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Test Report of

ENERGY STAR® Program Requirements

For Downlights V1.0

Applicant:

Beyond LED Technology

1939 Parker Court, Stone Mountain, GA 30087

Manufacturer:

TAIZHOU JIAOGUANG LIGHTING CO.,LTD

1 Wei Er Rd., Taizhou Economic Development Zone, Taizhou City, Zhejiang Province, China

Models:

D228-20W-90-CCT-WH

("**" represents finished color, it can be BZ=Brown, BK=Black, WH=White and NK=Nickel.)

Test Date:	From Nov. 21, 2024 to Dec. 2, 2024		
Test Lab.:	**LCTECH Guangdong Testing Services Co., Ltd.** 1/F., Building I, & 2, 3, 4/F., Building II, Technology and Enterprise Development Center, Guangyuan Road, Xiaolan, Zhongshan, Guangdong, China Tel:+86-760-22833366 E-mail:Service@lccert.com http://www.lccert.com		
Test Sites:	2/F., Building II & 1/F., Building I, Technology and Enterprise Development Center, Guangyuan Road, Xiaolan, Zhongshan, Guangdong, China		
Template No.:	LC-RT-PL-111 Rev.1.0		
Lab. Note:	*N/A*		
Compiled by:	Fish Tan Dec. 2, 2024 Fish Tan	**Reviewed by:**	Lin Qiu Dec. 2, 2024 Lin Qiu

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1. General

1.1 Product information

Brand Name	LIGHT THE FUTURE
Model Name	LED Downlight
Product Type	Downlight Surface Mount
Indoor/Outdoor	Indoor
Model Number	D228-20W-90-CCT-**
Rated Input	120VAC 50/60Hz
Rated Power	20W
Rated Initial Light Output	1640lm
Nominal CCT	2700K, 3000K, 3500K, 4000K, 5000K
LED Package, Array or Module	9.2835W3V32F-S02, XUYU OPTOELECTRONICS (SHENZHEN) CO.,LTD
LED LM-80 Test Information	Please refer to Appendix A 1 for detail information.
Driver Information	LED Driver
Rated Life	50000hours
Dimming Information	Dimmable
Downlight Features	Continuously Dimmable
Most Consumptive White Light Settings	5000K
Recessed Downlight Ratings	Type Non-IC
Connected Downlight or not	Not
Aperture Size	7.1”
Intended Application	Residential
Market	Canada, United States
Note	-

1.2 Sample Received Record:

Date	Model	Numbers	Sample Code of lab.
2024/11/11	D228-20W-90-CCT-WH	1	241111102004

1.3 Reference standards or methods

The following standards are partly or totally used or referenced for test and report.

No.	Name
ANSI/NEMA/ANSLG C78.377 -2017(R2022)	Specifications for the Chromaticity of Solid State Lighting Products
ANSI/ANSLG C82.16-2022	Light Emitting Diode Drivers—Methods of Measurement
ANSI C82.18-2022	Light Emitting Diode Drivers—Performance Characteristics
ANSI C82.77-5-2017	Lighting Equipment—Voltage Surge Requirements
C82.77-10-2020 or -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 1310-2018	Standard for Safety of Class 2 Power Units
ANSI/UL 1598-2008	Standard for Safety of Luminaires
ANSI/UL 1598B-2010	Standard for Supplemental Requirements for Downlight Reflector Kits for Installation on Previously Installed Fluorescent Luminaires
ANSI/UL 1598C	Light-Emitting Diode (LED) Retrofit Luminaire Conversion Kits
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. 015:2004	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 62301 ED.2.0 B:2011	Household electrical appliances - Measurement of standby power
IEC 62321 Ed. 1.0	Electrotechnical Products - Determination Of Levels Of Six Regulated Substances (lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls, polybrominateddiphenyl ethers)
IEEE PAR1789-2015	IEEE Recommending Practices for Modulating Current in High Brightness LEDs for Mitigating Health Risks to Viewers
IES LM-58-13	Method for Spectroradiometric Measurement Methods for Light Sources
IES LM-79-08	Electrical and Photometric Measurements of Solid-State Lighting Products
ANSI/IES LM-79-19	Optical and Electrical Measurements of Solid -State Lighting Products
IES LM-80-08 and its Addendum A	Measuring Lumen Maintenance of LED Light Sources
ANSI/IES LM-80-15	Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays and Modules

ANSI/IES LM-80-21	Approved Method: Measuring Maintenance of Light Output Characteristics of Solid-State Light Sources
ANSI/IES RP-16-17	Nomenclature and Definitions for Illuminating Engineering
IES TM-21-21	Projecting Long-Term Luminous, Photon, and Radiant Flux Maintenance of LED Light Sources
NEMA LSD 45-2009	Recommendations for Solid State Lighting Sub-Assembly Interfaces for Luminaires
NEMA SSL 7A-2013 or SSL 7A-2015	Phase Cut Dimming for Solid State Lighting: Basic Compatibility
NEMA 77-2017	Temporal Light Artifacts: Test Methods and Guidance for Acceptance Criteria
ENERGY STAR®	ENERGY STAR® Program Requirements for Lamps and Luminaires (including Downlights) – Start Time Test Method (November 2023)
ENERGY STAR®	ENERGY STAR® Program Requirements for Lamps and Luminaires – Noise Test Method (September - 2015)

1.4 Equipment list

All the equipment for the measurements were calibrated by ISO 17025 accredited laboratory or traceable to National Institute of Metrology (NIM) or National Institute of Standards and Technology (NIST), below are equipment list.

Instrument	ID	Model name	Cal. date	Next cal. Date
AC power supply	LC-I-923	CHP-500	2023-12-12	2024-12-11
AC power supply	LC-I-987	APW-120N	2023-12-12	2024-12-11
AC power supply	LC-I-989	APW-120N	2023-12-12	2024-12-11
Power analyzer	LC-I-PL-024	WT310E	2023-12-15	2024-12-14
Power analyzer	LC-I-954	WT210	2023-12-12	2024-12-11
Digital caliper	LC-I-973	(0~200)mm	2024-06-27	2025-06-26
Photometric colorimetric electric system (2 meter sphere)	LC-I-956	HAAS-2000	Before used	Before used
Standard lamp	LC-I-963	24V50W	2024-06-26	2025-06-25
Lighting Flicker Measuring Instrument	LC-I-PL-028	LFA-3000	2024-04-15	2025-04-14
Luminous flux lamp	LC-I-PL-031	AC220V/200W	2024-06-26	2025-06-25
Goniophotometer(with mirror)	LC-I-902	GMS2000	2024-03-25	2025-03-24
Digital oscilloscope	LC-I-919	TDS 1012	2023-12-12	2024-12-11
Sound level meter	LC-I-951	AWA5661	2023-12-12	2024-12-11
Anechoic room	LC-I-952	TNX-03	2023-12-12	2024-12-11
Steel tape	LC-I-PL-023	5M	2023-12-19	2024-12-18
Wireless temperature and humidity transmitter	LC-I-PL-008	DWLR-DLR	2023-12-14	2024-12-15
Wireless temperature and humidity transmitter	LC-I-PL-009	DWLR-DLR	2023-12-14	2024-12-15
T&H recorder	LC-I-SF-008	W2305001	2024-01-12	2025-01-11
Ringing wave generator	LC-I-PL-025	EMS61000-12C	2023-12-12	2024-12-11
J thermocouple	LC-I-SF-022	TT-J-30-SLE	2024-01-12	2025-01-11
Data acquisition/Switch unit	LC-I-098	34970A	2023-12-11	2024-12-10

2. Test conducted and method

2.1 Test conducted

2.1.1 Light Output, Efficacy, Zonal Lumen Density, and color quantities

For color tunable downlights, added the following items:

2.1.1.1 Photometric performance tests were tested under the undimmed state.

2.1.1.2 All the tests were tested at the most consumptive white light setting. Watts, lumens, chromaticity and CRI were tested for all CCT settings.

The following method for normal downlights except downlight retrofits:

2.1.1.3 The sample was tested without seasoning according to IES LM-79-08. Before measurements were taken, the sample was operated for about 2 hours to reach stabilization and temperature equilibrium. Stabilization in which the variation (maximum -minimum) of at least 3 readings of the light output and electrical power over a period of 30min, taken 15 minutes apart, is less than 0.5%. The ambient temperature in the whole test process was kept in 25±1°C, and the sample was in its designated orientation for all the measurements as IES LM-79-08 requirement.

2.1.1.4 The sample was first used to color and photometric quantities measurements by spectroradiometer with 2 meters integrated sphere (4π) and power analyzer.

2.1.1.5 After integrated sphere test, the sample was removed to a mirror-type goniophotometer (Type C) with photometer (f1<1.5%) for light distribution and photometric quantities test. The angle interval was settled based on the sample beam angle, and horizontal angle interval was 15°, vertical angle interval was 1° in normally.

2.1.1.6 After luminous intensity distribution test, the sample was subjected to color spatial uniformity measurement by the same goniophotometer with another colorimeter. Vertical angular scanning was 1 degree on the 0 and 90 degree vertical planes.

2.1.2 ISTM and TM-21

The following method for Downlights:

2.1.2.1 The LED module used in the downlight was tested in accordance with ANSI/UL 1598(Section 19.7, 19.10-16), ANSI/UL 1574 （Section 54） or ANSI/UL 153(Sections 124-128A) and LM-80.

2.1.2.2 Thermocouples were in contact with the TMP_{LED} location described in LM-80 test report. In order to gain the maximum temperature, if appropriate, more than one thermocouple may use.

2.1.2.3 The sample was tested in the housing as provided by customer which was the designated application, and the housing with the sample was mounted according to the standard requirement.

2.1.2.4 Temperatures shall be measured after they have stabilized, when the test has been running for a minimum of 7. 5 h or the test has been running for a minimum of 3 h, and three successive readings taken at 15min intervals are within1° C of one another and are not rising.

2.1.2.5 The ambient temperature was kept in 25±5°C, and final measured values were normalized to an ambient of 25°C.The sample was in its designated orientation.

2.1.3 Start Time Test

2.1.3.1 The downlight was not seasoned before test. Start time was measured by digital oscilloscope and photometer.

2.1.3.2 Connect oscilloscope probe to measure the input voltage to the downlight, and light output.

2.1.3.3 Set trigger level at 10V to trigger off the input voltage signal.

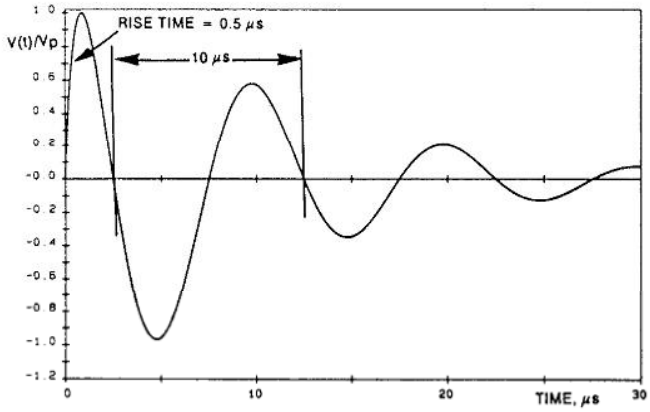
2.1.3.4 Set the power supply to rated voltage and frequency of the device (Normal 120V/60Hz applied). If a range is specified, test sample at the midpoint of the range.

2.1.3.5 Record the starting time was based on the point where the light source is continuously illuminated, and the light output is either constant or increasing.

2.1.3.6 The ambient temperature in the whole test process was kept in 25±1°C, and in its designated orientation.

2.1.4 Transient Protection Test

2.1.4.1 The line transient was consisting of seven strikes of a 100 kHz ring wave, 2.5 kV level, for both common mode and differential mode. Here is the 100 kHz Ring Wave Graph:



2.1.4.2 The ambient temperature was kept in 25±5°C, and the sample was in its designated orientation.

2.1.5 Standby power consumption test

2.1.5.1 The tests shall be carried out in a room that has an air speed close to the product under test of ≤0.5 m/s. The ambient temperature shall be maintained at 23°C ± 5°C throughout the test

2.1.5.2 For input powers less than or equal to 1 W, stability is established when a linear regression through all power reading for the second two thirds of the total period has a slope of less than 10 mW/h. for input powers of more than 1 W, stability is established when a linear regression through all power readings for the second two thirds of the total period has a slope of less than is 1 % of the measured input power per hour.

2.1.6 Operating Frequency

2.1.6.1 Operating frequency was measured by oscilloscope and photodetector which can capture the light output with an interval less than 50 microseconds (Sample rating no less than 20 KHz). The actual used oscilloscope has a sample rating of 1GS/s.

2.1.6.2 An image of the relative photometric waveform which contains more than 8 cycles was recorded.

2.1.6.3 The light output data of no less than 1 second were captured and recorded too.

2.1.6.4 Frequency was calculated based the light output data captured.

2.1.6.5 The ambient temperature was kept in 25±1°C, and the sample was in its designated orientation.

2.1.7 Thermal Performance Test

The following method for Downlights:

2.1.7.1 The LED driver used in the downlight were tested in accordance with ANSI/UL 1598(Section 19.7, 19.10-16)..

2.1.7.2 Thermocouples were in contact with the TMP_C location of LED driver as designated by manufacturer.

2.1.7.3 The sample was tested in the housing as provided by customer which was the designated application, and the housing with the sample was mounted according to the standard requirement.

2.1.7.4 Temperatures shall be measured after they have stabilized, when the test has been running for a minimum of 7. 5 h or the test has been running for a minimum of 3 h, and three successive readings taken at 15min intervals are within1° C of one another and are not rising.

2.1.7.5 The ambient temperature was kept in 25±5°C, and final measured values were normalized to an ambient of 25°C.The sample was in its designated orientation.

2.1.8 Dimming Test (only for downlights marked as dimmable)

2.1.8.1 Set and apply rated voltage power to the device.

2.1.8.2 Adjust the dimmer to the maximum and minimum light output with recommended dimmer, measure the light output by a2 meters integrated sphere (4π). The lowest light output level was recommended by customer.

2.1.8.3 The sample was connected to a dimmer recommended by customer and operated in center of an anechoic room with a background noise lower than 15 dBA. The microphone was located at place less than 1 meter at the minimum output; maximum value was used as the test result.

2.1.8.4 During the whole tests, ambient temperature was kept in 25±1°C, and the sample was in its designated orientation.

2.1.9 Flicker Test

2.1.9.1 Lamp light output shall be stabilized according to IES LM-79-08, then collect the light output wave data.

2.1.9.2 If testing a light source that dims by a phase cut method, to apply SSL7A Synthetic Waveform Generator or dimmer output to the light source DUT, and readjust each phase conduction angle(e.g. Maximum conduction(130 degrees), Minimum conduction(40 degrees), Intermediate conduction(90 degrees)) to collect the data.

2.1.9.3 If testing a light source that dims by a non - phase cut method, replace the phase conduction conditions by minimum light output, 50% light output, and maximum light output.

3. Test Result Summary

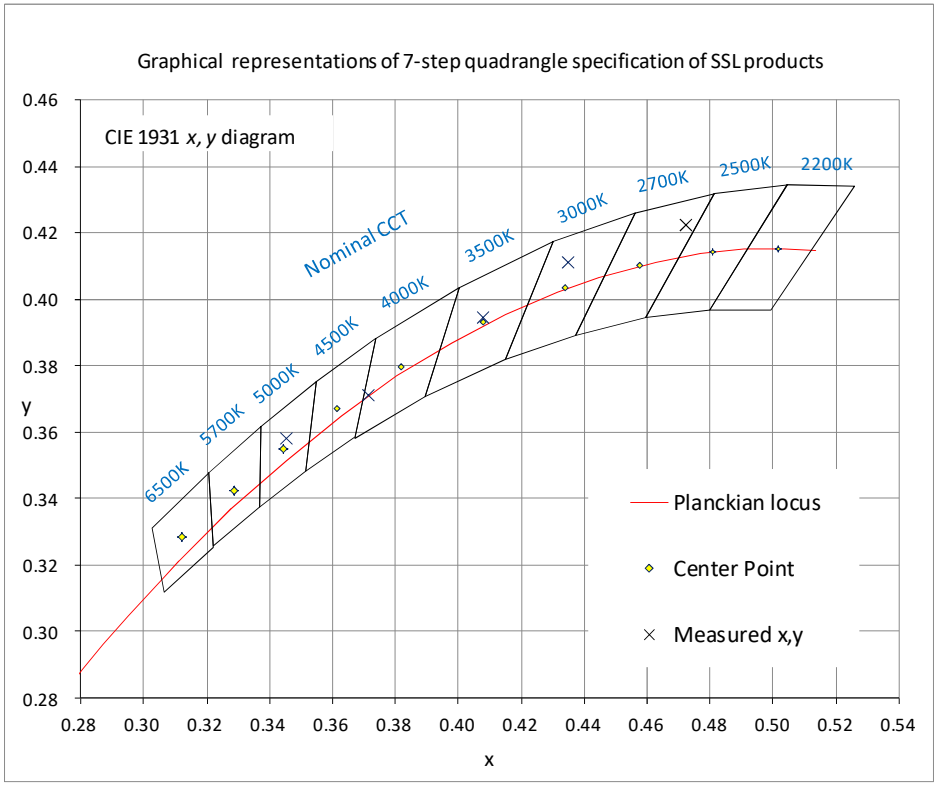
Item	Result	Requirement
Power	Measured: 19.31 W	None
	Reported: 20 W	
Efficacy (initial)	Measured: 104.88 lm/W	⩾82 lm/W
	Reported:82.00 lm/W	
Light Output (initial)	Aperture size:7.1"	＞4.5'' aperture:575 lumens ⩽4.5'aperture: 345 lumens
	Measured:2025.23lm	
	Reported:1640 lm	
Zonal Lumen Density	75.49% of total initial lumens within 0-60°zone	⩾75% of total lumens within the 0-60° zone
Correlated color temperature	Measured: 5021 K	The downlight or recessed downlight retrofit kit shall have one of correlated color temperatures 2200K, 2500K, 2700 K, 3000 K, 3500 K, 4000K, and 5000 K. The downlight or recessed downlight retrofit kit shall fall within the corresponding 7-step chromaticity quadrangles as defined in ANS C78.377-2017(R2022).
	falls within the 5000K 7-step chromaticity quadrangles	
Color Rendering Index	Ra: 94.0	Ra⩾80 R9＞0
	R9: 99	
Color Angular Uniformity	0.0010	⩽ 0.006 throughout the beam angle
Projected Life _TM-21 Method	*In situ* TMP_{LED} : 56.2 °C	**LM-80 with TM-21 method:** L_{70} lumen maintenance life shall meet the follow: L70(6k) ≥ 25,000 hours for indoor
	Current on each LED: 60 mA	
	Projected L_{70} Life:>54000hours	
Color Maintenance	≤0.0022 (0-9000 hours) Gained from LM-80 report, refer to Appendix A for LM-80 report summary.	**LM-80 method:** The downlight or recessed downlight retrofit kit change in chromaticity coordinates from 0-hour measurement, at any measurement point during operation, shall be a total linear distance of 0.007 on the CIE 1976 u'v' diagram
Start time	69 ms	Non-Connected products: ≤ 750 ms Connected products: ≤ 1000 ms

Power factor	0.839	≥ 0.7
Transient protection	Passed	Products shall survive 7 strikes of a 100 kHz ring wave, 2.5 kV level for both common model and different mode
Standby Power Consumption	0.0 W	Products without sensors: 0.0W Products with sensors, or connected downlights: ≤ 0.5 W Products with sensors and connected downlights: ≤ 1 W
Operating Frequency	Minimum:120Hz	≥120 Hz. Dimming operation shall meet the requirement at all light output levels
Flicker	Highest Pst:0.780 Highest SVM:1.017	The highest Pst and SVM shall be reported.
Light Source Serviceability	Inseparable LED Source	Could be replaced or Inseparable.
LED Driver Replaceability	Implacable LED driver	Drivers shall be accessible and removable by an electrician without the cutting of wires and without damage to the downlight housing, trim, decorative elements or the carpentry (e.g., ceiling drywall) in which the downlight is recessed.
Maximum Driver Case Temperature	55.3°C	Measured temperature at the TMP_C shall be less than or equal to the manufacturer recommended temperature **125°C**.
Dimming Requirements	Dimming Range: Measured dimming from 100% to 1.07% Reported dimming from 100% to 0%	All products marked as dimmable. The product and its components shall provide continuous dimming from 100% to 20% of light output.
	Noise: 17.2dBA	All products marked as dimmable. ⩽ 24dBA at 1 meter or less at the minimum output
Connected Functionality (Option)	N/A	Exemption for non-connected functionality products
Light Source Shipment	Light Source shipped with the downlights	Complete light source components shall be provided with the downlight or retrofit kit.

4. Test Data

4.1 Initial Photometric and Electrical Data

CCT	Voltage (V)	Current (A)	Power (W)	Power factor	Light output (lm)	Efficacy (lm/w)
2700K	120.03	0.190	19.08	0.837	2025.87	106.18
3000K	119.97	0.189	18.89	0.835	2033.07	107.63
3500K	119.99	0.186	18.60	0.833	2048.65	110.14
4000K	119.98	0.190	19.09	0.837	2064.88	108.17
5000K	119.95	0.192	19.31	0.839	2025.23	104.88
CCT	Chromaticity (x)	Chromaticity (y)	CCT (K)	Ra	R9	Duv
2700K	0.4722	0.4222	2623	95.2	67	0.0032
3000K	0.4347	0.4110	3094	96.2	80	0.0031
3500K	0.4080	0.3943	3470	96.7	91	0.0010
4000K	0.3716	0.3712	4210	95.7	98	0.0001
5000K	0.3451	0.3579	5021	94.0	99	0.0032

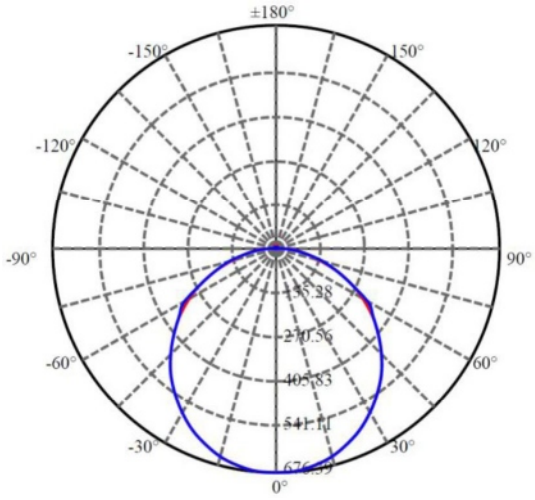


ANSI Chromaticity Quadrangles Diagram

4.2 Zone Lumen Density

Zonal density: 75.49% within 0-60°zone, details as follow:

Light Distribution Curve:



C0(Max):
C0/C180:
C90/C270:

Zonal Lumen Summary:

Zone	Lumens	%Lamp	%Fixt
0-30	524.93	25.92%	25.92%
0-40	860.47	42.49%	42.49%
0-60	1528.76	75.49%	75.49%
0-90	1993.81	98.45%	98.45%
0-120	2010.02	99.25%	99.25%
0-180	2025.23	100.00%	100.00%
60-90	465.05	22.96%	22.96%
90-120	16.21	0.80%	0.80%
90-130	19.50	0.96%	0.96%
90-150	26.36	1.30%	1.30%
90-180	31.34	1.55%	1.55%
0-63.37	1620.18	80.00%	80.00%

0-10	63.99
10-20	183.24
20-30	277.70
30-40	335.53
40-50	349.43
50-60	318.86
60-70	249.17
70-80	154.01
80-90	61.88
90-100	11.57
100-110	2.08
110-120	2.57
120-130	3.29
130-140	3.53
140-150	3.33
150-160	2.86
160-170	1.76
170-180	0.36

4.3 Color Angular Uniformity

Beam Angle: 115.8°, Half Beam angle: 56.6°; Average x=0.3457 y=0.3567;

Field Angle: [C0/180] Left=83.7 Right=83.7; [C90/270] Left=83.2 Right=83.2

Max color angular uniformity throughout the beam angle: 0.0010 at C: 180, Gama: 58

C0				C90			
gamma	Δu'	Δv'	Δu'v'	gamma	Δu'	Δv'	Δu'v'
0	0.00018	0.00049	0.00052	0	0.00054	0.00023	0.00059
1	0.00022	0.00044	0.00049	1	0.00054	0.00023	0.00059
2	0.00018	0.00049	0.00052	2	0.00054	0.00023	0.00059
3	0.00018	0.00049	0.00052	3	0.00051	0.00017	0.00054
4	0.00022	0.00044	0.00049	4	0.00054	0.00023	0.00059
5	0.00015	0.00043	0.00046	5	0.00054	0.00023	0.00059
6	0.00018	0.00049	0.00052	6	0.00050	0.00028	0.00058
7	0.00019	0.00038	0.00043	7	0.00048	0.00022	0.00052
8	0.00019	0.00038	0.00043	8	0.00058	0.00019	0.00061
9	0.00019	0.00038	0.00043	9	0.00054	0.00023	0.00059
10	0.00015	0.00043	0.00046	10	0.00051	0.00017	0.00054
11	0.00015	0.00043	0.00046	11	0.00048	0.00022	0.00052
12	0.00019	0.00038	0.00043	12	0.00048	0.00022	0.00052
13	0.00019	0.00038	0.00043	13	0.00048	0.00022	0.00052
14	0.00016	0.00032	0.00036	14	0.00045	0.00016	0.00047
15	0.00016	0.00032	0.00036	15	0.00048	0.00022	0.00052
16	0.00012	0.00037	0.00039	16	0.00045	0.00016	0.00047
17	0.00016	0.00032	0.00036	17	0.00051	0.00017	0.00054
18	0.00009	0.00030	0.00032	18	0.00038	0.00014	0.00041
19	0.00013	0.00026	0.00029	19	0.00045	0.00016	0.00047
20	0.00013	0.00026	0.00029	20	0.00042	0.00009	0.00043
21	0.00006	0.00024	0.00025	21	0.00038	0.00014	0.00041
22	0.00013	0.00026	0.00029	22	0.00042	0.00009	0.00043
23	0.00010	0.00019	0.00022	23	0.00038	0.00014	0.00041
24	0.00004	0.00018	0.00018	24	0.00031	0.00013	0.00034
25	0.00007	0.00013	0.00015	25	0.00035	0.00008	0.00036
26	0.00007	0.00013	0.00015	26	0.00039	0.00003	0.00039
27	0.00007	0.00013	0.00015	27	0.00028	0.00007	0.00029
28	0.00007	0.00013	0.00015	28	0.00032	0.00002	0.00032
29	0.00004	0.00007	0.00008	29	0.00028	0.00007	0.00029
30	0.00001	0.00012	0.00012	30	0.00029	-0.00005	0.00030
31	-0.00002	0.00005	0.00006	31	0.00029	-0.00005	0.00030
32	0.00002	0.00001	0.00002	32	0.00023	-0.00006	0.00023
33	0.00002	0.00001	0.00002	33	0.00019	-0.00001	0.00019

34	0.00002	0.00001	0.00002	34	0.00023	-0.00006	0.00023
35	-0.00001	-0.00006	0.00006	35	0.00023	-0.00006	0.00023
36	-0.00008	-0.00007	0.00011	36	0.00016	-0.00007	0.00018
37	-0.00001	-0.00006	0.00006	37	0.00016	-0.00007	0.00018
38	-0.00004	-0.00012	0.00013	38	0.00013	-0.00014	0.00019
39	-0.00004	-0.00012	0.00013	39	0.00013	-0.00014	0.00019
40	0.00000	-0.00017	0.00017	40	0.00006	-0.00015	0.00017
41	-0.00011	-0.00013	0.00017	41	0.00006	-0.00015	0.00017
42	-0.00014	-0.00020	0.00024	42	0.00006	-0.00015	0.00017
43	-0.00003	-0.00023	0.00023	43	0.00006	-0.00015	0.00017
44	-0.00010	-0.00024	0.00026	44	0.00003	-0.00022	0.00022
45	-0.00017	-0.00026	0.00031	45	0.00003	-0.00022	0.00022
46	-0.00017	-0.00026	0.00031	46	-0.00003	-0.00023	0.00023
47	-0.00017	-0.00026	0.00031	47	0.00001	-0.00028	0.00028
48	-0.00020	-0.00032	0.00038	48	0.00001	-0.00028	0.00028
49	-0.00013	-0.00031	0.00033	49	-0.00006	-0.00029	0.00030
50	-0.00020	-0.00032	0.00038	50	-0.00006	-0.00029	0.00030
51	-0.00020	-0.00032	0.00038	51	-0.00013	-0.00031	0.00033
52	-0.00019	-0.00043	0.00047	52	-0.00009	-0.00036	0.00037
53	-0.00022	-0.00038	0.00045	53	-0.00013	-0.00031	0.00033
54	-0.00022	-0.00038	0.00045	54	-0.00009	-0.00036	0.00037
55	-0.00015	-0.00048	0.00050	55	-0.00016	-0.00037	0.00040
56	-0.00025	-0.00045	0.00051	56	-0.00020	-0.00032	0.00038
57	-0.00025	-0.00045	0.00051	57	-0.00016	-0.00037	0.00040
58	-0.00022	-0.00050	0.00054	58	-0.00029	-0.00040	0.00049
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C180				C270			
gamma	Δu'	Δv'	Δu'v'	gamma	Δu'	Δv'	Δu'v'
0	0.00018	0.00049	0.00052	0	0.00054	0.00023	0.00059
1	0.00018	0.00049	0.00052	1	0.00054	0.00023	0.00059
2	0.00011	0.00048	0.00049	2	0.00054	0.00023	0.00059
3	0.00014	0.00054	0.00056	3	0.00058	0.00019	0.00061
4	0.00011	0.00048	0.00049	4	0.00048	0.00022	0.00052
5	0.00014	0.00054	0.00056	5	0.00051	0.00017	0.00054
6	0.00007	0.00052	0.00053	6	0.00054	0.00023	0.00059
7	0.00014	0.00054	0.00056	7	0.00051	0.00017	0.00054
8	0.00014	0.00054	0.00056	8	0.00051	0.00017	0.00054
9	0.00007	0.00052	0.00053	9	0.00051	0.00017	0.00054
10	0.00007	0.00052	0.00053	10	0.00051	0.00017	0.00054
11	0.00014	0.00054	0.00056	11	0.00051	0.00017	0.00054
12	0.00007	0.00052	0.00053	12	0.00051	0.00017	0.00054
13	0.00007	0.00052	0.00053	13	0.00049	0.00011	0.00050
14	0.00005	0.00046	0.00046	14	0.00055	0.00012	0.00057
15	0.00001	0.00051	0.00051	15	0.00049	0.00011	0.00050
16	0.00005	0.00046	0.00046	16	0.00049	0.00011	0.00050
17	0.00001	0.00051	0.00051	17	0.00052	0.00006	0.00053
18	-0.00006	0.00050	0.00050	18	0.00038	0.00014	0.00041
19	-0.00002	0.00045	0.00045	19	0.00042	0.00009	0.00043
20	-0.00002	0.00045	0.00045	20	0.00046	0.00005	0.00046

21	-0.00013	0.00048	0.00050	21	0.00046	0.00005	0.00046
22	-0.00006	0.00050	0.00050	22	0.00039	0.00003	0.00039
23	-0.00013	0.00048	0.00050	23	0.00039	0.00003	0.00039
24	-0.00009	0.00043	0.00044	24	0.00040	-0.00008	0.00041
25	-0.00013	0.00048	0.00050	25	0.00040	-0.00008	0.00041
26	-0.00019	0.00047	0.00050	26	0.00043	-0.00002	0.00043
27	-0.00016	0.00042	0.00045	27	0.00033	-0.00009	0.00034
28	-0.00016	0.00042	0.00045	28	0.00033	-0.00009	0.00034
29	-0.00022	0.00040	0.00046	29	0.00033	-0.00009	0.00034
30	-0.00025	0.00034	0.00042	30	0.00030	-0.00016	0.00034
31	-0.00025	0.00034	0.00042	31	0.00030	-0.00016	0.00034
32	-0.00029	0.00039	0.00048	32	0.00027	-0.00022	0.00035
33	-0.00036	0.00037	0.00052	33	0.00024	-0.00017	0.00029
34	-0.00036	0.00037	0.00052	34	0.00027	-0.00022	0.00035
35	-0.00042	0.00036	0.00055	35	0.00027	-0.00022	0.00035
36	-0.00036	0.00037	0.00052	36	0.00021	-0.00023	0.00031
37	-0.00039	0.00031	0.00050	37	0.00021	-0.00023	0.00031
38	-0.00042	0.00036	0.00055	38	0.00021	-0.00023	0.00031
39	-0.00042	0.00036	0.00055	39	0.00022	-0.00034	0.00041
40	-0.00049	0.00034	0.00060	40	0.00022	-0.00034	0.00041
41	-0.00052	0.00028	0.00059	41	0.00015	-0.00036	0.00039
42	-0.00059	0.00027	0.00064	42	0.00011	-0.00031	0.00033
43	-0.00059	0.00027	0.00064	43	0.00019	-0.00041	0.00045
44	-0.00062	0.00031	0.00070	44	0.00019	-0.00041	0.00045
45	-0.00059	0.00027	0.00064	45	0.00016	-0.00047	0.00050
46	-0.00069	0.00030	0.00075	46	0.00016	-0.00047	0.00050
47	-0.00069	0.00030	0.00075	47	0.00016	-0.00047	0.00050
48	-0.00072	0.00024	0.00076	48	0.00009	-0.00048	0.00049
49	-0.00072	0.00024	0.00076	49	0.00009	-0.00048	0.00049
50	-0.00076	0.00028	0.00081	50	0.00009	-0.00048	0.00049
51	-0.00076	0.00028	0.00081	51	0.00013	-0.00053	0.00055
52	-0.00082	0.00027	0.00087	52	0.00006	-0.00055	0.00055
53	-0.00082	0.00027	0.00087	53	0.00006	-0.00055	0.00055
54	-0.00089	0.00026	0.00093	54	0.00006	-0.00055	0.00055
55	-0.00089	0.00026	0.00093	55	0.00003	-0.00061	0.00061
56	-0.00096	0.00024	0.00099	56	0.00006	-0.00055	0.00055
57	-0.00096	0.00024	0.00099	57	0.00007	-0.00066	0.00066
58	-0.00100	0.00029	0.00104	58	0.00007	-0.00066	0.00066
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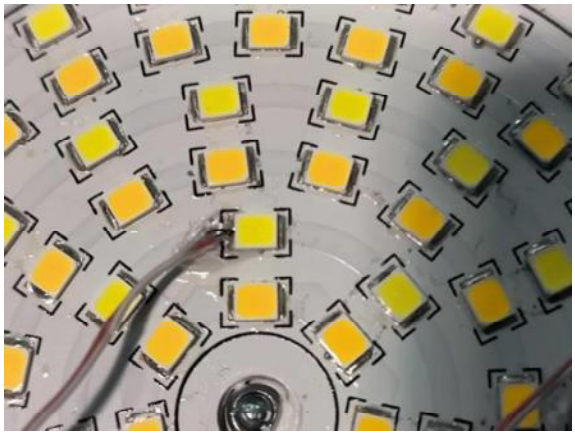
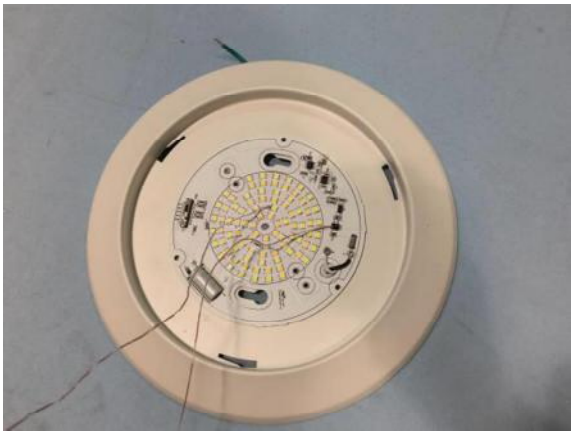
4.4 In-situ TMP_{LED} and TMP_C

TMP_{LED}(℃)	TMP_C(driver temperature) (℃)
56.2	55.3

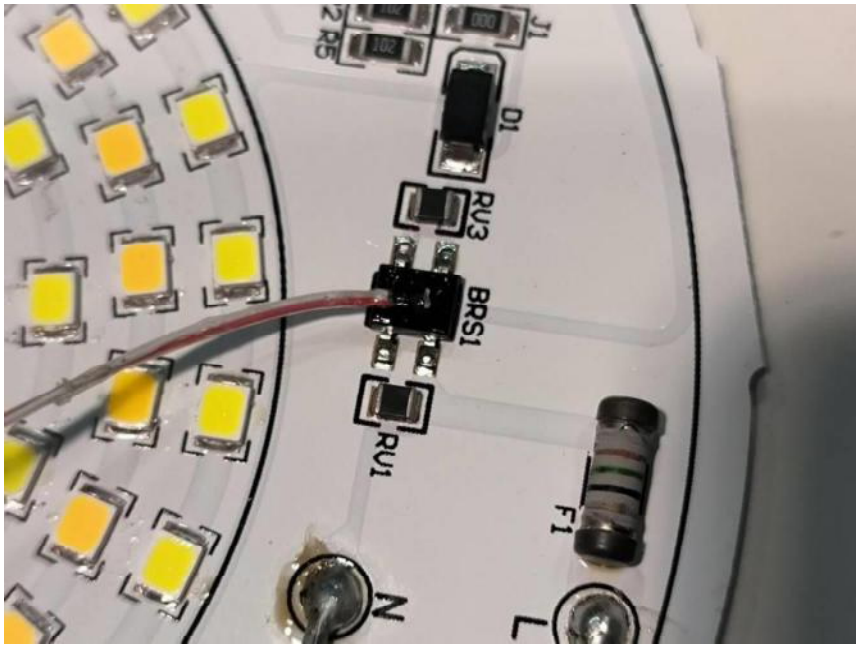
LED numbers: 133 Units; Driver numbers: 1 Unit

Thermocouple contact photograph (TMP_{LED}):





Thermocouple contact photograph (TMP_C):



4.5 Other Test Data

Test Item	Test Result			
Start time	69 ms			
Frequency (Minimum)	120Hz			
Standby power	0.0 W			
Transient protection	Passed			
Dimming	Dimming Range	Maximum light output	Minimum light output	Diming range
		2017.28 lm	21.68 lm	Dimming from 100% to 1.07%
	Noise:	17.2dBA		
Flicker		Maximum conduction (130 degrees)	Intermediate conduction (90 degrees)	Minimum conduction (40 degrees)
	Short Term Flicker Indicator (P_{st})	0.784	0.093	0.130
	Stroboscopic Visibility Measure (SVM)	0.099	0.989	1.017

Note: Test Dimmer model number: Lutron DVCL-153P

Appendix A LM-80 Report information

Report originated by	Bay Area Compliance Laboratories Corp. (Dongguan).		
Manufactured by	XUYU OPTOELECTRONICS(SHENZHEN)CO.,LTD		
LM-80 report No.	RSZ180821507-10-M1		
LED Model	9.2835W3V32F-S02		
LED Part Number	9.2835W3V32F-S02		
Number of LED light source tested	25 units per case temperature		
Drive Current	150mA		
Case temperature	85℃	105℃	-
Lumen maintenance during 9000 hours test	97.68%	97.48%	-
Color maintenance(Δu'v') during 9000 hours test	0.0022	0.0036	-

Appendix B ANSI/IES TM-21-21 Report

Descriptionof testedLED light source 9.2835W3V32FS02, XUYU OPTOELECTRONICS(SHENZHEN) CO.,LTD

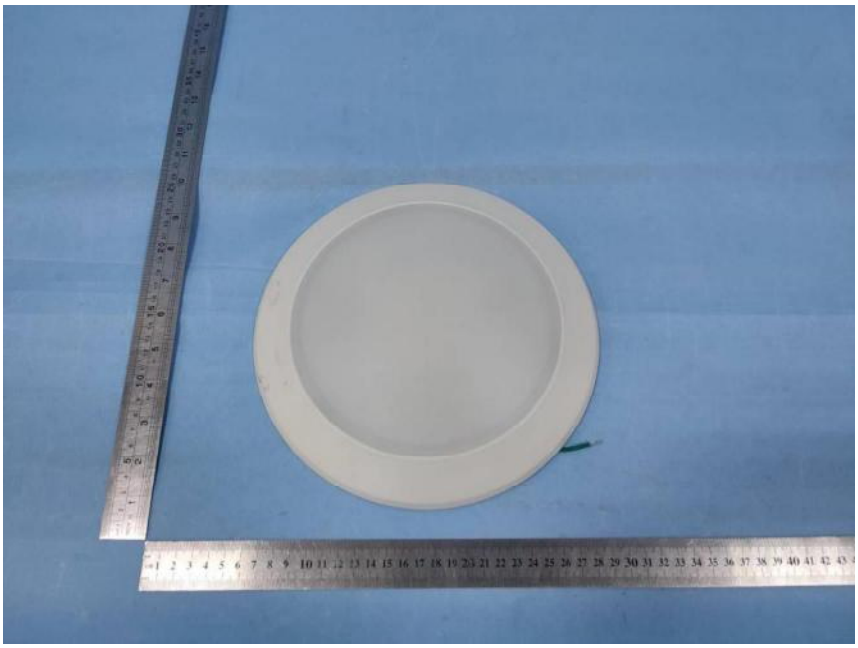
Rated maximum current(DC): 150 mA
Temperature(interpolated): 56.2 °C
Flux maintenance L70: > 54,000 hours
Nominal Vf: 6 V
In-situ current(interpolated): 60 mA
Flux maintenance at 50000hours: 87%
Maximum input power: 0.9 W

User Entered ANSI/IES LM-80 Data

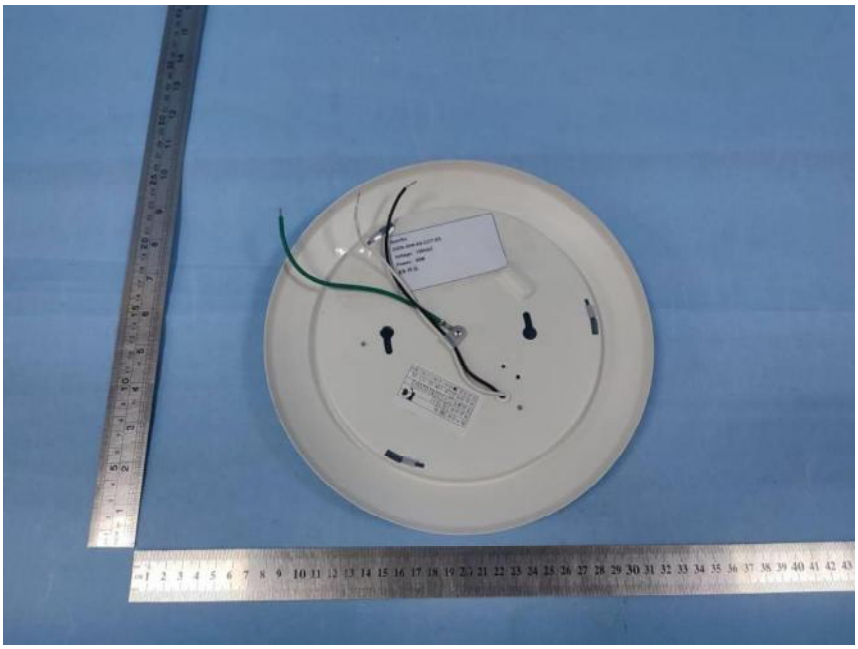
	Condition1
Case temperature(°C):	85
DriveCurrent(mA):	150
Number of units tested:	25
Number of failures:	0

Measureddata:	Hours	Flux
	0	1.0000
	1000	0.9994
	2000	0.9967
	3000	0.9941
	4000	0.9916
	5000	0.9877
	6000	0.9860
	7000	0.9834
	8000	0.9801
	9000	0.9768

Appendix C Photos



Picture 1



Picture 2

Appendix D Report Update Record

Report Version	Update Time	Update content
1.0	2024/12/02	Original report.

****End of test report****