



**ENERGY STAR Program Requirements Product Specification for Lamps (Light Bulbs)  
Eligibility Criteria Version 2.1 (6000 Hours) Test Report**

**Applicant's name** .....: P.Q.L., Inc.

**Address** .....: 2285 Ward Avenue  
Simi Valley, CA 93065

**Brand Name** .....: PQL

**Report No.** .....: BTR66.181.20.0023.80

**Basic Model**.....: 92003

**Tested by**  
(printed name and signature) .....: Xia Zeng  
Test Engineer *Xia Zeng*

**Approved by**  
(printed name and signature) .....: Zack Zhao  
Approved By *Zack Zhao*

**Test Date** .....: Jul 23, 2021 to Apr 01, 2022

**Date of issue** .....: Apr 24, 2022

**Testing Laboratory Name** .....: BEST Test Service Shenzhen Co., Ltd.

**Address** .....: 1<sup>st</sup> Floor, 1<sup>st</sup> Building, Weitai Industrial Park, Yingrenshi, Shiyao, Baoan,  
Shenzhen, China

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DLC/Lighting Facts/UL/ETL/ELI/CEC/EPA/DOE  
NVLAP Testing Lab Code: 200770-0

**Test specification**

**Standard** .....: Lamps V2.1

**Test procedure/method**.....: Energy Star Test Procedure-Lamps 2.1(BEST-SOP-Lamps2.1)

**Non-standard test method** .....: No

**Deviations** .....: N/A

**Test Report Form No.** .....: BEST\_ Lamps Report Form(June23,2017)

**TRF originator**.....: BEST Test Service Shenzhen Co., Ltd. Mr Chris Tseng.

**Master TRF**.....: BEST\_ Lamps V2.1.doc

**Note:**  
The laboratory has not been responsible for the sampling stage (e.g. the sample has been provided by the customer), the results relate only to the items tested.  
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<b>Lamp Information</b>			
The date of sampling .....	N/A		
The date of receipt of the test sample/requirement /item(s) .....	Jul 23, 2021		
Description .....	LED Lamps		
The condition of the item .....	N/A		
Sampling method .....	Provided by Applicant		
Lamp Classification .....	<input type="checkbox"/> Directional	<input checked="" type="checkbox"/> Omni directional	<input type="checkbox"/> Decorative
Multiple Discrete Light Output Levels .....	<input type="checkbox"/> Yes		<input checked="" type="checkbox"/> No
Color Tunable? .....	<input type="checkbox"/> Yes		<input checked="" type="checkbox"/> No
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, Min Dimming Level .....	10%		
If Yes, Select Dimming Technology .....	<input checked="" type="checkbox"/> Forward phase cut off	<input type="checkbox"/> Reverse phase cut off	<input type="checkbox"/> Non-phase cut off
If Yes, Dimmer Information .....	<input checked="" type="checkbox"/> See the Dimming Data Collection Form		
Lumen Maintenance and Rated Life Operating Temperature .....	<input type="checkbox"/> Not for use in enclosed luminaires and not for use in recessed luminaires (25°C)		
	<input checked="" type="checkbox"/> All other Omni-directional and decorative lamps (45°C)		
Base Orientation .....	<input checked="" type="checkbox"/> 5 units Base Up, 5 units Base Down		<input type="checkbox"/> All Base Up
<b>LED Light Source Information:</b>			
LED Brand .....	Lumileds		
LED Model Number .....	L128-AA80RD3500DDD 18V; L128-AA80RG3500DDD 12V		

<b>Product Family and Allowable Variations</b>				
General information	Basic Model	Allowable Variations	Allowable Variations	Allowable Variations
Model Number	92003	92004	92005	92006
Rated Input	AC 120V/60Hz	AC 120V/60Hz	AC 120V/60Hz	AC 120V/60Hz
CCT(K)	2700	3000	4000	5000
Nominal Lamp Power(W)	12.0	12.0	12.0	12.0
Nominal Light Output(lm)	1100	1100	1100	1100
Nominal CRI(Ra)	80	80	80	80
Nominal Lamp Life(hrs)	25000	25000	25000	25000
Beam Angle (solid-state only)	N/A	N/A	N/A	N/A
Target Lamp	A19 75W	A19 75W	A19 75W	A19 75W
Overall length(mm)* Diameter(mm)	106*60	106*60	106*60	106*60
Heat Sink Paint Color (solid-state only)	White	White	White	White
Lamp Base	GU24	GU24	GU24	GU24
Envelope Shape (Decorative shapes only)	N/A	N/A	N/A	N/A
Envelope Finish	N/A	N/A	N/A	N/A

<b>Product Family and Allowable Variations</b>				
General information	Allowable Variations	Allowable Variations	Allowable Variations	Allowable Variations
Model Number	92003	92004	92005	92006
Rated Input	AC 120V/60Hz	AC 120V/60Hz	AC 120V/60Hz	AC 120V/60Hz
CCT(K)	2700	3000	4000	5000
Nominal Lamp Power(W)	12.0	12.0	12.0	12.0
Nominal Light Output(lm)	1100	1100	1100	1100
Nominal CRI(Ra)	80	80	80	80
Nominal Lamp Life(hrs)	25000	25000	25000	25000
Beam Angle (solid-state only)	N/A	N/A	N/A	N/A
Target Lamp	A19 75W	A19 75W	A19 75W	A19 75W
Overall length(mm)* Diameter(mm)	106*60	106*60	106*60	106*60
Heat Sink Paint Color (solid-state only)	White	White	White	White
Lamp Base	GU24	GU24	GU24	GU24
Envelope Shape (Decorative shapes only)	N/A	N/A	N/A	N/A
Envelope Finish	N/A	N/A	N/A	N/A

Note: Declared by the applicant that these models are same except CCT and/or model number (a product can be marked as dimmable or non-dimmable for commercial purposes).

## Reference Docuemnts

ENERGY STAR<sup>®</sup> Program Requirements Product Specification for Lamps: Ambient Temperature Life Testing Test Method-2015

ENERGY STAR<sup>®</sup> Program Requirements Product Specification for Lamps: Elevated Temperature Life Testing Test Method-2015

ENERGY STAR<sup>®</sup> Program Requirements Product Specification for Lamps: Elevated Temperature Light Output Ratio Test Method -2015

ENERGY STAR<sup>®</sup> Program Requirements for Lamps and luminaire: Start Time Test Method October-2017

ENERGY STAR<sup>®</sup> Program Requirements Product Specification for Lamps and luminaire: Run-Up Time Test Method -2015

ENERGY STAR<sup>®</sup> Program Requirements Product Specification for Lamps: Light Output on a Dimmer Recommended Practice -2015

ENERGY STAR<sup>®</sup> Program Requirements Product Specification for Lamps: Light Source Flicker Testing Tutorial-2017

ENERGY STAR<sup>®</sup> Program Requirements Product Specification for Lamps and luminaire: Test Method – Noise -2015

ANSI/IEEE C62.41.2-2002 IEEE Recommended Practice on Characterization of Surges in Low Voltage (1000V and Less) AC Power Circuits

ANSI C78.20-2003 Electric Lamps—A, G, PS and Similar Shapes with E26 Medium Screw Bases

ANSI C78.21-2011 Electric Lamps—PAR and R Shapes

ANSI C78.50-2014 Electric Lamps—Electric Lamps - Assigned LED Lamp Codes

ANSI C78.79-2014 Electric Lamps - Nomenclature for Envelope Shapes Intended for Use with Electric Lamps

ANSI C78.23-1995 (R2003) Incandescent Lamps—Miscellaneous Types

ANSI/ANSLG C78.357-2010 For Incandescent Lamps: Tungsten Halogen Lamps (non-vehicle)

ANSI C78.376-2014 Specifications for the Chromaticity of Fluorescent Lamps

ANSI/ANSLG C78.377-2015 Specifications for the Chromaticity of Solid State Lighting Products

ANSI C79.1-2002 Nomenclature for Glass Bulbs Intended for Use with Electric Lamps

ANSI/ANSLG C81.61-2009 Specifications for Bases (Caps) for Electric Lamps

ANSI/NEMA C82.2-2002 Fluorescent Lamp Ballasts, Methods of Measurement of (includes supplements)

ANSI C82.77-10-2014 Harmonic Emission Limits—Related Power Quality Requirements for Lighting Equipment

ANSI/IES RP-16-10 Nomenclature and Definitions for Illuminating Engineering

ANSI/UL 1993-2012 Standard for Safety of Self-Ballasted Lamps and Lamp Adapters

ANSI/UL 8750-2009 Standard for Light Emitting Diode (LED) Equipment for Use in Lighting Products

ASA S12.55-2012 / ISO3745:2012 Determination of Sound Power Levels of Noise Sources Using Sound Pressure - Precision Methods

Anechoic and Hemi-Anechoic Rooms

CIE Pub. No. 13.3-1995 Method of Measuring and Specifying Color Rendering of Light Sources

CIE Pub. No. 15:2004 Colorimetry

Commission of the European Communities (EC) No 244/2009 Commission Regulation (EC) No 244/2009 of 18 March 2009 Implementing Directive 2005/32/EC of the European Parliament and of the Council

DOE 10 CFR 429 Certification, Compliance, and Enforcement for Consumer Products and Commercial and Industrial Equipment

DOE 10 CFR 430 Energy Conservation Program for Consumer Products

IES LM-20-13 Photometric Testing of Reflector-Type Lamps

IES LM-54-12 Guide to Lamp Seasoning

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-80-15 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

LM-84-14 Measuring Luminous Flux and Color Maintenance of LED Lamps, Light Engines, and Luminaires

IES TM-21-11 Projecting Long Term Lumen Maintenance of LED Light Sources

IES TM-28-14 Projecting Long-Term Luminous Flux Maintenance of LED Lamps and Luminaires

IES TM-30-15 Evaluating Light Source Color Rendition

ISO 7574-4 B.2.1 Statistical Methods for Determining and Verifying Stated Noise Emission Values of Machinery and Equipment

IEC 62321 ED.1.0 B:2008 Electrotechnical Products – Determination Of Levels Of Six Regulated Substances (lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls, polybrominated diphenyl ethers)

IEC 62301 Edition 2.0 2011-01 Household electrical appliances - Measurement of standby power

IEEE 1789-2015 Recommended Practices for Modulating Current in High-Brightness LEDs for Mitigating Health Risks to Viewers

NEMA 77-2017 Temporal Light Artifacts: Test Methods and Guidance for Acceptance Criteria

NEMA SSL 7A-2015 Phase Cut Dimming for Solid-State Lighting – Basic Compatibility

## Test Method

### Photometric and Electrical Measurement

Total light output (luminous flux) for the  $25^{\circ}\text{C}\pm 1^{\circ}\text{C}$  ambient temperature conditions are measured using a  $\phi 2.0\text{m}^4$  geometry integrating sphere. Temperature is measured at a position inside the sphere. Spectral radiant flux is measured using the photo detector built in the integrating sphere. Each lamp is operated at rated voltage in its designated orientation. Each lamp is in a stable state before measurements is done as below:

Step 1 Take 3 measurements of the lamp light output at 15-minute interval (total time=30 minutes.), the pre-burning time is not included in the formal testing time period.

Step 2 Calculate the difference in percentage between the maximum measured value and the minimum measured value with the three consecutive measurements.

Step 3 If the value calculated in Step 2 does not exceed 0.5 percent, the lamp is considered stable.

Luminous flux, chromaticity coordinates, correlated color temperature and color rendering index for each lamp are calculated from the spectral radiant flux measurements taken at 1nm increment over the range of 380 to 780 nm. The calibration of the sphere photometer-spectrometer system can be traced back to the NIM. Lamp efficacy (lumens per watt) for each lamp model is computed based on the luminous flux result revised taking the self-absorbing correction factor into consideration. Electrical measurements including voltage, current, power and power factor are measured using the digital power meter.

### Start Time Test at Ambient Temperature

The start time test at  $25^{\circ}\text{C}\pm 1^{\circ}\text{C}$  ambient temperature is performed after the lamps are stored in  $25^{\circ}\text{C}\pm 1^{\circ}\text{C}$  for 18 hours prior to conducting the test. The digital oscilloscope is used to measure the start time. Each sample is operated at its designated rated input, and the lamp orientation is vertical base up.

### Transient Protection Test at Ambient Temperature

The transient protection test at  $25^{\circ}\text{C}\pm 1^{\circ}\text{C}$  ambient temperature is performed on each sample. Each sample is operated at its designated rated input in base up orientation during the test. A strike of 2500V (0.5us - 100 kHz Ring Wave) is applied seven times at an interval of 1 minute across the lamp base contacts. After the transient protection test, estimated if the lamp could be operated normally.

### Frequency

Frequency is measured on one lamp sample using a flicker analyzer LFA-3000 with a rise time of 10 microseconds or less in the integrating sphere, which is done at the same time when doing the Total light output measurement after the lamp in stable state. Digitized photometric waveform data and an image of the relative photometric amplitude waveform are recorded. Measured data are recorded to a digital file with an interval of 0.00001 sec. between each measurement which corresponding to 100 kHz of LFA-3000, and 1 second of data are captured.

### Luminous Intensity

A goniophotometer is used to measure the intensity distribution at each angle. Luminous intensity (cd) is measured within each vertical plane at a  $22.5^{\circ}$  vertical angle increment (maximum) from  $0^{\circ}$  to  $360^{\circ}$ . Measurements are repeated in vertical planes about the lamp (polar) axis in an increment of  $1^{\circ}$  from  $0^{\circ}$  to  $180^{\circ}$ , and the intensity data is exported to a file in excel format.

### Temperature Measurements

All temperature measurements including in-situ measurement (i.e.  $T_{\text{LED}}$ ,  $T_{\text{c}}$ (driver case),  $T_{\text{fuse}}$ (fuse),  $T_{\text{capacitor}}$ (capacitor)) are done according to the requirements outlined in ANSI/UL 1993, one sample per basic model, one sample per variant model, with a thermocouple and a data recorder to record the measured data, the current is measured by a current meter. The lamps are applied the designated rated input power for seven hours to allow to reach thermal equilibrium before measurements are actually done. Temperature measurements point locations are from the manufacturer's specifications or from the LM80 report provided by manufacturer. The maximum temperature is recorded for the sample.

The lamp that is designed for use in a totally enclosed luminaire, is subjected to the normal temperature test with the lamp mounted base-up in the test fixture as shown in Figure 9.1 of ANSI/UL 1993 and is tested with a 3mm (0.125 in) thick glass applied to the test fixture opening.

### Color Maintenance at 6000 Hours

Ten lamps are placed on the life racks in their designated positions for an elapsed period of 6000 hours. The lamps then are re-measured for color Coordinate of CIE 1976 at environment temperature same as lumen maintenance test, the deviation of  $u'v'$  between 6000 hours data and initial data is calculated.

### Elevated(45°C) Temperature Lumen Maintenance and Life Test

Life test is conducted on elevated temperature testing racks (Optional C) which specified in energy star test method, Life test of SPSA75GU24G1501D278 lamps is conducted at BEST Test Service Shenzhen Co., Ltd. The lamps are at its designated rated input and the environment temperature is  $45^{\circ}\text{C} \pm 5^{\circ}\text{C}$ . All lamps stayed on during the life test. The samples are inspected at regular intervals throughout the life test. Number of hours of operation before failure and failure description are recorded, the actual elapsed time for each lamp is in hour.

When the life time achieves 6000 hours, the lamps are taken off and the photometric and electrical parameters re-measured according to **“Photometric and Electrical Measurement”** section of this chapter, and the lumen maintenance are calculated. The difference is the lumen output at 6000 hours divided by the initial lumen flux in percentage.

The image shows the logo for BEST, consisting of the letters 'BEST' in a bold, white, sans-serif font. The letters are set against a light blue, rounded rectangular background. The logo is centered horizontally and vertically on the page.

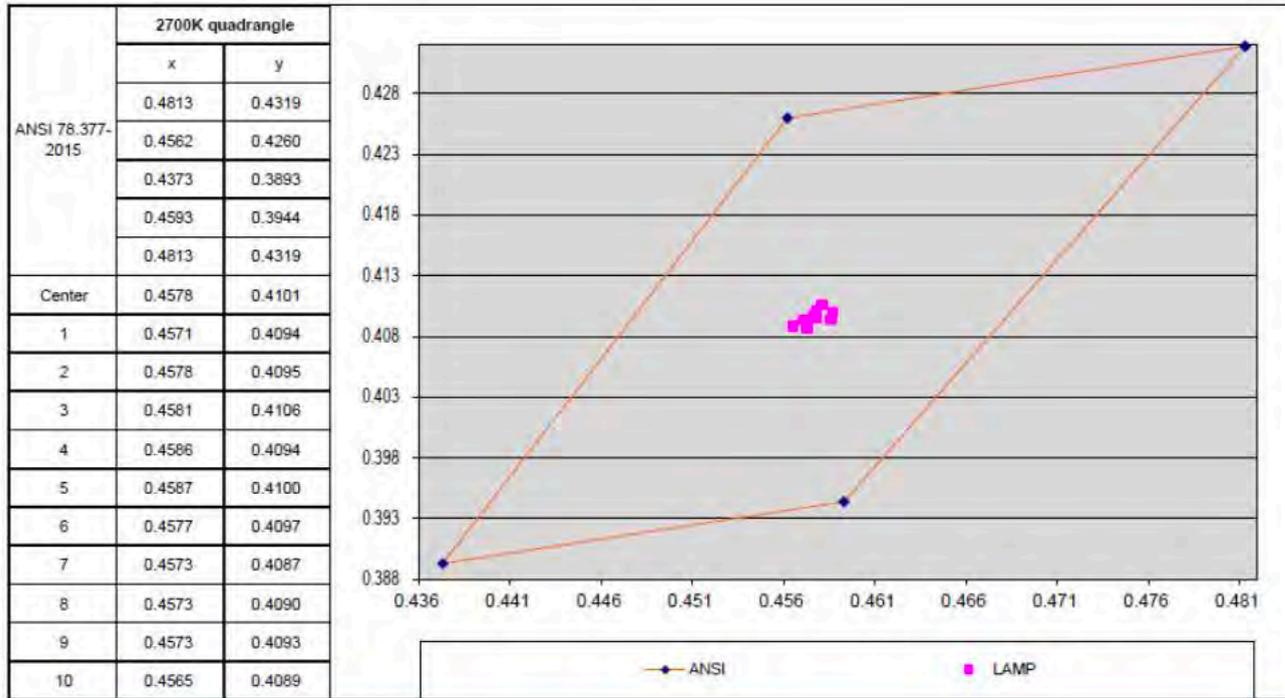
**Test Data(92003)****Initial Photometric and Electrical Test Data**

Sample No	Base	Voltage (V)	Current (A)	Power (W)	Power Factor	Light Output (LM)	Efficiency (LM/W)
L1	VBU	120.06	0.1288	11.06	0.7154	1173.50	106.10
L2	VBU	120.06	0.1282	11.03	0.7166	1182.80	107.23
L3	VBU	120.06	0.1296	11.17	0.7177	1183.30	105.94
L4	VBU	120.06	0.1278	10.95	0.7137	1148.50	104.89
L5	VBU	120.06	0.1268	10.85	0.7129	1152.50	106.22
L6	VBD	120.06	0.1295	11.15	0.7174	1190.80	106.80
L7	VBD	120.06	0.1294	11.11	0.7154	1174.60	105.72
L8	VBD	120.06	0.1288	11.08	0.7165	1155.70	104.31
L9	VBD	120.06	0.1285	11.03	0.7151	1174.80	106.51
L10	VBD	120.07	0.1287	11.07	0.7166	1170.00	105.69
/	AV	/	/	11.1	0.7	1170.7	105.9
/	Represented Value	/	/	11.1	0.7	1170	105.9

Sample No	Base	CCT (K)	CRI (Ra)	R9	Rf	Rg	Standby Power (W)
L1	VBU	2730	81.5	4	81	96	0.00
L2	VBU	2722	81.6	4	82	96	0.00
L3	VBU	2724	81.3	3	82	95	0.00
L4	VBU	2708	81.6	4	82	96	0.00
L5	VBU	2712	81.5	4	82	95	0.00
L6	VBD	2724	81.4	4	81	96	0.00
L7	VBD	2721	81.6	4	81	96	0.00
L8	VBD	2723	81.8	5	82	96	0.00
L9	VBD	2726	81.5	4	81	95	0.00
L10	VBD	2735	81.5	4	82	96	0.00
/	AV	2723	82	4	82	96	0.00
/	Represented Value	2723	82	4	82	96	0.00

Note: Please see the Spectral Data Form for the Spectral power distribution information.

**7-Step Chromaticity Quadrangles Test Data**



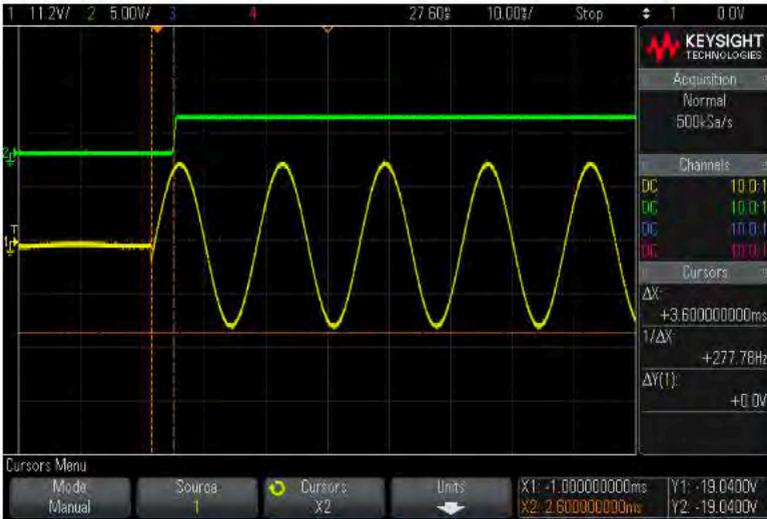
**Start Time /Transient Protection Test Data**

Sample No.	Base Orientation	Start Time (mS)	Sample No.	Base Orientation	Transient Protection (100KHz ring wave, 2.5KV level, 7 strikes)
T1	VBU	4	T1	VBU	Survival
T2	VBU	4	T2	VBU	Survival
T3	VBU	4	T3	VBU	Survival
AV	/	4	T4	VBU	Survival
/	/	/	T5	VBU	Survival

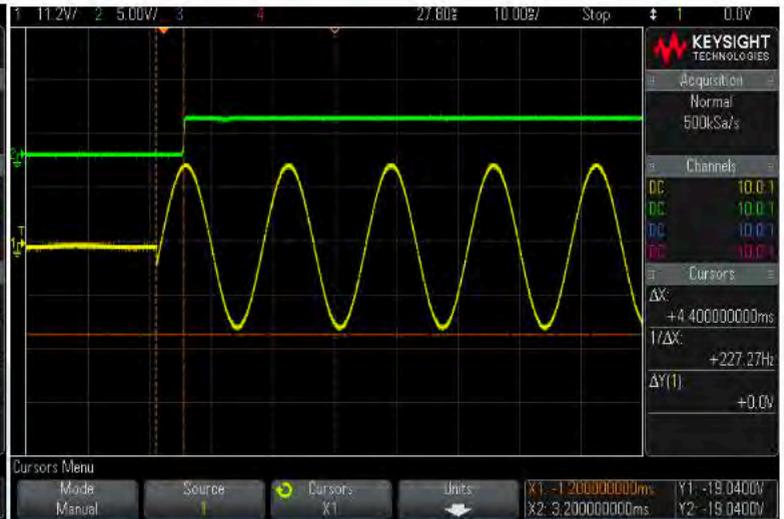
**Frequency/Lamp Size Test Data**

Sample No	LED Frequency (Hz)	Max Lamp Overall Length (mm)	Target Lamp Overall Length (mm)	Max Lamp Diameter (mm)	Target Lamp Diameter (mm)
T1	120	106.2	98.4-108.0	59.7	69.0

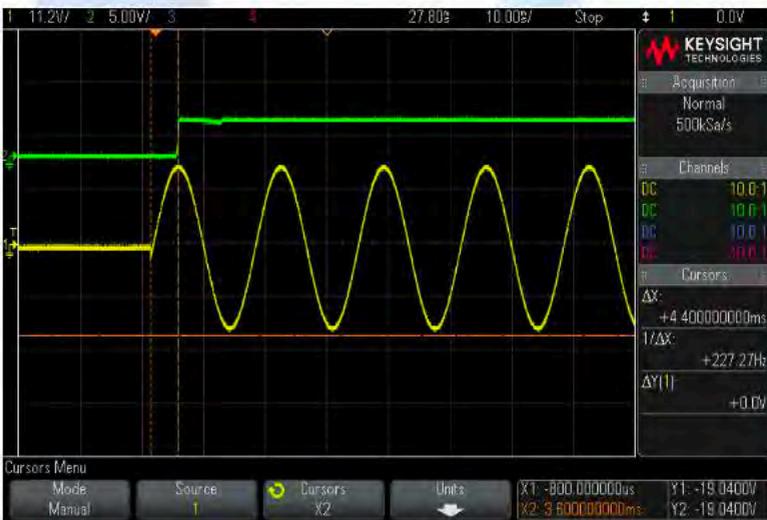
**Start Time/ FrequencyWaveform:**



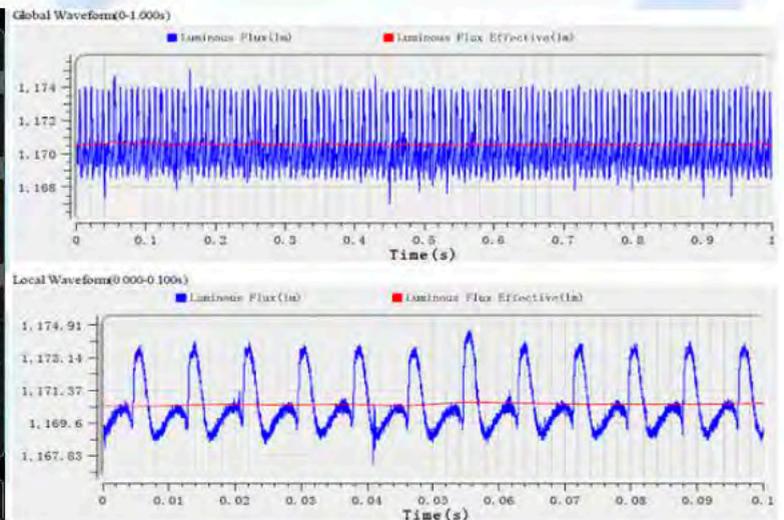
Start Time 1



Start Time 2



Start Time 3



Frequency

**Luminous Intensity Distribution-ANSI Standard Omnidirectional Lamps**

Vertical Angles:		Horizontal Angles:		Luminous Intensity Averages:		
Start	0	Start	0	Zone:	Average	Count in group
End	180	End	337.5	Average (0-180)	90.58	592
Spacing	5	Spacing	22.5	Average (0-130)	114.31	432

Luminous Intensity (cd) Variation in 0-130:			
	Value	Test Condition	# Past Threshold
0-130 Avg	114.31	(n/a)	(n/a)
Avg +35%	154.32	>154.32	0
Avg -35%	74.30	<74.3	66
Avg +60%	182.90	>182.9	0
Avg -60%	45.72	<45.72	0
Max Value:	147.90	Min Value:	48.32
Largest Variation (+/-):		58%	

Luminous Intensity Results:	
Total Past Threshold:	66
Total in 0-130:	432
% Values > 35% Variation	15.28%
20% or Less Values > 35% Variation?	PASS
No Values with > 60% Variation?	PASS

Zonal Lumens Calculator:	
Zone:	Zonal Lumens:
0-90	793.84
0-130	1104.27
90-130	310.43
90-180	395.26
0-180	1189.11

Zonal Lumen Results:	
Total Lumens:	1189.107
130-180:	84.837
Percent Zonal Lumens (130-180):	7.13%
No less than 5% of total Zonal Lumens (130-180):	PASS

**Elevated Temperature(45°C) 6000H Lumen/Color Maintenance Test Data**

Sample No.	Base	0H		3000H			6000H		
		u'	v'	Lumen Output (lm)	Lumen Maintenance	$\Delta u'v'$	Lumen Output (lm)	Lumen Maintenance	$\Delta u'v'$
L1	VBU	0.2613	0.5265	N/A	N/A	N/A	1089.46	92.8%	0.0022
L2	VBU	0.2616	0.5266	N/A	N/A	N/A	1101.12	93.1%	0.0023
L3	VBU	0.2614	0.5271	N/A	N/A	N/A	1100.80	93.0%	0.0022
L4	VBU	0.2622	0.5267	N/A	N/A	N/A	1064.25	92.7%	0.0030
L5	VBU	0.2620	0.5269	N/A	N/A	N/A	1072.68	93.1%	0.0027
L6	VBD	0.2615	0.5267	N/A	N/A	N/A	1103.62	92.7%	0.0027
L7	VBD	0.2617	0.5262	N/A	N/A	N/A	1091.16	92.9%	0.0024
L8	VBD	0.2616	0.5263	N/A	N/A	N/A	1075.62	93.1%	0.0024
L9	VBD	0.2614	0.5265	N/A	N/A	N/A	1092.30	93.0%	0.0028
L10	VBD	0.2611	0.5262	N/A	N/A	N/A	1084.32	92.7%	0.0026
AV	/	/	/	N/A	N/A	/	1087.53	92.9%	/



## Allowable Variations Test Data

### Performance requirements between Basic Model and Allowable Variations Model Test Data

Basic model:	Voltage (V)	Current (A)	Power (W)	Power Factor	Max Overall Length (mm)	Max Overall Diameter (mm)
92003	120.06	0.1288	11.06	0.7154	106.2	59.3
Allowable Variant Model:	Voltage (V)	Current (A)	Power (W)	Power Factor	Max Overall Length (mm)	Max Overall Diameter (mm)
92006	120.07	0.1259	10.81	0.7150	106.4	59.6
Variant (%)	/	2.2%	2.3%	0.1%	0.3%	0.6%
Limit	/	±10%	±10%	±5%	±5%	±5%

Note: Maximum overall length, except as affected only by variations in lamp base or envelope shape - ±5%

### In-situ Temperature of Critical Components Test Data

Basic model:	Sample No.	T <sub>capacitor</sub> (°C)	T <sub>fuse</sub> (°C)	T <sub>C(Inner)</sub> (°C)	TMP <sub>LED</sub> (°C)
92003	L11	115.9	114.6	74.7	108.6
Allowable Variant Model:	Sample No.	T <sub>capacitor</sub> (°C)	T <sub>fuse</sub> (°C)	T <sub>C(Inner)</sub> (°C)	TMP <sub>LED</sub> (°C)
92006	LD11	116.4	115.3	74.5	108.9
Variant (°C)	/	0.5	0.7	0.2	0.3
Limit	/	≤2.5°C	≤2.5°C	≤2.5°C	≤2.5°C

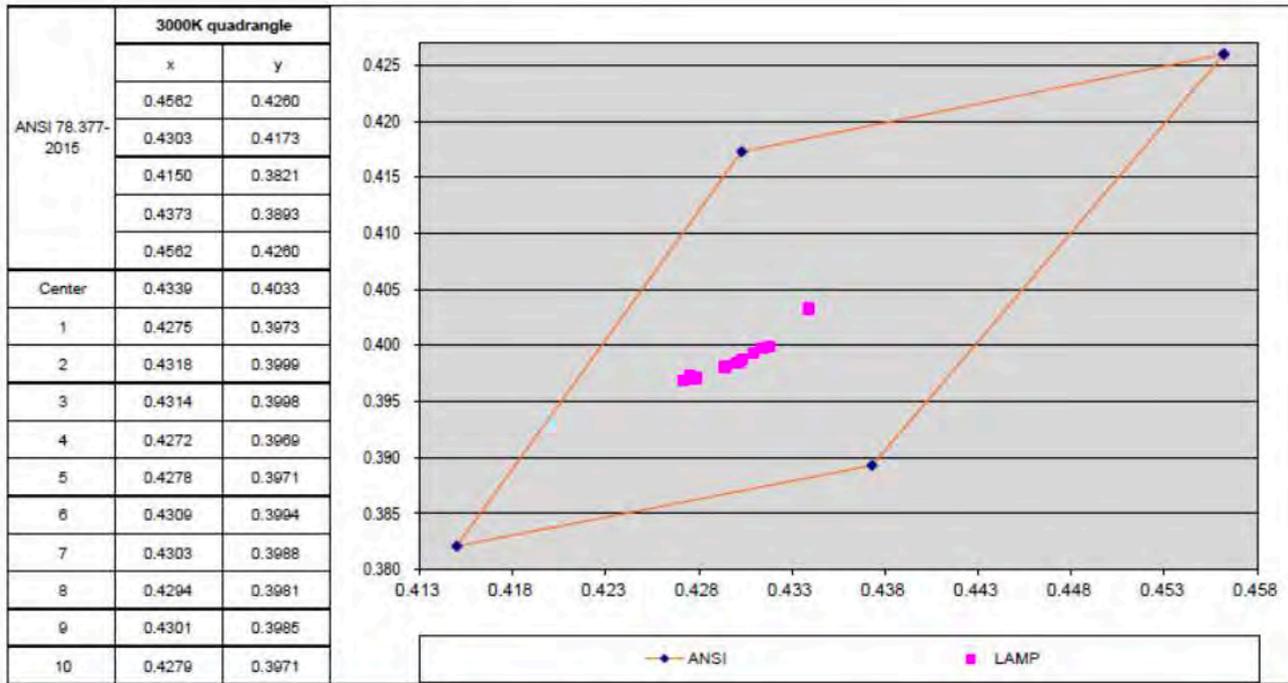
**Test Data (92004)****Initial Photometric and Electrical Test Data**

Sample No	Base	Voltage (V)	Current (A)	Power (W)	Power Factor	Light Output (LM)	Efficiency (LM/W)
LB1	VBU	120.07	0.1272	10.90	0.7137	1188.60	109.05
LB2	VBU	120.07	0.1259	10.78	0.7133	1156.10	107.24
LB3	VBU	120.07	0.1258	10.77	0.7132	1158.00	107.52
LB4	VBU	120.07	0.1268	10.87	0.7142	1172.50	107.87
LB5	VBU	120.07	0.1261	10.83	0.7155	1182.40	109.18
LB6	VBD	120.07	0.1261	10.79	0.7128	1141.30	105.77
LB7	VBD	120.07	0.1261	10.78	0.7119	1152.90	106.95
LB8	VBD	120.07	0.1263	10.82	0.7136	1174.80	108.58
LB9	VBD	120.07	0.1258	10.81	0.7155	1175.40	108.73
LB10	VBD	120.07	0.1269	10.86	0.7127	1169.20	107.66
/	AV	/	/	10.8	0.7	1167.1	107.9
/	Represented Value	/	/	10.8	0.7	1170	107.9

Sample No	Base	CCT (K)	CRI (Ra)	R9	Rf	Rg	/
LB1	VBU	3109	82.5	7	82	96	/
LB2	VBU	3054	82.3	7	82	96	/
LB3	VBU	3061	82.3	6	82	96	/
LB4	VBU	3113	82.5	8	82	96	/
LB5	VBU	3102	82.6	8	82	96	/
LB6	VBD	3065	82.3	7	82	96	/
LB7	VBD	3073	82.4	7	82	96	/
LB8	VBD	3081	82.5	7	82	96	/
LB9	VBD	3072	82.5	7	82	96	/
LB10	VBD	3100	82.6	8	82	96	/
/	AV	3083	82	7	82	96	/
/	Represented Value	3083	82	7	82	96	/

Note: Please see the Spectral Data Form for the Spectral power distribution information.

### 7-Step Chromaticity Quadrangles Test Data



**Luminous Intensity Distribution-ANSI Standard Omnidirectional Lamps**

Vertical Angles:		Horizontal Angles:		Luminous Intensity Averages:		
Start	0	Start	0	Zone:	Average	Count in group
End	180	End	337.5	Average (0-180)	89.76	592
Spacing	5	Spacing	22.5	Average (0-130)	113.15	432

Luminous Intensity (cd) Variation in 0-130:			
	Value	Test Condition	# Past Threshold
0-130 Avg	113.15	(n/a)	(n/a)
Avg +35%	152.75	>152.75	0
Avg -35%	73.54	<73.54	67
Avg +60%	181.03	>181.03	0
Avg -60%	45.26	<45.26	0
Max Value:	143.75	Min Value:	51.39
Largest Variation (+/-):		55%	

Luminous Intensity Results:	
Total Past Threshold:	67
Total in 0-130:	432
% Values > 35% Variation	15.51%
20% or Less Values > 35% Variation?	PASS
No Values with > 60% Variation?	PASS

Zonal Lumens Calculator:	
Zone:	Zonal Lumens:
0-90	787.01
0-130	1099.81
90-130	312.80
90-180	398.25
0-180	1185.26

Zonal Lumen Results:	
Total Lumens:	1185.262
130-180:	85.453
Percent Zonal Lumens (130-180):	7.21%
No less than 5% of total Zonal Lumens (130-180):	PASS

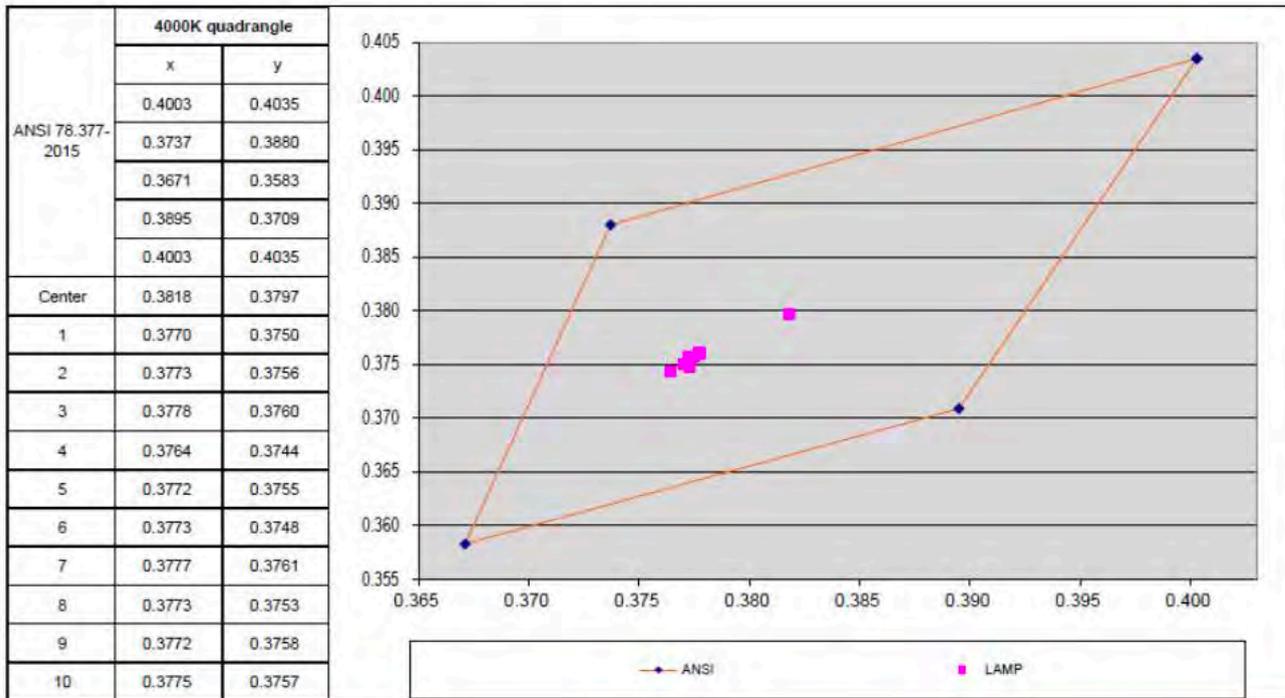
**Test Data (92005)****Initial Photometric and Electrical Test Data**

Sample No	Base	Voltage (V)	Current (A)	Power (W)	Power Factor	Light Output (LM)	Efficiency (LM/W)
LC1	VBU	120.07	0.1239	10.66	0.7165	1146.00	107.50
LC2	VBU	120.07	0.1237	10.63	0.7159	1134.40	106.72
LC3	VBU	120.07	0.1229	10.56	0.7154	1155.70	109.44
LC4	VBU	120.07	0.1246	10.70	0.7153	1150.90	107.56
LC5	VBU	120.07	0.1241	10.68	0.7166	1130.30	105.83
LC6	VBD	120.07	0.1241	10.65	0.7146	1139.70	107.01
LC7	VBD	120.07	0.1237	10.63	0.7158	1152.70	108.44
LC8	VBD	120.07	0.1251	10.72	0.7137	1140.60	106.40
LC9	VBD	120.07	0.1242	10.67	0.7153	1143.60	107.18
LC10	VBD	120.07	0.1231	10.56	0.7146	1137.90	107.76
/	AV	/	/	10.6	0.7	1143.2	107.4
/	Represented Value	/	/	10.6	0.7	1140	107.4

Sample No	Base	CCT (K)	CRI (Ra)	R9	Rf	Rg	/
LC1	VBU	4082	82.9	10	82	95	/
LC2	VBU	4078	82.8	10	82	95	/
LC3	VBU	4068	82.7	10	82	95	/
LC4	VBU	4092	82.9	10	82	95	/
LC5	VBU	4080	82.8	10	82	95	/
LC6	VBD	4073	83.0	11	82	95	/
LC7	VBD	4071	82.7	10	82	95	/
LC8	VBD	4075	82.9	10	82	95	/
LC9	VBD	4082	82.6	9	82	95	/
LC10	VBD	4073	82.7	10	82	95	/
/	AV	4077	83	10	82	95	/
/	Represented Value	4077	83	10	82	95	/

Note: Please see the Spectral Data Form for the Spectral power distribution information.

**7-Step Chromaticity Quadrangles Test Data**



**Luminous Intensity Distribution-ANSI Standard Omnidirectional Lamps**

Vertical Angles:		Horizontal Angles:		Luminous Intensity Averages:		
Start	0	Start	0	Zone:	Average	Count in group
End	180	End	337.5	Average (0-180)	86.43	592
Spacing	5	Spacing	22.5	Average (0-130)	108.93	432

Luminous Intensity (cd) Variation in 0-130:			
	Value	Test Condition	# Past Threshold
0-130 Avg	108.93	(n/a)	(n/a)
Avg +35%	147.05	>147.05	0
Avg -35%	70.80	<70.8	63
Avg +60%	174.28	>174.28	0
Avg -60%	43.57	<43.57	0
Max Value:	136.86	Min Value:	49.38
Largest Variation (+/-):		55%	

Luminous Intensity Results:	
Total Past Threshold:	63
Total in 0-130:	432
% Values > 35% Variation	14.58%
20% or Less Values > 35% Variation?	PASS
No Values with > 60% Variation?	PASS

Zonal Lumens Calculator:	
Zone:	Zonal Lumens:
0-90	758.17
0-130	1061.21
90-130	303.05
90-180	385.77
0-180	1143.94

Zonal Lumen Results:	
Total Lumens:	1143.936
130-180:	82.725
Percent Zonal Lumens (130-180):	7.23%
No less than 5% of total Zonal Lumens (130-180):	PASS

## Test Data (92006)

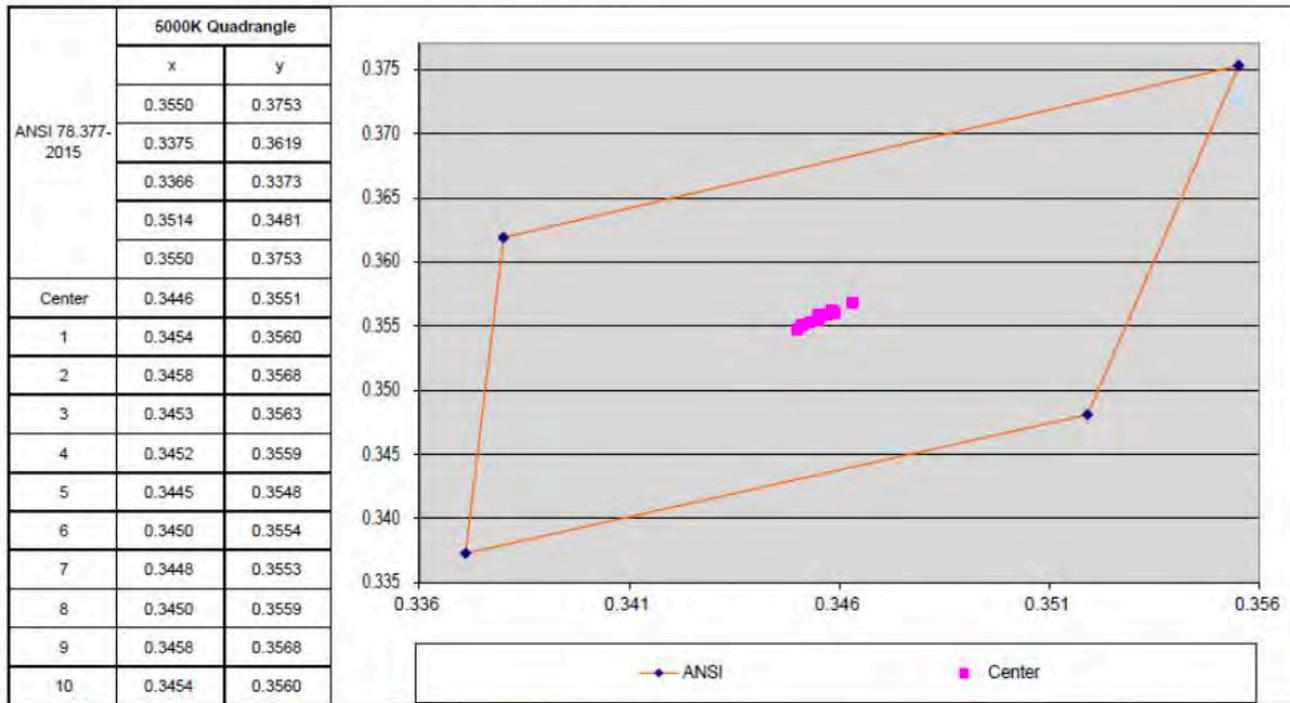
### Initial Photometric and Electrical Test Data

Sample No	Base	Voltage (V)	Current (A)	Power (W)	Power Factor	Light Output (LM)	Efficiency (LM/W)
LD1	VBU	120.07	0.1259	10.81	0.7150	1134.60	104.96
LD2	VBU	120.07	0.1247	10.72	0.7157	1137.60	106.12
LD3	VBU	120.07	0.1240	10.65	0.7151	1147.50	107.75
LD4	VBU	120.07	0.1236	10.61	0.7147	1151.20	108.50
LD5	VBU	120.07	0.1261	10.78	0.7122	1167.30	108.28
LD6	VBD	120.07	0.1260	10.80	0.7139	1171.60	108.48
LD7	VBD	120.07	0.1241	10.64	0.7138	1148.30	107.92
LD8	VBD	120.07	0.1246	10.66	0.7127	1141.00	107.04
LD9	VBD	120.07	0.1256	10.79	0.7157	1135.80	105.26
LD10	VBD	120.07	0.1250	10.67	0.7112	1150.90	107.86
/	AV	/	/	10.7	0.7	1148.6	107.2
/	Represented Value	/	/	10.7	0.7	1150	107.2

Sample No	Base	CCT (K)	CRI (Ra)	R9	Rf	Rg	/
LD1	VBU	5003	83.3	9	81	94	/
LD2	VBU	4992	82.9	10	81	94	/
LD3	VBU	5008	83.0	8	81	94	/
LD4	VBU	5010	83.1	9	81	94	/
LD5	VBU	5033	83.5	10	81	94	/
LD6	VBD	5016	83.4	10	81	94	/
LD7	VBD	5023	83.2	9	81	94	/
LD8	VBD	5016	83.1	9	81	94	/
LD9	VBD	4989	82.9	10	81	94	/
LD10	VBD	5001	83.2	9	81	94	/
/	AV	5009	83	9	81	94	/
/	Represented Value	5009	83	9	81	94	/

Note: Please see the Spectral Data Form for the Spectral power distribution information.

### 7-Step Chromaticity Quadrangles Test Data



**Luminous Intensity Distribution-ANSI Standard Omnidirectional Lamps**

Vertical Angles:		Horizontal Angles:		Luminous Intensity Averages:		
Start	0	Start	0	Zone:	Average	Count in group
End	180	End	337.5	Average (0-180)	86.80	592
Spacing	5	Spacing	22.5	Average (0-130)	109.42	432

Luminous Intensity (cd) Variation in 0-130:			
	Value	Test Condition	# Past Threshold
0-130 Avg	109.42	(n/a)	(n/a)
Avg +35%	147.72	>147.72	0
Avg -35%	71.12	<71.12	63
Avg +60%	175.07	>175.07	0
Avg -60%	43.77	<43.77	0
Max Value:	137.26	Min Value:	51.10
Largest Variation (+/-):		53%	

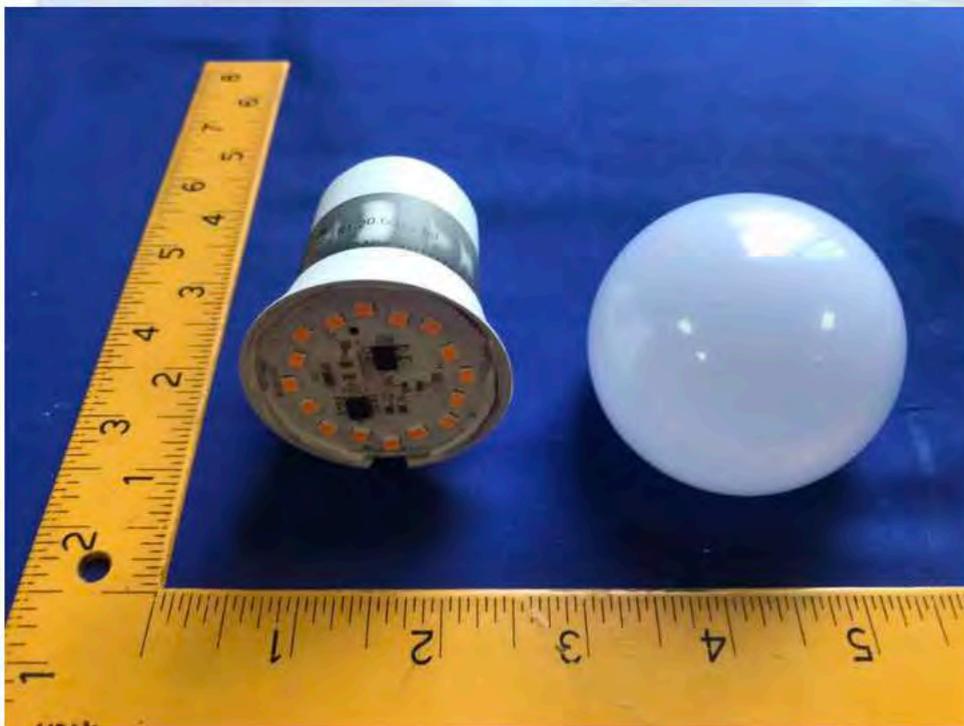
Luminous Intensity Results:	
Total Past Threshold:	63
Total in 0-130:	432
% Values > 35% Variation	14.58%
20% or Less Values > 35% Variation?	PASS
No Values with > 60% Variation?	PASS

Zonal Lumens Calculator:	
Zone:	Zonal Lumens:
0-90	761.12
0-130	1065.91
90-130	304.79
90-180	387.82
0-180	1148.93

Zonal Lumen Results:	
Total Lumens:	1148.934
130-180:	83.027
Percent Zonal Lumens (130-180):	7.23%
No less than 5% of total Zonal Lumens (130-180):	PASS

## Photographs

### EUT –General Appearance View



Equipment list			
BEST ID#	Apparatus Name	Cal Date	Cal Due Date
B231	Temperature and Humidity Meter	2021/4/17	2022/4/16
B089	Digital Oscilloscope	2021/4/17	2022/4/16
B093	Oscilloscope Voltage Probe	2021/4/17	2022/4/16
B197	Photometric Sensor	2021/4/17	2022/4/16
B053	AC Power Source	N/A	N/A
B167	Digital Power Meter	2021/4/17	2022/4/16
B073	Standard Light Source	2019/8/26	every 50 hours life
B186	Digital CC&CV DC Power Supply	2021/4/17	2022/4/16
B059	Second Meter	2021/4/17	2022/4/16
B179	Spectroradio Meter	Calibrated before measurement	N/A
B177	Integral Sphere	Calibrated before measurement	N/A
B190	AC Source	2021/4/17	2022/4/16
B087	Digital Power Meter	2021/4/17	2022/4/16
B113	Temperature Meter	2021/4/17	2022/4/16
B187	Aux Lamp DC Source	N/A	N/A
B073	Standard Light Source	2019/8/26	Every 50 hours life
B186	Digital CC&CV DC Power Supply	2021/4/17	2022/4/16
B059	Second Meter	2021/4/17	2022/4/16
B178	Spectroradio Meter	Calibrated before measurement	N/A
B174	Integral Sphere	Calibrated before measurement	N/A
B188	AC Source	2021/4/17	2022/4/16
B012	Digital Power Meter	2021/4/17	2022/4/16
B161	Temperature Meter	2021/4/17	2022/4/16
B184	Aux Lamp DC Source	N/A	N/A
B045	Temperature Meter	2021/4/17	2022/4/16
B015	AC Power Source	N/A	N/A
B133	Goniophotometer	2021/4/17	2022/4/16
B181	Spectroradio Meter	2021/4/17	2022/4/16
B084	Digital Power Meter	2021/4/17	2022/4/16
B232	Standard Light Source	2019/8/26	Every 50hours life
B144	Digital CC&CV DC Power Supply	2021/4/17	2022/4/16
B250	Air Flow Meter	2021/4/17	2022/4/16
B127	Ultra Compact Simulator	2021/4/17	2022/4/16
B220	Photo Intensity Meter	2021/4/17	2022/4/16
B190	AC Source	N/A	N/A
B057	Digital Power Meter	2021/4/17	2022/4/16
B019	Noise Meter	2021/4/17	2022/4/16
B600	Chamber	2021/4/17	2022/4/16
B260	Flicker Analyzer	2021/4/17	2022/4/16
B480	Temperature Meter	2021/4/17	2022/4/16
B193	AC Source	N/A	N/A
B085	Digital Power Meter	2021/4/17	2022/4/16
B200	Digital Caliper	2021/4/17	2022/4/16
B170	Tape	N/A	N/A
B456	AC Power Source	2021/4/17	2022/4/16
B153	8 Channel Temperature Controller	2021/4/17	2022/4/16
B205	4 Channel Temperature Controller	2021/4/17	2022/4/16

Uncertainty of Measure item		
NO.	Measure item	Uncertainty
1	Temperature	±0.4°C
2	AC Voltage	±0.1%
3	AC Current	±0.14%
4	Power≥1W	±0.17%
5	Power < 1W	±0.02W
6	luminous flux( $\phi$ )	±1.6%
7	CCT	±15K
8	CRI(Ra)	±0.2
9	Beam Angle	±1°
10	DC Voltage	±0.07%
11	DC Current	±0.03%
12	Starting Time	±0.005ms
13	Life Time	±0.2h

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