



FOR THE SCOPE OF
ACCREDITATION UNDER NVLAP LAB
CODE 100402-0.

REPORT

3933 US ROUTE 11, CORTLAND, NEW YORK 13045

Project No. G101508737

Date: May 29, 2014

REPORT NO. 101508737CRT-012

TEST OF ONE LED HIGH BAY

MODEL NO. HELMC4PNSNG
LED MODEL NO. NICHIA NS2L757A-V1

RENDERED TO

DIALIGHT
1501 ROUTE 34
FARMINGDALE, NJ 07727

TEST: Electrical and Photometric tests as required to the IESNA test standard.

STATEMENT OF LIMITATION: This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

AUTHORIZATION: The testing performed was authorized by signed quote number 500502123.

STANDARDS USED: The following American National Standards or Illuminating Engineering Society of North America Test Guides were used in part or totally to test each specimen:

IESNA LM-79 - 2008: Electrical and Photometric Measurements of Solid State Lighting

ANSI NEMA ANSLG C78.377: 2012: Specifications of the Chromaticity of Solid State Lighting Products

Energy Star Manufacturer's Guide Version 2.1 (2010): Guide for Qualifying Solid State Lighting Luminaires

DESCRIPTION OF SAMPLE: The client submitted one production sample of model number HELMC4PNSNG. The sample was received by Intertek on May 21, 2014, in undamaged condition and one sample was tested as received. The sample designation was CRT1404211134-001.

DATES OF TESTS: May 27, 2014 through May 29, 2014.

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SUMMARY

Model No.:	HELMC4PNSNG
Description:	LED High Bay

Criteria	Result
Goniometer	
Total Lumen Output (Lumens)	24079
Total Power (W)	214.1
Lumen Efficacy (LPW)	112.5

Criteria	Result
Sphere	
Power Factor at 120Vac	0.996
Power Factor at 277Vac	0.964
Current ATHD % at 120Vac	5.34
Current ATHD % at 277Vac	12.87
Correlated Color Temperature (CCT - K)	5098
Color Rendering Index (CRI - Ra)	82.0
Color Rendering Index (CRI - R9)	24.4
DUV	0.001
Chromaticity Coordinate (x)	0.343
Chromaticity Coordinate (y)	0.353
Chromaticity Coordinate (u')	0.209
Chromaticity Coordinate (v')	0.485
Maximum In-Situ Source Temperature Point (°C)	63.8

EQUIPMENT LIST

Equipment Used	Model Number	Control Number	Last Date Calibrated	Calibration Due Date
Yokogawa Power Analyzer	WT1600	E474	03/07/14	03/07/15
LABSPHERE 3M	W/ CDS 1100	N307	VBU	VBU
Fluke Temperature Meter	53 II	T1318	03/21/14	03/21/15
Elgar Power Supply	CW1251	---	VBU	VBU
Extech Hygro-Thermometer	445703	T1366	11/27/13	11/27/14
SORENSEN POWER SUPPLY	XFR 150-8	---	VBU	VBU
NIST Spectral Flux Standard Source	RF1024	---	09/18/10	100 hrs of use
LSI High Speed Mirror Goniometer	6440	---	05/27/14	06/27/14
Elgar Power Supply	CW1251	---	VBU	VBU
Yokogawa Power Analyzer	WT210	E464	04/17/14	04/17/15
ExTech Hygro Thermometer	445703	T1357	11/25/13	11/25/14
Fisher Scientific	14-649-9	N1405	08/13/13	08/13/14
M-D Building Products	Smart Tool	L112	03/14/14	03/15/15
Cole Parmer Hygro-thermometer	03313-85	T1469	05/31/13	05/31/14
Fluke Multimeter	87	E259	03/20/14	03/20/15
Fluke Temperature Meter	53 II	N1324	03/21/14	03/21/15



TEST METHODS

Seasoning in Sample Orientation – LED Products

No seasoning was performed in accordance with IESNA LM-79.

Photometric and Electrical Measurements – Integrating Sphere Method

A Labsphere Model CDS 1100 CCD Array Spectroradiometer and Two Meter or Ten Foot Sphere was used to measure correlated color temperature, chromaticity coordinates, and the color rendering index for each SSL unit.

Ambient temperature was measured at a position inside the sphere. Each SSL unit was operated on the client provided driver at the rated input voltage in its designated orientation. Each SSL unit was allowed to stabilize for at least thirty minutes before measurements were made. Electrical measurements including voltage, current, and power were measured using the Xitron or Yokogawa Power Analyzer.

The calibration of the sphere photometer-spectroradiometer system is traceable to the National Institute of Standards and Technology.

Photometric and Electrical Measurements – Distribution Method

A LSI Type C High Speed Model 6440 Mirror Goniometer was used to measure the intensity (candelas) at each angle of distribution for each sample.

Ambient temperature was measured equal to the height of the sample mounted on the Goniometer equipment. Each sample was operated at input rated voltage in its designated orientation. Each sample was allowed to stabilize for at least thirty minutes before measurements were made. Electrical measurements including voltage, current, and power were measured using the Xitron or Yokogawa Power Analyzer.

Some graphics were created with Photometrics Plus software.

In-Situ Maximum Measured Power Supply Case and LED Source Point Temperature

Power supply case and/or LED source operating temperature measurements were taken on one test sample per model with a thermocouple and Fluke 87 temperature meter. The SSL sample was allowed to reach thermal equilibrium for seven and a half hours before measurements were taken. Power supply or source temperature measurements were measured at the TMPPS or TS point as indicated by the included diagram in accordance with manufacturers declared hot spot location, or at a hot spot location found with a thermal camera when no diagram from the manufacturer is given. The maximum temperature was recorded for the sample. A simulated ceiling or other enclosure may be used in accordance to UL 1598 or UL 153 as applicable.

RESULTS OF TEST

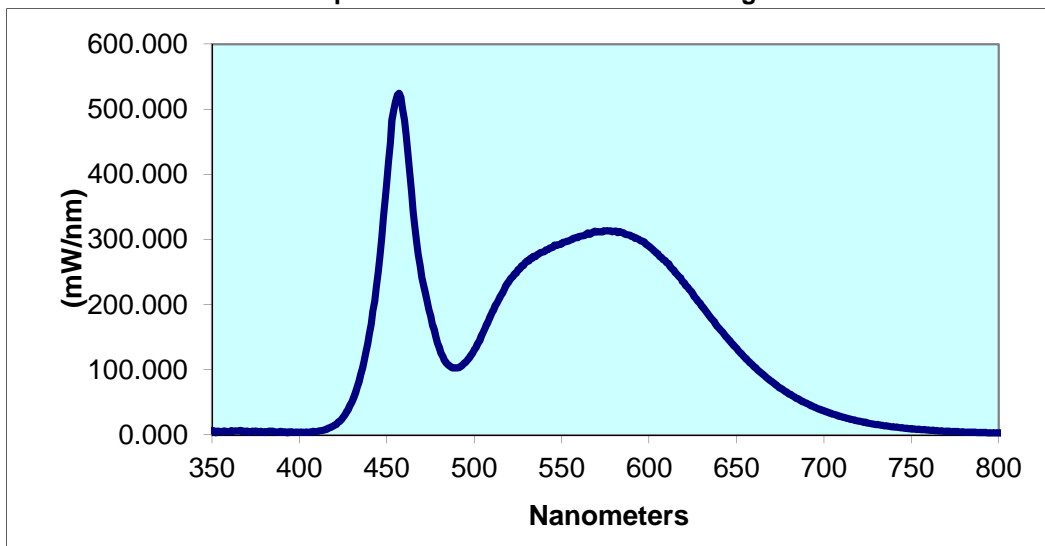
Photometric and Electrical Measurements at Ambient Temperature (25°C +/- 1°C) - Integrating Sphere Method

Intertek Sample No.	Base Orientation	Input Voltage {Vac}	Input Current (mA)	Input Power (Watts)	Input Power Factor	Current ATHD (%)	Luminous Flux (Lumens)	Lumen Efficacy (LPW)
CRT1404211134-001	UP	120.0	1777	212.6	0.996	5.34	#REF!	#REF!
		277.0	768.4	205.4	0.964	12.87		
Correlated Color Temperature (K)	CRI -Ra	CRI -R9	DUV	CIE 31' Chromaticity Coordinate	CIE 31' Chromaticity Coordinate (y)	CIE 76' Chromaticity Coordinate (u')	CIE 76' Chromaticity Coordinate (v')	
5098	82.0	24.4	0.001	0.343	0.353	0.209	0.485	

Spectral Distribution over Visible Wavelengths

nm	mW/nm	nm	mW/nm	nm	mW/nm	nm	mW/nm	nm	mW/nm
350	6.849	440	154.800	530	266.700	620	233.500	710	27.980
355	5.098	445	250.300	535	273.900	625	216.400	715	24.330
360	5.344	450	390.600	540	281.600	630	198.300	720	21.290
365	6.296	455	512.400	545	288.800	635	180.700	725	18.490
370	5.757	460	483.100	550	294.100	640	163.800	730	15.940
375	5.774	465	342.800	555	299.400	645	148.000	735	14.070
380	4.163	470	241.800	560	304.700	650	132.800	740	12.230
385	5.621	475	182.400	565	310.100	655	117.900	745	10.650
390	3.915	480	133.500	570	311.700	660	104.800	750	9.367
395	4.477	485	107.500	575	313.100	665	92.800	755	8.276
400	3.832	490	102.800	580	312.500	670	82.220	760	7.323
405	4.044	495	111.400	585	310.700	675	71.780	765	6.320
410	5.516	500	130.800	590	304.700	680	62.970	770	5.702
415	8.612	505	157.100	595	298.200	685	55.520	775	4.987
420	14.830	510	187.500	600	289.400	690	48.510	780	4.323
425	27.270	515	213.400	605	277.500	695	42.240		
430	50.700	520	236.400	610	264.500	700	36.900		
435	92.230	525	253.700	615	249.400	705	32.200		

Spectral Data Over Visible Wavelengths



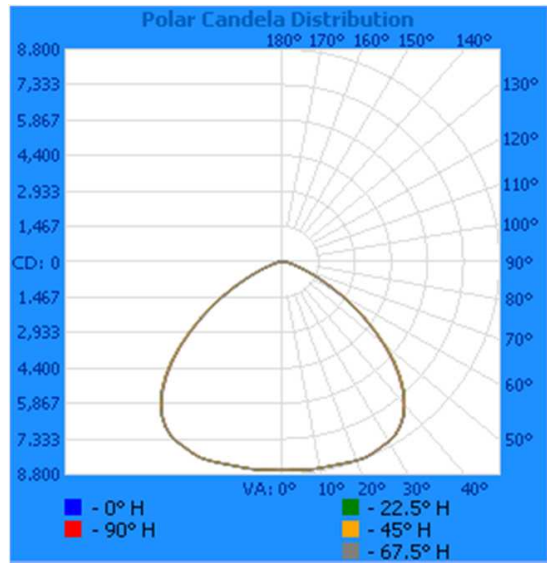
RESULTS OF TEST (cont'd)

Photometric and Electrical Measurements at Ambient Temperature (25°C +/- 1°C) – Distribution Method

Intertek Sample No.	Base Orientation	Input Voltage {Vac}	Input Current (mA)	Input Power (Watts)	Input Power Factor	Absolute Luminous Flux (Lumens)	Lumen Efficacy (Lumens Per Watt)
CRT1404211134-001	UP	120.1	1788	214.1	0.997	24079	112.5

Intensity (Candlepower) Summary at 25°C - Candelas

Angle	0	22.5	45	67.5	90
0	8616	8616	8616	8616	8616
5	8639	8636	8630	8631	8632
10	8667	8664	8662	8661	8660
15	8684	8680	8675	8673	8674
20	8751	8751	8746	8742	8743
25	8718	8720	8713	8709	8705
30	8590	8592	8582	8582	8579
35	8309	8311	8296	8296	8284
40	7693	7692	7681	7658	7647
45	6742	6742	6739	6661	6659
50	5482	5481	5499	5396	5399
55	4057	4066	4104	4018	4045
60	2718	2735	2787	2745	2775
65	1618	1641	1671	1693	1701
70	896	915	925	962	944
75	504	512	514	531	512
80	309	318	319	324	315
85	231	232	233	234	232
90	192	192	191	193	192
95	152	152	151	153	152
100	106	106	104	107	105
105	61	62	60	63	60
110	27	29	28	29	28
115	9	9	10	10	10
120	8	7	8	7	8
125	11	9	11	10	10
130	11	10	11	10	11
135	11	10	11	11	11
140	12	12	12	12	12
145	13	13	13	13	13
150	15	15	15	15	15
155	16	16	16	16	16
160	18	17	17	17	17
165	19	19	18	18	18
170	20	19	19	19	19
175	20	20	20	20	20
180	20	20	20	20	20

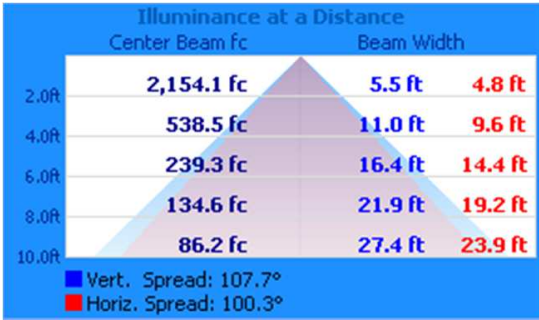


RESULTS OF TEST (cont'd)

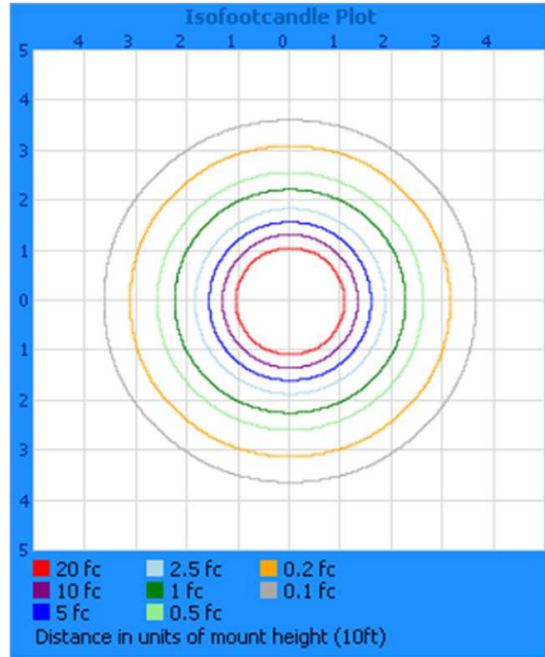
Illumination Plots

Mounting Height: 10 ft.

Illuminance - Cone of Light



Isoillumination Plot



Zonal Lumen Summary and Percentages at 25°C

Zone	Lumens	% Luminaire
0-30	7311	30.4
0-40	12474	51.8
0-60	21237	88.2
60-90	2557	10.6
0-90	23794	98.8
90-180	284.8	1.2
0-180	24079	100.0

Zonal Lumens and Percentages at 25°C

Zone	Lumens	% Luminaire
0-10	825.5	3.4
10-20	2464	10.2
20-30	4021	16.7
30-40	5163	21.4
40-50	5130	21.3
50-60	3633	15.1
60-70	1707	7.1
70-80	586.6	2.4
80-90	262.8	1.1
90-100	164.6	0.7
100-110	67.4	0.3
110-120	12.8	0.1
120-130	8.7	0.0
130-140	8.4	0.0
140-150	8.3	0.0
150-160	7.4	0.0
160-170	5.2	0.0
170-180	1.9	0.0

RESULTS OF TEST (cont'd)

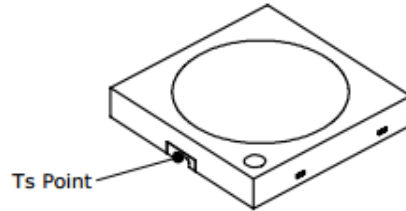
In-Situ Maximum Measured LED Source Temperature

Manufacturer Supplied Documentation:

LED model identified as: Nichia NS2L757A-V1

(1) Absolute Maximum Ratings

Item	Symbol	Absolute Maximum Rating	Unit
Forward Current	I_F	180	mA
Pulse Forward Current	I_{FP}	240	mA
Allowable Reverse Current	I_R	85	mA
Power Dissipation	P_D	630	mW
Operating Temperature	T_{op}	-40~100	°C
Storage Temperature	T_{stg}	-40~100	°C
Junction Temperature	T_J	120	°C



(2) Initial Electrical/Optical Characteristics

Item	Symbol	Condition	Typ	Max	Unit	
Forward Voltage	V_F	$I_F=150mA$	3.05	-	V	
Rnn	Luminous Flux	Φ_v	$I_F=150mA$	60.4	-	lm
	Luminous Intensity	I_v	$I_F=150mA$	20.2	-	cd
	Color Rendering	R_a	$I_F=150mA$	-	-	-
R8000	Luminous Flux	Φ_v	$I_F=150mA$	53.9	-	lm
	Luminous Intensity	I_v	$I_F=150mA$	18.0	-	cd
	Color Rendering	R_a	$I_F=150mA$	83	-	-
Chromaticity Coordinate	x	-	$I_F=150mA$	0.344	-	-
	y	-	$I_F=150mA$	0.355	-	-
Thermal Resistance	$R_{\theta js}$	-	13	19	°C/W	

Maximum Junction Temperature from LED specification (T_J) = 120°C

Thermal Resistance Formula from LED specification = 19°C/W

Maximum Forward Voltage (V_f) from LED specification = 3.05V

Measured LED Current = 96mA

Calculated LED Wattage = $V_f \times$ Measured LED Current = 0.293W

Maximum Source Temperature (T_s) = $T_J - (LED \text{ Wattage} \times \text{Thermal Resistance}) = 114.4^\circ\text{C}$

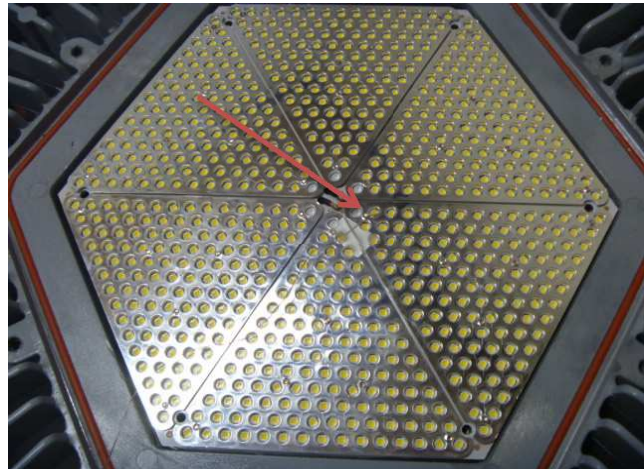
Maximum Measured Manufacturer Designated Source Temperature

Sample No.	Maximum Measured Source Temperature (°C)	Location	Maximum Rated Source Temperature (°C)
CRT1404211134-001	63.8	Per diagram	114.4

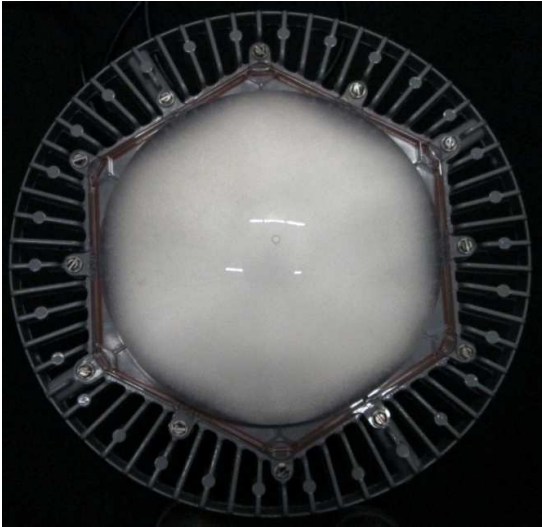
In-Situ Picture – T_s



In-Situ Picture – T_s locator



PICTURE (not to scale)



CONCLUSION

The results tabulated in this report are representative of the actual test samples submitted for this report only. The data is provided to the client for further evaluation. Compliance to the referenced specification requirements was not determined in this report.

In Charge Of Tests:



Melanie Brittain
Associate Engineer
Lighting Division

Attachment: None

Report Reviewed By:



Jeffrey Davis
Engineering Manager
Lighting Division