

# TEST REPORT

No. ETA19010034P-001 for

**P.Q.L., Inc.**

2285 Ward Avenue / Simi Valley, CA 93065

<b>Service</b>	Electrical and Photometric as required to the IESNA LM-79 test standard and Design Lights Consortium V4.4.
<b>Product Classification</b>	Premium
<b>Primary Use</b>	Outdoor - Outdoor Full-Cutoff Wall-mounted Area Luminaires
<b>Model Number</b>	8335X-30K, 83358, 83359
<b>Trade Mark</b>	Superior Life®
<b>Date of Issue</b>	February 19, 2019
<b>Date of Tests</b>	January 29 to February 01, 2019
<b>Test Laboratory</b>	ETA Testing Technology Co., Ltd.
<b>Address</b>	Floor 8, Building A, The Western Science Park, Yuhang District, Hangzhou 311121, China
<b>Test Location</b>	ETA Testing Technology Co., Ltd.
<b>Prepared By</b>	Jack Yang
<b>Reviewer</b>	Lionel Zha



## Table of Content

REFERENCE STANDARD.....	3
EQUIPMENT LIST.....	4
TEST METHOD.....	5
PRODUCT INFORMATION .....	6
TEST SUMMARY .....	8
RESULT OF TEMPERATURE TEST.....	13
PRODUCT PICTURES.....	17

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## REFERENCE STANDARD

Designation	Description
DesignLights Consortium V4.4	Qualification Requirements for Luminaires (Light Fixtures)
ANSI C82.77-10-2014	American National Standard for Lighting Equipment -Harmonic Emission Limits—Related Power Quality Requirements
CIE Pub. No. 13.3-1995	Method of Measuring and Specifying Color Rendering of Light Sources
IES LM-79-08	Electrical and Photometric Measurements of Solid-State Lighting Products (Goniophotometer)
ANSI C78.377-2015	Specifications for the Chromaticity of Solid State Lighting Products
ANSI / UL 1598	Standard for Safety of Luminaires
IES TM-21-11	Projecting Long Term Lumen Maintenance of LED Light Sources + Addendum B

The above standards or test methods were used in part or totally to test.

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**EQUIPMENT LIST**

<b>Equipment Used</b>	<b>Model Number</b>	<b>Control Number</b>	<b>Due date</b>
Everfine – Goniophotometer	GO-R5000	ETA1013	---
AC power source for Goniophotometer System	DPS1010	ETA1006	2019/12/8
Power Analyzer for Goniophotometer	WT310	ETA1005	2019/12/8
Two meter integrating sphere unit	Everfine – 2M	ETA1014	---
AC power source for Integrating Sphere System	DPS1010	ETA1002	2019/12/8
Power Analyzer for Integrating Sphere System	WT310	ETA1001	2019/12/8
Spectroradiometer	HAAS 2000	ETA1003	---
DC Linear Power Source	WY12010	ETA1004	2019/12/8
AC power source for Integrating Sphere System	DPS1010	ETA1006	2019/12/8
Power Analyzer for Integrating Sphere System	WT310	ETA1001	2019/12/8
Illumination Photometer	HA-1	ETA1007	2019/12/8
Luminous intensity Standard lamp For Goniophotometer	---	ETA1008	2019/3/22
Standard lamp	D204	ETA1009	2019/3/22
Digital thermometer	TES-1311A	ETA1141	2019/12/8
Tektronix Oscilloscope	DPO2012B	ETA1187	2019/5/1

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## TEST METHOD

### Photometric, Chromaticity and Electrical Measurements

No seasoning was performed in accordance with IESNA LM-79

Photometric and chromaticity were measured using a 2 meters integrating sphere spectral lamp measurement system. Maintain the ambient temperature at  $25\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$ . Temperature was measured at a position inside the sphere shielded from direct light. Relative humidity of 65% was measured at a position in the testing laboratory.

Spectral radiant flux measurements were made using spectroradiometer (bandwidth: 5nm) attached to the detector port of the integrating sphere. Each fixture was allowed to stabilise before measurements were made. The calibration of the integrating sphere spectroradiometer system is by the reference/standard lamps which are traceable to NIST. Lamp efficacy (lumens per watt) for each fixture model was then computed based on the luminous flux result.

Prior to measurement, stabilize the fixture as specified in section 5.0 of IES LM-79-08 Calculate the stabilization variation as  $[(\text{maximum} - \text{minimum}) / \text{minimum}]$  of at least three readings of the input power and lumen output over a period of 30 minutes, taken 15 minutes apart.

Electrical measurements including voltage, power and power factor were measured using YOKOGAWA - Digital Power Meter, model WT310.

A goniophotometer 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 goniophotometer 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 power analyzer YOKOGAWA - Digital Power Meter, model WT310.

### Maximum In-Situ LED Source Point Temperature

LED source operating temperature measurements were taken on one test sample per model with a thermocouple and temperature meter. Power supply or source temperature measurements were measured at the TMP or  $T_s$  point as indicated by the included diagram in accordance with manufacturers declared documentation. The luminaire was allowed to reach thermal equilibrium before measurements were taken. The maximum temperature was recorded for the sample. A simulated ceiling or other enclosure may be used in accordance to UL 1598 as applicable.

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**PRODUCT INFORMATION**

Manufacturer	P.Q.L., Inc.		
Address	2285 Ward Avenue / Simi Valley, CA 93065		
Trade Mark	Superior Life®		
Sample Quantity	2 pcs		
Sample Number	1190129-07-001 through 1190129-07-002		
Model Number	8335X-30K, 83358, 83359		
<b>Note:</b> These models as above are all the same except for the CCT, Sensor Device and Surface Color.			
Nominal Operate Voltage (V; Hz)	AC 120-277V		
Nominal Power	20W		
Nominal Lumen Output	2500lm; 2600lm; 2620lm		
Nominal CCT	3000K; 4000K; 5000K		
Nominal CRI(Ra)	≥70		
Nominal Life	50000H		
Warranty	5 years		
Product Classification	<input checked="" type="checkbox"/> Premium	<input type="checkbox"/> Standard	
Primary Use	Outdoor - Outdoor Full-Cutoff Wall-mounted Area Luminaires		
Dimmable? (For Test Model)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
If Yes, Select Dimming Mechanism	<input checked="" type="checkbox"/> Continuous dimming	<input type="checkbox"/> Step dimming	<input type="checkbox"/> Not Provide
If Yes, Mini Dimming Level	10%		
Integral Controller? (For Test Model)	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Color-Tunable	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
If Yes, Select Color-Tunable types	<input type="checkbox"/> White-Tunable	<input type="checkbox"/> Warm-Dimming	
If Yes, lowest efficacy setting	N/A		

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Field-Adjustable	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
If Yes, default setting	N/A	
If Yes, rated wattage range	N/A	
If Yes, rated light output range	N/A	
LED Lighting Source Manufacture	Lumileds	
LED Lighting Source Model	LUXEON 3030 2D	
Driver Brand	KERHAM	
Driver Model Number	MSPI-DIM45W12S-1120	
Driver output Voltage and Current	N/A	
Maximum Recommended Temperature (°C) During Normal Operation	75	
Fixtures Band (Retrofit Kit/Lamp Only)	N/A	
Fixtures Model No. (Retrofit Kit/Lamp Only)	N/A	

Remarks	
TBD	To Be Determined, test case will be conducted
N/A	Test case does not apply to the test object

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**TEST SUMMARY**

Test Model No: 8335X-30K

**Initial Photometric and Electrical Test Data**

Input Voltage (V)	Frequency (Hz)	ITHD	Input Current (A)	Input Power (W)	Power Factor	Lumen Output (Lumens)	Efficiency Lumen/w
120.0	60.0	7.9%	0.162	19.20	0.987	2418.06	125.94
277.0	60.0	13.1%	0.081	20.46	0.912	/	/

Input Voltage (V)	Frequency (Hz)	CCT (K)	CRI Ra	R9	x CIE1931	y CIE1931
120.0	60.0	2950	73.2	0	0.4410	0.4063

Input Voltage (V)	Frequency (Hz)	u' CIE1976	v' CIE1976	Duv	Rf	Rg
120.0	60.0	0.2523	0.5229	0.0003	71	97

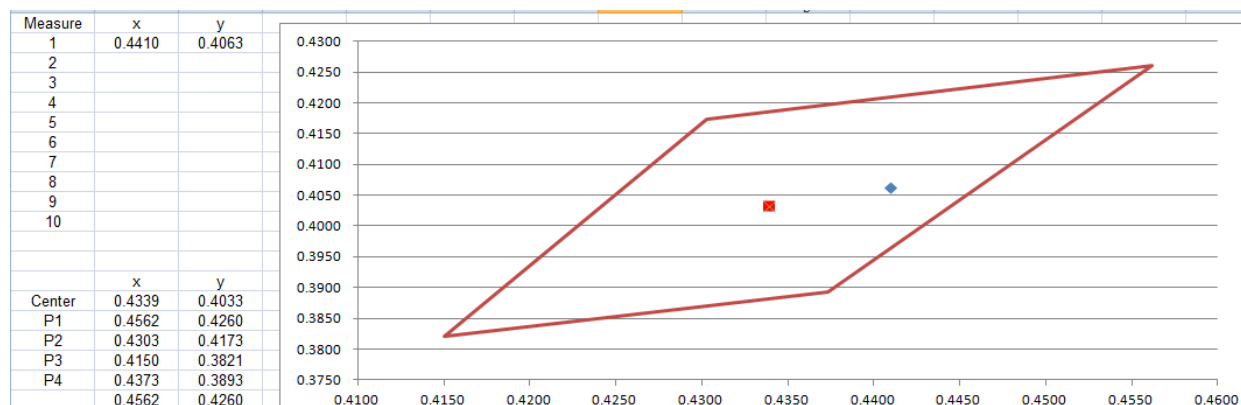
Input Voltage (V)	Frequency (Hz)	Zonal Lumen Density zone (0-90°)	Zonal Lumen Density zone (80-90°)
120.0	60.0	100.0%	0.6%

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**7 Step Quadrangle**



**Spectral Energy Distribution**

WL(nm)	Spectrum	Spectrum	WL(nm)	Spectrum	Spectrum
380	0.0013	0.0605	585	0.9551	44.9500
385	0.0017	0.0817	590	0.9749	45.8800
390	0.0010	0.0456	595	0.9907	46.6300
395	0.0011	0.0513	600	0.9964	46.9000
400	0.0018	0.0839	605	0.9939	46.7800
405	0.0039	0.1831	610	0.9725	45.7700
410	0.0101	0.4771	615	0.9404	44.2600
415	0.0243	1.1430	620	0.8997	42.3400
420	0.0509	2.3940	625	0.8511	40.0600
425	0.0967	4.5490	630	0.7971	37.5100
430	0.1662	7.8230	635	0.7392	34.7900
435	0.2610	12.2800	640	0.6811	32.0600
440	0.4014	18.8900	645	0.6203	29.1900
445	0.5902	27.7800	650	0.5614	26.4200
450	0.5871	27.6300	655	0.5063	23.8300
455	0.3556	16.7400	660	0.4528	21.3100
460	0.2193	10.3200	665	0.4026	18.9500
465	0.1585	7.4580	670	0.3574	16.8200
470	0.1008	4.7420	675	0.3148	14.8200
475	0.0694	3.2650	680	0.2755	12.9600
480	0.0605	2.8460	685	0.2408	11.3300
485	0.0594	2.7940	690	0.2102	9.8920
490	0.0702	3.3030	695	0.1834	8.6300
495	0.0987	4.6450	700	0.1580	7.4380
500	0.1465	6.8950	705	0.1376	6.4760
505	0.2109	9.9260	710	0.1192	5.6100
510	0.2853	13.4300	715	0.1029	4.8420

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515	0.3606	16.9700	720	0.0902	4.2460
520	0.4280	20.1500	725	0.0785	3.6960
525	0.4865	22.9000	730	0.0670	3.1530
530	0.5353	25.1900	735	0.0583	2.7460
535	0.5755	27.0800	740	0.0500	2.3530
540	0.6128	28.8400	745	0.0437	2.0580
545	0.6459	30.4000	750	0.0383	1.8010
550	0.6820	32.1000	755	0.0328	1.5430
555	0.7215	33.9600	760	0.0294	1.3830
560	0.7612	35.8300	765	0.0248	1.1670
565	0.8025	37.7700	770	0.0218	1.0280
570	0.8448	39.7600	775	0.0185	0.8700
575	0.8858	41.6900	780	0.0170	0.7986
580	0.9229	43.4400			

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**Test Model No: 83359**

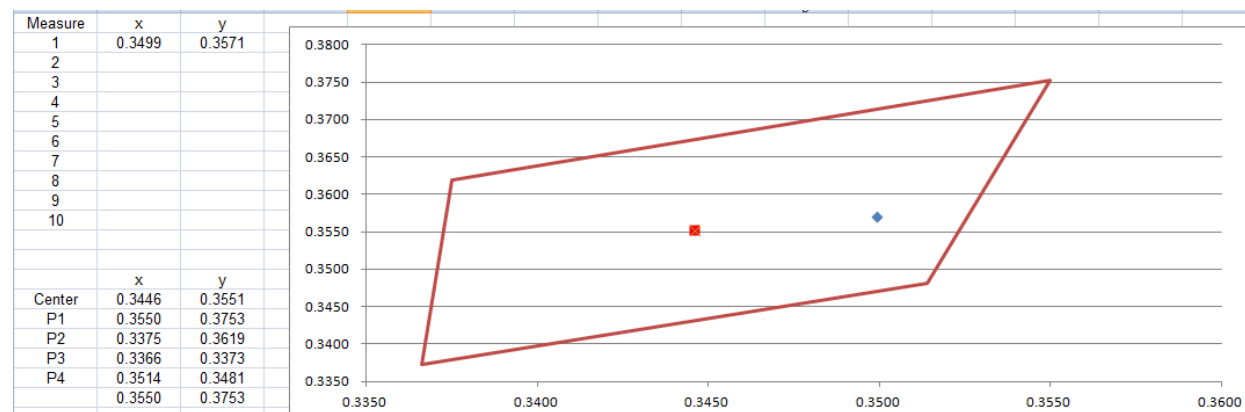
**Initial Photometric and Electrical Test Data**

Input Voltage (V)	Frequency (Hz)	ITHD	Input Current (A)	Input Power (W)	Power Factor	Lumen Output (Lumens)	Efficiency Lumen/w
120.0	60.0	8.1%	0.163	19.37	0.991	/	/
277.0	60.0	13.0%	0.081	20.49	0.909	/	/

Input Voltage (V)	Frequency (Hz)	CCT (K)	CRI Ra	R9	x CIE1931	y CIE1931
120.0	60.0	4840	74.2	0	0.3499	0.3571

Input Voltage (V)	Frequency (Hz)	u' CIE1976	v' CIE1976	Duv	Rf	Rg
120.0	60.0	0.2125	0.4880	0.0008	73	95

**7 Step Quadrangle**



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**Spectral Energy Distribution**

WL(nm)	Spectrum	Spectrum	WL(nm)	Spectrum	Spectrum
380	0.0015	0.1042	585	0.5512	39.2200
385	0.0010	0.0712	590	0.5406	38.4700
390	0.0009	0.0661	595	0.5264	37.4600
395	0.0013	0.0903	600	0.5119	36.4300
400	0.0015	0.1055	605	0.4945	35.1900
405	0.0029	0.2041	610	0.4703	33.4700
410	0.0073	0.5168	615	0.4437	31.5700
415	0.0178	1.2650	620	0.4160	29.6100
420	0.0396	2.8160	625	0.3856	27.4400
425	0.0813	5.7870	630	0.3559	25.3300
430	0.1546	11.0000	635	0.3259	23.1900
435	0.2732	19.4400	640	0.2959	21.0600
440	0.4570	32.5200	645	0.2688	19.1300
445	0.7652	54.4600	650	0.2418	17.2000
450	0.9969	70.9400	655	0.2174	15.4700
455	0.7723	54.9600	660	0.1939	13.8000
460	0.4510	32.0900	665	0.1734	12.3400
465	0.3165	22.5300	670	0.1536	10.9300
470	0.2131	15.1700	675	0.1363	9.6980
475	0.1333	9.4880	680	0.1198	8.5260
480	0.1013	7.2060	685	0.1055	7.5070
485	0.0924	6.5730	690	0.0919	6.5410
490	0.0965	6.8680	695	0.0805	5.7270
495	0.1225	8.7200	700	0.0702	4.9960
500	0.1703	12.1200	705	0.0612	4.3550
505	0.2332	16.5900	710	0.0534	3.7970
510	0.3010	21.4200	715	0.0465	3.3110
515	0.3652	25.9900	720	0.0409	2.9120
520	0.4206	29.9300	725	0.0360	2.5610
525	0.4622	32.8900	730	0.0314	2.2330
530	0.4936	35.1200	735	0.0271	1.9280
535	0.5160	36.7200	740	0.0237	1.6850
540	0.5325	37.9000	745	0.0207	1.4740
545	0.5441	38.7200	750	0.0182	1.2930
550	0.5507	39.1900	755	0.0157	1.1150
555	0.5571	39.6400	760	0.0137	0.9757
560	0.5632	40.0800	765	0.0119	0.8465
565	0.5644	40.1600	770	0.0105	0.7506
570	0.5649	40.2000	775	0.0092	0.6555
575	0.5638	40.1200	780	0.0077	0.5467
580	0.5595	39.8200			

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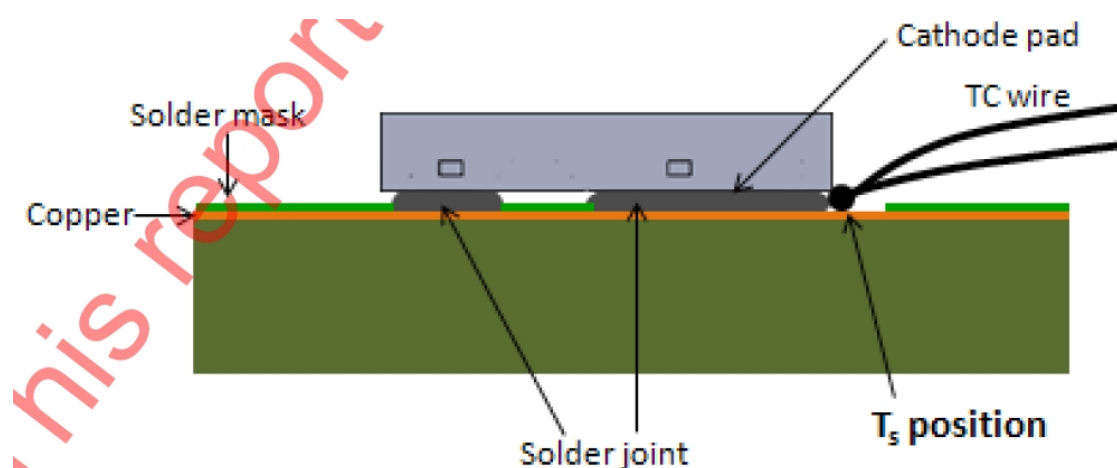
## RESULT OF TEMPERATURE TEST

**Test Model No: 8335X-30K**

### Test Result

Measurement Point	Measured LED Current (mA)	Maximum Measured Source Temperature (°C)	Maximum Rated Source Temperature (°C)
T <sub>s</sub>	82.9	40.9	85.0

### LED Lighting Source Temperature Measurement Point in LM-80 Report

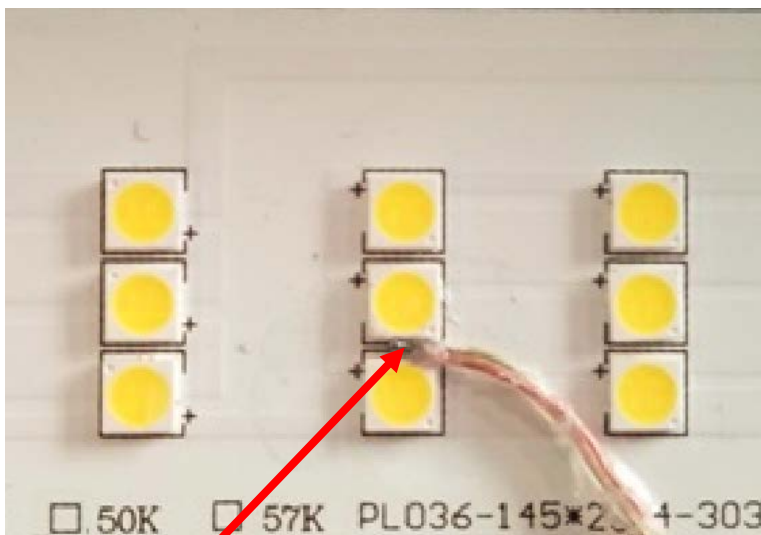


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**LED Lighting Source In Situ Temperature Measurement**



**TOP: LED 2 (Maximum)**

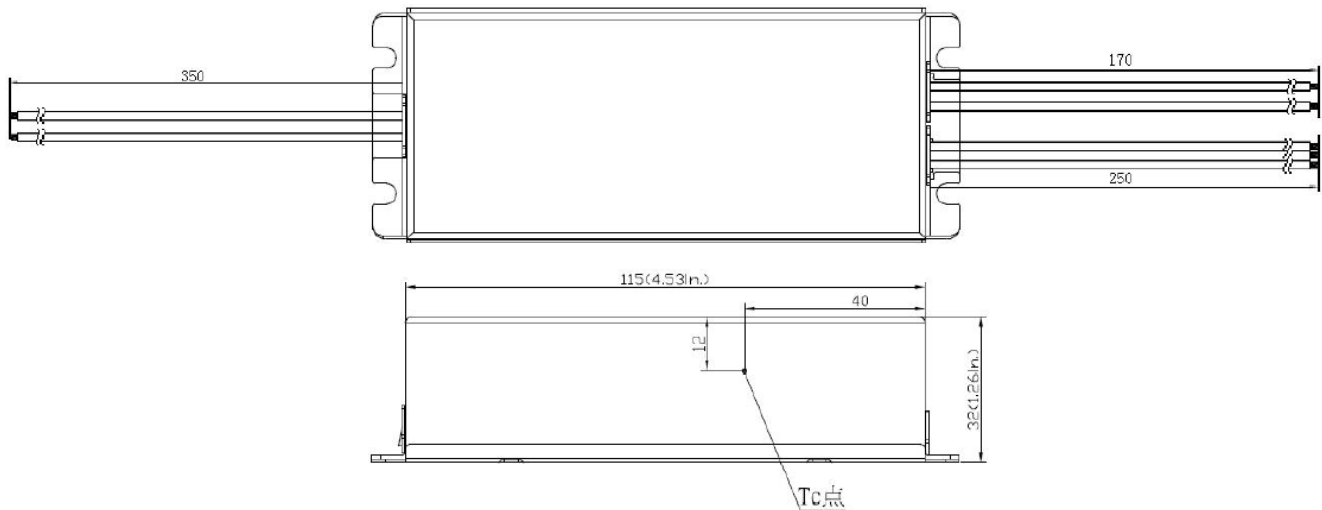


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Test Result

Measurement Point	Measured Driver Case Temperature (°C)	Maximum Rated Driver Case Temperature (°C)
Tc	42.3	75.0

**Driver Hot Spot Location and Tc**



**Driver Hot Spot In-Situ Temperature Measurement**



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### Lumen Maintenance and Lighting Source Life Test Data

#### L70

TM-21 Inputs																																																											
<p><b>Instructions</b></p> <p>Yellow fields are completed by the user. Fields not used should be left blank. Cyan fields are calculated based on user entries.</p> <p>First, enter a description of the LED light source tested. Then complete the fields labeled "LM-80 Testing Details". Test duration must be at least 6,000 hours. If only one case temperature data set is to be used (no interpolation), complete only "Tested case temperature 1". For only two case temperature data sets, complete 1 and 2.</p> <p>Next, further to the right, in the corresponding box(es) for each tested case temperature, enter the test data along with the time (in hours) at which each measurement was taken. Data entered must be normalized then averaged measured data (per TM-21 sections 5.2.1 and 5.2.2). If case temperatures have different test durations, enter data up to the lowest of the test durations for all of the case temperatures.</p> <p>Enter drive current, in-situ temperature data and the percentage of initial lumens to project to in the fields labeled "In-Situ Inputs".</p> <p>Results can be tailored to estimate lumen maintenance at a specific time by entering a value (t) in the yellow field. A complete TM-21 report will appear on the next tab labeled "Report".</p>	<p><b>Description of LED Light Source Tested (manufacturer, model, catalog number)</b></p> <p>Lumileds, LUXEON 3030 ZD</p>		<p><b>LM-80 Test Inputs</b></p> <table border="1"> <thead> <tr> <th colspan="2">Test Data for 85°C Case Temperature</th> <th colspan="2">Tested Case Temperature 2</th> <th colspan="2">Tested Case Temperature 3</th> </tr> <tr> <th>Time (hours)</th> <th>Lumen Maintenance (%)</th> <th>Time (hours)</th> <th>Lumen Maintenance (%)</th> <th>Time (hours)</th> <th>Lumen Maintenance (%)</th> </tr> </thead> <tbody> <tr><td>0</td><td>100.00%</td><td></td><td></td><td></td><td></td></tr> <tr><td>1000</td><td>99.80%</td><td></td><td></td><td></td><td></td></tr> <tr><td>2000</td><td>99.70%</td><td></td><td></td><td></td><td></td></tr> <tr><td>3000</td><td>99.50%</td><td></td><td></td><td></td><td></td></tr> <tr><td>4000</td><td>99.40%</td><td></td><td></td><td></td><td></td></tr> <tr><td>5000</td><td>99.20%</td><td></td><td></td><td></td><td></td></tr> <tr><td>6000</td><td>98.90%</td><td></td><td></td><td></td><td></td></tr> </tbody> </table>			Test Data for 85°C Case Temperature		Tested Case Temperature 2		Tested Case Temperature 3		Time (hours)	Lumen Maintenance (%)	Time (hours)	Lumen Maintenance (%)	Time (hours)	Lumen Maintenance (%)	0	100.00%					1000	99.80%					2000	99.70%					3000	99.50%					4000	99.40%					5000	99.20%					6000	98.90%				
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<p><b>LM-80 Testing Details</b></p> <table border="1"> <tr><td>Total number of units tested per case temperature:</td><td>25</td></tr> <tr><td>Number of failures:</td><td>0</td></tr> <tr><td>Number of units measured:</td><td>25</td></tr> <tr><td>Test duration (hours):</td><td>6000</td></tr> <tr><td>Tested drive current (mA):</td><td>100</td></tr> <tr><td>Tested case temperature 1 (T<sub>c</sub>, °C):</td><td>85</td></tr> <tr><td>Tested case temperature 2 (T<sub>c</sub>, °C):</td><td></td></tr> <tr><td>Tested case temperature 3 (T<sub>c</sub>, °C):</td><td></td></tr> </table>		Total number of units tested per case temperature:	25	Number of failures:	0	Number of units measured:	25	Test duration (hours):	6000	Tested drive current (mA):	100	Tested case temperature 1 (T <sub>c</sub> , °C):	85	Tested case temperature 2 (T <sub>c</sub> , °C):		Tested case temperature 3 (T <sub>c</sub> , °C):		<p><b>In-Situ Inputs</b></p> <table border="1"> <tr><td>Drive current for each LED package/array/module (mA):</td><td>82.9</td></tr> <tr><td>In-situ case temperature (T<sub>c</sub>, °C):</td><td>40.9</td></tr> <tr><td>Percentage of initial lumens to project to (e.g. for L<sub>70</sub>, enter 70):</td><td>70</td></tr> </table>					Drive current for each LED package/array/module (mA):	82.9	In-situ case temperature (T <sub>c</sub> , °C):	40.9	Percentage of initial lumens to project to (e.g. for L <sub>70</sub> , enter 70):	70																															
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<p><b>Results</b></p> <table border="1"> <tr><td>Time (t) at which to estimate lumen maintenance (hours):</td><td>50,000</td></tr> <tr><td>Lumen maintenance at time (t) (%):</td><td>91.04%</td></tr> <tr><td>Reported L70 (hours):</td><td>&gt;35000</td></tr> </table>							Time (t) at which to estimate lumen maintenance (hours):	50,000	Lumen maintenance at time (t) (%):	91.04%	Reported L70 (hours):	>35000																																															
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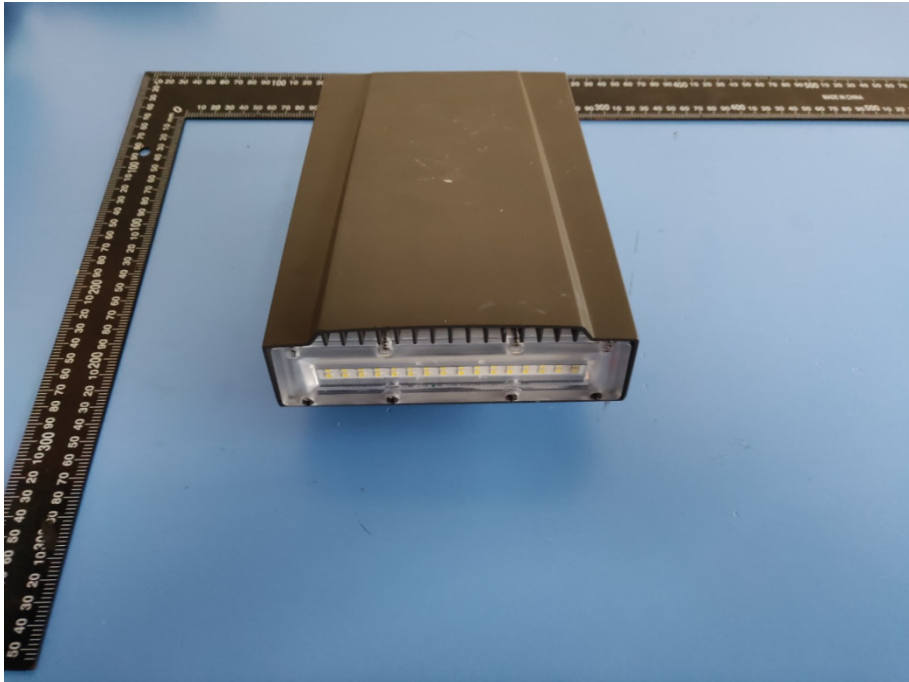
#### L90

TM-21 Inputs																																																											
<p><b>Instructions</b></p> <p>Yellow fields are completed by the user. Fields not used should be left blank. Cyan fields are calculated based on user entries.</p> <p>First, enter a description of the LED light source tested. Then complete the fields labeled "LM-80 Testing Details". Test duration must be at least 6,000 hours. If only one case temperature data set is to be used (no interpolation), complete only "Tested case temperature 1". For only two case temperature data sets, complete 1 and 2.</p> <p>Next, further to the right, in the corresponding box(es) for each tested case temperature, enter the test data along with the time (in hours) at which each measurement was taken. Data entered must be normalized then averaged measured data (per TM-21 sections 5.2.1 and 5.2.2). If case temperatures have different test durations, enter data up to the lowest of the test durations for all of the case temperatures.</p> <p>Enter drive current, in-situ temperature data and the percentage of initial lumens to project to in the fields labeled "In-Situ Inputs".</p> <p>Results can be tailored to estimate lumen maintenance at a specific time by entering a value (t) in the yellow field. A complete TM-21 report will appear on the next tab labeled "Report".</p>	<p><b>Description of LED Light Source Tested (manufacturer, model, catalog number)</b></p> <p>Lumileds, LUXEON 3030 ZD</p>		<p><b>LM-80 Test Inputs</b></p> <table border="1"> <thead> <tr> <th colspan="2">Test Data for 85°C Case Temperature</th> <th colspan="2">Tested Case Temperature 2</th> <th colspan="2">Tested Case Temperature 3</th> </tr> <tr> <th>Time (hours)</th> <th>Lumen Maintenance (%)</th> <th>Time (hours)</th> <th>Lumen Maintenance (%)</th> <th>Time (hours)</th> <th>Lumen Maintenance (%)</th> </tr> </thead> <tbody> <tr><td>0</td><td>100.00%</td><td></td><td></td><td></td><td></td></tr> <tr><td>1000</td><td>99.80%</td><td></td><td></td><td></td><td></td></tr> <tr><td>2000</td><td>99.70%</td><td></td><td></td><td></td><td></td></tr> <tr><td>3000</td><td>99.50%</td><td></td><td></td><td></td><td></td></tr> <tr><td>4000</td><td>99.40%</td><td></td><td></td><td></td><td></td></tr> <tr><td>5000</td><td>99.20%</td><td></td><td></td><td></td><td></td></tr> <tr><td>6000</td><td>98.90%</td><td></td><td></td><td></td><td></td></tr> </tbody> </table>			Test Data for 85°C Case Temperature		Tested Case Temperature 2		Tested Case Temperature 3		Time (hours)	Lumen Maintenance (%)	Time (hours)	Lumen Maintenance (%)	Time (hours)	Lumen Maintenance (%)	0	100.00%					1000	99.80%					2000	99.70%					3000	99.50%					4000	99.40%					5000	99.20%					6000	98.90%				
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PRODUCT PICTURES



None Attachment

\*\*\*\*\* End of Report \*\*\*\*\*

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