Photometric and Electrical Tests on 100W LED Bulb

For	CREE XXX Street City, State XXXXX
P.O. Number	Credit Card
Date Tested	3/13/2018
Test Personnel	Jessica Kramer
Test Specification	IES LM-79-08

Test Report By: [redacted]
Mechanical Engineer

Requested By: Jane Doe
CREE

Approved By: [redacted]
Environmental Team Leader

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1. Report Revision History

Revision	Date	Description
–	March 15, 2018	Initial release

2. Introduction

This document presents the results of photometric and electrical (PHT) tests that were performed on 1 100W LED Bulb (hereinafter referred to as the Device Under Test (DUT)). The DUT was identified as follows:

Part ID: [redacted]	S/N DUT1

3. Test Specification

The tests were performed to selected portions of, and in accordance with IES LM-79-08 and to IES TM-30-15.

4. Modifications Made to DUT and/or Deviations to Specification During Testing

Temperature was not controlled, but was recorded in Section 12.

5. Summary

The following PHT tests were performed and their results are shown below:

Scan ID	S/N	Name	Results	Date Tested
1120	DUT1	[redacted]	Completed, See Section 12	3/13/2018

6. Operation States

The PHT tests were performed with the DUTs operating in one or more of the test modes described below.

6.1. Powered

The DUTs were powered at 120VAC, 60Hz during testing.

7. Performance Monitoring

The DUTs were not monitored during testing. Units functioned properly throughout the test.

8. Test Method

The tests were performed as described in IES LM-79-08 and IES TM-30-15.

9. Certification

Elite Electronic Engineering Incorporated certifies that the information contained in this report was obtained under conditions which meet or exceed those specified in the test specifications. The data presented in this test report pertains to the DUTs at the test date as operated and monitored if required. Any electrical or mechanical modification made to the DUTs subsequent to the specified test date will serve to invalidate the data and void this certification.

10. DEVICE UNDER TEST PHOTOGRAPHS

Device Under Test Photographs

11. TEST SECTIONS

11.1. Total Luminous Flux, Luminous Efficacy, and Color Characteristics

11.1.1. Test Objective:

Measure and record the electrical characteristics, total luminous flux, luminous efficacy, and color characteristics of the DUT per the test specifications in section 3 of this report.

11.1.2. Test Procedure:

Using the equipment listed in section 11.1.3,

- Calibrate integrating sphere and spectroradiometer.
- Install DUT in 4pi position inside the sphere with base up.
- Power on DUT, ensure light is properly baffled, adjust DUT placement if necessary, and take photographs.
- Power off DUT, close sphere, and update self-absorption correction.
- Power on DUT, monitor light output and electrical power until stabilization is achieved per LM-79-08 Section 5.0. using Integral software
- Once stabilization is confirmed, immediately run auto exposure to set appropriate integration time, and take scan.
- One scan of the relative spectral power distribution was used to generate both the LM-79 and TM-30 calculations.
- Immediately power off DUT.
- Correction factors applied included spectrometer stray light correction, dark correction, and self-absorption correction.
- The Labsphere Integral software was used to generate the LM-79-08 total luminous flux, luminous efficacy, and color characteristics.
- The relative spectral power distribution measured using Labsphere Integral software was linearly interpolated to 1nm interval and input into the 'IES TM-30-15 Basic Calculation Tool v1.02.xlsm' to return the TM-30-15 results in section 12.

11.1.3. Description of Test Apparatus:

Eq ID	Equipment Description	Manufacturer	Model No.	Serial No.	Frequency Range	Cal Date	Due Date
PHT10	INTEGRATING SPHERE	LABSPHERE	IllumiaPlus LMS-195	0428164553	2M DIA, SPECTRAFLECT ® COATING WITH (98% REFLECTANCE, VISIBLE)	CNR	
PHT11	SPECTRORADIOMETER	LABSPHERE	CDS 2600	0313172858	350NM-1050NM	3/12/2018	3/19/2018
PHT12	TEMPERATURE MONITOR	OMEGA ENGINEERING	USB TC08	AO026/180			4/21/2018
PHT13	POWER ANALYZER	XITRON TECHNOLOGIES	2801+ OPT ON	28011702005		2/21/2017	4/21/2018
PHT14	PROGRAMMABLE AC POWER SUPPLY	CHROMA	61603	616030001333		CNR	
PHT15	PHOTOMETRY MODULE (INCLUDES DC POWER SUPPLY FOR CAL LAMP)	LABSPHERE	PM-150-1400	0302172331	SET AT 2.679A	3/2/2017	4/21/2018
PHT16	DC POWER SUPPLY	LABSPHERE	LPS-100-0833	0223172234	SET AT 8.333A	2/23/2017	4/21/2018
PHT17A	TOTAL SPECTRAL FLUX STANDARD	LABSPHERE	SCL-1400	H156	75W, OMNI-DIRECTIONAL, TUNGSTEN HALOGEN LAMP, NIST TRACEABLE	1/13/2017	4/21/2018

I/O: Initial Only N/A: Not Applicable
Note 1: For the purpose of this test, the equipment was calibrated prior to the test or monitored by a calibrated instrument.

11.1.4. Setup Photographs

Mounting Bracket, Input (Red) Wire, and Neutral (Black) Wire

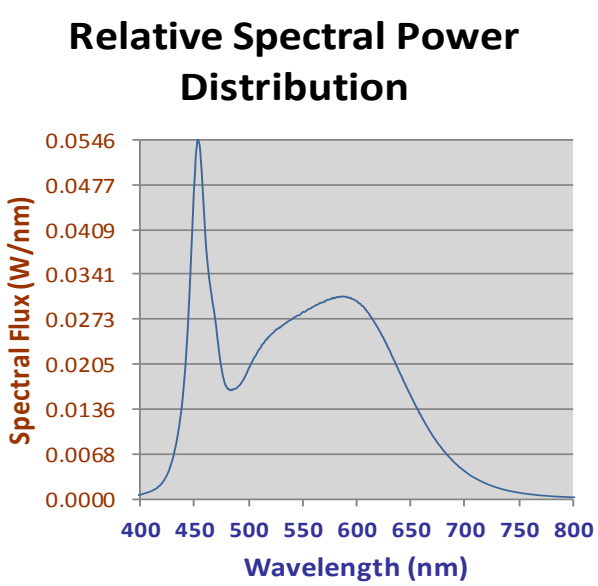
12. RESULTS

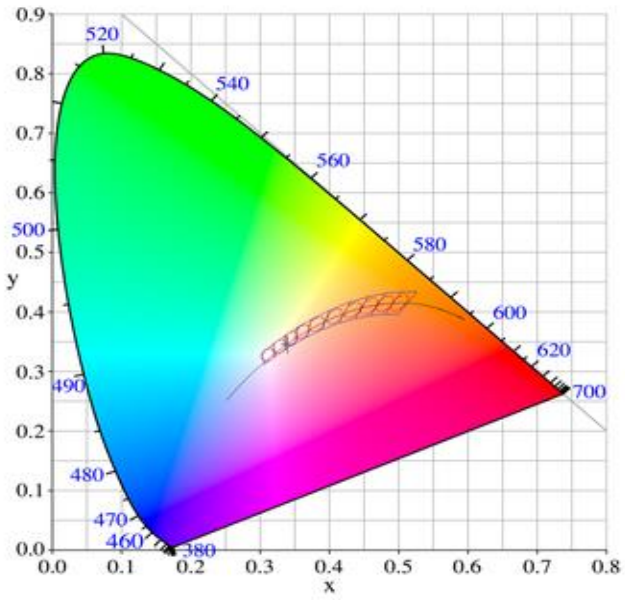
Test Set-up Details

Scan Number	Name	Calibration Name	Stabilization Time (Minutes)	DUT Rated Voltage (Volts)	DUT Rated Frequency (Hertz)	Nominal CCT (Kelvin)	Hours Operated prior to Measurement (Hours)	Total Operating Time for Measurement Including Stabilization (Hours)
1120	CREE SA21-16050MDFD-12DE26-1-11 LM79	2018.03.12 Weekly Cal	63	120	60	5000	2	2

LM-79-08 Total Luminous Flux, Luminous Efficacy, and Color Characteristics

EEE180SAMPLE		3/13/18	
Description	100W LED Bulb	Test Time	10:12 AM
		Integration Time	413.9
Orientation	Base Up	Scans Averaged	1
Test by	JDK	Saturation	75%
Notes		Sphere Geometry	4pi
Scan ID	Scan id 1120 [redacted] LM79	Sphere Temp	22.05





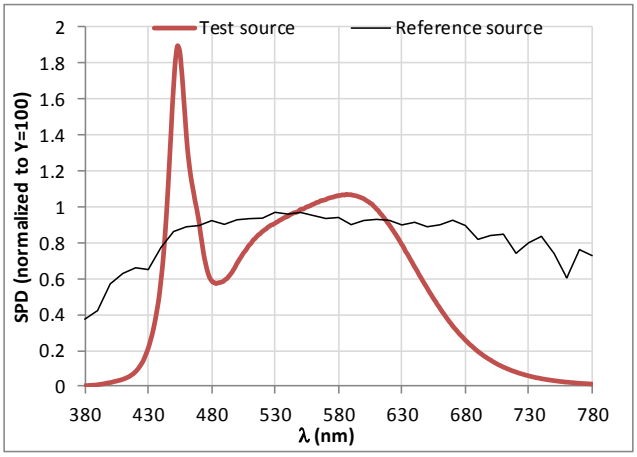
Lumens	Watts	Volts	Amps	Efficacy	PF	ITHD
1966.7	15.148	120.010	0.126773	129.8375	0.995639	2.94437

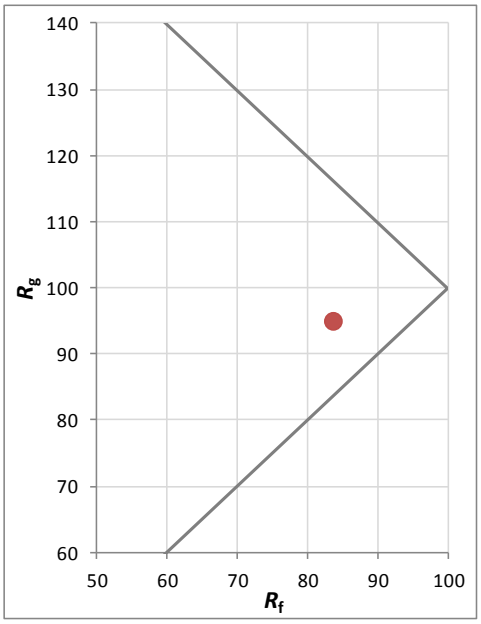
CCT	CRI	x	y	Duv	u'	v'
5193.0	87.236	0.3398	0.3456	-0.0008	0.2101	0.4809

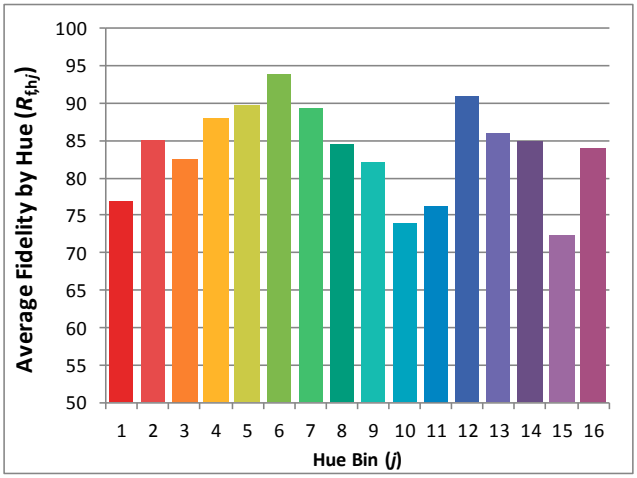
R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14
87	94	95	86	87	89	88	73	28	84	85	67	90	98

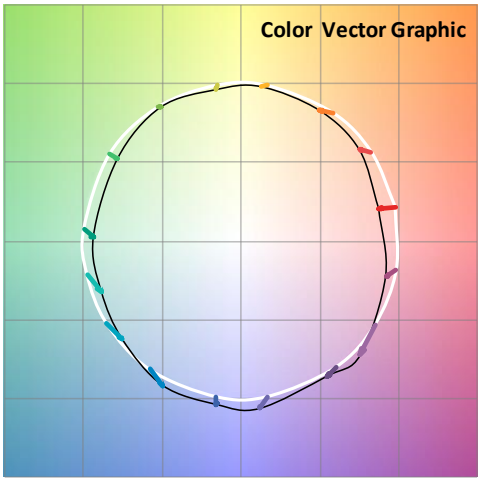
IES TM-30-15 Calculation Results

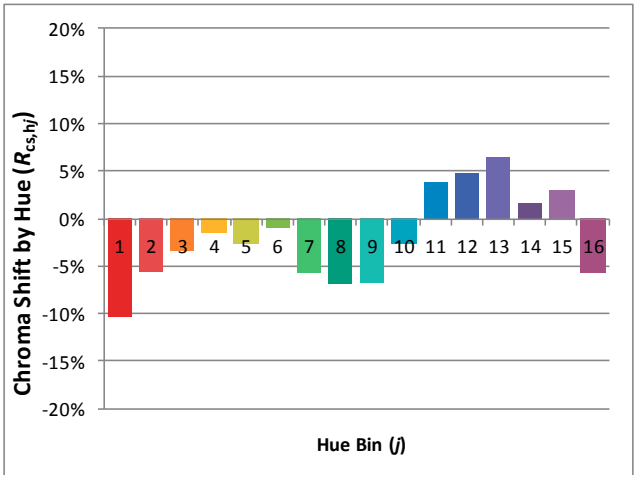
R_f	84	CCT (K)	5194
R_g	95	D_{uv}	-0.0009
		u'	0.2102
LER	308	v'	0.4809

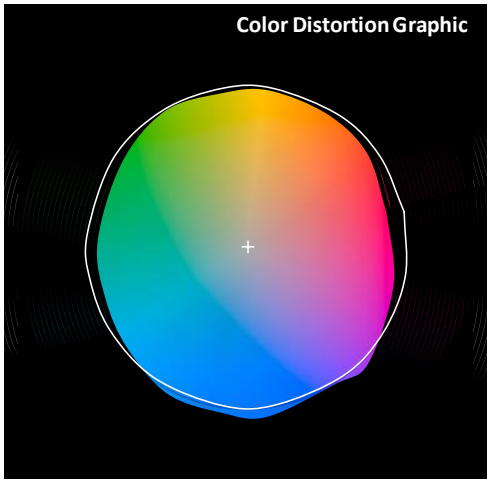












IES TM-30-15 Calculation Results (Continued)

		Graphic shifts (%)	
Hue Bin (j)	$R_{f,hj}$	Chroma ($R_{cs,hj}$)	Hue
1	77	-10%	1%
2	85	-6%	6%
3	83	-4%	7%
4	88	-1%	4%
5	90	-3%	2%
6	94	-1%	-1%
7	89	-6%	0%
8	84	-7%	4%
9	82	-7%	12%
10	74	-3%	14%
11	76	4%	13%
12	91	5%	1%
13	86	7%	-7%
14	85	2%	-8%
15	72	3%	-21%
16	84	-6%	-5%