

SPECTRUM LIGHTING INC.

TEST REPORT

SCOPE OF WORK

Electrical and Photometric tests as required to the IESNA test standard and Insitu Temperature Measurement Tests.

MODEL NUMBER

PR3007LEDLX140L35KEX/CD3X

PROJECT NUMBER

G103482968

REPORT NUMBER

103482968CRT-002

ISSUE DATE

April 28, 2018

REVISION DATE

None

PAGES

13

DOCUMENT CONTROL NUMBER

RTTDS-R-AMER-Test-3407

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TEST REPORT**REPORT NO.: 103482968CRT-002****REPORT DATE: April 28, 2018**

TEST OF (1) LED HIGH BAY

MODEL NO. PR3007LEDLX140L35KEX/CD3X

RENDERED TO:

SPECTRUM LIGHTING INC.
994 JEFFERSON ST.
FALL RIVER MA 02721**STATEMENT OF LIMITATION**

NVLAP Lab Code 100402-0. 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 Qu-00876905.

STANDARDS USED

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

ANSI NEMA ANSLG C78.377: 2015: Specifications of the Chromaticity of Solid State Lighting Products

Select Insitu Standard

SAMPLE INFORMATION

CONTROL NO.	MODEL/SERIAL NO.	DESCRIPTION	TYPE	RECEIVED
CRT1804171150-002	PR3007LEDLX140L35KEX/CD	LED High Bay	Production	4/17/2018

DATE OF TESTS

April 24, 2018 through April 25, 2018.

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SUMMARY

MODEL NO:	PR3007LEDLX140L35KEX/CD3X
DESCRIPTION:	LED High Bay
LED MODEL NO:	Nichia NFSL757G-V1
DRIVER MODEL NO:	Osram 79369

CRITERIA	RESULTS	
	INTEGRATING SPHERE	GONIOPHOTOMETER
Lumen Output (lumens)	13174.2	13421.0
Input Power (W) @ 120 (VAC)	109.01	108.71
Lumen Efficacy (lm/W)	120.9	123.5
Input Power Factor () @ 120 (VAC)	0.995	0.996

CRITERIA	RESULTS
Input Current ATHD (%) @ 120 (VAC)	3.75
Correlated Color Temperature (K)	3551
Color Rendering Index - Ra ()	82.2
Color Rendering - R9 ()	8.0
DUV ()	0.0002
Chromaticity Coordinate (x)	0.403
Chromaticity Coordinate (y)	0.390
Chromaticity Coordinate (u')	0.234
Chromaticity Coordinate (v')	0.511
Maximum Measured Source Temperature (°C)	69.2
Maximum Measured Driver Temperature (°C)	59.1
Input Power Factor () @ 277 (VAC)	0.917
Input Current ATHD (%) @ 277 (VAC)	8.00

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EQUIPMENT LIST

EQUIPMENT USED	MODEL NO.	CONTROL NO.	LAST CAL DATE	CAL DUE DATE
LSI High Speed Mirror Goniometer	6440	---	4/9/2018	5/9/2018
Elgar AC Power Supply	CW1251	---	VBU	VBU
Sorenson DC Power Supply	XG 150-10	---	VBU	VBU
Yokogawa Power Analyzer	WT210	E464	5/2/2017	5/2/2018
Omega Thermometer	DPI8-C24	M263	5/2/2017	5/2/2018
M-D Building Products Digital Level	Smart Tool	E499	6/22/2017	6/22/2018
NIST Luminous Intensity Standard Source	NBS10322	N1427	1/9/2017	1/9/2019
NIST Luminous Intensity Standard Source	NBS10332	N1435	1/9/2017	1/9/2019
NIST Luminous Intensity Standard Source	NBS10265	N1437	1/9/2017	1/9/2019
NIST Luminous Flux Standard Source	NBS10428	N1424	1/11/2017	1/11/2019
Elgar AC Power Supply	CW1251	---	VBU	VBU
Sorenson DC Power Supply	XFR 150-8	---	VBU	VBU
Yokogawa Power Analyzer	WT1600	E474	5/4/2017	5/4/2018
Fluke Thermometer	53 II	T1318	4/9/2018	4/9/2019
Fluke Multimeter	87V	D590	4/28/2017	4/28/2018
3M Integrating Sphere Spectrometer System	CDS 1100	---	4/23/2018	5/23/2018
Fisher Scientific Stopwatch	14-649-9	N1132	2/15/2018	2/15/2019
Secondary Spectral Intensity Standard Source	BS5186	RF5186	1/28/2018	1/28/2019
Secondary Luminous Flux Standard Source	BS3616	--	1/28/2018	1/28/2019
Secondary Luminous Flux Standard Source	BS4116	--	1/28/2018	1/28/2019
Secondary Luminous Flux Standard Source	6836	--	1/28/2018	1/28/2019
Extech Hygro-Thermometer	445703	T1359	3/16/2018	3/16/2019
Fluke Multimeter	87 V	D589	11/30/2017	11/30/2018
Fluke Temperature Meter	53 II	D588	4/27/2017	4/27/2018

TEST REPORT**REPORT NO.: 103482968CRT-002****REPORT DATE: April 28, 2018****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 Spectroradiometer and integrating sphere were used to measure light output, correlated color temperature, chromaticity coordinates, color rendering index, and the spectral distribution 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. Stabilization procedures to LM-79 were followed. Electrical measurements including voltage, current, and power were measured using a 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 Type C Mirror Goniometer was used to measure the intensity (candelas) at each angle of distribution for the SSL sample.

Ambient temperature was measured equal to the height of the sample mounted on the goniometer equipment. The SSL sample was operated on the client provided driver at rated input volts in its designated orientation. The SSL sample was allowed to stabilize for at least thirty minutes before measurements were made. Stabilization procedures to LM-79 were followed. Electrical measurements including voltage, current, and power were measured using a power analyzer.

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 temperature meter. The SSL sample was allowed to reach thermal equilibrium for three and a half to 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 thermal test point location, or at a thermal test point 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, UL 153, or UL 1993 as applicable.

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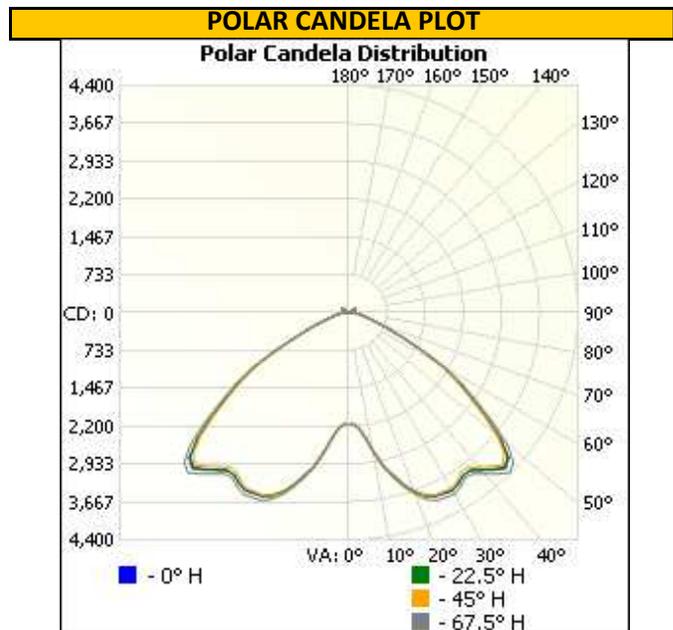
RESULTS OF TESTS

PHOTOMETRIC AND ELECTRICAL MEASUREMENTS - DISTRIBUTION METHOD (25°C +/- 1°C)

INTERTEK CONTROL NO.	BASE POSITION	INPUT VOLTAGE (VAC)	INPUT CURRENT (mA)	INPUT POWER (W)	INPUT POWER FACTOR ()	LIGHT OUTPUT (lm)	LUMEN EFFICACY (lm/W)
CRT1804171150-002	Base Up	120.01	909.1	108.71	0.996	13421.0	123.5

INTENSITY SUMMARY - CANDELAS

Angle	0	22.5	45	67.5	90
0	2163	2163	2163	2163	2163
5	2242	2244	2246	2244	2254
10	2723	2727	2740	2758	2757
15	3251	3248	3293	3300	3273
20	3697	3678	3717	3747	3749
25	3927	3910	3903	4010	4011
30	3978	3967	3926	4057	4059
35	3838	3835	3756	3896	3880
40	3968	3980	3893	4067	3983
45	4233	4262	4168	4376	4222
50	3789	3815	3736	3973	3796
55	2866	2900	2829	3005	2907
60	2089	2106	2060	2180	2142
65	1140	1156	1153	1184	1173
70	644	640	634	636	642
75	381	374	374	375	376
80	244	240	239	242	242
85	163	162	161	164	167
90	125	128	127	128	128
95	99	94	95	96	101
100	62	60	59	63	64
105	35	35	36	35	35
110	37	44	44	36	29
115	89	102	105	88	66
120	147	145	151	155	136
125	124	110	117	131	141
130	34	25	25	33	48



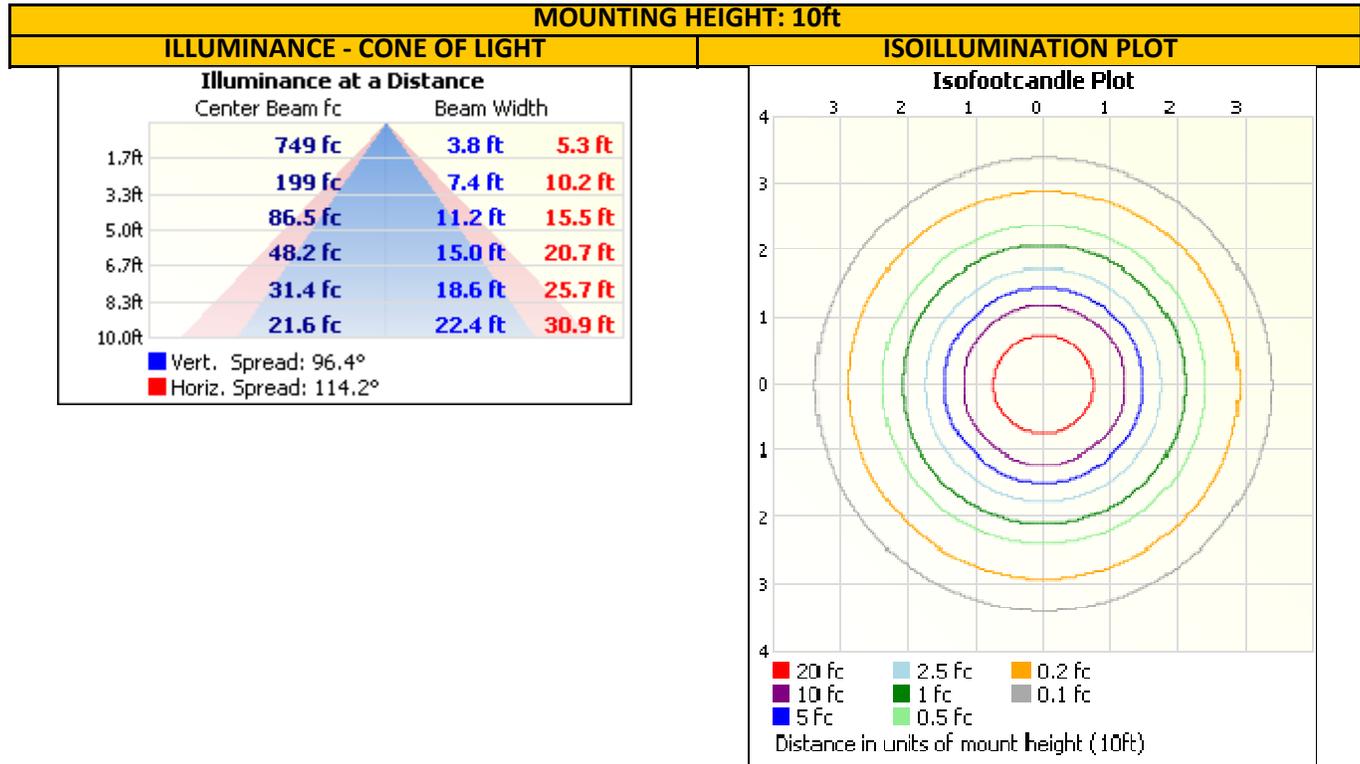
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PHOTOMETRIC AND ELECTRICAL MEASUREMENTS - DISTRIBUTION METHOD (25°C +/- 1°C)



ZONAL LUMEN SUMMARY AND PERCENTAGES

ZONE	LUMENS	% LUMINAIRE
0-30	2984.1	22.2
0-40	5434.3	40.5
0-60	11240.1	83.7
60-90	1837.8	13.7
0-90	13077.9	97.4
90-180	343.1	2.6
0-180	13421.0	100.0

ZONE	LUMENS	% LUMINAIRE
0-10	231.5	1.7
10-20	940.7	7.0
20-30	1811.9	13.5
30-40	2450.2	18.3
40-50	3183.7	23.7
50-60	2622.1	19.5
60-70	1231.0	9.2
70-80	420.7	3.1
80-90	186.2	1.4
90-100	104.8	0.8
100-110	43.2	0.3
110-120	91.8	0.7
120-130	99.7	0.7
130-140	3.6	0.0

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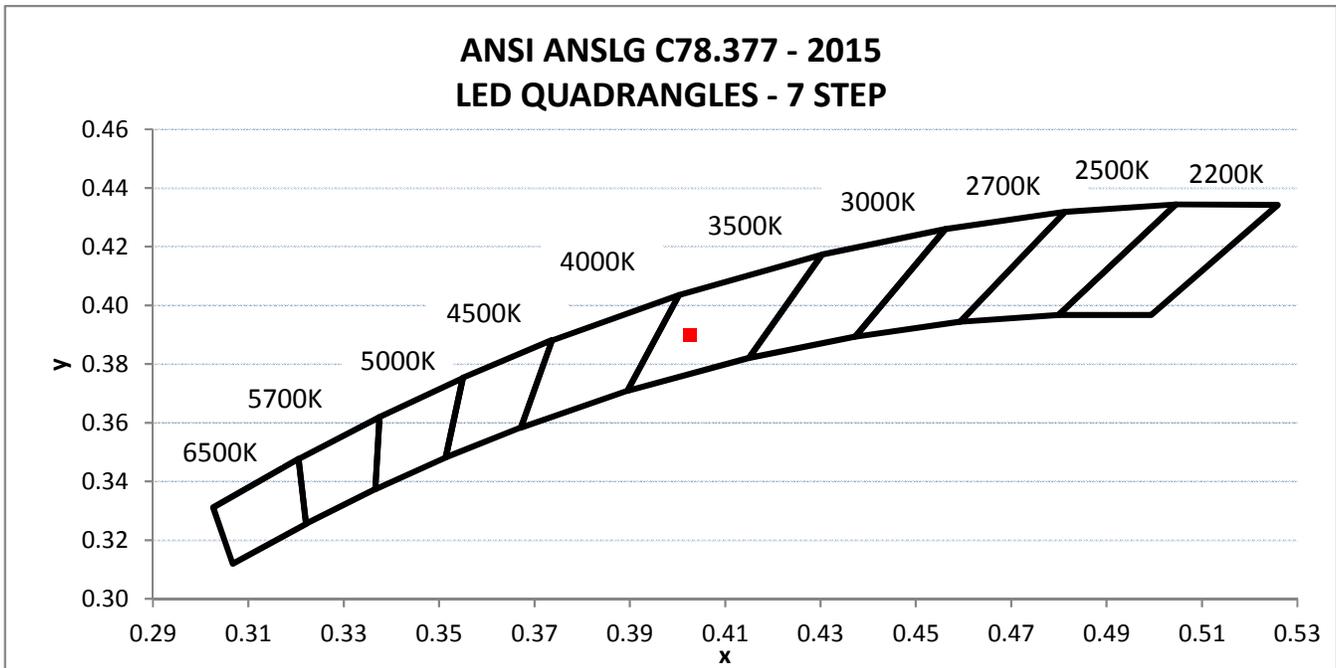
RESULTS OF TESTS

PHOTOMETRIC AND ELECTRICAL MEASUREMENTS - INTEGRATING SPHERE METHOD (25°C +/- 1°C)

INTERTEK CONTROL NO.	BASE POSITION	INPUT VOLTAGE (VAC)	INPUT CURRENT (mA)	INPUT POWER (W)	INPUT POWER FACTOR ()	INPUT CURRENT ATHD (%)
CRT1804171150-002	Base Up	120.02	912.6	109.01	0.995	3.75
		277.04	425.5	108.12	0.917	8.00

LIGHT OUTPUT (lm)	LUMEN EFFICACY (lm/W)	CORRELATED COLOR TEMPERATURE - CCT (K)	CRI - Ra ()	CRI - R9 ()	DUV ()
13174.2	120.9	3551	82.2	8.0	0.0002

CIE 1931 CHROMATICITY COORDINATE (x)	CIE 1931 CHROMATICITY COORDINATE (y)	CIE 1976 CHROMATICITY COORDINATE (u')	CIE 1976 CHROMATICITY COORDINATE (v')
0.403	0.390	0.234	0.511



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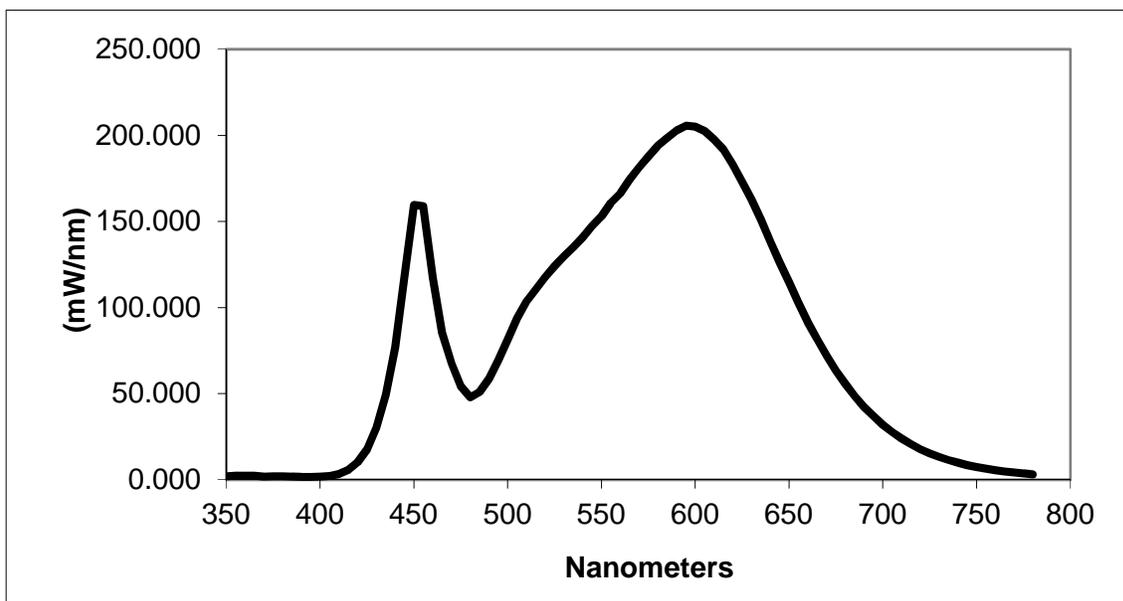
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PHOTOMETRIC AND ELECTRICAL MEASUREMENTS - INTEGRATING SPHERE METHOD (25°C +/- 1°C)

SPECTRAL DISTRIBUTION OVER VISIBLE WAVELENGTHS*							
nm	mW/nm	nm	mW/nm	nm	mW/nm	nm	mW/nm
350	2.031	460	117.509	570	181.514	680	55.629
355	2.349	465	85.546	575	187.644	685	48.584
360	2.317	470	67.550	580	194.087	690	42.307
365	2.326	475	54.363	585	198.440	695	36.971
370	1.906	480	47.804	590	202.897	700	31.926
375	1.963	485	51.051	595	205.556	705	27.710
380	1.945	490	58.695	600	205.024	710	23.926
385	1.845	495	69.463	605	202.425	715	20.680
390	1.650	500	81.342	610	197.740	720	17.731
395	1.637	505	93.922	615	191.844	725	15.405
400	1.771	510	103.528	620	183.125	730	13.212
405	2.250	515	110.635	625	172.996	735	11.414
410	3.317	520	117.646	630	162.684	740	9.907
415	5.742	525	124.084	635	150.982	745	8.553
420	10.177	530	129.620	640	138.406	750	7.382
425	17.811	535	135.107	645	126.453	755	6.423
430	30.320	540	140.769	650	114.718	760	5.594
435	49.333	545	147.194	655	102.911	765	4.851
440	76.824	550	153.026	660	91.538	770	4.234
445	117.936	555	160.738	665	81.728	775	3.686
450	159.685	560	166.269	670	72.084	780	3.210
455	158.962	565	174.232	675	63.451		

*Without correction of sample absorption.



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IN-SITU MAXIMUM MEASURED LED SOURCE TEMPERATURE

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 = 3.3V
 Measured LED Current = 118.78mA
 Calculated LED Wattage = $V_f \times$ Measured LED Current = 0.392W
 Maximum Source Temperature (T_s) = $T_j - (\text{LED Wattage} \times \text{Thermal Resistance}) = 112.55^\circ\text{C}$

LED SOURCE MANUFACTURER'S SUPPORTING DOCUMENTATION:

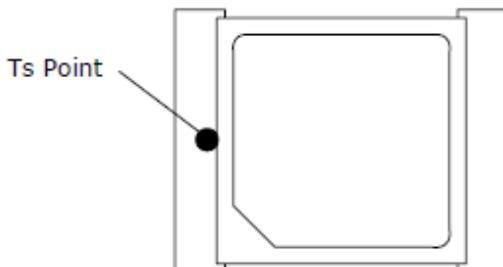
(1) Absolute Maximum Ratings

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	594	mW
Operating Temperature	T_{opr}	-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	$I_F=65\text{mA}$	2.88	-	V
R9050	Luminous Flux	Φ_v $I_F=65\text{mA}$	23.5	-	lm
	Luminous Intensity	I_v $I_F=65\text{mA}$	7.9	-	cd
	Color Rendering Index	R_a $I_F=65\text{mA}$	92	-	-
Chromaticity Coordinate	x	- $I_F=65\text{mA}$	0.41	-	-
	y	- $I_F=65\text{mA}$	0.39	-	-
Thermal Resistance	$R_{\theta JS}$	-	13	19	°C/W

Item	Rank	Min	Max	Unit
Forward Voltage	-	2.4	3.3	V



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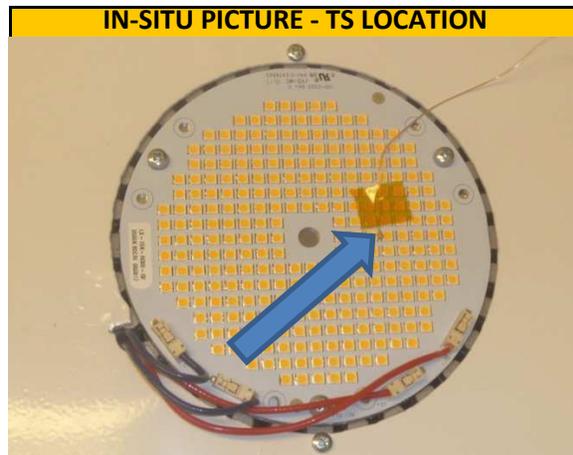
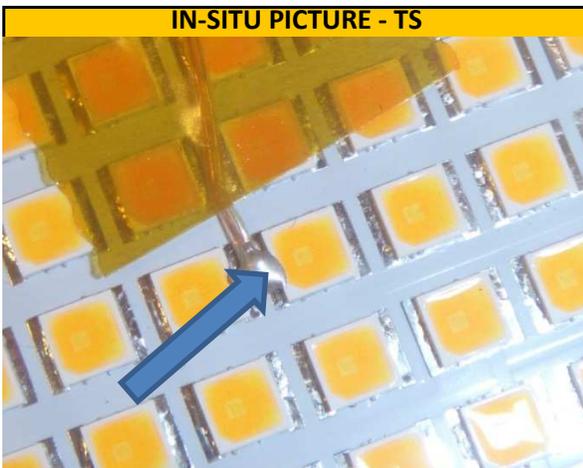
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MAXIMUM MEASURED MANUFACTURER DESIGNATED LED SOURCE TEMPERATURE

INSITU APPARATUS:	Ceiling Pendant
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INTERTEK CONTROL NO.	MAXIMUM MEASURED LED TEMPERATURE (°C)	LOCATION OF THERMOCOUPLE	MAXIMUM RATED LED TEMPERATURE (°C)
CRT1804171150-002	69.2	Per Diagram	112.55



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IN-SITU MAXIMUM MEASURED DRIVER SOURCE TEMPERATURE

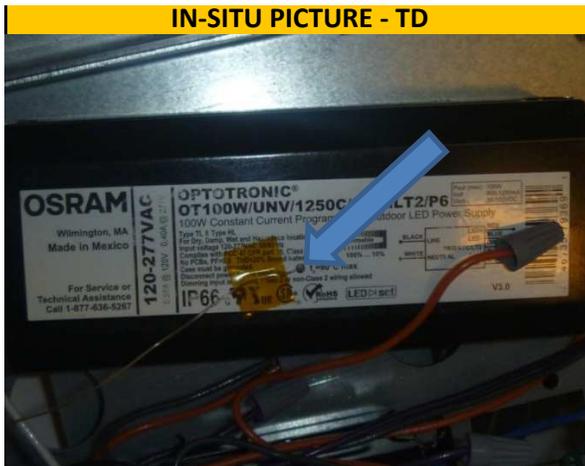
DRIVER SOURCE MANUFACTURER'S SUPPORTING DOCUMENTATION:

ENVIRONMENTAL SPECIFICATIONS	
Ambient Operating Temperature	-40 °C to 55 °C
Case Temperature (Tc)	85°C** 90°C (max)

*Measurement location marked on driver.

MAXIMUM MEASURED MANUFACTURER DESIGNATED DRIVER SOURCE TEMPERATURE

INTERTEK CONTROL NO.	MAXIMUM MEASURED DRIVER TEMPERATURE (°C)	LOCATION OF THERMOCOUPLE	MAXIMUM RATED DRIVER TEMPERATURE (°C)
CRT1804171150-002	59.1	Per Diagram	90.0



End Of Test Results

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PICTURES



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:



Gerald Gray
Associate Engineer
Lighting Division

Report Reviewed By:



Jeff Davis
Engineering Supervisor
Lighting Division

Attachments: IES File

REVISION HISTORY

JOB NUMBER	DATE OF REVISION	PROJECT HANDLER	REVIEWED BY	REVISION NOTE
None				