



IESNA LM79-2008 Test Report

TÜV SÜD America

Photometric Testing and Evaluation in Accordance with LM79-2008

Report Prepared for:

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Sample Tested: S4-2-22W-41K
Manufacturer: RedBird LED

Technical Report Number: JL2109722-3-LM79
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Summary of Key Test Results

Model# **S4-2-22W-41K**
 Manufacturer **RedBird LED**
 TÜV Sample# 1440-4
 Date of Test August 19th, 2014



Notes:

Tested with diffuser and grill Installed
 in Lithonia 1X4 PMG Troffer
 Tested in Horizontal orientation (intended)

Parameter	Measured Result
Luminous Flux	4356 Lumens
Input Power	22.61 Watts
Efficacy	192.67 Lumens/Watt
C.C.T.	4150 K
C.R.I. (R _a)	85.1
Beam Angle	97.4°
Stabilization Time	60 minutes
In-Situ Temp Test (ISTMT)**	33.2°C

The above results are recorded / derived from measurements in accordance with LM79-08

**ISTMT in accordance with “Energy Star Program Requirements for Luminaires – Version 1.2”.



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Test Results –

The following results were obtained after stabilization of the sample in accordance with the requirements set forth in section 5.0 of IES LM79-2008. Stability is achieved when the variation of 3 readings of light output and electrical power over a period of 30 minutes, taken 15 minutes apart, is less than 0.5%.

Photometric Results	RedBird LED - S4-2-22W-41K	
	Integrating Sphere	
Total Luminous Flux (Lumens)	4356	
Luminous Efficacy (Lumens/Watt)	192.67	
Total Radiant Flux (Watts)	14.37	
Correlated Color Temperature (CCT)	4150	
Color Rendering Index (CRI – R _a)	85.1	
R ₉ Value	26.0	
Chromaticity (Chroma x / Chroma y)	0.3768 / 0.3728	
Chromaticity (Chroma u / Chroma v)	0.2243 / 0.3329	
Chromaticity (Chroma u' / Chroma v')	0.2243 / 0.4993	
D _{uv} Value	-0.00078	

Electrical Results	RedBird LED - S4-2-22W-41K	
	Integrating Sphere	
Input Power (Watts)	22.61	
Input Voltage (Volts AC)	120.02	
Input Current (Amps) (120/277V)	0.200 / 0.079	
Power Factor (120/277V)	0.987 / 0.981	
Input Frequency (Hertz)	60.0	
A-THD (Current %) (120 / 277V)	6.98% / 7.24 %	

Additional Parameters	RedBird LED - S4-2-22W-41K	
	Integrating Sphere	Goniophotometer
Stabilization Time (Light and Power)	60 minutes	55 minutes
Test Geometry Configuration	4π	Type C
Spectroradiometer	Labsphere CDS1100	Gigahertz Optik P9801
Ambient Temperature	24.1°C	24.4°C
ISTMT (In-Situ Temperature Measurement)	NA°C	
Spacing Criteria	1.30 (0° – 180°) / 1.30 (90° – 270°)	



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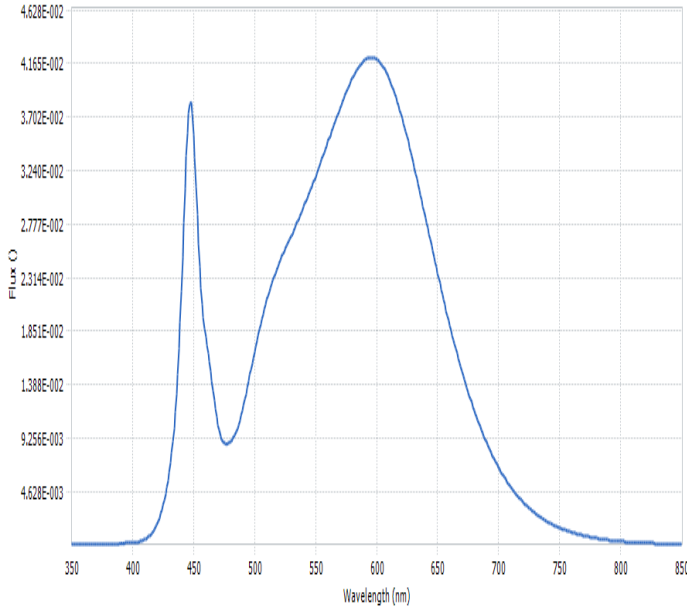
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Spectral Flux and Chromaticity Diagram

Spectral Flux

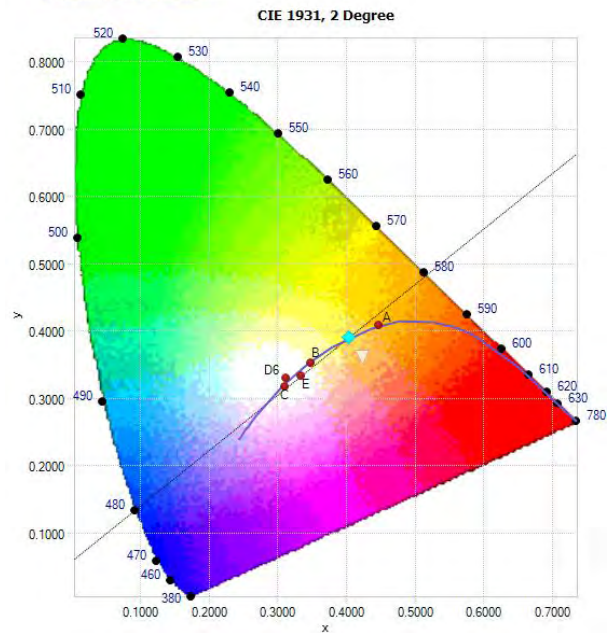
▼ SPECTRAL FLUX GRAPH:



**Spectral response of the Radiant Flux
(350nm to 850nm)**

Chromaticity Diagram

▼ CHROMATICITY DIAGRAM:



Tristimulus values (from page 5):

$$x / y = 0.4106 / 0.3924$$

The locations on the diagram of the tristimulus coordinates are indicated by the blue diamond.

Zonal Lumen Summary

Zone	Lumens	% Lamp / Luminaire
0 - 60	3885.5	89.2 %
60 - 90	470.5	10.8 %
0 - 90	4356.0	100.0 %
90 - 180	0.0	0.0 %
0 - 180	4356.0	100.0 %

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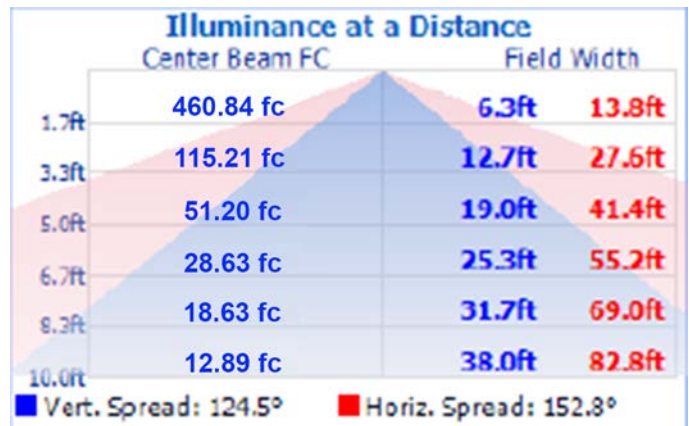
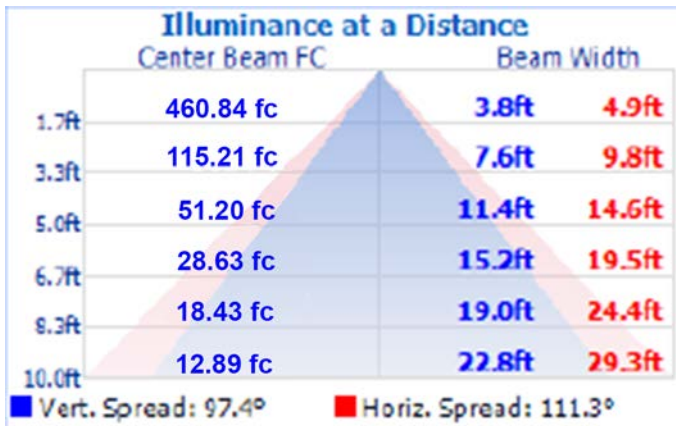


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Test Results – Illuminance Plots

The following images depict the illuminance characteristics of the luminaire.

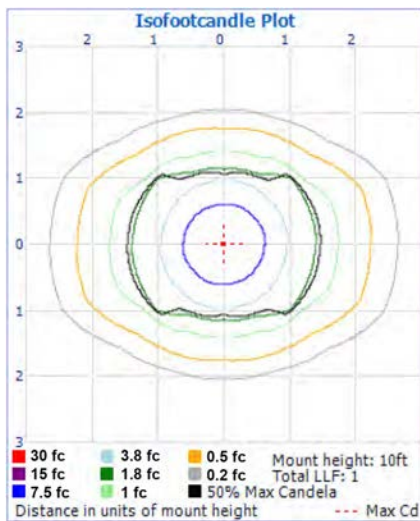


Beam Angle = 97.4°

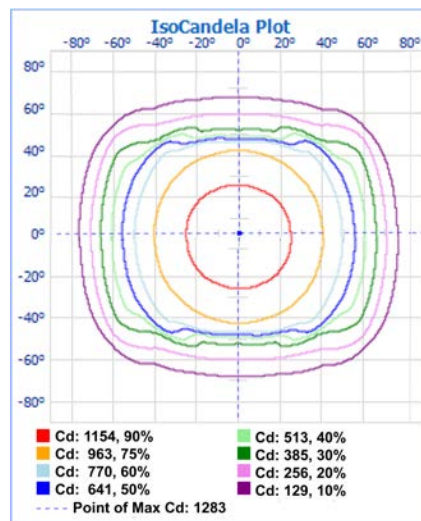
Field Angle = 124.5°

Test Results – Candela Plots

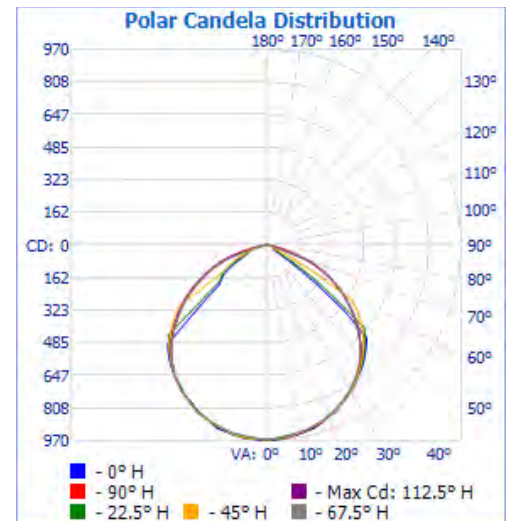
The following images depict the luminous intensity distribution characteristics of the luminaire:



Isofootcandle Plot



Isocandela Plot



Polar Candela





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ISTMT Temperature Measurement

ISTMT temperature measurement at thermal stabilization (8 hours continuous operation). Thermocouple locations (shown below) are in accordance with manufacturers recommended / stated guidelines for TMP - Temperature Measurement Point.

	
"LED" Thermocouple location at TMP	TUV SUD Sample #1440-4

Test Results for: **Redbird - S4-2-22W-41K**

LED TMP Temperature	33.2°C
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Reported temperatures are maximum temperatures. All temperatures are normalized to 25°C ambient.

Test Equipment

Description	Manufacturer / Model#	TÜV SÜD Ref#	Calibration Due Date
Thermometer	Fluke 52-II	ATLE0118	1/16/2015



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Addendum A (DLC Program Results) –

DesignLights Consortium Product Qualification Criteria 1X4 Troffer Retrofit, Technical Requirements Table, v3.0

32	Retrofit Kits for 1x4 Luminaires for Ambient Lighting of Interior Commercial Spaces	Nominal Requirements	Tolerance	Actual Requirement	<i>Measured Results</i>
	Minimum Light Output	1,500 lm	-10%	1,350 lm	4,356 lm
	Zonal Lumen Requirements	1.0-2.0: 0-180° 1.0-2.0: 90-270° ≥75%: 0-60°	0.1 -3%	0.9 – 2.1 72%	1.30 / 1.30 89.2%
	Minimum Luminaire Efficacy	85 lm/W	-3%	82.45 lm/W	192.67 lm/W
	Allowable CCTs (ANSI C78.377-2008)	≤5000K	Defined by ANSI C78.377	≤5000K	4150
	Minimum CRI	80	-2 points	78	85.1
	L70 Lumen Maintenance	50,000 hrs	None	50,000 hrs	
	Minimum Luminaire Warranty	5 years	None	5 Years	
	Power Factor 120 / 277VAC	≥ 0.9	-3%	0.873	0.987 / 0.981
	Total Harmonic Distortion (THD-A%)	≤20%	+5%	25%	6.98% / 7.24 %



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TÜV SÜD Photometric Testing Information

Testing is performed in accordance with the procedures outlined in IESNA LM79-2008. The sample is evaluated for photometric and electrical characteristics using an integrating sphere and a goniophotometer, located in an accredited, temperature and humidity-controlled, draft free photometric laboratory.

Sphere Geometry

The integrating spheres used for measurement utilize a “ 4π geometry” configuration in accordance with section 9 of IES LM-79-2008 and is applicable for all types of SSL products (directional and non-directional light projections). The spectroradiometer is an array-type detector manufactured and calibrated by Labsphere (Model# CDS1100).

Self-Absorption Correction

The integrating sphere uses self-absorption correction to eliminate errors due to mismatches between the standard reference lamp and the test samples being measured. This auxiliary correction lamp is a halogen type lamp powered by a calibrated Lamp Power Supply manufactured and calibrated by Labsphere (model LPS150). Ambient temperature is measured using a thermocouple located inside the integrating sphere at the same height as the sample under test (UUT) and not more than 1 meter in horizontal distance away from the sample (section 2.2 of LM79-2008). The thermocouple is located behind a baffle in order to eliminate any direct optical radiation from the sample under test.

Sample Stabilization

The sample (UUT) is placed inside the integrating sphere and powered by a regulated and conditioned alternating or direct current supply. The stabilization times shown on the results pages of this report denote the time of the 3rd measurement (of the 3 consecutive readings) since this is the minimum time that the sample is assumed to have taken to reach stabilization in accordance with section 5.0 of LM79-2008.

Sphere Calibration

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

Manufacturer: EYE Lighting International

Model# J94/JD28V75W

Voltage = 28.0 Volts DC

Wattage = 75.0 Watts

Calibration Current = 2.679 Amperes

Luminous Flux = 1685 Lumens

Calibration Date = 2-17-2011 (calibrated by Labsphere – NIST traceable).

Continued.....

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TÜV SÜD Photometric Testing Information (continued)

Goniophotometer

The Goniophotometer is a Mirror based Type C optical measurement system in accordance with section 9.3.1 of IESNA LM79-2008.

Goniophotometer Calibration

The Goniophotometer is calibrated using a frosted tungsten filament FDS/DZE lamp with the following specifications:

- Manufacturer: General Electric
- Part Number: CSB-110
- Lamp Number: 112-A
- Voltage: 16.52 Volts DC
- Wattage: 150.0 Watts
- Calibration Current: 4.816 Amperes
- Luminous Intensity: 151.5 Candelas
- Calibration Date: 02-13-2011 (NIST traceable)

TÜV SÜD Test Equipment List:

TÜV SÜD Sphere System – contains the following:			
Description	Manufacturer / Model#	TÜV SÜD Ref#	Calibration Due Date
Integrating Sphere	Labsphere LM760	SPH003	weekly
Spectroradiometer	Labsphere CDS1100	ATLE0048	9/7/2015
Power Analyzer	Yokogawa WT210	ATLE0052	1/16/2015
Power Source	Chroma 61602	AC003	N/A
Thermometer	Fluke 52-II	ATLE0118	1/16/2015
TÜV SÜD Mirror Goniophotometer System – contains the following:			
Goniophotometer	M.E. GONC02	GON002	Weekly
Spectroradiometer	Gigahertz Optik P9801	GIG002	Weekly
Power Analyzer	Yokogawa WT210	ATLE0031	11/21/2014
Power Source	Chroma 61603	AC007	N/A

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