

Photometric Test Report

Relevant Standards

- IES LM-79-2008
- ANSI C82.77:2014
- UL1598-2008

Prepared For

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Project Number

DLF1805116

Report Number

DLF20180523001-2a

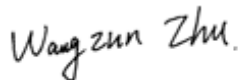
Test Date

2018/5/23

Issue Date

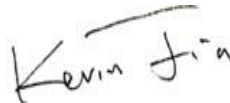
2018/5/23

Prepared By



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Kevin Jia

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1.0 Test Summary

DLC Technical Requirements v4.3

Direct Linear Ambient Luminaires				
Requirement Category	Test Method	Requirements	Test value	Results (Fail/Pass)
Lamp Output (lm)	IES LM-79-2008	N/A	2803	N/A
Zonal Lumen Requirement (0°-60°)	IES LM-79-2008	≥40%	75.00%	P
Minimum Luminaire Efficacy (lm/W)	IES LM-79-2008	126.1	127.4	P
Lamp Output (lm/ft)	IES LM-79-2008	375	1401.7	P
Allowable CCTs* (K)	IES LM-79-2008	5700	4878	P
Minimum CRI	IES LM-79-2008 CIE 13.3-1995	70	82.5	P
L90 Lumen maintenance (hours)	IES LM-80-2015 IES TM-21-2011	36000	63000	P
Power Factor	ANSI C82.77:2014	0.873	0.936	P
Total Harmonic Distortion (A%)	ANSI C82.77:2014	25.00%	9.05%	P
In-Situ Temperature Measurement Test for LED (°C)	UL1598-2008/ UL1993-2012	105	63.2	P
In-Situ Temperature Measurement Test for Driver (°C)	UL1598-2008/ UL1993-2012	90	46.2	P

2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test for the lower CCT	2018/5/23	LWP2-23/D10/B/30	B1
	Integrating Sphere Test for the higher CCT	2018/5/23	LWP2-23/D10/B/50	B2
2	Goniophotometer Test	2018/5/23	LWP2-23/D10/B/30	B1
3	THD and PF Test	2018/5/23	LWP2-23/D10/B/30	B1
4	In-Situ Temperature Measurement Test	2018/5/23	LWP2-23/D10/B/30	B1

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3.0 Production Description

Luminaire Description:

Electrical Specification: 120V-277V,50/60HZ,23W

Light source: SPMWH1228xxxxxxxxx

Manufacturer Of Light Source: Samsung Electronics Co., LTD

Photos of Luminaire Characteristics



4.0 LM-79 Measurement and Test Results

4.1 Integrating Sphere Test for the lower CCT

Model No.	LOC-2FTWA-23W30KD	Sample ID.	B1
Operate time (Min.)	90	Stabilization time (Min.)	45

Test Method

The samples were tested according to the IES LM-79-2008.

Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$.

The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere.

The voltage of an AC power supply (RMS voltage) or DC power supply (instantaneous voltage) applied to the device under test shall be regulated to within ± 0.2 percent under load.

The sample was measured using 4π geometry and operated at rated voltage and was stabilized before measurement. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral radiant flux measurements taken at 1 nm intervals over the range of 380 to 780 nm.

Test Conditions

Temperature ($^{\circ}\text{C}$)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
25.1	119.94	60	0.184	21.95	0.995

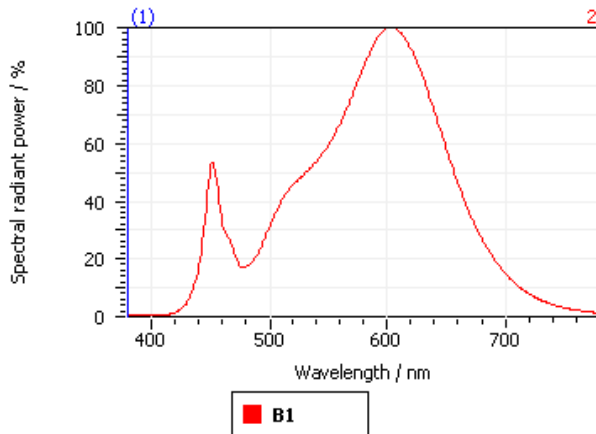
Test Result

CCT (K)	CRI (Ra)	R9	Duv
2945	82.5	5.8	8.9E-04

4.1 Integrating Sphere Test for the lower CCT

Spectroradiometric Parameters

Results



Spectral values

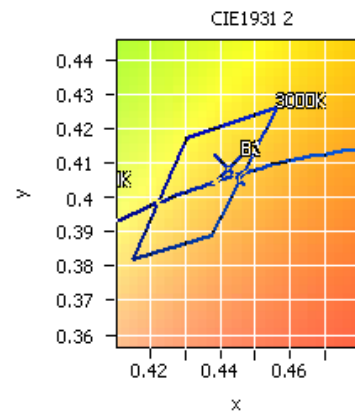
DominantWavelength	582.75 nm
Purity	0.552
PeakWavelength	603.61 nm
Width50%:	125.57 nm

Color Coordinates

Correlated Color Temperature 2945 K

x: 0.4422 u: 0.2522 u': 0.2522
y: 0.4081 v: 0.3492 v': 0.5237

ResultsCRICRI01	80.8	ResultsCRICRI09	5.8
ResultsCRICRI02	90.8	ResultsCRICRI10	79.4
ResultsCRICRI03	96.6	ResultsCRICRI11	80.4
ResultsCRICRI04	80.7	ResultsCRICRI12	69.8
ResultsCRICRI05	81.1	ResultsCRICRI13	83.1
ResultsCRICRI06	89.2	ResultsCRICRI14	98.9
ResultsCRICRI07	82.7	ResultsCRICRI15	72.8
ResultsCRICRI08	58.3	ResultsCRICRI16	70.1
ResultsCRI	82.5		



Nominal CCT: 3000K

PlanckDistance 8.9E-004

4.0 LM-79 Measurement and Test Results

4.2 Integrating Sphere Test for the higher CCT

Model No.	LOC-2FTWA-23W50KD	Sample ID.	B2
Operate time (Min.)	90	Stabilization time (Min.)	45

Test Method

The samples were tested according to the IES LM-79-2008.

Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$.

The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere.

The voltage of an AC power supply (RMS voltage) or DC power supply (instantaneous voltage) applied to the device under test shall be regulated to within ± 0.2 percent under load.

The sample was measured using 4π geometry and operated at rated voltage and was stabilized before measurement. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral radiant flux measurements taken at 1 nm intervals over the range of 380 to 780 nm.

Test Conditions

Temperature ($^{\circ}\text{C}$)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
25.1	119.98	60	0.185	22.10	0.994

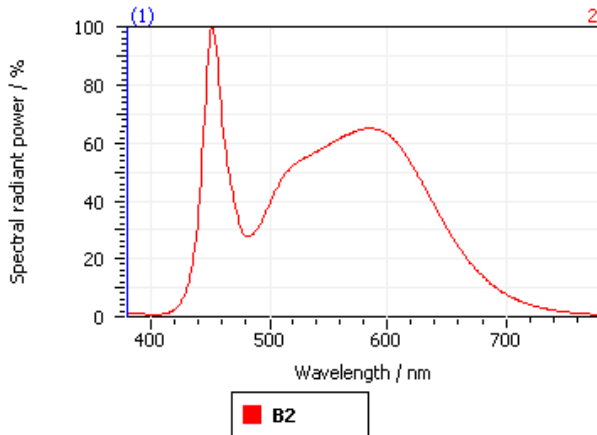
Test Result

CCT (K)	CRI (Ra)	R9	Duv
4878	83.4	9.6	3.0E-03

4.2 Integrating Sphere Test for the higher CCT

Spectroradiometric Parameters

Results



Spectral values

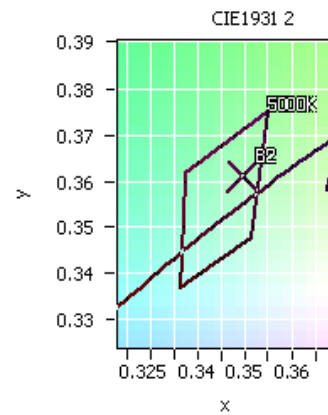
DominantWavelength	571.60 nm
Purity	0.132
PeakWavelength	452.12 nm
Width50%:	23.24 nm

Color Coordinates

Correlated Color Temperature 4878 K

x: 0.3494 u: 0.2107 u': 0.2107
y: 0.3611 v: 0.3266 v': 0.4898

ResultsCRICRI01	81.3	ResultsCRICRI09	9.6
ResultsCRICRI02	89.4	ResultsCRICRI10	74.2
ResultsCRICRI03	94.4	ResultsCRICRI11	80.3
ResultsCRICRI04	81.5	ResultsCRICRI12	55.9
ResultsCRICRI05	81.3	ResultsCRICRI13	83.6
ResultsCRICRI06	84.6	ResultsCRICRI14	97.2
ResultsCRICRI07	87.7	ResultsCRICRI15	75.3
ResultsCRICRI08	67.3	ResultsCRICRI16	71.7
ResultsCRI	83.4		



Nominal CCT: 5000K

PlanckDistance 3.0E-003

4.0 LM-79 Measurement and Test Results

4.3 Goniophotometer Test

Model No.	LOC-2FTWA-23W30KD	Sample ID.	B1
Operate time (Min.)	90	Stabilization time (Min.)	45

Test Method

The samples were tested according to the IES LM-79-2008.

Photometric parameters were measured using a type C goniophotometer and software.

The ambient temperature shall be maintained at $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$, measured at a point not more than 1 m from the sample and at the same height as the sample.

The voltage of an AC power supply (RMS voltage) or DC power supply (instantaneous voltage) applied to the device under test shall be regulated to within ± 0.2 percent under load.

The samples were operated at rated voltage and was stabilized before measurement. Luminous flux, luminaire efficacy, zonal lumen were calculated from the software taken at 0.5° vertical intervals and 10° horizontal intervals.

Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
25.1	119.98	60	0.184	22.00	0.994	Light Down

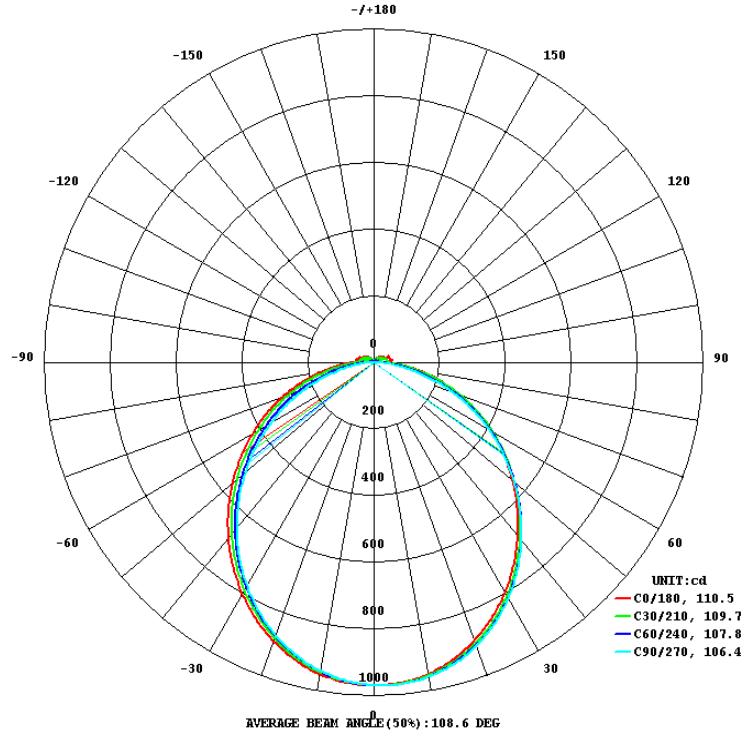
Test Result

Flux(lm)	Zonal Lumen Requirement(0°-60°)	Field Angle(10%)		Beam Angle(50%)		Luminous Efficacy (lm/W)
		Horizontal Spread	Vertical Spread	Horizontal Spread	Vertical Spread	
2803	75.00%	157.9	169.2	106.4	110.5	127.4

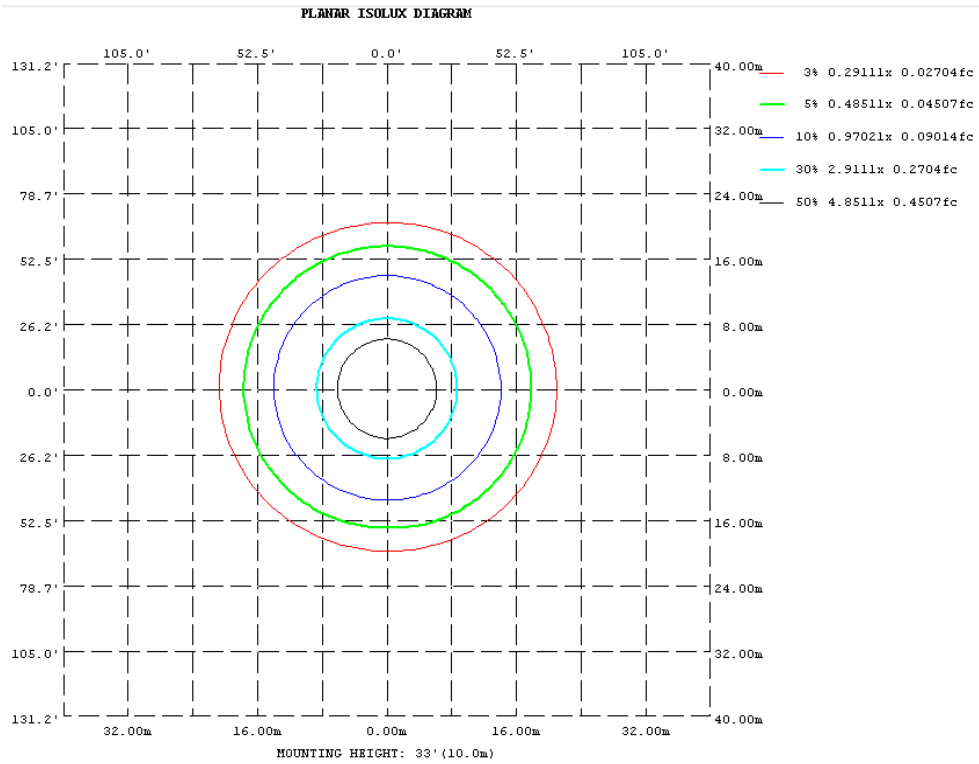
Length (ft)	Flux(lm/ft)
2.0	1401.7

4.3 Goniophotometer Test

Light Distribution Curve



Isolux Plot



4.3 Goniophotometer Test

Zonal Lumen Summary

DEG	LUMINOUS INTENSITY:cd										LUM:lm	Lum, Lamp	
	C0	C45	C90	C135	C180	C225	C270	C315	γ	φ zone			φ total
γ													
10	949.2	943.1	939.9	942.5	948.3	955.0	957.5	954.6	0-10	91.50	91.50	3.26,3.26	
20	891.6	878.9	872.9	878.5	889.1	901.6	906.2	901.0	10-20	260.5	352.0	12.6,12.6	
30	800.7	782.5	772.7	781.4	797.0	813.1	818.0	812.6	20-30	390.1	742.1	26.5,26.5	
40	687.5	664.1	648.0	660.9	681.2	695.8	698.1	697.1	30-40	463.1	1205	43,43	
50	560.7	532.2	508.0	526.0	550.3	561.1	558.0	564.2	40-50	473.3	1679	59.9,59.9	
60	426.9	394.5	361.4	384.3	412.8	416.1	405.2	423.3	50-60	424.5	2103	75,75	
70	291.3	254.2	212.8	240.7	271.8	266.5	246.4	276.3	60-70	327.0	2430	86.7,86.7	
80	161.2	120.5	73.76	104.7	138.1	120.7	92.90	134.0	70-80	197.2	2627	93.7,93.7	
90	48.98	14.80	0.1943	6.773	21.54	12.40	0.9628	21.16	80-90	67.79	2695	96.1,96.1	
100	55.49	32.23	0.8317	30.28	56.41	33.34	0.7786	31.34	90-100	21.95	2717	96.9,96.9	
110	47.45	9.920	2.169	4.029	47.44	8.687	1.785	10.45	100-110	27.57	2745	97.9,97.9	
120	40.88	21.85	2.615	20.73	13.77	22.42	2.825	22.56	110-120	17.43	2762	98.5,98.5	
130	30.18	17.30	2.973	16.72	29.73	17.95	3.647	17.84	120-130	16.90	2779	99.1,99.1	
140	22.04	13.40	3.628	13.17	22.09	14.13	3.428	13.77	130-140	11.62	2791	99.5,99.5	
150	14.73	9.992	3.446	9.560	15.31	10.55	4.192	10.18	140-150	7.177	2798	99.8,99.8	
160	9.376	6.936	4.231	6.148	8.898	7.067	4.375	6.397	150-160	3.799	2802	99.9,99.9	
170	5.348	4.681	2.988	3.430	4.894	4.397	4.022	3.745	160-170	1.549	2803	100,100	
180	2.285	2.651	2.714	2.888	2.116	2.247	2.688	2.852	170-180	0.3229	2803	100,100	



5.0 THD and PF Test

Model No.	LOC-2FTWA-23W30KD	Sample ID.	B1
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Test Method

The samples were tested according to the ANSI C82.77:2002.
 The total harmonic distortion shall be measured to the 40th order.
 The ambient temperature condition was maintained at 25° C ± 1° C. The sample measurements were made using a digital power meter and power supply. The sample was operated at rated voltage and was stabilized before measurement. The total harmonic distortion were calculated.

Test Results

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD
25.1	277.08	60	0.085	22.02	0.936	9.05%

6.0 In-Situ Temperature Measurement Test

Model No.	LWP2-23/D10/B/30KD	Sample ID.	B1
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Test Method
In-Situ Temperature Measurement Test is conducted according to UL 1598, Section 14. The samples were tested and properly mounted in the troffer which is mounted in recessed ceiling. The testing was conducted in a room with ambient temperature of 25°C±5°C. The apparatus construction followed those described in UL 1598 for normal temperature testing. Thermocouples were placed on the LED package in the locations indicated by LM-80 report. The temperature was recorded after the lamp was operating for a minimum of 7.5 hours, or the lamp was running for a minimum of 3 hours and three successive readings taken at 15 min intervals are within 1 °C of one another and are not rising.

In-Situ Temperature Measurement Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
25.2	119.98	60	0.185	22.10	0.994	Base Up

Test Results

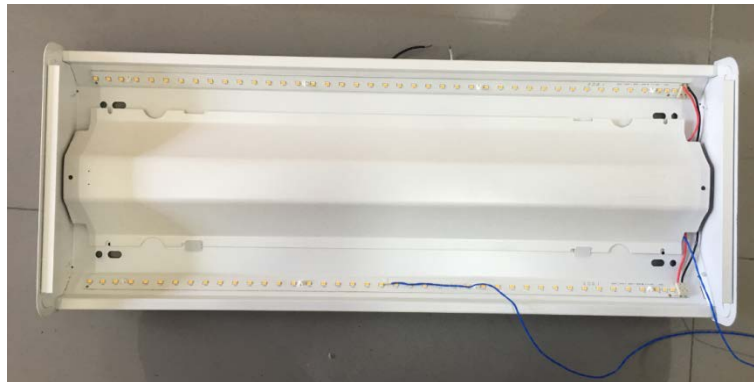
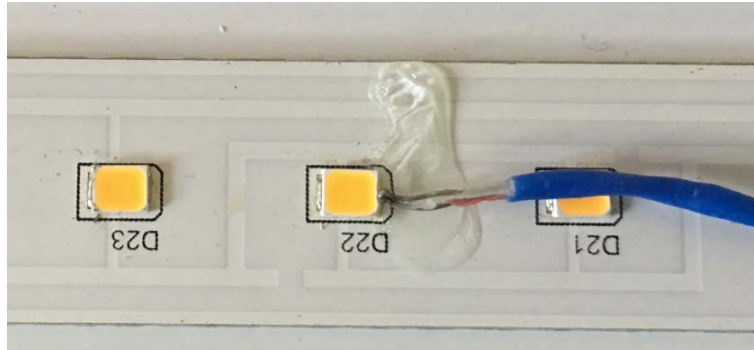
Thermocouple Location	Manufacturer Declared Current(mA)	Temperature for Lighting source(°C)	LED Model Number	LM-80 Limit Current(mA)	LM-80 Limit Temp.(°C)
TMP of LEDs	83.3	63.2	SPMWH122 8xxxxxxxxx	120	105
Ambient temperature	N/A	25.0			

Thermocouple Location	Limit Temp (°C)	Temperature for Drive (°C)	Drive Model Number
TMP of Drive	90	46.2	SLE 23-I500 120-277 W D1

Life time expectation at 50,000 hours of operation with Driver Case Temperature (Tc) at maximum of 90°C not to be exceed as indicated in the Driver specification sheet

6.0 In-Situ Temperature Measurement Test

Test Photos



7.0 Equipment Information

Test Equipment			
Equipment ID	Equipment Name	Last Calibration	Calibration Due Date
DLF107	Integrating Sphere System	2017/12/28	2018/12/27
DLF108	Auxiliary Lamp	2017/12/28	2018/12/27
DLF122	Measurement Standard Lamp Standard Lamp Type: 220 V, 0.4720 A, Tungsten, Omni-derectional	2017/12/28	2018/12/27
DLF116	AC Power Source	2017/12/28	2018/12/27
DLF113	Power Meter	2017/12/28	2018/12/27
DLF112	Temperature Recorder	2017/12/28	2018/12/27
DLF114	Temperature & Humidity Datalogger	2017/12/28	2018/12/27
DLF101	Goniophotometer	2017/12/28	2018/12/27
DLF125	Standard Lamp Standard Lamp Type: 76.58 V, 6.7875 A, Tungsten, Omni-derectional	2017/12/28	2018/12/27
DLF104	AC Power Source	2017/12/28	2018/12/27
DLF507	DC Power Source	2017/12/28	2018/12/27
DLF102	Power Meter	2017/12/28	2018/12/27
DLF111	Temperature & Humidity Datalogger	2017/12/28	2018/12/27
DLF119	Power Meter	2017/12/28	2018/12/27
DLF031	Temperature data logger	2017/12/28	2018/12/27
DLF022	Digital power meter	2017/12/28	2018/12/27
DLF003	Temperature & Humidity Datalogger	2017/12/28	2018/12/27

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