



# TEST REPORT

No. ETA19090024P-001 for

## LED One Distribution, Inc

45885 Hotchkiss St Fremont, CA 94539 USA

<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 Pole/Arm-mounted Area and Roadway Luminaires
<b>Model Number</b>	LOC-RGAL-75W-40KD-T3LV1 ; LOC-RGAL-75W-40KD-T4LV1 ; LOC-RGAL-75W-40KD-T5LV1 ; LOC-RGAL-75W-50KD-T4LV1 ; LOC-RGAL-75W-40KD-[T3 or T4 or T5]LV[Blank or -AA to -ZZ][Blank or 1 to 4]; LOC-RGAL-75W-50KD-[T3 or T4 or T5]LV[Blank or -AA to -ZZ][Blank or 1 to 4]
<b>Trade Mark</b>	N/A
<b>Date of Issue</b>	September 25, 2019
<b>Date of Tests</b>	September 20, 2019 to September 25, 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>	Kavi Ding 
<b>Reviewer</b>	Lionel Zha 



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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	2019/12/6
Power Analyzer for Goniophotometer	WT310	ETA1005	2019/12/6
Two meter integrating sphere unit	Everfine – 2M	ETA1014	---
AC power source for Integrating Sphere System	DPS1010	ETA1002	2019/12/6
Power Analyzer for Integrating Sphere System	WT310	ETA1001	2019/12/6
Spectroradiometer	HAAS 2000	ETA1003	---
DC Linear Power Source	WY12010	ETA1004	2019/12/6
AC power source for Integrating Sphere System	DPS1010	ETA1006	2019/12/6
Power Analyzer for Integrating Sphere System	WT310	ETA1001	2019/12/6
Illumination Photometer	HA-1	ETA1007	2019/12/6
Luminous intensity Standard lamp For Goniophotometer	---	ETA1008	2020/3/21
Standard lamp	D204	ETA1009	2020/3/21
Digital thermometer	TES-1311A	ETA1141	2019/12/6
Tektronix Oscilloscope	DPO2012B	ETA1187	2020/4/30

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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 [(maximum—minimum)/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	N/A		
Address	N/A		
Trade Mark	N/A		
Sample Quantity	4 pcs		
Sample Number	1190920-03-001 through 1190920-03-004		
Model Number	LOC-RGAL-75W-40KD-T3LV1; LOC-RGAL-75W-40KD-T4LV1; LOC-RGAL-75W-40KD-T5LV1; LOC-RGAL-75W-50KD-T4LV1; LOC-RGAL-75W-40KD-[T3 or T4 or T5]LV[Blank or -AA to -ZZ][Blank or 1 to 4]; LOC-RGAL-75W-50KD-[T3 or T4 or T5]LV[Blank or -AA to -ZZ][Blank or 1 to 4]		
<b>Note:</b> These models as above are all the same except for the CCT, Sensor Device, Surface Color and/or Mounting Arm.			
Nominal Operate Voltage (V; Hz)	AC 120-277V		
Nominal Power	75W		
Nominal Lumen Output	11250lm; 11325lm		
Nominal CCT	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 Pole/Arm-mounted Area and Roadway 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		
Field-Adjustable	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	

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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-DIM100A12S-2500
Driver output Voltage and Current	33.8V DC; 2050mA
Maximum Recommended Temperature (°C) During Normal Operation	73
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: LOC-RGAL-75W-40KD-T4LV1

**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	4.5%	0.665	79.30	0.993	12107.80	152.68
277.0	60.0	14.2%	0.306	77.51	0.915	/	/

Input Voltage (V)	Frequency (Hz)	CCT (K)	CRI Ra	R9	x CIE1931	y CIE1931
120.0	60.0	3836	73.7	-15	0.3904	0.3893

Input Voltage (V)	Frequency (Hz)	u' CIE1976	v' CIE1976	Duv	Rf	Rg
120.0	60.0	0.2266	0.5085	0.0030	74	94

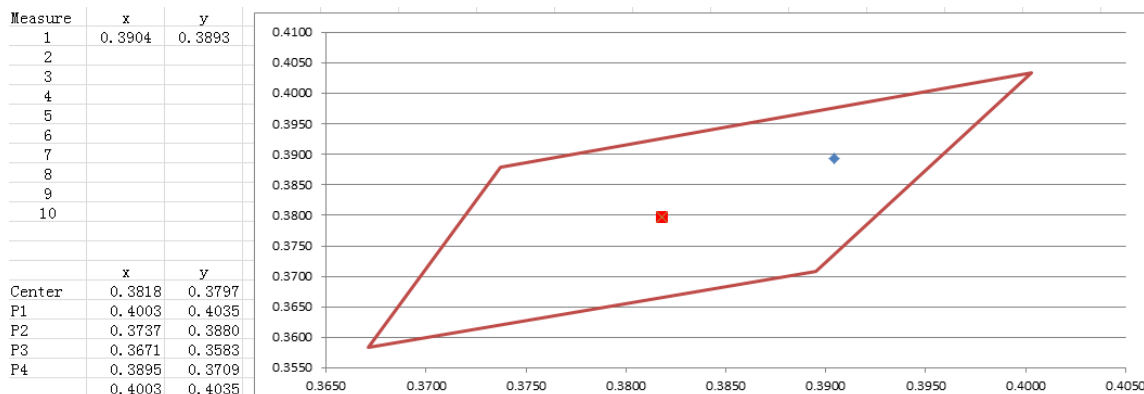
Input Voltage (V)	Frequency (Hz)	Zonal Lumen Density zone (0-90°)	Zonal Lumen Density zone (80-90°)
120.0	60.0	99.7% (-1% Tolerance)	0.5%

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**7 Step Quadrangle**



**Spectral Energy Distribution**

WL(nm)	Spectrum	Spectrum	WL(nm)	Spectrum	Spectrum
380	0.0135	2.9780	585	0.9220	202.8000
385	0.0097	2.1280	590	0.9209	202.5000
390	0.0068	1.4870	595	0.9103	200.2000
395	0.0056	1.2420	600	0.8941	196.6000
400	0.0064	1.4160	605	0.8694	191.2000
405	0.0090	1.9820	610	0.8365	184.0000
410	0.0163	3.5950	615	0.7981	175.5000
415	0.0315	6.9260	620	0.7538	165.8000
420	0.0600	13.2000	625	0.7090	155.9000
425	0.1078	23.7000	630	0.6581	144.7000
430	0.1842	40.5100	635	0.6072	133.5000
435	0.2958	65.0500	640	0.5553	122.1000
440	0.4569	100.5000	645	0.5061	111.3000
445	0.7184	158.0000	650	0.4558	100.2000
450	0.9864	216.9000	655	0.4089	89.9200
455	0.8459	186.0000	660	0.3648	80.2400
460	0.5081	111.7000	665	0.3252	71.5100
465	0.3547	78.0000	670	0.2875	63.2300
470	0.2557	56.2400	675	0.2538	55.8000
475	0.1678	36.9000	680	0.2232	49.0900
480	0.1288	28.3300	685	0.1957	43.0400
485	0.1200	26.3900	690	0.1716	37.7400
490	0.1271	27.9600	695	0.1500	32.9800
495	0.1588	34.9300	700	0.1310	28.8200
500	0.2207	48.5300	705	0.1143	25.1400
505	0.3030	66.6300	710	0.0995	21.8700
510	0.3959	87.0600	715	0.0865	19.0300

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515	0.4877	107.3000	720	0.0757	16.6600
520	0.5697	125.3000	725	0.0659	14.4900
525	0.6379	140.3000	730	0.0574	12.6200
530	0.6895	151.6000	735	0.0499	10.9700
535	0.7298	160.5000	740	0.0435	9.5720
540	0.7613	167.4000	745	0.0376	8.2720
545	0.7891	173.5000	750	0.0332	7.3020
550	0.8150	179.2000	755	0.0290	6.3770
555	0.8358	183.8000	760	0.0254	5.5940
560	0.8577	188.6000	765	0.0223	4.9110
565	0.8769	192.8000	770	0.0193	4.2350
570	0.8965	197.1000	775	0.0171	3.7540
575	0.9092	199.9000	780	0.0159	3.4980
580	0.9176	201.8000			

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**Test Model No: LOC-RGAL-75W-50KD-T4LV1**

**Initial Photometric and Electrical Test Data**

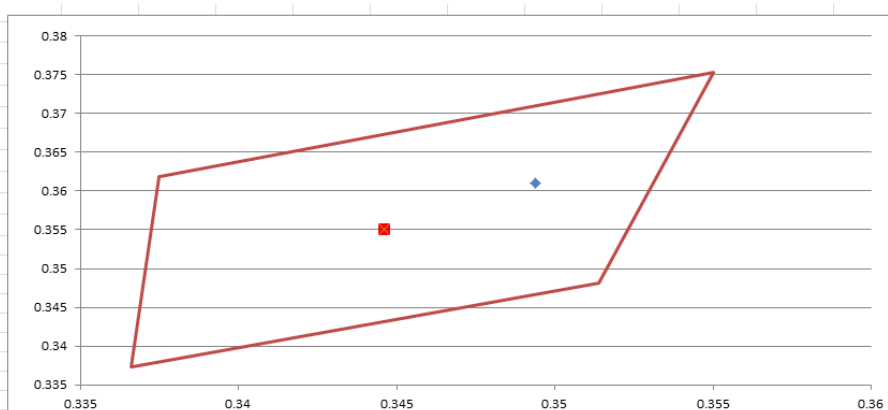
Input Voltage (V)	Frequency (Hz)	ITHD	Input Current (A)	Input Power (W)	Power Factor	Lumen Output (Lumens)	Efficiency Lumen/w
120.0	60.0	4.2%	0.660	78.87	0.995	/	/
277.0	60.0	14.2%	0.312	79.53	0.919	/	/

Input Voltage (V)	Frequency (Hz)	CCT (K)	CRI Ra	R9	x CIE1931	y CIE1931
120.0	60.0	4874	73.2	-18	0.3494	0.3610

Input Voltage (V)	Frequency (Hz)	u' CIE1976	v' CIE1976	Duv	Rf	Rg
120.0	60.0	0.2107	0.4898	0.0029	73	94

**7 Step Quadrangle**

Measure	x	y
1	0.3494	0.361
2		
3		
4		
5		
6		
7		
8		
9		
10		
Center	0.3446	0.3551
P1	0.3550	0.3753
P2	0.3375	0.3619
P3	0.3366	0.3373
P4	0.3514	0.3481
	0.3550	0.3753



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**Spectral Energy Distribution**

WL(nm)	Spectrum	Spectrum	WL(nm)	Spectrum	Spectrum
380	0.0137	4.1630	585	0.6020	183.1000
385	0.0112	3.4030	590	0.5886	179.0000
390	0.0095	2.8800	595	0.5733	174.3000
395	0.0077	2.3380	600	0.5521	167.9000
400	0.0098	2.9710	605	0.5284	160.6000
405	0.0134	4.0640	610	0.5023	152.7000
410	0.0214	6.4920	615	0.4738	144.1000
415	0.0371	11.2700	620	0.4433	134.8000
420	0.0677	20.6000	625	0.4116	125.2000
425	0.1188	36.1300	630	0.3807	115.7000
430	0.2005	60.9700	635	0.3487	106.0000
435	0.3181	96.7300	640	0.3176	96.5600
440	0.4907	149.2000	645	0.2879	87.5400
445	0.7458	226.8000	650	0.2590	78.7400
450	0.9915	301.5000	655	0.2322	70.6100
455	0.8404	255.5000	660	0.2081	63.2600
460	0.5090	154.8000	665	0.1848	56.1900
465	0.3491	106.2000	670	0.1643	49.9500
470	0.2464	74.9200	675	0.1453	44.1800
475	0.1604	48.7700	680	0.1283	39.0000
480	0.1195	36.3300	685	0.1127	34.2700
485	0.1082	32.9100	690	0.0991	30.1200
490	0.1105	33.5900	695	0.0868	26.3900
495	0.1353	41.1400	700	0.0761	23.1500
500	0.1856	56.4300	705	0.0666	20.2600
505	0.2523	76.7300	710	0.0584	17.7600
510	0.3277	99.6400	715	0.0512	15.5700
515	0.4010	121.9000	720	0.0448	13.6200
520	0.4646	141.3000	725	0.0392	11.9300
525	0.5138	156.2000	730	0.0343	10.4300
530	0.5493	167.0000	735	0.0299	9.0880
535	0.5767	175.3000	740	0.0263	7.9970
540	0.5930	180.3000	745	0.0230	7.0020
545	0.6058	184.2000	750	0.0202	6.1470
550	0.6120	186.1000	755	0.0178	5.4090
555	0.6179	187.9000	760	0.0157	4.7620
560	0.6225	189.3000	765	0.0138	4.1960
565	0.6235	189.6000	770	0.0120	3.6550
570	0.6228	189.4000	775	0.0107	3.2490
575	0.6181	187.9000	780	0.0101	3.0620
580	0.6112	185.8000			

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Test Model No.: see in table

Test Voltage: 120V/60Hz

**Goniophotometer Test Data**

Model	THDi	Input Current (A)	Input Power (W)	Power Factor	Lumen Output (Lumens)	Efficiency Lumen/W	Zonal Lumen Density zone (0-90°)	Zonal Lumen Density zone (80-90°)
LOC-RGAL-75W-40KD-T3LV1	4.4%	0.665	79.30	0.993	12246.70	154.23	99.7% (-1% Tolerance)	0.5%
LOC-RGAL-75W-40KD-T4LV1	4.5%	0.665	79.30	0.993	12107.80	152.68	99.7% (-1% Tolerance)	0.5%
LOC-RGAL-75W-40KD-T5LV1	4.2%	0.666	79.50	0.994	12289.50	154.58	99.8% (-1% Tolerance)	0.5%

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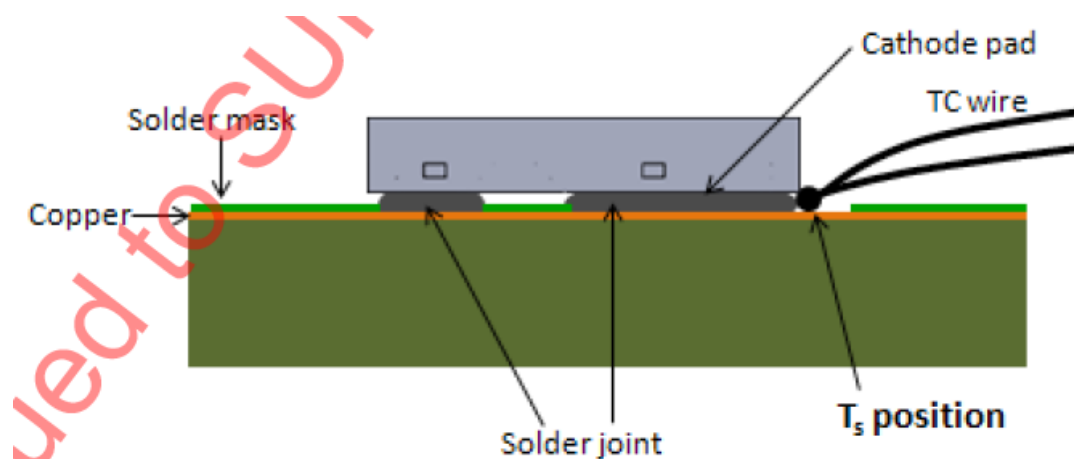
## RESULT OF TEMPERATURE TEST

Test Model No: LOC-RGAL-75W-40KD-T4LV1

### Test Result

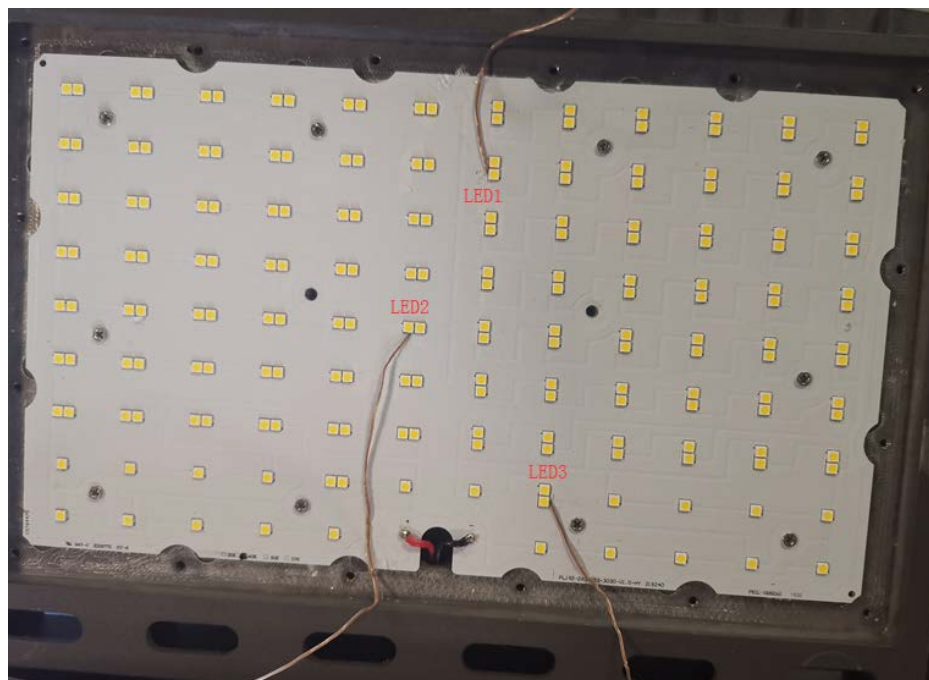
Measurement Point	Measured LED Current (mA)	Maximum Measured Source Temperature (°C)	Maximum Rated Source Temperature (°C)
T <sub>s</sub>	66.1	47.9	85.0

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

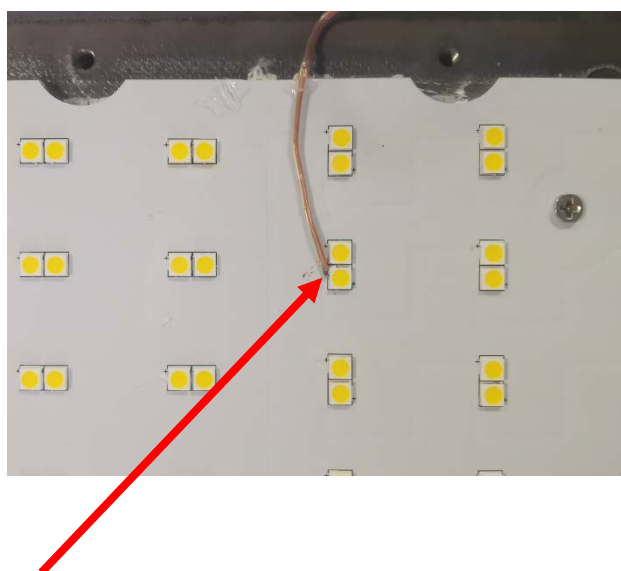


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**LED Lighting Source In Situ Temperature Measurement**



**TOP: LED 1 (Maximum)**

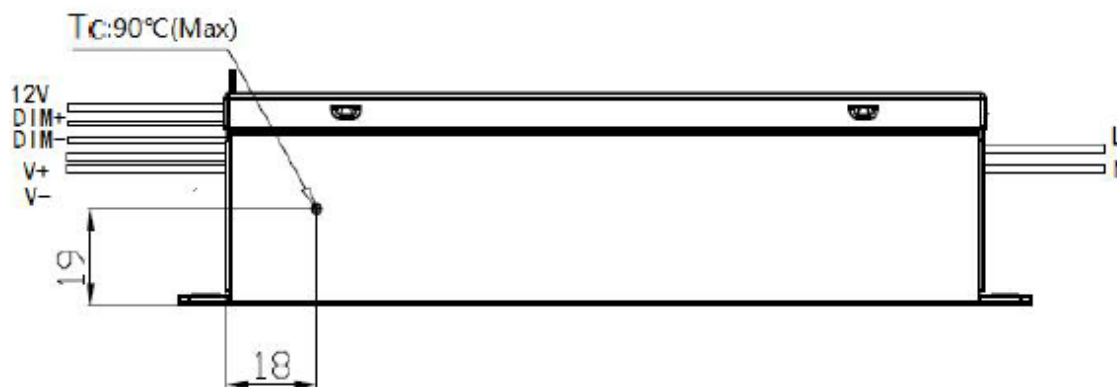


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Test Result

Measurement Point	Measured Driver Case Temperature (°C)	Maximum Rated Driver Case Temperature (°C)
Tc	45.4	73.0

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**

**Instructions**

Yellow fields are completed by the user. Fields not used should be left blank. Cyan fields are calculated based on user entries.

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.

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.

Enter drive current, *in-situ* temperature data and the percentage of initial lumens to project to in the fields labeled "In-Situ Inputs".

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".

Description of LED Light Source Tested (manufacturer, model, catalog number)		LM-80 Test Inputs					
Lumileds LUXEON 3030 2D		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	99.86%				
		2000	99.68%				
		3000	99.52%				
		4000	99.37%				
		5000	99.16%				
		6000	98.93%				
		7000	98.70%				
		8000	98.48%				
		9000	98.25%				
		10000	97.98%				
		11000	97.74%				
		12000	97.45%				

LM-80 Testing Details	
Total number of units tested per case temperature:	25
Number of failures:	0
Number of units measured:	25
Test duration (hours):	12000
Tested drive current (mA):	100
Tested case temperature 1 (T <sub>case</sub> , °C):	85
Tested case temperature 2 (T <sub>case</sub> , °C):	
Tested case temperature 3 (T <sub>case</sub> , °C):	

In-Situ Inputs	
Drive current for each LED package/array/module (mA):	66.1
In-situ case temperature (T <sub>case</sub> , °C):	47.9
Percentage of initial lumens to project to (e.g. for L <sub>70</sub> , enter 70):	70

Results	
Time (t) at which to estimate lumen maintenance (hours):	50,000
Lumen maintenance at time (t) (%):	88.67%
Reported L70 (hours):	>72000

#### L90

**TM-21 Inputs**

**Instructions**

Yellow fields are completed by the user. Fields not used should be left blank. Cyan fields are calculated based on user entries.

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.

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.

Enter drive current, *in-situ* temperature data and the percentage of initial lumens to project to in the fields labeled "In-Situ Inputs".

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".

Description of LED Light Source Tested (manufacturer, model, catalog number)		LM-80 Test Inputs					
Lumileds LUXEON 3030 2D		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	99.86%				
		2000	99.68%				
		3000	99.52%				
		4000	99.37%				
		5000	99.16%				
		6000	98.93%				
		7000	98.70%				
		8000	98.48%				
		9000	98.25%				
		10000	97.98%				
		11000	97.74%				
		12000	97.45%				

LM-80 Testing Details	
Total number of units tested per case temperature:	25
Number of failures:	0
Number of units measured:	25
Test duration (hours):	12000
Tested drive current (mA):	100
Tested case temperature 1 (T <sub>case</sub> , °C):	85
Tested case temperature 2 (T <sub>case</sub> , °C):	
Tested case temperature 3 (T <sub>case</sub> , °C):	

In-Situ Inputs	
Drive current for each LED package/array/module (mA):	66.1
In-situ case temperature (T <sub>case</sub> , °C):	47.9
Percentage of initial lumens to project to (e.g. for L <sub>70</sub> , enter 70):	90

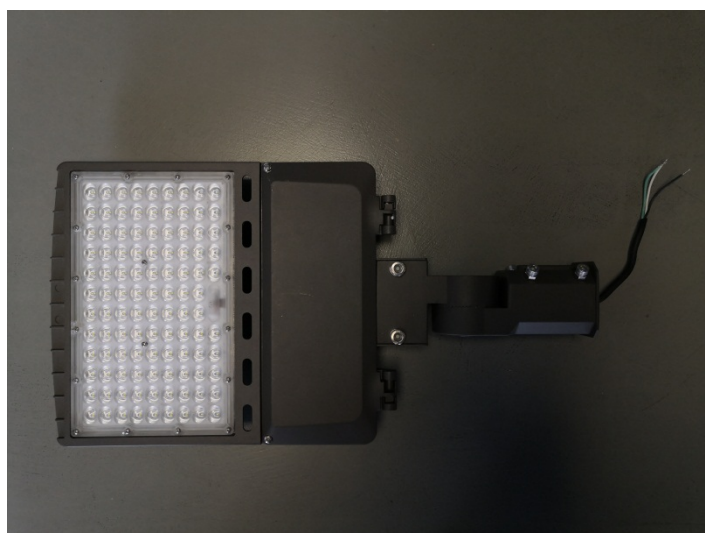
Results	
Time (t) at which to estimate lumen maintenance (hours):	36,000
Lumen maintenance at time (t) (%):	91.62%
Reported L90 (hours):	44,000

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## PRODUCT PICTURES

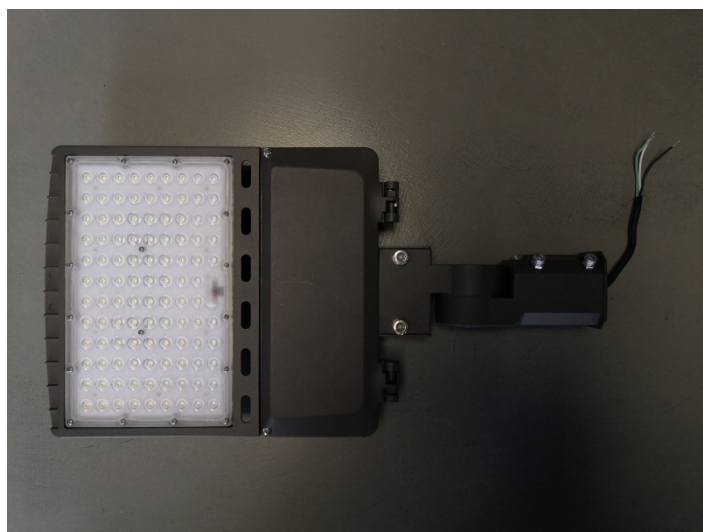


LOC-RGAL-75W-40KD-T3LV1



LOC-RGAL-75W-40KD-T4LV1

\*\*\*\*\* End of Page \*\*\*\*\*



LOC-RGAL-75W-40KD-T5LV1



LOC-RGAL-75W-XXKD-[T3 or T4 or T5]LV[Blank or -AA to -ZZ]1

\*\*\*\*\* End of Page \*\*\*\*\*



LOC-RGAL-75W-XXKD-[T3 or T4 or T5]LV[Blank or -AA to -ZZ]2



LOC-RGAL-75W-XXKD-[T3 or T4 or T5]LV[Blank or -AA to -ZZ]3

\*\*\*\*\* End of Page \*\*\*\*\*



LOC-RGAL-75W-XXKD-[T3 or T4 or T5]LV[Blank or -AA to -ZZ]4

None Attachment

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