



## DLC V4.0 TEST REPORT

<b>Applicant's name</b> .....	P.Q.L., Inc.
<b>Address</b> .....	2285 Ward Avenue / Simi Valley, CA 93065
<b>Brand Name</b> .....	Superior Life®
<b>Report No.</b> .....	BTR66.181.15.0046.36
<b>Product Name</b> .....	Outdoor Wall-mounted Area Luminaires
<b>Basic Model</b> .....	83329, 83330
<b>Tested by</b> (printed name and signature) .....	David Zhang
<b>Title</b> .....	<b>Test Engineer</b> 
<b>Approved by</b> (printed name and signature) .....	Steven Su
<b>Title</b> .....	<b>Approved Signatory</b> 
<b>Date of issue</b> .....	July 06, 2016
<b>Testing Laboratory Name</b> .....	BEST Test Service Shenzhen Co., Ltd.
<b>Address</b> .....	1 <sup>st</sup> Floor, 1 <sup>st</sup> Building, Weitai Industrial Park, Yingrenshi, Shiyan, Baoan, Shenzhen, China TEL: + 86-755-28236006; FAX: + 86-755-23467087 Email: <a href="mailto:certification@bestcert.cn">certification@bestcert.cn</a>
<b>Accreditation</b> .....	DLC/Lighting Facts/UL/ETL/ELI/NVLAP/EPA/DOE
<b>Test specification</b>	
<b>Standard</b> .....	DLC V4.0
<b>Test procedure</b> .....	DLC Test Procedure
<b>Non-standard test method</b> .....	No
<b>Test Report Form No.</b>	BEST_DLC-V4.0
<b>TRF originator</b> .....	BEST Test Service Shenzhen Co., Ltd. Mr Tseng
<b>Master TRF</b> .....	BEST_DLC V4.0.doc

Note:

This report is not valid as a BEST Test Report unless signed by an approved BEST Test Service Shenzhen Co., Ltd. This report shall not be reproduced except in full without the written approval of the testing laboratory. The test report only allows to be revised within the retention period unless further standard or the requirement was noticed. This report is for the exclusive use of BEST's Client and is provided pursuant to the agreement between BEST and its Client. BEST's responsibility and Liability are limited to the terms and conditions of the agreement. BEST 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 permit copying or distribution of this report and then only in its entirety. Any use of the BEST 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 BEST. The observations and test results in this report are relevant only to the sample tested. This report by itself does not cover that the material, product, or service is or has ever been under a BEST certification program. National Voluntary Laboratory Accreditation Program (NVLAP) has accredited this laboratory under ISO17025: 2005 for specific laboratory activities as listed in the NVLAP directory of accredited laboratories. The results shown in this report were determined by this laboratory in accordance with its terms of accreditation. This report must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.



Product description:	
Sample received date .....	June 27, 2016
Sample Quantity .....	1 pcs per model
Model Number .....	83329, 83330
Rating(s) (V; Hz) .....	AC 120V-277V
Nominal Power.....	40W
Nominal Power Factor .....	N/A
Nominal Lumen Output.....	4100lm; 4150lm
Nominal CCT .....	4000K; 5000K
Nominal CRI(Ra) .....	80
Nominal Life .....	50000H
Product Classification .....	<input type="checkbox"/> Premium <input checked="" type="checkbox"/> Standard
Category .....	<input type="checkbox"/> Indoor <input type="checkbox"/> Indoor Retrofit Kit
	<input checked="" type="checkbox"/> Outdoor <input type="checkbox"/> Outdoor Retrofit Kit
	<input type="checkbox"/> Linear Replacement Lamp <input type="checkbox"/> E39 Replacements for HID Lamps
General Applicant .....	Outdoor –Low Output
Primary use.....	Outdoor Non-Cutoff and Semi-Cutoff Wall-mounted Area Luminaires
Dimmable .....	<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
If Yes, Mini Dimming Level .....	≤10%
Integral Controller .....	<input checked="" type="checkbox"/> Yes, <input type="checkbox"/> No
LED Lighting Source Manufacture .....	Seoul Semiconductor Co.,Ltd
LED Lighting Source Model .....	STWxC2SB
LED Driver Brand.....	N/A
LED Driver Model Number.....	N/A
Maximum Recommended Temperature (°C) During Normal Operation .....	N/A
Fixtures Band (Retrofit Kit/Lamp Only) .....	N/A
Fixtures Model No. (Retrofit Kit/Lamp Only) .....	N/A



## Test Method Description

ANSI C78.376-2001 Specifications for the Chromaticity of Fluorescent Lamps  
ANSI/NEMA/ANSLG C78.377-2011 Specifications for the Chromaticity of Solid State Lighting Products  
ANSI C78.5-2003 Specifications for Performance of Self-ballasted Compact Fluorescent Lamps  
ANSI/ANSLG C78.81-2010 Double-Capped Fluorescent Lamps—Dimensional and Electrical Characteristics  
ANSI C78.901-2014 Single-Based Fluorescent Lamps—Dimensional and Electrical Characteristics  
ANSI/ANSLG C81.61-2009 Specifications for Bases (Caps) for Electric Lamps  
ANSI/ANSLG C81.62-2009 Lamp holders for Electric Lamps  
ANSI C82.11-2011 High-Frequency Fluorescent Lamp Ballasts  
ANSI/ANSLG C82.16-2015 (anticipated) Light Emitting Diode Drivers—Methods of Measurement  
ANSI C82.2-2002 Method of Measurement of Fluorescent Lamp Ballasts  
ANSI C82.77-10:2014 Harmonic Emission Limits—Related Power Quality Requirements for Lighting Equipment  
ANSI/IEEE C62.41.1-2002 IEEE Guide on the Surge Environment in Low-Voltage (1000 V and Less) AC Power Circuits  
ANSI/IEEE C62.41.2-2002 IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000V and Less) AC Power Circuits  
ANSI/UL 153-2002 Standard for Safety of Portable Electric Luminaires  
ANSI/UL 935-2009 Standard for Safety of Fluorescent-Lamp Ballasts  
ANSI/UL 1310-2010 Standard for Safety of Class 2 Power Units  
ANSI/UL 1574-2004 Standard for Safety of Track Lighting Systems  
ANSI/UL 1598-2008 Standard for Safety of Luminaires  
ANSI/UL 1598C Light-Emitting Diode (LED) Retrofit Luminaire Conversion Kits  
ANSI/UL 1598B-2010 Standard for Supplemental Requirements for Luminaire Reflector Kits for Installation on Previously Installed Fluorescent Luminaires  
ANSI/UL 1993-2009 Standard for Safety of Self-Ballasted Lamps and Lamp Adapters  
ANSI/UL 2108-2004 Standard for Low-Voltage Lighting Systems  
ANSI/UL 8750-2009 Standard for Light Emitting Diode (LED) Equipment for Use in Lighting Products  
ASTM E283-04 Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen  
CIE Pub. No. 13.3-1995 Method of Measuring and Specifying Color Rendering of Light Sources  
CIE Pub. No. 15:2004 Colorimetry  
EU Directive 2002/95/EC Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the Restriction of the Use of Certain Hazardous Substances In Electrical and Electronic Equipment  
FCC CFR Title 47 Part 15 Radio Frequency Devices  
FCC CFR Title 47 Part 18 Industrial, Scientific, and Medical Equipment  
IEC 60061-1 (2012) Lamp Caps and Holders Together with Gauges for the Control of Interchangeability and Safety – Part 1: Lamp Caps  
IEC 60081 Amend 4 Ed 5.0 (2010) Double-capped Fluorescent Lamps - Performance Specifications  
IEC 60901 (2011) Single-capped Fluorescent Lamps - Performance Specifications  
IEC 62301 ED.2.0 B:2011 Household electrical appliances - Measurement of standby power  
IEC 61347-2-3-am2 ed1.0 b.2011 Amendment 2 - Lamp Control Gear - Part 2-3: Particular Requirements for A.C. Supplied Electronic Ballasts for Fluorescent Lamps  
IEC 62321 Ed. 1.0 Electrotechnical Products - Determination Of Levels Of Six Regulated Substances (lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls, polybrominated diphenyl ethers)  
IEEE PAR1789 IEEE Recommending Practices for Modulating Current in High Brightness LEDs for Mitigating Health Risks to Viewers  
IES LM-9-09 Electric and Photometric Measurements of Fluorescent Lamps  
IES LM-10-96 or LM-10-XX Photometric Testing of Outdoor Fluorescent Luminaires (2015 update anticipated)  
IES LM-31-95 Photometric Testing of Roadway Luminaires Using Incandescent Filament and High Intensity Discharge (HID) Lamps  
IES LM-40-10 Life Testing of Fluorescent Lamps  
IES LM-41-14 Approved Method for Photometric Testing of Indoor Fluorescent Luminaires  
IES LM-46-04 Photometric Testing of Indoor Luminaires Using High Intensity Discharge or Incandescent Filament Lamps  
IES LM-49-12 Life Testing of Incandescent Filament Lamps  
IES LM-58-13 Method for Spectroradiometric Measurement Methods for Light Sources  
IES LM-65-14 Life Testing of Compact Fluorescent Lamps  
IES LM-66-14 Electrical and Photometric Measurements of Single-Ended Compact Fluorescent Lamps  
IES LM-79-08 Electrical and Photometric Measurements of Solid-State Lighting Products  
IES LM-80-08 Measuring Lumen Maintenance of LED Light Sources  
IES LM-82-12 Method for the Characterization of LED Light Engines and Integrated LED Lamps for Electrical and Photometric Properties as a Function of Temperature  
IES LM-84-14 Measuring Luminous Flux and Color Maintenance of LED Lamps, Light Engines, and Luminaires  
IES RP-16-10 Nomenclature and Definitions for Illuminating Engineering  
IES TM-21-11 Projecting Long Term Lumen Maintenance of LED Sources  
IES TM-28-14 Projecting Long-Term Luminous Flux Maintenance of LED Lamps and Luminaires  
NEMA LL 9-2009 Dimming of T8 Fluorescent Lighting Systems  
NEMA LSD 45-2009 Recommendations for Solid State Lighting Sub-Assembly Interfaces for Luminaires  
NEMA SSL 7A-2013 Phase Cut Dimming for Solid State Lighting: Basic Compatibility



## Initial Photometric and Electrical Test Data

EUT	Input Voltage (V)	Frequency (Hz)	Input Current (A)	ITHD	Input Power (W)	Power Factor	Lumen Output (Lumens)	Efficiency Lumen/w
83329	120.0	60.0	0.360	9.8%	42.96	0.993	4580.40	106.62
83329	277.0	60.0	0.162	8.5%	43.34	0.965	/	/

EUT	CCT (K)	CRI Ra	R9	x CIE1931	y CIE1931
83329	4217	83.6	13	0.3732	0.3789
83330	5152	83.9	12	0.3413	0.3533

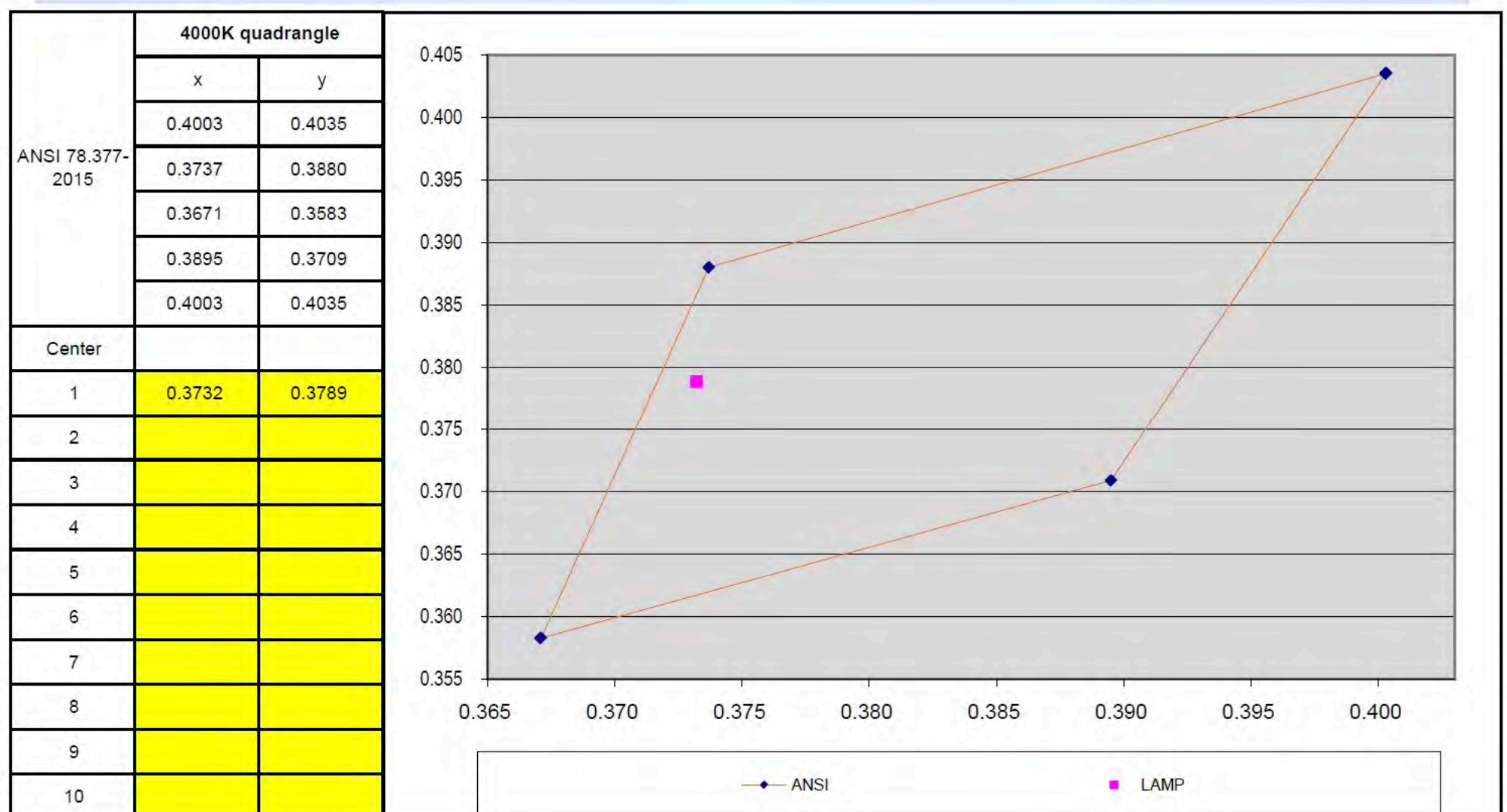
EUT	u' CIE1976	v' CIE1976	Duv	Rf	Rg
83329	0.2195	0.5015	0.0030	84	94
83330	0.2082	0.4849	0.0024	82	94

EUT	Zonal Lumen Density zone (80-90°)
83329	10.8% (3% tolerance)

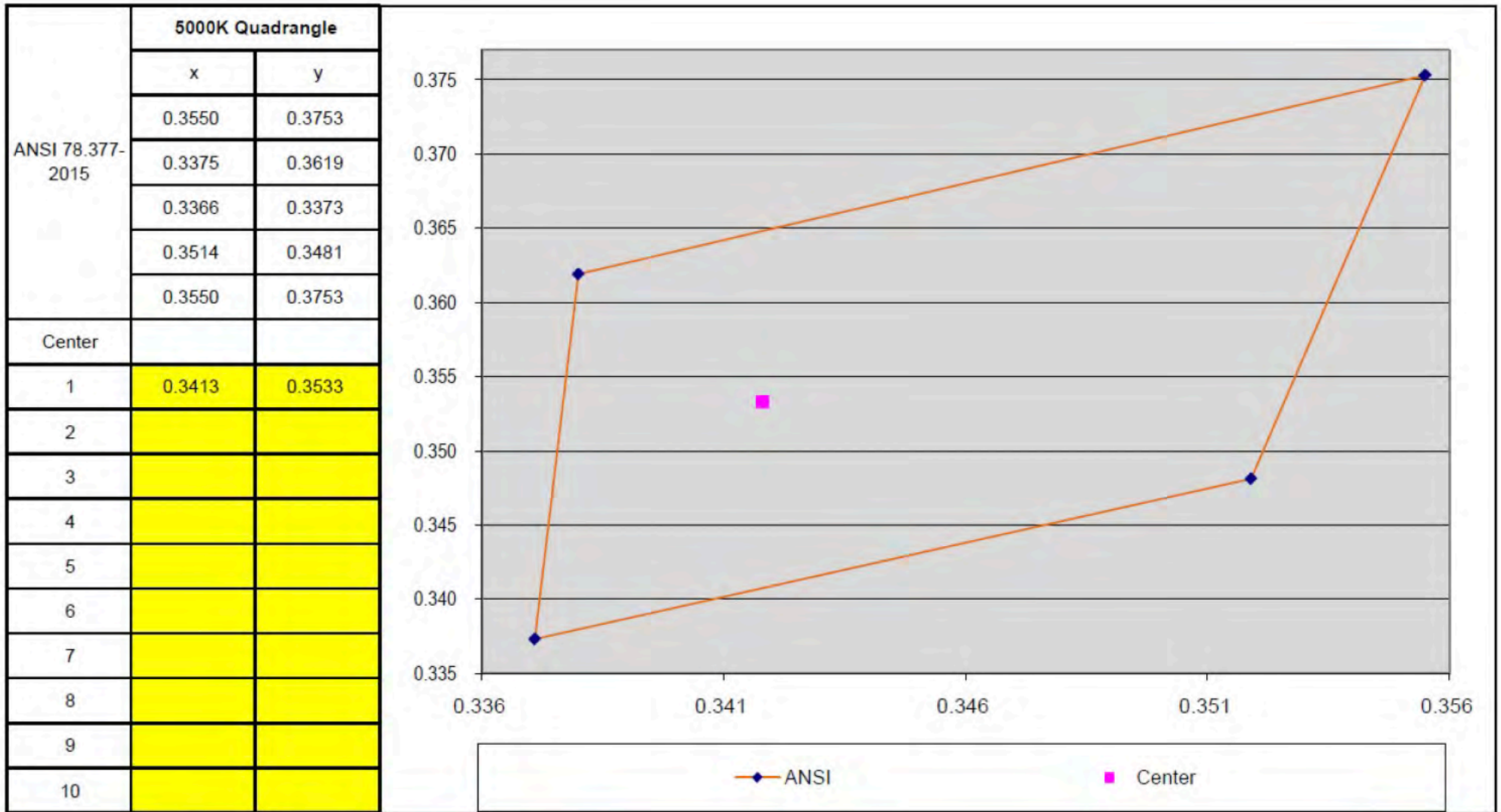
Note: see the annex of Luminous Intensity Distribution Test Plots

### 7 Step Quadrangle

83329



83330





## Spectral Energy Distribution

83329

WL(nm)	Spectrum	Spectrum	WL(nm)	Spectrum	Spectrum
380	0.0178	1.3370	585	0.8677	65.2600
385	0.0112	0.8453	590	0.8708	65.5000
390	0.0084	0.6292	595	0.8684	65.3100
395	0.0072	0.5435	600	0.8619	64.8300
400	0.0063	0.4746	605	0.8474	63.7300
405	0.0086	0.6467	610	0.8258	62.1100
410	0.0160	1.2040	615	0.7969	59.9400
415	0.0327	2.4600	620	0.7615	57.2700
420	0.0620	4.6610	625	0.7184	54.0300
425	0.1114	8.3750	630	0.6717	50.5200
430	0.1869	14.0600	635	0.6221	46.7900
435	0.2950	22.1800	640	0.5719	43.0200
440	0.4380	32.9400	645	0.5199	39.1100
445	0.6647	49.9900	650	0.4689	35.2600
450	0.9549	71.8200	655	0.4226	31.7900
455	0.9194	69.1500	660	0.3775	28.3900
460	0.6275	47.2000	665	0.3363	25.3000
465	0.4863	36.5800	670	0.2972	22.3600
470	0.4039	30.3800	675	0.2625	19.7400
475	0.3236	24.3400	680	0.2299	17.2900
480	0.3050	22.9400	685	0.2005	15.0800
485	0.3363	25.2900	690	0.1749	13.1600
490	0.3793	28.5300	695	0.1523	11.4600
495	0.4370	32.8700	700	0.1316	9.8960
500	0.4951	37.2400	705	0.1134	8.5320
505	0.5446	40.9600	710	0.0981	7.3800
510	0.5802	43.6400	715	0.0843	6.3390
515	0.6055	45.5400	720	0.0723	5.4360
520	0.5922	44.5400	725	0.0625	4.7010
525	0.6392	48.0800	730	0.0535	4.0230
530	0.6690	50.3200	735	0.0460	3.4620
535	0.6919	52.0400	740	0.0395	2.9740
540	0.7171	53.9300	745	0.0341	2.5610
545	0.7388	55.5700	750	0.0295	2.2170
550	0.7643	57.4900	755	0.0256	1.9230
555	0.7879	59.2600	760	0.0223	1.6780
560	0.8086	60.8200	765	0.0190	1.4300
565	0.8266	62.1700	770	0.0165	1.2410
570	0.8406	63.2200	775	0.0146	1.0970
575	0.8520	64.0800	780	0.0133	1.0010
580	0.8626	64.8800			



WL(nm)	Spectrum	Spectrum	WL(nm)	Spectrum	Spectrum
380	0.0057	0.1740	585	0.6353	19.3100
385	0.0038	0.1146	590	0.6291	19.1200
390	0.0024	0.0744	595	0.6185	18.8000
395	0.0029	0.0868	600	0.6036	18.3500
400	0.0031	0.0950	605	0.5846	17.7700
405	0.0049	0.1494	610	0.5630	17.1100
410	0.0098	0.2985	615	0.5374	16.3400
415	0.0220	0.6697	620	0.5071	15.4200
420	0.0449	1.3660	625	0.4754	14.4500
425	0.0825	2.5080	630	0.4412	13.4100
430	0.1432	4.3520	635	0.4058	12.3300
435	0.2380	7.2330	640	0.3722	11.3100
440	0.3716	11.3000	645	0.3383	10.2800
445	0.5589	16.9900	650	0.3045	9.2550
450	0.8162	24.8100	655	0.2737	8.3190
455	0.9999	30.3900	660	0.2436	7.4050
460	0.8813	26.7900	665	0.2168	6.5890
465	0.6459	19.6300	670	0.1913	5.8160
470	0.5068	15.4100	675	0.1691	5.1410
475	0.4062	12.3500	680	0.1475	4.4850
480	0.3327	10.1100	685	0.1295	3.9360
485	0.3079	9.3600	690	0.1123	3.4120
490	0.3175	9.6520	695	0.0980	2.9800
495	0.3432	10.4300	700	0.0848	2.5780
500	0.3778	11.4800	705	0.0736	2.2390
505	0.4166	12.6600	710	0.0639	1.9410
510	0.4521	13.7400	715	0.0550	1.6710
515	0.4820	14.6500	720	0.0476	1.4480
520	0.5064	15.3900	725	0.0413	1.2550
525	0.5279	16.0500	730	0.0354	1.0770
530	0.5460	16.6000	735	0.0305	0.9286
535	0.5622	17.0900	740	0.0265	0.8045
540	0.5771	17.5400	745	0.0230	0.6985
545	0.5902	17.9400	750	0.0198	0.6015
550	0.6028	18.3200	755	0.0174	0.5282
555	0.6134	18.6500	760	0.0148	0.4509
560	0.6232	18.9400	765	0.0129	0.3918
565	0.6299	19.1500	770	0.0112	0.3403
570	0.6355	19.3200	775	0.0099	0.3016
575	0.6377	19.3900	780	0.0091	0.2752
580	0.6394	19.4400			

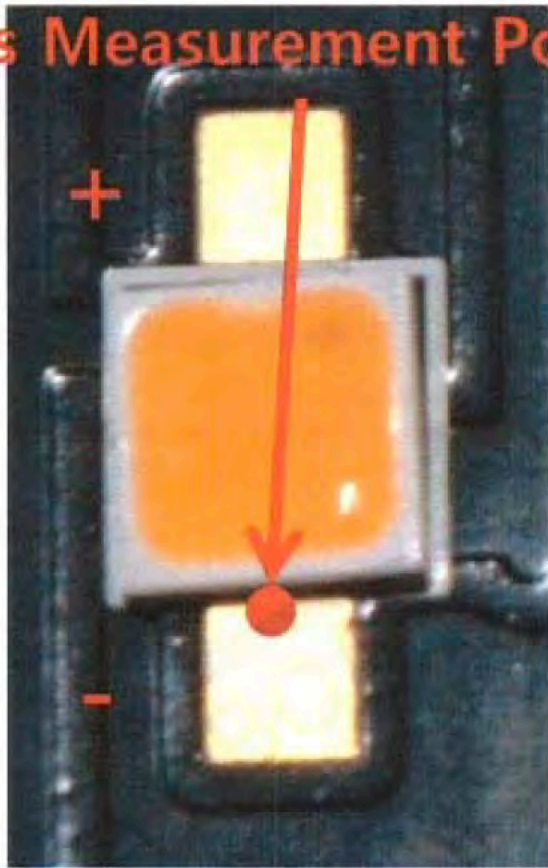


**Driver Case Temperature/ LED Drive Current/TMP<sub>LED</sub> Test Data**

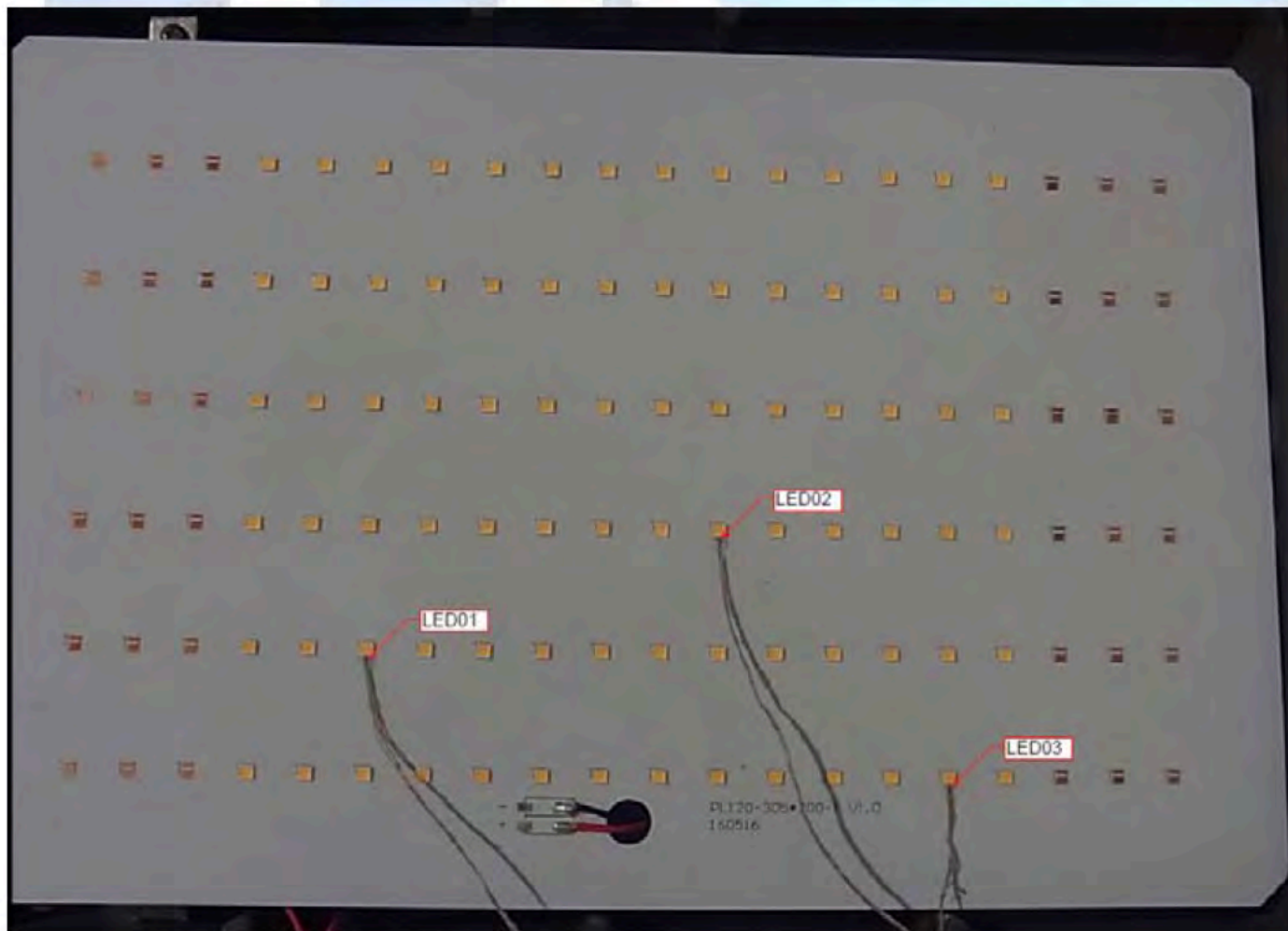
EUT	Driver Max Tc (°C)	Driver In-Situ Temperature (°C)	LED In-Situ Current (mA)	LED In-Situ Temperature (°C)(1#)	LED In-Situ Temperature (°C)(2#)	LED In-Situ Temperature (°C)(3#)
83329	N/A	N/A	79.0	60.8	58.9	59.3

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

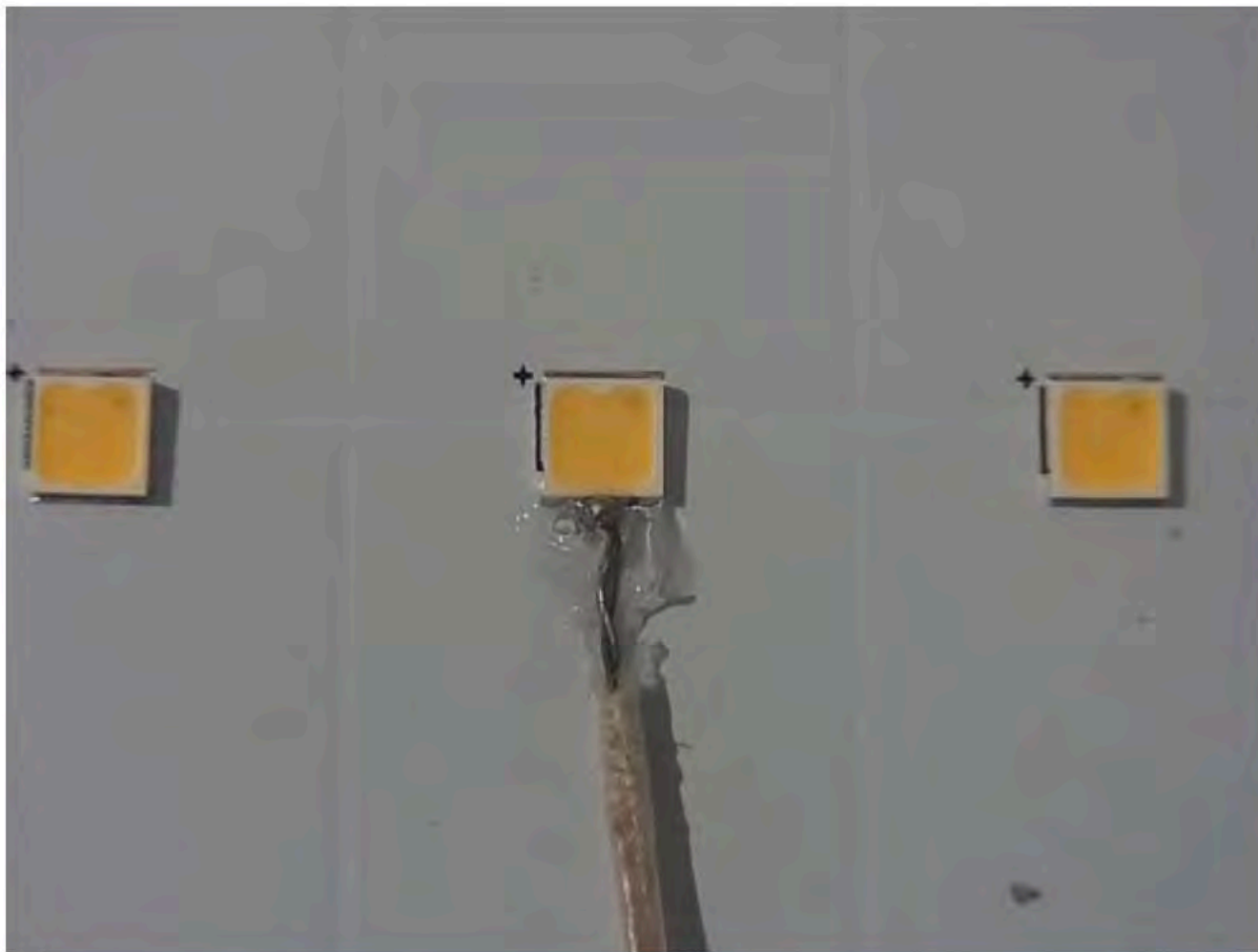
**Ts Measurement Point**




**LED Lighting Source In Situ Temperature Measurement**







Lumen Maintenance and Lighting Source Life Test Data



### 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)**

Seoul, 3030B (STWxC2SB)

**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):	7000
Tested drive current (mA):	200
Tested case temperature 1 (T <sub>c</sub> , °C):	55
Tested case temperature 2 (T <sub>c</sub> , °C):	85
Tested case temperature 3 (T <sub>c</sub> , °C):	105

**LM-80 Test Inputs**

Test Data for 55°C Case Temperature		Test Data for 85°C Case Temperature		Test Data for 105°C Case Temperature	
Time (hours)	Lumen Maintenance (%)	Time (hours)	Lumen Maintenance (%)	Time (hours)	Lumen Maintenance (%)
0	100.00%	0	100.00%	0	100.00%
1000	101.20%	1000	101.00%	1000	99.20%
2000	100.80%	2000	100.10%	2000	98.10%
3000	101.20%	3000	99.80%	3000	96.90%
4000	101.10%	4000	98.80%	4000	95.90%
5000	100.80%	5000	97.50%	5000	94.30%
6000	99.90%	6000	97.00%	6000	92.30%
7000	99.10%	7000	96.10%	7000	90.20%

**In-Situ Inputs**

Drive current for each LED package/array/module (mA):	79
<i>In-situ</i> case temperature (T <sub>c</sub> , °C):	60.8
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) (%):	82.20%
Reported L70 (hours):	>42000



---

EUT Photo

