



REPORT

Dialight, 1501 Route 34 South, Farmingdale, NJ 07727

Project No. 101520233

Date: March 6, 2014

INTERTEK REPORT NO. 101520233CRT-001
DIALIGHT REPORT NO. L14010

TEST OF ONE HIGHBAY

MODEL NO. HEGMC4PN-SNG
DRIVER MODEL NO. INTEGRATED DIALIGHT DRIVER
LED MODEL NO. NICHIA NT2W757DT

RENDERED TO

DIALIGHT COPORATION
1501 ROUTE 34 SOUTH
FARMINDALE, 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 500515173.

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 Version 1.2 (2012): Program Requirements for Luminaires (Light Fixtures)

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 HEGMC4PN-SNG. The sample was received by Dialight lab on February 27, 2014, in undamaged condition and one sample was tested as received. The sample designation was L14010.

DATES OF TESTS: March 3, 2014 through March 5, 2014.

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 copy or distribute 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.



SUMMARY

Model No.:	HEGMC4PN-SNG
Description:	Highbay

Criteria	Result	
	Sphere	Goniometer
Total Lumen Output (Lumens)	26124	26959
Total Power (W)	215.5	215.4
Luminaire Efficacy (LPW)	121.2	125.2

Criteria	Result
Power Factor at 120Vac	0.997
Power Factor at 277Vac	0.965
Current ATHD % at 120Vac	5.06
Current ATHD % at 277Vac	10.72
Correlated Color Temperature (CCT - K)	4995
Color Rendering Index (CRI - Ra)	74.4
Color Rendering Index (CRI - R9)	-18.8
DUV	0.000
Chromaticity Coordinate (x)	0.345
Chromaticity Coordinate (y)	0.353
Chromaticity Coordinate (u')	0.211
Chromaticity Coordinate (v')	0.324
Maximum In-Situ Source Temperature Point (°C)	59.7

EQUIPMENT LIST

Equipment Used	Model Number	Control Number	Last Date Calibrated	Calibration Due Date
Elgar AC Power Supply	CW1251P	OP-014	VBU	VBU
Instrument System Spectrometer	CAS140B-151	OB-006	VBU	VBU
Sorensen DC Power Supply	XHR150-7	OP-016	VBU	VBU
Delta Elektronika DC Power Supply	SM300-5	OP-013	VBU	VBU
Volttech Universal Breakout Box	PM1000+	OP-012	03/06/13	03/06/14
Instrument System Lamps (Osram Sylvan STD-20WF-3		OP-007	10/22/13	10/22/14
Instrument System Sphere	ISP1500	OP-010	VBU	VBU
Fluke 52II Thermometer	51II	OP-019	03/06/13	03/06/14
Instek AC Power Supply	APS-9501	N/A	VBU	VBU
Volttech Power Analyzer	PM1000+	OP-012	02/27/13	03/06/14
Extech Hygro-Thermometer	445703	OP-017	06/01/13	06/01/14
LSI High Speed Mirror Goniometer	6240T	N/A	VBU	VBU
Elgar AC Power Supply	CW1251P	N/A	VBU	VBU
Yokogawa Power Analyzer	760401	OP-004	03/06/13	03/06/14
Omega TC	Dpi8	OP-001	03/06/13	03/06/14
Extech Hygro-Thermometer	445703	OP-018	04/22/13	04/22/14
Fluke 8808A Digital Multimeter	8808A	OP-002	03/06/13	03/06/14
Extech Hygro-Thermometer	445703	OP-017	06/01/13	06/01/14
Fluke Multimeter	PM2525	M127	11/01/13	11/01/14
Digital Thermometer 343	TPI 343	OP-011	03/06/13	03/06/14
LSI Standard Lamps	#30279	OP-004	09/10/13	09/10/14



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 Instrument System CAS 140B Array Spectroradiometer and 1.5 or Five 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 Volttech 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 6240T 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

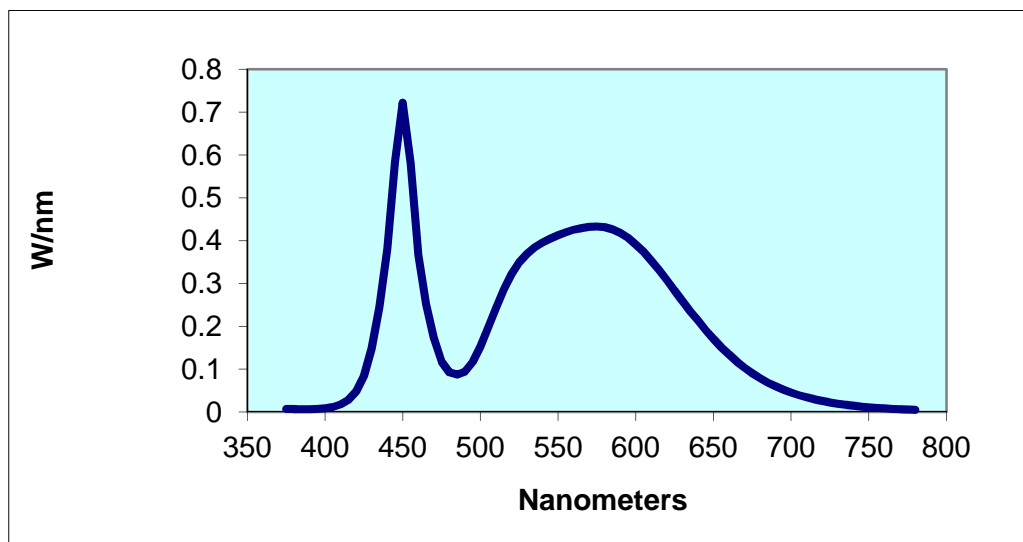
Photometric and Electrical Measurements at Ambient Temperature (25°C +/- 1°C) - Integrating Sphere Method

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)
L14010	UP	120.0	1.799	215.5	0.997	5.06	26124	121.2
		277.0	0.778	208.2	0.965	10.72		
Correlated Color Temperature (K)	CRI -Ra	CRI -R9	DUV	CIE 31' Chromaticity Coordinate (x)	CIE 31' Chromaticity Coordinate (y)	CIE 76' Chromaticity Coordinate (u')	CIE 76' Chromaticity Coordinate (v')	
4995	74.4	-18.8	0.000	0.345	0.353	0.211	0.324	

Spectral Distribution over Visible Wavelengths

nm	W/nm	nm	W/nm	nm	W/nm	nm	W/nm	nm	W/nm
375	0.007	465	0.252	555	0.420	645	0.191	735	0.017
380	0.007	470	0.174	560	0.425	650	0.171	740	0.015
385	0.007	475	0.117	565	0.430	655	0.152	745	0.013
390	0.007	480	0.093	570	0.432	660	0.134	750	0.011
395	0.008	485	0.087	575	0.433	665	0.118	755	0.010
400	0.009	490	0.094	580	0.432	670	0.104	760	0.009
405	0.012	495	0.117	585	0.426	675	0.091	765	0.008
410	0.018	500	0.153	590	0.418	680	0.079	770	0.007
415	0.029	505	0.197	595	0.406	685	0.069	775	0.006
420	0.048	510	0.244	600	0.391	690	0.060	780	0.005
425	0.084	515	0.286	605	0.374	695	0.052		
430	0.149	520	0.322	610	0.353	700	0.046		
435	0.244	525	0.349	615	0.331	705	0.040		
440	0.381	530	0.369	620	0.307	710	0.034		
445	0.584	535	0.385	625	0.284	715	0.030		
450	0.722	540	0.396	630	0.260	720	0.026		
455	0.580	545	0.404	635	0.236	725	0.023		
460	0.366	550	0.413	640	0.213	730	0.020		

Spectral Data Over Visible Wavelengths





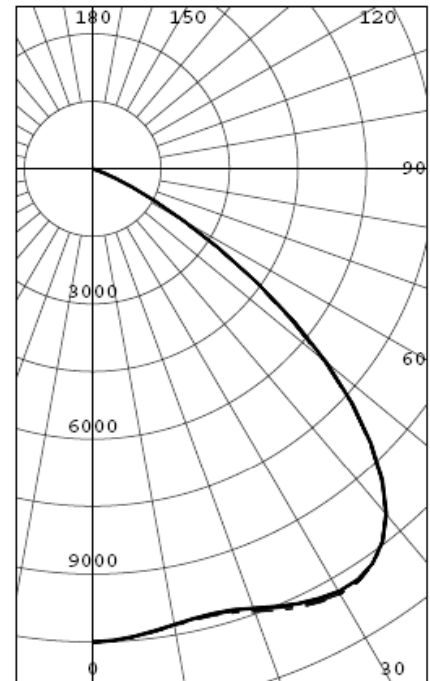
RESULTS OF TEST (cont'd)

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

Intertek Sample No.	Base Orientation	Input Voltage {Vac}	Input Current (A)	Input Power (Watts)	Input Power Factor	Absolute Luminous Flux (Lumens)	Lumen Efficacy (Lumens Per Watt)
L14010	UP	120.0	1.797	215.4	0.997	26959	125.2

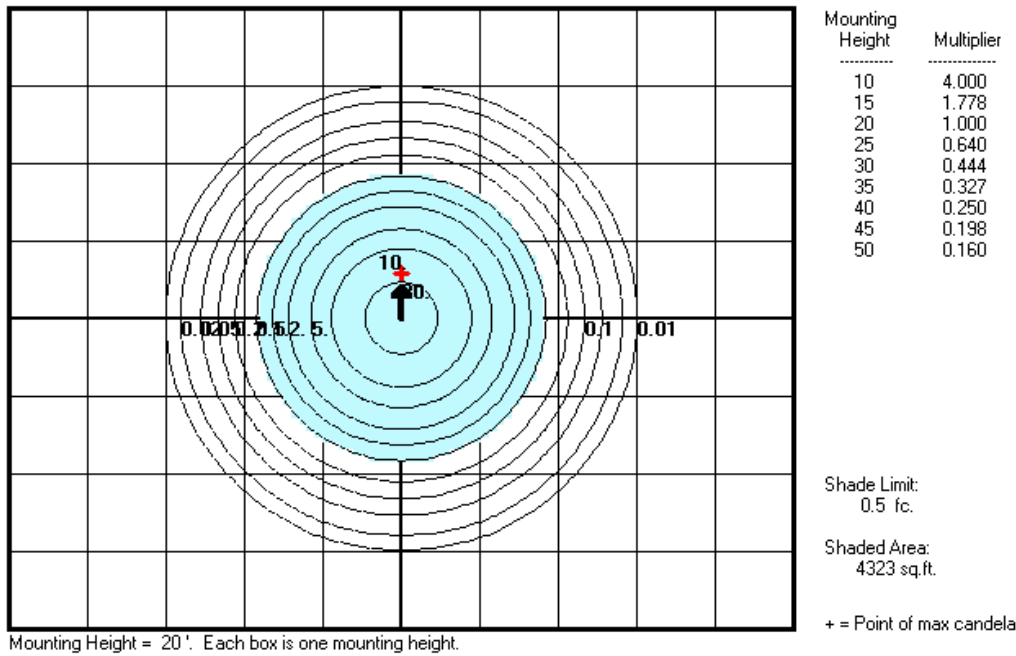
Intensity (Candlepower) Summary at 25°C - Candelas

INTENSITY (CANDLEPOWER) SUMMARY						OUTPUT LUMENS
ANGLE	ALONG	22.5	45	67.5	ACROSS	
0	10505	10505	10505	10505	10505	
5	10440	10442	10431	10431	10420	1006
15	10266	10257	10246	10240	10224	2914
25	10744	10696	10700	10680	10652	4942
35	10726	10716	10710	10675	10693	6639
45	8612	8618	8576	8527	8623	6521
55	4311	4375	4314	4294	4399	3862
65	912	935	935	920	953	1022
75	19	19	19	19	19	52
85	0	0	0	0	0	0
90	0	0	0	0	0	0
95	0	0	0	0	0	0
105	0	0	0	0	0	0
115	0	0	0	0	0	0
125	0	0	0	0	0	0
135	0	0	0	0	0	0
145	0	0	0	0	0	0
155	0	0	0	0	0	0
165	0	0	0	0	0	0
175	1	0	1	0	0	0
180	0	0	0	0	0	0



RESULTS OF TEST (cont'd)

Isoillumination Plots



Zonal Lumen Summary and Percentages at 25°C

ZONAL LUMENS AND PERCENTAGES

ZONE	LUMENS	% LUMINAIRE
0-30	8863	32.87
0-40	15502	57.50
0-60	25884	96.01
0-90	26959	100.00
40-90	11457	42.50
60-90	1075	3.99
90-180	0	0.00
0-180	26959	100.00

RESULTS OF TEST (cont'd)

In-Situ Maximum Measured LED Source Temperature

Manufacturer Supplied Documentation:

LED identified as: Nichia NT2W757DT

SPECIFICATIONS

(1) Absolute Maximum Ratings

Item	Symbol	Absolute Maximum Rating	Unit
Forward Current	I_F	300	mA
Pulse Forward Current	I_{FP}	400	mA
Allowable Reverse Current	I_R	85	mA
Power Dissipation	P_D	1.05	W
Operating Temperature	T_{OP}	-40~100	°C
Storage Temperature	T_{STG}	-40~100	°C
Junction Temperature	T_J	120	°C

* Absolute Maximum Ratings at $T_S=25^{\circ}C$.

* I_{FP} conditions with pulse width $\leq 10ms$ and duty cycle $\leq 10\%$.

RANKS

Item	Rank	Min	Max	Unit
Forward Voltage	-	2.6	3.5	V
Luminous Flux	P16	72.0	85.6	lm
	P15	60.5	72.0	
	P14	51.0	60.5	
Color Rendering Index	Rnn	R_n	-	-
	R70	R_a	70	-
	R8000	R_a	80	-
		R_s	0	-

(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 $I_F=150mA$	67.3	-	lm
	Luminous Intensity	I_v $I_F=150mA$	22.2	-	cd
	Color Rendering Index	R_n $I_F=150mA$	-	-	-
R70	Luminous Flux	Φ_v $I_F=150mA$	65.7	-	lm
	Luminous Intensity	I_v $I_F=150mA$	21.8	-	cd
	Color Rendering Index	R_n $I_F=150mA$	73	-	-
R8000	Luminous Flux	Φ_v $I_F=150mA$	62	-	lm
	Luminous Intensity	I_v $I_F=150mA$	20.7	-	cd
	Color Rendering Index	R_n $I_F=150mA$	83	-	-
Chromaticity Coordinate	x	- $I_F=150mA$	0.344	-	-
	y	- $I_F=150mA$	0.355	-	-
	Thermal Resistance	R_{JSS}	-	12	18

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

Thermal Resistance Formula from LED specification = 18°C/W

Maximum Forward Voltage (V_f) from LED specification = 3.5V

Measured LED Current = 25mA

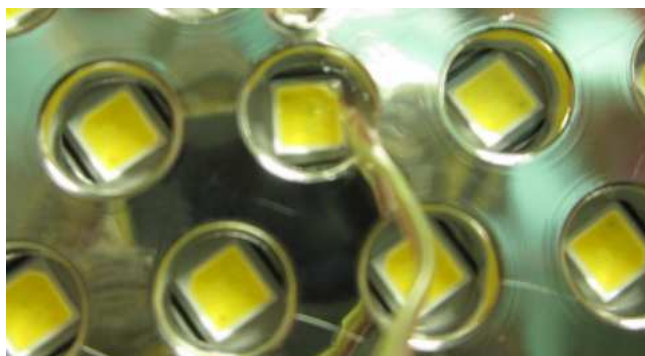
Calculated LED Wattage = $V_f \times$ Measured LED Current = 0.088W

Maximum Source Temperature (T_s) = $T_j - (LED\ Wattage \times Thermal\ Resistance) = 118.4^{\circ}C$

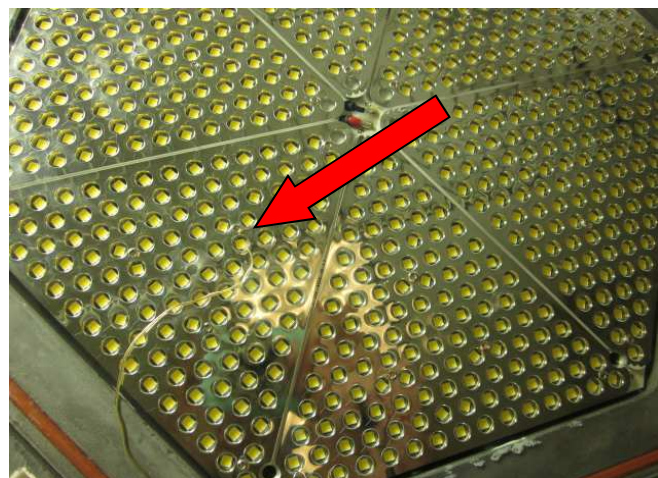
Maximum Measured Manufacturer Designated Source Temperature

Sample No.	Maximum Measured Source Temperature (°C)	Location	Maximum Rated Source Temperature (°C)
L14010	59.7	Per diagram	118.4

In-Situ Picture – T_s

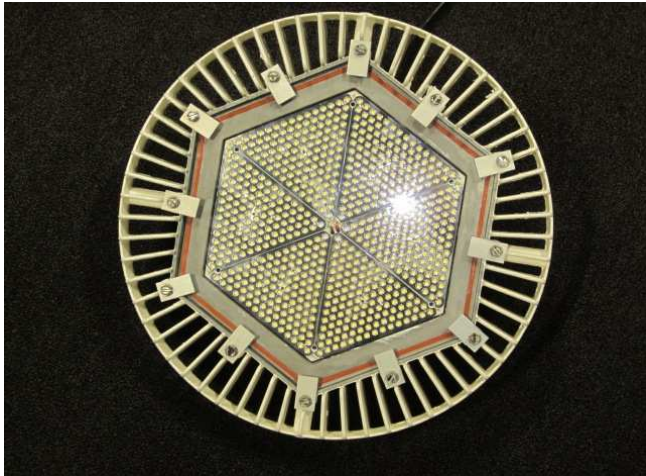


In-Situ Picture – T_s location



PICTURE (not to scale)

X



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:

Richard Huegi
Dialight Coporation
Senior Optics Technicair
Lighting Division

Attachment: None

Report Reviewed By:

Jacki Swiernik
Intertek
Staff Engineer
Lighting Division

Report Reviewed By:

Cecil Thomas
Dialight Corporation
Engineering Manager
Lighting Division