peak	Average
0.15 to 0.5	66 to 56	56 to 46
0.5 to 5	56	46
5 to 30	60	50

Note 1: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

Note 2: The lower limit is applicable at the transition frequency.



4.1.5 Test Data

At main terminal: Pass

Tested Wire: Live

Operation Mode: LED light on

EDIT PEAK LIST (Final Measurement Results)				
Trace1:	FCC15-QP			
Trace2:	FCC15-AV			
Trace3:	---			
TRACE	FREQUENCY	LEVEL dB μ V		DELTA LIMIT dB
2 Average	818 kHz	30.74	L1	-15.25
1 Quasi Peak	822 kHz	37.99	L1	-18.01

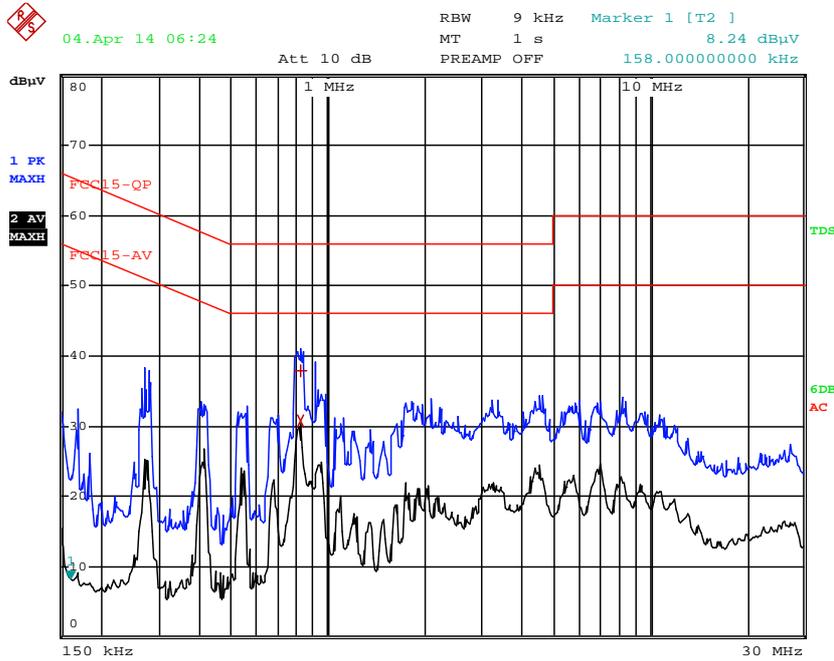
Tested Wire: Neutral

Operation Mode: LED light on

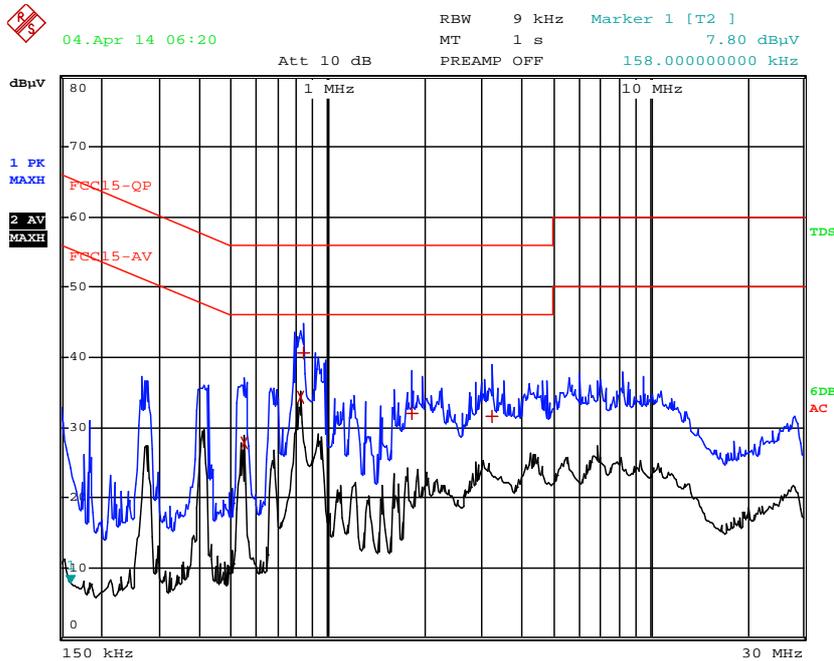
EDIT PEAK LIST (Final Measurement Results)				
Trace1:	FCC15-QP			
Trace2:	FCC15-AV			
Trace3:	---			
TRACE	FREQUENCY	LEVEL dB μ V		DELTA LIMIT dB
2 Average	546 kHz	27.79	L1	-18.20
2 Average	818 kHz	34.28	L1	-11.71
1 Quasi Peak	842 kHz	40.61	L1	-15.38
1 Quasi Peak	1.822 MHz	32.00	L1	-23.99
1 Quasi Peak	3.226 MHz	31.61	L1	-24.38

4.1.6 Emission Curve

Tested Wire: Live



Tested Wire: Neutral



4.1.7 Measurement Uncertainty

Uncertainty: 2.3 dB at a level of confidence of 95%

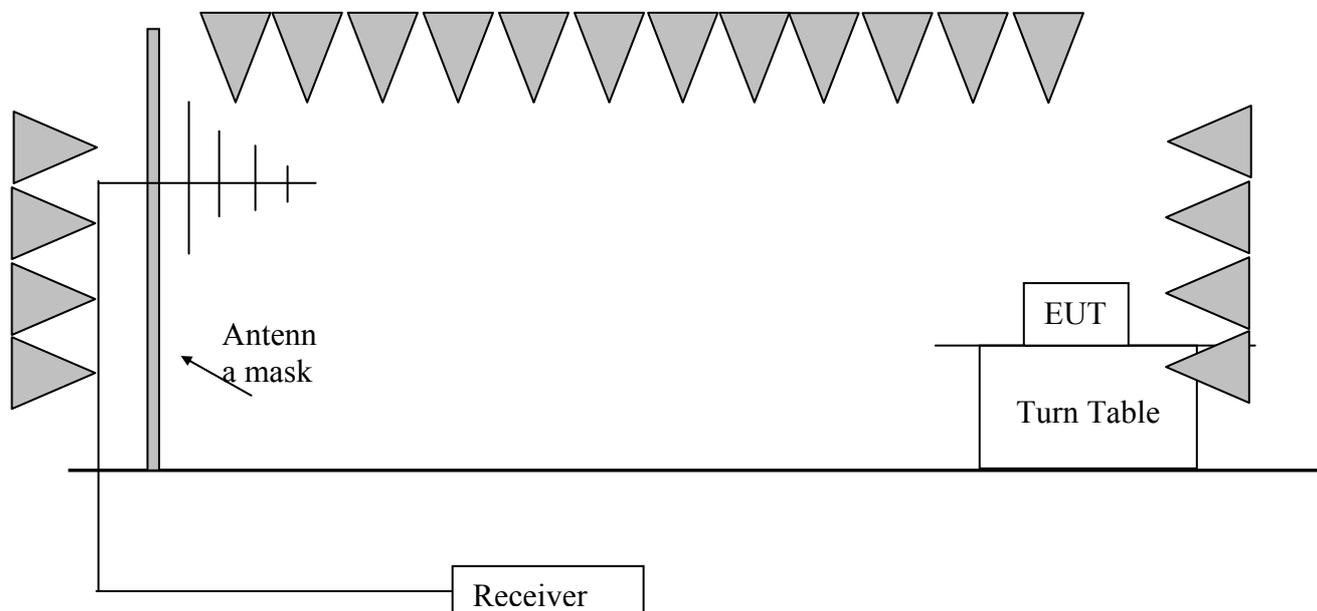
4.2 Radiated Emission (30 MHz -2000 MHz)

Test Result: Pass

4.2.1 Used Test Equipment

Equip. No.	Equipment	Model	Manufacturer
EM030-01	3m Semi-Anechoic Chamber	9×6×6 m3	ETS•LINDGREN
EM030-02	Control room for 3m Semi-Anechoic Chamber	4×4×3 m3	ETS•LINDGREN
EM031-02	EMI Test Receiver (9 kHz~7 GHz)	R&S ESR7	R&S
EM061-03	TRILOG Super Broadband test Antenna (30 MHz-1.5 GHz)	VULB 9161	SCHWARZBECK
EM031-02-01	Coaxial cable	/	R&S
EM031-03	Signal and Spectrum Analyzer (10 Hz~40 GHz)	R&S FSV40	R&S
EM033-02	Bouble-Ridged Waveguide Horn Antenna (800 MHz-18 GHz)	R&S HF907	R&S
EM033-02-02	Coaxial cable	/	R&S

4.2.2 Block Diagram of Test Setup



4.2.3 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any), Average Factor (optional) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF - AG$$

→ $FS = RA + \text{Correct Factor}$

where FS = Field Strength in dB μ V/m

RA = Receiver Amplitude (including preamplifier) in dB μ V

CF = Cable Attenuation Factor in dB

AF = Antenna Factor in dB

AG = Amplifier Gain in dB

Correct Factor = AF + CF – AG

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows:

$$FS = RA + \text{Correct Factor}$$

4.2.4 Test Setup and Procedure

The measurement was applied in a 3 m semi-anechoic chamber. The EUT and simulators were placed on a 0.8m high wooden turntable above the horizontal metal ground plane. The turn table rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which was mounted on an antenna mask. The antenna moved up and down between from 1meter to 4 meters to find out the maximum emission level.

Broadband antenna was used as receiving antenna. Both horizontal and vertical polarization of the antenna was set on measurement. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4: 2009 requirement during radiated test. The bandwidth setting on R&S Test Receiver was 120 kHz for 30MHz-1GHz. The bandwidth setting on R&S Test Receiver was 1 MHz for above 1GHz.

Radiated emissions from an ITE shall be measured from the lowest frequency generated, or used, in the device or 30 MHz, whichever is higher, up to the frequency determined in accordance with Table following:

Frequency Range of Measurement

Highest Frequency Generated or Used in Device	Upper Frequency of Radiated Measurement
Below 1.705 MHz	30
1.705 MHz – 108 MHz	1 GHz
108 MHz – 500 MHz	2 GHz
500 MHz – 1 GHz	5 GHz
Above 1 GHz	5th harmonic of the highest frequency or 40 GHz, whichever is lower.
At transitional frequencies the lower limit applies.	

The frequency range from 30MHz to 2000MHz was checked.

4.2.5 Limit

Radiated emissions from an unintentional radiator, including a digital device shall be measured from the lowest frequency generated, or used, in the device or 30 MHz, whichever is higher, up to the frequency determined in accordance with Table following:

Class B limit at 3m test distance:

Frequency range MHz	Field strength dB (µV/m)
30 to 88	40.0
88 to 216	43.5
216 to 960	46.0
Above 960	54.0
At transitional frequencies the lower limit applies.	



4.2.6 Test Data

Radiated Emissions Pursuant to FCC 15.109: Emissions Requirement: 30MHz-2GHz

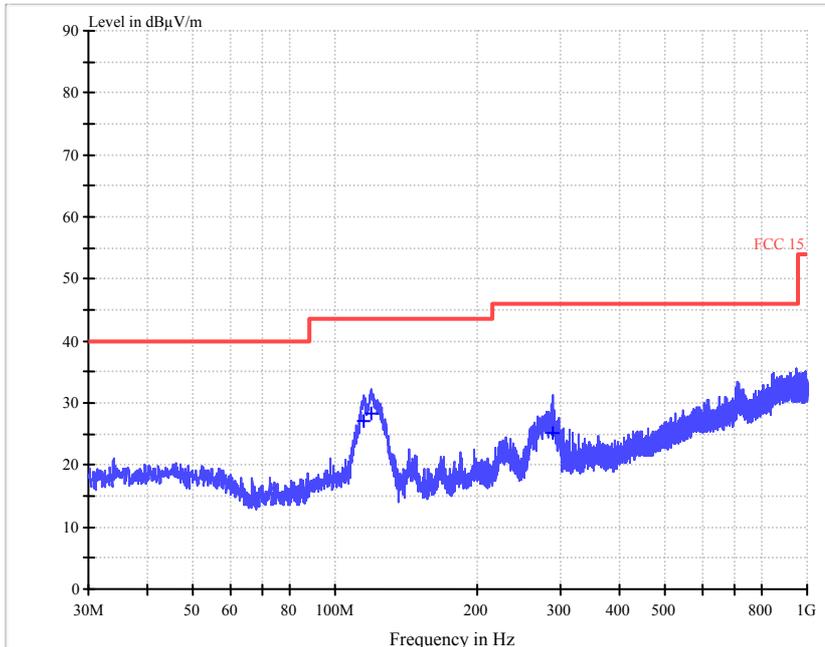
Test Voltage: AC120V, 60Hz

Polarization	Frequency (MHz)	QP Reading (dB μ V)	Correction factor (dB/m)	QP Net at 3m (dB μ V/m)	QP Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	114.63	15.8	11.4	27.2	43.5	16.3
Horizontal	119.42	17.3	10.9	28.2	43.5	15.3
Horizontal	289.41	9.8	15.3	25.1	46.0	20.9
Vertical	34.48	17.4	12.9	30.3	40.00	9.7
Vertical	80.56	22.9	7.4	30.3	40.00	9.7
Vertical	115.29	23.2	11.4	34.6	43.5	8.9
Vertical	119.08	24.7	11.0	35.7	43.5	7.8

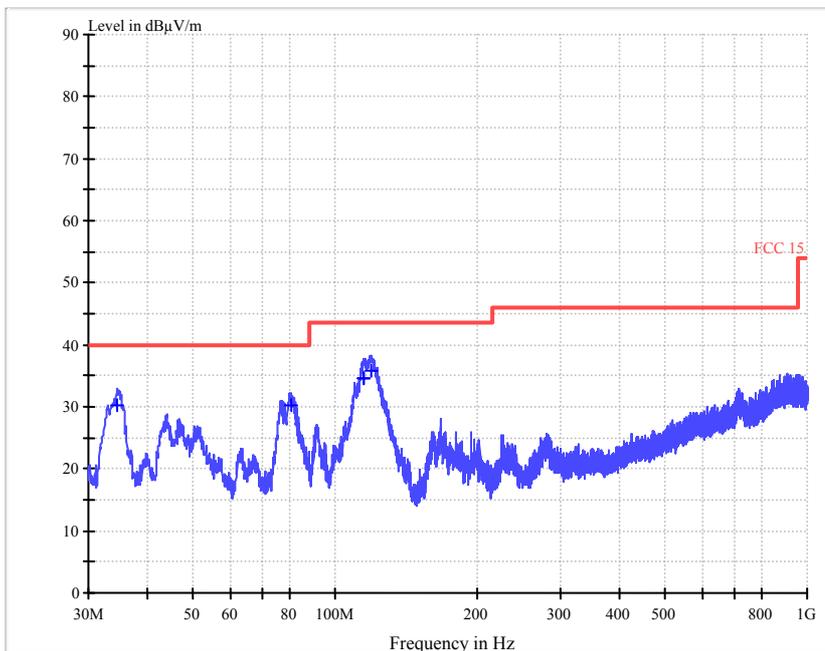
- Notes: 1. Quasi-peak detector was used at below 1GHz, peak detector was used at above 1GHz.
2. All measurements were made at 3 meter.
3. Positive value in the margin column shows emission below limit.
4. When tested above 1GHz, the emissions found were at least 20 dB below the limit.

4.2.7 Test Curve

Horizontal:



Vertical:



4.2.8 Measurement uncertainty

Uncertainty: 4.48 dB in the frequency range of 30-1000 MHz at a level of confidence of 95%