ENERGY STAR® Program Requirements Product Specification for Decorative Light Strings, Version 1.5

Report prepared for:	Guangde Ledup Enterprise, Inc Jingtang Road Economic Development Zone Guangde, Anhui 242200, China
CSA Report Number:	229828-70024182
Report Date:	May 21, 2015
Model Tested:	Model RGB120/25L, RGB120/50L and RGB120/100L.
Model Description:	Decorative Lighting Strings
Manufacturer:	Guangde Ledup Enterprise, Inc
Test Protocols:	ENERGY STAR® Program Requirements Product Specification for Decorative Light Strings, Version 1.5
Test Note:	N/A

Prepared by:

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Certifier

Date: May 21, 2015

Approved by:

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Energy Efficiency (Lighting Product)

Date: May 21, 2015

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Product Description

The product submitted for evaluation is as follows:

Indoor and outdoor use, decorative LED lighting string, with Class 2 output LED driver and controller, Model RGB120/25L, RGB120/50L and RGB120/100L.

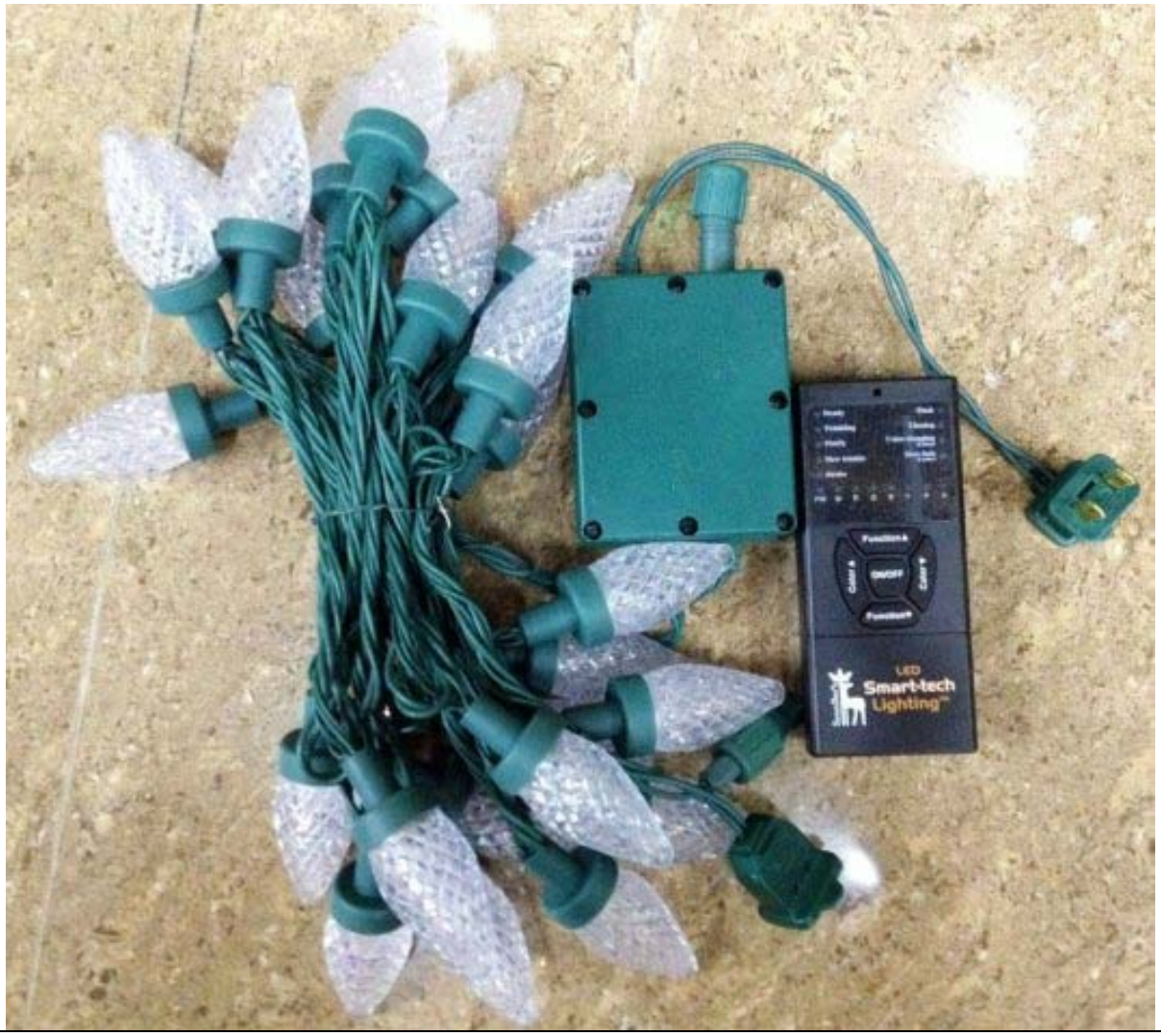
Rating of Lighting String:

Lighting String Model	Total Number of Lamps of the Lighting String	Rated Input Current (A)	Rated Input Wattage (W)
RGB120/25L	25	0.035	4.2
RGB120/50L	50	0.050	6.0
RGB120/100L	100	0.075	9.0

1. The lamps are parallel-connected to the output of the LED driver.
2. All lighting strings are using the same lighting source.
3. All lighting strings have the same material in lamp cover / diffuser, wire and socket / lampholder husk.
4. All lighting strings have the same socket / lampholder husk type: push-in type lampholder; the difference in lampholder dimension will not affect the energy efficiency.

Remark: All samples submitted for Output and Reliability Requirements and Weathering Requirements are provided with HC9 diffusers.

Photo of the Product



Test Overview
The Decorative Lighting Strings Samples were evaluated in accordance with **ENERGY STAR® Program Requirements Product Specification for Decorative Light Strings, Version 1.5** An *Integrating Sphere* was used to measure all photometric characteristics of the sample. A full description of these and the associated equipment is provided at the end of this report. A *Power Analyzer* was used to measure all electrical characteristics of the sample. In the Electrical Requirement, Output and Reliability Requirement, Weathering Requirement Tests, the lighting string was set to steady on, yellow color setting. It is the maximum power condition of the lighting string.

Summary of Tests Result –				
Criteria Item	***ENERGY STAR Requirements***	***Sample Size/Specific Requirements***	***Measured Test Data***	***Verdict***
A. Inspection				
Decorative Forms	All decorative light strings attached to a decorative form shall be ENERGY STAR qualified for their intended end use on the decorative form and meet all applicable electrical safety requirements for their intended use. Decorative light strings and decorative forms shall be rated for their intended use. Intended use shall be either indoor-only or indoor/outdoor rated. Indoor/outdoor rated decorative light strings are permitted for use on indoor-only rated decorative forms.	Total power consumption shall be reported, based on power consumption of the attached ENERGY STAR qualified decorative light string on the decorative form.	Not decorative form.	***N/A***
Number of Lamps per String	For all strings in the sample, the number of lamps indicated on the packaging shall equal the number of lamps on the strings.	3 decorative light strings of the same model shall be used to determine compliance with all of the inspection requirements. This same sample of strings may also be used for one of the three tests (i.e., electrical, output and reliability, or weathering).	The number of lamps indicated on the packaging equal to the number of lamps on the strings.	***PASS***
Replaceable Lamps	If the string has replaceable lamps, the socket and lamp shall have a marking or means to ensure correct insertion of replacement lamps.		Keyed Lamp	***PASS***
Safety Requirements	All strings shall comply with UL 588 (for the United States) and/or CSA C22.2 No.37 (for Canada).	UL and/or CSA requirements, as appropriate.	CSA us Certified	***PASS***
Rated for Indoor or Indoor/Outdoor Applications	A label on the string shall indicate whether it is rated for indoor-only or indoor/outdoor use.	3 decorative light strings of the same model shall be used to determine compliance with all of the inspection requirements. This same sample of strings may also be used for one of the three tests (i.e., electrical, output and reliability, or weathering).	Label marked indoor/outdoor	***PASS***
Warranty	A warranty shall be provided and may either be printed on the packaging or included as an insert. Warranty statement shall: 1) include minimum 3-year warranty under normal residential seasonal use against all product defects; and 2) provide either a toll-free telephone number, or mailing address, or email and website address for consumer complaint resolution.		5 year warranty, provided with toll-free telephone number and website.	***PASS***

Summary of Tests Result – (Con't)				
Criteria Item	***ENERGY STAR Requirements***	***Sample Size/Specific Requirements***	***Measured Test Data***	***Verdict***
B. Electrical Requirements				
Input Power	The input power consumption per lamp on each of the three strings in the sample shall not exceed 0.20 watts. For decorative light strings that modulate in their power use (e.g., flashing, changing color), energy use shall be measured over a time period of 5 or more complete modulation cycles, averaged, and recorded as the input power.	3 decorative light strings of the same model.	All < 0.2 W per lamp.	***PASS***
Over-Voltage	Average percentage of failed lamps on all three strings in the sample shall be no greater than 3%.		No failed lamp.	***PASS***
C. Output and Reliability Requirements				
Maintained Light Output	For strings with colored lamps, the average maintained light output shall be no less than 70%. For strings with white lamps or any phosphor-based lamps, the average shall be no less than 50%.	3 decorative light strings of the same model. See ENERGY STAR Test Method for Decorative Light Strings, December 2011 (Annex A) for string testing configuration and test steps.	All more than 70%.	***PASS***
Failed Lamps	The average percentage of failed lamps on all three strings in the sample shall be no greater than 3%.		No failed lamp.	***PASS***
D. Weathering Requirements				
Maintained Light Output	For strings with colored lamps, the average maintained light output shall be no less than 70%. For strings with white lamps or any phosphor-based lamps, the average shall be no less than 50%.	3 decorative light strings of the same model. Weathering condition as specified in Cycle 7 of Table X2.1 of ASTM G154-06.	All more than 70%.	***PASS***
Failed Lamps	The average percentage of failed lamps on all three strings in the sample shall be no greater than 3%.	See ENERGY STAR Test Method for Decorative Light Strings, December 2011 (Annex A) for string testing configuration and test steps.	No failed lamp.	***PASS***

Summary of Tests Result – (Con't)				
Criteria Item	***ENERGY STAR Requirements***	***Sample Size/Specific Requirements***	***Measured Test Data***	***Verdict***
E. Product Packaging for Consumer Awareness Requirements				
Product Suitability	Packaging shall state product's suitability for use indoor-only or indoor/outdoor use.	Electronic draft or hard copy of packaging for the specific model or product family. One copy per family if the labeling is the same for all models.	Marked indoor/outdoor	***PASS***
Product Description	1) Number of lamps on the decorative light string, 2) Total lighted length of string in metric and imperial units, and 3) Total rated wattage of decorative light string.		Verified, include number of lamps, lighted length, and rated wattage.	***PASS***
Correlated Color Temperature for White-light Strings	Packaging shall indicate if "warm-white," "pure-white" or "cool-white" lamps. These three terms pertain to the correlated color temperature (CCT) of the white-light lamps: Warm-white < 3500 CCT Pure-white 3500 – 5000 CCT Cool-white > 5000 CCT		Marked as Pure-white.	***PASS***

Test Data:

A. Inspection:

Model No.	Sample ID GZ20150309007	Number of Lamps per Strings	Replaceable Lamps	Environmental usage label provided	Warranty / Contact Info Provided
RGB120/25L	-001	25	Keyed Lamp	Indoor/outdoor	warranty, contact info provided
	-002	25	Keyed Lamp	Indoor/outdoor	warranty, contact info provided
	-003	25	Keyed Lamp	Indoor/outdoor	warranty, contact info provided

B. Electrical Requirement:

Input Power:

Prior to testing, operate three decorative light strings for a 24 hour (± 1%) seasoning period at 120 V ± 1 V RMS AC. Measure input power and current at 120 V ± 0.5 V RMS AC. For light string systems with power adapters or controllers that can accommodate multiple light strings, the input power shall be measured with the rated maximum number of strings attached. Divide the measured input power by the number of lamps on the tested string to calculate the input power consumption per lamp.

The input power consumption per lamp on each of the three strings in the sample shall not exceed 0.20 watts.

Equipment No. / Cal. Due.Date	Commencing Date	Complete Date	Tested by
JV60266-004/ 2015-10-22	2015-03-13	2015-03-13	Marco Xu

Tested Model	Sample ID GZ20150309007	Input Voltage (V)	Input Frequency(Hz)	Input Current (mA)	Input Wattage (W)	Input Power Per Lamp (W)
RGB120/25L	-001	120.13	60	33.25	1.550	0.06
	-002	120.13	60	32.49	1.541	0.06
	-003	120.13	60	34.82	1.563	0.06
RGB120/50L	-004	120.13	60	47.60	2.435	0.05
	-005	120.13	60	48.27	2.482	0.05
	-006	120.13	60	47.33	2.417	0.05
RGB120/100L	-007	120.13	60	74.27	3.931	0.04
	-008	120.13	60	73.90	3.870	0.04
	-009	120.13	60	73.25	3.837	0.04

Over-Voltage:

Prior to testing, operate three decorative light strings for a 24 hour (± 1%) seasoning period at 120 V ± 1 V RMS AC. Energize the light string at 132 V ± 1 V RMS AC for one hour and examine for failure. Count any lamps that have failed (as per definition below). Calculate the failed lamps as a percentage of total lamps on the three strings.

A lamp has failed if the light output is less than half the expected output for a comparable lamp of the same age in good condition. This will normally be determined by comparison with a good lamp of the same color on the same string.

Equipment No. / Cal. Due.Date	Commencing Date	Complete Date	Tested by
JV60266-004/ 2015-10-22	2015-03-16	2015-03-17	Marco Xu

Tested Model	Sample ID	Number of Failed Lamps	Percentage of Failed Lamp
RGB120/25L	GZ20150309007-001	0	0%
	GZ20150309007-002	0	0%
	GZ20150309007-003	0	0%
RGB120/50L	GZ20150309007-004	0	0%
	GZ20150309007-005	0	0%
	GZ20150309007-006	0	0%
RGB120/100L	GZ20150309007-007	0	0%
	GZ20150309007-008	0	0%
	GZ20150309007-009	0	0%

C. Output and Reliability Test:

Prior to testing, operate three decorative light strings for a 24 hour (± 1%) seasoning period at 120 V ± 1 V RMS AC. Assemble the three decorative light strings into three flat test configurations. For each, wrap the string around a rigid board or frame so that all are mechanically supported and oriented with the lamps directed outward. Tape the assembly together with electrical tape to maintain the relative positioning of the lamps throughout the test. Next, for its optical properties, white Teflon® tape shall be wrapped around the assembly to completely cover the electrical tape and wiring harnesses. Ensure that the Teflon tape does not cover any part of the lamp or lamp socket.

Measure the light output of the assemblies while operating at 120 V ± 0.5 V RMS AC, 25°C ± 5°C and following the guidelines contained in CIE Publication 084-1989, The Measurement of Luminous Flux. For decorative light strings that modulate their light output (e.g., flashing, changing color), light output shall be measured over at least five (5) complete cycles.

Keeping the testing assemblies intact (i.e., do not remove the tape, or move any of the lamps), operate each assembly for 1000 hours (± 1%) continuously. This period of operation (41 days, 16 hours) may be conducted using a test bench facility (i.e., outside the measuring device), provided that none of the lamps in any of the assemblies have been moved relative to each other.

After completing the output and reliability (previously referred to as lifetime) test, conduct a second measurement of the light output on the respective sample of lamps following the same procedure above. Calculate the average maintained light output for the three strings tested relative to the initial average measurement for those same strings.

For strings with colored lamps, the average maintained light output shall be no less than 70%. For strings with white lamps or any phosphor-based lamps, the average shall be no less than 50%.

The average percentage of failed lamps on all three strings in the sample shall be no greater than 3%.

Equipment No. / Cal. Due.Date	Commencing Date	Complete Date	Tested by
JV60265-001 / 2015-10-22	2015-03-14	2015-05-05	Marco Xu
JV60265-002 / 2015-10-22			
JV60265-005 / 2015-10-23			
JV60042 / 2016-04-17			

Tested Model	Sample ID GZ20150309007	Initial Light Output (lm)	Light Output after 1000 hours aging (lm)	Maintained Light Output between initial and 1000 hours	Number of Failed Lamps	Percentage of Failed Lamp (%)
RGB120/25L	-010	20.620	16.77	81.32%	0	0
	-011	21.394	17.64	82.47%	0	0
	-012	20.819	16.66	80.06%	0	0

D. Weathering Requirement:

Prior to testing, operate three decorative light strings for a 24 hour (± 1%) seasoning period at 120 V ± 1 V RMS AC. Assemble the three decorative light strings into three flat test configurations. For each, wrap the string around a rigid board or frame so that all are mechanically supported and oriented with the lamps directed outward. Tape the assembly together with electrical tape to maintain the relative positioning of the lamps throughout the test. Next, for its optical properties, white Teflon® tape shall be wrapped around the assembly to completely cover the electrical tape and wiring harnesses. Ensure that the Teflon tape does not cover any part of the lamp or lamp socket.

Measure the light output of the assemblies while operating at 120 V ± 0.5 V RMS AC, 25°C ± 5°C and following the guidelines contained in CIE Publication 084-1989, The Measurement of Luminous Flux. For decorative light strings that modulate their light output (e.g., flashing, changing color), light output shall be measured over at least five (5) complete cycles.

Keeping the testing assemblies intact, load them into the testing chamber. The decorative light strings under test shall be operated for the duration of this test at 120 V ± 3 V RMS AC inside the testing chamber. Each cycle of this test includes 8 hours of UV light (340 nm at 1.55 W/m²/nm) at 60°C, 0.25 hours of water spray, and 3.75 hours of condensation at 50°C. The strings shall be subjected to 20 consecutive iterations of Cycle 7 under Table X2.1 of ASTM G154-06 for a total of 240 hours.

After completing the output and reliability (previously referred to as lifetime) test, conduct a second measurement of the light output on the respective sample of lamps following the same procedure above. Calculate the average maintained light output for the three strings tested relative to the initial average measurement for those same strings.

For strings with colored lamps, the average maintained light output shall be no less than 70%. For strings with white lamps or any phosphor-based lamps, the average shall be no less than 50%.

A lamp has failed if the light output is less than half the expected output for a comparable lamp of the same age in good condition. This will normally be determined by comparison with a good lamp of the same color on the same string.

The average percentage of failed lamps on all three strings in the sample shall be no greater than 3%.

Equipment No. / Cal. Due.Date	Commencing Date	Complete Date	Tested by
JV60272 / 2015-04-14 JV60265-001 / 2015-10-22 JV60265-002 / 2015-10-22 JV60265-005 / 2015-10-23 JV60042 / 2016-04-17	2015-03-23	2015-04-03	Marco Xu

Tested Model	Sample ID	Initial Light Output (lm)	Light Output after 240 hours aging (lm)	Maintained Light Output between initial and 240 hours	Number of Failed Lamps	Percentage of Failed Lamp (%)
RGB120/25L	GZ20150309007-013	21.739	19.593	90.13%	0	0
	GZ20150309007-014	21.864	19.833	90.71%	0	0
	GZ20150309007-015	20.317	18.588	91.49%	0	0

Photometric Testing Information

The sample was evaluated for photometric and electrical characteristics using an integrating sphere, each located in purpose-built, temperature and humidity-controlled, draft free environments.

The integrating sphere is a 2-meter diameter sphere manufactured by EVERFINE (Model# 2.0m R98-A-V1) which exhibits a "4π geometry" configuration according to IES LM-79-08 and is applicable for all types of LED products (directional and non-directional light projections). Its spectroradiometer is an array-type detector manufactured and calibrated by EVERFINE (Model# HAAS-2000).

The integrating sphere uses self-absorption correction to eliminate errors due to mismatches between the standard reference lamp and the test samples being measured. The auxiliary lamp used to perform this task is a halogen type lamp powered by a calibrated *Lamp Power Supply* manufactured by Everfine (model WY12010). Ambient temperature (for photometric analysis) is measured using a "J-Type" thermocouple located inside the integrating sphere at the same height as the sample under test and not more than 1 meter in horizontal distance away from the sample. The thermocouple is located behind the baffle of the photo detector in order to eliminate any direct optical radiation from the sample under test.

Luminaire Stabilization.
The sample was placed inside the integrating sphere and powered by a regulated and conditioned 120.0 Volt, 60 Hertz alternating current supply. The light output and electrical power measurements contained in this report are the numeric **averages** of the three readings upon which stabilization is verified. The stabilization times shown on the Notes pages of this report denote the time of the 1st measurement (of the 3 consecutive readings) since this is the minimum time that the sample is assumed to have taken to reach stabilization.

The integrating sphere is calibrated using a quartzline halogen lamp with the following specifications:

Manufacturer: Everfine
Part Number: D204
Bulb Number: JV-60267-004
Voltage= 22.50Volts
Calibration Current= 3.917 Amperes
Luminous Flux = 1310 Lumens
Calibration Date: 2014-10-20 (ilac-MRA traceable)

A *Yokogawa WT210 Power Analyzer* was used to measure all electrical characteristics of the sample.

CSA Group (Guangzhou) is an accredited Test Laboratory (TL-464) to IESNA LM79-08 by IAS (International Accreditation Service)

EQUIPMENTS STATUS
仪器设备使用记录

Used In This Project 本次测试使用	JV Number JV 编号	Description 仪器名称 Manufacturer 生产商	Model 型号	Calibration Due Date 校准日期	Status 使用状态	
					Commencing Test Date 测试开始日期	Completed Test Date 测试结束日期
Part I: Sphere						
Yes☐ No☒	JV60265-007	Integrating Sphere EVERFINE	0.5m LED-R98-A-V1	N/A	N/A	N/A
Yes☐ No☒	JV60265-003	Digital DC Power Supply KEITHLEY	2420	N/A	N/A	N/A
Yes☐ No☒	JV60265-004	Programmable LED Test Power EVERFINE	LED300E	Oct 22,2015	N/A	N/A
Yes☐ No☒	JV60267-007	Standard Lamp EVERFINE	D062	N/A	N/A	N/A
Yes☐ No☒	JV60267-008	Standard Lamp EVERFINE	D062	N/A	N/A	N/A
Yes☒ No☐	JV60265-006	Integrating Sphere EVERFINE	2.0m R98-A-V1	N/A	2015-03-14	2015-05-05
Yes☒ No☐	JV60265-005	Spectroradiometer EVERFINE	HAAS-2000	Oct 23,2015	2015-03-14	2015-05-05
Yes☒ No☐	JV60267-004	Standard Lamp EVERFINE	D204	Oct 19,2015	2015-03-14	2015-05-05
Yes☒ No☐	JV60272	UV Test Atlas	22550	Apr 14, 2015	2015-03-23	2015-04-03
Yes☒ No☐	JV60265-001	AC Power Supply Agilent	6812B	Oct 22,2015	2015-03-14	2015-05-05
Yes☒ No☐	JV60265-002	Power Analyzer Yokogawa	WT210	Oct 22,2015	2015-03-14	2015-05-05
Yes☒ No☐	JV60267-010	Auxiliary Lamp EVERFINE	D204C	N/A	2015-03-14	2015-05-05
Yes☒ No☐	JV60266-007	DC Power Supply EVERFINE	WY12010	Aug 24, 2015	2015-03-14	2015-05-05
Yes☒ No☐	JV60266-009	Temperature & Humidity Recorder Shenzhen HuaTu	S100-TH	April 17,2016	2015-03-14	2015-05-05
Yes☒ No☐	JV60266-010	Temperature & Humidity Recorder Shenzhen HuaTu	S100-TH	April 17,2016	2015-03-14	2015-05-05
Yes☒ No☐	JV60042	Thermometer (Thermocouple) Fluke 52	52II	April 17,2016	2015-03-14	2015-05-05
Yes☒ No☐	JV60266-004	Power Analyzer Yokogawa	WT210	Oct 22, 2015	2015-03-13	2015-03-17