
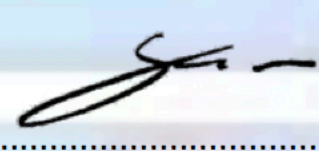




DLC V3.1 TEST REPORT

Applicant's name	P.Q.L., Inc.
Address	2285 Ward Avenue / Simi Valley, CA 93065
Brand Name	Superior Life®
Report No.	BTR66.181.15.0037.37
Product Name	Flood and Spot Luminaires
Model Number	83316, 83319, 83322
Tested by (printed name and signature)	David Zhang 
Title	Test Engineer
Approved by (printed name and signature)	Steven Su 
Title	Approved Signatory
Date of issue	April 27, 2016
Testing Laboratory Name	BEST Test Service Shenzhen Co., Ltd.
Address	1 st Floor, 1 st Building, Weitai Industrial Park, Yingrenshi, Shiyan, Baoan, Shenzhen, China
Accreditation	DLC/Lighting Facts/UL/ETL/ELI/NVLAP/EPA/DOE
Test specification	
Standard	DLC V3.1
Test procedure	DLC Test Procedure
Non-standard test method	No
Test Report Form No.	BEST_ DLC-V3.1
TRF originator	BEST Test Service Shenzhen Co., Ltd. Mr Tseng
Master TRF	BEST_ DLC V3.1.doc

Note:
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Product description:		
Sample received date	April 08, 2016	
Sample Quantity	2 pcs	
Rating(s) (V; Hz)	AC 120V-277V, 60Hz	
Nominal Power.....	20W	
Nominal Power Factor	>0.9	
Nominal Lumen Output.....	2250lm; 2280lm	
Nominal CCT	4000K, 5000K	
Nominal CRI(Ra)	70	
Nominal Life.....	50000H	
Product Classification	<input checked="" type="checkbox"/> Premium	<input 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.....	Architectural Flood and Spot 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	CITIZEN	
LED Lighting Source Model	CLU028-1202	
LED Driver Brand.....	TOWIN	
LED Driver Model Number.....	FS24W-48C0500	
Maximum Recommended Temperature (°C) During Normal Operation	85 °C	
Fixtures Band (Retrofit Kit/Lamp Only)	N/A	
Fixtures Model No. (Retrofit Kit/Lamp Only)	N/A	
Electronic Ballast Brand.....	N/A	
Electronic Ballast Model.....	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 Luminaries
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

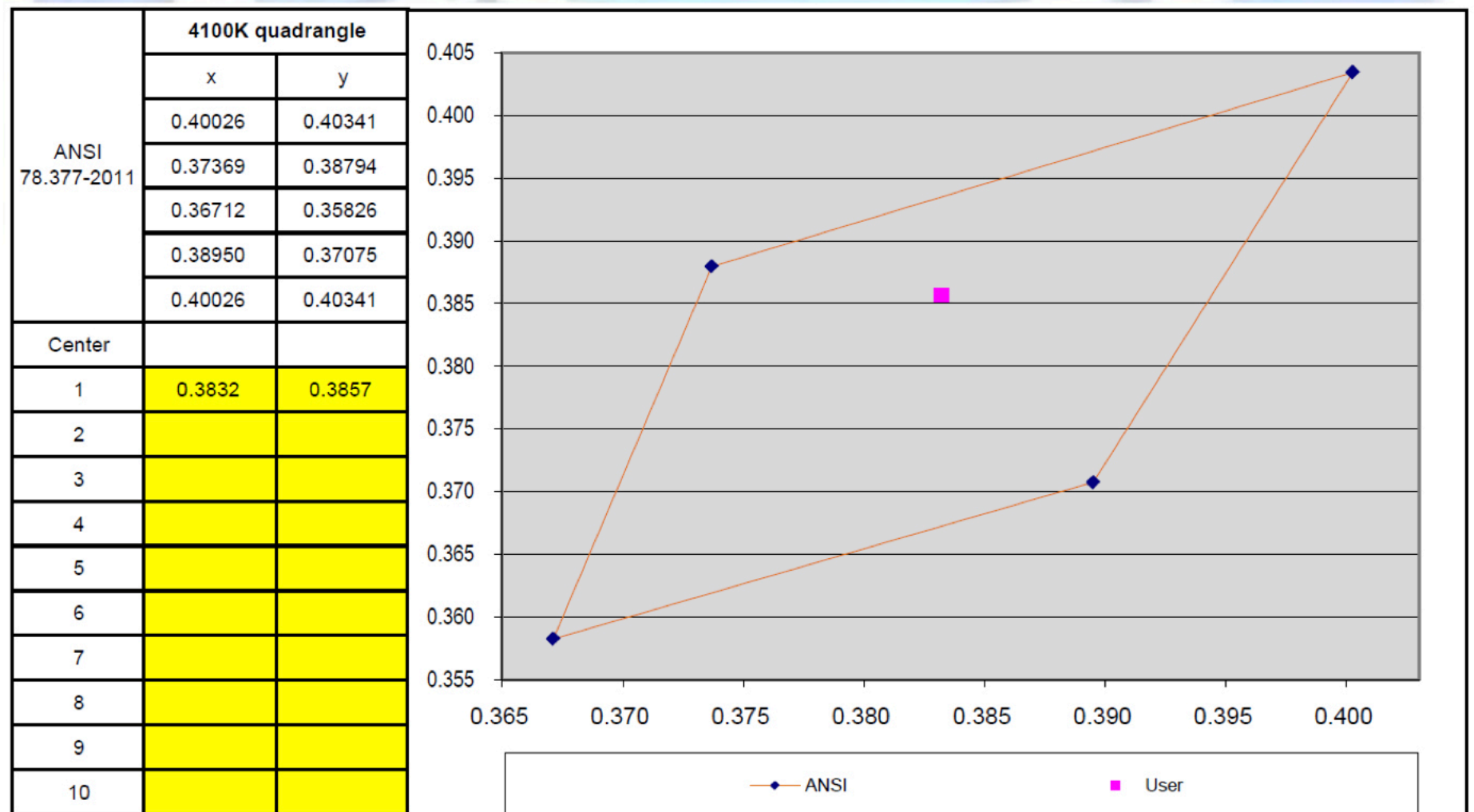
EUT	Input Voltage (V)	Frequency (Hz)	Input Current (A)	ITHD	Input Power (W)	Power Factor	Lumen Output (Lumens)	Efficiency Lumen/w
83316, 83319	120.0	60.0	0.152	10.9%	17.61	0.962	1996.73	113.39
83316, 83319	277.0	60.0	0.070	11.3%	17.46	0.901	/	/
83322	120.0	60.0	0.154	/	17.74	0.962	2027.62	114.30

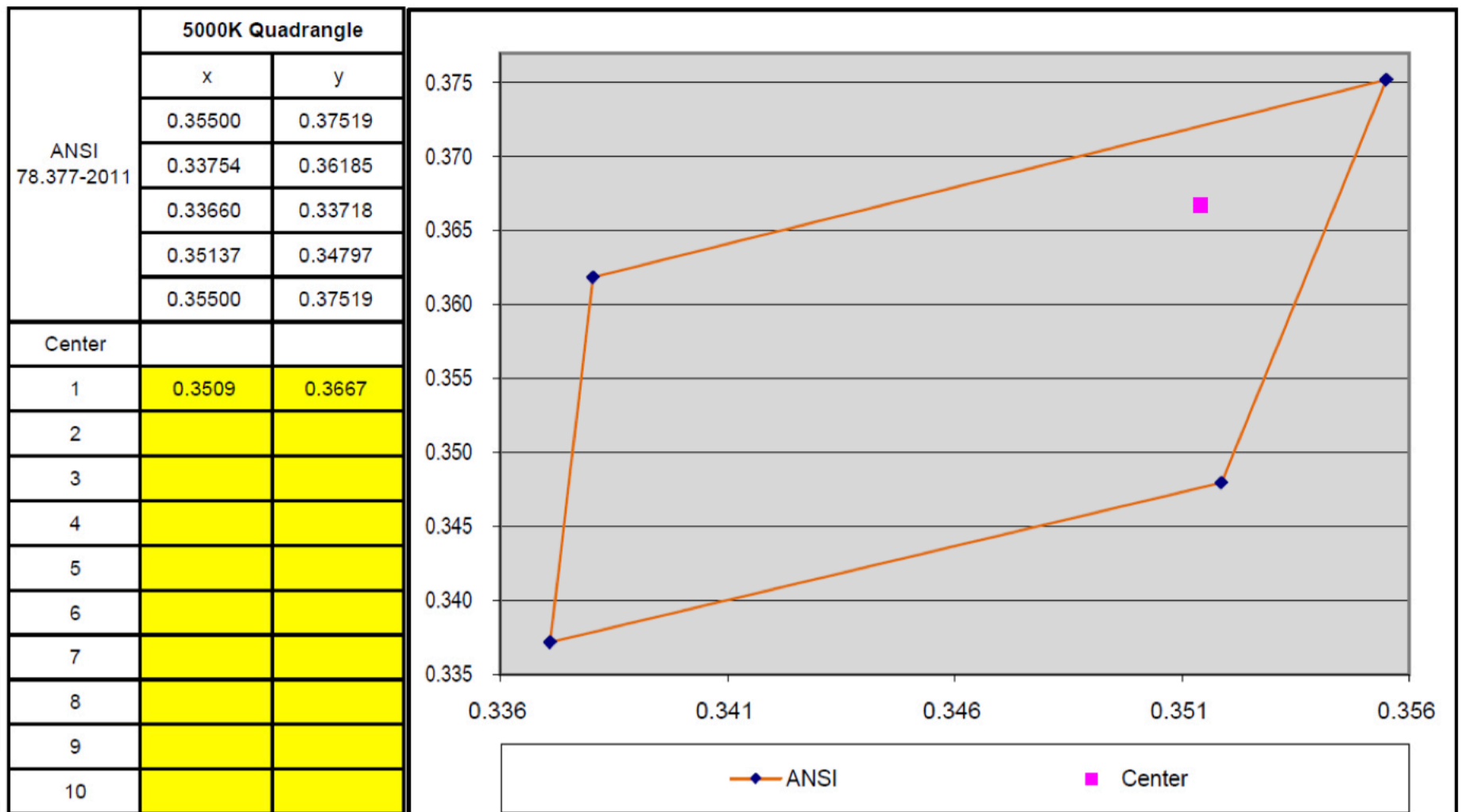
EUT	CCT (K)	CRI Ra	R9	Duv	x CIE1931	y CIE1931	u' CIE1976	v' CIE1976
83316, 83319	3991	71.6	-31	0.3832	0.3857	0.2234	0.5059	0.0033
83322	4845	71.7	-32	0.3509	0.3667	0.2096	0.4927	0.0051

EUT	Zonal Lumen Distribution(0-90°)
83316, 83319	85.6%

Note: see the annex of Luminous Intensity Distribution Test Plots

7 Step Quadrangle

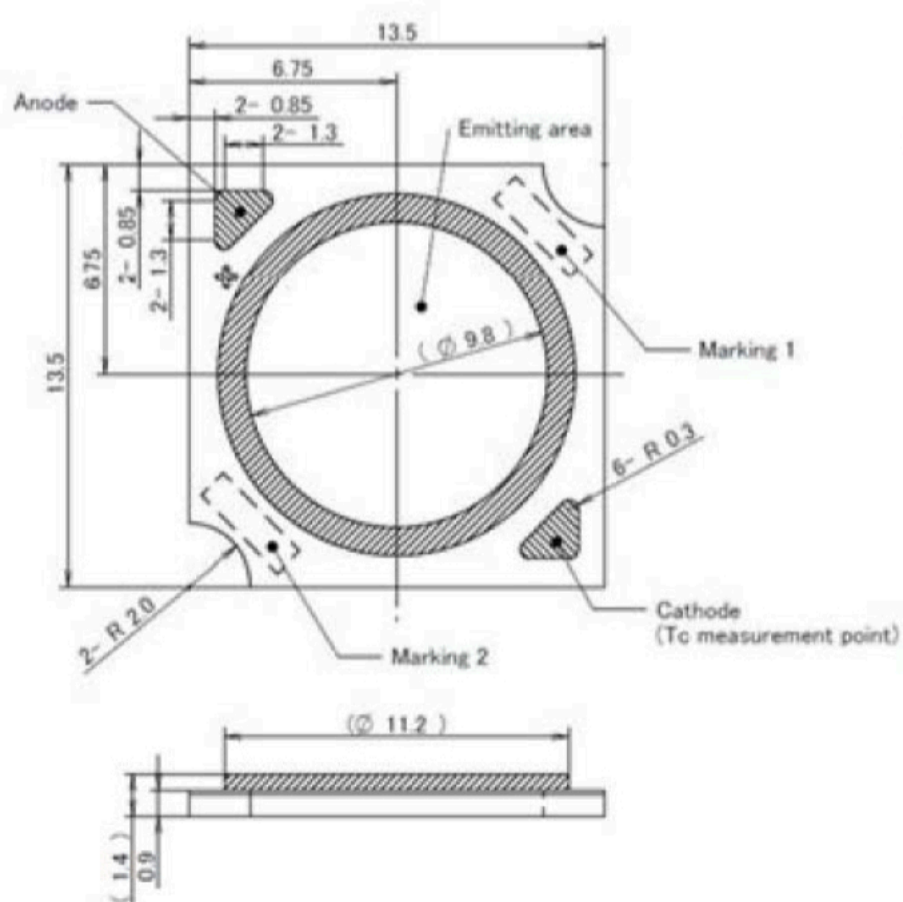




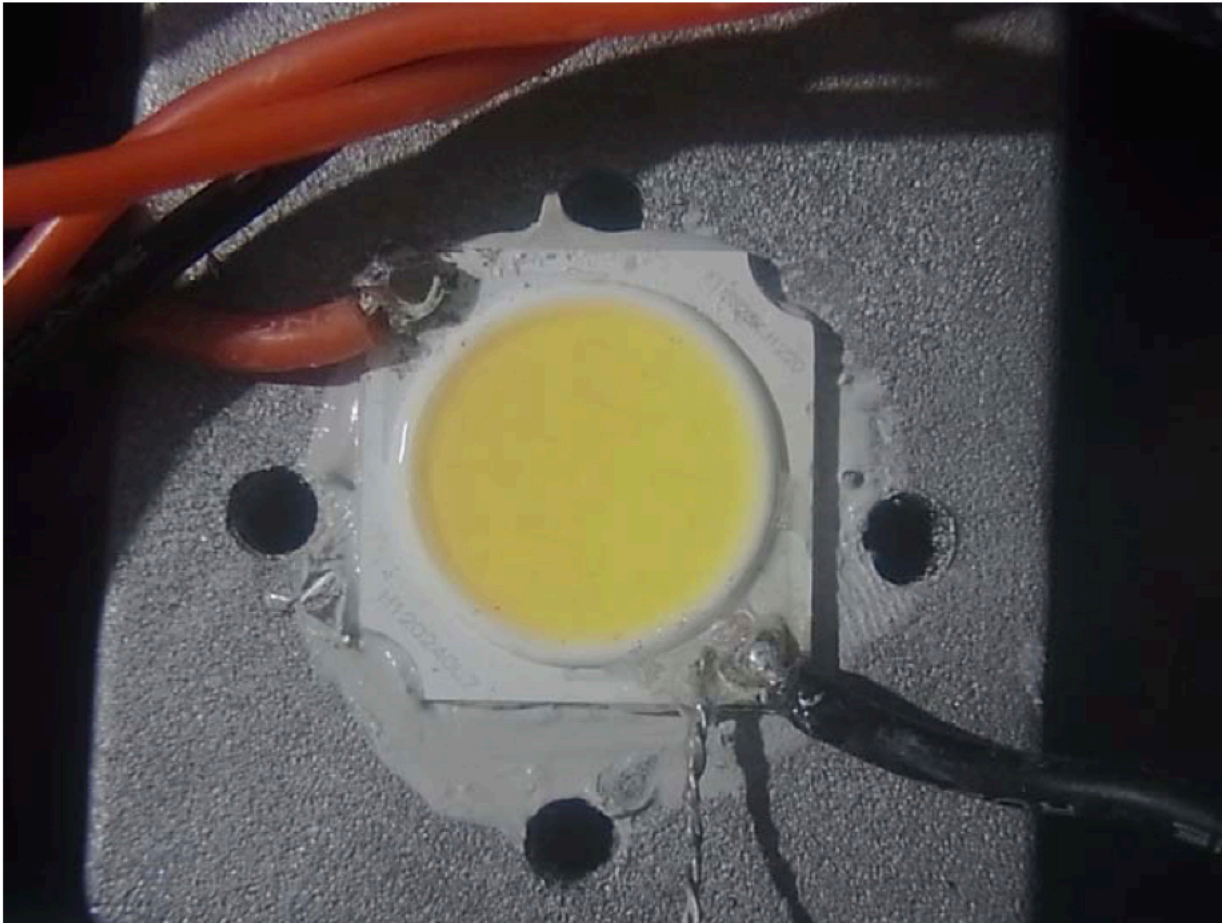
Driver Case Temperature/ LED Drive Current/TMP_{LED} Test Data

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#)
83316, 83319	85	63.6	238.0	58.2	57.2

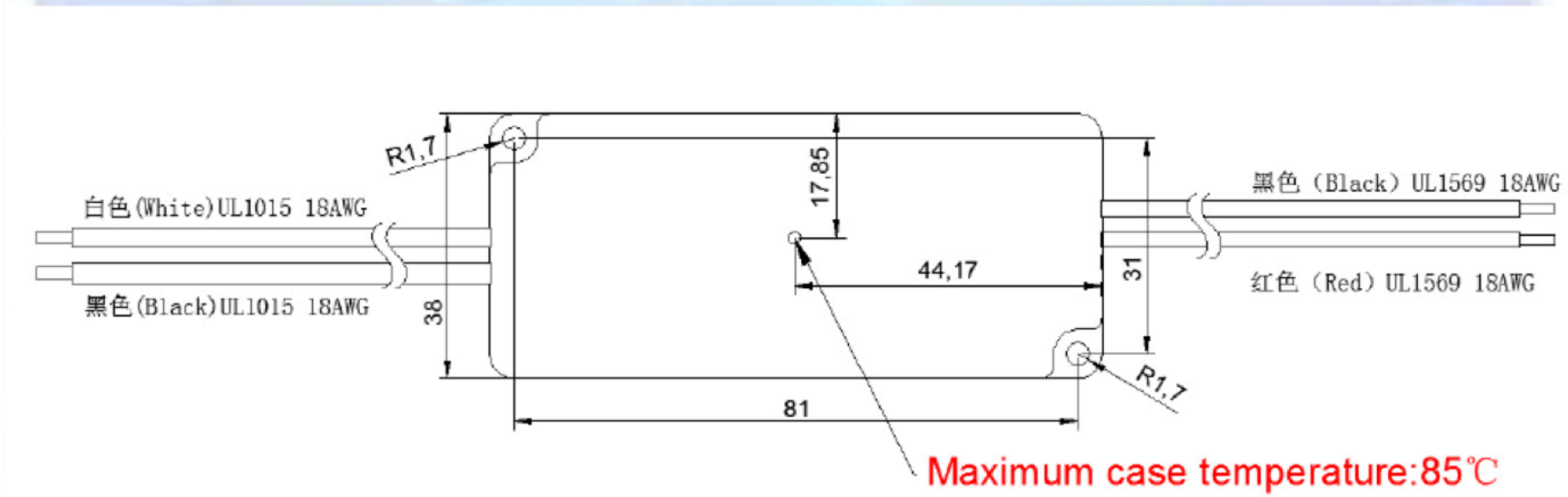
LED Lighting Source Temperature Measurement Point in LM-80 Report



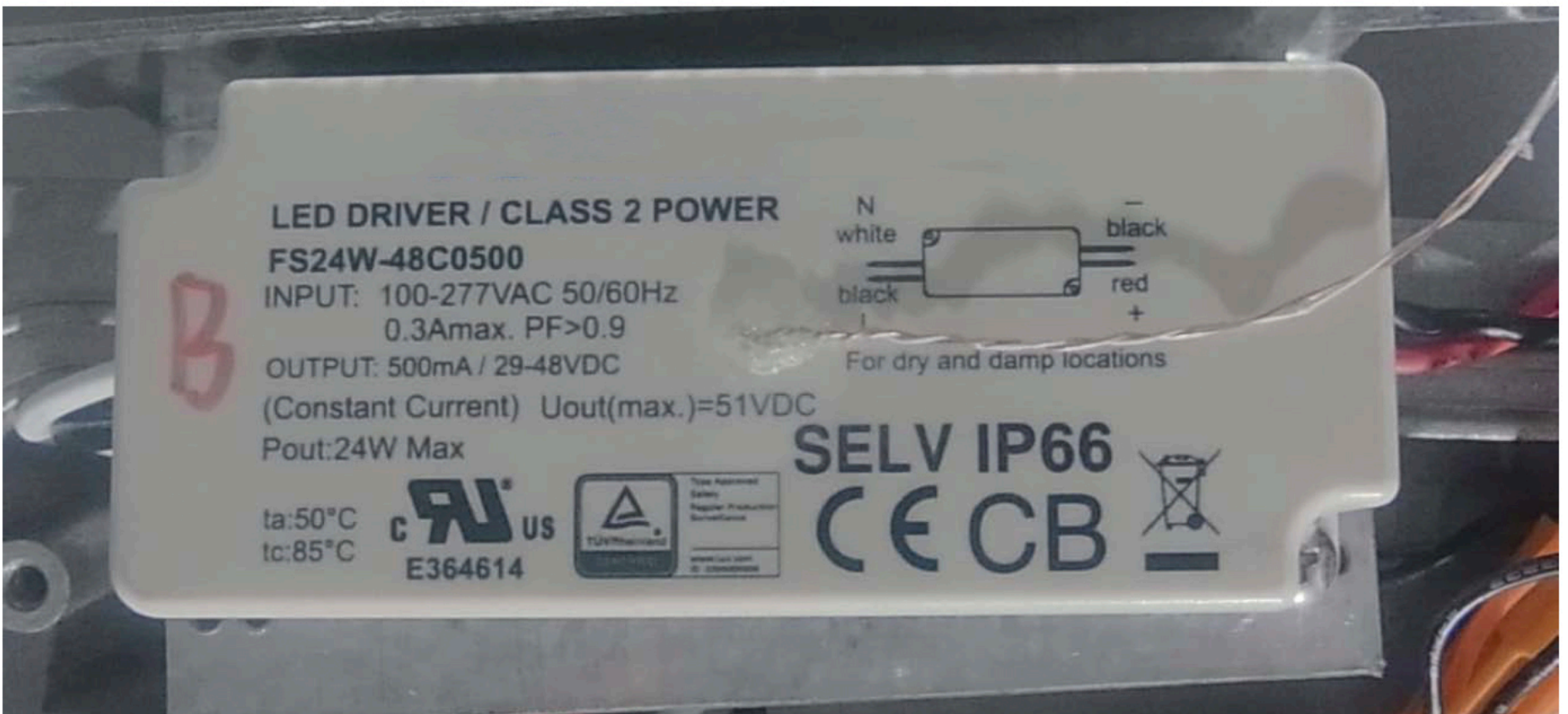
LED Lighting Source In Situ Temperature Measurement



LED Driver Hot Spot Location and TC




LED Driver Hot Spot In-Situ Temperature Measurement



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)		Test Data for 55°C Case Temperature		Test Data for 85°C Case Temperature		Tested Case Temperature 3	
CITIZEN, CLU028-1202		Time (hours)	Lumen Maintenance (%)	Time (hours)	Lumen Maintenance (%)	Time (hours)	Lumen Maintenance (%)
		0	100.00%	0	100.00%		
		1000	99.70%	1000	100.00%		
		2000	99.50%	2000	99.60%		
		3000	99.30%	3000	99.30%		
		4000	99.30%	4000	99.10%		
		5000	98.90%	5000	98.70%		
		6000	98.60%	6000	98.50%		

LM-80 Testing Details	
Total number of units tested per case temperature:	20
Number of failures:	0
Number of units measured:	20
Test duration (hours):	6000
Tested drive current (mA):	460
Tested case temperature 1 (T _c , °C):	55
Tested case temperature 2 (T _c , °C):	85
Tested case temperature 3 (T _c , °C):	

In-Situ Inputs	
Drive current for each LED package/array/module (mA):	238
In-situ case temperature (T _c , °C):	58.2
Percentage of initial lumens to project to (e.g. for L ₇₀ , enter 70):	70

Results	
Time (t) at which to estimate lumen maintenance (hours):	50,000
Lumen maintenance at time (t) (%):	89.71%
Reported L70 (hours):	>36000

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)		Test Data for 55°C Case Temperature		Test Data for 85°C Case Temperature		Tested Case Temperature 3	
CITIZEN, CLU028-1202		Time (hours)	Lumen Maintenance (%)	Time (hours)	Lumen Maintenance (%)	Time (hours)	Lumen Maintenance (%)
		0	100.00%	0	100.00%		
		1000	99.70%	1000	100.00%		
		2000	99.50%	2000	99.60%		
		3000	99.30%	3000	99.30%		
		4000	99.30%	4000	99.10%		
		5000	98.90%	5000	98.70%		
		6000	98.60%	6000	98.50%		

LM-80 Testing Details	
Total number of units tested per case temperature:	20
Number of failures:	0
Number of units measured:	20
Test duration (hours):	6000
Tested drive current (mA):	460
Tested case temperature 1 (T _c , °C):	55
Tested case temperature 2 (T _c , °C):	85
Tested case temperature 3 (T _c , °C):	

In-Situ Inputs	
Drive current for each LED package/array/module (mA):	238
In-situ case temperature (T _c , °C):	58.2
Percentage of initial lumens to project to (e.g. for L ₇₀ , enter 70):	90

Results	
Time (t) at which to estimate lumen maintenance (hours):	50,000
Lumen maintenance at time (t) (%):	89.71%
Reported L90 (hours):	>36000

EUT Photo

