

TEST REPORT

No. ETA19050019P-001 for

Shanghai Supertek Lighting Co.,Ltd.

No.455 Laodong Rd, Jiading Dist, Shanghai, China



Service	Electrical and Photometric as required to the IESNA LM-79 test standard and Design Lights Consortium V4.4.
Product Classification	Premium
Primary Use	Outdoor - Architectural Flood and Spot Luminaires
Model Number	FL31A-45-30K-LV-N77-SK-N-V40 ; FL31A-45-40K-LV-N77-SK-N-V40 ; FL31A-45-50K-LV-N77-SK-N-V40 ; FL31A-45-30K-LV-[Blank or D0 to D9]-[Blank or P0 to P9]-[Blank or S0 to S9]-[Blank or -AA to -XX]-N77-SK-N-V40; FL31A-45-40K-LV-[Blank or D0 to D9]-[Blank or P0 to P9]-[Blank or S0 to S9]-[Blank or -AA to -XX]-N77-SK-N-V40; FL31A-45-50K-LV-[Blank or D0 to D9]-[Blank or P0 to P9]-[Blank or S0 to S9]-[Blank or -AA to -XX]-N77-SK-N-V40; FL31A-45-30K-LV-[Blank or D0 to D9]-[Blank or P0 to P9]-[Blank or S0 to S9]-[Blank or -AA to -XX]-N77-UB-N-V40; FL31A-45-40K-LV-[Blank or D0 to D9]-[Blank or P0 to P9]-[Blank or S0 to S9]-[Blank or -AA to -XX]-N77-UB-N-V40; FL31A-45-50K-LV-[Blank or D0 to D9]-[Blank or P0 to P9]-[Blank or S0 to S9]-[Blank or -AA to -XX]-N77-UB-N-V40
Trade Mark	Supertek
Date of Issue	May 29, 2019
Date of Tests	May 14, 2019 to May 23, 2019
Test Laboratory	ETA Testing Technology Co., Ltd.
Address	Floor 8, Building A, The Western Science Park, Yuhang District, Hangzhou 311121, China
Test Location	ETA Testing Technology Co., Ltd.
Prepared By	Jack Yang 
Reviewer	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

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



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**

Equipment Used	Model Number	Control Number	Due date
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 °C ± 1 °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	Shanghai Supertek Lighting Co.,Ltd.		
Address	No.455 Laodong Rd, Jiading Dist, Shanghai, China		
Trade Mark	Supertek		
Sample Quantity	2 pcs		
Sample Number	1190514-01-001 through 1190514-01-002		
Model Number	FL31A-45-30K-LV-N77-SK-N-V40 ; FL31A-45-40K-LV-N77-SK-N-V40 ; FL31A-45-50K-LV-N77-SK-N-V40 ; FL31A-45-30K-LV-[Blank or D0 to D9]-[Blank or P0 to P9]- [Blank or S0 to S9]-[Blank or -AA to -XX]-N77-SK-N-V40; FL31A-45-40K-LV-[Blank or D0 to D9]-[Blank or P0 to P9]- [Blank or S0 to S9]-[Blank or -AA to -XX]-N77-SK-N-V40; FL31A-45-50K-LV-[Blank or D0 to D9]-[Blank or P0 to P9]- [Blank or S0 to S9]-[Blank or -AA to -XX]-N77-SK-N-V40; FL31A-45-30K-LV-[Blank or D0 to D9]-[Blank or P0 to P9]- [Blank or S0 to S9]-[Blank or -AA to -XX]-N77-UB-N-V40; FL31A-45-40K-LV-[Blank or D0 to D9]-[Blank or P0 to P9]- [Blank or S0 to S9]-[Blank or -AA to -XX]-N77-UB-N-V40; FL31A-45-50K-LV-[Blank or D0 to D9]-[Blank or P0 to P9]- [Blank or S0 to S9]-[Blank or -AA to -XX]-N77-UB-N-V40		
Note: 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	45W		
Nominal Lumen Output	5265lm; 5535lm; 5670lm		
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 - Architectural Flood and Spot Luminaires		
Dimmable? (For Test Model)	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
If Yes, Select Dimming Mechanism	<input type="checkbox"/> Continuous dimming	<input type="checkbox"/> Step dimming	<input type="checkbox"/> Not Provide
If Yes, Mini Dimming Level	N/A		
Integral Controller?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	

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(For Test Model)		
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
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-NIS50W21S-770	
Driver output Voltage and Current	N/A	
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: FL31A-45-30K-LV-N77-SK-N-V40****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	14.5%	0.369	43.59	0.986	5091.81	116.81
277.0	60.0	17.4%	0.183	46.25	0.913	/	/

Input Voltage (V)	Frequency (Hz)	CCT (K)	CRI Ra	R9	x CIE1931	y CIE1931
120.0	60.0	3033	71.3	-20	0.4354	0.4050

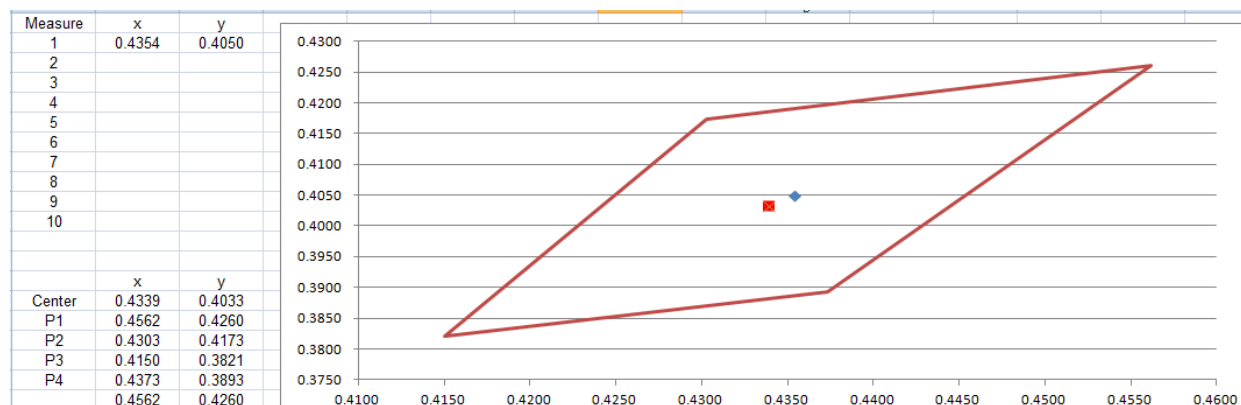
Input Voltage (V)	Frequency (Hz)	u' CIE1976	v' CIE1976	Duv	Rf	Rg
120.0	60.0	0.2492	0.5215	0.0006	69	96

Input Voltage (V)	Frequency (Hz)	Zonal Lumen Density zone (0-90°)
120.0	60.0	100%

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7 Step Quadrangle



Spectral Energy Distribution

WL(nm)	Spectrum	Spectrum	WL(nm)	Spectrum	Spectrum
380	0.0117	1.1020	585	0.9742	91.5500
385	0.0089	0.8338	590	0.9888	92.9200
390	0.0057	0.5334	595	0.9988	93.8700
395	0.0061	0.5712	600	0.9950	93.5100
400	0.0072	0.6725	605	0.9830	92.3800
405	0.0117	1.1000	610	0.9555	89.7900
410	0.0237	2.2240	615	0.9215	86.5900
415	0.0485	4.5600	620	0.8776	82.4700
420	0.0888	8.3440	625	0.8271	77.7300
425	0.1479	13.9000	630	0.7723	72.5700
430	0.2277	21.4000	635	0.7162	67.3000
435	0.3210	30.1600	640	0.6608	62.1000
440	0.4311	40.5100	645	0.6026	56.6300
445	0.5577	52.4100	650	0.5480	51.5000
450	0.5725	53.8000	655	0.4940	46.4300
455	0.3928	36.9100	660	0.4428	41.6100
460	0.2401	22.5600	665	0.3944	37.0700
465	0.1688	15.8600	670	0.3508	32.9600
470	0.1139	10.7000	675	0.3106	29.1900
475	0.0788	7.4030	680	0.2741	25.7600
480	0.0650	6.1080	685	0.2404	22.6000
485	0.0618	5.8040	690	0.2108	19.8100
490	0.0687	6.4560	695	0.1838	17.2800
495	0.0934	8.7800	700	0.1604	15.0700
500	0.1361	12.7900	705	0.1400	13.1500
505	0.1981	18.6200	710	0.1220	11.4600
510	0.2740	25.7500	715	0.1066	10.0100

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515	0.3529	33.1600	720	0.0929	8.7290
520	0.4303	40.4400	725	0.0807	7.5800
525	0.4966	46.6700	730	0.0704	6.6160
530	0.5519	51.8600	735	0.0613	5.7580
535	0.5981	56.2000	740	0.0532	4.9950
540	0.6419	60.3300	745	0.0463	4.3550
545	0.6791	63.8200	750	0.0409	3.8390
550	0.7180	67.4700	755	0.0357	3.3520
555	0.7567	71.1100	760	0.0311	2.9240
560	0.7995	75.1400	765	0.0273	2.5620
565	0.8396	78.9000	770	0.0240	2.2580
570	0.8769	82.4000	775	0.0209	1.9640
575	0.9168	86.1600	780	0.0196	1.8440
580	0.9489	89.1700			

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Test Model No: FL31A-45-50K-LV-N77-SK-N-V40

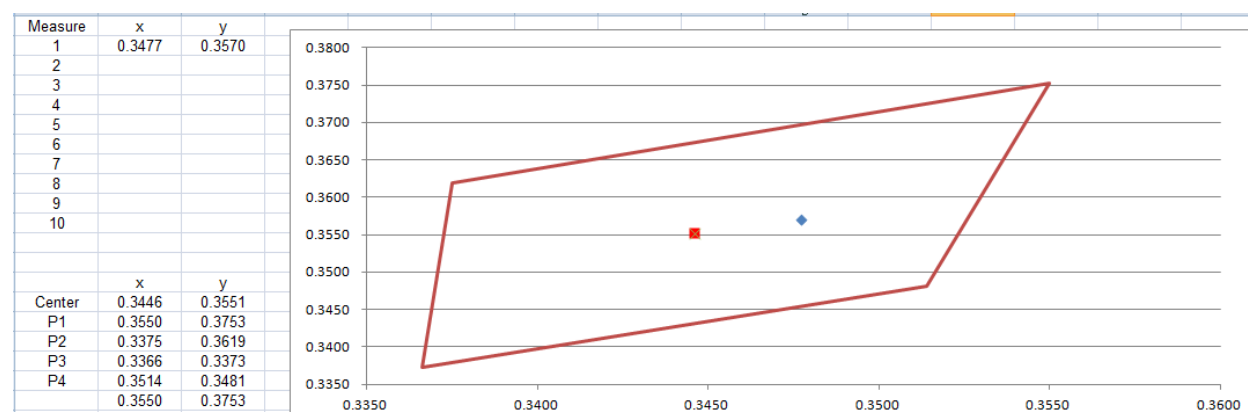
Initial Photometric and Electrical Test Data

Input Voltage (V)	Frequency (Hz)	ITHD	Input Current (A)	Input Power (W)	Power Factor	Lumen Output (Lumens)	Efficiency Lumen/w
120.0	60.0	14.1%	0.369	43.71	0.986	/	/
277.0	60.0	16.8%	0.185	46.45	0.908	/	/

Input Voltage (V)	Frequency (Hz)	CCT (K)	CRI Ra	R9	x CIE1931	y CIE1931
120.0	60.0	4922	74.3	-13	0.3477	0.3570

Input Voltage (V)	Frequency (Hz)	u' CIE1976	v' CIE1976	Duv	Rf	Rg
120.0	60.0	0.2111	0.4877	0.0017	73	95

7 Step Quadrangle



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**Spectral Energy Distribution**

WL(nm)	Spectrum	Spectrum	WL(nm)	Spectrum	Spectrum
380	0.0113	1.6030	585	0.5997	85.1000
385	0.0080	1.1330	590	0.5866	83.2400
390	0.0062	0.8830	595	0.5732	81.3300
395	0.0055	0.7750	600	0.5544	78.6700
400	0.0068	0.9661	605	0.5338	75.7400
405	0.0112	1.5930	610	0.5075	72.0100
410	0.0220	3.1180	615	0.4795	68.0400
415	0.0437	6.1980	620	0.4485	63.6400
420	0.0821	11.6600	625	0.4167	59.1200
425	0.1474	20.9200	630	0.3848	54.6000
430	0.2508	35.5800	635	0.3535	50.1600
435	0.3984	56.5300	640	0.3227	45.7900
440	0.6084	86.3300	645	0.2932	41.6000
445	0.8838	125.4000	650	0.2652	37.6300
450	0.9800	139.1000	655	0.2380	33.7800
455	0.7014	99.5300	660	0.2130	30.2200
460	0.4434	62.9200	665	0.1893	26.8700
465	0.3170	44.9800	670	0.1681	23.8600
470	0.2124	30.1300	675	0.1490	21.1400
475	0.1461	20.7300	680	0.1310	18.5900
480	0.1215	17.2400	685	0.1151	16.3400
485	0.1172	16.6400	690	0.1012	14.3700
490	0.1300	18.4400	695	0.0884	12.5500
495	0.1653	23.4500	700	0.0772	10.9500
500	0.2194	31.1400	705	0.0676	9.5990
505	0.2852	40.4700	710	0.0588	8.3370
510	0.3539	50.2100	715	0.0513	7.2800
515	0.4169	59.1500	720	0.0448	6.3590
520	0.4710	66.8400	725	0.0393	5.5780
525	0.5120	72.6500	730	0.0344	4.8830
530	0.5435	77.1200	735	0.0299	4.2500
535	0.5658	80.2800	740	0.0260	3.6840
540	0.5827	82.6800	745	0.0229	3.2500
545	0.5947	84.3900	750	0.0201	2.8480
550	0.6035	85.6400	755	0.0176	2.5000
555	0.6108	86.6700	760	0.0154	2.1860
560	0.6167	87.5100	765	0.0135	1.9170
565	0.6185	87.7600	770	0.0118	1.6750
570	0.6166	87.4900	775	0.0106	1.5070
575	0.6151	87.2800	780	0.0099	1.4020
580	0.6092	86.4400			

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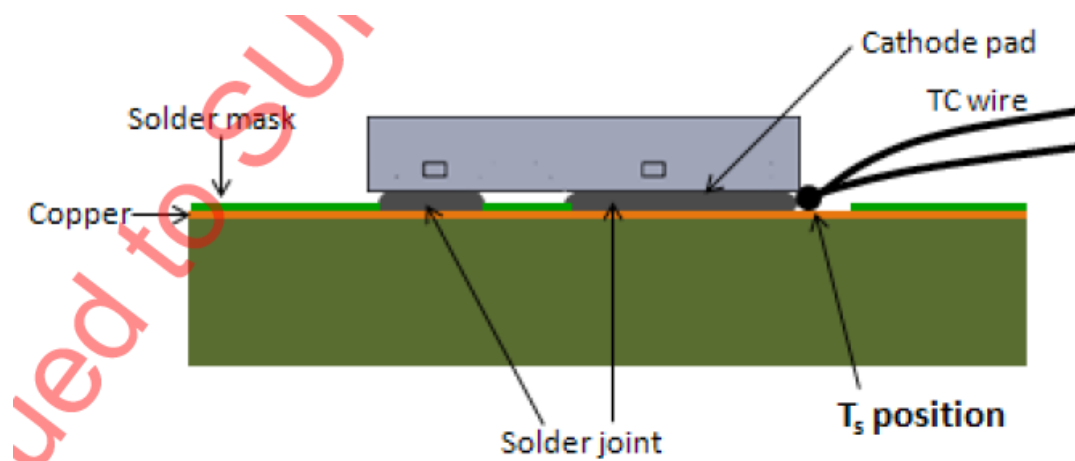
RESULT OF TEMPERATURE TEST

Test Model No: FL31A-45-30K-LV-N77-SK-N-V40

Test Result

Measurement Point	Measured LED Current (mA)	Maximum Measured Source Temperature (°C)	Maximum Rated Source Temperature (°C)
T _s	99.6	63.8	85.0

LED Lighting Source Temperature Measurement Point in LM-80 Report

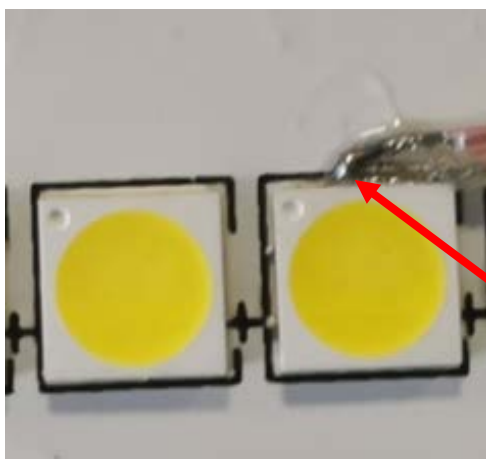


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LED Lighting Source In Situ Temperature Measurement



TOP: LED 3 (Maximum)

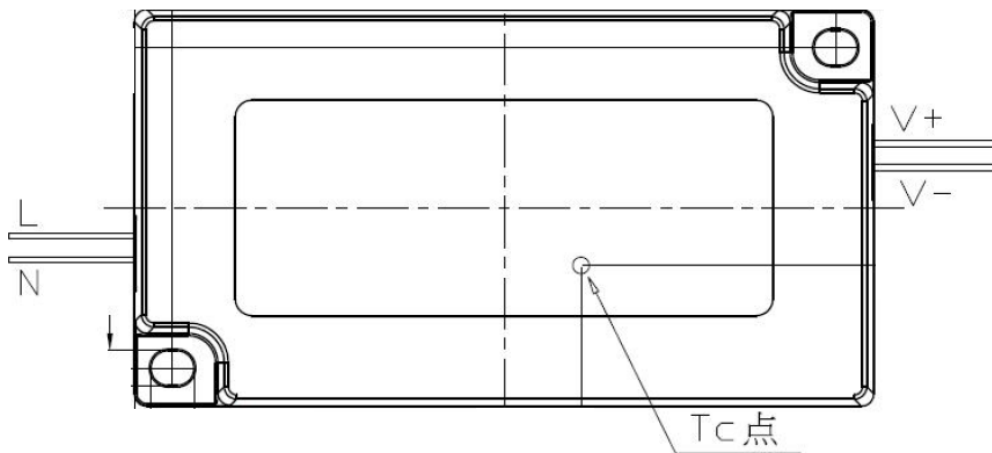


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Test Result

Measurement Point	Measured Driver Case Temperature (°C)	Maximum Rated Driver Case Temperature (°C)
Tc	68.1	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																																																																																																
<p>Instructions</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>Description of LED Light Source Tested (manufacturer, model, catalog number)</p> <p>Lumileds, LUXEON 3030 ZD</p>		<p>LM-80 Test Inputs</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>99.98%</td><td></td><td></td><td></td><td></td></tr> <tr><td>2000</td><td>99.88%</td><td></td><td></td><td></td><td></td></tr> <tr><td>3000</td><td>99.52%</td><td></td><td></td><td></td><td></td></tr> <tr><td>4000</td><td>99.37%</td><td></td><td></td><td></td><td></td></tr> <tr><td>5000</td><td>99.16%</td><td></td><td></td><td></td><td></td></tr> <tr><td>6000</td><td>98.93%</td><td></td><td></td><td></td><td></td></tr> <tr><td>7000</td><td>98.70%</td><td></td><td></td><td></td><td></td></tr> <tr><td>8000</td><td>98.48%</td><td></td><td></td><td></td><td></td></tr> <tr><td>9000</td><td>98.25%</td><td></td><td></td><td></td><td></td></tr> <tr><td>10000</td><td>97.98%</td><td></td><td></td><td></td><td></td></tr> <tr><td>11000</td><td>97.74%</td><td></td><td></td><td></td><td></td></tr> <tr><td>12000</td><td>97.45%</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	99.98%					2000	99.88%					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%				
	Test Data for 85°C Case Temperature		Tested Case Temperature 2		Tested Case Temperature 3																																																																																											
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L90

TM-21 Inputs																																																																																																
<p>Instructions</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>Description of LED Light Source Tested (manufacturer, model, catalog number)</p> <p>Lumileds, LUXEON 3030 ZD</p>		<p>LM-80 Test Inputs</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>99.86%</td><td></td><td></td><td></td><td></td></tr> <tr><td>2000</td><td>99.68%</td><td></td><td></td><td></td><td></td></tr> <tr><td>3000</td><td>99.52%</td><td></td><td></td><td></td><td></td></tr> <tr><td>4000</td><td>99.37%</td><td></td><td></td><td></td><td></td></tr> <tr><td>5000</td><td>99.16%</td><td></td><td></td><td></td><td></td></tr> <tr><td>6000</td><td>98.93%</td><td></td><td></td><td></td><td></td></tr> <tr><td>7000</td><td>98.70%</td><td></td><td></td><td></td><td></td></tr> <tr><td>8000</td><td>98.48%</td><td></td><td></td><td></td><td></td></tr> <tr><td>9000</td><td>98.25%</td><td></td><td></td><td></td><td></td></tr> <tr><td>10000</td><td>97.98%</td><td></td><td></td><td></td><td></td></tr> <tr><td>11000</td><td>97.74%</td><td></td><td></td><td></td><td></td></tr> <tr><td>12000</td><td>97.45%</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	99.86%					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%				
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PRODUCT PICTURES



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FL31A-45-XXK-LV-[Blank or D0 to D9]-[Blank or P0 to P9]-[Blank or S0 to S9]-[Blank or -AA to -XX]-N77-UB-N-V40

None Attachment

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